

Community Gardening in Mathare, Nairobi

*Opportunities to Improve Food Security
and the Right to the City*



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M.Sc Urban Management
2018.

Statement of Authorship

I declare that the research contained in this thesis, unless otherwise formally indicated within the text, is the original work of the author. The thesis has not been previously submitted to this or any other university for a degree, and does not incorporate any material already submitted for a degree.

Signed,



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Acknowledgments

Thank you to the Mathare community for sharing their stories, time, and space with me: Georges, Lucas, Morris Obwanda, Morris Owala, Paul, James Blanks, Joseph, Eva, Emily, Stacy, Eunice, Angeline, Grace, Donn Musyoki, Peter Mande, Charles Onyango, Kevin Kygan, Vincent, Morrie – the list goes on. Special thanks to the Mathare Bondeni Recovery group and Mathare Roots Youth Center for their capacity.

Thank you to those who donated to the Mathare Shamba project to buy tools, seeds, a water connection, and a fence, which contributed immensely to the project development. These donations served to feed Mathare residents, impact the public space, and bridge connections between communities.

Thank you to UN-Habitat for supporting the Mathare Shamba, especially the intern volunteers, who spent their free weekends gardening with us. It was a really special experience to work together on this project.

Thank you Kareem, for your endless energy, adaptable attitude and emotional support. Thank you for the encouragement.

Thank you to my supervisor Katrin Bohn, whose book *Continuous Productive Urban Landscapes* and immense knowledge of Urban Agriculture was hugely beneficial.

“It’s the little things citizens do that will make a difference. My little thing is planting trees.”

Wangari Maathai

“Cities have the capability of providing something for everybody, only because, and only when, they are created by everybody.”

Jane Jacobs

Abstract

Urban Agriculture (UA) activities and spaces can be an opportunity to fulfill the food security needs of urban communities. Previous research from a global sample illuminates a set of criteria for analyzing the benefits of UA for low-income communities, due to its impact on food chains and the lives of those who have limited access to affordable food. The thesis focuses on community gardens as a form of UA which require land management innovations and offer unique, shared benefits.

With the exponential increase of urbanization throughout the twentieth century, sustainable urban management solutions have taken a prominent role in urban policy and planning. However, policy and planning frameworks for UA still lack the evidence and case studies to support regulatory legislation that can help communities implement UA sites and activities. For UA to be successful, participatory governance mechanisms should make land available and eliminate restrictions to cultivating food in the city. This requires a breakdown of traditional planning ideologies such as the rural/urban binary, as well as a renewed focus on food security as a spatial issue. Moreover, urban decision makers should recognize and value the community efforts already showing the synergies and opportunities for UA.

Kenya's capital city, Nairobi, offers a strong urban case study for the need and development of UA, as well as the urban legislation to support it. In 2015, Nairobi City County passed The Urban Agriculture Regulation and Promotion Act to support community groups practicing UA. Although this initiative intended to help localize sustainable food chains and provide economic activities for poor Nairobians, especially in informal settlements, the impacts of this new law are yet unclear.

In one of Nairobi's largest slums called Mathare, a community-based organization manages a community garden (called 'Shamba' in Swahili) and has been fighting for years to garner municipal support for their project and basic urban services. This research seeks to position the Mathare Shamba project within Nairobi's UA law of 2015. How can Nairobi use its UA legislation to better the lives of low-income groups? By studying the challenges and opportunities of the Mathare Shamba case study, the research gives recommendations for better UA collaboration between Nairobi City County and its low-income constituents.

Key words

Urban Agriculture, Slum Upgrading, Informal Settlement, Food Security, Urban Management, Urban Policy, Urban Legislation, Community Development, Placemaking, Productive Public Space, Participatory Planning, Sustainable Development, Food Justice, Urban Metabolism, Right to the City

Acronyms

AFINUA = Action Framework for the Implementation of the New Urban Agenda

CBO = Community-Based Organization

CSA = Community Supported Agriculture

EU = European Union

FAO = Food and Agriculture Organization

GoK = Government of Kenya

KDI = Kounkuey Design Initiative

MBR = Mathare Bondeni Recovery

NCC = Nairobi City County

NGO = Non-Government Organization

OPS = Open Public Space

PPS = Productive Public Space

PRA = Participatory Rural Appraisal

SDG = Sustainable Development Goal

UA = Urban Agriculture

UN = United Nations

UN-Habitat = United Nations Human Settlements Program

UNDESA = United Nations Department of Economic and Social Affairs

Contents

1	Introduction	8
	1.1 Summary	8
	1.2 Problem Statement: Inadequate Urban Planning for Food Security	8
	1.3 Research Aims	9
	1.4 Methodology	10
	1.4.1 Combination of Theoretical and Ethnographic Research	10
	1.4.2 Qualitative and Participatory Information Gathering	10
	The Participatory Rural Appraisal (PRA)	11
	Community Mapping	11
	Questionnaires	11
	Key Informant Interviews	12
	Ethnographic Observation	12
	1.4.3 Reflexivity and Positionality	12
	Outsider Status	13
	Gender	13
	1.5 Scope of Food System and Urban Agriculture Research in Nairobi	13
	1.5.1 Focus on Community Gardens	13
	1.5.2 Scope for Qualitative, not Quantitative Research	14
	1.6 Limitations	14
	1.6.1 Time	14
	1.6.2 Slum Environment	14
	1.6.3 Political Climate	14
2	Urban Food Security and the Right to the City	15
	2.1 Urban Food Security	16
	2.1.1 Urban Food Security for Sustainable Development	16
	2.2 The Right to Food in the Right to the City	19
	2.3 The Urban Metabolism	20
	2.4 Social and Ecological Footprint of Food Commodity Chains	21
	2.5 Policy and Legislation for Food Security and the Right to the City	22
	2.5.1 Informal Governance and Co-production	24
	2.5.2 Decentralized and Participatory Governance of Food Systems	24
3	Urban Agriculture and Community Gardening in Nairobi	26
	3.1 Finding Urban Space for Agriculture	27
	3.2 Functional and Spatial UA Typologies	28
	3.3 UA Benefits for Low-Income Nairobi	29

3.3.1 UA for Food Security Innovation	29	
3.3.2 UA for Income and Employment Generation	30	
3.3.3 UA for Public Green Space	31	
3.3.4 UA for Ecological Education	35	
3.3.5 UA for Decentralized, Participatory Governance	36	
4	Nairobi's Institutional and Legal Context	37
4.1 Spatial Segregation: The Development of Slums	38	
4.2 Urban Management in Slums	41	
4.3 Institutional Framework	43	
4.3.1 Civil Society Governance	43	
4.4 Kenya National Food Security Policy	43	
4.5 Legalizing Urban Agriculture	44	
4.5.1 Urban Agriculture Regulation and Promotion Act, 2015	45	
4.6 Current County Government Policy Aims	47	
5	Case Study - The Mathare Shamba Community Garden	48
5.1 Background of the Mathare Community	49	
5.1.1 Informal Employment and Community Reliance	50	
5.1.2 Food Security and Health Concerns	51	
5.1.3 Housing and Safety	52	
5.1.4 Public Space and Accessibility	53	
5.1.5 Pollution and Waste Management	54	
5.2 Mathare Shamba Project	55	
5.2.1 Site History	55	
5.2.2 Shamba Management	57	
5.2.3 Relationship with Nairobi City County	58	
5.2.4 Skill-Building Activities	58	
5.2.5 Food Production	59	
5.2.6 Environmental and Spatial Improvements	60	
6	Analysis and UA Recommendations for Nairobi City County	62
6.1 Key Findings and Reflections	63	
6.1.1 The Shamba for Food Security Innovation	63	
6.1.2 The Shamba for Income and Employment Generation	63	
6.1.3 The Shamba for Public Green Space	63	
6.1.4 the Shamba for Ecological Education	63	
6.1.5 The Shamba for Decentralized, Participatory Governance	63	
6.1.6 The Shamba for Collaborative Neighborhood Development	64	
Waste Management Interventions	64	

Renovations to the Mathare Bridge and Community Hall	64
6.2 Effectiveness of the Urban Agriculture Regulation and Promotion Act in Mathare	65
6.3 Urban Agriculture Governance Recommendations for Nairobi City County	66
6.3.1 The Right to the City in National Urban Policy	66
6.3.2 Participatory Urban Public Space Design	67
6.3.3 Effective Rules and Regulations	67
6.2.4 An Equitable Urban Economy	67
6.2.5 Decentralized, Local Implementation	67
7 Conclusion	69
References	71

1

Introduction

1.1 Summary

The community-led creation of food-producing landscapes in urban areas illustrates unmet food needs on the part of these groups; they demand social progress. Political and legal frameworks respond to these demands for equity and sustainability. Hence, Urban Agriculture (UA) activities and spaces manifest the political will of the society at hand. While public opinion about producing food in cities is mixed, this contestation of space nevertheless transforms urban areas.

While urban legal frameworks govern land zoning, uses, and development, there is a simultaneous neoliberal, economic power governing food markets, trade, value chains, branding, certifications, and all of the food-related jobs and spaces in a given urban area. Both legal and economic forces on the urban food system must be critiqued to improve social spaces. This thesis shows how community gardens, as a bottom-up urban planning strategy, can improve the urban landscape and quality of life.

Through the firsthand experience of participating in a community garden project in Mathare, one of Nairobi's oldest and largest slum settlements, this thesis reflects on urban farming in challenging urban environments. At first, participating in the Shamba facilitated a hypothesis that an investment in seeds, tools, and other tangible garden materials could transform the environment to provide an abundance of fresh produce. However, throughout the six months of my involvement, the garden did not drastically change Mathare food security, but served more as a catalyst for community cohesion and development.

The Mathare Shamba manifests different aspects of food production and food security in a community space: environmental and agricultural education, intergenerational learning, waste management, productive public space, Placemaking, food-related income generation, and community dialogue and collaboration. This qualitative record of the community gardening experience and its impacts in Mathare then makes recommendations for Nairobi's practical and legal UA frameworks.

1.2 The Problem: Inadequate Urban Planning for Food Security

Global urbanization trends show an overwhelming influx of low-income, rural people to urban centers in search of employment, since the mid-twentieth century. The global urban population grew from 29.6% to 54% from 1950 to 2015, with a particularly high rate of urbanization in Africa. Africa is currently the least urbanized continent, with a 40% urban population, but it has the highest urbanization rate at 4% per year (UN-Habitat 2015, p. 1). Many African cities like Nairobi are unable to accommodate the rapidly growing population. For this reason, slums and informal settlements host increasing proportions of the population.

Informal settlements are characterized as self-built, “illegal,” and unplanned constructions which often lead to dense and unsafe conditions. Informal settlements are called slums when they lack adequate shelter and basic services like energy and sanitation. Out of the 4 billion people living in cities in 2017, 1 billion live in informal settlements (UN-Habitat 2015, p. 1). Half of Nairobi’s population lives in such conditions.

Slums make apparent the inequality of wealth accumulation in cities. In fact, urban areas can manifest higher income inequality than their rural counterparts, as is the case in Nairobi (Global Hunger Index, 2017, p. 1). Social inequalities and segregation cause widespread hunger and other deprivations for these low-income urban populations. This inequality explains how a large portion of the world’s population remains food insecure, despite the highly praised economic development throughout the past century. According to the German International Cooperation Agency (GIZ), 2 billion of the world’s 7.5 billion people are malnourished (GIZ 2014). Food security is an increasingly urban issue, so urban areas face increased pressure to feed their growing populations. The lack of research connecting food security to urbanization and urban segregation in low-income countries like Kenya, laid the foundation for this thesis.

Poor and vulnerable groups of urban society should be prioritized in institutional and legal frameworks. However, urban governments often fail to provide for the poor because of financial or political constraints. Governments’ lack of capacity thus increases the importance of urban activists, non-government organizations (NGOs), community-based organizations (CBOs), and other civil society advocates to meet the needs of the urban poor. Community-led urban agriculture has been explored in urban planning and management discourse due to its positive addition to greenery, food security, and public space. However, UA is still commonly outlawed because it can be difficult to regulate and it is often perceived as a contradiction to modern, industrial development.

The Nairobi City County government succeeded in the legalization of UA activities by passing of the Urban Agriculture Regulation and Promotion Act, 2015 after a decade-long conversation with local advocacy groups. This law to assist the urban poor in securing their right to produce food presents both opportunities and challenges. The impact of the law in the food insecure communities of Nairobi is yet to be analyzed.

The contemporary inequalities in rapidly growing urban areas challenges urban researchers to forego traditional urban planning frameworks, which are theoretically naive, detached or simply unimplementable, and try management solutions that address the immediate needs of the urban poor. As Oswalt et al. 2013 write: “management is the ability to deal with uncertainty in a manner that makes it workable, without mistaking the outcome for certainty” (p. 91). This thesis contends that urban agriculture is a management solution to urban inequalities and food insecurity.

1.3 Research Aims

This research explores the link between the Right to the City and the Right to Food. In the case of Nairobi, members of a community-based organization in the Mathare slum carve out their

right to participate in the development of the city through community gardening, which not only provides food but also serves as a site for waste management, water services, and other amenities. By ethnographically studying this garden project, the thesis combines theory and primary research to argue for the relationship between the Right to the City and UA. The research aims to vocalize the needs of the Mathare Shamba project so as to inform urban planners and policy makers how to improve assistance to low-income communities.

The thesis questions the spatial and social ways that urban agriculture can ameliorate food security. The community gardening case study then considers the role community gardens can play in urban development if enabled by governments and legal frameworks. UA is highly contextual, so this research focuses on the Nairobi governance context and community gardening in Mathare. In this case, governance is shared between the county government, civil society advocates, international non-governmental bodies, and community groups. Within this frame, the thesis aims to make recommendations to the local government — Nairobi City County — as to how their UA legal frameworks can be optimized towards improved outcomes for community-led UA projects.

1.4 Methodology

1.4.1 Combination of Theoretical and Ethnographic Research

Firstly, the theoretical chapters draw upon previous research on global food systems, UA, and urban policy frameworks to understand the spatial and social impacts of UA in Nairobi. Secondly, the fieldwork chapters relate the legislation and policy frameworks governing the city to the Mathare Shamba case study.

This research looks to urban scholars and radical theorists who explore 'just' and ethical frameworks for accessibility, inclusivity and equity, if not equality in opportunity, for urban populations. These theories illustrate the purpose of studying food systems, the relevance of UA to urban management, and the challenges for sustainable development in slum environments. The theories inform various concepts which appear in the case study and in the recommendations to Nairobi City County.

The primary research from the Mathare community garden is positioned within the history of spatial segregation, food insecurity, and UA throughout Nairobi's urban fabric. The field work is combined with background information on the neighborhood to assess the slum-dwellers' relationship to the county government and then to make recommendations for effective urban policy and legislation for UA in Nairobi.

1.4.2 Qualitative and Participatory Information Gathering

A qualitative, largely participatory research methodology has proven effective in gathering fieldwork data on the community impacts of urban agriculture (Tomkins 2011). The first-hand experience of community gardening in Mathare is detailed through observations, conversations, stories, photographs and sensory details. Through this method, I grew to understand the needs and experiences of the gardeners in the settlement.

The Participatory Rural Appraisal (PRA)

The Participatory Rural Appraisal (PRA) methodology, crafted by Robert Chambers in 1994, is a fitting practice for this study. Chambers describes PRA as “a growing family of approaches and methods to enable local (rural or urban) people to express, enhance, share and analyze their knowledge of life and conditions, to plan and to act” (1994, p. 1253). The PRA methodology accentuates the value of information gathered from local informants, made possible when the outside facilitator’s behaviors and attitudes are relaxed, patient, adaptable, and self-aware. The PRA criticizes the biased perceptions generated from large-scale questionnaire surveys administered by outsiders acting like tourists — visiting the research site in an exploratory way to extract desired and preconceived information without adapting to the local context. PRA research is often conducted for agricultural management, conservation, health, nutrition, food security and programs for the poor (Chambers 1994, p. 1253), which makes it a fitting method for the urban farming community studied here.

One of the best elements of the PRA methods is the possibility for personal discovery and surprise at the unexpected results of the knowledge and capabilities of the community. Chambers (1994) writes “to enable these capabilities to be expressed, the practice principle has been to assume that people can do something until proved otherwise” (p. 1256). Moreover, the idea to triangulate information strengthens the analysis by cross-checking information with others: “the learning is progressive. The information is visible, semi-permanent, and public, and is checked, verified, amended, added to, and owned by the participants” (Chambers 1994, p. 1257).

The values and principles of the PRA approach, including patience and building trust and rapport, prove critical for not only research, but also for managing the actualization of a successful community garden:

- Sustained involvement;
- Rapport at the core of a community garden;
- The trust, openness, and the importance of the social network;
- The rapid and progressive strive for advancing the project, while being patient and allowing space and time for information (and in this case, crops) to manifest.

Community Mapping

In order to understand the history of the Mathare land and environment from the perspective of residents, two community maps were drawn by the local youths involved in the project. A group of UN-Habitat volunteers and I facilitated the exercise, but the local participants drew the maps while pointing out and describing important landmarks within the vicinity of the garden.

Questionnaires

During the development of the Mathare Shamba project, a local youth group, in coordination with our UN-Habitat group, carried out two qualitative questionnaires in the area. The first questionnaire asked about the public space and safety near the Shamba and the second asked respondents

about their waste management habits and possibilities for improvement. Each questionnaire had thirty respondents from a wide range of ages and gender. Participants were willing to share their experiences.

Key Informant Interviews

A large portion of the information generated by this research was gathered through a qualitative interview series with many stakeholders involved in UA, food security, and community gardening activities in Mathare and throughout Nairobi. These interviews took the form of focus groups and key informant interviews. Each interview lasted approximately thirty minutes.

- Mathare Bondeni Recovery (CBO) — three focus groups
- James Blanks (Mathare Gardener) — key informant interview
- Georges Gachie (Mathare Activist and Gardener) — key informant interview
- Lucas Odhiambo (Mathare Activist and Gardener) — key informant interview
- Dr. Murithi of Nairobi City County Ministry of Agriculture — key informant interview
- Phyllis Adhiambo of Nairobi City County Ministry of Agriculture — key informant interview
- Douglas Rori (Nairobi Food Justice Activist) —key informant interview
- Ibrahim Maina (KDI Kibera Project Manager) — key informant interview
- Charles Gachanga (Dandora Transformation League) — key informant interview
- Peter Mande (Mathare gardener) — key informant interview
- Kevin Otieno (Mathare gardener) — key informant interview

Ethnographic Observation

Accompanying the interviews, the most extensive research method was participatory observation undertaken as a coordinator and active member in the project development of the Mathare Shamba. My role in the community garden was multifaceted: I communicated and coordinated meetings, workshops, and gardening activities with the Mathare Bondeni Recovery (MBR) Group and other community members in Mathare. I also engaged other UN-Habitat volunteers, staff, and senior unit leaders in planning public space interventions on the site, and ran a successful fundraising campaign for the project.

1.4.3 Reflexivity and Positionality

The analysis requires a self-assessment of the positionalities and biases inherent to the methods employed and their capacity for knowledge production. This self-critical, reflexive approach acknowledges that I am not a neutral observer and that all research herein is subjective.

Reflexivity in ethnographic fieldwork is a concept introduced by Rabinow (1977) in the book *Reflections on Fieldwork in Morocco*; where he challenged the possibility of objectivity in research and provided nuance to the inherent power dynamics in fieldwork. Positionality developed out of this idea of reflexivity, as a strategy to identify the political aspects of the researcher which thus

reveals a more insightful analysis and contributes to knowledge production (Moser 2008, p. 384).

In regards to my dynamics with the subject group, it is important to recognize the potential biases that could be formed based on my position as a foreigner and an outsider to the slum community. Although the position of outsider can be advantageous in many ways, through the resources and connections available to me, it can also be a limitation for the research process.

Outsider Status

Because of my position as an outsider to a community that has been repeatedly disempowered by colonial forces and contemporary political bodies, I was made aware of the preconceptions involved in our relationship. For example, the community expressed to me that Wazungu (Swahili word for foreign 'white' people) are assumed to have a lot of money, which was a preconception that guided their communications with me. It was also discussed how many foreigners have come to Mathare to view their project and made promises to help that were not followed up on. However, after many months of developing project plans through group discussions, crafting budgets, and working in the garden together, friendships were formed with mutual trust and understanding. Turner (2013), with extensive fieldwork experience, writes "without a doubt, wherever we are, making friends among our research subjects requires gaining their trust, or they will otherwise remain reluctant participants" (Turner 2013, p. 283). Building trust and rapport proved especially important.

Gender

Gender roles are starkly pronounced in the research context. My female gender was a limitation to accessing networks here, because females are not often regarded professionally, but are more often treated as immature, unserious, or sometimes as a sexual object. Secondly, I would like to note that the interview series is largely informed by male respondents because the Mathare Shamba was managed by a mostly male group.

1.5 Scope of Food and Urban Agriculture Research in Nairobi

1.5.1 Focus on Community Gardens

Urban agriculture can take many forms, from highly productive peri-urban farms, to small-scale single family gardens. Each type can implicate food systems widely, in terms of nutrition, food prices, market systems, and the length and environmental quality of commodity chains. However, this thesis will not look deeply at Kenyan agricultural commodity chains and food systems at large. Instead, it investigates the catalytic effects of community gardens, as a form of UA, to ameliorate the challenges facing Nairobi's urban poor. The community garden site was chosen to investigate the possibilities and challenges of UA in slum environments, and reflect the role of the Nairobi county government in promoting, regulating, or thwarting their efforts.

1.5.2 Scope for Qualitative, not Quantitative Research

For discovering the spatial and social elements of urban community development, a qualitative research methodology was appropriate. In the past, quantitative food security studies such as household surveys have been conducted throughout Nairobi. However, the nexus of spatial and social dynamics involved in the community garden project to ameliorate food security is better understood through qualitative methods. Rather than focusing on the problems caused by food insecurity, I find it more productive to assess possible solutions. Thus the scope is for a qualitative analysis of one garden rather than a quantitative study of the food system in entirety.

1.6 Limitations

The environmental and political conditions in Mathare are important factors in the research. The challenges of the slum environment are both limitations and important findings. While the unstable political climate throughout the research process hindered the Shamba project development, it also revealed the governance and power dynamics at play.

1.6.1 Time

My thesis study in Nairobi lasted six months. As the PRA approach creates the possibility for rapid and progressive learning, this provided me with a body of material to analyze during the first 4 months. However, the spatial development of the community garden and its food security outcomes could not be determined within such a short time frame. After investing in new tools and seeds, the garden only began producing food in my fourth month of involvement. Therefore, the research's ability to assess long-term food security amelioration and sustainability of the project is limited.

1.6.2 Slum Environment

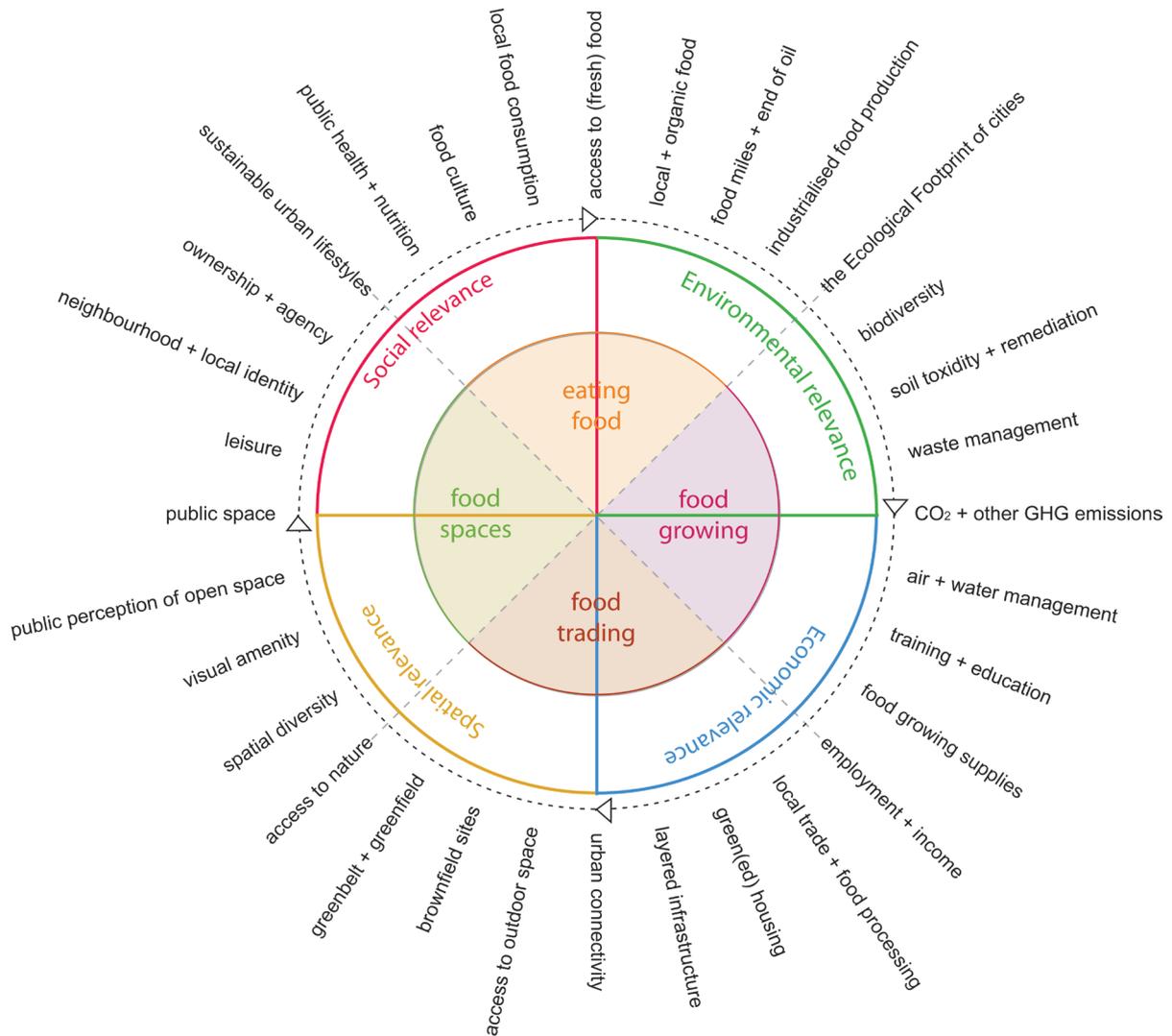
Mathare is a difficult place to study political and legal frameworks because of its informality. Informal settlements often lie beyond the rule of law governing urban spaces. Therefore, the frameworks of urban law governing community gardening in Mathare, require an understanding of the systemic urban management challenges facing this community and its unique forms of governance.

1.6.3 Political Climate

Nairobi is rapidly urbanizing and politically dynamic. Because it is a relatively young capital city in a relatively young nation, its government bodies are ever-changing. Recent reforms include the new National Constitution of 2010, and the devolution process in 2011 which decentralized urban planning to the county level. Moreover, turmoil surrounding the nullified presidential election (happening congruent to the research) made for an unclear time to analyze the impact of laws. However, such a dynamic political context could also make urban growth recommendations more impactful.

2

Urban Food Security and the Right to the City



Social, environmental, economic and spatial aspects of the urban food system

Source: Bohn and Viljoen (2012).

Urban areas drive consumption. As food is an essential resource, it is no surprise that its systems encompass many global industries, involving land, natural resources, labor, capital, and other factors of production. The commodity chains, or flows of food from farmers to consumers, vary by distance, value, employment, surplus, and waste. The resource flows of urban food systems make the relationship between humans and the environment visible on a manageable scale.

The market-based business model currently determines urban food consumption patterns: who can afford to eat, what can they eat, and how much. This manifests the social inequalities characteristic

to capitalist societies, not only in the ownership over food production sites, but also in the variation of food availability throughout a spatially segregated urban fabric. As such, urban food systems relate directly to the Right to the City, a theory which encourages equal rights for urban residents to own and produce urban areas.

Analyzing food systems at the urban scale from spatial, social, and environmental angles offers opportunities for various actors to contribute to a more equitable and sustainable city. The importance of localized food solutions is emphasized as a solution to improve food access disparities and offset the negative effects of capitalist urban development.

2.1 Urban Food Security

The Right to Food has been acknowledged since the 1948 Universal Declaration of Human Rights (Office of the High Commissioner for Human Rights 2017, p. 1). It declared that central and local governments must respect the Right to Food by implementing supportive policies and programs to allow people to provide food for themselves (Lee-Smith 2011). Following suit, the Government of Kenya's third and most recent National Food Security and Nutrition Policy refers to food security as "a situation where all people, at all times, have physical and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life" (2011, p. vii). It notes that food access is not only about quantity, but also quality and nutritional value (Government of Kenya 2011, p.4).

Although there is enough food in the world to feed everyone, 815 million people (1 in 9) worldwide are chronically hungry (FAO 2015), and up to 2 billion are malnourished (GIZ 2014). This is because the quantity and quality of food access is determined by many geographic and monetary factors such as income, supply, transport, public provision, and storage (Bohn and Viljoen 2005, p. xxii). Access to food is determined by the political and economic ideologies governing global society.

Food security has historically been a rural issue. The association of cities with prosperity caused many to neglect the disparities aggravated by capitalist economic development. The Food and Agriculture Organization of the United Nations (FAO) contributed to this global hunger narrative focused on rural poverty. The FAO Director-General proclaims: "fulfilling the 2030 [Sustainable Development Goals] Agenda depends crucially on progress in rural areas, which is where most of the poor and hungry live" (FAO 2017c). The FAO's publication, *The State of Food Security and Nutrition in the World* (2017d) maintains that food security is a global rural issue, faced by many famine-ridden countries in conflict such as Nigeria, Somalia, and Yemen, and countries which are heavily dependent on commodity exports. However, the rural focus and nation-based view of food systems and food security that the FAO propagates does not fully take into account the food access disparities which cause the prevalence of food insecurity in cities.

Because of food security's rural focus, solutions often promote innovations for higher agricultural production output in the developing world. However, another body of food security research (Zahrnt 2011; Otsuki et al. 2001) shows that current agricultural production rates could already feed

the global human population but global trade patterns unequally disperse the food supply. Food insecurity is not about adequate supply, but rather the lack of access for the poor to produce or purchase food. The FAO (2017d) states that “access to food has deteriorated in part due to reduced fiscal potential to protect poor households against rising domestic food prices”. Urban lifestyles, industries, and consumer patterns are all culprits of global food access inequality.

Ensuring the Right to Food is a challenge on the global, national, and urban scale. Globally, the food security differences between Africa and the rest of the world are stark: while the continent of Africa has 232.5 million (19.5%) hungry people, Europe and the U.S. together have only 14.7 million (1.37%) (UN 2015 and Worldometers 2017). Food security is a non issue in the European Union (EU), where food is actually in excess — it “far outstrips dietary energy requirements” (Zahrnt 2011 p. 1). Zahrnt thus proposes a EU Common Agricultural Policy reform that would increase food prices, in order to mitigate climate change effects and global food insecurity. His position appears radical compared to the sustainable development discourse outlined by Germany’s development agency (GIZ) and its federal government, which focus on agricultural production innovations in developing countries, rather than on German trade policies on the consumer end of the food chains. According to Elander et al. (2000), Germany sees sustainability as an aspect of foreign development that they can enforce on other countries through aid or direct investment: “sustainability has hardly been regarded as an obligation to promote a lifestyle in Germany that is compatible with the social and environmental needs of future generations world-wide” (p. 111).

Differences in the global food economy are also visible between nations, for example in Kenya and Germany. While Kenya has 28 million hectares of agricultural land, 2.7 million Kenyans (5.6%) were classified as severely food insecure in 2017. Germany, however, has only 17 million hectares of agricultural area, and little to no severe food insecurity (FAO 2017a). In 2005, the percentage of stunted German and Kenyan children under five was 1.3% and 40%, respectively (FAO 2017a), indicating chronic undernourishment in Kenya. A common method for calculating food security is the prevalence of child undernourishment, often called wasting (low weight to height ratios), and stunting (low height to age ratios) (Global Hunger Index 2017). Germany’s low rates of food insecurity can be explained by their low poverty rate (0-1%), high GDP per capita (\$43,444USD), and relatively low gini index score (31 in 2010), indicating low-income inequality (Global Nutrition Report, 2015a, p.1). Kenya’s economic statistics show drastic differences: GDP per capita was \$2,776 in 2014, and the gini index score was 48 in 2005, making Kenya one of the countries with the highest income inequality (Global Nutrition Report, 2015b, p. 1).

Moreover, high rates of food export to the Germany and the rest of the Global North implicate food affordability for Kenyans. In the post-colonial economy, the World Bank and the International Monetary Fund encouraged structural adjustment programs (SAPs) for Kenya, which incentivized farmers to produce cash crops for export, such as coffee and tea, rather than food for local consumption. SAPs caused “food and agricultural products...to be seen as commodities for trading, to pay off debts and earn foreign exchange [which] promotes insecurity for growers, and the lowering of environmental and social standards to cut costs and compete in international markets” (Bohn and Viljoen 2005, p. 45-46). This simultaneously increased domestic food prices.

This global economic shift led to the increase of food access inequality in urban areas. In Kenya, 1.3 million rural people and 3.5-4 million urban people were food insecure in 2008 (International Food Policy Research Institute Food Portal 2017). This is surprising, given that most of the population (77%) was still living in rural areas at that time (FAO 2017a). Meanwhile, Nairobi slum residents were shown to have the worst health and nutritional status of any group in Kenya, due to lack of basic services and poor sanitation (African Population and Health Research Council 2000). Nairobi's characteristics are common across Southern Africa, where "77% of low-income urban dwellers were food insecure" (Lee-Smith and Lamba 2017, p. 45).

A further study on health inequalities in Kenya counted 4 million 'food poor' people in Kenya's urban slums (Oxfam 2009). According to Oxfam, the unaffordability of food in cities causes urban food insecurity; the urban poor must spend up to 75% of their income on staple foods alone, exacerbated by rises in maize prices (the staple Kenyan grain). While income inequality is declining in rural Kenya, it is rising in urban areas, directly causing the food unaffordability in urban areas. According to Oxfam (2009), Nairobi's Gini index of .59 indicates inequality at the level of Johannesburg in 1994, at the end of apartheid.

It is clear that the causes of global food security vary in different geographic and financial contexts. Regional conflict and drought cause chronic hunger in Yemen and South Sudan, but by this metric, Kenya's high rates of agriculture should yield nationwide food security. However, food is unaffordable for many poor Kenyan due to the high income inequality and global export rates. In contrast to the rural focus of food security research, it is the urban populations in Kenya that suffer most, in direct relation to the neighborhoods they live in. This shows the pertinence of studying food security, poverty, and spatial segregation at the urban level.

2.1.1 Urban Food Security For Sustainable Development

Food systems greatly impact the environmental and social sustainability of the global ecosystem. In the 1987 Brundtland Commission report "Our Common Future," sustainable development is defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (United Nations World Commission on Environment and Development 1987). In line with this discourse, the UN adopted, in 2015, 17 guiding Sustainable Development Goals (SDGs) aiming to tackle the root causes of poverty, inequality, and environmental degradation through inclusive and participatory strategies. Food security and agriculture are integral to many of the SDGs, including:

- Goal 1: End poverty in all its forms everywhere;
- Goal 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture;
- Goal 12: Ensure sustainable consumption and production patterns;
- Goal 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss (Game and Primus 2015).

Some activists still critique the SDG doctrine for its failure to fully incorporate the urbanization of food security in Africa (Battersby 2016). High urbanization rates since the mid-twentieth century have shifted food insecurity and poverty from rural to urban areas. Neglecting this phenomenon in the SDG Agenda denotes a gap in the research on the connection between agriculture, food security and urban issues.

SDG 11 focuses particularly on equity in urban areas — “make cities and human settlements inclusive, safe, resilient, and sustainable” — and offers opportunities to improve the Right to Food in cities. UN-Habitat’s New Urban Agenda (2016) emphasizes the importance of public participation in urban political and planning frameworks from the national to local level. The inclusion of disadvantaged groups in decision making and development processes will lead to equitable cities, and this sentiment extends through the food security discourse.

2.2 The Right to Food in the Right to the City

Inclusion and participation in urban planning reflects the Right to the City. This concept originated with Lefebvre’s advocacy for urban residents to access, enjoy and produce urban spaces in 1968. Advocates of the Right to the City prioritize access because of the segregation and lack of human rights which result from the competition for resources such as land throughout the process of urbanization. De Paula (2016) writes that “access is crucial, as gentrification, increasing density, economic shifts and the physical restructuring of cities all have the potential to exacerbate inequality”.

The Right to the City is increasingly prevalent in the contemporary age of neoliberalism. David Harvey calls to attention the embeddedness of human rights issues in the spatial segregation of cities. According to Harvey, segregation is caused by “hegemonic liberal and neoliberal market logics and neoliberal modes of legality and state action” (Harvey 2008, p. 1). These political and economic forces are counter to human rights and in particular the Right to the City, which includes the collective right not just to access the city, but also to play a role in its formation, and thus let the city play a role in one’s own formation: “the freedom to make and remake ourselves and our cities is, I want to argue, one of the most precious yet most neglected of our human rights” (Harvey 2008, p. 1-2).

Right to the City theorists point out spatial justices and injustices (Soja 2010). The equitable distribution of resources, services, and access is a basic human right, which is not afforded to all. For Soja, these spatial and social injustices necessitate territorial policies aimed at tackling them. Right to the City theorists propose to activate political frameworks and organizations of governance that are not restricted by national relations, so they function at the local level. Merrifield writes: “can we define a new form of cosmopolitanism that bypasses the nation-state, an urban solidarity?” (2017, p. 33). Access to spatial justice starts with participating in the decision-making processes which shape urban space, the urban metabolism, and the urban food system.

The Right to the City includes one’s right to contribute to the production of urban space, for housing, livelihood, food, and leisure. Thus a combination of the Right to Food and the right to produce

urban space confirms an individual's right to grow food in urban areas. The Right to Food is a critical place to assess the Right to the City discourse, which is dedicated to revolutionary social and spatial protest against disparaging capitalist urban development.

Cities developing with capitalist, neoliberal priorities — the consumption of urban space to make a profit, rather than to benefit residents — manifest disparity and segregation. Take, for example, the vast proportion of food-poor slum dwellers, compared to the the wealthy elite. Harvey (2008) points out this contrast: "what, for example, are we to make of the immense concentrations of wealth, privilege and consumerism in almost all the cities of the world in the midst of an exploding 'planet of slums?'" (p. 2). This passage draws attention to the inequalities in the physical urban fabric between those with economic privilege, living in comfortable, resource-consuming homes, and those in crowded, inhumane slum neighborhoods. Slum dwellers are not empowered to shape the city, let alone their homes. This makes it even more interesting that Nairobi slum dwellers claim their Right to the City and their Right to Food through community gardening.

The Right to the City serves to protect the most vulnerable urban residents, who are excluded from the planning and legal process and lack political power. Their participation is required for a just city. This research shows the severity of food injustice in Nairobi, which necessitates an investigation into both spatial aspects (the Right to the City) and social aspects (the Right to Food) of urban management.

2.3 The Urban Metabolism

The urban metabolism involves the process of producing and distributing commodities derived from natural resources. It provides for one's right to basic resources like food, energy, and clean water. Shillington (2012) connects the urban metabolism to the Right to the City through the case of UA in a neighborhood called San Augusto in Managua, Nicaragua — the greenest city in Central America (p. 103). Uncharacteristic for urban areas, many poor Managua households have more trees than the wealthier homes. As Shillington (2012) discovered, poor areas in Managua are so green because poor families claim their Right to the City by fertilizing the fruit trees in their yards with organic food waste:

"Due to a lack of garbage service in San Augusto, most homes dispose of organic garbage in their patios, usually burying it. As a result, many fruit trees, herbs and sometimes vegetables will grow unintentionally...households choose which plants and trees become permanent inhabitants" (p. 108).

This form of urban agriculture in Managua shows how the urban metabolism is wrapped up in social relations. Managua's urban poor claim their Right to the City through everyday activities of the urban metabolism: "it is through mundane routines and relations that urban space is produced" (Shillington 2012, p. 105). Thus, the author challenges policy officials to recognize the sustainability of everyday activities that shape the urban landscape.

A perfectly sustainable and equitable urban metabolism system would be a circular: the available land and resources would be proportionately allocated to the needs of the population. It has been shown that UA can achieve a closed, resource-efficient urban ecosystem by linking production to consumption (Lohrberg et al. 2015).

Improving the connections of the urban metabolism also offsets the inequalities incurred through capitalist growth. Capitalist development “is fundamentally entropic, and therefore anti-ecological, because it is geared to the endless expansion of value, a process predicated on the increasing consumption of nature” (Elander et al. 2000, p. 21). The surplus derived from this endless consumption of nature leads to vast quantities of food waste. Wasting food is a direct consequence of a disconnected urban metabolism. A complete urban metabolism would use food waste and other materials as resources, or inputs to grow food in the city:

“The interpretation ‘waste is food’ enables us to conceive of operating systems that utilize waste (heat, sewage, waste-water runoff, organic solids, construction debris, etc.) to green the city and feed the urban population of the globe by closing now-open nutrient cycles” (Bohn and Viljoen 2005, p. ix).

It is calculated that 4,600 kilocalories of food per person are harvested daily, but only 2,000 are eaten. The 1.3 billion tonnes of food wasted each year could feed 3 billion people (Tristram 2009). High rates of unused food worldwide signal a need to improve the Right to Food.

2.4 Social and Ecological Footprint of Food Commodity Chains

The current global food system leads to environmental and social problems for countries like Kenya. Many researchers have explored the sustainability of food systems by measuring food commodity chains, showing that food distance causes an ecological and social footprint. Commodity chain research generally studies food markets from production to consumption with all of the actors involved. The term ‘market’ is an economic concept, but it involves an interdisciplinary understanding of the forces which drive human consumptive behavior.

Sustainability Impact Assessments of various commodity chains, based on the distance each product travels, indicate that less travel between production and consumption leads to less negative environmental impact (Wascher et al. 2015b). The study analyzes land-use patterns, production and consumption patterns, food waste, economic sustainability, as well as the social aspects of food consumption in six urban case studies: Rotterdam, Berlin, London, Milan, Ljubljana, and Nairobi (Wascher et al. 2015b). Their long and short food chain research methodology uses a concept called “social proximity”, to measure the number of actors involved. Short food chains have reduced distance because products are grown, sold, and consumed with less intermediaries. A shorter chain allows more personal interactions between the producers and consumers, which can optimize the regional food supply (Wascher et al. 2015b, pg. 8).

Long distance food chains in the global agri-food system, rather, are driven by retail and consumer

demands, such that “the type and quality of food that most people consume, its cost and how it is produced” is largely determined by transnational supermarket chains (Konefal et al. 2004, p. 294). Globalized supermarket retail causes a variety of ecological and social problems:

“Food is being transported further than ever before, often by air between countries on opposite sides of the world, whilst local crop varieties are replaced by a few commercial types popular with supermarkets (Cook and Rodgers, 1996). This pattern of growing ‘food miles’ is far from sustainable, its by-product being increasing air pollution, notably of major greenhouse gases such as carbon dioxide, increasing road congestion and noise, and increasing stress. Urban food production supplying local outlets offers an alternative to this pattern” (Bohn and Viljoen 2005, p. 22)

In Kenya, the globalized economy for supermarket products disadvantages local farmers and makes food less affordable (Owuor and Mabatia 2011, p. 128). The local food movement encourages local farmers, and consumers to stand up to powerful industrial agriculture and food retailer corporations. The movement seeks to shorten food chains and improve the urban metabolism through methods such as UA, fair trade,¹ local farmers markets, and programs like Community Supported Agriculture (CSA) which brings local produce to consumers’ doorsteps. A Sustainable Impact Assessment of localized urban agriculture commodity chains in Nairobi showed that “urban gardening for self-supply had the highest positive impact on the environment, particularly on ‘ecoefficiency for abiotic resource use’, followed by ‘provision of ecological habitats and biodiversity’ and ‘reduction on transportation costs’” (Wascher et. al 2015a). The study cited employment generation along the commodity chain as the best economic achievement of UA for commercial supply. Urban gardening in Nairobi also showed social benefits in food quality, food safety, and food security and sovereignty (Wascher et. al 2015a). UA in Nairobi plays a social, environmental, and political role in the food system, not only by providing local produce, but also by enabling the Right to the City for residents.

2.5 The Right to Food in Policy and Legislation

The exponential urban growth rates in Africa require competent governance institutions and legal frameworks to equitably distribute the benefits of urbanization. Most importantly, to the urban poor who lack the Right to the City and the Right to Food. While the private sector undoubtedly plays a large role in food systems, municipal governments oversee urban processes so it is the local governments must implement national food security policy. Local implementation of national urban policies is a key feature of UN-Habitat’s Action Framework for the Implementation of the New Urban Agenda (AFINUA). The document outlines five actions pillars for sustainable urban development:

1. National urban policies;
2. Urban legislation, rules, and regulations;
3. Urban planning and design;
4. The urban economy and municipal finance; and
5. Local implementation (UN-Habitat 2017a, p. 1).

¹ “The Fair Trade movement demonstrates a viable alternative trading pattern, which supports local production by providing local growers with relatively higher incomes by eliminating a number of unnecessary intermediate traders” (Bohn and Viljoen 2005, p. 29).

Food policies are tools of governance which can be defined at the national or municipal level. They arise out of food security, sustainability and dietary concerns based in the cultural context. Food policy has been shown to effectively respond to global urbanization in order to manage urban metabolisms (Calori and Magarini 2015 p. 24). However, most cities still lack a comprehensive food policy to provide for the needs of low-income groups. Food policy should be primarily aimed at improving circumstances for the urban poor.

While policy is an important driver of equity and sustainability, it must be backed by effective legislation to have the intended impact. Policies and legislation go hand in hand: while consistent policies support the passing of effective legislation and ensure quality of outcome, the laws (rules and regulations) that govern a city manifest the policy goals. Effective laws intersectionally enact greater policy aims.

Effective urban legislation is a core element of successful cities (UN-Habitat 2017). Rules and regulations create a foundation for managing cities by mediating competing land use developments, including the participation of many actors, and requiring accountability and follow-through from governing bodies (Crispi and Mousmouti 2015, p. 257).

UN-Habitat's Planning Law Assessment Framework illuminates five indicators of a functionally effective urban law (UN-Habitat 2018):

1. Consistency of policy objectives: Regulatory measures in an urban law should have consistent objectives backed by clear policies. In this sense legislation relies on the existence of a policy foundation.
2. Transparency and efficiency of mechanisms and processes: The mechanisms and processes to achieve the law's objectives are clearly defined. Transparency ensures that the mechanisms do not involve any discretion or corruption on the part of governing actors.
3. Organization of institutional roles and responsibilities: Institutional roles and responsibilities determine the implementation and enforcement of the law. They can be concentrated in one efficient institution or in several well-coordinated institutions.
4. Clarity in standard of drafting: Legislative texts must be written in clear and unambiguous language, understandable by both professionals and common citizens. The data used and the contextual sensibility of the legislation also determine the quality of its outcome.
5. Capacity for implementation: The way a law is implemented proves to be the most pivotal aspect of urban legislation which achieves its intended purpose. Human and financial resources must be adequate for the successful implementation of a law.

When urban legislation does not meet such criteria, it excludes certain groups and leaves them to find their own informal or community-based solutions for meeting their everyday needs. In the case

of informal settlements, like the slums of Nairobi, ineffective legal frameworks cause alternative forms of public service delivery.

2.5.1 Informal Governance and Co-Production

Joshi and Moore (2004) explore the unorthodox governance strategies for public service delivery found in challenging environments, which they call “institutionalised co-production”. Co-production recognizes bottom-up forms of community governance that occur in the absence of effective national or city-wide legal frameworks for the provision of basic urban services. Joshi and Moore note the diversity of arrangements for service delivery in poor neighborhoods, which can take the form of “self-provisioning through collective action” on the small scale, or “direct social provision through private associations” such as religious organizations, philanthropic foundations, or other groups, on the larger scale (2004, p. 33). The exclusion of informal settlement communities from legal frameworks can lead to institutionalized co-production systems and community management.

Nonetheless, the community groups in informal environments who provide basic urban services can be aided by a large body of stakeholders, including, but not limited to: the national government, the municipal government, international NGOs, other community-based organizations, and various volunteer groups.

2.5.2 Decentralized and Participatory Governance

Because community-led governance is prevalent in informal settlements, this thesis promotes decentralized and participatory urban governance strategies for effective food policy and legislation. Lindell (2008) defines urban governance as “the multiple sites where practices of governance are exercised and contested, a variety of actors, various layers of relations and a broad range of practices of governance that may involve various modes of power, as well as different scales” (p. 1879). With this transfer of power from top-down leadership to bottom-up community relations, governments can serve more as enablers than providers (2008, p. 1879).

Decentralization of government manifests the Right to the City by enabling communities to self-govern, thus ensuring their needs are met in more localized contexts. According to Heinrichs (2006), decentralized governance can operate in many ways: as a tool for deepening democracy by increasing political participation, as an alternative to centrally organized planning, or as a means to appreciate local, grassroots forms of knowledge. Decentralization can also expand the base of information collection processes for policy-making Healey (1998). A decentralized planning system has a deep instrumental importance for local communities to involve themselves in the process of urban development.

Many food justice advocates (Lohrberg et al. 2015; Bohn and Viljoen 2005) argue for a shift from top-down managerial government to multi-level governance structures to include a wide range of stakeholders in sustainable urban food management. Urban agriculture, for example, is most effective when bottom-up activities are incorporated into top-down urban design frameworks.

Focusing on UA only as a grassroots, bottom-up activity fails to see the benefit of intervention by local planning authorities to free up or reclassify land for UA (Bohn and Viljoen 2005, p. 55). Both ends of the governance spectrum can create sustainable food systems.

3

Urban Agriculture and Community Gardening in Nairobi



*Organiponicos in Havana were developed during Cuba's revolution of organic urban agriculture
Source: Bohn and Viljoen (2012).*

Urban agriculture discourse encounters questions such as: why farm the city? Is there enough space in cities for agriculture? Why use precious urban land for farming when it could be used for housing, or more profitable uses? What purpose does UA serve and for who? Is urban farming merely a trendy oxymoron or a viable solution for an agricultural revolution, food security and “greening the city”?

This part of the thesis seeks to answer such questions while elaborating UA's basic tenets, typologies and terminologies. Previous research from a global sample illuminates a set of criteria for analyzing the benefits of UA for low-income communities. The thesis focuses on community gardens as a form of UA which require land management innovations and offer unique, shared benefits.

3.1 Finding Urban Space for Agriculture

Agriculture comprises any organized form of production involving land and biological systems. However, agricultural land uses are often dichotomized from urban spaces. The history of urban planning has often separated urban space from rural (agricultural) land. Urban plans and studies sometimes refer to the “urban rural interface” or the “town and country divide” to differentiate rural from urban land uses (United Nations Department of Economic and Social Affairs - UNDESA 2010).

Population growth, and people’s will to improve their employment and housing prospects leads to increased urbanization of previously agricultural landscapes. Each year, 19.5 million hectares (195,000 km²) of land are urbanized: converted from agricultural to urban uses (UNDESA 2010, p. 1). Rural to urban land conversion is just one of the effects of urban migration, as cities struggle to develop quickly enough to accommodate the growing population. When planners enforce an urban-rural binary, urbanization and land use change puts higher pressure on the peri-urban or rural agricultural areas to produce higher yields of food.

However, the traditional binary has been disrupted by rapid urbanization. Indeed, 21st century cities have been called ‘Edgeless’ due to urban sprawl and the lack of city boundaries (Bohn and Viljoen 2005, p. x). Urban plans, in fact, can and should protect rural land from urban sprawl: the uncontrolled encroachment of urban development that often irresponsibly consumes space and resources. Fortunately, contemporary planning has responded to urban sprawl with innovative tools to intensify urban land use, for example vertical development, densification, and more productive uses of space (Bohn and Viljoen 2005, p. xix).

Food producing urban spaces and activities, known inclusively as urban agriculture, counteract the prohibitive urban-rural binary, while optimizing urban land uses in favor of humans and the environment alike. Smit et al. (1996) comprehensively defined UA as:

“an industry that produces, processes and markets food and fuel, largely in response to the daily demand of consumers within a town, city or metropolis, on land and water dispersed throughout the urban and peri-urban area, applying intensive production methods, using and reusing natural resources and urban wastes, to yield a diversity of crops and livestock” (p. 3).

By this definition, urban agriculture also localizes food chains and efficiently uses resources. Innovative urban design, legislation, and land management, can enable UA to produce with less, in response to increased environmental pressures (Lohrberg et al. 2015, p. 203).

UA has been criticized for using precious urban land and economically disadvantaging rural agriculturalists. Those critics assume that commercial and industrial urban development yields higher profit than ecological land uses. The argument is predicated on the rural-urban binary and fails to see UA as an optimization of urban space for increased food production, thus benefiting landowners, business owners, farmers and consumers. Bohn and Viljoen (2005) advocate spatial innovations to produce food in cities, with varying shapes, sites, and scales, including “big, small,

horizontal, sloped, vertical, rectangular, triangular, irregular, on brownfield sites, on greenfield sites, in parks, on reclaimed roads, on spacious planes, or squeezed in corners” (p. 15). UA’s spatial efficiency, they argue, yields three main ecological benefits: “preserving biodiversity, tackling waste and reducing the amount of energy used to produce and distribute food” (p. 21). UA not only relates to urban space, but also to its food production and distribution in the market system. UA must be approached relationally, at the nexus of the political, spatial, economic, and ideological frameworks.

Theorists cite that “from the earliest records of urban life, agricultural activities have taken place in urban areas” (Lohrberg et al. 2015, p. 19). While this is unarguably true, UA has been more actively studied and managed since industrial revolution catalyzed a large-scale rural to urban migration. For example, England’s ‘Garden City Movement,’ propagated by Howard (1898), promoted the integration of rural, garden-like land uses into the city fabric, in response to polluted, overcrowded, and unplanned city development. Planned development of small-scale farmland inside the city aimed to balance the dense, industrial urban spaces with a green garden atmosphere. Planned UA land uses have a long history in Europe, and the movement now proves UA is a viable solution to food system injustice.

In Africa, rather, UA has been continuously practiced as a grassroots response to food insecurity. UA has always existed as a food source for city dwellers in Africa, despite being absent from urban policy and planning until recently.

3.2 Functional and Spatial UA Typologies

The diversity of UA typologies makes it difficult to define and study broadly. This thesis defines UA typologies based on land ownership, principle function and spatiality. Land ownership and spatiality illuminate classifications such as allotment gardens and squatter gardens; allotment gardens are formalized and subdivided into small plots to be rented under tenancy agreements, whereas squatter gardens (also called guerilla gardening) formally or informally produce on idle or abandoned sites (Lohrberg et al 2015).

UA functionality can include “greening, food security, food accessibility, food literacy, job skills training, employment, and community-building” as well as the many stakeholders and actors involved in the management and governance of those spaces. Community gardens, for example, have an integral social function, as a meeting place to build community. “Social farms” are a distinct type of community garden which function to rehabilitate and care for minors, emigrants, people with disabilities, addictions, minors, or criminal records (Lohrberg et al. 2015). Some researchers also consider shared kitchens, markets for local products, and redistribution of food surpluses to be forms of UA, because they intervene micro-economically in the urban food cycle (Calori and Magarini 2015, p.31).

UA’s function varies by geographic and cultural context and the priorities of the community. For example, the food security differences between Kenya and Germany discussed in chapter 2 manifest different types of UA. Because urban Germans are not food insecure, they initiate community gardens as public spaces to connect with nature, create more sustainable food chains,

'green' public spaces, or for social reasons. However, UA in Nairobi is more often a survival tool. UA in slum communities like Mathare usually takes the form of small-scale subsistence farming. Here food security is the most common motivation. In all cases, though, UA and particularly community gardens yield social, political and environmental benefits beyond the production of food. and environmental benefits beyond the production of food.

3.3 UA Benefits for Low-Income Nairobi

Improving food security for vulnerable urban populations initiated this research. To understand UA's role in this, the research also considers global examples of UA and analyzes the constraints of these theoretical frameworks in the Nairobi slums. The primary benefits of UA for low-income communities globally are:

1. Food security innovation
2. Income or employment generation
3. Public green space
4. Site for ecological education
5. Site for participatory governance and social inclusivity

3.3.1 UA for Food Security Innovation

Providing food for the urban poor proves the most beneficial factor of UA globally. The case of Cuba exemplifies this, widely considered to be the pioneer of UA due to unique political and social circumstances which necessitated drastic food and agriculture reform in the 1990s. In the 1980s, Cuba had been importing 90% of its agricultural fertilizers and pesticides, and 57% of food products. But when the Soviet Union and its trade partnerships disintegrated in 1989, Cuba lost access to 80% of its global food trade imports and many Cuban people were starving (Cashman 2017). The government had to build a production system from the ground up, using traditional farming methods and very few inputs. In the Cuban case, UA was simply the most promising remedy to an imminent food crisis.

The Cuban government and civil society collaborated to incentivize the urban populations to create an industry for local organic food. Agricultural researchers proposed organic farming methods without pesticides and fertilizers, and the older, knowledgeable generations reinstated low-input, traditional, self-reliant methods such as integrating grazing animals, teams of oxen for farming, natural pesticides, composting, and cover cropping to suppress weeds (Wright, 2008, p. 5).

In Havana alone, land reform for UA designated over 25,000 allotment gardens for families to farm, and dozens of larger scale organiponicos — market gardens (Cashman 2017). Organiponicos are high-yield urban market gardens, ranging from 200m² to a few hectares, farmed by five or six workers (Bohn and Vijoer, 2005b). The farmers of the new organic market garden cooperatives sold their produce to the government, who then sold the food at subsidized prices to schools, hospitals, and to the tourism industry (Koont, 2008). Market reforms stimulated a local economy for food products.

In Kenya, with 10 million chronically hungry people, 30% of children being undernourished, and 38% of the urban population food insecure (GoK 2011, p.Vii), they are facing a food security crisis of a similar magnitude to that of Cuba in the 1990s. However, the Kenyan context lacks the Cuban urgency because the food crisis in Kenya is not sudden; it has been growing for decades.

In Nairobi, small-scale subsistence urban farming has developed as a survival method for many who cannot afford the food at markets. It was concluded in the late 1990s that most urban farmers in Nairobi are women, as it becomes a last resort for them to feed their families (Foeken and Mwangi 2000, p. 7). Limited space in Nairobi's low-income neighborhoods forces the majority of urban farms to be very small-scale plots growing staple foods like greens and maize (Foeken and Mwangi 2000, p.5). These small plots require few inputs, tools, and technology. Irrigation is rare, so wastewater is a common input. Since most farmers cannot afford chemical fertilizers, animal manure or compost is used as an alternative.

Sack gardening is a form of small-scale subsistence farming used in Kibera, Nairobi's biggest slum. One study reported that 20% of Kibera residents frequently go a whole day and night without food (Gallaher et al. 2013, p. 400). Growing collard greens, kale and other leafy, indigenous vegetables out of the tops and sides of sacks became popular in Kibera in 2008 when an international NGO distributed free seedlings and technical advice. This form of UA was shown to increase vegetable consumption, and respondents reported becoming less likely to skip meals. Gallaher et al. (2013) promote vertical gardening for Nairobi slum dwellers as a way to acquire space for farming to supplement their diets (p. 402).

3.3.2 UA For Income and Employment Generation

As in Cuba, other Latin American cities have used UA to expand local food production and generate employment. For example, amidst an economic crisis and rapid job loss in Argentina in 2002, the municipality of Rosario launched an Urban Agriculture Program (PAU) to supplement city food donation programs and provide new jobs. Their methodology was to pair a national assistance program (for unemployed heads of households) with local NGOs to cover startup costs, garden tools, materials, and seeds to family gardens in squatter communities, who then passed on the knowledge to their neighbors (Guénette 2006). The PAU soon had over 800 gardening groups throughout the city. Furthermore, the local university and the urban planning and property registration departments of the Rosario municipality collaborated to identify vacant land sites throughout the city that gardeners could "peacefully usurp"; the municipality's public housing service then agreed upon a new regulation that temporarily ceded the land to the gardeners (Guénette 2006).

The program aimed to provide employment opportunities and reduce poverty. The PAU estimated that gardeners could earn approximately \$260 USD per month, which brought them up to the poverty line. However, this necessitated an expansion of the market system. Rosario built seven new markets throughout the city to support the economic development of the upcoming urban farming sector, and also coordinated the transportation of produce from gardens to markets. The main agenda of the PAU was to feed the poor and employ people, and this policy aim has institutionalized a new industry in Rosario, both ameliorating the economic crisis, and changing the

landscape of the city to this day (Guénette 2006).

Creating alternative UA livelihoods has also been shown to prevent crime and social problems, especially for disadvantaged communities (Novo and Murphy 2000; Lohrberg et al. 2015). This benefit is especially relevant for Nairobi because it is well established that food insecurity across Africa is largely due to a lack of income, widespread poverty, and unemployment, rather than a lack of accessible food (Githugunyi 2014, p. 23). With high unemployment and even higher informal employment rates, UA in Nairobi can go beyond subsistence farming to generate employment and income (Wascher et al. 2015a). Informal employment in Nairobi involves casual and sometimes illegal activities such as micro-scale businesses, begging, theft, illegal brewing, and prostitution and leaves the workers vulnerable and with inconsistent wages (Foeken and Mwangi 2000, p. 3). Thus the formalization of UA activities through an integrated employment program can reduce poverty.

3.3.3 UA for Public Green Space

Land ownership is especially important in the development of a community garden. A vacant location within the community is identified, and the leasing of this space is negotiated with the land owner. Iles (2005) finds that “[community gardens] exist mostly in built-up areas, where their creation has been a response to the local community’s lack of access to open, informal, community-run green space” (p. 83). Responding to local needs, a community garden turns an open space into a place of impact and community building. Community gardens can also make an area safer. Some authors notice that community gardens situated in high-crime areas offer alternatives to drug use and other criminal activities. An example in Doncaster, UK shows that vandalism decreased when local land was put to use for community orchards (Bohn and Viljoen 2005, p. 56).

UA requires spatial innovation, whether on a public, private, or communally-owned site. Some of the first UA researchers in Nairobi noticed the high likelihood of poor urban farmers transforming ‘open space’ in Nairobi into cultivated farmland, especially during the rainy season (Freeman 1991). Bryld (2002) noticed UA on Nairobi’s underutilized and undesirable land such as roadsides, ditches, drainage paths, wetlands, and steep hillsides (p. 80). While urban food cultivation in low-income cities like Nairobi often takes place in backyards and around buildings, this can also slum dwellers back from the practice:

“While most urbanites who farm do so to feed their own families, they are not the poorest people. Urban farmers are better off than non-farmers. Slum dwellers cannot easily find space to farm whereas better-off urbanites have backyards where they can produce food.”
(Lee-Smith and Lamba 2017, p. 45).

Therefore, UA in dense, poor, and informal settings like slums requires innovative land management solutions. Tajima (2008) tests the integration of urban agricultural production on sites of weak land tenure. Weak land tenure occurs when “the status of land’s exchange value [is] either diminished or suspended due to changes affected by time, circumstances or through sheer social force” so the land became less valuable. This type of land presents opportunities for the poor to develop urban

farms because they can use it without paying; it “allow[s] low-income populations access to land’s use values without exchange values” (Tajima 2008). She says that UA activities on weak land tenure sites “demonstrate how such underused and often invisible sites can help address the problems that haunt urban areas: environmental degradation, hunger, [un]employment, etc.” (Tajima 2008).

In *Urban Catalyst: The Power of Temporary Use*, Oswald et al. (2013) advocate legal provisions and contracts to give legitimacy and long-term sustainability to informal and temporary land uses (p. 118). Oswald et al. suggest that temporary and informal uses of space challenge the contemporary neoliberal and capitalist economy and societal structure because temporary uses of land define themselves in terms of content rather than financial return. The authors argue that foregoing our obsession with permanence will present many opportunities for land use, and can also be financially viable (Oswald et al. 2013). Temporary uses are also beneficial to the city’s image because they make a place known and spark conversations between often isolated urban actors: “the introduction of temporariness and processuality is intended to force a rethinking of city planning by shifting it into the role of a mediator between disparate interests” (p. 92). Some cities have instituted policies to mitigate this issue, such as a “penalty tax on disused inner-city sites” and city-initiated transfer agreements, whereby “the owner temporarily transfers a parcel that is not currently marketable to a public institution or the city itself for a public-interested-oriented use” (Oswald et al. 2013, p. 121).

Allowing open space to be used by community groups for UA represents opportunities for the Right to the City, or as Brenner calls it, the Open City: “a realm in which the institutional capacity to produce and transform space has itself been radically democratised, such that it becomes equally available to all who inhabit urban space” (Brenner 2017, p. 45). The Right to the City requires that public spaces grant residents the opportunity to creatively and freely inhabit and produce urban spaces, and this includes the collective production of food.

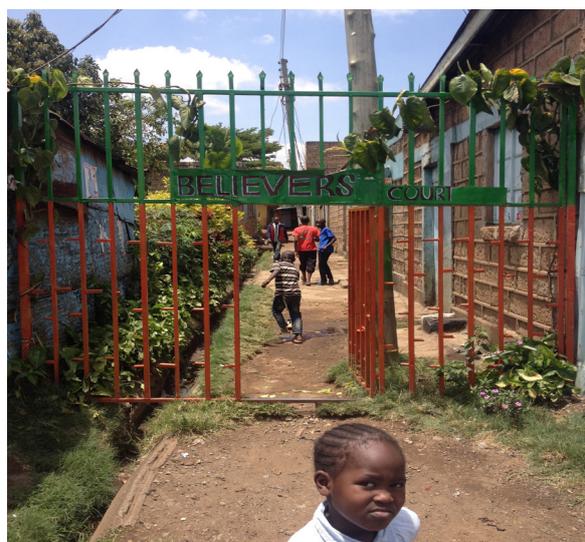
In *The Social Life of Small Urban Spaces*, Whyte says, “people tend to sit where there are places to sit” (1980, p. 16). Design gives a space meaning and determines people’s occupation of a space. A space can “stimulates people into new habits” (Whyte 1980, p. 16) and transform the city and the community. According to Project for Public Spaces (2016), space turns into a place when “the community feels ownership and engagement, and where design serves function. Here, human needs will be met and fulfilled, for the betterment of all” (p. 4). Placemaking advances the Right to the City by prioritizing the role of everyday citizens in planning, design, and management; this process encourages citizens to take ownership of local public spaces and contribute to their unique growth and development, thus offering collective, shared purpose (Merrifield 2017, p. 21). The Placemaking strategy can be used to advance community assets by allowing community groups to propose and install temporary and informal uses of space, thus including them in the formation of the city itself, not just the political framework. Placemaking in Nairobi has taken the form of new lanes for rollerblading, as this is not only a popular sport, but also a method of transportation for youth (Placemaking Week Nairobi). Public space thus reflects local culture in its diversity of expression.

Public Space is considered a vital aspect of the livability of cities, facilitating social interactions and

civic engagement. The Biennale for Public Space (2013) calls for open spaces like streets, sidewalks, squares, gardens, and parks to be made public, as in, without a profit motive and available for everyone's enjoyment. This does not require land ownership by the public sector, but it does require accessibility, without fencing, barriers or a prohibitive fee (section I). Commercial activities which showcase alternative and creative practices can also be incorporated (Biennale for Public Space 2013, section III).

UN-Habitat's Community-led, Citywide Open Public Spaces Assessment found that Nairobi offers only 8.21% of its land for public recreation and only 70% of these open public spaces (OPS) are freely accessible to all groups of the general public, while the remainder is restricted by barriers, opening hours, or a fee (UN-Habitat 2016a, p. 2). UN-Habitat advocates dedicating 15-20% of urban land to equitably distributed OPS. Like most cities, Nairobi's affluent neighborhoods have higher quality public spaces while its poor neighborhoods like Mathare are lacking (UN-Habitat 2016a, p.3).

The assessment also notes that Nairobi City County inadequately manages its public spaces, due to "territorial encroachment, lack of maintenance, lack of support furniture like seating, street lighting and waste receptacles among others" (UN-Habitat 2016a, p. 4). On the other hand, community-managed OPS, such as in Dandora, a low-income Nairobi estate that is infamous for crime, are said to be safer due to their reclamation by youth (UN-Habitat 2016a, p.5). The Dandora Transformation League incentivized youth to participate in the maintenance and upgrade of the neighborhood through a program to use public space management as an opportunity to employ youth. The group cleaned up and established parking lots to generate community revenue. They also rent out their communally-owned garden space for weddings and events and charges residents for waste collection services undertaken in public spaces, to generate revenue for further public space investment projects. This model was made feasible due to Dandora's semi-private space model; Dandora is made up of estates which are gated communities, turning their OPS into 'semi-public spaces' because they are accessible only to those who live there.



"Believers Court" in Dandora, Nairobi communally manages public space and waste management
Source: Cashman 2017



The semi-public green space in Dandora generates income for the community group

Source: Cashman 2017

Using public space design and management to generate revenue is also modeled in Kibera, Nairobi. Nairobi slums lack social spaces, but because space is so limited, shared spaces are best used productively, whether for food or material production or revenue generation through micro-enterprises. The Kounkuey Design Initiative (KDI) operates in Kibera with a model they call 'productive public spaces' (PPS) to generate revenue for the maintenance of the community space. KDI holds competitions for community groups to propose PPS interventions, such as Kibera Public Space Project 01, a community garden completed in 2010. It generates revenue by selling vegetables to local kiosk vendors. A percentage of the proceeds are then put into a site maintenance fund. A business called "Grow Kenya" also uses waste from on-site community composting toilets to produce compost, which is packaged and sold to farmers. A women's collective also operates there, harvesting an invasive weed called water hyacinth to make baskets and crafts (Kounkuey Design Initiative, 2017). KDI assisted the development of five other PPS in Kibera, with a participatory and inclusive design process from project conception to construction, operation and maintenance. Local ownership of the space is prioritized.



“Grow Kenya” uses human manure compost to fertilize their community garden in Kibera, Nairobi
Source: Cashman 2017

3.3.4 UA for Ecological Education

Socially welcoming public spaces like community gardens facilitate dialogue. Other community garden priorities include reusing waste as compost, and other organic and permaculture farming methods (Lohrberg et al. 2015, p. 25). Permaculture is a technique which aligns sustainable and ecological agricultural designs with natural processes. Permaculture principles have been widely used in UA out of a need to improvise in small and challenging spaces with limited and resources and inputs. In Nairobi, for example, permaculture is needed because climate change is causing water shortages (Githugunyi 2014, p. 23). Many studies in Nairobi link UA to the mitigation of ecological and environmental degradation, as well as agricultural innovations such as nutrient-waste cycling (Karanja et al. 2010; Njenga et al. 2010).

City bylaws often prevent growing food or rearing animals in cities under the pretense that those activities create waste. However, in practice, UA can reuse waste in ways that lessen the inputs required from municipal services. Successful UA systems use what are usually considered urban outputs as crucial inputs, with routine recycling and composting of organic materials for reuse (Githugunyi 2014). For example, Mazingira’s survey of UA in Nairobi in the 1980s “found 35% of crop growers were using compost and 29% were using manure, 91% and 44% respectively producing these inputs on their own farms” (Lee-Smith and Lamba 2017, p. 49). Wastewater is also a viable input for UA when appropriately treated, as it supplies the nitrogen, phosphorus, and potassium that crops need to grow (Githugunyi 2014, p. 26-27). The opportunities for inputting organic waste

and wastewater into UA are limitless, but integrating these practices requires knowledge on the part of the farmers, and those who regulate the systems. Community gardens, as social spaces, have the unique benefit of facilitating ecological conversations, training and education.

3.3.5 UA for Decentralized, Participatory Governance

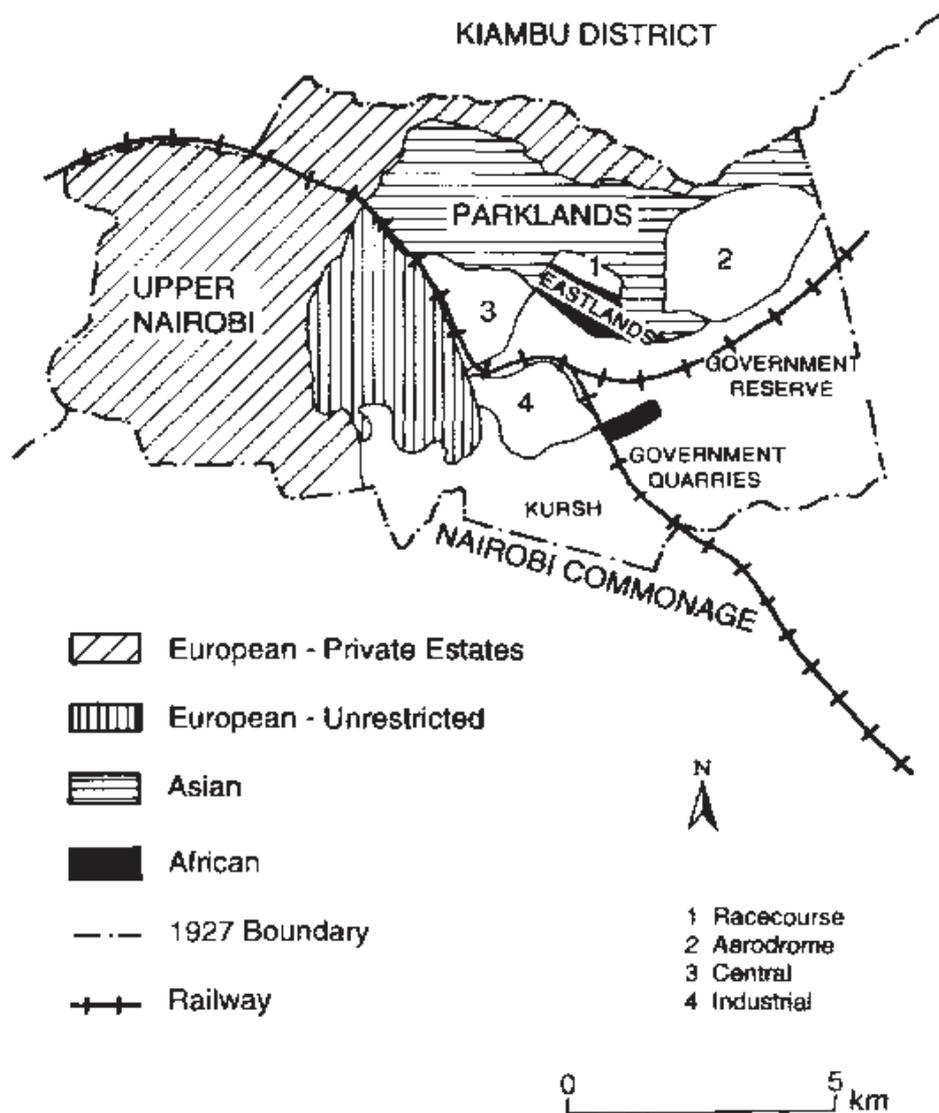
Trust, inclusivity and social ties determine the success of a communally-operated urban farm. Community gardens cultivate not only food but also social networks (Lohrberg et al. 2015), as they are characteristically owned and tended to collectively. The benefits of community gardens are often studied in terms of health, wellbeing, and relationship building (Twiss et al. 2011; Kingsley 2009; Glover et al. 2005). Californian cities, for example, devised a community gardening system, incorporating local leadership and resources to improve access to produce and health education. The community gardens also created “opportunities to organize around other issues and build social capital” (Twiss et al. 2011).

Communally managing land for production not only strengthens social ties, but also offers opportunities to mobilize governance networks. Cuba’s radical UA transformation offers urban managers a model for implementing government decentralization through urban food production. Cuba’s UA revolution required a land management reform from nationally-owned land to communally managed urban farms. To do so, the government initiated a Department of Urban Agriculture in Havana in 1991 whose motto was “production in the community, by the community, for the community” to decentralize agricultural land management to the local level (Novo and Murphy, p. 333). The Department of Urban Agriculture collaborated with neighborhood-level governments called “Poder Popular” to distribute land to urban farmers, so long as they used the land to produce food (Bourque 1999, pg. 135). All fallow and unused urban land was offered for people to develop into urban farms (Wright 2008, p. 5). The new cooperative production programs used a philosophy of “linking people with the land” whereby the farmers were directly responsible for production (Rosset 1998, pg. 2).

Decentralization of authority in Cuba manifested not only in the governance of land and economic structures, but also through the food industry. Administrative functions of the UA systems were allocated to state enterprises in the divisions of urban municipalities called ‘Granjas Urbanas’ which oversaw the activities. The cooperative members democratically elected a local minister for each subunit, to manage the farms (Deere, 1997, p. 654). Their duties included creating production plans, training the urban farmers, promoting new technologies, and gathering data to ensure quality and veracity (Koont, 2008, p. 288). They also became a link to the state-owned production inputs. This decentralized management structure transformed the state apparatus from an authority to a provider for the autonomous cooperative farms, who felt newfound ownership over their work. Ownership was derived because farmers could sell their excess produce in a farmer’s market. According to Deere (1997), Cuba opened at least one new agricultural market in each municipality, 121 throughout the country. Incentivizing urban residents to farm required collaboration between the government and grassroots groups at the neighborhood level. This case shows the opportunities for shared governance and co-production in the urban food system when there is trust and collaboration between the government and residents.

4

Nairobi's Institutional and Legal Context



The 1927 Nairobi Plan for Settler Capital racially divided the city and institutionalized patterns of segregation and neglect in low-income Nairobi

Source: Nairobi City County 2012, pg. 35

When I asked an Uber driver why he moved to Nairobi from his rural village, he said: "I came to Nairobi for greener pastures" and laughed. A few minutes later, he continued, "I still haven't found them yet". He was a farmer before and now he drives a cab.

4.1 Spatial Segregation: The Development of Slums

Nairobi, “the place of cool waters”, was a fruitful place for the Kikuyu and Maasai tribes to water and graze livestock, and to trade in grain, copper, pottery, ivory, beeswax and other commodities for many centuries. The city was not permanently settled until the British colonial settlers made it an administrative and commercial center to connect their trade networks in 1900. Nairobi then became the capital of Kenya in 1905 (Owuor and Mabatia 2011, p. 120-121). The Municipal Council of Nairobi was set up in 1919, and institutionally contributed to the exclusivity of land, property, and business assets for the colonial population. Until Kenyan independence in 1963, only Europeans could own urban land while other races were restricted to certain areas (Lee-Smith and Lamba 2017, p. 48).

The British Colonial Plan for Settler Capital of 1927 formally zoned Nairobi to separate Europeans, Indians, and Africans. The Plan reserved the housing estates in West Nairobi (with rich volcanic red soil for farming) for formalized European housing, and reserved the unserved neighborhoods on the East side of town for Africans, where the non-porous black cotton soil is less ideal for farming (Owuor and Mabatia 2011, p. 122).

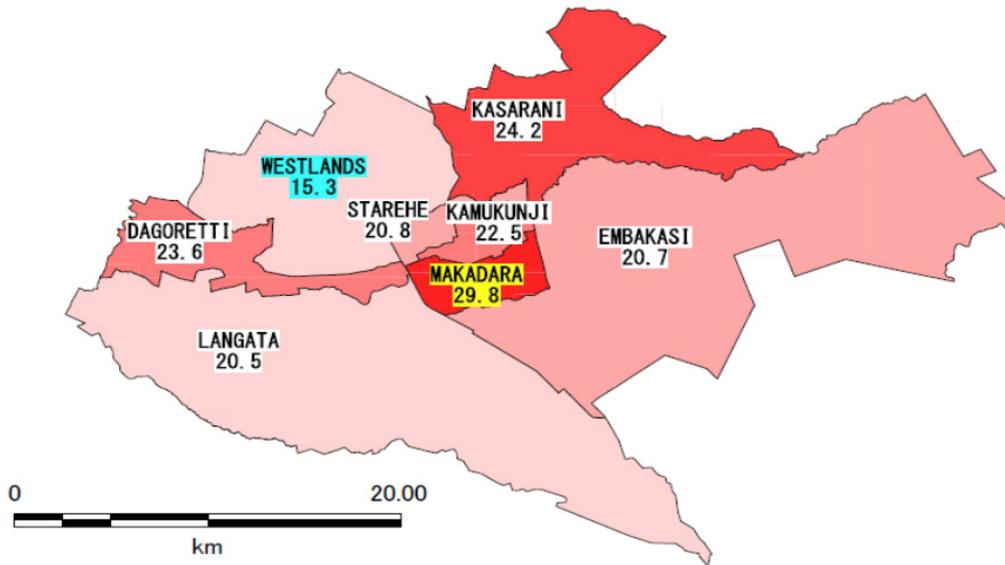
The 1927 Plan initiated patterns of neglect in East Nairobi in waste and sewage management, electricity, roads, and other urban services. In the early twentieth century, not only institutional housing settlements disadvantaged Africans, but colonial regulations also prevented the local African population and the Asian migrant worker population from producing food or conducting business, which was reserved for the European population (Lee-Smith and Lamba 2017, p. 48). Despite the laws, African and Asian businesses existed informally. The women who came to town to informally hawk vegetables on roadsides were harassed by authorities, an occurrence which has persisted to this day (Omondi 2015). They are called ‘Mama Mboga’ (vegetable woman in Kiswahili).

As motivation for Kenyan independence grew, colonial rules relaxed and many Africans moved into Nairobi. Still, by independence in 1963, only 10% of Kenya’s total population was urban (Municipal Council of Nakuru 1999, p. iv). However, Kenya’s urban population grew quickly in the coming decades: to 23% in 2008, and up to 26% in 2017 (FAO 2017a). Increased urbanization in Nairobi coincided with an increase in poverty, signifying unequal development of the city. UN-Habitat (2010) cites widespread patterns of rapid unplanned and unsustainable urban development across Africa, causing the creation of megaslums, much larger in size, density, and population than the poor urban neighborhoods existing before. They call African cities “oceans of poverty containing islands of wealth” (UN Habitat 2010, p.2).

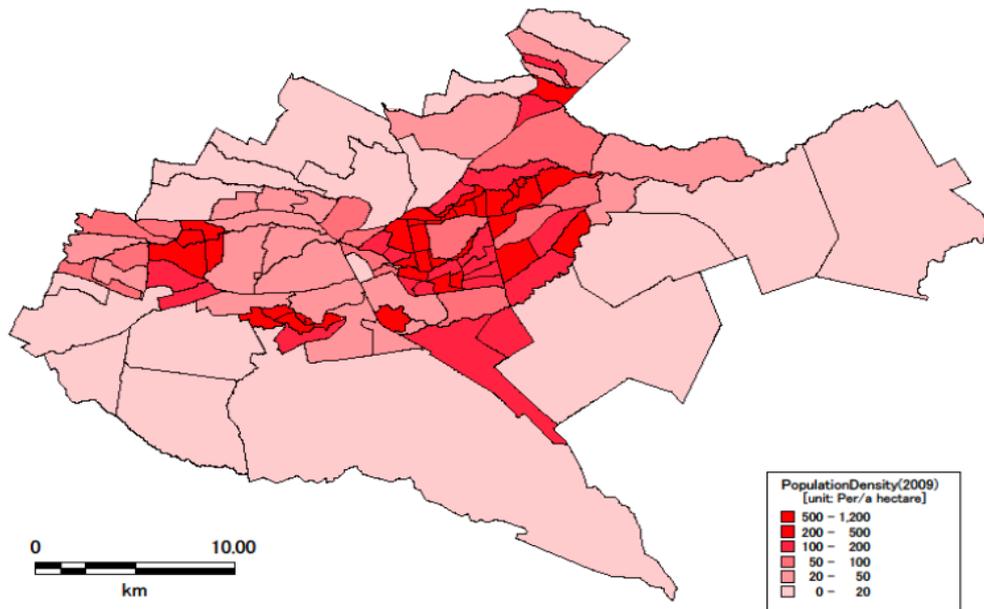
Urban poverty in Nairobi was negligible in the mid 1970s, with only 2.9% of Nairobi households in poverty. However, subsequent rapid population growth and rural-urban migration in tandem with an ongoing decline in economic growth and an increase in structural adjustment policies² caused the marginalization of a large portion of the population into poverty (Foeken and Mwangi 2000, p.

² Structural adjustment policies are the “reduction of government spending, increased taxation, currency devaluation” and a subsequent increase in “real producer prices for agriculture” (Foeken, D. and Mwangi, A. 2000, p. 2).

2). In the large-scale rural to urban migration of the 1980s (Nairobi's population growth rate was 5.1%), most migrants ended up in the low-income areas. By the 1990s, 47% of Nairobi lived in very-low-income neighborhoods, with densities higher than 30,000 persons/km². Segregation patterns continued; now up to 200 slums have taken root throughout Nairobi, mostly on the unplanned East side. West Nairobi is still largely high-income, despite a few slums situated there including Kawangware and Kibera. The following maps shows a correlation between poverty and density in Nairobi.



The share of households below the poverty line by district from the budget survey 2005-2006
 Source: Nairobi City County 2012, p. 2-8



Population density per hectare in Nairobi in 2009
 Source: Nairobi City County 2012, p. 2-3

The urban poverty of the post-colonial era brought informality in both housing and employment. The Nairobi population grew by 51% between 1989 and 1997 but formal waged employment only grew by 15%, showcasing a huge discrepancy in the opportunities available to urban migrants (Foeken and Mwangi 2000). From 1994 to 1997, Nairobi's formal sector grew by 5% but the number of people informally working increased by 65%. Two thirds of Nairobi relied on inconsistent work in the informal sector by the turn of the century (p.3).

Disproportionate disadvantages for the poor are reflected in Nairobi's spatial segregation. Failure to plan and provide services to the East side contributed to poverty levels and informality in those areas, with a lack of public space, lighting, safety, and consistent access to health and affordable food. Globalization has also emphasized segregation of classes in Nairobi, such that high and middle class residents have built exclusionary gated communities for housing and shopping. Shopping malls in West Nairobi (the historically European, planned area) have increased consumption patterns for the rich with ill effects on the food security of and unaffordability for the poor. The supermarkets in these malls, such as Nakumatt, sell "imports from multinational and transnational suppliers, at the expense of local products" (Owuor and Mabatia 2011, p. 128). Globalization, paired with neoliberal development in Kenya, also privatized many public sector services.

History shows how colonial laws manifested the settlement and segregation patterns of Nairobi's urban fabric today. The 2012 Nairobi Integrated Master Plan Draft concluded "the current data on the distribution of social services and facilities throughout Nairobi city's 9 districts suggests that inequalities between facilities in Nairobi East and West may be reflective of the disproportionality of resources caused during this earlier [Colonial] period" (Nairobi City County 2012, p. 2-35). Post-independence Kenyan government could not effectively manage the unplanned and out-of-control urbanization. This led to a plethora of urban problems in Nairobi, including

"declining and stagnating urban economies, diminishing employment opportunities, uncontrolled expansion (urban sprawl) accompanied by the growth of informal settlements, a deterioration in the quality and distribution of basic services, and a decline in the quality of the urban environment, both built and natural" (Municipal Council of Nakuru, 1999, p. 2).

Attempts to apply 'traditional' urban planning frameworks from French, British and North American practice were not suitable for the Kenyan context. Centralized planning frameworks typical of British and French practice aimed for civic design with strong land use regulations, and North American practices emphasized land use zoning and land subdivision regulations to promote private property rights and values. These frameworks have shortcomings in their implementation due to lack of community consensus in planning and of contextual consideration for the rapid uncertainty of urban conditions, and are cited in the rise of low quality informal settlements (Municipal Council of Nakuru, 1999, p. 4). For instance, the Building Code of Kenya (established in 1969 and borrowed from England) set unreasonable building size requirements that led to informal slums. The Code's minimum housing requirements stipulate that a structure should have at least two bedrooms each measuring a minimum of 7m², with a separate kitchen and conduit ventilation. This effectively made minimum plot sizes for a residential housing unreasonable and unaffordable for the poor

(Crispi and Mousmouti 2014).

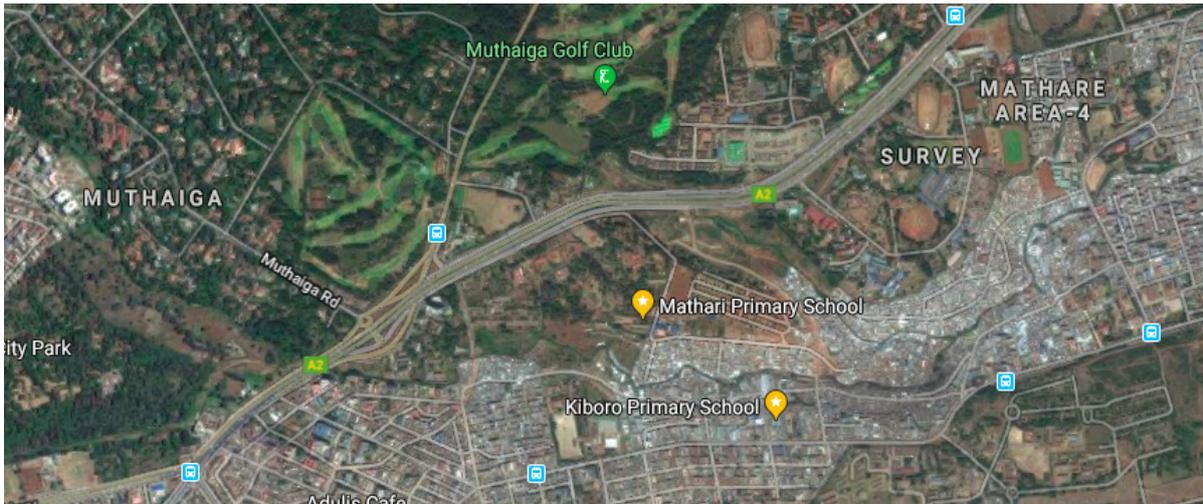
According to a UN-Habitat report from a global sample, “two thirds of the reported plot sizes in informal land subdivisions are smaller than the minimum legal plot sizes” (UN-Habitat 2016b, p. 16), exhibiting that worldwide, inadequate legal frameworks cause housing informality. UN-Habitat recommends setting lower minimum plot sizes for housing to provide affordable and legal options for the poor. Revising the laws that make informal settlements illegal is a step in the right direction for integrating poor residents into the city. Post-colonial African cities face a unique set of challenges in providing the planning and political provision of services to residents, requiring context-sensitive governance recommendations.

4.2 Urban Management in Slums

Informal settlements are called as such because they were not formally planned, but informally squatted by the urban poor, without land tenure or permission from development control officials. Slums often arise without adequate building materials, construction techniques, or infrastructural provisions such as roads, power lines, sewerage, waste management, and other services. According to the 2012 Nairobi Integrated Master Plan Draft, informal settlements arose on the land which was unsuitable for construction (and not taken by the formal sector) like “floodplains, steep slopes, river valleys, or adjacent to sewers or dump sites” (Nairobi City County 2012, p. 2-21). The lack of tenure security or any sort of rights over the land they occupy, prohibits slum dwellers from upgrading their built environment, and leaves them vulnerable to eviction or oppression by politicians and slumlords.

Critiques of profit-driven urban development note how housing inequality is embedded in the structures of class segregation and globalised, neoliberal capitalism (Madden and Marcuse 2017, p. 65). Engels understood housing problems as a symptom of the capitalist mode of production, and the inequality it brings (p. 62). Considering slum housing as a symptom of system-wide inequality recognizes that it is not the housing nor the slum-dwellers that are the problem, but the inadequacy of planning and policies to afford them better circumstances. Despite drastic need in Nairobi, slum upgrading measures or social housing projects to provide alternatives have not been undertaken on a sufficient scale. Notably, the Kenyan government sits on land that could be developed into social housing but fails to assert its right to public land on behalf of the poor.

Neighborhood density correlates directly with income in Nairobi. Six low-income constituencies in Nairobi host over 20,000 people per km²; Mathare has the highest density in Nairobi at 120,000 people per km² (Nairobi City County 2012, p. 2-28). Nairobi’s growth strategy recommends an average density of 37,500 people per km² for the sake of public health (Nairobi City County 2012, p. 2-30). Currently Nairobi has 4,500 residents/km² on average, at the city-wide scale. This is because of the low-density, high-income neighborhoods where residents enjoy plenty green space. Just across the highway from Mathare, a high-income neighborhood called Muthaiga has only 500 people per km² (Nairobi City County 2012 p. 2-29).



Muthaiga to the West and Mathare to the East of Thika Road

Source: Google Earth 2017

**5 person/ha (2 person/acre)
Karen, Muthaiga area**



**1,200 person/ha (480 person /acre)
Mathare, Huruma area**



Densities are recorded at 500 people per km² in Muthaiga and 120,000 people per km² in Mathare

Source: Nairobi City County 2012, p. 2-29

The demographic data available to cities today allows for an easy prediction of the demand for housing. Therefore it is cities' responsibility to recognize the need for adequate land management and affordable services to the urban poor. In 2009, Nairobi had approximately 2 million slum dwellers (roughly 60% of the city's population) with little to no water, sanitation, and healthcare services (Oxfam 2009). The lack of basic services in slums also implicates food security, especially because urban populations in poverty do not have land and water available for farming as the rural poor do. Nairobi's urban poor rely on informal employment and community support systems to survive.

4.3 Institutional Framework

The Constitution of Kenya (2010) decentralized governance through a process called “devolution”. This increased the size and capacity of local governments and thus increased constituents’ political participation. This political advancement granted Kenya’s 47 counties the power over urban planning and land management. As such, the City Council of Nairobi was dissolved and transformed into the Nairobi City County (NCC), “a service provision outfit larger in structure than the defunct City Council of Nairobi. The former bears more functions and responsibilities than the latter some inherited from the Council and others transferred from the national government” (Nairobi City County 2017). According to Muungano Support Trust et al. (2011), the new Constitution and devolution propagated more inclusive governance by “requir[ing] new processes and plan making by local authorities that include slum dwellers, community-based organizations and universities” (Muungano Support Trust et al. 2011).

Following devolution, the Urban Areas and Cities Act (2011) and the County Government Act (2012) stipulated that each county shall prepare a county-integrated plan and operate within this urban/regional plan. NCC initiated an Integrated Development Plan (NIUPLAN) for Nairobi in 2012 to address many urban management issues of the city. However, this plan was drafted but not approved and therefore not legally binding or implementable.

4.3.1 Civil Society Governance

Participation in urban governance activates citizenship and brings the city to life (Merrifield, p. 19). A disconnect between the Kenyan government and its constituents has led to participatory governance through the growth of civic participation. This occurs most commonly through NGOs, CBOs and self-help groups, for Kenyan communities facing the same struggles to register and organize themselves for resource mobilization. Community governance structures in Kenya are essential to ensuring social stability. For example, two food-related NGOs in Nairobi called A Well-Fed Kenya and Nairobi Food not Bombs, operate to fill the gaps where the government fails to provide food for its people. Both organizations operate by distributing extra supermarket food and donations at community feedings in slums. However, storing and transporting the food remains the biggest challenge because of the distance between adequate food supplies and the intended beneficiaries. In an interview with the leader of the aforementioned organizations, he noted: “the government cannot reach everywhere so where they cannot reach, we are there. We are not against the government. We are interested to work with the government, as long as they don’t compromise the project or manipulate it” (Rori 2017).

4.4 Kenya National Food Security Policy

Food security has been on the Kenyan Policy agenda since the first National Food Security Policy of 1981 urged agricultural self-sufficiency. The second National Food Security Policy in 1994 promoted a market-driven approach to agriculture for better food access. However, it seems that the market-driven agricultural system has also driven up the domestic food prices and is a cause of food

insecurity today, due to the use of agricultural land for bio-fuel production, human settlements, and leasing for export production (GoK 2011, p. 5). Policy has mainly been an unimplementable force.

The National Food and Nutrition Security Policy of 2011 (FNSP) outlines the GoK's commitment to developing the Right to Food through self-reliance (p. Vii). The new Policy focuses on providing safety nets and long-term development for the most vulnerable populations and increasing sustainable food production that is affordable. The Policy also notes the right to produce food and the need for government to provide access to productive resources such as land, water, and seeds, and adequate markets for food selling. It also promises to support the majority of workers who are in the informal sector, but lacks indication of direct measures to do so. The Policy's implementation tactic implores the government sectors to develop a legal and institutional framework and mobilize financial resources for improved food security (GoK 2011, p. 11).

4.5 The Legalization of Urban Agriculture

Although UA has existed in Africa since the beginning of urban developments, these activities have been undervalued and resisted by officials until recently. Researchers note that colonial and post-colonial governments found UA to be counter to an ideology of modern cities and therefore discouraged or outlawed it (Gallaher et al. 2013, p. 390). The trend began to change at the end of the 20th century, with studies such as the 1980s Mazingira survey of Nairobi, which documented 20% of households growing crops in the city and 7% keeping livestock (Lee-Smith and Lamba 2017, p. 49).

Civil society agricultural and research organizations in Nairobi including Mazingira Institute, Kenya Agricultural Research Institute (KARI), Urban Harvest - CIP, and International Livestock Research Institute (ILRI) advocated for urban farming and the development of a legislative and institutional framework for its governance (Lee-Smith 2011; Ayaga et al. 2004). Their research-based approach first proved the significance of UA in Nairobi, then endeavored to communicate it to policy makers. They held workshops for dialogue between UA stakeholders, for example the Nairobi and Environs Food Security Agriculture and Livestock Forum (NEFSALF) in 2004, which linked urban farmers together through workshops, courses, knowledge sharing, and collaborations.

Collaborative research between NEFSALF and KARI showed that UA was being practiced in the lowest-income areas of Nairobi (Mathare, Kariobangi, Kasarani, Kibera, Dandora, Korogocho, Laini-Saba-Ngombe, Huruma and Kawangware) and most significantly reaches the poor either with food or income (Ayaga et al. 2004, p.4). The research also showed the health, income, and environmental benefits of urban farming. For example, projects that mixed household waste and livestock manure to make compost kept the neighborhood clean, grew food, and mobilized the community and the youth. Solid waste proved a very promising input for UA, as NEFSALF and KARI studies noticed that 60-70% of waste in Nairobi is organic, and can therefore be turned into compost. In 2000, 2,700 farmers in Nairobi had irrigation systems, 36% of which used waste water, although it is noted that this can be a very risky input due to the presence of heavy metals like lead (Ayaga et al. 2004, p.5). The contamination from pathogens and toxic chemicals in the waste material inputs and the lack

of legal framework to govern UA were the main challenges for urban household farmers in Nairobi at that time.

Civil society workshops recommended that the Nairobi government reform its land laws to allow UA in land use and zoning categories and facilitate forms of tenure that support it. They succeeded in the drafting of a national Peri-Urban Agriculture and Livestock policy by 2009, though it was met with great opposition by the city council (governing body at that time). They were concerned with health problems and lack of food safety standards from locally grown food. NEFSALF contended that “with legality and income comes increased use of health measures” (Ayaga et al. 2004, p.7).

Until legalization of UA in Nairobi City County in 2015, the Local Government Act, the Public Health Act, and city by-laws governed UA activities, though in somewhat contradictory ways. It is noted that because the legal situation was unclear, many assumed UA to be illegal. Nairobi City Council used by-laws to prohibit cultivation on public streets and the keeping of livestock in the city due to its nuisance; the Public Health Act empowered the Ministry of Health to prohibit cultivation and irrigation within and around townships; and the Local Government Act prohibited “cultivation by unauthorized persons on land that is not occupied or enclosed, or land belonging to private persons, government and local authorities” (Ayaga et al. 2004, p.6). However, the Local Government Act simultaneously allowed for agriculture and livestock keeping and the provision of services to assist them, and allowed local authorities to lease, transfer, or allocate land for temporary use (which could include UA).

In the past, urban farmers communicated only with the central government through the provision of extension services. Since decentralization, the Nairobi government provides these services. However, Lee-Smith and Lamba question the top-down nature of service provision and note the importance of “a political voice for the farmers and a say in governance” within these new decentralized relations (Lee-Smith and Lamba 2017, p. 50).

4.5.1 Urban Agriculture Regulation and Promotion Act

After many years of cooperation between the Ministry of Agriculture and civil society, Nairobi City County passed the Urban Agriculture Promotion and Regulation Act in 2015 to support residents of high-density and informal settlements with access to land, water, and agricultural resources like organic waste for urban farming activities (Republic of Kenya 2015, p.3). Their principle aim is to contribute to food security through the development of agriculture in the county by empowering people and institutions through allowing and facilitating agricultural activities for subsistence and commercial purposes.

According to the Act, “promotion” means supportive structures, instructional spaces, capacity building and training for farmers, while “regulation” implies the management of processing, marketing, grading, storage, collection, transportation, and warehousing of products and inputs (including organic waste) (p. 4). The Law establishes procedures to oversee UA law enforcement, such as research for best practices to monitor UA activities (p. 4) and co-management as a viable strategy for implementation of the Act (p.6). The Nairobi City County Urban Agriculture Promotion

Advisory Board was created to advise executive committee members on how they can achieve the Act's objectives (p.7). The Minister of Agriculture stated

“most urban agriculture is done in informal settlements, so that legislation is mostly for those areas, because they are the food insecure areas. But they have challenges. One challenge would be land, secondly water, third food safety, fourth the environmental pollution, and fifth sustainability. Sixth one would be markets. Those are the issues. Because there is a lot of pollution in those areas. But they will get water from any source” (Murithi 2017).

The recent UA policy change shows the government's intentions to support urban farmers, and specifically slum dwellers, by making land and water available to them. However, land and water support arrangements for slum-dwellers to farm have not been formalized because of a lack of collaboration between the Ministry of Agriculture and the Ministry of Environment (Lee-Smith and Lamba 2017 p. 50). The Ministry of Agriculture prides itself on the following achievements: 54 green houses and water storage tanks installed, technology for 260 sack gardens disseminated, 56 fish farming and consumption clinics held, 23 slaughter houses licensed, over 1.5 million animals immunized in Nairobi through free immunization campaigns, milk & green house development for youth projects, 43 fish farming projects and ponds in schools and neighborhoods, and the promotion of other micro garden projects (Nairobi City County 2017). However, it was noted in interview that vandalism and political violence brought on the destruction of many of these projects so far:

“people in slums do not understand how a policy can help them; they think it is the politician that can help them more than the policy. For example we have had some programs to help them improve their livelihoods. We had very many gardens, we had fish ponds and poultry farms but there was a time you hear they destroyed all of them, even the fish ponds, because if it was not [their preferred politician that] sponsored those projects, they will destroy them” (Ministry of Agriculture, 2 November 2017).

This vandalism resulted from political turmoil whereby opposing political parties (associated with particular tribes in Kenya) destroyed each other's developments. The Ministry hopes to advance UA implementation, lacks the funding to do so. They think their programs could benefit from more on-site UA research to compare food safety with diet patterns and hospital cases of those eating the urban produce. While the Ministry of Agriculture is aware that a UA program's success relies on collaboration with other ministries, such as water and irrigation, public space, planning, lands, environment, safety, and health, an attitude change is required to convince all NCC ministries of UA's importance.

It is not the existence of policies or laws that will make for a successful legal framework to enable UA activities, but rather the method of implementing that policy. As the Municipal Council of Nakuru notes in their Structural Plan (2000): “It has been observed that the problems with Kenya's legal system is not so much the absence of laws but rather the inadequacy of its implementation process” (p. 13). Lee-Smith (founder of Mazingira Institute and NEFSALF) says that the “key to the

future governance of food security in the city will be the institutional relationship between Nairobi's farmers and the city government" (Lee-Smith and Lamba 2017, p. 50).

4.6 2017-2022 County Government Policy Aims

A new Nairobi County Governor, Mike Sonko, was elected in August 2017. Upon coming into office he and the deputy governor, Polycarp Igathe, released two documents summarizing their main policy aims for the upcoming five year term. They draw attention to previous urban management actions that have been detrimental to Nairobi County, in "Chronicle of a City Mismanaged". They say that financial corruption halted Nairobi's development: "private greed, not public need, is what has driven county government" (Sonko and Igathe 2017b, p. 3). The Auditor-General, Controller of Budget, and Nairobi County Assembly Committees noted illegal budget managing through the overexpenditure on government wages, where the money should be put into development: "nearly 70% of the County's recurrent budget (69.1%) is spent on wages. This too, is illegal, being far in excess of the 35% ceiling" (Sonko and Igathe 2017b, p. 3). Nairobi County only spends a third of its approved budget on development. Moreover, the city lacks a fixed asset register to list the values and acreage of properties. This lack of land survey leaves public land susceptible to land grabbing (p. 6). In their opinion, better budget and asset management present an opportunity for more effective urban management (Sonko and Igathe 2017b, p. 2).

With these shortcomings in mind, the new governorship plans for Nairobi development, prioritizing waste management, nutrition, mobility, water, business and density. The Manifesto only briefly mentions food security, with concern for the 500% increase in stunting since 2012 from a study by the Ministry of Health (Sonko and Igathe 2017b, p. 15). To remedy this, the Manifesto does not consider food planning or UA, but only the improvement of health facilities: "Nairobi needs to do health planning for its projected population of 5.2 million in 2030 who will need in total 208 health centers" (Sonko and Igathe 2017b, p. 18). Childhood stunting can only be improved through improved food security. Manifesto also calls upon an increase of food markets, to reach the ratio of a market for every 25,000 people. The current 20 open-air markets and 23 super markets are insufficient. Their ratio suggests the construction of 126 additional markets (Sonko and Igathe 2017b, p. 19).

Nairobi's economy is also challenged to absorb the city's young population (76.7% under 35) into employment opportunities (Sonko and Igathe 2017a, p. 5). Women's unemployment is 30% higher than that of men in Nairobi—the average unemployment rate is at 14.7%— indicating additional prioritization required for gender equity.

Finally, the governor prides Nairobi on its former title as 'The Green City in the Sun' and hopes that waste, water, sewerage, and environmental management improvements would bring Nairobi to its former glory. The following case study shows how integrated UA support can manifest the policy aims that Nairobi City County strives for.

5

Case Study - Community Gardening in Mathare



*The case study "Mathare Shamba" is a terraced community garden situated on a steep hillside
Source: Cashman 2017*

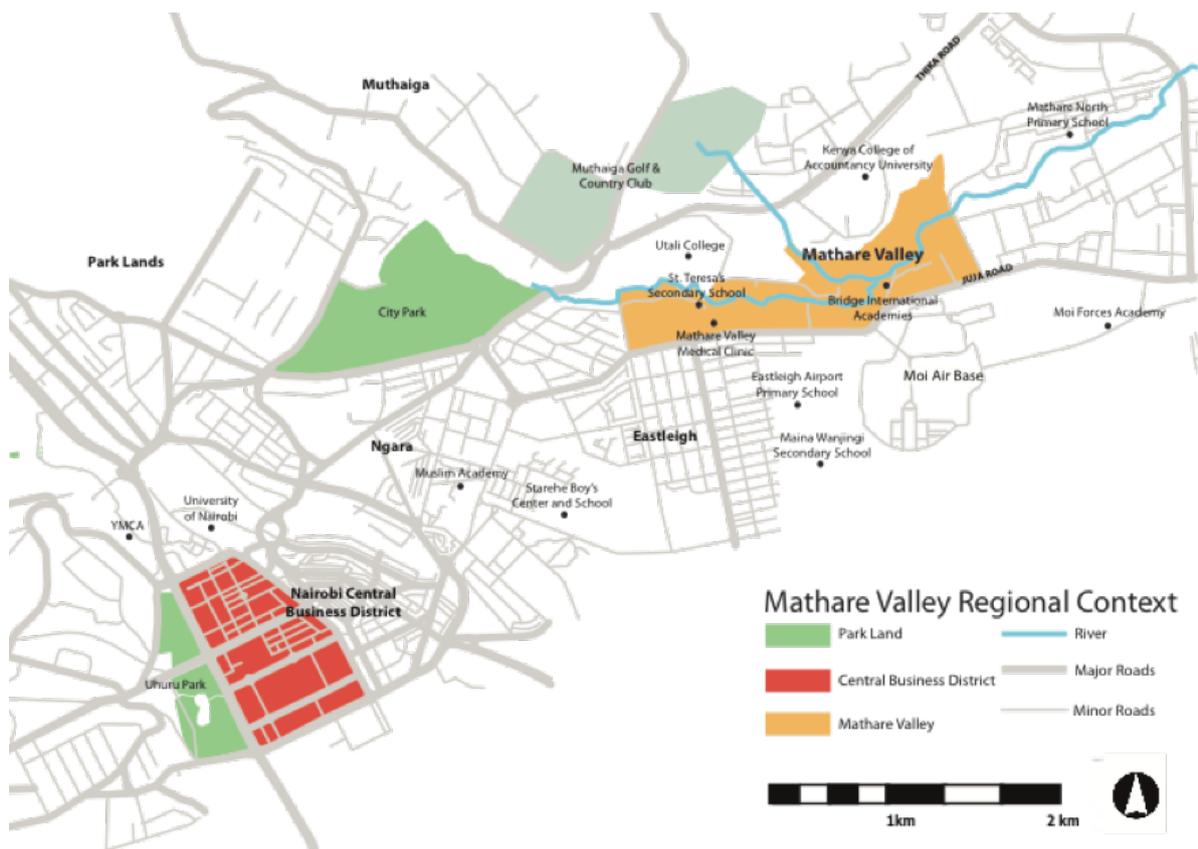
One of the first Mathare residents I spoke to about Urban Agriculture said, "finding space for food cultivation in a dense slum is not easy because all the space that is taken is used by people to build houses; it is nearly impossible to do such a thing here". UA is inherently spatial, and thus is difficult in a dense informal settlement with limited viable land, and strained resources such as water and agricultural inputs. However, one community-based organization called Mathare Bondeni Recovery (MBR) established a community garden on a hillside riverbank in 2010 after recognizing that the neighborhood severely lacked food, green public space and environmental protections. This section of the thesis constitutes the participatory community gardening ethnography carried out at the Mathare Shamba.

5.1 Background of the Mathare Community

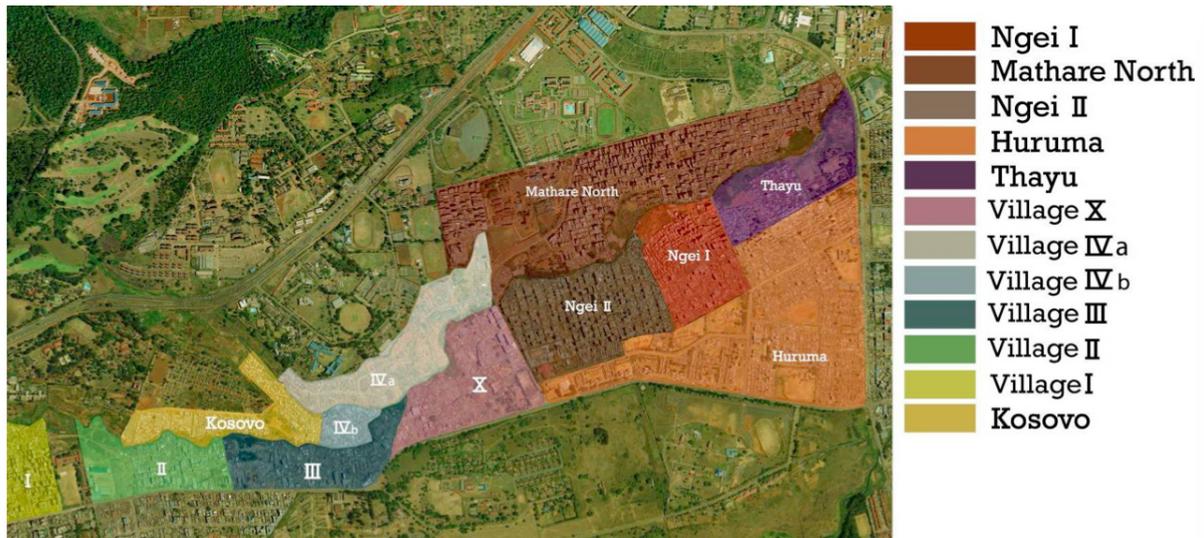
Few “formal” studies have been undertaken to measure the social and spatial features of the Mathare slums. Therefore, this thesis relies on a participatory methodology to show the community project through sensory experiences, photos and interviews.

Mathare is one of Kenya’s oldest and most populated slums. Due to its informality, demographic information of Mathare varies. A collaborative study from 2011 from Muungano Support Trust, the University of Nairobi, and UC Berkeley cited the population of Mathare at 188,183 people (p. 14). In an interview, locals mentioned their distrust of that study because it was not inclusive of the community who did not know about it. Nonetheless, the study puts Mathare as the second largest slum population in Nairobi, after Kibera in the southwest corner of Nairobi.

Mathare is often called ‘Mathare Valley’ because the settlements slope into the Mathare River, which runs through the slum. Mathare is a combination of 12 villages and is situated 6 km northeast of the Nairobi Central Business District.



Mathare Valley regional context
Source: Muungano Support Trust et al. 2011, p. 15



The 12 villages of Mathare. The research takes place in Kosovo and Village III (also called Bondeni). Kosovo is named after the Kosovo war of the 1990s, because of violence. Bondeni means 'boat' in Kiswahili.

Source: Dianga 2012, p. 3

5.1.1 Informal Employment and Community Reliance

The majority of Mathare residents work in the informal sector. Muungano Support Trust et al. (2011) estimates 87% of residents are casual laborers or have informal businesses (p. 18). Friends of mine from Mathare call themselves “hustlers”, which means that each day they try to find someone to hire them for a small job to make some money for food. For example, during power outages, Joshua (17 years old) goes door to door asking neighbors for a few Kenyan shillings to fetch them water. While the average household income is 8,500 Kenyan shillings per month (equivalent to 85 USD), monthly expenditures are over 9,100 Kenyan shillings, which puts many in debt and poverty. Poverty and the fluctuation in income due to informal employment cause food insecurity (Muungano Support Trust et al. 2011, p. 18). High unemployment also stimulates theft, drug and alcohol abuse, and sex work.

Mathare community members depend on one another for survival. According to Muungano Support Trust (2011), “one third of all residents report membership in a community organization”, most commonly for financial support (p. 16). The MBR group who runs the shamba, for example, was founded as a recovery center for alcohol and drug addicts and registered as a self-help group with Nairobi County in 2010. They have an office with a single bed for those suffering from overdoses, and the 40 members help each other combat the addictions and mental illnesses they face, as well as the desolate lifestyle of unemployment in Mathare. Many of them work at a riverside chang’aa factory, which produces a very dangerous and illegal alcoholic brew, to which many are addicted. One interview respondent called chang’aa “the cash crop of Mathare”; its presence is felt throughout the neighborhood, with high levels of addiction and related deaths. MBR operates like a safety net for members, as they rely on one another financially during crises. When the brother of one of MBR’s leaders was critically injured in a piki (motorbike) accident in September, MBR collected funds for his hospital bills.



*MBR members making chang'aa across the river from the Shamba
Source: Cashman 2017*

5.1.2 Food Security and Health Concerns

My friend Kevin (16 years old) was to arrive at a community data collection activity at 10. When he came at 11, I asked him where he had been, and he informed me that he had been searching for breakfast prior to joining us. Finding food that morning had taken him hours. The challenges of life Mathare include overcrowding, frequent fires, poor sanitation, the lack of drinking water, physical barriers to accessibility, underemployment, and food insecurity. Only 11% of Mathare residents have an at-home water connection; most buy water in jerry cans at a communal station. According to Muungano Support Trust et al., “almost every [Mathare] village fails to meet the minimal Sphere Humanitarian standard of no more than 250 people per water point, with some villages having more than 700 and 1,500 people sharing one public water tap” (p. 26).

Without toilets, plumbing, and trash collection, in addition to the heat of the sun and high volumes of industrial waste, Mathare carries a noticeable smell. It is not only unpleasant, but it is also unsafe. Poor sanitation renders the residents susceptible to many water and food-borne illnesses like cholera and typhoid, which spread when water and food is infected by feces. Disease is a common reality which affects their ability to work, cook, eat, and provide for themselves.

When my North American father visited Mathare one day, the garden group asked his age. Learning that he was almost 60, they were shocked: “here in Mathare, you don’t get to live to that age and if you do, you will not be able to move around” (Mathare Bondeni Recovery 2017). Low life expectancy rates remind us of the very tangible health benefits wealthy people are afforded.

Food insecurity is caused and exacerbated by unemployment, lack of mobility, low educational attainment, and poor sanitation in Mathare. Additionally, the density of urban life does not allow for residents to easily build household gardens.

5.1.3 Housing and Safety

Most homes in Mathare are self-constructed with cheap local materials such as corrugated iron or rammed earth, and leave only small alleyways in between. Household rent costs approximately 1,200 Kenyan shillings (12 USD) per month (Muungano Support Trust 2011, p. 18). Population density figures for Mathare range from 87,377 (Sonko and Igathe 2017b., p. 17) to 120,000 people per km² (Nairobi City County 2012, p. 2-29), making Mathare unarguably the densest area of Nairobi, at more than double NCC's recommended density (2012, p. 2-30). Because of the unplanned construction, sewerage is limited and the small pathways between houses prevent service vehicles like firetrucks and ambulances from coming in emergencies.



Mathare's corrugated iron homes in dense constructions

Source: Cashman 2017

Fatal fires caused by electric circuits or outdoor cooking frequently erupt and they spread quickly and incur much damage before the residents can put them out. District services like ambulances, fire trucks and waste collection do not reach Mathare, but the police come when there are riots to quell. During 2017's violent election season, frequent riots destabilized the neighborhood. The first time I visited Mathare in August, a large group rioted along Juja road. Police tear gassed the crowds, and caused all residents and rioters to run away to find shelter. Police killed dozens of Mathare residents throughout the election season, a frequent occurrence throughout the informal settlements during periods of high political tension.

5.1.4 Public Space and Accessibility

Despite being only 6km from the Nairobi City Center, Mathare lacks mobility connections. Thika

Highway and Juja Road are the main access points, but they are fast paced and dangerous. Reaching Mathare on foot, by public transport (matatu) or by motorbike is also perilous due to the unpaved and winding dirt roads, made cavernous by flood lines and haphazard ditches, not to mention the crowds of people and animals in the street. It can take residents hours to reach work, school and other destinations on foot.

There are few bridges to cross the Mathare river. An unfinished pedestrian bridge connects Bondeni to Kosovo and the next place to cross requires a 25-minute walk in either direction. The bridge is situated just 60m west of the garden and is a critical social hub for the community.



*The wooden ladder to used to climb the bridge frequently has a long line
Source: Cashman 2017*

However, the bridge was left unfinished in a politician's bid for votes over ten years ago, so pedestrians must climb a makeshift wooden ladder in order to cross. In a survey of those living near the bridge (Mathare Roots Youth Center 2017), 25 of 29 respondents (86%) feel unsafe crossing the bridge due to the 4m fall between the bridge and the ground, which can occur when there is fighting, drinking or drugs involved. The ladder becomes dangerously slippery during rain, especially for those carrying heavy bikes, children, water, bags of cement, tools and other work materials and goods. Most respondents (except the elderly, who cannot climb the ladder) continue to use the bridge due to the lack of alternative routes to school, work, the hospital, visiting friends, food shopping, and other daily tasks. The unfinished bridge represents the community's distrust of the government, as they were promised a bridge ten years ago and it's still unfinished.

Survey respondents were also acutely aware of the lack of public spaces and the dangers caused by lack of urban design. For example, three women cited the lack of street lighting at night as a danger in the area because of robbery and rape.

5.1.5 POLLUTION AND WASTE MANAGEMENT



*The Mathare River is full of waste. The Shamba is situated on the left hillside riverbank
Source: Cashman 2017*

Residents noted that twenty years ago the Mathare River was clean enough to fish and swim in, but now it is toxic and trash-ridden. On rainy days, the river changes from grey to brown, as the toxic waste washes downstream, but it quickly reverts to grey sludge. Household sewage, trash and industrial waste from chang'aa production pollute the river daily. 29 of 30 survey respondents in Bondeni and Kosovo said throwing waste in the river is the most viable waste management option. 68% of respondents also throw their trash in the informal dump site by the river and 14% burn their waste. These methods go unchallenged due to the unavailability of other waste disposal methods. However, 29 survey respondents were also amenable to paying small amounts for waste collection, such as 10 Kenyan shillings (\$0.10 USD) per sack. A community-managed waste collection systems holds promise for public space improvement and environmental management in Mathare.

Paper and food waste are the two most common waste materials in Mathare (Mathare Roots Youth Center 2017). Since both are organic, they can be made into compost and can be used as fertilizer in planting.

5.2 Mathare Shamba Project



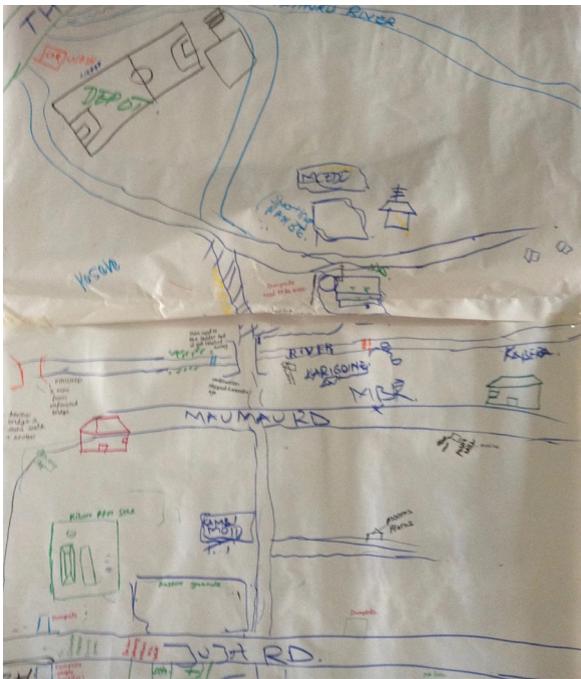
The Shamba has 6 terraces built into the hillside where community gardeners plant local vegetables like Sukuma Wiki (kale)

Source: Cashman 2017

5.2.1 Site History

The Mathare Shamba was established in 2010 when MBR secured the right to use a large police-owned plot near the river, adjacent to the unfinished pedestrian bridge and an informal dumpsite. With financial assistance from Coopi International NGO, six terraces were built into the hillside and filled with uncontaminated soil from a nearby forest. The garden provides the community with food and opportunities for training and capacity building.

A community mapping exercise illuminated that the land near the Mathare Shamba, in the Kosovo village, is mostly police-owned and off-limits if not permitted to use it. The river, the pedestrian bridge and the Shamba were the first landmarks to be noted on the community map, indicating the area as a social hub.



*Community mapping exercise show landmarks in Kosovo and Bondeni
Source: Mathare Roots Youth Center 2017*

Friends who have lived in Mathare for more than twenty years recall when the dumpsite and Shamba land was full of trees they used to play in. According to an urban legend, a leopard from the forest once killed a neighbor's goat. The forest was cleared as newcomers used the trees as wood to build illegal housing. The police department tore down the illegal houses, and now the area is a dumpsite.

The Mathare Shamba is situated on underutilized public/police-owned land, but the idea that public space is 'to be enjoyed by all' is not a perception of Nairobians. For many in Mathare, 'public space' indicates government ownership and they feel that state-owned lands are off limits to them. 'Community space,' rather, implies that locals have a say in its design and creation and are also able

to enjoy it. The Mathare Shamba participants call the garden a community space, rather than public space, due to deep distrust of the government and their wish to disassociate from government activities.

In 2010, the Mathare Police Depot carried out a security assessment of the Mathare Shamba site and granted use of the land for environmental purposes, as the garden's terraces prevent erosion into the river. Nairobi City County officially welcomed the implementation of the Mathare Shamba project, as its proposed activities contribute to the achievement of the Nairobi City County Development Plan, especially in the improvement of food security and WASH (Water, Sanitation, and Hygiene). Thus, MBR was entrusted with the maintenance of the land. A fence was installed around the garden as a protection against goats who come and eat the plants. However, after years of continued vandalism, the fence is now falling and lots of trash gets into the garden, implicating the health and safety of the plants. MBR members want better security at the garden, to make it less publically accessible.

5.2.2 Shamba Management

The Mathare Shamba typifies a community garden because it is collectively run by a CBO, and the rules are set by the group. Compost creation is a very important input in the Shamba, and food production is not the only benefit. MBR created the garden to combat their addictions, and provide an opportunity for productive engagement and food for starving community members. Until now the food has not been sold, but given freely to neighbors and members in need:

"If our neighbors don't have food they can come to us and request something, Then the managers of the Shamba come to the chairman, and then he will decide to give it to them, not for sale, just for free. We are working for the people who are needy, seriously needy, because we know people who are. Even us, most of us we don't have jobs, and we fight for eating" (Mathare Bondeni Recovery 2017).

Despite MBR members' low education levels (with schooling only until grade six), their group has a formalized structure, including a Chairman, Assistant Chairman, Garden Manager, Treasurer, Secretary, and many youth members. However, the group has struggled to consistently manage and upkeep the garden, citing the need for further planting plans, security strategies, and organization. The struggle to upkeep the garden is a commonly encountered capacity problem with voluntarily-led community projects (Bohn and Viljoen 2014, p. 43).



*Shamba management meetings took place at the garden and in MBR's office
Source: Cashman 2017*

5.2.3 Relationship Between Shamba Participants and Nairobi City County

Although the government approved the garden they did not offer any hands-on or financial assistance for tools or training. Mathare gardeners were unaware that UA was legalized in 2015. In fact, they feared the government would destroy their project. The gardeners have visited government ministries to get support for the garden, but were denied because they did not have a bribe. MBR members were uneasy about applying for a grants from the U.S. government, because it requires the district officer's and the Nairobi city government's signatures:

"So, to give us the stamp they need first money from us. First we give them the money, then they give us the stamp so things can go on. That is the problem in Kenya, if you don't give money, it's like my brother said here, they will just postpone. But when you produce the money, immediately it will be done" (Mathare Bondeni Recovery, 2017).

Due to the community's distrust of the government, proposals for collaboration between stakeholders should build trust and mutually benefit both groups.

5.2.4 Skill-Building Activities: Composting and Budget Management

In September 2017, MBR held a composting workshop with 30 participants in the garden. Participants collected green (wet) and brown (dry) organic materials from the nearby dumpsite and mixed them with water and goat manure bought from a neighbor. Shamba managers then turned the compost every few days for two weeks until it was decomposed and ready to be mixed into the soil for planting. Community members observed that using compost increased the growth

and quality of vegetables grown.

Community skill-building also included planning and budgeting workshops for site-upgrading interventions. In the meetings, UN-Habitat volunteers asked MBR to craft budgets for projects that could improve the Shamba's success. MBR's increased management capacity facilitated the installation of a piped water connection to broaden the scope of local agricultural production beyond rain-fed farming methods, and the construction of a wooden fence along the top of the Shamba facing the street, and a poultry cage on the side of their office. These new skills contribute to tangible and intangible advancements in food security for the group.

5.2.5 Food Production

When I first visited the garden in August 2017, the garden hosted tomatoes, onions, sukuma wiki (kale), sugar cane, and flowers, though they were very unhealthy, having not been consistently watered nor tended to. Production was low. In our initial meetings, MBR said they hoped to increase their harvest to include maize to make unga, the corn flour used for ugali, which is Kenya's staple grain. The group prefers to plant crops that produce food quickly and are commonly grown in Kenya like spinach, kale, tomatoes and onions, rather than the elaborate or experimental crops that UN-Habitat volunteers proposed. Together we planted green beans, cabbage, zucchini, kale, spinach, managu (another indigenous leafy green), sunflowers, and four trees. Sunflowers were planted to remove toxicity from the soil, and enhance the scenery. MBR explored ways to harvest the sunflower seeds to produce oil. Most of the vegetables except the cabbage survived and produced consistent food. However, the produce was frequently destroyed by children stepping on the crops, birds eating them, or a lack of maintenance.

Crops flourished when planted from October-December, during one of Nairobi's rainy seasons, but dried up when the rainy season ended. Even though the Shamba now has a water connection and storage tank, managers did not water the plants frequently enough. The water was also used by neighbors during emergencies such as fires. The food production rates measured in six months were not enough to feed the 30-person group daily; they merely supplemented their diets. However, the Shamba created opportunities for improved food security in other ways.



The installation of a water connection helped the gardeners grow consistent vegetables
Source: Cashman 2017

5.2.6 Environmental and Spatial Improvements

The garden instigated four major environmental improvements. Firstly, the compost activities initiated patterns of sustainable waste management. Secondly, the installation of a direct water source improved plant health and was also drinkable for gardeners. Thirdly, the sunflowers provided a visual appeal to the garden and gave it identity. Finally, trees offered from another CBO's nursery prompted tree planting as a goal of the garden.



Sunflowers turned the Shamba into a place of interest and identity
Source: Cashman 2017

6

Analysis and Recommendations to Nairobi City County

Finding space for food cultivation in a dense slum is not easy because residents use the space to build houses. The Mathare Shamba's position on a hillside unfit for construction and adjacent to an informal landfill made it possible, but was also a challenge. The Shamba has survived for many years despite dangerous circumstances due to burning trash and industrial waste from chang'aa, as well as a lack of maintenance funds. The project exhibits the possibility for sustained productive community spaces in low-income neighborhoods.

"Here in 2017, this is the only surviving shamba in Mathare. All the other ones are dead, it is just this one. That's why we want to make a history from it. It is with our passion that we want to build it, until even the government of Kenya can come and see it and say 'hey these people are living in Nairobi and built a shamba here. That is very wonderful' (Mathare Bondeni Recovery 2017).

6.1 Key Findings and Reflections

The research initially intended to reveal the extent to which community gardens can ameliorate food security for low-income groups living in Nairobi's slums. While working on the Mathare Shamba with MBR, a number of observations changed the initial research aims. It became clear that community gardening in this challenging setting does not drastically change food security levels. Production rates are not sufficient to feed those in need. The garden has existed for 7 years and many of its operational team still live on one meal a day, struggle to feed their families, and continue to work as manual labourers in very dangerous and unjust employment situations.

Low resources and education rates limit the Mathare Shamba. Environmental constraints due to pollution and vandalism also challenge the project's potential. However, the garden creates many other positive social and spatial improvements in the neighborhood: increased environmental and agricultural education, intergenerational learning, waste management, Placemaking in open space, opportunities for food-related income generation, and collaboration between community groups. The challenges to developing the project illuminate key recommendations as to how the NCC Ministry of Agriculture can use the momentum of UA legislation and existing community developments to create trust between the vulnerable slum populations and the local government.

We can measure the impact of Mathare Shamba on the community based on the benefits of UA studied in chapter 3:

6.1.1 The Shamba for Food Security Innovation

The garden makes very few tangible food security advancements. With low levels of farming skills and technology, little food is produced. However, successful garden management inspired MBR members to expand their feeding program through the construction of a poultry operation near their office. The feeding program is primarily for struggling addicts in the program while they rehabilitate in the care of MBR.

6.1.2 The Shamba for Income and Employment Generation

Although the garden is not yet providing financial income, its little food produce does supplement MBR's food expenses. The sharing of tools and materials also led to mutual benefit through economies of scale. Improving the Shamba has catalyzed the group to plan for the sale of compost and the development of a poultry program. Moreover, planting and maintaining vegetables offers a positive and healthy activity to fend off demotiation and drug use and thus is a valuable use of time nonetheless. However, because the garden does not yet self-sustain it still depends on foreign aid.

6.1.3 The Shamba for Public Green Space

The garden turned idle land into a communal green space for shared water, food, landscaping and leisure. As a meeting point of geographical reference, many gatherings and opportunities for social progress took place there. Environmental improvements also made it a safe space for youth to hang out and relax. However, protecting the garden from vandalism, kids, and thieves, requires fencing to make it less of an open space.

6.1.4 The Shamba for Ecological Education

The garden initiated workshops on compost, budgeting, management, and other skill-building activities. Participants learned about agriculture: the names of plants, how to plant, how to weed, how to water, how to pick the produce, and other lessons. The project also taught participants about plumbing, through the installation of a water source, and construction through the creation of the fence and poultry program infrastructure. Important intergenerational learning exchanges took place between village elders and youth on Shamba soil.

6.1.5 The Shamba for Decentralized, Participatory Governance

The Shamba strengthened the network of community-based organizations. For example, youth involved in the Shamba were introduced to the Mathare Roots Youth Center through data collection activities; they now have access to the computer room and recreation areas. As another example, members of the Mathare Social Justice Center visited the Shamba one day to offer us trees from their nursery. Also, when installing the water source, the You and I Youth Group (from the Kosovo side of the river) and the Mathare Roots Youth Center (from the Bondeni side of the river) facilitated conversations between village elders from either side of the river. Any construction or intervention

in the area requires dialogue between residents. However, all parties expressed mutual goals and offered their support to help one another's endeavors.

The Shamba project attracts both Mathare residents, and also visitors to the neighborhood. On numerous occasions, kids, young adults, and elderly folks stopped to ask if they could help. Various groups of UN volunteers from all around the world visited the project each weekend to participate, which also created possibilities for outside funding. Shamba members appreciated the UN-Habitat visitors who showed up consistently, commenting that people who sustain their involvement care more, and they are more open to working with them. Moreover, conversations about the Shamba with the Ministry of Agriculture, inspired them to look for ways to support the project.

6.1.6 The Shamba for Collaborative Neighborhood Development

Beyond these five characteristics, the research shows an additional effect: the garden catalyzed collaborative community-led neighborhood improvements. George Gachie, a Mathare Roots Youth Center leader, said: "the Shamba is like the baby of the project; it's like the seed that started it all." The garden facilitated the exchange of ideas and instigated development proposals in waste management, public space design, and income-generating enterprises.

Waste Management Interventions

The informal dumpsite next to the garden generated conversations about better waste management options in Mathare. The waste management data collection activity (30-person survey) made it apparent that without options for removing waste from Mathare, trash ends up burned, in the river, or scattered in informal dumpsites. Almost all respondents were amenable to an informal collection service whereby local youth collect sacks of rubbish for a small fee and take it out of Mathare to a designated pick-up point. Initiating a program like that would require government collaboration, as they facilitate the trash pick-up from designated points to the city dump site in Dandora.

Secondly, the reuse of organic waste as compost fertilizer in the garden catalyzed an awareness of solid waste's environmental impacts. A coordinated composting training program could streamline the Nairobi urban metabolism by reusing waste materials within the city to help produce food.

Renovations to the Mathare Bridge and Community Hall

The neighbourhood lacks well-designed, clean, safe, and accessible public spaces (referred to as 'community spaces'), as many Mathare residents cited negative perceptions of government-owned ('public') spaces. Therefore, volunteers of the Shamba proposed community-driven approaches to open space improvements through two notable renovations to the shared bridge and the shared community hall.

The garden brought physical accessibility to the attention of residents and UN-Habitat because of the danger of the pedestrian bridge across Mathare River. UN volunteers drafted a funding proposal to upgrade the unfinished pedestrian bridge leading to the Shamba. The proposal recommended a

collaboratively designed and constructed set of staircases and ramps on both sides of the bridge to connect Kosovo and Bondeni. The proposal aims to make the site accessible and safe for all residents, including women, children and vulnerable groups; create the potential for follow-up projects to improve the safety and amenity of the space; transform the bridge area into a productive community hub; and provide training opportunities in construction and design development for local youth.

A community hall in Mathare was identified as a second public space upgrade proposal to be completed by the community organizations, in collaboration with UN-Habitat. The community hall project aims for a management program that will self-sustain the building maintenance through revenue generation. The hall could be used one day a week as a farmer's market, charging a small rental fee to vendors. On other days, the hall could be rented and used for education and training, recreation, service provision, or social events. Involving youth in the management of this multi-purpose space, as at the Mathare Roots Youth Center, is hugely beneficial in providing employment and skill-building and reducing vandalism and petty crime. The community hall in Mathare Bondeni is already constructed, but needs renovation and management. An international group of researchers from Cambridge University previously conducted a participatory design workshop to plan for the hall's renovation but plans halted when the outside funding stopped. This project also added to Mathare residents' distrust of outsiders who make false promises, reiterating the need for continuous sustained involvement and follow-through.

6.2 Effectiveness of the Urban Agriculture Regulation and Promotion Act in Mathare

No Mathare resident that I talked to had heard of the UA Regulation and Promotion Act of 2015, and many distrusted the County's purported support for their community garden project. They mentioned how corruption fuels Nairobi's development, so if you don't have pocket money to pay officials, they will not help you. This makes it difficult for low-income Mathare residents to access government services. As evidenced by projects in Mathare, the Kenyan government is not accountable to the needs of the urban poor in slum areas. There is a disconnect between various policy aims and County legislation.

Assessing the Law's effectiveness recalls UN-Habitat's Law Assessment Framework (2017b). The 2015 Law aligns with policies such as the National Food Security policy, advocating solutions to urban food insecurity. In this sense the UA Regulation and Promotion Act is effective. However, the Law's mechanisms and processes are not clearly defined, thus allowing too much discretion. The Law fails to detail how UA projects in Nairobi can apply for support, or how the committee will administer it.

The institutional roles and responsibilities to carry out the law's implementation are unclear. The Ministry of Agriculture created the Promotion Advisory Board, but the members do not meet regularly nor have they organized specific programs. Moreover, the Ministry has not effectively coordinated with other ministries such as water, land, environment, and public space to provide UA support.

The language of the Law is clear, unambiguous and understandable both by professionals and

common citizens. However, the Law does not ensure its capacity for implementation. Finally, human and financial resources are inadequate for the successful implementation of the legislative framework in this area. The Ministry of Agriculture lacks the capacity and coordination to bring about the Law's intended outcomes.

The Nairobi Urban Agriculture Promotion and Regulation Act would benefit from a more detailed definition of regulation and promotion with a specific program for implementation. What does it mean for the County to support those involved in UA, beyond the formal 'legalization' of their activities? Interviews with the Mathare community show their unfamiliarity with the laws and policies guiding urban development, slum upgrading, and UA activities in Nairobi. The law's implementation requires coordination between Ministries and the communities practicing UA on the ground.

6.3 Urban Agriculture Governance Recommendations for Nairobi City County

A comprehensive management approach for UA must take into account the psychological, communal, educational, and environmental advantages of green space in general. As such, an integrated program to support community-led UA activities could enhance Nairobi's 'Green City in the Sun' policy aim, to maintain city greenery while mutually improving food security for informal settlement groups. This would require collaboration between many NCC Ministries, including agriculture, land, water, public space, and education.

More specific UA governance recommendations are addressed through a return to UN-Habitat's 5 pillar Action Framework for the Implementation of the New Urban Agenda: national urban policy, urban design, rules and regulations, urban economy, and local implementation (2017a, p. 1):

6.3.1 The Right to the City in National Urban Policy

Kenyan National Urban Policy offers the opportunity to increase the Right to the City for residents of informal settlements through an adjustment to the laws which makes the settlements illegal to begin with: colonial land management systems which are not attune to the Nairobi context, limited programs for housing affordability, and tenure systems which do not offer opportunities for slum dwellers to improve their circumstances. Informality need not hinder urban agriculture. Deregulation could actually legitimize and assist community-led developments by allowing for usufruct land to be used by people who are not the owners, for example. By accepting and legalizing the informal in the urban fabric, self-help organizations can be empowered to improve the urban landscape, without needing money or land ownership to do so. The positive benefits of using usufruct land for urban agriculture are shown through the environmental changes Mathare residents made to the vacant, undesirable hillside by turning it into a community garden. The government could work as a mediator between landowners of and community gardeners to help to legalize these activities.

6.3.2 Participatory Urban Public Space Design

It is recommended to make Nairobi's open spaces more accessible through participatory urban design processes, such as Placemaking. In order to include communities into urban design, the NCC can enhance already-existing community activities and upgrade public spaces according to requests and proposals from communities. This could include the grant-model KDI uses in Kibera, as they host competitions for organized community groups to apply for funding. KDI then sustains support throughout the development and offers assistance where needed. Moreover, using public space productively, whether through micro-enterprises, markets, or food growing, offsets the government's costs for maintenance.

6.3.3 Effective Rules and Regulations

Thirdly, the importance of rules and regulations in UA governance has been well-covered by this thesis, as they ensure the implementation of policy goals. Integrating community garden support into the urban development scheme requires comprehensive legislation backed by solid policies and coordinated plans, and organizational bodies and mechanisms for its implementation, including many Ministerial bodies of the NCC. To this end, the NCC should run an outreach campaign to show their support and inform communities of the urban agriculture Law and available programs. The Urban Agriculture Promotion and Regulation Act stipulates that it should be used to effectively administer land and water resources to urban farmers.

6.3.4 An Equitable Urban Economy

The urban economy pillar calls into question the opportunity for income generation through community gardening. While communally-managed assets are difficult to formalize into employment, the NCC could support urban farmers by installing more open-air markets for local produce or provide cheaper ways for urban farmers to sell their produce in existing markets. This has been stated as a policy aim of the incoming governor. The priority should be upgrading existing markets to improve food security for Nairobi's poor residents, especially those in slums. Facilitating connections between local food producers and consumers is one of the key tenets of a sustainable urban food system. Green business models are an opportunity to upscale UA endeavors.

6.3.5 Decentralized, Local Implementation

Governance over urban space determines the success of a community garden. As with any project, management is a key feature. From my observations as a participant in the Mathare Shamba, the essentiality of sustained engagement is emphasized in community gardening, not only to maintain the plants, but also to care for the site itself. Projects will not advance if not initiated and progressed by the local community. So, while outsiders can coordinate and contribute funding, they cannot ensure its success. For outsiders to help the project, they should sustain their involvement and build trust with the community.

To ensure "local implementation", the NCC should understand civil society's role in local neighborhoods. These bottom-up organizations such as MBR, Mathare Roots Youth Center, You

and I Youth organization, and Mathare Social Justice Center offer essential service provision where the government's capacity lacks; MBR runs the garden, Roots Youth Center offers key education and skill-building opportunities for youth, and You and I Youth manages the small-scale informal waste management scheme in Mathare. The NCC can improve its relations with informal settlement residents by supporting these groups, for example through a series of events and trainings on urban farming techniques. Trainings, workshops and skill-building collaborations would also advance the NCC's education goals in connection to urban services like waste management, public space, and food production.

7

Conclusion

This thesis originally intended to explore the urban management of Nairobi's food systems. However, the research led me to the possibility for food security solutions through the creation of food-producing public spaces in challenging urban areas. The research illustrates community gardens as equitable urban developments which manifest the Right to Food and the Right to the City. The Mathare Shamba case study showcases low-income residents participating in the design, planning, and development of an equitable and accessible urban landscape.

Institutionalized segregation and large-scale informality, resulting from colonial and post-colonial governance, created barriers to food access in Nairobi. The barriers are upheld by contemporary neoliberal urban development patterns. For example, prioritizing private property and exclusionary urban design contributes to social disparity and food insecurity for the poor. Because traditional urban planning frameworks in Nairobi failed to accommodate the urban poor, this thesis advocates participatory urban management techniques to more effectively deal with contemporary problems, while proactively preventing future ones.

Community gardens in low-income urban areas defy profit-driven norms. The 'alternative' market logic to connecting food production with food consumption in the hands of the workers, who collectively toil the land, is counter to the capitalist forces driving urban development. As seen from the Mathare Shamba, community gardens also catalyze social cohesion and improve public space in the urban environment.

UA disrupts and defies binaries between urban and rural land uses, recreational and productive space, and capitalist and ecological development. Urban managers can use urban agriculture to break down these binaries by allowing citizens to optimize urban space with ecological principles. Urban managers must ensure that planning and legal frameworks are inclusive and participatory, and guarantee the Right to the City for all, especially the poor.

Moreover, because food security remains an ongoing concern for cities and rural areas globally, given the population growth rates, urbanization rates, and the limits of resources, agriculture must evolve. Agriculture can innovate land uses, resource circulation and urban metabolic systems through UA projects. Non-binary land use studies on agriculture in urban space will be crucial to the dissemination of this information.

The Nairobi County Ministry of Agriculture progressed urban planning in 2015 through the Urban Agriculture Regulation and Promotion Act. However, the Law has been difficult to implement and thus has not achieved its intended impacts to ameliorate food security for the urban poor. Building trust between the government and slum dwellers means sustained involvement and hands-on support from the government.

While the research originally intended to explore how community gardens ameliorate urban food security in Nairobi, the Mathare Shamba illuminated different benefits of communally growing produce. The main aspects include: the greening of open spaces, providing a place for community meetings and interactions, increasing organizational cohesion, and facilitating educational workshops and skill-building activities. This exemplifies how community gardens are a unique form of UA, as the focus is not solely on food production, but also manifesting bottom-up improvements to the community and the physical environment. As a spatial and social site, the Mathare Shamba brought attention to a 'place'. Because the Mathare Shamba is a place with a purpose, not just an open field, it the seed to grow other projects to improve life in Mathare.

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