UNIVERSITY OF CAPE TOWN

Sustainable urban agriculture: a sustainable adaptation strategy for the City of Cape Town?

Practices and views on sustainable urban agriculture and climate change in Cape Town

by
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DECLARATION

I hereby declare that I have read and understood the regulations governing the submission of MPhil specializing in Climate Change and Sustainable Development dissertations, including those relating to length and plagiarism, as contained in the rules of this University, and that this minor dissertation conforms to those regulations.

I hereby declare that I have read and understood the regulations governing the submission of dissertations for the MPhil specializing in Climate Change and Sustainable Development, including those relating to length and plagiarism, as contained in the rules of this University, and that this minor dissertation conforms to those regulations.

I further declare specifically that I know the meaning of plagiarism and that all the work in this dissertation, save for that which is properly acknowledged, is my own.

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Date: 18th June 2017

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ABSTRACT

This work explores the narratives associated with the benefits of sustainable urban agriculture areas in terms of adaptation to climate change in the Cape Town Metropolitan Area, South Africa. Urbanization and climate change are stressing urban areas in developing countries. Therefore, finding a development path towards "sustainable adaptation" remains a critical matter for humanity. Adaptation is sustainable only if it takes into consideration climate risks, while maximizing both social justice and environmental integrity. Urban agriculture is defined in this dissertation as the urban and peri-urban locations where agricultural practices, either the production of crops, livestock, or fish, utilize urban resources for the purpose of selling and consuming these goods produced locally, supporting the urban economy and providing a supply of food for urban citizens. Sustainable urban agriculture encompasses urban agricultural areas operating towards the satisfaction of human food, the preservation of environmental resources, the economic viability of agriculture and the enhancement of the quality of life of farmers, farm workers, and society.

This research reviews the practices and views of urban agriculture stakeholders in Cape Town on sustainable urban agriculture to determine if the practices of urban agriculture could be a part of a sustainable adaptation strategy. The methods used to answer this question included a systematic review of studies on urban agriculture worldwide since 1980, and a review of the urban agriculture and adaptation to climate change policies which are implemented at the metropolitan level, all supported and tested through interviews with key informants. Non-Government Organization (NGO)-based community farming initiatives such as Oranjezicht City Farm, Abalimi Bezekhaya or the ERF 81, independent farmers, municipal and provincial government representatives were interviewed. A critical discourse analysis method was utilized to analyze the findings.

The study found that the narratives at the metropolitan level, including the policies and the views of governmental representatives, remains focused on the food security contribution whereas the practitioners' narrative expressed an interest in the economic opportunities and social benefits that sustainable urban agriculture can bring, as stated by the literature on sustainable urban agriculture. The key practitioners and NGOs narratives suggest that sustainable urban agriculture is contributing to the adaptive capacity of the farmers as they are using practices such as permaculture or organic farming, which allow them to cope with the impacts of climate variability and climate change. If sustainable farming practices were emphasized instead of farming practices towards small-scale, home-based activity to improve households' food security, the adaptation framework at the municipal and provincial level would be aligned with practitioners and NGOs narratives and would contribute to the sustainable adaptation capacity of the city.

The recent shift within the City of Cape Town towards the broad concept of resilience could bridge the gap between current policy and practices, and informants' narratives, but it remains too soon for this to be tested. This study concludes suggesting that the analysis of the informants' and literature's narratives on sustainable urban agriculture express potential to contribute to climate change adaptation and the reduction of vulnerability in Cape Town but alignment between policy and practitioners' needs, wants and actions needs to take place.

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LIST OF ACRONYMS

CDA	Critical Discourse Analysis
CoCT	City of Cape Town
COP	Conference of the Parties
DEA	Department of Environmental Affairs
WCDEA&DP	Western Cape Department of Environmental Affairs and Development Planning
DWAF	Department of Water Affairs and Forestry
FAO	Food and Agriculture Organization of the United Nations
IMF	International Monetary Fund
INGO	International Non-Governmental Organization
IPCC	Intergovernmental Panel on Climate Change
NGO	Non-Governmental Organization
PHA	Philippi Horticultural Area
SDB	Social Desirability Bias
UN	United Nations
UNDESA	United Nations Department of Economic and Social Affairs
UNFCCC	United Nations Framework Convention on Climate Change
WB	World Bank
WCG	Western Cape Government

I. INTRODUCTION

INTRODUCTION

The United Nations Framework Convention on Climate Change (UNFCCC, 1992:3) defines climate change as "a change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods". The Intergovernmental Panel on Climate Change (IPCC) estimates that globally, due to climate change, "the frequency of warm days and warm nights will increase in most land regions, while the frequency of cold days and cold nights will decrease" (Stocker *et al.*, 2013:72). The African continent is expected to warm faster than the global mean average temperature (Niang *et al.*, 2014), while the Southern part of the continent will experience more droughts than other parts of the continent (Stocker *et al.*, 2013).

In South Africa, climate change projections up to 2050, under unmitigated emission scenarios, foresee a very significant warming as high as 5–8°C, over the South African interior by the end of this century; a general pattern of a risk of drier conditions to the West and South of the country and a risk of wetter conditions over the East of the country (Department of Environmental Affairs [DEA], 2013b). The temperatures across the Western Cape region are strongly expected to increase. Projected increases for the period 2040 to 2060 are between 1.5°C and 3°C and most models predict a decrease in rainfall (Jack & Johnston, 2015). Climate change and its impacts are stressing the Western Cape region (Mukheibir & Ziervogel, 2007; Western Cape Department of Environmental Affairs and Development Planning [WCDEA&DP], 2014). The impacts of climate change, coupled with severe poverty and level of inequalities experienced by the south African society causes significant threats to the country's water resources, food security, health, infrastructure, as well as its ecosystem services and biodiversity (DEA, 2011a).

In South Africa, as all over the continent, the vulnerabilities to climate change of populations are emphasized by the overlapping trends of rapid population growth and high rate of urbanization. Africa's urban population is growing faster than any other region. By 2020, 24 of the world's 30 fastest growing cities will be in Africa (Food and Agriculture Organization of the United Nations [FAO], 2012). With an urbanization rate of 2.8% per year in South Africa, between 1996 and 2001 (Todes *et al.*, 2010), the rapid growth and high concentration of people in cities increases vulnerability in terms of infrastructure, health and people's capital. Urban climate change risk assessments have been conducted in the City of Cape Town municipality. The impacts of climate change on business and tourism, air quality, health, water resources, food security, infrastructure and biodiversity have been assessed (IPCC, 2014). In the global South, the investments needed to accommodate the rapid rate

of urbanization are not sufficient or can be maladaptive (IPCC, 2014). Urban settlements are constantly expanding but the creation and adaptation of infrastructure do not follow, therefore putting the population at risk of climate change hazards and impacts. In 2004, the Department of Water Affairs and Forestry (DWAF), currently the Department of Water and Sanitation (DWS), identified greater Cape Town as the first major urban region in South Africa where the demand for water will exceed the total potential yield for the area (DWAF, 2004). Latest reports on municipal water surplus states that the water supply will only be adequate to 2020, under the worst-case scenario (DWAF, 2014). The Southern Coast, where Cape Town is located, is also at risk of droughts and flooding as well as of alien species invasion and land use change due to climate variability and extreme events (WCDEA&DP, 2008). More than an environmental threat, climate change poses critical challenges for national development (Ziervogel *et al.*, 2014).

However, if cities are vulnerable to climate change, they can also be resourceful places. The expansion and intensification of cities can lead to higher levels of exposure to climate change, however the inter-linkages of the cities in terms of administrative, financial, social or political processes and flows make them specific places of innovation and opportunities (Birkmann *et al.*, 2010). Cities have the ability to act on the food system, through regulation and control, and manage resources, such as water and energy supply. Cities have municipal tools and mandates to act towards adaptation to climate change, such as transport planning, urban greening, agriculture and adaptation to climate change policies. Therefore, cities are described as environments where implementation of adaptation strategies are possible (Birkmann *et al.*, 2010). As such, the City of Cape Town is a place with a high diversity of activities. For instance, Cape Town is a city, which grows its own vegetables. If the extent of the contribution of the urban agricultural areas to the entire Cape Town food supply is still unknown, estimations have said that almost 100 000 tonnes of fresh produce are grown annually in the Philippi Horticultural Area (PHA), one of the production areas in the city, with a large proportion of it entering Cape Town's food system (Western Cape Department of Agriculture, 2016). Local urban agriculture initiatives are developing at a time where cities and social organizations are being rethought and reshaped as a result of global trends associated with population growth, poverty and urbanization (UNHabitat, 2014). Although the initiatives in Cape Town have different farming practices, motivations and geographical locations and issues, they all contribute to the food system and to the development path of the city.

In the literature, urban agriculture examples have been highlighted for its great benefits in terms of sustainable adaptation to climate change, from environmental benefits (water management, soil erosion, energy consumption…) to social development (poverty alleviation, social cohesion, citizenship empowerment…) (De Silvey, 2003; Glover, 2004; De Zeeuw, Van Veenhuizen & Dubbeling, 2011; Battersby & Marshak, 2013). However, most of the research on social benefits of urban agriculture have been carried out in the Northern hemisphere, while urban agriculture in developing countries is mostly seen as a poverty and food insecurity alleviation strategy. Literature has

considered some components and benefits of urban agriculture in Cape Town, and especially its food provision benefits (Frayne *et al.*, 2009; Battersby, 2011b; Battersby-Lennard & Haysom, 2012), but none has interrogated the relevance of urban agriculture to the climate risk vulnerabilities and sustainable adaptation strategy of the city, although, in South Africa, agriculture and forestry are seen as crucial sectors for adaptation to climate change (DEA, 2013a). These sectors are expected to be severely impacted by climate change, but also to contribute to it. Indeed, agriculture is responsible for 14% of the country's greenhouse gas emissions (DEA, 2011b) and is a large consumer of water for irrigation. In the meantime, agriculture is vulnerable to changes in water availability, water pollution and soil erosion. South Africa is calling for a change of agricultural practices (such as use of crops) and for the development of "climate-smart agriculture" in rural agricultural areas (SmartAgri, 2015), understood as the improvement of the "overall efficiency, resilience, adaptive capacity and mitigation potential of the production systems" (FAO, 2010:2). However, when it comes to climate change and the agriculture sector, the focus remains on adaptation in rural areas through community-based, bottom-up strategies (DEA, 2013a). The country is experiencing rapid and expanding urbanization and, as such, agriculture in urban areas becomes an emerging important part to be taken into account within the agricultural adaptation strategies. Although the conventional agriculture located in rural areas comes with negative environmental, social and economic externalities, small-scale farmers, some of whom are located in urban areas, are very vulnerable to rainfall variability and climate change (DEA, 2011a).

Hence, this study is part of the effort to bridge the knowledge gap on urban agriculture as a possible sustainable adaptation strategy for the City of Cape Town. This study will investigate the practices, perceptions and views on sustainable urban agriculture as a sustainable adaptation strategy at the metropolitan scale. Throughout this research the term municipal will encompass the metropolitan scale, *i.e.* the policies and municipal representatives from the City of Cape Town. The critical discourse analysis (CDA) will interrogate the narratives on sustainable urban agriculture in Cape Town and evaluate its potential as a sustainable adaptation strategy, according to the narratives expressed by the informants interviewed. This research will present the narratives and possible change urban agriculture could trigger in the adaptive capacity of the city by evaluating the different benefits of sustainable urban agriculture initiatives expressed in the city.

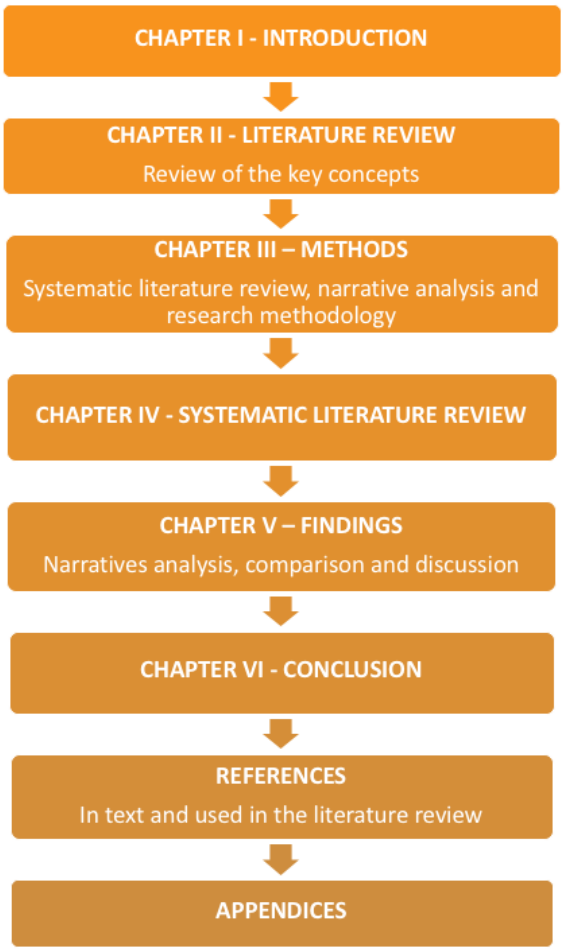
In the face of such urban development and climate risks for agriculture (DEA, 2013a); food production, agricultural livelihoods and food security in South Africa have become significant national policy concerns. In Cape Town, urban dwellers are vulnerable to climate change from different perspectives. Firstly, because Cape Town's exposure to climate change is high, as increased temperatures, frequency of heat waves and changes in rainfall are expected to have severe impacts on the population (WCDEA&DP, 2014). Also, the very diverse and unequal distribution of population in Cape Town contributes to the amplification of harm caused by exposure to climate change risks. The Cape Flats population for example is more sensitive to climate change, and particularly to floods and heat

waves (City of Cape Town [CoCT], 2006). The question of the development path to take to accommodate sustainable development and adaptation to climate change remains. How to achieve a sustainable adaptation, understood as adaptation measures focusing on social justice, environmental integrity and taking climate risks into consideration at the same time. In order to follow this development path, more research and studies need to be carried out in Africa. This dissertation is a contribution to the research effort on the issue of urban agriculture in regard to sustainable development under a changing climate. The outcome of this research could provide new information on the development path to follow, which would finally reconcile humanity with the environment on which we depend to live (Hopwood, Mellor & O'Brien, 2005).

I.A. DISSERTATION OUTLINE

This dissertation is built on six chapters (see Figure 1). The introduction chapter sets the rationale of this research and introduced its main aims and objectives. The second chapter presents a review of the key concepts used throughout this dissertation. It sets out a review of the literature arguments and concepts which are used and referred to in the following sections of the dissertation. The third chapter explains the methodology used to carry out this research. The novelty of this research lies in the mix of sources used and analyzed. Stakeholders' and literature's narratives are studied together in this research, *i.e.* the narratives gathered in interviews with informants, through policy analysis and from the systematic literature review, as per the Petticrew and Roberts methods (2008). These narratives are analyzed following the critical discourse analysis methods developed by Fairclough (2012). Therefore, the third chapter presents these different methods as follows. First, it explains the critical discourse analysis used to analyzed the mix of sources, and then presents the methodology behind the interviews of informants and behind the systematic literature review. The fourth chapter presents the outcome of the systematic literature review. The fifth chapter exposes the results of this critical discourse analysis. The sixth chapter concludes this dissertation.

Figure 1. Structure of the dissertation



I.B. RESEARCH AIMS AND OBJECTIVES

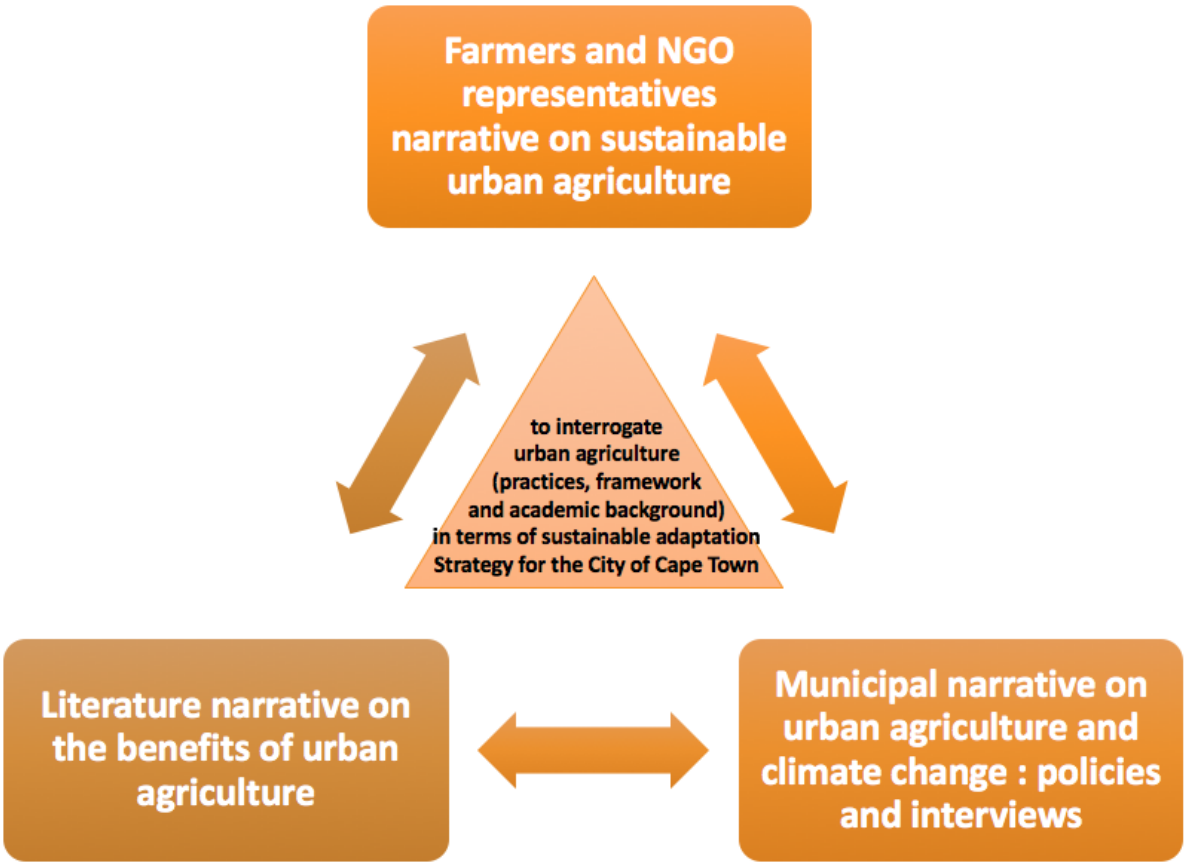
I.B.1. RESEARCH AIM

This Master's dissertation aims to interrogate the narratives on the benefits of urban agriculture areas[1] in terms of sustainable adaptation to climate change in Cape Town, and evaluate its potential as an adaptation strategy, according to the narratives expressed. This research aims to improve our understanding of the different narratives in Cape Town on sustainable urban agriculture and its benefits as a sustainable adaptation to climate change strategy. By reviewing narratives from

[1] The terms of urban agriculture will be used in this research as an umbrella term encompassing urban and peri-urban agriculture (see definition in Chapter II)

practitioners farming on the ground, municipal representatives at the city level and theories and studies on urban agriculture from national and foreign academics, urban agriculture in Cape Town, its practices, its political framework and academic background, will be better understood. Therefore, the potential for urban agriculture to contribute to the adaptation strategy designed by the city can be assessed and the research will contribute to the global body of literature on urban agriculture. Figure 2 shows how and which urban agriculture narratives will be explored and compared during this research.

Figure 2. Narratives explored in this dissertation and their comparison



I.B.2. RESEARCH OBJECTIVES AND TARGETED OUTCOMES

More specifically, the study will analyze the understanding and experience of climate change by the sustainable urban agriculture farmers and NGO representatives in Cape Town as well as their narratives on the role of urban agriculture to urban adaptation to climate change in reference to the literature's narrative. The study will then compare the municipal and literature's narratives on urban agriculture and adaptation to climate change in order to investigate the academic background informing urban agriculture and adaptation policies implemented at the municipal and provincial level. Finally, the study investigates the congruity of the municipal urban agriculture and climate

change policies with the farmers' and NGO representatives' experiences and expectations in order to establish if the policies of the City of Cape Town are aligned with the narratives of the practitioners in Cape Town in terms of urban agriculture and adaptation to climate change.

The term 'narrative' is used in this research in the understanding of Fairclough (2012) as an "order of discourse", *i.e.* a specific articulation of diverse "genres", "discourses" and "styles". As such, informants' and literature narratives encompass the use of language (genre), the representations (discourse) and the identity (style) of the narrator.

Analyzing and comparing different farming initiatives and types of stakeholders' narratives is expected to contribute to the discussion on urban agriculture and its benefits as a sustainable adaptation strategy as well as to define the potential for urban agriculture to contribute to the adaptation strategy designed by the city. The critical discourse analysis used to study the different narratives will allow the research to confront different views and perceptions of stakeholders in Cape Town with academic literature. The scientific and academic background underlying such narratives will then be exposed and better understood. This first phase will then feed the last analysis section, which will look at the congruence and divergence between the stakeholders' narratives in the light of the academic background they relate to. Such a process will allow the study of the potential for urban agriculture to contribute to the adaptation strategy designed by the city. Indeed, the alignment points between city policies and officials and urban agriculture practitioners will be revealed. The enablers and constraints to an improve adaptive capacity at the municipal level will exposed.

II. LITERATURE REVIEW OF THE KEY CONCEPTS

INTRODUCTION AND CHAPTER OVERVIEW

This section serves to introduce the key concepts used in this research. Defining and understanding the terms and concepts used enables the research to stand on solid ground and helps the reader to follow the train of thought and analysis developed later in this research.

II.A. ADAPTATION TO CLIMATE CHANGE IN SOUTH AFRICA

II.A.1. CLIMATE CHANGE PROJECTIONS AND RISKS

IPCC estimates that the global mean temperature increase will range from 1°C to 3.7°C by 2100. According to the different scenarios used, sea level is likely to rise by 0,21 to 0,59 m by 2100. These estimates could even be increased by 0,1 or 0,2 m according to the evolution of the ice-sheet outflow (Church et al., 2013:1185). Globally, "the frequency of warm days and warm nights will increase in most land regions, while the frequency of cold days and cold nights will decrease" (Stocker *et al.*, 2013:72). However, these projections hide huge continental and regional disparities. The African continent is expected to warm faster than the global mean average temperature (Niang *et al.*, 2014), while the Southern part of the continent will experience more droughts than other parts of the continent (Stocker *et al.*, 2013). Nonetheless, the projections are not accurately representative of the local climate projections which differ from the North to the South of the continent.

In South Africa, climate change projections up to 2050, under unmitigated emission scenarios, foresee a very significant warming as high as 5–8°C, over the South African interior by the end of this century; a general pattern of a risk of drier conditions to the West and South of the country and a risk of wetter conditions over the East of the country (DEA, 2013b). Climate is seen as a significant threat to the country's water resources, food security, health, infrastructure, as well as its ecosystem services and biodiversity, considering the high levels of poverty and inequality (DEA, 2011a).

According to Jack and Johnston (2015), in their review of climate change and agriculture in the Western Cape Province of South Africa, future climate projections follow the continental trends with some local variations. The temperatures across the Western Cape region are strongly expected to

increase. Projected increases for the period 2040 to 2060 are between 1.5°C and 3°C and most models predict a decrease in rainfall (Jack & Johnston, 2015). Climate change and its impacts are causing water stress in the Western Cape region (Mukheibir & Ziervogel, 2007; WCDEA&DP, 2014). In 2004, the DWAF identified greater Cape Town as the first major urban region in South Africa where the demand for water will exceed the total potential yield for the area (DWAF, 2004). Latest reports on the municipal water surplus states that the water supply will only be adequate to 2020, under the worst-case scenario, *i.e.* without successful implementation of water demand management measures and considering the actual growth in water requirements (DWAF, 2014). The Southern coast, where Cape Town is located, is at risk of droughts and flooding as well as of alien species invasion and land use change due to variability and extreme events (WCDEA&DP, 2008). More than an environmental threat, climate change poses critical challenges for national development (Ziervogel *et al.*, 2014).

II.A.2. ADAPTIVE CAPACITY AND SUSTAINABLE ADAPTATION

In facing such climate change and hazards, each and every place and population is not vulnerable to the same degree. Indeed, vulnerability depends on the severity of the hazards at first but also on the exposure, sensitivity and adaptive capacity of a system (Baede *et al.*, 2008). As such, the IPCC believes that adaptation is the adjustment of practices, processes and systems in order to limit negative effects and take advantage of opportunities associated with climate change (IPCC, 2007a) and as such can reduce sensitivity to climate change, while mitigation can reduce the exposure to climate change, including its rate and extent (IPCC, 2007b).

Adaptive capacity, as a component of vulnerability amongst exposure and sensitivity, allows a representation and assessment of the capacity of an individual, a society, a city to face climate change and its impacts (Pelling, O'Brien & Matyas, 2015). The adaptive capacity is defined by Nelson *et al.* (2007) as "the preconditions necessary to enable adaptation, including [economic], social and physical elements, and the ability to mobilize these elements" (Nelson *et al.*, 2007:297). Therefore, at the city level, the adaptive capacity depends on its resources, but also on the utilization of these resources. According to the level of understanding of and engagement with climate change impacts and risks at the city level, a municipality might develop a certain level of adaptive capacity. Adaptive capacity is also an individual characteristic depending on individual capital, such as income, social networks or level of education. Adaptation measures aim at improving adaptive capacity to increase the means and opportunity to anticipate, face and recover from climate change impacts, while decreasing exposure and sensitivity (UNISDR, 2009).

As such, adaptation to climate change cannot be seen as a goal *per se*, but rather as a development path to reach sustainable development (Eriksen *et al.*, 2011). On that point, Eriksen *et al.* (2011) have elaborated on the idea of sustainable adaptation. According to them, climate change could be made more relevant to policy-making by contextualizing it within a sustainable development framework. Framing adaptation and mitigation within sustainability could contribute to a range of

sustainable goals, while sustainable development policies could contribute to adaptation and mitigation (Eriksen *et al.*, 2011). The sustainable adaptation idea is based on the assumption that responses to climate change create social and environmental externalities (positive and negative externalities as well as trade-offs of externalities) in the present and in the future (Eriksen *et al.*, 2011). As such, adaptation is sustainable only if it takes into account climate risks, while maximizing both social justice, environmental integrity. Sustainable adaptation then implies changes within development paths as the social, economic and political structures underlying contemporary problems should be challenged (Eriksen *et al.*, 2011). At a city level, following a sustainable development path including sustainable adaptation to climate change will then refer to the choice made by local governments to integrate social justice and environment preservation within policies such as the economic development policies, the transport policies or the industry and tourism policies. In doing so, the backbone of the development policies designed by the local government would aim at a sustainable development pathway, maximizing social justice and environment integrity. The word maximization is used here in reference of the mathematical concept of maximization, defined as the process of finding the maximum value of a function ("Maximization, noun", 2017). Therefore, maximizing social justice and environmental integrity can still be maximized to their highest level possible, given the circumstances.

II.A.3. INTERNATIONAL AND NATIONAL INTEREST IN CLIMATE CHANGE ADAPTATION

The terms "developed" versus "developing"; and "global North" versus "global South"; will be used interchangeably throughout this research. Although the World Bank (WB) decided not to use this terminological differentiation anymore since the 2016 edition of its World Development Indicators (Khokhar & Serajuddin, 2015), the distinction between categories of countries remains. Low-income countries and middle-income countries (defined by their gross national income) are still considered unique categories of countries, *i.e.* emerging economies, by economists and the academic world (Farber, 2013). Moreover, these terms are only used in reference to the economic dichotomy made from the international institutions such as the International Monetary Fund (IMF), the WB or the United Nations (UN) agencies; this does not imply any sort of judgement of the development status of the countries (Khokhar & Serajuddin, 2015). This research acknowledges that the use of non-economic indexes to produce a classification of countries (such as well-being or sustainability of society) would reflect another order of the world. However, this classification is not the most widely referred to and agreed upon. Therefore, this research acknowledges the unevenness of situations within the developed and developing countries (Farber, 2013), but the terms of "developed" versus "developing" and "global North" versus "Global South" will be used for convenience in this dissertation.

From the establishment of the UNFCCC (United Nations Framework Convention on Climate Change) in 1992, adaptation, along with mitigation, have been set as priorities for international action and

development projects. Instruments were created and funds allocated to enhance adaptation options. Internationally and nationally, instruments, plans and funds emerged significantly with time and alarming projections. Since the Bali Conference of the Parties (COP) in 2007, Least Developed Countries and other developing countries are now designing and implementing their National Adaptation Plans of Action under the requirements of the international climate change framework. Africa has gained experience in planning and implementing adaptation projects at different levels and across a range of sectors (Niang *et al.*, 2014).

The political and international texts still emphasize mitigation over adaptation (Niang *et al.*, 2014). However, a shift in focus is occurring. Issues around adaptation to future climate impacts are more and more debated by policy makers and academics. Adaptation strategies are often local community-based initiatives. These initiatives can be supported by Non-Governmental Organizations (NGOs), with regional, national and sometimes international institutional support, in which the private sector occasionally sees an economic opportunity (Niang *et al.*, 2014). Whereas mitigation projects or mostly governmentally led strategies, supported by international donors, in which the private sector is implicated through taxes and regulations.

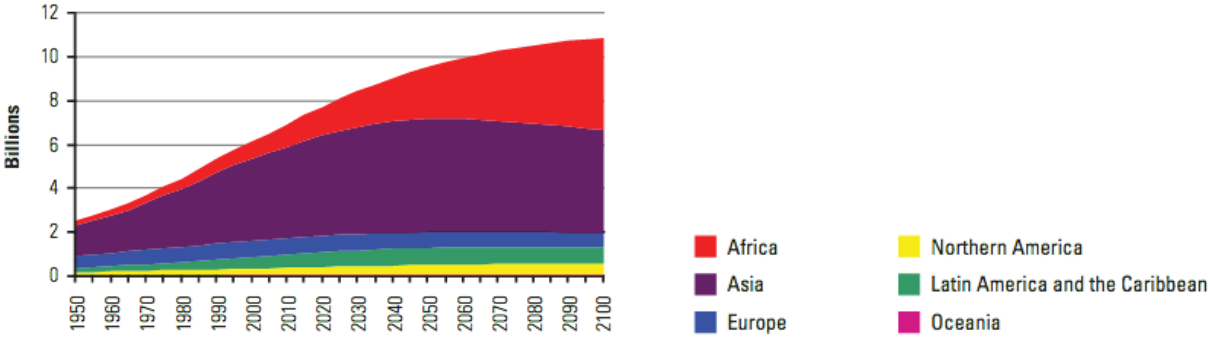
In South Africa, the South African National Climate Change Response White Paper was the first formal outline of the national government's involvement with climate change and it stated the need for a national adaptation strategy, while setting out the South African Government's vision for an effective climate change response: "a long-term, just transition to a climate-resilient and lower-carbon economy and society" (DEA, 2011a:5). To achieve such a vision, adaptation actions should aim to "manage climate change impacts through interventions that build and sustain South Africa's social, economic and environmental resilience and emergency response capacity" (DEA, 2011a:5). In the Western Cape, the climate change strategy designed in 2014, also emphasizes the need to "reduce the climate vulnerability, and develop the adaptive capacity of the Western Cape's economy, its people, its ecosystems and its critical infrastructure in a manner that simultaneously addresses the province's socio-economic and environmental goals" (WCDEA&DP, 2014:21). These national and provincial climate change strategies in South Africa are utilized as framework to enable local implementation, such as city-scale adaptation policies.

The National Development Plan (Vision 2030) also frames climate change adaptation in South Africa (National Planning Commission, 2012) through sectoral interventions with national, regional and municipal strategies for agriculture, energy, water or climate change. In Cape Town, there are municipal strategies with some climate change adaptation components such as the Energy and Climate Change strategy or the Urban Agriculture Policy, some of which will be reviewed later in this research. Climate change adaptation guidelines are embedded within other sectoral strategies (SmartAgri, 2015: chapter 10).

II.B. URBAN ADAPTATION TO CLIMATE CHANGE

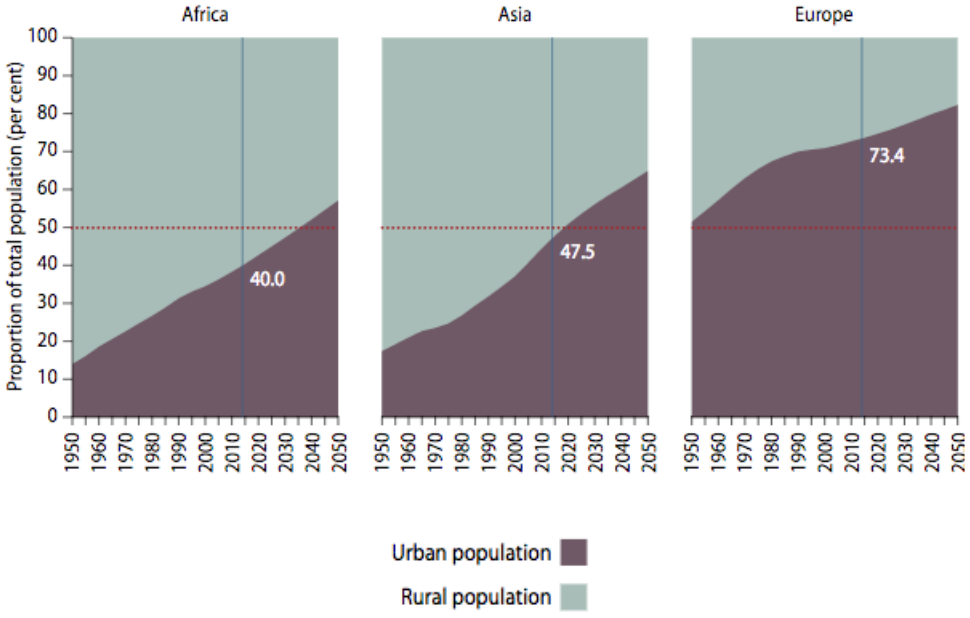
Research on adaptation in urban areas is especially needed in Africa according to the high climate risks and high rate of urbanization and population growth (UNHabitat, 2014). Africa's urban population is growing faster than any other region and is expected to triple by 2050 (Figure 3). The very high rate of urbanization in Africa (Figure 4) is expected to contribute to an increase in the number of megacities and large cities throughout the continent. By 2020, 24 of the world's 30 fastest growing cities will be in Africa (FAO, 2012). These changes are predicted to influence the development path of the continent as economic and social challenges are directly linked to urban areas (UN Department of Economic and Social Affairs [UNDESA], 2014).

Figure 3. Population growth by major area 1950-2100



Source: UNDESA, 2012. World Population. UNDESA: Population Department

Figure 4. Urban and rural population as proportion of total population in Africa, Europe and Asia (for comparison) 1950-2050



Source: UNDESA. 2014. Population Division. World Urbanization Prospects: The 2014 Revision

These two factors combined make cities in Africa highly vulnerable to climate change. Indeed, the rapid growth and high concentration of people in cities increases vulnerability to climate change in terms of infrastructure, health and assets of people (UNHabitat, 2014). "The ability of [cities] exposed to climate change to resist, absorb, accommodate and recover from the effects of climate change in a timely and efficient manner, including through the preservation and restoration of their essential basic structures and functions" is known as urban resilience (UNISDR, 2009). The capacity of the cities to prepare, respond to and alleviate impacts is reduced because of the unequal distribution of human, financial, technical and social capital (Simon & Leck, 2015). Meanwhile, cities and urban regions have influence over their local micro-climate due to their scale and the high concentration of people (Revi *et al.*, 2014). The example of the urban heat island is illustrative of such a relationship, when the urban areas and their greenhouse gas emissions are amplifying the greenhouse effect locally, resulting in higher temperatures in cities than in the adjacent countryside (Bornstein, 1968).

Urban climate change risk assessments have been conducted for the Southern African region (SADC Secretariat, 2016), as well as for cities such as Durban (the eThekwini Metropolitan Municipality) (eThekwini Metropolitan Municipality, 2010) or Cape Town (the City of Cape Town municipality) (CoCT, 2005) in South Africa. The impacts of climate change on business and tourism, air quality, health, water resources, food security, infrastructure or biodiversity have been assessed (IPCC, 2014). The investments needed to accommodate the rapid rate of urbanization in the global South are not sufficient or can be maladaptive (IPCC, 2014). Urban settlements are constantly expanding but the creation and adaptation of infrastructure do not follow, therefore putting the population at risk of climate change hazards and impacts. The 2014 IPCC report describes cities from the Southern African region as places with low adaptive capacity due to structural factors (lack of infrastructure), but also due to poor capacities and resources within the local municipality departments and mandates (IPCC, 2014).

However, if cities are vulnerable to climate change, they can also be resourceful places. Cities have the ability to act on the food system and manage resources, such as water and energy supply (Birkmann *et al.*, 2010). Transport planning, urban greening, agriculture and adaptation to climate change policies are municipal tools used by cities to act towards adaptation to climate change. Therefore, cities can be comprehended as environments where adaptation strategies are possible (Birkmann *et al.*, 2010). If the expansion and intensification of cities can lead to higher levels of exposure to climate change, the inter-linkages of the cities in terms of administrative, financial, social or political processes and flows make them specific places of innovation and opportunities (Birkmann *et al.*, 2010). Sustainable adaptation strategies to climate risks have the opportunity to increase the resilience of cities. The peculiar characteristics of cities make them areas where adaptation to climate change can be implemented through strategic planning (Parnell & Pieterse, 2014).

From the point of view of Eriksen *et al.* (2011), sustainable adaptation can be used to address three problems stated in the vulnerability literature. Firstly, the fact that climate change is a global problem affecting current and future populations. Sustainable adaptation gives responses that are sensitive to both spatial and temporal consequences of climate change. Furthermore, sustainable adaptation could reduce vulnerability as it would target vulnerability and poverty at the same time. And finally, sustainable adaptation strategies have the ability to reduce global greenhouse gas emissions and facilitate a rapid transition to low-emission economies. "Responses to climate change can thus be seen as a means to promote alternative development pathways, such as transitions to low-carbon economies, organic agriculture and horticulture, agroforestry, ecological sanitation, water harvesting, water purification by the use of solar energy, alternative modes of transport, decentralized renewable energy supply, recycling or participatory plant breeding" (Eriksen *et al.*, 2011:10).

II.C. AGRICULTURE AND ADAPTATION TO CLIMATE CHANGE IN SOUTH AFRICA

II.C.1. THE RURAL BIAS IN AGRICULTURAL ADAPTATION

Even though urban and rural farmers have similar primary economic activities, the urban and rural contexts in South Africa vary widely as do the adaptation policies guiding them. Some attention from academics and international institutions has been given to agriculture in peri-urban and urban areas during the last decades (Mok *et al.*, 2013; Hamilton *et al.*, 2013). Concerns have been raised regarding agricultural adaptation to climate change in urban and peri-urban agricultural areas (IPCC, 2014). When they are implemented, projects tend to be designed, compared and assessed according to the experiences in rural agricultural adaptation projects, which challenges the efficiency of adaptation to climate change knowledge, policies and behavioral change in urban agricultural areas (IPCC, 2014).

Adaptation projects in Africa are mostly described to be "reactive in response to short-term motivations and occurring autonomously at the individual/household level" (IPCC, 2014:1225). Implemented at the individual and household level to cope with short-term impacts of climate change, adaptation projects lack support from government stakeholders and policies. The continent's wealth in natural resources, the well-developed social networks, and the traditional coping mechanisms are reported to be inherent strengths for adaptation in Africa (IPCC, 2014). However, adaptation policies have focused on the agricultural, forestry and fishery sectors in rural areas as a development strategy (IPCC, 2014) and not as much on the urban areas and their related agricultural economies and food systems. In South Africa, agriculture and forestry are seen as crucial sectors for adaptation to climate change (DEA, 2013a). These sectors are expected to be largely impacted by climate change, as much

as they contribute to it. Indeed, agriculture is responsible for 14% of the country greenhouse gas emissions (DEA, 2011b) and is a large consumer of water for irrigation, although it is vulnerable to changes in water availability, water pollution and soil erosion. Adaptation strategies related to agricultural vulnerabilities and practices are still mostly focused on rural areas as stated in the National Climate Change Response White Paper (2011). The White Paper advocates the integration of agriculture and forestry into climate-resilient rural development planning. The DEA contends that implementing sustainable agricultural practices, water and irrigation management projects, disaster risk management and developing alternative sources of energy would reduce climate impacts and specific vulnerabilities (DEA, 2011a).

Local urban agriculture initiatives are developing at a time where cities and social organizations are being rethought and reshaped as a result of global trends associated with population growth, poverty and urbanization (UNHabitat, 2014). However, agriculture in urban areas seems to be left out of the agricultural adaptation strategies. Although conventional agriculture comes with negative environmental, social and economic externalities, small-scale farmers, some of whom are located in urban areas, are very vulnerable to rainfall variability and climate change (DEA, 2011a). Therefore, focusing research on urban and peri-urban farming areas seems interesting as this will enhance understanding of the local socio-economic views and dynamics around climate change risks, adaptive capacity and adaptation to climate change in the city.

II.C.2. URBAN AGRICULTURE

A DEFINITION BY THE LOCATION AND LAND REGIME

Agreeing on a unique but inclusive definition of urban agriculture is constrained by the distinction made between urban, peri-urban and rural areas. However, cities would not exist without farming and agriculture. The reason for the existence of town and cities, in the first place, was to be places of trade, markets to exchange products coming from agricultural areas. The production of crops and stock called for the gathering of people and specialization of labor, which is the essence of cities (Hamilton *et al.*, 2013). Nowadays, agriculture is largely seen solely as an attribute of rural areas. Dictionaries include the agricultural activity as an element of definition of the word rural ("Rural, adj.", 2017), therefore the term "urban agriculture", could be considered an oxymoron. Urban agriculture has been extensively defined by several authors (Freeman, 1991; Smit, Ratta & Nasr, 1996; Allen, 2003; Can Veenhuizen 2006, Dubbeling & De Zeeuw, 2011) but this research intends to build on these definitions and define agricultural activities within an urban or peri-urban setting comprehensively, according to the reality of the research site and relevant theoretical frameworks.

In developing countries, informality, density of population, types and patterns of land use influence the nature of urban and peri-urban spaces (Padgham, Jabbour & Dietrich, 2015). The characterization

of these areas depends on the constraints and opportunities for agricultural production systems and therefore can vary according to the context. In South Africa, a conceptual differentiation amongst urban agriculture stakeholders, is established between urban agriculture, which "takes place on the boundaries of cities or town" and "refers primarily to household and community gardens that are intended to contribute to household food security of poorer communities"; and peri-urban agriculture, which refers to complex and diverse agricultural activities at the city boundaries (SmartAgri, 2015:155). Urban agriculture encompasses micro-farmers and small-emerging farmers, understood as gardeners and non-commercial farmers, while "peri-urban agriculture ranges from subsistence to commercial farming activities" (SmartAgri, 2015:155). Urban agriculture refers to "small areas (e.g. vacant plots, gardens, verges, balconies, containers) within the city for growing crops and raising small livestock […] for own-consumption or sale in neighborhood markets" whereas peri-urban agriculture is defined as "farm units close to town which operate intensive semi- or fully commercial farms to grow vegetables and other horticulture, raise chickens and other livestock, and produce milk and eggs" (FAO, N.D: IV). The distinction lies in the qualification of the land. Inner city, urban agriculture is using public and private small areas to thrive, whereas in peri-urban agriculture areas, most lands are officially zoned for agricultural production and located outside the defined urban area (Allen, 2003). However, such official but strict definition is challenged by the reality of Cape Town and theoretical frameworks.

A DEFINITION BY THE PRACTICES AND FUNCTIONS OF AGRICULTURAL AREAS

With the expansion of metropolitan areas, the lines drawn between rural and urban areas become blurred. The peri-urban interface becomes a mosaic of rural, urban and natural sub-systems, a place where the social structures change and the physical and spatial mandates of institutions overlap and converge due to the geographical location change in the peri-urban interface (Allen, 2003). Rural and urban features are more likely to co-exist and challenge the urban–rural dichotomy that is often established in planning systems resulting in areas "characterized by either the loss of "rural" aspects […] or the lack of "urban" attributes" (Allen, 2003:136).

Mougeot (2000) developed the idea that one important feature of urban and peri-urban agriculture is not its location but its function as part of the urban socio-economic and ecological system. Urban and peri-urban agriculture uses urban resources such as land, labor, water or organic waste. It is also completely embedded within the urban conditions such as policies, regulations, land and prices markets, while contributing to the urban economy and provide supply of food and processed goods. As such, they are the means of living of cities, but also their reason to be. Indeed, urban and peri-urban agriculture influence urban systems having impacts on urban food security and poverty, as well as on urban ecology and health (Mougeot, 2000).

Moreover, agricultural practices in urban and peri-urban areas are very diverse. According to local socio-economic characteristics, geographic and political conditions, urban and peri-urban agriculture

can take different forms, scales and practices (RUAF, 2014). From home-based activities, being home dwellers using their back and front yards to grow vegetables and/or keep animals to feed their families, to small emerging farmers, having a formal business activity and farming professionally, the types and scales of urban agriculture are diverse. Community-based activities stand in between, consisting of a group of people coming together to produce food collectively for themselves or a community institution, as well as micro-farmers, who are involved in urban agricultural activities to create an income (RUAF, 2014). Additionally, urban and peri-urban agriculture can consist of farming activities (*i.e.* growing crops and vegetables or taking care of cattle) but can also include forestry or agroforestry practices, understood as planting, care and management of trees, along with conventional farming practices; and can promote permaculture, a designed system to create permanent sustainable cultures (Mollison, 1978).

Conventional farming refers to farming practices aiming at high productivity of the land. Conventional farming practices usually include one or several of these practices: use of synthetic chemical fertilizers, pesticides, herbicides, genetically modified organisms, heavy irrigation, intensive tillage or concentrated monoculture production (Reganold, Elliott & Unger, 1987; Pimentel *et al.*, 2005). As opposed to organic farming and permaculture, conventional farming practices are typically highly resource and energy intensive. Organic farming is defined by the International Federation of Organic Agriculture Movements (IFOAM) as "a production system that sustains the health of soils, ecosystems and people" (IFOAM, 2016). Permaculture is "the conscious design and maintenance of agriculturally productive ecosystems which have the diversity, stability and resilience of natural ecosystems. It is the harmonious integration of landscape and people providing their food, energy, shelter, and other material and non-material needs in a sustainable way" (Mollison, 1978: ix). These terms will be used throughout this dissertation according to the definitions set, and be encompassed under the term of sustainable agriculture. Indeed, sustainable agriculture is defined as agricultural areas operating towards the satisfaction of human food needs, the enhancement of environmental quality and resources, the economic viability of agriculture and the enhancement of the quality of life of farmers, farm workers, and society (National Research Council, 2010).

McClintock argues that the development of capitalism and the related urbanization of the world have disconnected humans from their "traditional forms of social metabolism […] for the purpose of social reproduction" (McClintock, 2010:192). From this point of view, urban agriculture can represent a metabolic rift, which reconnects cities and citizens to their food system and more generally urban dwellers to their environment. In an attempt to dissociate this research from pre-conceptions, the theoretical framework applied by McClintock will be followed to try to understand the dynamics, practices and interpretations of urban and peri-urban agriculture with the less social constructs as possible. As such, the term urban agriculture will be used to encompass urban and peri-urban locations where agricultural practices, these being either the production of crops, breeding of livestock, or

cultivation of fish (FAO, N.D.: IV), utilize urban resources for the purpose of selling and consuming these goods produced locally, supporting the urban economy and providing food to urban citizens.

II.C.3. SUSTAINABLE URBAN AGRICULTURE AS AN URBAN ADAPTATION STRATEGY

The literature on the issue states that agricultural activities, located in urban areas, could promote sustainable development practices and contribute to climate change adaptation in cities. The literature on urban agriculture has emphasized different aspects and benefits of the agricultural practices on social, economic and environmental spheres (Battersby & Marshak, 2013). Studies in and on the global North have focused on the social benefits of urban agriculture (De Silvey, 2003; Glover, 2004; Jamison, 1985; Pudup, 2008), while, in the global South, food security, poverty and waste management improvement are the primary benefits mentioned by researchers (De Zeeuw, Van Veenhuizen & Dubbeling, 2011; Frayne *et al.*, 2009). The framework to understanding urban agriculture practices, in the global North, uses the concept of "community gardening". This concept used is based on the assumption that urban agricultural areas have social and environmental benefits. In this definition, urban agriculture initiatives are said to have influence on the citizen participation and social inclusion as thus create social capital at the individual level and within the community (Glover, 2004). Highlighting the social and political aspects of growing food in cities has been the main focus of research in the global North and it is seen as a means to connect people and places and to shape individual identities and public spaces appropriation. Urban agriculture is described and scrutinized in Southern studies as a development tool, enhancing food security, alleviating poverty and improving waste management (De Zeeuw, Van Veenhuizen & Dubbeling, 2011; Frayne *et al.*, 2009). Indeed, studies on urban agriculture in the global South, have often been related to food security for the lower-income households producing vegetables and the economic and health benefits of urban agriculture on urban poor populations (Battersby, 2011a; De Zeeuw, Van Veenhuizen & Dubbeling, 2011; Frayne *et al.*, 2009; Frayne, McCordic & Shilomboleni, 2014).

However, urban agriculture also has other (co-) benefits in terms of sustainable adaptation to climate change in cities such as climate change risk reduction, water management improvement, energy consumption and biodiversity conservation (RUAF, 2014). The benefits of urban agriculture set by the literature in terms of adaptation to climate change are conditional on the use of sustainable farming practices. In order to avoid confusion, the term of "sustainable urban agriculture" will be used to describe urban agricultural practices which contribute to the benefits expressed by the literature. The practices used in sustainable urban farming are reported to enhance water storage and retention capacity due to an increase in organic matter in soils, which also reduce the risks of floods and landslides due to reduced run-off. Improvement of water storage, disposal and use, through urban farming practices also act on the vulnerability of the urban communities to droughts, competition over water and access to water (RUAF, 2014). Sustainable farming practices can regulate water flows,

moderate runoffs, mitigate urban temperature extremes and recycle wastes (Padgham, Jabbour & Dietrich, 2015). They have a positive impact on biodiversity as they can provide appropriate habitats for species, especially in conjunction with organic agricultural practices (RUAF, 2014). Finally, urban agriculture provides shortening and enhancing mechanisms within the food supply chain that reduce transport requirements and offer households the capacity to access fresh produces (UNHabitat, 2014).

In addition to providing local, healthy and low-cost food, urban agriculture has the potential to provide and enhance ecosystem services for urban populations (RUAF, 2014), and therefore enhance the adaptive capacity of some urban areas. The concept of ecosystem services is an interesting one, as it links researchers and academics from natural sciences, social sciences and economics. Humans are benefiting from ecosystem goods (food for example) and ecosystem services (such as waste assimilation) but are also supporting the ecosystem while being factors of (de)regulation. Costanza *et al.* (1997) have contributed to our understanding of the human dependency on ecosystem services by financializing the costs of these services. Their study has determined that what humans use for free from the ecosystem could actually be estimated around $16 - 54 trillion, with an estimated average of $33 trillion. As human activities, and especially agriculture, have serious and well-documented impacts on the environment (Van der Werf & Petit, 2002, Belevi, & Baumgartner, 2003, Gomiero, Pimentel & Paoletti, 2011), one idea for sustainable development and adaptation to climate change would be the implementation of integrated and sustainable agricultural practices. Rotational land use and mixed livestock, cropland, and forestry systems would utilize ecosystem services more sustainably and reduce climate change risks (Chapin *et al.*, 2010). Urban agriculture is said to be multi-functional as it is an important part of urban ecosystems (Carter *et al.*, 2015). As such, sustainable urban agriculture could address vulnerabilities to climate risks of cities and be a sustainable urban adaptation strategy.

III. METHODOLOGY

INTRODUCTION AND CHAPTER OVERVIEW

As much as the gathering of data is crucial to contribute to a better understanding of a research topic (Tongco, 2007), defining the methodology behind the collection and the analysis of the data appears to be the core of a research project, hence this section.

Usually, in the social sciences and specifically within narratives analysis, stakeholders' and literature's narratives are not studied together. The novelty of this research lies in the mix of sources used and analyzed in order to interrogate the narratives on urban agriculture in Cape Town and evaluate its potential as a sustainable adaptation strategy, according to the narratives expressed. A systematic review of the global literature on urban agriculture was used to understand the theoretical perspectives (see Section III.D.), the policy landscape as well as certain debates and discussions gleaned from grey literature, in order to be able to evaluate and compare local narratives with international studies and theories. The multiplicity of relevant texts forced the researcher to develop a comparative method to analyze the existent narratives on the topic. Rather than producing certainty and quantitative results, a critical discourse analysis approach was used. This method as developed by Fairclough (2012) helped to investigate local realities and understandings through a reflexive analysis of individual experiences of urban agriculture and the texts collected.

This section presents an overview of the research site, the strategies and processes to gain a detailed understanding of the research terrain. It is then followed by a description of the data analysis methodology used to interpret and formalized the findings exposed in Chapter V. Thereafter, it explains the stakeholders mapping process, and the process whereby certain sites, industries and stakeholders were abstracted and informants selected. This section ends with a detailed methodology of the systematic literature review run to gather international trends in debates and discussions on urban agriculture. The findings of this systematic literature review will be presented in the Chapter IV.

III.A. CRITICAL DISCOURSE ANALYSIS' METHODOLOGY

III.A.1. DEFINING THE SOCIAL WRONG

To compare and investigate the narratives emerging from the different text on urban agriculture and adaptation to climate change, a CDA approach was used. This methodology, as explained by

Fairclough is used to better understand the "nature and sources of social wrongs, the obstacles to addressing them, and possible ways of overcoming those obstacles" (Fairclough, 2013:13). As per Fairclough's definition, a social wrong is an aspect of a social system, which is detrimental to human well-being (Fairclough, 2013:13). In this case study, the lack of adaptation to climate change can be identified as the social wrong.

The second step defined by Fairclough is to construct an object of research from this broad topic. To do so, Fairclough prescribes identifying the relevant bodies of social science to engage with and therefore describe CDA as a transdisciplinary process. Because the research topic involves sciences to understand climate change and social sciences (such as sociology and political sciences) using the concepts of sustainability or adaptability, we can argue that this work is interdisciplinary. In this research, a cultural-political-economy framework (Jessop, 2004) will be used to analyze the narratives of the informants. This framework views "technical and economic objects as socially constructed, historically specific, more or less socially (dis)embedded in broader networks of social relations […] and in need of continuing social 'repair' work for their reproduction" (Jessop, 2004:3). Because adaptation to climate change and urban agriculture in Cape Town are linked to the sustainability and development discourses, this framework will allow an objectification and a broad study of the research topic. This framework will be used to study the following objectified social wrongs: the unquestioned and dominant international and national development pathway established in policies, the farming practices of the people inhibiting sustainable development and the research bias on urban agriculture and climate change. Each of these objects relates to narratives that CDA will allow us to study.

In order to study narratives on urban agriculture and climate change, texts will be reviewed and analyzed. The term "text" or similarly "data" is understood as written documents, websites of organization as well as interviews and meetings organized for this research; any social event that involves the use of language and creates a narrative. Because texts are socially determined by other social elements, linguistic analysis encompasses social analysis of relations, identities, positions (Fairclough, 2012). Therefore, the economic, social and cultural capital of the informants is assessed in this research, as per the methodology explained below, to inform their narratives.

III.A.2. DEFINING "NARRATIVE" AND ITS IMPLICATION FOR SOCIAL CHANGE

Drawing from Fairclough's methodology, the term of discourses is used in this research in the sense of semiosis, *i.e.* ways of making meaning. In his view, semiosis, or narratives as used in this research, encompass: "genres", "discourses" and "styles" (Fairclough, 2013). Fairclough explains that using a language in a particular way, according to the position of a person is the genre of a narrative. The production of representations of others or reflexive representations is the discourse of a narrative.

The way of being, what constitutes an identity is the style of the narrative. A specific articulation of diverse "genres", "discourses" and "styles" is said to be an "order of discourse" (Fairclough, 2012), we are calling them narratives. The narrators' narratives encompass their different views, understandings, interpretation, application and implementation of urban agriculture and climate change adaptation practices.

From this understanding, narratives reflect social practices and social events. Therefore, the analysis of texts encompasses linguistic analysis *per se* but also semiotic analysis, *i.e.* the analysis of the structures, strategies and properties of texts. Elements of context must be incorporated in the analysis of texts to show and explain the evolution of texts displaying narratives. Thus, analysis of narratives' change can be related to processes of social change (Fairclough, 1992). Indeed, social events are the results of social practices, determined by social structures, and social agents. If change occurs within narratives, *i.e.* within social practices and social agents, it prefigures a possibility of change in social events. Especially if the social event and practices are knowledge-driven, as is the case for urban development practices, a change in narrative can imply a change in practice. No development project or policy is considered as a good intervention if it is not informed by experts and such interventions are now publicly reviewed and assessed, in an effort to create better democratic practices. The evolution of narratives can display new possible worlds, new ways of acting and new ways of being (Fairclough, 2012). This analysis of narratives in Cape Town is an attempt to contribute to the discussion on urban agriculture and its benefits as a sustainable adaptation strategy as well as to define the potential for change towards more sustainable adaptation to climate change in Cape Town.

III.B. URBAN AGRICULTURE IN CAPE TOWN: RESEARCH SITE

In Cape Town, urban agriculture is located both within the city boundaries and on its periphery. These agricultural areas offer unique examples to be studied in order to gain understanding and knowledge of sustainable adaptation to climate change at a municipal scale.

The PHA is a food production area, with a long history of food production, dating back to the mid 1800's (SmartAgri, 2015). Economically but also socially and ecologically, the PHA plays a vital role in the entire Cape Town food system, ecosystem functioning, as well as in the larger communities of the Cape Flats (Battersby-Lennard & Haysom, 2012). The scale of the farming activities remains small and mostly micro-farmers and small-emerging farmers are operating in the PHA, hence their involvement in the study. Cape Town also experiences urban agriculture initiatives driven by NGOs such as Abalimi Bezekhaya (http://www.abalimi.org.za), the Oranjezicht City Farm (http://www.ozcf.co.za) or the ERF 81. The latter is located on the old Erf 81 military base, on which the Tyisa Nabanye NGO developed an organic vegetable garden and indigenous plant nursery

(https://www.facebook.com/Erf-81-The-Farm-NPO-177886328949677/). These NGO-based farming initiatives operate with different motivations and aim at developing home-based activities, while promoting community-based activities. These initiatives were selected to be part of the study as they represent very diverse examples of urban agriculture projects but all fall under urban agriculture as defined, *i.e.* urban and peri-urban location where agricultural practices utilize urban resources for the purpose of selling and consuming locally these goods produced, supporting the urban economy and providing food to urban citizens.

From the above delineation, the commercial wine farms and wine estates located within the boundaries of the urban area of Cape Town should be considered. However, their privileged situation in terms of final product and access to market excluded them from the study. Indeed, the production and business of wine is a niche market, directed towards national and international markets. While this industry does create income for its practitioners, the land generally used for vineyards is such that it is not ideally suited to other types of fruits and vegetable production. Finally, a further reason for exclusion is that wine is not considered to be a fundamental consumption good, as urban agriculture is understood as the practices providing food to urban citizens. Therefore, it was determined that such urban agriculture activities would not be included in the study.

Cape Town and its inhabitants are vulnerable to climate change from different perspectives. Firstly, because Cape Town's exposure to climate change is high, as increased temperatures, frequency of heat waves and changes in rainfall are expected to have severe impacts on the population (WCDEA&DP, 2014). Also, the very diverse and unequal distribution of population in Cape Town contributes to the amplification of harm caused by exposure. The Cape Flats population for example is more sensitive to climate change, and particularly to floods and heat waves (CoCT, 2006). The Cape Flats are characterized by significant poverty and development needs (Battersby-Lennard & Haysom, 2012), which amplifies the harm caused to these populations. Indeed, sensitivity is inversely correlated to the socio-economic capital of a population (Battersby, 2011b). In other words, the less capital you have, the more sensitive you are. Facing many social, economic and environmental challenges, the Cape Town municipality is working at reducing its vulnerabilities and is aiming to orient its policies and management toward a sustainable and resilient city (CoCT, 2006). Cape Town has become one of the 100 Resilient Cities chosen by the Rockefeller Foundation to improve resilience at the municipal level (CoCT, 2016a). The City of Cape Town has been concerned about resilience and climate change and is at the forefront of cities' networks internationally, such as the Cities Climate Leadership Group (C40), which is negotiating during the COPs.

Notwithstanding, when it comes to adaptation projects implementation, coordination amongst Cape Town municipal sectors is still weak (Ziervogel *et al.*, 2014) and fails to provide a sustainable, comprehensive and realistic adaptation policy. More cross-sectoral interventions are needed to increase adaptive capacity of cities and move beyond coping with current variability and finally sustainably adapt to climate change in practice. The CDA of the narratives in Cape Town will inform

the stakeholders on the narratives' change which occurs in the different spheres of urban agriculture. More importantly this research intends to present the possible narrative evolutions which could trigger change.

III.C. INTERVIEWING INFORMANTS

Interviewing informants is the first step of the primary data collection. This section outlines the process to select informants amongst the urban agriculture stakeholders in Cape Town, the interview guide design and the data collection process and limitations.

III.C.1. STAKEHOLDER'S IDENTIFICATION AND INFORMANTS' SELECTION

Interviews were conducted amongst sustainable urban agriculture practitioners as well as with institutional representatives from the municipal governments with expertise on climate change or urban agriculture. More specifically, micro farmers from the PHA, beneficiaries from and workers for NGO-based urban agriculture initiatives were approached and eight (8) were interviewed. Representatives from the municipality of Cape Town were also included in the research and three (3) were interviewed. Departments of the City of Cape Town interviewed for this research were: the Environmental Policy and Strategy department, the department of Trade and Industry and the Social Development and Early Childhood Development Directorate. These departments appeared to be knowledgeable on climate change and/or urban agriculture according to the policies they currently implement and designed in the past.

From March to July 2016, preliminary fieldwork was conducted. The complexity of the area in terms of governance and economic activities makes it an overwhelming field of study with multiple stakeholders and matters at stake, requiring a process of project scoping. The spatial and geographical scope of governance from the institutions and their policies, and the scale of the urban agriculture initiatives in Cape Town are challenging. Urban agricultural areas in Cape Town are located within and outside the city's boundaries. As such, the City of Cape Town and Western Cape Government have mandates to manage the urban agriculture areas, understood *as per* the definition set previously in this dissertation. Moreover, the land use management within the city is regulated by a system of zoning, defined by the Development Management Scheme of the municipal planning by-law. As a foreigner studying the South African context, I felt it imperative to initiate first meetings and contacts beforehand and to participate in as many events on urban agriculture as possible in order to get acquainted with the places, the actors and the narratives of the different practitioners having an urban agriculture activity. The first step was to locate the places and practitioners involved in sustainable urban agriculture as well as their on-going projects and manifestations. NGOs, such as OZCF, the Erf 81, Abalimi Bezekhaya and Soil for Life organize gardens open-days and tours regularly,

to allow visitors the opportunity to explore their food gardens and learn more about their initiatives. The 2nd Cape Flats Aquifer Seminar took place on the 26th of July, in Philippi, to gather scientists, farmers and stakeholders of the Cape Flats Aquifer and raise the question of the future of the PHA. These events gave the researcher the opportunity to map, engage with some stakeholders and get initial insights on the potential narratives. On the governance side, a review of the past and present policies related to urban agriculture in Cape Town was conducted to start getting acquainted with the organization chart of the city and the main municipal and provincial stakeholders involved. Meetings with two (2) researchers at UCT also helped to identify the potential future informants of this research.

Purposive sampling, also called judgement sampling, was used to select knowledgeable informants. The informants were chosen because they possessed information on sustainable urban agriculture by virtue of particular knowledge or experience, using a nonrandom sampling aimed at choosing informants according to their capacity to provide information (Tongco, 2007). A list of potential contacts was established, which included informants with some knowledge either on sustainable urban agriculture, or on climate change. The idea was to determine the narratives on sustainable urban agriculture and climate change and the links between the two. In order to try to generate a reflection process on the link between urban agriculture and climate change, questions were asked in a specific order to focus the interviews on one or the other topic. In practice, the interviews were mostly focusing on the urban agriculture aspect for informants knowledgeable on climate change, while the practitioners of sustainable urban agriculture were mainly interviewed through climate change questions.

After the preliminary fieldwork phase, more research and investigation was done to map and contact different types of stakeholders and create a diversity of informants representing different narratives. Municipal representatives and practitioners were mapped further in the second phase of fieldwork, mostly through references. Indeed, during mail exchanges and interviews, informants were resourceful in terms of stakeholders mapping and helped to map better the sustainable urban agriculture stakeholders in Cape Town. The existence of NGOs working on sustainable urban agriculture also facilitated access to potential informants, either by connecting the researcher to their beneficiaries, or by referring the researcher to individuals formerly involved with the NGO. Contact with stakeholders was then arranged and informants finally defined in November 2016.

III.C.2. INTERVIEW GUIDE DESIGN

Two types of interview guides were designed for this research. The informants' interview guide for the practitioners utilized in this research is structured in three different parts (see Appendix A) to cover a variety of topics. The first part was designed to gather quantitative data on the informant him/herself, such as genre, level of education or income bracket to define the capitals of the informants (see following Section). The two following parts were constructed to collect qualitative

data on practitioners' perceptions of climate change, their views on their adaptation contribution to climate change and the influence of climate change on farming practices (water, waste, crops management). Whilst the third part interrogated, in quantitative and qualitative terms, the practices of urban agriculture as an economic activity to provide data on the type of products grown, the relationship and inclusion of urban agriculture within the formal and informal markets, and the scale of production.

The informants' interview guide for the municipal informants utilized in this research was structured in two parts (see Appendix B). The questions of the first part were related to adaptation to climate change policies and their link with urban agriculture to reveal the extent to which adaptation to climate is understood and implemented by institutional informants. The questions of the second part were related to urban agriculture to reveal the discourses and practices of institutional informants on urban agricultural areas management and their views on the potential contribution of urban agriculture to adaptation to climate change.

Both interview guides were composed of open-ended questions. Questions were ordered to assess discourses and practices of informants on urban agriculture and adaptation to climate change. As such, establishing the understanding of the term of climate change and its formal definition was a prerequisite to the good conduct of the interviews. However, questions on practices and perceptions of practices were formulated as simply and neutrally as possible to avoid social desirability bias (SDB), defined as "providing responses that are perceived as more acceptable than the response that the participant would have made under neutral conditions" (Matthews, Baker & Spillers, 2003:328). The use of open-ended questions contributed to the mitigation of SDB, mostly in the case of government's stakeholders' interviews.

Open-ended questions were also used in the interview guide as they are a useful tool to facilitate the elicitation of narratives. Indeed, open-ended questions seek qualitative data and provide opportunities to gather individual perceptions, experiences and behaviors. They allow a high level of understanding of the informants' outlook and facilitate the further analyze of narratives. Open-ended questions seek to bring to light thought processes, beliefs and perceptions in the most neutral way, *i.e.* with as little guidance and influence from the researcher as possible (Barriball & While, 1994). Although most of the questions were designed as open-ended questions, follow up questions were used to elicit greater information and clarity from respondents on certain issues.

DEFINING THE INFORMANTS' FORMS OF CAPITAL

Based on Bourdieu's theory on the forms of capital, questions were designed to gather information on the different forms of capital owned by the informants. The economic capital refers to the 'capital' as defined by the economic theory, *i.e.* the financial assets owned by someone. In this research, the monthly income will be used to assess the economic capital of an informant as it is the easiest and

most common piece of information shared by informants, when questioned on their economic capital. In relation tp the article from Roberts (2008), based on the South African Social Attitudes Survey of 2008, and the living conditions survey of 2014/2015 from Stats SA, income categories have been designed as follows for clarity and discretion towards informants' information:

- 1 = Lower class: less than R 5 000[2]
- 2 = Middle class: R 5 000 – R 20 000[3]
- 3 = Upper class: more than R 20 000[4]

Bourdieu, then, defines social capital as "the actual or potential resources which are linked to possession of a durable network" (1986:248). To evaluate the social capital, questions on informants' experience of South African society and the strength of their network in terms of community and organization were asked. These criteria, related to the networks of informants were established as they capture the type of network they were embedded in and their level of integration in them. To evaluate the social capital of informants, an evaluation chart, was used. Points were credited according to the following criterion (Table 1) and an average grade was calculated.

Table 1. Social capital evaluation chart according to social capital criterion

Criterion	1 = poorly connected	2 = medium network	3 = highly connected	TOTAL
Experience of South African society	Foreigner, in South Africa for less than 10 years	Foreigner, in South Africa for more than 10 years	South African	
Strength of community network	Not part of a community	Part of a community	Leader of a community	
Strength of organizational network	Not part of an NGO	Beneficiary of an NGO	Managing member of an NGO	
			Average	

[2] which correspond to the income bracket of the households from expenditure decile 1 to 4 (StatsSA, 2015)
[3] which correspond to the income bracket of the households from expenditure decile 5 to 8 (StatsSA, 2015)
[4] which correspond to the income bracket of the households from expenditure decile 9 and 10 (StatsSA, 2015)

Finally, cultural capital is said by Bourdieu to either be embodied ("long-lasting dispositions of the mind and body"), objectified ("cultural goods […] which are the trace or realization of theories") or institutionalized ("a form of [objectified cultural capital], which confers entirely original properties on the cultural capital which it is presumed to guarantee", such as "educational qualification") (1986:252). Only the institutionalized cultural capital was measured in this study, as educational qualifications are the most objective criterion. The evaluation of the level of cultural capital was established as follows:

- 1 = primary education level until secondary education
- 2 = from secondary education to matric
- 3 = tertiary education

Compiling all the information on economic, social and cultural capital of the informants, allows the critical discourse analysis to be more relevant to the specific context of this research.

III.C.3. DATA COLLECTION

Eleven (11) interviews were conducted during the fieldwork period, from November 2016 to January 2017. Interviews were held in a variety of locations, mostly the place of business of the informants but also in public spaces such as coffee shops or cafés when needed. Informants interviewed were farmers, representatives of NGOs, beneficiaries from NGOs, municipal representatives. The number and type of informants interviewed is detailed in the Table 2 below.

Table 2. Amount and type of informants interviewed

	Amount
Cape Town farmers	1
PHA farmers	2
Representatives from NGO 1	1
Beneficiaries from NGO 1	1
Representatives from NGO 2	1
Beneficiaries from NGO 2	1
Representative from NGO 3	1
Municipal representatives	3
TOTAL	11

Every face-to-face interview was conducted in English, started with a short explanation of the research, and an explanation of the content, aim and anticipated duration of the interview to create a positive environment enabling freedom of speech. The interviews lasted from 45 to 90 minutes. An opportunity was given to the informant to present him/herself, his/her work and the organization

he/she was working for before starting asking the first questions of the interview. Confidentiality, anonymity and the right to withdraw from the survey at any point were assured to the informant verbally, as well as with the handover of the UCT ethical process required consent form, the authorization to record the interview being requested and granted.

III.C.4. ETHICS

The standard ethical procedures of the Ethics Committee from the University of Cape Town's Science Faculty were followed throughout the fieldwork and research. The proposal of this research has been approved by the ethics committee along with the research interview guide and consent forms. While working with human subjects, the "UCT Code for Research involving Human Subjects"[5] was followed: the consent of all informants was obtained, anonymity was offered, and the right to step down from the study at any point was offered.

Prior to all interviews, the aim of the study and interview procedure was explained to the interviewee. When photographs of sites were taken, permissions were sought and given beforehand as well as permissions to record the interviews. A consent form was presented to the informants, who agreed upon it. Sometimes additional conditions related to the right to check and oversee the final version of the research prior to submission or publication was requested by the informants. In an effort to build trust with the informants and to be as close to the views and narratives of the stakeholders, these conditions were agreed to and the dissertation draft shared with informants for review and additional comments.

III.D. RUNNING A SYSTEMATIC LITERATURE REVIEW

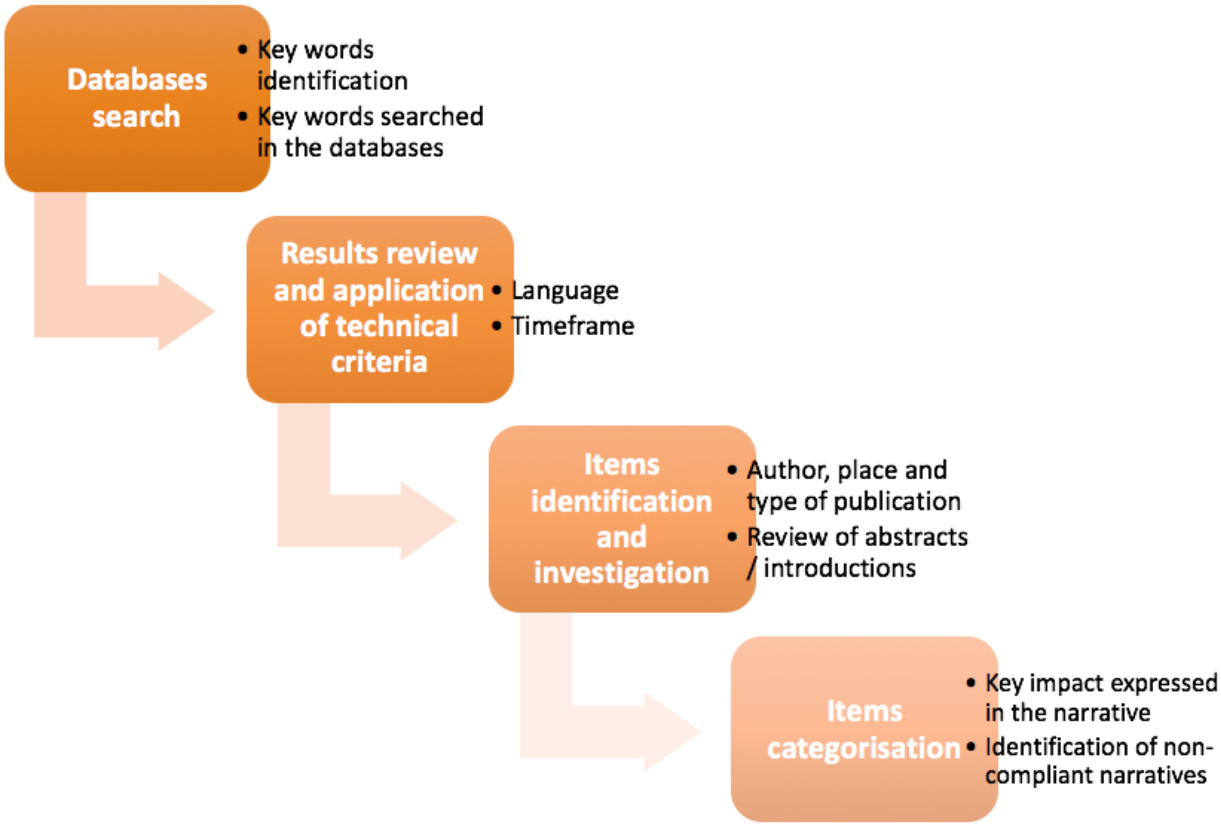
The review of literature and written policy documents is the second part of the primary data collection. International, national, regional and local literature on urban agriculture was scrutinized as well as the potential scientific, environmental and social benefits of urban agriculture expressed by it.

A systematic review method (Petticrew & Roberts, 2008) was used for this research to identify, examine and synthesize as much as possible of the available literature on the topic of urban agriculture. Although the application of systematic review techniques across the social sciences is becoming more frequent, these methods have mostly been used in evidence-based study fields, such

[5] Available at: http://www.education.uct.ac.za/sites/default/files/image_tool/images/104/uctcodeforresearchinvolvinghumansubjects.pdf

as medicine or engineering (Petticrew & Roberts, 2008). However, using such a methodology to review social science and climate change text helps to avoid the theoretical bias that researchers can have while choosing their referencing system. Indeed, a qualitative approach in the determination of the relevant literature, such as snowball sampling for example, could have biased the findings of this research. Systematic review allows the researcher to have a comprehensive visibility of the literature in a field of research. Typically, systematic reviews are used by medical professionals to analyze vast numbers of clinical trials to determine the most statistically successful intervention to treat a specific medical condition (Gough, Oliver & Thomas, 2012; Littell, Corcoran & Pillai,2008). The subject of urban adaptive capacity is not a condition but a complex construction determined by social sciences and climate change analysis. Using a quantitative approach to review the literature on urban agriculture and its impacts can help to determine statistically if such an urban development could help to reduce climate change vulnerability and increase adaptive capacity of a city. Therefore, a quantitative approach was preferred for this literature review, whereby the different papers and literature items found were critically qualified in a systematic manner. Figure 5 below summarizes the different steps taken during this literature review process.

Figure 5. Literature selection process

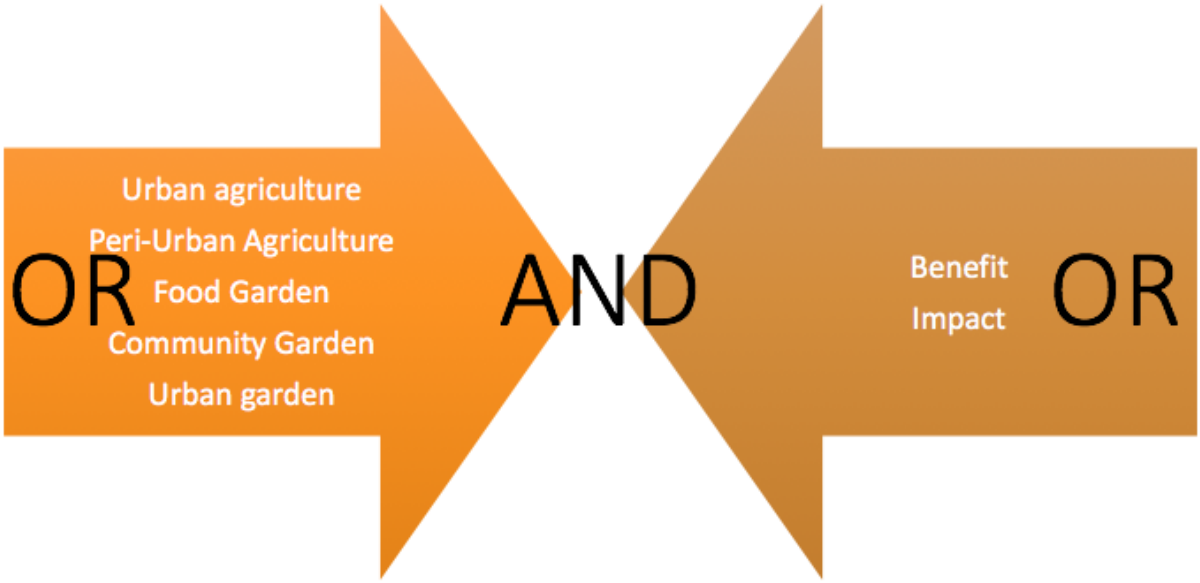


III.D.1. COLLECTION OF DATA

The systematic literature review is organized in an effort to answer the research aim of this research, which is to improve the understanding of the different narratives in Cape Town on urban agriculture and its impacts on urban adaptation to climate change. This literature review aims to synthesize thematically and historically fragmented pieces of literature related to the subject of urban agriculture and its economic, social and environmental impacts in developing and developed countries. Specifically, this global literature review aims at identifying the different impacts of urban agriculture on the adaptive capacity of cities, to be able to compare these findings with local narratives in Cape Town.

In order to find available literature on the subject of urban agriculture, a step-by-step approach was used. Firstly, terms relevant to urban agriculture were tabled in general databases to find peer-reviewed articles, books and grey literature, accessible through the UCT Library: Sabinet Reference, Google Scholar and Scopus. To include theses and dissertations, National ETD Portal and EBSCOhost databases were also accessed. The terms 'urban agriculture' AND 'benefit' were searched first, before moving to synonyms and combinations. Figure 6 below lists all the terms and combinations of terms searched in the databases.

Figure 6. Terms and combinations of terms searched in the databases



The Boolean phrase typed in the different databases was: (Urban agriculture OR peri-urban agriculture OR Food Garden OR Community Garden OR Urban Garden) AND (Benefit OR Impact). This phrase did not work in every database due to their own specificities, but it was adjusted according to those.

Lists of all results were saved in Excel. However, urban agriculture is a large subject field and as such, a certain containment was applied to control the extent of the research. Technical exclusion criteria were defined to polish the database. By looking through the item records, duplicates were excluded and only results published in English and French were kept. A time frame was also applied to focus on the items published after 1980. The application of technical criteria was part of a desktop research to review the titles and abstracts of literature (as well as introductions and conclusions when these were not available). The items were scrutinized to make sure that only the ones related to the impacts of urban agriculture were kept. Thus, results that were irrelevant were eliminated, while others where some relevance was suspected were kept. This stage reduced the final number of literature items to (n=268).

To create an easily navigable database, identification criteria were defined and assigned to each item, namely year of publication, type of publication, scope and place of study.

III.D.2. CATEGORIZATION OF DATA

The final stage consisted of reviewing all the items to define the main impacts and benefits of urban agriculture emphasized by the literature.

The main potential impacts of urban agriculture have been studied in two articles discussing separately developed and developing countries (Mok *et al.*, 2013; Hamilton *et al.*, 2013). As shown in Figure 7, these articles revealed that in developed countries urban agriculture is mainly contributing to food supply, "reduce[s] food transportation distance, carbon sequestration, potentially reduce[s] urban heat island effect, improve[s] physical and mental health, improve[s] aesthetics, community building, employment opportunities, improve[s] local land prices, shorten[s] supply chains and, thus, reduce[s] price differentials between producers and consumers, [it provides] habitat for wildlife, [and] waste recycling" (Mok *et al.*, 2013:22). While, in developing countries, the main impacts of urban agriculture are to be found in "the food security and sustenance of livelihoods, the contribution of urban agriculture to communicable diseases, especially malaria but also diarrheal disease, the role that urban agriculture does and/or could play in abating both malnutrition and obesity [or] the impacts of urban agriculture on women" (Hamilton *et al.*, 2013:45).

From these two general articles, three overall categories of possible benefits or impacts of urban agriculture were designed, namely:

- Environment pollution or preservation (this category includes: carbon emissions contribution, urban heat island effect contribution, impacts on habitat for wildlife, waste recycling, farming practices and environmental risks, chemical pollutants, aesthetics, food transportation distances)

- Contribution to food security and economic impacts (this category includes: food supply contribution, contribution to malnutrition and obesity, impact on women, contribution to households' income and employment opportunities)
- Social impacts (this category includes: physical and mental health, diseases and chemical pollution impacts on health, community building, impacts on women)

After a systematic review of all the items, qualification criteria were assigned to each of them, namely 'Social', 'Food Security/Economic', 'Environmental', 'Multiple' (in the case where several impacts of urban agriculture were taken into consideration by the literature items).

Figure 7. Main impacts of urban agriculture expressed in Mok *et al.*, 2013 and Hamilton *et al.*, 2013

	Developed countries	Developing countries
Nutrition and food system	Provides food supply, reduces food transportation distance, shortens supply chains and, thus, reduces price differentials between producers and consumers	Increases food security and sustenance of livelihoods The role that urban agriculture does and/or could play in abating both malnutrition and obesity
Health	Improved physical and mental health	Contribute to communicable diseases, especially malaria but also diarrheal diseases
Social	Improves aesthetics, community building	Impacts of urban agriculture on women
Environment	Reduces carbon sequestration Potentially reduces urban heat island effect Provides habitat for wildlife and] waste recycling	
Economic	Creates employment opportunities, improves local land prices	Impacts of urban agriculture on women
Article	Mok et al., 2013 p 22	Hamilton et al., 2013 p 45

III.E. LIMITATIONS

No study is free from limitations and some of them are unavoidable. The following list considers the limitations pertaining to this study.

III.E.1. REPRESENTATIVENESS

The stakeholders interviewed may not be representative of all the narratives expressed by all the stakeholders of the urban farming activities in Cape Town. Indeed, farmers and NGO representatives were chosen for their practice of sustainable urban farming. However, the inclusion of as many different narrators as possible within the institutional, academic spheres provides useful and sufficient insights for the research. The time constraint of the research and the lack of availability of certain actors were compensated by the variety of stakeholders interviewed to inform the study on the existent narratives. As such, claims made reflect the trends and specific findings at the time of the dissertation but should be read with due consideration of this limitation.

III.E.2. RESEARCH BIAS DUE TO POSITIONALITY

In addition to this limitation, a personal bias towards the benefits of urban agriculture must be acknowledged. As any human being, the researcher carries a set of particular attributes, values, attitudes and beliefs, known as a "position". In the case of qualitative research through interviews, the position of the researcher can affect the conversation between the researcher and the informant (Ganga & Scott, 2006). In this case, the bias of the researcher lies in a high level of environmental concern and in the belief that alternatives to the conventional agricultural systems are possible and needed. Therefore, it was important to attempt to conceal the researcher's position during the interviews not to influence the answers of the informants. If the answers had been guided by the researcher's bias, this would also have affected the data collection and therefore the analysis and final findings of this research. Paraphrasing Griffith (1998), the bias does not come from having ethical and political positions, because each and every one is carrying some, but it comes from the lack of acknowledgment of such positions. Moreover, the use of open-ended questions, as explained above, contributed to the effort of reducing the influence of the researcher's views on the answers provided by the informants.

Furthermore, the perception of the researcher's position by the informant could have been a bias to the study. Being a white, female student, 25 years of age, coming from France, gave the researcher an outsider position to the topic compared to the informants' position. However, this specific social and political position can be seen as an asset in this research as it grants the researcher a neophyte position. Informants showed benevolent attitudes towards the researcher as she was seen as a not informed newcomer on the subject and the informants felt like they were in a position of superiority in terms of knowledge and experience. This novice position allowed the researcher to ask questions, clarifications and details freely, while the answers given were very detailed, offering thorough explanations on the issues discussed.

The matter of SDB, defined in the interview guide design's section, was also mitigated by the researcher's outsider position. Social desirability bias may emerge when informants give answers to

create a favorable impression and appear as a “good” person. The outsider position of the researcher was expected to minimize the creation of a situation where informants felt the need to be seen as “good”, “expert” or “having an efficient action” as they were in the dominant position in terms of knowledge on the urban agriculture and/or climate change. In addition, the open-ended questions were designed to avoid SDB as much as possible, questioning their own practices, behaviors and perception of it, without asking to assess or judge them. Finally, being aware of the potential for SDB, the researcher made every attempt to appear non-judgmental and to be cautious with questions and answers that might foster SDB.

III.E.3. NARRATIVES CATCHMENT LIMITATIONS

The answers of some informants could have been influenced by weather conditions at the time of the interviews (November – January 2016/2017). Being a time of water scarcity and extreme heat for Cape Town, the informants’ answers related to climate change could have been biased. Being aware of this possible bias, the researcher made a point of asking questions related to other climatic events, which happened previously at different period of the year.

III.E.4. GENERALIZATION OF THE CASE STUDY

In terms of generalization, the study does not aim at setting general findings on urban agriculture but only to participate in the creation of knowledge on this subject. The specific location of the case study does not yet allow a generalization opportunity. Statistical generalizability is not the aim of all research, and especially not in the case of exploratory, qualitative research. If any generalization of this case study is possible, it will be on a theoretical basis.

IV. SYSTEMATIC LITERATURE REVIEW

INTRODUCTION AND CHAPTER OVERVIEW

This section describes the key results from the systematic literature review on urban agriculture. The first part will expose the trends and themes emerging from the review in a quantitative manner, whereas the following section will provide a qualitative analysis, using the conceptual categorization of the items explained earlier. This section starts with a description of the results in terms of type of items captured by this systematic review, historical evolution by publishing entities, geographic origin as well as by their geographical scope of study. The second part will disclose the different narratives on urban agriculture according to the type of publications and what it means for the development of urban adaptation policies worldwide.

IV.A. TRENDS AND THEMES CAPTURED BY THE SYSTEMATIC REVIEW

IV.A.1. OVERVIEW OF THE ITEMS CAPTURED

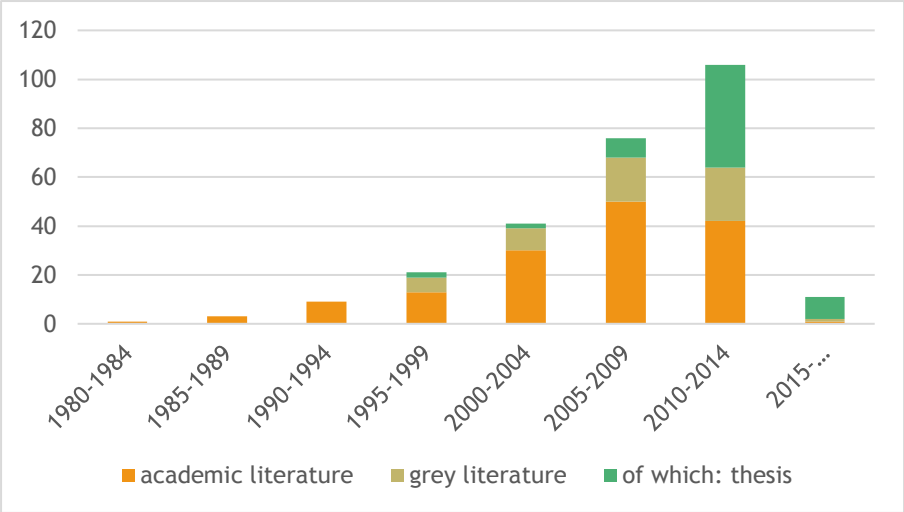
The final results (n=268) contained a combination of academic literature (n=147), and grey literature (n=121). In the academic literature, most of the items captured were peer-reviewed journal articles (n=142), with book chapters being a minority (n=5). Within the grey literature items, the nature of the publications was more diverse. The majority of the publications were from universities (n=63), including masters' and PhD theses, then publications from international organizations (UN and International Non-Governmental Organizations (INGOs)) and from conferences made up 31 of the items captured. Finally, 27 items were documents and articles from national NGOs and governments, websites and newspaper.

IV.A.2. HISTORICAL EVOLUTION OF THE TYPE OF LITERATURE ON URBAN AGRICULTURE

From an historical point of view, the number of items of literature collected by this research increased over time and drastically since the 1990s. From Figure 8, one can see that the decade 1990-2000 gathered 30 items related to urban agriculture; mostly from the academic literature (n=22). Between 2000 and 2010, this number increased to 121 items, of which 82 were from the academic literature.

In the current decades (2011 – to date), the increase of grey literature is noteworthy, making more than 65% (n=80) of the 123 items published. Indeed, INGOs such as the RUAF, WWF or the International Development Research Centre, as well as international institutions such as the FAO or UN-Habitat or policy-makers started to take a stance on urban agriculture in the 2000s, and published more research on the topic. The explosion of the use of the internet has had effects on the motivation to share knowledge (Hendriks, 1999) and the increase of grey literature in the pool of knowledge on urban agriculture might have benefited from it.

Figure 8. Evolution of the urban agriculture literature by type since 1980 (n=268)



Source: Authors own calculations

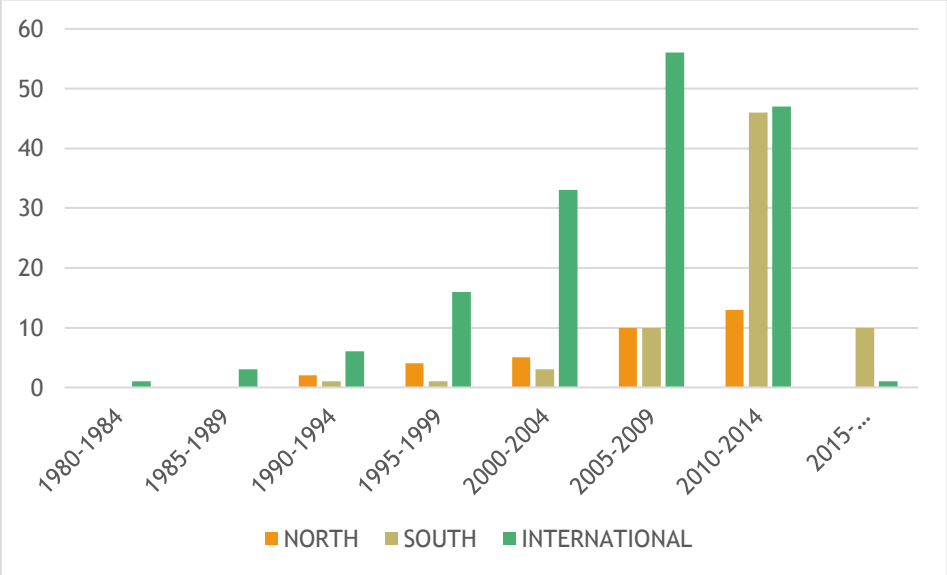
Perhaps one of the most striking findings from the Figure 8 was that since the 2000s, the number of Masters' and PhD's theses on the subject of urban agriculture increased significantly. This finding could be attributed to the latest improvement by universities of electronic management of their publications. Nonetheless, the difference in numbers between the 2005-2009 period and the 2010-2014 period is striking. Figure 8 displays that 8 items were Masters' and PhD's theses, when their number increased to 42 for the 2010-2014 period. It shows how the subject of urban agriculture has been tackled more intensively over time by Masters' students and PhD candidates (and their research institutions). The number of literature items has grown over the years, along with a more diverse approach to urban agriculture, as will be discussed later.

IV.A.3. ANALYSING THE GEOGRAPHICAL LOCATION OF THE PUBLICATIONS AND THEIR GEOGRAPHICAL SCOPE

The geographic location of the publications as well as their geographical scope of study reveals interesting patterns in the urban agriculture narrative since the late 1990s. The geographic location of publication is linked to the place where the publishing institution is located, whereas the scope of

the research is related to the subject of the research and the place where the research took place. Some of the items have been published in peer-reviewed journals, most of which are located in the global North. However, these publishing entities are independent bodies, offering their libraries online; they often don't embrace a specific point of view, but only offer a platform to publish academic articles. As such, the origin of the items published in these journals has been qualified as international.

Figure 9. Geographical location of the items reviewed from 1980 (n=268)



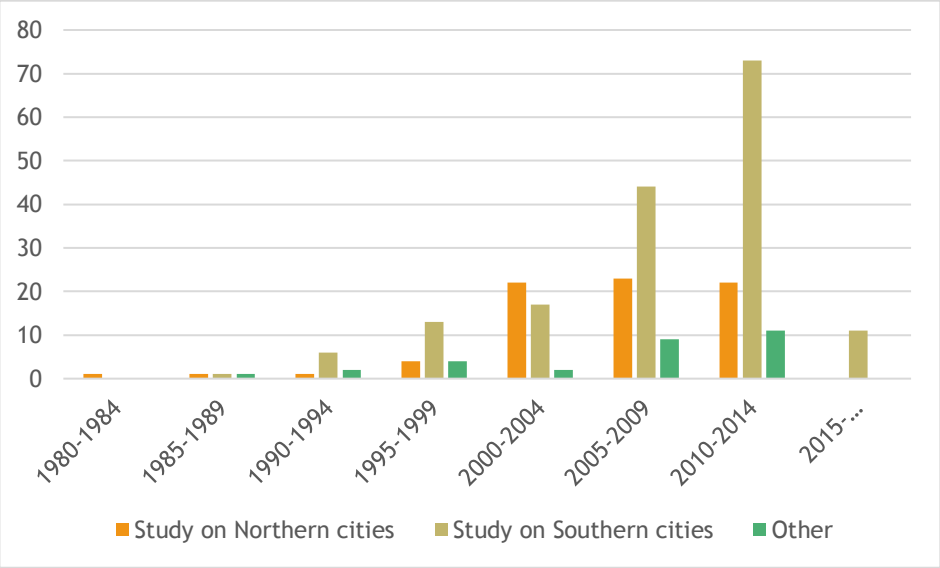
Source: Authors own calculations

From Figure 9, one can note that publications on urban agriculture mainly originated from the global North universities and publishing institutions until the late 2000s, when Southern academics and publishers started contributing to the pool of knowledge on urban agriculture. Meanwhile, items with international origins progressed significantly from the late 1990s, early 2000s. International publications are mostly peer-reviewed articles published in journals such as Acta Horticulturae, Agriculture and Human Values, Environment and Urbanization, Geographical Review or Leisure Sciences.

Because peer-reviewed literature is mostly considered to be international by this classification it is worthwhile to look at the geographical scope of the studies more than at the location of publication to get a more accurate picture of the conditions of production of the different narratives on urban agriculture. With this qualification of items, and looking at Figure 10, one can realize that the interest of the literature for urban agriculture in Southern cities is correlated with the introduction of studies from the global South as well as with the rise of "international" publications. If the number of publications on Northern cities increased in the 2000s, their numbers remain pretty steady in the following decades, whereas the publications on urban agriculture in Southern cities increased at a far

greater rate. Publications on Southern cities have emerged in the 1990s and their numbers have constantly increased since then, to reach 47 between 2005 and 2009 and even more (n=79), during the following period. Between 2010 and 2014 out of the publications on Southern cities experiencing urban agriculture, half of them (n=41) were academic theses.

Figure 10. Geographical scope of the items from 1980 (n=268)



Source: Authors own calculations

Note: Items qualified as 'Other' are items with unspecified locations of research tackling general aspects of urban agriculture or items with global scope of study, including both Northern and Southern cities.

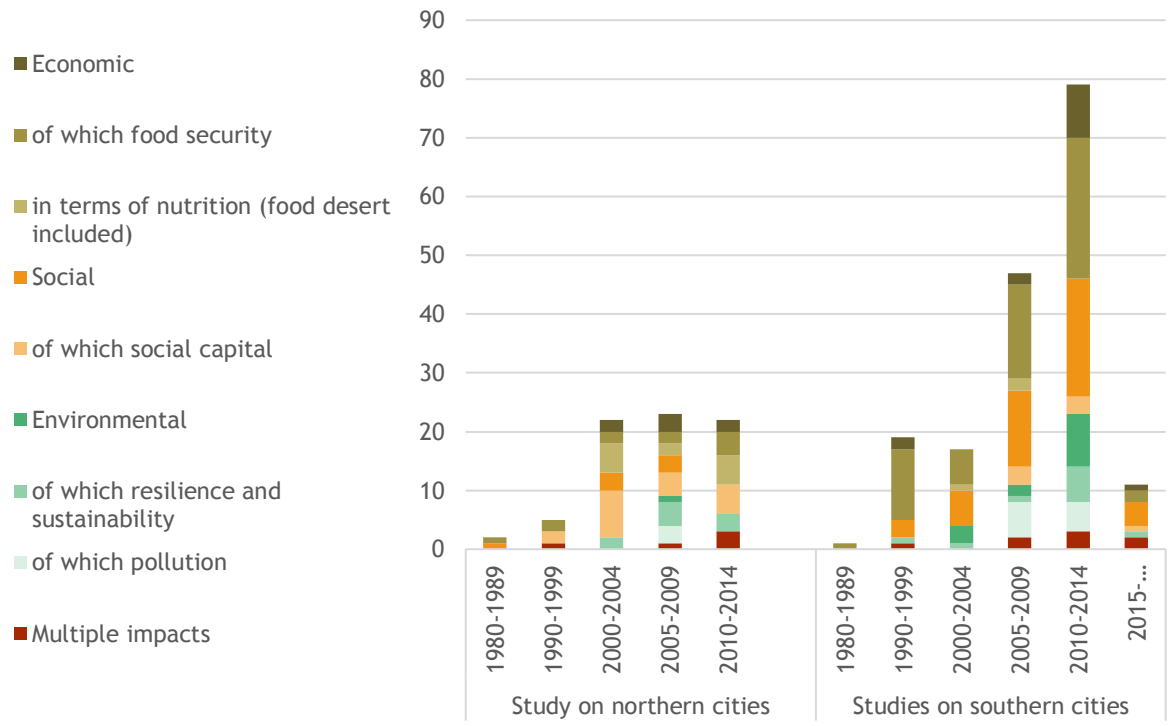
IV.B. EVIDENCE FROM THE LITERATURE REVIEWED

This second section describes the items captured by this research in terms of qualitative assessment. As explained in the methodology section, each item was given a category according to the main impacts of urban agriculture expressed by the publication. Using a quantitative approach to review the literature on urban agriculture and its impacts can help to determine statistically if such an urban development could help to reduce climate change vulnerability and increase adaptive capacity of a city.

In developed cities, urban agriculture is looked at from a social empowerment and social organization aspect (Mok *et al.*, 2013) and hailed as part of the political ideology supported by municipal and national governments (Crush & Frayne, 2011). In the developing world, urban agriculture is approached as a matter of subsistence and survival (Hamilton *et al.*, 2013). This second section will

consider the verification of this assumption through the analysis of the literature items gathered in and on the developing countries.

Figure 11. Impacts of urban agriculture stated in the literature from geographical scope of study (n=247)



Source: Authors own calculations

IV.B.1. URBAN AGRICULTURE PROVIDES FOOD FOR HOUSEHOLDS

The contribution of urban agriculture to food security has been analyzed by researchers as early as 1919 by Charles Lathrop Pack. At first, the European and World Wars as well as the economic depression episodes of 1929 or of 1973 in the Western World altered food demand to the point where backyard food production was advocated by governments (Hall, 1996; Miller, 2003). However, in more recent times, and especially following the economic recovery of the 1980s, the progression of convenient neighborhood supermarkets and refrigeration challenged the narrative on urban agriculture as a mean of food provision in the global North (Schukoske, 1999; Stigsdotter & Grahn, 2003; Westphal, 2003). More and more studies were found to focus on the social impacts of urban agriculture, instead of the food provision benefits of it. In Figure 11, one can see that the studies related to social components of urban agriculture were multiplied by four between the 1990s decades and the period 2000-2004. Nonetheless, the interest of researchers for the food supply contribution of urban agriculture and therefore the matter of food security re-emerged in the 2000s in the

literature on the global North (Jacke & Toensmeier, 2005; Kurita, Yokohari & Bolthouse, 2009). From Figure 11, we can note that the number of studies categorized as tackling solely the issue of food security in the global North was steady (n=2) for the period 2000-2004 and 2005-2009; but doubled (n=4) in the period 2010-2014. This change is attributed to the mainstreaming of urban agriculture in many developed countries to the point where it actually contributes significantly to the food supply of cities in the global North (Carey *et al.*, 2010; Millar *et al.*, 2012, McClintock, 2008). Boston is often quoted as a success in terms of urban agriculture and greening policies, as well as London or Toronto (Mok *et al.*, 2013; MacRae et al, 2010; Nasr, MacRae & Kuhns, 2010,). Moreover, the concept of food deserts (Schafft, Jensen & Hinrichs, 2009; Beaulac, Kristjansson & Cummins, 2009), *i.e.* areas characterized by poor access to healthy and affordable food through lack of physical ability, financial means, or knowledge by its inhabitants, has been widely used since the 2000s (Mok *et al.* 2013). This concept is correlated with food security in terms of accessibility and quality. From Figure 11, one can notice that the proportion of items engaging with food security from the nutritional perspective of it increased since the 2000s. Indeed, the number of economic urban agriculture studies on Northern cities gathered from 2000 and 2014 reached a total of 27 items, of which 20 were related to food security only. 60% of them (n=12) were tackling food security through the nutritional and food desert aspect of it. Research on urban agriculture in the global North through the food supply and food security lens can be linked to the increase of interest for the sustainable development of cities and the needed adaptation to climate change. As such, the food provision benefits of urban agriculture are considered towards a tool to address the failure of the actual food system at the city-scale level and provide a solution to the need for sustainable adaptation strategy.

The literature from the developing countries reveals an *a priori* strong interest for the food security aspects of urban agriculture. From Figure 11, one can see that food security, over time, has made up a good proportion of the topics considered from items gathered for the 1990-2014 period. 35,3% of the total items (n=61 out of n=173) were studying food security, and these items represent 82,4% of the economic studies on urban agriculture from 1990 to 2014 (n=61 out of n=74). At first, the Cuban example of extensive urban agriculture (Deere, 1993; Chaplowe, 1998; Altieri *et al.* 1999; Funes *et al.*, 2008; Febles-Gonzalez *et al.*, 2011) as well as the Russian situation (Seeth *et al.*, 1998; Gavrilov, 2000; Moldakov, 2000) have been extensively researched, since the beginning of the 1990s, in terms of urban agriculture as an intervention to enable societies to cope with food crises. The same way the world wars and economic depression in the developed countries triggered urban agriculture and its study, the end of the Cold War as well as the worsening fiscal situation for the urban poor in developing countries due to the Structural Adjustment Programs imposed by the IMF and the WB (the Bretton Woods Institutions) have stimulated urban agriculture in the developing countries (Hamilton *et al.*, 2013). This fact could explain some of the food security bias encountered in the literature about urban agriculture in the developing countries.

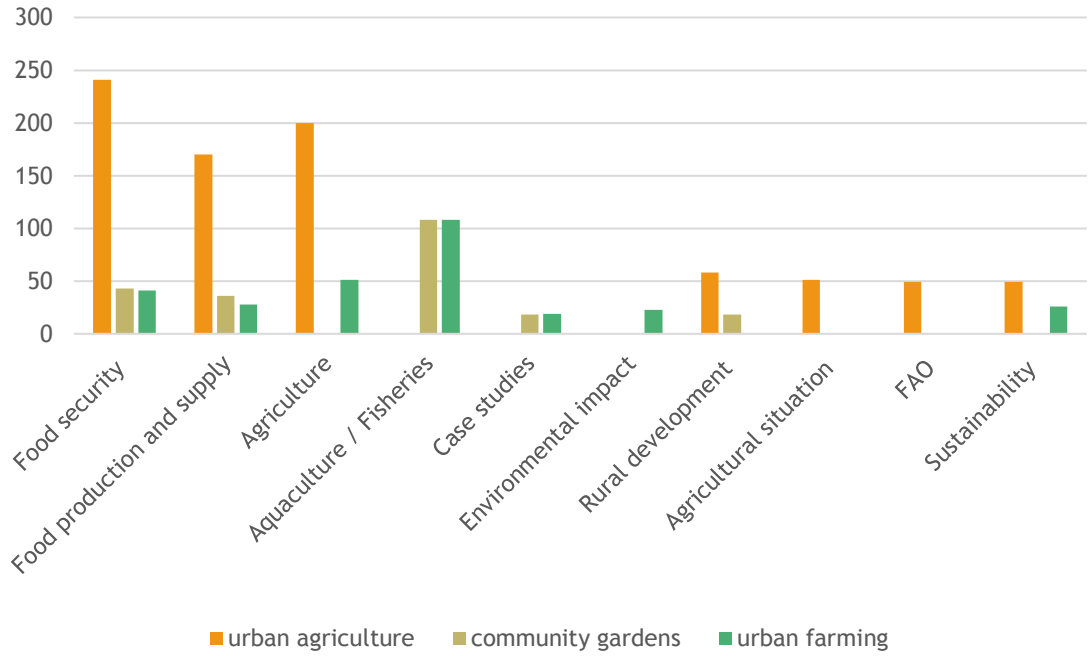
Moreover, the literature of urban agriculture in Southern cities cannot be evaluated without its links with the grey literature from the international institutions. Although these institutions are located in the global North (New York, Rome, etc.), researches and studies on urban agriculture have used both a Southern and food security lens to analyze urban agriculture. The need to alleviate poverty and hunger articulated at the 1974 World Food Conference and the Rome Declaration on World Food Security in 1996 is correlated with an increase of publications on urban agriculture in Southern cities studying food security, as shown previously (Figure 11); this could reflect a developmentalist approach when studying the global South, as opposed to the social cohesion and inclusive approach in the global North. At the time of the World Food Conference, the FAO and other UN agencies were publishing their first reports on urban agriculture and food security, with special attention to the Asian continent. The Support Group on Urban Agriculture was established in 1992 and the Global Initiative on Urban Agriculture in 1996. These groups are constituted by major donors and international agencies (including the United Nations Development Program, the International Development Research Centre, the FAO, the WB, *die Deutsche Gesellschaft für Internationale Zusammenarbeit*, *l'Agence Française de Développement*, the English Department for International Development, and others) and their views on urban agriculture have been reflecting, informing and driving the literature on the topic. Indeed, most of the publications and projects financed by the FAO on urban agriculture are related to food security, as shown in the following FAO literature review. First, through the FAO's Committee on Agriculture, established in 1971, which recognized the importance of urban agriculture for food security in 1999 during its 15th session in Rome, the FAO developed guidelines for the development of urban agriculture. Then, through urban programs such as Growing Greener Cities[6] or Food for the Cities[7], the FAO directed grants and actions towards urban agriculture since the 2000s.

Using the search engine provided on the website of the FAO, comes to correlate the findings of this study (Figure 12). Using the databases of publication of the FAO accessible on the website: http://www.fao.org/publications/search/.

The following terms were tabled *urban agriculture*, *community gardens* and *urban farming* and the exclusion-inclusion criterion of publications in English was selected.

[6] FAO Growing Greener Cities website link: http://www.fao.org/ag/agp/greenercities/
[7] FAO Food for the Cities website link: http://www.fao.org/fcit/fcit-home/en/

Figure 12. FAO publications on urban agriculture per concepts 2007-2016 (n=1337)



Source: Authors own calculations from the FAO database engine search

Food security appeared to be the most related concept to urban agriculture in the FAO database. Agriculture and food production and supply came in 2nd and 3rd position (Figure 12). When the terms "community gardens" and "urban farming" were tabled, the emphasis seemed to be on the aquaculture and fisheries, although the concepts of food security and food production and supply were mentioned. In developing countries, very little is studied in term of urban food supply, and the focus is largely towards households and survival strategies (either being in terms of direct improved consumption (Kortright & Wakefield, 2011; Arce *et al.*, 2007) or in terms of economic tradeoffs (Foeken, 2006)). The subsistence narrative of urban agriculture continues to be related by the UN, and the sustainable adaptation potential keeps on being concealed.

This study shows the geographical and conceptual bias in the literature when it comes to urban agriculture. The international food security agenda set food security as a central sustainable development issue, but reproduces and perpetuates the rural bias in the development policy agendas (Crush & Frayne, 2001). This study, in line with the research from Crush and Frayne, emphasizes the fact that due to the urban future of Africa and especially South Africa, urban agriculture should not only be seen as a survival coping strategy for urban food insecure households in developing countries, but be acknowledged as a way to sustainably develop and adapt cities in the global South : meet their

food needs in the future, while considering the environmental impacts of urban food systems as well as the vulnerabilities of these food and eco-systems to climate change.

IV.B.2. URBAN AGRICULTURE ALSO HAS SOCIAL AND ENVIRONMENTAL DIMENSIONS

From the food provisioning and survival narrative of urban agriculture, the social benefits became more important in the literature and especially about Northern cities (Schukoske, 1999; Westphal, 2003). One can see from Table 3 the evolution of the number of mentions of the social and environmental impacts of urban agriculture within the literature over time. Once more, the geography correlates a bias on the integration of urban agricultural benefits in terms of potential for sustainable adaptation. In the developed countries, less and less is said about the urban farmers, their economic situation and contribution to urban development on a social point of view; whereas the studies on the developing South have shown a strongest interest for the social impacts of urban agriculture over time (Table 3).

Table 3. Social and environmental impacts of urban agriculture in literature items on developed and developing cities reviewed (n=247)

	Social (n=73)		Environmental (n=47)	
	Developed (n=25)	Developing (n=48)	Developed (n=13)	Developing (n=34)
1990-1999	40,0%*	15,8%	0,0%	5,3%
2000-2009	33,3%	34,4%	22,2%	20,3%
2010-2014	22,7%	29,1%	13,6%	25,3%

Source: Authors own calculations

*percentage of total number of items per period and per geographical scope of study

The literature gathered on urban agriculture in developing countries expanded from 2005 onwards (see Figure 11). In Southern cities, social impacts of urban agriculture are linked (46%) with women empowerment or health-related issues (n=22 out of n=48), when in Northern cities urban agriculture is said to improve citizen participation and inclusion and to create social capital individually and within the community (Glover, 2004). In Northern cities, the social impacts of urban agriculture have been over-represented in the literature since the 1965s. Indeed, it is said that interest in community and backyard gardens reappeared in the late 1960s and early 1970s along with an environmentalist counter-culture movement promoting urban agriculture as a means to cope ideologically and

economically with consumerism and industry, as well as with inflation and unemployment (Glover, 2004:24, Pudup, 2008; Battersby & Marshak, 2013). As such, urban agriculture is described by the literature as a political reaction, a way to reconnect cities and citizens to the food system and their environment, in order to sustain societies and communities more than as a means to increase food supply in cities (McClintock, 2010:193). The framework used to understand urban agriculture practices revolves around the concepts of "community gardening", "community greening" or "civic agriculture" (which entail social and environmental dimensions) to analyze urban agriculture initiatives. For instance, "community gardening" is said to be able to "alleviate some of the alienating aspects of modern lifestyles, restoring a sense of place to the urban context" as well as relieving stress (Hall, 1996:18). From this point of view, the ideological and political embeddedness of urban agriculture could explain the focus in studies on the global North. The empowerment of municipalities and the importance of mega-cities or metropolitan areas and their suburbs has increased the importance of the role of cities in sustainable development and adaptation to climate change (Birkmann *et al.*, 2010; Parnell & Pieterse, 2014; Revi *et al.*, 2014). In developed countries, the concerns for environmental issues in urban agriculture raised greatly in recent literature, from no mention in the 1990 decade to making 22,2% and 13,6% of the literature on the global South in the next two decades (Table 3). In the global North, as well as in the global South, as seen later, cities have been more present in the international conferences and are continually building their capacities to design and plan their food systems, social organization and overall adaptation to climate change.

Since the 2000s, studies on developed and developing countries mentioning the environmental consequences of urban agriculture have emerged and their number is increasing. Table 3 displays how the proportion of studies focusing on the environmental impacts of urban agriculture increased from 5,3% for the 1990 decade, to 20,3% of the literature items in the 2000s and reached 25,3% in the first years of the 2010s. The recent and repeated food scandals (Abbots & Coles, 2013) and increase in environmental catastrophes (IPCC, 2014), as well as the increase in funding from donors and governments for adaptation projects (Buchner *et al.*, 2014) might have enhanced the number of studies conducted on urban agriculture and its environmental impacts. In developing countries, a large part of the items found were part of literature on health impacts related to case studies in Asia, due to the high industrialization of the urban and peri-urban areas of the country (Xue *et al.*, 2012; Hyon *et al.*, 2012) and in Africa, due to the high risk of malaria infection linked with stagnant water (Afrane *et al.*, 2004; Keating *et al.*, 2004). The literature mentioning urban agriculture as well as its urban planning and governance implications grew in number throughout the period, and especially during this last decade. Urban agriculture and the governance of Southern cities was historically seen through the lens of hygienic and formal planning of cities (Battersby & Marshak, 2013) and this trend seems to remain until today. Recent case studies have looked at urban agriculture from medical, health risks and sanitation points of view, but have not incorporated the other aspects of urban agriculture in a sustainable framework although the social and environmental impacts can be link to the reduction of vulnerabilities to climate change in cities.

The ratification of the UNFCCC, in 1992, started to set adaptation to climate change as a priority for development interventions and projects. Instruments were created and funds allocated to enhance adaptation options. Internationally and nationally, instruments, plans and funds emerged significantly with time and alarming projections. The IPCC report describes cities from the Southern African region as places with low adaptive capacity due to structural factors (lack of infrastructure) but also due to poor capacities and resources within the local municipality departments and mandates (IPCC, 2014). The recent funding made available by donors and the international community towards adaptation and mitigation, as well as the pledge from the 21st COP and national governments to reduce the effects of climate change through mitigation and adaptation, fostered the research sector and opened new ways to support urban agriculture (Buchner *et al.*, 2014). However, the role of urban agriculture in urban adaptation remains anecdotal in the literature.

In Western cities, the literature on sustainable cities usually does not express the opportunity for urban agriculture to contribute to urban sustainability and urban adaptation to climate change. In the US, studies on initiatives to improve sustainability identified the importance of green spaces but did not integrate agriculture or food production; they emphasized the need for actions to improve urban health but did not mention the potential for urban agriculture (Pearson, Pearson & Pearson, 2010). In terms of urban adaptation to climate change, the same trend appears. Pearson, Pearson and Pearson (2010) point out that the disconnection between urban agriculture and urban adaptation can be associated, on one hand, to the preference of urban planners for the built environment and on the other hand, to the research focus on urban agriculture, which does not consider the urban agriculture-adaptation nexus. The study of Mougeot (2000) indicates that over time, studies on urban agriculture have first been related to the geography of cities, then to "success stories", and nowadays, urban agriculture is thought of as a system, although it should be considered as a part of the global urban system. In Southern cities, the same tendency applies. Adaptation actions have been set as priorities by international and national institutions and funds are getting organized to finance these projects (Buchner *et al.*, 2014).

However, urban agriculture has been left out of the adaptation agenda. When adaptation projects are directed to urban agricultural areas, they tend to be designed, compared and assessed according to the experiences in rural agricultural adaptation projects (IPCC, 2014). This research looked at the mentions of sustainability or adaptation impacts in FAO publications on urban agriculture (see Figure 12). The international organizations promoting urban agriculture for its food provision benefits fail to mention its urban adaptation potential in a substantial manner. Nevertheless, literature items articulate arguments on the benefits of urban agriculture in terms of sustainable adaptation to climate change in Northern and Southern cities. In addition to provisioning local, healthy and low-cost food, urban agriculture has the potential to provide and enhance ecosystem services for urban populations as well as biodiversity, to reduce climate change risks, to improve water and energy

consumption, as well as waste and waste water management (Vymazal, 2005; Wong & Yu, 2005; Drechsel *et al.*, 2008; Padgham, Jabbour & Dietrich, 2015; RUAF, 2014).

CONCLUSION

This systematic literature review firstly exposed the trends and themes emerging from the review in a quantitative manner. As demonstrated in this research, the number of items of literature collected by this research increased over time and drastically so since the 1990s, and especially the number of Masters' and PhD's theses on urban agriculture. At first, publications on urban agriculture mainly originated from universities in the global North and Northern publishing institutions until the late 2000s. Thereafter Southern universities and publishers started contributing to the pool of knowledge on urban agriculture. However, publications on Southern cities emerged in the 1990s and their number has constantly increased since then. The increase of the literature for urban agriculture in Southern cities is correlated with the introduction of studies from the global South as well as with the rise of "international" publications on urban agriculture in developing countries.

The second section showed the different narratives on urban agriculture in developing and developed countries. In developed cities, urban agriculture is looked at from a social empowerment and social organization aspect, whereas urban agriculture is typically a matter of subsistence and survival in developing countries. However, this dichotomy is slightly more ambiguous than that.

Within the literature on the global North, the interest of researchers in the food supply contribution of urban agriculture and the matter of food security re-emerged in the 2000s, after having been put aside since the 1980s. The comeback of the food security perspective in the urban agriculture literature could be related to the increase of studies on food deserts and therefore to the need for cities to develop and adapt to climate change sustainably and inclusively. In developing countries urban agriculture has been, and remains, massively studied from a food security point of view. However, the social benefits become more important in the literature on Southern cities, joining the literature produced on Northern cities since the mid-1960s.

In terms of the link between urban agriculture and its impacts or benefits on/for the environment, the study of the literature exposes that studies on developed and developing countries mentioning the environmental consequences of urban agriculture have emerged in the 2000s and their number has increased since then. Recent studies look at urban agriculture from nutrition, health risks and sanitation point of view, following the traditional hygienic and formal planning governance of cities developed in Northern cities. In terms of the potential for urban agriculture to be part of urban adaptation strategies, urban agriculture has been left out of the adaptation agendas in developed and developing countries. Nevertheless, the themes developed in the literature items articulate

arguments on the benefits of urban agriculture which can be related to sustainable adaptation to climate change in Northern and Southern cities.

Globally, urban agriculture literature has a food security bias, whereas researchers focus more and more on other types of urban agriculture impact. If recent international environmental frameworks have triggered further research on other contributions of urban agriculture such as environmental, health or social impacts, the international development institutions have not yet followed that trend and remain focused on the contribution of urban agriculture to food security in developing countries. However, some literature items have already spotted a new trend on the function, benefits and risks of urban agriculture and set urban agriculture as a potential urban adaptation strategy.

V. NARRATIVE'S ANALYSIS, COMPARISON AND DISCUSSION

INTRODUCTION AND CHAPTER OVERVIEW

This chapter of the dissertation aims to review the farmers', municipal and literature's narratives on urban agriculture, interrogate these narratives and evaluate the potential of urban agriculture as an adaptation strategy, according to the narratives expressed.

As a reminder, the term 'narrative' is used in this research in the understanding of Fairclough (2012) as an "order of discourse", *i.e.* a specific articulation of diverse "genres", "discourses" and "styles". As such, informants' narratives encompass their use of language (genre), their representations (discourse) and their identity (style). The governmental (national, provincial or municipal) texts display certain narratives, *i.e.* the use of words and language, the representation of an issue (the way an issue is framed) and the identity of the department or person producing these texts (written or verbal texts). Institutional narratives will be understood as the combination of these. The literature's narratives also comply with the definition of the term and include the genre, discourse and style of its authors.

The term 'informant' is used in this chapter to designate the people interviewed. Informants are specific stakeholders selected through a specific process, defined in the methodology section, for their knowledge and specific characteristics. As this study aims to display narratives, which are related to genre, discourse and style, social characteristics and positions needs to be clarified. However, in an effort to grant anonymity to the informants, code names will be used. Table 4 below presents the informants and the names given to protect their anonymity.

Table 4. Informants' types, with details and code name given

Type of respondent	Informants details	Code name
Farmers	Cape Town and PHA farmers; Beneficiaries from NGOs 1 and 2	Farmers 1, 2, 3, 4 and 5
NGO representatives	NGOs 1, 2 and 3	NGO Rep 1, 2 and 3
Municipal representatives	Municipal Department 1, 2 and 3	Mun Rep 1, 2 and 3

Finally, a point of clarification on the terms used to describe farming practice: 'conventional farming' will refer to farming practices aiming at high productivity of the land. Conventional farming practices usually include one or several of these practices: use of synthetic chemical fertilizers, pesticides, herbicides, genetically modified organisms, heavy irrigation, intensive tillage or concentrated monoculture production (Reganold, Elliott & Unger, 1987; Pimentel *et al.*, 2005). As opposed to organic farming and permaculture, conventional farming practices are typically highly resource- and energy-intensive. Organic farming is defined by the International Federation of Organic Agriculture Movements (IFOAM) as "a production system that sustains the health of soils, ecosystems and people" (IFOAM, 2016). Some practitioners refer to their practices as organic farming other as using permaculture principles. The latter is a method to design "agriculturally productive ecosystems which have the diversity, stability and resilience of natural ecosystems" (Mollison, 1978: ix). These terms will be used in this research according to the definitions set.

Specific questions will be answered in this chapter. Firstly, how the impacts of climate change and the role of urban agriculture in urban adaptation described in the literature are understood and experienced by the practitioners? Then, to what extent does the municipal narrative on urban agriculture reflects the literature's narrative on urban agriculture as a potential urban adaptation strategy? And finally, are the urban agriculture and climate change policies of the City of Cape Town aligned with the views and practices of the practitioners in Cape Town, and if not, how could they be reconciled?

V.A. THE PRACTITIONERS' NARRATIVES ON URBAN AGRICULTURE AND CLIMATE CHANGE

The analysis of the farmers' and NGO representatives' interviews displays several interesting points regarding their narratives on urban agriculture in Cape Town and its link to climate change and adaptation to climate change. This section analyses the understanding and experience of climate change by the practitioners on urban agriculture in Cape Town. In reference to the literature's narrative, this section will also investigate the narratives of the practitioners on the role of urban agriculture to urban adaptation.

V.A.1. KNOWLEDGE OF CLIMATE CHANGE AND CLIMATE VARIABILITY

UNDERSTANDING CLIMATE CHANGE

Generally, extreme events can severely impact small-scale farmers (Altieri & Nicholls, 2017). Small-scale farmers in South Africa have always had to deal with extremes (Thomas *et al.*, 2007). In Cape Town, these include poor soils, high heat levels at key times of the year, and high winds. The

Mediterranean climate adds to these challenges, precipitating long dry summers and wet cold winters (Niang *et al.*, 2014). On top of the general trend of extremes due to natural variability and local climate, climate change, understood as the rapid change of climate induced by human activities, impacts the farming activities of the farmers, because of the changes in long-term and short-term variations. Climate change has been harshly experienced by urban farmers in Cape Town, regardless of the scale of their production, or the farming practices they use.

Farmers' knowledge on climate change in terms of forces and scientific mechanisms behind the long-term change of the climate was minimal. One farmer out of five understood the science of climate change; one had some comprehension of the science; the three others had none. The three NGO representatives interviewed understood the science of climate change. Use of concepts, correlations, scientific explanations showed that their narratives on climate change had an in-depth understanding of the causes and consequences of climate change, as the quotes below illustrate. They were all able to explain the difference between climate change and climate variability, climate and weather, natural climate cycles and human-driven climate change.

> "*What climate change is essentially, it's the rapid shift due to human destructive activity and added on to the natural cycles which are there already.*" (NGO Rep 3)

> "*I have studied the dynamics of macro-climatic cycles as well as the stochastic nature of change; the difference between climate, weather and climate change affecting different regions differently.*" (NGO Rep 1)

If we compare these narratives with the definition from the United Nations of climate change as "a change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods" (UNFCCC, 1992:3), the NGO informants' narratives on climate change seem to correlate with the literature.

EXPERIENCING CLIMATE CHANGE

Some farmers (n=3 out of n=5) did acknowledge the change of climate over the last two decades, although their discourse was not supported by scientific knowledge on climate change. The common factor amongst all farmers interviewed was that their experiences of the changing climate, either climate change or climate variability, were related to the impact on their farming activity.

In the interviews with farmers, the subject of climate variability arose in all interviews of farmers when questions about climate change were asked. Climate is defined by long-term, over a period of several decades, variation of mean climate variable such as temperature or rainfall whereas variability is the variation of climate variables from year to year, decade to decade (Smit *et al.*, 2000). Climate change is understood as the rapid change induced by human activities, occurring since

the end of the 19th century and the industrial development of societies. As climate variability is linked to rapid climate change, which induces different patterns of occurrence of extreme events in South Africa, climate variability represents significant disturbances and threats for societies, households, persons that utilize natural resources within their livelihoods (Thomas *et al.*, 2007). Climate variability, influenced by the long-term climate change, is an environmental factor that is at stake for farmers as the production of crops depends on the weather and its predictability.

The discourse of the farmers on climate variability reveals the impacts of a change in weather from year to year on their farming activities. The genre used to describe their farming activity, in the face of climatic change, encompassed negative terms such as "challenging", "hard", "difficult", "harsh", "tough". These terms used produce a discourse on their farming activity, which express the negative impact of the change in climate and climate variability on their daily-life activity. The following quotes illustrates the use of negative terms to describe the impacts of climatic events on their farming activity.

> "*10-20 years ago the weather wasn't like that, it has changed a lot. And it is challenging now, it is harder now.*" (Farmer 5)

> "*Last year was an extremely hot summer where the highest temperature of 42 degrees was measured here in Cape Town. The wind came very late and for only about 2 weeks. […] Working on this conditions of extreme heat was very, very difficult. […] Then winter came along and it was the most beautiful winter ever but with very little rain. So, going into summer when the dams are only about 60% full and to face even harsher water restrictions than we had last year. It's a tough reality.*" (Farmer 2)

Climate change and its impacts are stressing the Western Cape region (Mukheibir & Ziervogel, 2007). The urban farmers experience the impacts of climate change on their crops productions and they affect their farming activity. The fast change in climate, precipitated by human activities, is expected to have negative impacts on the Western Cape agricultural areas (SmartAgri, 2015). This applies to the urban farmers in Cape Town. The narratives on climate change and climate variability of urban farmers in Cape Town are correlated with the literature.

V.A.2. ADAPTING TO CLIMATE CHANGE: THE POTENTIAL OF SUSTAINABLE URBAN AGRICULTURE

SUSTAINABLE URBAN FARMING PRACTICES HAVE ADAPTATION BENEFITS

All the NGO representatives interviewed, displayed discourses on the role of sustainable urban farming practices to adapt to climate change, whereas majority of the farmers (n=4 out of n=5) did not.

Reflexivity, as defined by Ferguson is "the ability to act in the world and to critically reflect on our actions and in ways that may reconstitute how we act and even reshape the very nature of identity itself" (2003:199). In the case of NGO representatives, their level of reflexivity on sustainable farming practices is high because of the very nature of their position. Representatives of NGOs are speaking in the name of organizations promoting sustainable farming practices such as organic farming or permaculture principles. Their position as representatives compels them to have knowledge on sustainable practices, to be able to advocate for their projects and activity. The representatives articulate their narratives using informed arguments on sustainable farming practices in urban agricultural areas. The underlying assumption of these narratives is that sustainable urban farming practices would be the dominant type of farming practices. During interviews, all three NGO representatives used concepts and developed discourses supporting sustainable urban farming practices and their adaptation to climate change benefits, as the following quotes illustrate.

> "*The organic and biodynamic movement has always been towards adaptation and mitigation of climate change.*" (NGO Rep 2)

> "*There is definitely a role of urban agriculture when it comes to resilience*", added NGO Rep 1, going as far as stating that "*agriculture practices in urban areas could create green spaces, help with soil conservation, water resources, aquifer management, biodiversity, and finally contribute to a better urban environment.*"

The discourses expressed a high level of reflexivity on the role of sustainable urban farming practices. According to one of the NGO representatives, sustainable urban agriculture is related to the concept of resilience. Resilience is defined by the literature as "the ability of [cities, populations, ecosystems, etc.] exposed to climate change to resist, absorb, accommodate and recover from the effects of climate change in a timely and efficient manner, including through the preservation and restoration of their essential basic structures and functions" (UNISDR, 2009). The other two NGO representatives set the role of urban agriculture as an enabler of sustainable adaptation to climate change. Finally, only one farmer made the direct correlation between sustainable farming practices and adaptation to climate change. Other farmers expressed that their sustainable farming practices were better for the environment, without providing hard evidence of their narratives, nor expressing explicitly that their farming practices were potential urban adaptation strategies to climate change.

The NGO representatives are advocating for sustainable farming practices such as permaculture or organic farming to play a role in the face of climate change and increased resilience in the City. The narratives of these informants are aligned with the literature, that states that sustainable farming practices contribute to urban adaptation to climate change (Pretty, 2011; Kate, 2014; RUAF, 2014; UNHabitat, 2014; Carter *et al.*, 2015; Padgham, Jabbour & Dietrich, 2015).

SUSTAINABLE URBAN FARMING PRACTICES HAVE ECONOMIC BENEFITS

Organic farming practices, or home food gardening practices are generally not studied through a profitability lens, and especially not in the global South (Hamilton *et al.*, 2013; Prain *et al.*, 2010). However, when questioned about profitability of their activity, urban farmers revealed interesting views on their farming activity. The farmers interviewed argued that their farming practices were aiming at profitability and agricultural intensity. As an economic activity integrated within the urban economy of Cape Town, profitable sustainable agriculture, as expressed by the informants, could have benefits for the adaptive capacity of the farmers and the city more generally. A sustainable economy is defined by the Rockefeller Foundation and ARUP as an economy with a diverse economic base, an attractive business environment and integrated within regional and global economies (the Rockefeller Foundation & ARUP, 2016:13). Sustainable urban agriculture, as described by the practitioners could improve the sustainability of the economy. The practitioners' narratives on the economic implication of urban agriculture were related to the sustainability of the food system through a seasonal production of food and the inclusion of local economies connected to a network of economies. As expressed by NGO Rep 2:

> *"At a basic level through local economy and sustainable resource-use, [sustainable urban agriculture] can face the dynamics coming from climate change whilst feeding people and taking care of nature."*

This quote expresses the idea that the sustainability of the economy could be reached if sustainable urban agriculture was developed. In this sense, sustainable urban agriculture would be contributing to the diversification and sustainability of the urban economy of Cape Town, where resources would be managed sustainably in the face of climate change and the sustainable agricultural economy integrated within networks of other urban economies.

The majority of sustainable urban farmers (n=4 out n=5), and the majority of the NGO representatives (n=2 out of n=3) applied discourses usually used for conventional farming to speak about their activity. The quote below is an example of the discourse used to support the narrative of profitable sustainable urban farming:

> "*We might not do intensive farming but we could say that we are more profitable than the conventional farmers because we don't buy fertilizers we don't buy expensive inputs like they do. So technically our farming is cheaper.*" (Farmer 4)

> "*Urban farming, out of necessity, would be more intensive than rural farming because in rural areas you have more land accessible.*" (NGO Rep 2)

The narratives emerging from the interviews and discussions around the economic activity of the farmers were mostly related to urban farming as an economic upliftment activity. The main objective

expressed by the practitioners on the motivation of their farming activity was to earn an income, through a profitable activity. As such, sustainable urban agriculture could help the practitioners to be more resilient and adapt to climate change. For instance, having financial resources available in case the farming activity is threatened by climate change and revenues decrease, also known as a contingency funds can help to respond to emergencies and unforeseen climatic events in the short-term but could also help to plan in the long-term, a recovery plan that increases the resilience in the face of a future climatic event.

The income profiles of the farmers could influence their discourses on their farming activity. However, the study interrogated three low-income farmers (Farmers 1, 3 and 5), none of which had access to land but all received some sort of aid in the form of tools, inputs or economic networks and two middle-income farmers (Farmers 2 and 4) and the answers were similar in both cases.

> "*We don't want to be part of a project, we want business. We want to know that the trucks are coming to collect from our own farm. We don't want to do garden; we want farming and do business.*" (Farmer 5)

Moreover, a specific size of the land farmed was not mentioned by the farmers, nor the NGO representatives, as a prerequisite to intensification of sustainable farming. Practitioners supported the idea that any sort of sustainable urban farming activity could be profitable. The reasons behind farming expressed by all the practitioners were more related to an economic strategy, *i.e.* a strategy to earn an income than to a survival strategy for households, *i.e.* a strategy used to cope with the lack of access to food from the formal or informal markets. Contrary to the narratives on urban agriculture stating that urban agriculture is part of a survival strategy because it provides food for households (Hamilton *et al.*, 2013), sustainable farmers in Cape Town are engaging in farming activities towards profitability and high production to earn an income. As an economic activity, related to the formal and informal economy of the city and the food system, sustainable urban agriculture plays a role in the development and adaptation pathway of the city.

SUSTAINABLE URBAN FARMING PRACTICES HAVE FEW FOOD SECURITY BENEFITS BUT IMPACT THE URBAN FOOD SYSTEM

The systematic literature review presented in this research in Chapter IV highlighted the importance of the food security lens when looking at urban agriculture activities worldwide. Without minimizing the potential contribution of urban agriculture to food security in some contexts, the narratives expressed by the interviewed practitioners were not supporting this narrative. It is to be noted that the limited respondent sample of this research might have prevented the food security narrative from being expressed and therefore have had an effect on these findings. The dominant narratives in the literature, which state that micro-scale urban farming activities can bring food to households (Drescher, 1997; Slater, 2001; Dima *et al.*, 2002; Hamilton *et al.*, 2013), was barely indicated in the

interviews. No farmers said that it contributed to his/her food security in terms of direct food provision, but two farmers out of five indicated that their farming activity changed their view on their food consumption. Only one NGO representative (out of three) pointed out the potential link between food security and urban agriculture.

However, the discourse of the practitioners seems to correlate with McClintock's (2010) narrative on urban agriculture. Indeed, all the NGO representatives and two farmers (out of five), expressed the idea that what sustainable urban farming encompassed was beneficial to achieving a sustainable food system. As part of a sustainable development pathway in the face of climate change, a sustainable food system can be seen as a sustainable adaptation strategy. In their views, sustainable urban agriculture is said to be connected to a wider food system narrative, rather than linked with food security. The narratives expressed by the NGO representatives on the potential of sustainable urban agriculture to be a sustainable adaptation to climate change correlates with the theoretical framework of McClintock (2010), exposed in the literature review of the key concepts (Chapter II). In his explanation of the metabolic rift, urban dwellers are said to be 'de-alienated' from the food system, but urban agriculture attempts to overcome this metabolic rift. In the practitioners' narratives on sustainable urban agriculture and local economy, the matter of seasonality of the production, as well as its inclusion within a local food business were attributes of the sustainability of their farming activity. This relates to the literature's narrative on the dominant food business, which states that the current food system has negative impacts on poverty, hunger, employment, health, cultural integrity, the environment, rural recreation, and even animal rights (Friedman, 1993). Following McClintock's theory, the sustainable urban farming practitioners' narratives assume that extended urban agriculture activities could have social impacts and challenge the current food system. Five practitioners interviewed (out of eight), expressed the idea that sustainable urban farming could be a way to reconnect individuals with their food, the food system and their environment. The following quote illustrate this idea:

> "*I grow my vegetables because I know where my food comes from. […] If people understand the importance of going back to nature as much as possible specifically when it comes to food, so if people are going back to nature and growing their own food that is then negating the need for commercial farming which is one of the biggest causes of deforestation, pollution, soil erosion and all of that.*" (NGO Rep 3)

Out of the eight practitioners interviewed, two NGO representatives, and four farmers emphasized the 'trigger of change' aspect of urban agriculture, in terms of community and social benefits. For example, NGO Rep 3 disclosed that urban agriculture could be "a social uplifting, which brings communities together". From the interviews and the narratives gathered, several social benefits have been identified by the practitioners as being social benefits currently observed. These observable social benefits were: an increased interest in the food system and its economic, social and environmental impacts from the customers; the creation of social structures such as market places

which trigger a sense of community; or a better inclusion of the disabled, ill or socially excluded within the economy and therefore society. If a greater re-connection to natural systems enable an increased interest in and knowledge of climate change and the impact on the environment of urban dwellers, sustainable urban agriculture could trigger greater urban adaptation capacity.

The increasing but still not dominant shift of focus within the academic world considers urban agriculture not only as a survival strategy, but also as an activity which can provide environmental and social benefits (Hovorka, 2004; Hovorka, 2006). Therefore, the practitioners' narrative on sustainable urban agriculture supports the idea that sustainable urban agriculture through a local and seasonal food system can trigger a transformation of the current food and economic system.

V.A.3. ADAPTIVE CAPACITIES: THE OPPORTUNITY TO CHANGE PRACTICES

SUSTAINABLE URBAN AGRICULTURE TO ADAPT TO THE CHALLENGES OF FARMING IN CAPE TOWN

"*There is a lot of challenges: the wind, the water, the sun, the soil.*" (Farmer 5)

To cope with and prepare for climate change, small urban farmers, like small rural farmers, use 'traditional techniques', defined as agroecological methods including "high number for plant and animal diversity, high structural diversity, exploitation of a full range of microclimates, dependence on local resources and crop varieties, etc." (Altieri & Nicholls, 2017:3). This study points out that the sustainable urban farmers interviewed have shown signs of adaptive capacity towards climate change, using similar 'traditional techniques' to adapt to climate change.

The challenges expressed by the practitioners in terms of natural and climate changes were related to the quality of the soil, extreme heat and lack of water. The issue of theft was also identified by the farmers and NGO representatives as a challenge to cope with when having a sustainable urban agricultural activity. This section turns to consider these natural and climatic challenges as well as the theft issue reported by the practitioners.

- The issue of the soil

The sandy and infertile soil of Cape Town has been mentioned by practitioners as one of the first obstacles to farming, even before the climatic conditions.

"*We have got a soil that is very sandy, it is pure beach sand.*" (NGO Rep 1)

The three NGO representatives interviewed had the same statements on the poor quality of the soil and the difficulty of farming on a sandy or rocky soil. Four farmers out of five shared this view. Both

in the PHA or in the Central Business District of the city, farmers and NGO representatives express their struggle to farm according to the quality of the soil. However, the use of sustainable farming practices such as organic fertilizers, compost and mulch has been proposed as a solution to this natural challenge by all the practitioners facing this issue.

- The extreme heat

  "*At the end of the day the wind and the heat comes and it doesn't grow. The sun is really a challenge because it kills the soil.*" (Farmer 5)

During the 1990s, a period of strong heat stimulated shifts in production practice among the farmers of the Western Cape, who found solutions to adapt to this increasingly warmer climate (SmartAgri, 2015). The urban farmers in Cape Town expressed similar challenges in relation to increasing temperatures, and showed adaptive response to deal with these challenges.

> "*Working on this condition of extreme heat was very very difficult. So much so that I had to change the working day. We had to start much earlier so that we could end off much earlier in an effort to escape those unbearably hot days.*" (Farmer 2).

This change in practice expressed by Farmer 2 is one example of shift in practices stimulated by climate change.

- The water restrictions

Greater Cape Town was identified as the first major urban region in South Africa where the demand for water will exceed the total potential yield for the area (DWAF, 2004). Latest reports on the municipal water surplus states that it will only be adequate to 2020, under the worst-case scenario, without successful implementation of water demand management measures and considering the actual growth in water requirements (DWAF, 2014). In terms of water resources, the matter of water scarcity took a strong hold at the time of the interviews, as water restrictions were in place. The drought-driven water supply shortage has been alarming (Koyana & Isaacs, 2017). To reduce the water demand in the City of Cape Town and adapt it to the existing supply, water restrictions are implemented as an urban adaptation strategy (Mukheibir & Ziervogel, 2007). A level 3 water restriction was implemented from 01 November 2016 until further notice (CoCT, 2016c), meaning that no irrigation system using municipal and potable water could be used by the farmers. Urban farmers could not use as much water as they were used to and therefore, were forced to reflect on their watering techniques. Some of them (such as Farmers 2 and 4) took advantage of the situation to implement alternative techniques, such as reduced irrigated acreage through use of drought tolerant plants, use of mulch and compost to capture and hold moisture in the soil or use of drip irrigation. Others (Farmers 3 and 5) felt that the restrictions were jeopardizing their production and leaving them with no means to adapt.

> "*What we are trying to do is to minimize our water consumption. We are irrigating directly in the soil but it doesn't help if you don't have good protection for the soil*." (Farmer 4)

> "*Water is a problem, and if you want to dig a borehole, you don't have money. We use a pump, with electricity and we pay at the end of the month but if there is no electricity, there is no water. We should use dripping irrigation because the water is limited, it is the good ways but we can't afford it now.*" (Farmer 5)

The literature states that farming practices such as water harvesting, drip irrigation, seasonal crops or indigenous plants are solutions in adapting to climate change (RUAF, 2014). Practitioners' narratives aligned with narratives in the literature, as respondents reported using drought-tolerant crops (Farmer 1, Farmer 3 and Farmer 4) and water harvesting techniques (Farmer 3 and Farmer 5; NGO Rep 1, NGO Rep 2, NGO Rep 3). Thus, farming practices alternative to irrigation are spreading to cope with and adapt to climate change in times of water scarcity.

- The theft issue

This last challenge expressed by the practitioners interviewed is not related to the environment or the climate but can find a solution with the diffusion of sustainable urban farming practices. Challenges related to the issues of theft on farming premises were expressed by practitioners. Two of the three NGO Representatives and three farmers out of five shared experiences of theft or concern about the possibility that their vegetables or tools could be stolen. However, all the NGO representatives, as well as two farmers, expressed the idea that sustainable urban agriculture could provide social structures within and amongst communities, as suggested by the following quote.

> Urban agriculture "*is really uplifting for people because they can set up a garden that provide them with food. It's a social uplifting where they build confidence, it brings communities together*." (NGO Rep 3)

Creating a local identity within the farming communities and increasing social cohesion with the other surroundings communities could enhance trust and understanding between people, which could eventually overcome this theft issue.

DIFFERENT OPPORTUNITIES TO ADAPT TO CLIMATE CHANGE

The sense of adaptive capacity of each practitioner seems to be related to their financial and social resources. Farmers 2 and 4 can be described as having middle-class social profiles, with assets, access to land and resources. As such they expressed some flexibility in their farming practices and feel capable of adapting their farming practices to climate change. Farmers from lower social classes, such as Farmers 1, 3 and 5, with less financial means and a need to produce to earn an income

expressed a low sense of their adaptive capacity to face climatic challenges as the quotes below illustrate.

> *"We have to adapt to the conditions. We can't expose the soil anymore because we are struggling to keep water into the soil. We need to have good soil cover." "What we are trying to do is to minimize our water consumption. We are irrigating directly in the soil but it doesn't help if you don't have good protection for the soil. A better solution would be to try and water only three times a week if you have a proper soil cover. We are going to try and see how that works."* (Farmer 4)

> *"We should use dripping irrigation because the water is limited, it is the good ways. Even the tunnels, we could use it and plant things anytime, even with the climate change. But they don't give us those things. It depends on who you are."* (Farmer 5)

The study showed that practitioners are experiencing climate change impacts and have adaptive capacities due to their urban agriculture practices. The adaptation benefits of sustainable urban agriculture stated in the literature correlate with the everyday life experience expressed by the informants in Cape Town.

The social and cultural capital of farmers (as displayed in Table 5) might also come into play in their sense of adaptive capacity. Bourdieu defines social capital as "the actual or potential resources which are linked to possession of a durable network" (1986:248). Cultural capital is said by Bourdieu to either be embodied ("long-lasting dispositions of the mind and body"), objectified ("cultural goods […] which are the trace or realization of theories") or institutionalized ("a form of [objectified cultural capital], which confers entirely original properties on the cultural capital which it is presumed to guarantee", such as "educational qualification") (1986:252).

In the case of the farmers interviewed, their economic capital appeared to be a function of their cultural capital and their social capital. Therefore, poorer farmers (in economic terms) face more social constraints such as access to information, language barriers or administrative barriers and feel less able to adapt to climate change because their social, economic and cultural capital are not adapted to the social, economic and cultural capital of the dominant class. The following quote from NGO Rep 1 corroborates this argument.

> "*The farmers tend to struggle with access to capital, business skills such as cash flow projections and management, legal compliance, setting up and manage a bank account, English language and skills to complete forms so that they can participate in markets and forums.*" (NGO Rep 1)

Table 5. Economic, social and cultural capital of the practitioners

	Economic capital	Social Capital	Cultural Capital
Bourdieu's capitals definition	*the 'capital' as defined by the economic theory*	*"the actual or potential resources which are linked to possession of a durable network"*	*the cultural capital is embodied, objectified or institutionalized*
Rankings meanings	1= lower class 2= middle class 3= upper class	1= poorly connected 2= medium network 3= highly connected	1= less than matric 2= matric 3= more than matric
Farmer 1	1	2	1
Farmer 2	2	3	3
Farmer 3	1	1	2
Farmer 4	2	3	3
Farmer 5	1	3	1
NGO Rep 1	3	3	3
NGO Rep 2	3	3	3
NGO Rep 3	3	3	3

This study shows that urban farmers, as with the farmers in the Western Cape in the 1990s, are changing their practices according to the variability of climate and extreme events they experience, namely extreme heat and water scarcity. Farmers 1, 3 and 5, with a lesser sense of adaptive capacity, had lower scores in terms of social capital (*i.e.* 2, 1 and 3) and cultural capital (*i.e.* 1, 2, 1), whereas Farmers 2 and 4 had higher scores for their social and cultural capital (*i.e.* 3). Their narratives on adaptive capacity seem correlated to their financial and social resources as individuals.

V.B. THE INSTITUTIONAL NARRATIVE ON URBAN AGRICULTURE AND CLIMATE CHANGE

While recent policies and international environmental frameworks have highlighted the need for further research on all the different functions and benefits of urban agriculture both in the Northern and Southern hemispheres (Hamilton *et al.*, 2013; Mok *et al.*, 2013), the food security paradigm remains central in the institutional narratives on urban agriculture in Cape Town. The review of the municipal policies on urban agriculture and interviews with government officials, as well as the Western Cape and the Municipal Climate Change Framework reveals the mainstream narratives expressed by the governmental institutions. This section will compare this local narrative from the governmental texts (policies and interviews) with the urban agriculture literature review's findings at a global scale. The following current policies and strategies regulating urban agriculture and adaptation to climate change in Cape Town were reviewed and studied in this section:

- The City Parks Development Policy of 2004[8]
- The Urban Agriculture Policy of 2007[9]
- The Food Gardens Policy of 2013 in support of the Poverty Alleviation and Reduction Policy[10]
- The Spatial Development Framework of 2012[11]
- The Energy and Climate Change Strategy of 2005[12]
- The Framework for Adaptation to Climate Change of 2006[13]
- Cape Town's Action Plan for Energy and Climate Change of 2011[14]
- The 2016 Climate Adaptation Plan of Action on Food Security of the City of Cape Town
- The 2014 Western Cape Climate Change Response strategy[15]

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[8] Available: http://resource.capetown.gov.za/documentcentre/Documents/Bylaws%20and%20policies/Parks%20Development%20Policy%20-%20(Policy%20number%2037181)%20approved%20on%2028%20January%202015.pdf

[9] Available: http://resource.capetown.gov.za/documentcentre/Documents/Bylaws%20and%20policies/Urban%20Agricultural%20Policy%20for%20the%20City%20of%20Cape%20Town%20-%20approved%20on%2007%20December%202006.pdf

[10] Available: http://resource.capetown.gov.za/documentcentre/Documents/Bylaws%20and%20policies/Policy_Food_Gardens.pdf

[11] Available: http://resource.capetown.gov.za/documentcentre/Documents/City%20strategies,%20plans%20and%20frameworks/SDF_Technical_Report_2012_Quick_Read_Web.pdf

[12] Available: http://resource.capetown.gov.za/documentcentre/Documents/City%20strategies,%20plans%20and%20frameworks/Energy_+_Climate_Change_Strategy_2_-_10_2007_301020079335_465.pdf

[13] Available: http://resource.capetown.gov.za/documentcentre/Documents/City%20strategies,%20plans%20and%20frameworks/Framework_for_Adaptation_to_Climate_Change_(FAC4T)_08_2006_38200713832_465.pdf

[14] Available: http://resource.capetown.gov.za/documentcentre/Documents/Graphics%20and%20educational%20material/Moving_Mountains_Energy+CC_booklet_2011-11.pdf

[15] Available: https://www.westerncape.gov.za/text/2015/march/western_cape_climate_change_response_strategy_2014.pdf

- The 2015 SmartAgri report entitled "A Climate Change Response Framework for the Agriculture Sector of the Western Cape Province (WCCCARF)", submitted to the Western Cape Department of Agriculture and the Western Cape Department of Environmental Affairs and Development Planning[16].

V.B.1. URBAN AGRICULTURE IS NOT SUPPORTED BY THE MUNICIPALITY FOR ITS ADAPTATION TO CLIMATE CHANGE BENEFITS

THE UNDERSTANDING OF FOOD SECURITY

From the interviews conducted with government officials at the municipal level, it can be established that the narrative on urban agriculture and food security, as articulated in the policies, encompass a particular understanding of the term "food security".

> "*The first step the city needs to be doing is recognizing that food security is not only a question of having enough food, but the fact that a lot of people in the city can't afford nutritious food, enough food, the right food.*" (Mun Rep 1)

The municipal discourse suggests that urban agriculture in Cape Town is still mostly seen as a means for households to produce food for their own consumption, while increasing the amount of food available at the city scale. The municipal narrative considers urban agriculture as a survival strategy for households. This narrative correlates with the narratives expressed in the early literature items from the global North and most of the literature on the global South (Bassett, 1981; Drakakis-Smith *et al.*, 1995; Holmer & Drescher, 2006; Suteethorn, 2009). The municipal narrative indicates a certain idea of the type of urban agriculture supported, *i.e.* urban farming activities which will provide 'enough food' for the households, either by the production of food at the household level, or by the global increase of the amount of food available at the city level. Not having to buy food, frees some income for households. Being able to sell some parts of the harvest results in an improved income for farming households, as supported by the discourse of Mun Rep 2.

> "*It is well-known that growing their own food helps them diversify their family's diet, and selling surplus provides additional income.*"

[16] Available: http://acdi.uct.ac.za/sites/default/files/filesattached/Draft%20Final%20Western%20Cape%20Climate%20Change%20Response%20Framework%20for%20the%20Agricultural%20Sector.compressed.pdf

On the amount of food available at the city-level, urban agriculture is said to play a role in the food security of the city, as it contributes to have 'enough food' for the urban dwellers. This idea is supported by Mun Rep 2, who stated:

"*Urban agriculture is one of the ways that fresh produce is supplied to local markets*."

Whether as a home-based activity, as part of survival strategies, or as an emerging formal business, as part of the effort to increase the available food in the city, the municipality supports urban agriculture mainly for its food provision benefits. However, past research of Frayne *et al.* (2009) has shown that urban food security was minimally correlated to urban agricultural activities in Cape Town. Indeed, the main driver of food insecurity is not the availability of food but the capabilities of households to be able to access it. Although prices might be lower per sales unit size in supermarkets, poorer, and most food insecure households, cannot afford the quantity offered. Therefore, they rely on the informal sector, which is more adequate to their purchasing power (Battersby, 2011b). In the study of Frayne *et al.*, only 5% of the food insecure households surveyed in Cape Town "grow their own food, while 25% of households obtain food from sources that may be described as 'coping strategies' (food aid, remittances (food), shared meal with neighbors and/or other households, food provided by neighbors and/or other households, community food kitchen, and borrowing food from others)" (Frayne *et al.*, 2009:30). These studies suggest that the food system is failing the food security of the households and that urban agriculture does not seem to be the main solution to food security, as a survival strategy, in Cape Town.

A PARTICULAR TYPE OF URBAN AGRICULTURE SUPPORTED

The review of the Urban Agriculture Policy of 2007 and the 2013 Food Gardens Strategy in Support of Poverty Alleviation and Reduction Policy, pointed out another characteristic of the municipal narrative, which is its focus on the micro-scale type of urban agricultural activities supported.

The emphasis was then on the health and nutrition benefits brought by farming activities at a micro level, as well as on the possible economic upliftment offered by a small-scale farming activity (CoCT, 2007). As shown by the chart below (Figure 13), the support of the city was conditioned by the category of the urban farming activity, and shows how the city was already inclined, in 2007, towards the development of small-scale farming activity, in the forms of community gardens and micro farmers. Production inputs, tools and infrastructure and facilitation of access to land were mostly directed to community gardens and micro-farmers, while the commercial farmers were not included in this Urban Agriculture Policy process.

Motivations behind this specific municipal narrative can be set out. On one hand, one can imagine that the city wanted to limit the policy scope to avoid overlap with the policies and strategies of the Western Cape Department of Agriculture on the peri-urban fringe of the city. Contrary to the inclusive

understanding of the term urban agriculture in this research, the city managers must take into consideration the different mandates and policies in place for a specific area, in this case the municipality's boundaries, mandating limits to which the city can govern the urban agricultural activities. As the peri-urban zones of the city, such as the PHA, are not considered as part of the "urban edge", the municipal urban agricultural policies do not have a mandate over these areas. They rather fall within the governance mandates of the provincial authorities. As such, excluding commercial farming activities would have been a way to avoid an overlap of policies on the urban fringe. On the other hand, one can imagine that the mandate of the city in terms of economic development would support any type of urban agriculture, especially the emerging and commercial farmers in an effort to create more jobs and economic growth within the urban fringe. But as stated by Mun Rep 3, the role of a city, and its mandate in the economic space is not always in line with its overall mandate:

> "*The economic space in all municipalities is a contested one […] what is legitimately the role of a city in the economic space?*" (Mun Rep 3)

Figure 13. Type of assistance offered by the city per urban agriculture category

	Type Of Assistance	Home Gardens	Community Gardens	Micro Farmers	Small Emerging Farmers
A	**Access to land**				
	Acquisition of land		X	X	X
	Earthworks		X	X	
B	**Infrastructure**				
	Water supply including boreholes/well points		X	X	
	Electricity supply		X		
	Roads		X		
	Fencing		X		
	Irrigation systems		X	X	
	Containers		X	X	X
	Animal sheds		X	X	
	Ablution facilities		X	X	
C	**Tools / equipment / implements**				
	Hand tools (rakes, spades, pliers, etc.)		X	X	
	Water pumps		X	X	
	Power equipment (e.g. power hoes/rotovators)		X	X	X
	Wheelbarrows		X	X	
	Watering cans		X	X	
D	**Production inputs**				
	Seeds / seedlings	X	X	X	
	Fertilizer / compost	X	X	X	
	Pesticides		X		
	Fuel		X		
	Water		X		
	Electricity		X		
	Animal fodder (organic waste)		X	X	X
	Veterinary products (animal health care)		X	X	X

Source: CoCT, 2007:8

Therefore, the municipal narrative on urban agricultural activities in Cape Town appears to understand urban agriculture mostly in terms of food security outcomes and as an economic activity practiced on a micro-scale. The 2007 Urban Agriculture Policy is presented as a relevant policy that has a bearing on the 2013 "Food Gardens Strategy in Support of Poverty Alleviation and Reduction Policy" (CoCT, 2013:6-7). Since the adoption of the Food Gardens Strategy in 2013, the terminology of food gardens has been predominant in official discourses, municipal documents and the city's website, instead of urban agriculture. This shift in discourse is reinforcing the biased view of the city regarding urban agriculture, reducing urban agriculture in Cape Town to a small-scale, home-based activity concerned solely with the provision of food to households, as found in most of the literature on southern cities (Hamilton *et al.*, 2013; Drescher, 1997; Dima *et al.*, 2002; Slater, 2001). The municipal narrative disclosed in the preceding policies defines urban agriculture as a micro-scale activity and does not see the social and environmental benefits of urban agriculture, contributing to urban sustainability and adaptation, as main reasons to support urban agriculture.

V.B.2. SUSTAINABLE URBAN FARMING PRACTICES TO ADAPT TO CLIMATE CHANGE

URBAN AGRICULTURE POLICIES ACKNOWLEDGE THE BENEFITS OF URBAN AGRICULTURE IN TERMS OF ADAPTATION TO CLIMATE CHANGE

However, the social and environmental potential benefits of urban agriculture, as expressed since the mid-1960s in the literature on Northern cities (Kaplan, 1973; Morris, 1987), and later in the literature on the South, seem to be acknowledged in the municipal narrative. From the 2007 Urban Agriculture Policy, in which urban agriculture was said to be able to "contribute to the social and economic well-being of people" (CoCT, 2007:2), to the 2013 strategy mentioning the alignment of the food garden policy with the Social Development Strategic high-level objectives[17], the municipal narrative appears to take into consideration the social dimensions of urban agriculture with a positive inclination. The narrative of the City of Cape Town on urban agriculture recognized some potential social and environmental benefits, as expressed in the literature, but does not express these potential benefits as main reasons to support urban agriculture. In the 2007 policy and 2013 strategy the desired

[17] These high-level objectives are:
- Support the most vulnerable through enhancing access to infrastructure and services.
- Promote and foster social integration.
- Mobilize resources for social development.

(CoCT, 2013:5)

outcomes of urban agriculture and food gardens are related to poverty alleviation and food security. The social benefits of urban agriculture are only acknowledged in relation to other overall policies and strategies such as the Social Development Strategy. However, the recent study from Olivier and Heinecken (2016) brings significant weight to the argument that urban agriculture has social benefits, and specifically in Cape Town, as they proved that "urban agriculture not only contributes to food security but builds social capital, which improves livelihood strategies and interpersonal relations [and especially] where urban agriculture projects are facilitated by NGOs".

This municipal narrative on the environmental impacts of urban agriculture can be linked to the results of the literature review. In Southern cities, there are two dominant narratives relating to urban agriculture's environmental impacts or consequences. The first is the benefits of urban agriculture in terms of adaptation to climate change brought by sustainable farming practices in social, economic and environmental terms. The second is the negative pollution risks associated with production on contaminated soil, along road areas with heavy air pollution, use of contaminated water resources, etc… and the risks in terms of health linked to this pollution. Correlated with the literature on Southern and Northern cities, the narrative of the City of Cape Town implicitly acknowledges the potential social and environmental benefits of urban agriculture but also considers the health and environmental risk related to the urban agriculture practices used.

The 2007 Urban Agriculture Policy "promotes urban agriculture within the context that it will not degrade the quality of life of citizens, will not impact harmfully on public health [and] the natural environment" (CoCT, 2007:2). This phrasing show that the municipal narrative supports urban agricultural projects if their impacts are not proven to have negative impacts on the environment and public health. At the same time, it also shows that the potential negative impacts of urban agriculture are considered by the municipality, since they are mentioned. To prevent potential degradation of the quality of life of citizens from harmful impacts on public health and the natural environment, the city recommends environmental impact assessments and environmental management plans should be conducted (CoCT, 2007:7). The 2013 strategy does not mention explicitly this prevention narrative on urban agricultural activities, but the explicit reference to the 2007 Urban Agriculture Policy endorses it.

From the literature, it was argued that sustainable farming practices had the potential to reduce climate change risks, improve water management and biodiversity, increase ecosystems services and increase food security, especially if sustainable farming practices favoring organic inputs and farming practices and/or permaculture principles are used (RUAF, 2014; UNHabitat, 2014; Padgham, Jabbour & Dietrich, 2015; Carter *et al.*, 2015). As such, sustainable urban farming could increase the adaptive capacity at a city scale by reducing the vulnerability of the city, while matching the municipal requirements to avoid the risks in terms of environment and public health of conventional farming practices.

If the potential benefits of urban agriculture to adaptation to climate change seems to be implicitly acknowledged in the municipal texts on urban agriculture, the study needs to verify whether the adaptation texts from the municipality and province are aligned with this view on urban agriculture, as will be examined in the next section.

DO THE ADAPTATION POLICIES ACKNOWLEDGE THE POTENTIAL BENEFITS OF URBAN AGRICULTURE IN CAPE TOWN?

When looking at the climate change and adaptation strategies related to urban agricultural areas in Cape Town, established by the Western Cape Government as well as at the city level, one can see a corroborating trend to the narrative expressed in the urban agricultural policies and strategies. The Western Cape Government policies and strategies rule over the peri-urban agricultural areas outside the boundaries of the City of Cape Town, as per their mandate.

At the provincial level, the 2015 Climate Change Response Framework for the Agriculture Sector of the Western Cape Province, states agriculture's role in long-term sustainable and climate resilient development. The strategy includes "climate resilient food gardens" as a means to "build climate resilient and responsive agricultural value chains and food systems" (SmartAgri, 2015:39, Objective 1.6) in order to "promote a climate-resilient low-carbon agricultural sector that is productive, competitive, equitable and ecologically sustainable across the value chain" (SmartAgri, 2015:29, Strategic Focus Area 1). In developing sustainable food gardens, the Western Cape Government hopes to reduce the climate risks in terms of warming, heat waves, drying (less rainfall and more evapotranspiration), dry spells and drought, heavy rainfall, wind and indirectly the risks induced by pests and diseases (SmartAgri, 2015:40).

The Western Cape Climate Change Response Strategy of 2014 refers extensively to the need for climate change adaptation plans to guide the development of agriculture in the Western Cape, as expressed in several national and provincial strategies and frameworks. For instance, the Western Cape Climate Change Response Strategy refers to the National Development Plan, which states that the expansion of commercial farming should be guided by adaptation to climate change strategies (WCG, 2014:12). It also acknowledges the Western Cape Draft Strategic Plan (2009 – 2014), the Provincial Spatial Development Framework or the Western Cape Infrastructure Framework, which express the need for agriculture, and therefore urban agriculture, to be regarded with the adaptation to climate change lens. Finally, the Western Cape Climate Change Response Strategy of 2014 had a chapter on its own on food security, which set climate smart agriculture as a priority to improve food security at the provincial level (WCG, 2014:36).

From this review of the Western Cape texts, this study can conclude that agriculture practices adapted to climate change, such as climate resilient or climate smart practices, are part of the narrative on adaptation to climate change at a provincial level. In that sense, the narratives on

agriculture from the Western Cape Government seem to favor sustainable farming practices to increase climate change adaptive capacity. The farming practices advocated in the provincial strategies are related to the sustainable farming practices as defined by the literature on urban agriculture to contribute to the adaptation to climate change of cities.

At the municipal level, the Energy and Climate Change Strategy of 2005 and the Framework for Adaptation to Climate Change of 2006 made no mention of urban agriculture, food gardens or any type of farming activity or practices. It is only in the Cape Town's Action Plan for Energy and Climate Change of 2011 that food gardens and urban agriculture started to be mentioned. It stated that urban agriculture could help achieve the "Objective 6 - adapt to and build resilience to climate change impacts" (CoCT, 2011:47).

Furthermore, Mun Rep 1 indicated that the ongoing work on the Spatial Development Framework (CoCT, 2012) aimed to map out the ecological services of the city in order to design and define the future development of the city according to the impacts of its development on the environment and the city. As such, the "potential for urban agriculture" (Mun Rep 1) could find its place in the spatial development policies and therefore in the municipal narrative on sustainable development.

> "*What could be very good for us, in the city, is to drive the agenda of food security as an adaptation issue until everyone realizes what food security actually is and what threats to food security means. Because food security is going to be more of a challenge with climate change.*" (Mun Rep 1).

As such, the municipal narrative on urban agriculture, which favors its food security benefits, could be shifted towards its potential for developing adaptive capacity. If linked with the urban adaptation to climate change, the municipal narrative on urban agriculture could shift from a food security narrative to a sustainable adaptation narrative.

V.B.3. THE RESILIENCE PARADIGM: A WAY TO RECONCILE NARRATIVES?

In 2016, Cape Town became one of the 100 Resilient Cities chosen by the Rockefeller Foundation to improve resilience at the municipal level (CoCT, 2016a). The City of Cape Town has been concerned about resilience and climate change and is at the forefront of cities' networks internationally, such as the Cities Climate Leadership Group (C40), which is negotiating during the COPs, as explained by Mun Rep 3.

> "*The mayor has worked to keep involved in a lot of international organizations. The C40 is high on the agenda as Cape Town occupies a prominent position in this organization. This is an important organization in the point of view of lobbying particularly if you bind to the view that cities are major economic players and therefore should have the ability to lobby*

particularly national finance ministers for disbursement or response to climate change." (Mun Rep 3)

The new resilience focus taken by the municipality, triggered by its involvement in international cities' networks and conventions, could be a starting point in the realization of sustainable adaptation to climate change, as resilience tackles social justice, environment integrity and take into consideration adaptation to climate change. To enhance resilience in the face of climate change, the vulnerability of the city to climate risks must be minimized, given attention to the improvement of the adaptive capacity of the urban dwellers, urban infrastructure and more generally, of urban systems and ecosystems (IPCC, 2007a; Pelling, O'Brien & Matyas, 2015). Future policy orientation at the municipal level towards urban resilience could have an impact on the adaptive capacity of the city and its systems, such as the food system.

Eriksen *et al.* (2011) have elaborated that sustainable adaptation could help climate change adaptation measures to be made more relevant to policy-making, as it can be aligned with a dynamic sustainable development path; sustainable adaptation to climate change would be a means to broaden adaptation measures' goals in space and time and contribute to urban resilience (Eriksen *et al.*, 2011). Urban resilience promotes "the capacity of cities to function so that the people living and working in cities survive and thrive no matter what stresses or shocks they encounter" (the Rockefeller Foundation & ARUP, 2014:5). In this view, an improved urban resilience in Cape Town would enhance urban agriculture activities by supporting sustainable economic activities, better infrastructure and ecosystems and improved leadership and planning at the city level (the Rockefeller Foundation & ARUP, 2014).

The recent focus on resilience coming from the city representatives' involvement at the international level, might indicate a way to reconcile apparently contradictory narratives among practitioners. Indeed, within the Climate Adaptation Plan of Action for Food Security of 2016, the municipality proposes urban agriculture and food gardens be regarded as part of the food system on a wider scale. In reference to the 2007 Urban Agriculture Policy, urban farming is set as a means to alleviate poverty through food security and economic development. Meanwhile, in the Climate Adaptation Plan of Action for Food Security, urban agriculture has been positioned as a space "to work collectively to create sustainable economic opportunities in local communities" (CoCT, 2016b). This can be seen as a shift of the municipal narrative on the issue of urban agriculture towards the urban sustainability benefits of urban agriculture. As such, urban agriculture could be a trigger of sustainable adaptation to climate change, *i.e.* adaptation measures focusing on social justice and environmental integrity at the same time. Related to the theory of Fairclough, analysis of narratives' change can be related to processes of social change (Fairclough, 1992). As social events are the results of social practices, determined by social structures and social agents, a change within narratives can prefigure a possibility of change in social events.

FINDINGS AND DISCUSSION SUMMARY

The examination of the impacts of urban agriculture set out in the literature in comparison with the everyday life experience of practitioners in Cape Town showed that:

- The impacts of climate change are experienced by the practitioners: the urban farmers see their farming activity affected and especially their crop production, as the literature states, and the NGO representatives corroborated the farmers' narrative.
- The practitioners are using or advocating specific farming practices such as permaculture or organic farming. In their narrative, sustainable urban agriculture can play a role as an adaptation strategy in Cape Town, which is a narrative aligned with the literature on sustainable urban agriculture.
- Contrary to the dominant narratives on urban agriculture, which state that food security in terms of food provision is the main benefit of urban agriculture, sustainable farmers in Cape Town are engaging in farming activities towards profitability and high production to earn an income, regardless of their financial, social or cultural capital. Related to the overall urban food and economic systems, sustainable urban agriculture could contribute to the sustainable adaptation to climate change, according to the narratives expressed.

The investigation of the relationship of the urban agriculture and adaptation policies implemented at the municipal and provincial level with the literature's narratives indicated that:

- The municipal narrative indicates a certain idea of the type of urban agriculture supported. Urban agriculture in Cape Town is mostly justified by the food provision benefits brought to households, as small-scale, home-based activities.
- The municipal narrative analysis correlates with the dominant trends observed in the literature on urban agriculture from and in the South, in which the food security narrative prevails on the sustainable adaptation benefits of urban agriculture.
- The social and environmental potential benefits of urban agriculture, as expressed in the literature (mostly for Northern cities), are acknowledged in the municipal narrative but are seen as positive externalities, not as a main reason to support urban agriculture.
- The narrative on agriculture and adaptation from the Western Cape Government correlated to the urban agriculture and adaptation narratives from the municipality, which seem to favor sustainable farming practices to increase climate change adaptive capacity of the farmers and the city.

From the previous findings, it has been established that:

- The urban agriculture and adaptation policies in the City of Cape Town are not aligned with the views and practices of the practitioners as the municipal narrative remains focused on the food security contribution of urban agriculture, whereas the practitioners' narrative expressed an interest in the economic upliftment opportunities and social benefits sustainable urban agriculture can bring to Cape Town.
- However, the City of Cape Town's strategies seem to be shifting towards the concept of resilience which could help to address the gap between the practitioners' and the institutional narrative on urban agriculture and adaptation to climate change.

Sustainable urban agriculture narratives could find support in the new municipal narratives, and those narratives could support the realization of urban resilience. As a contributor to urban resilience, sustainable urban agriculture could have the potential to contribute to sustainable climate change adaptation in Cape Town.

VI. CONCLUSION

INTRODUCTION

This dissertation was part of the effort to bridge the knowledge gap on urban agriculture as a possible sustainable adaptation strategy for the City of Cape Town. It aimed at interrogating the narratives on urban agriculture in Cape Town and evaluating its potential of urban agriculture as an adaptation strategy, according to the narratives expressed. It was expected to contribute to the discussion on urban agriculture and its benefits as an adaptation strategy, as well as to define the opportunity to shift towards development strategies including more sustainable adaptation to climate change in Cape Town. The multiplicity of relevant narratives on the issue required an analysis of a mix of sources (interviews, policies and frameworks, grey and academic literature) with a mix of methods. Literature was reviewed systematically, according to the methods designed by Petticrew and Roberts (2008) to determine the literature's narrative on the benefits of urban agriculture. Then the CDA method, as designed by Fairclough (2012) provided a useful tool to analyze the practitioners', institutional and literature's narratives.

SUMMARY

Based on study findings, it can be concluded that the impacts of urban agriculture set out in the literature in comparison with the everyday life experience of practitioners in Cape Town found that the impacts of climate change and the role of urban agriculture to adaptation described in the literature were understood and experienced by the practitioners. The research found that climate change and variability are impacting the crop production of the farmers negatively. This result is corroborated by the NGO representatives and aligns with the literature on climate change risks (Pretty, 2011; Kate, 2014; RUAF, 2014; UNHabitat, 2014; Carter *et al.*, 2015; Padgham, Jabbour & Dietrich, 2015)). The research also found that the narrative of the practitioners advocating for sustainable urban farming practices is supporting the potential adaptation benefits of urban agriculture set out in the literature. The use of sustainable farming practices has the potential to reduce climate change risks, improve water management and biodiversity, increase ecosystems services and increase food security. Contrary to the dominant literature's narrative on urban agriculture, which states that food security is the main benefit of urban agriculture in the South, farmers in Cape Town are engaging in sustainable farming activities for the profitability of the activity. Regardless of their financial, social or cultural capital which can be linked to their level of food security, the activity of the farmers is supported by the economic incentive sustainable urban farming represents. By providing space for adaptive capacity and economic, social and civic

empowerment, the narratives expressed by the practitioners of sustainable urban agriculture in Cape Town support this urban activity in the face of climate change.

The urban agriculture and adaptation policies implemented at the municipal and provincial levels corroborate some of the literature's derived narrative on urban agriculture. At the municipal level, the justification of the support to urban agriculture is related to the dominant narrative from the literature, arguing that urban agriculture is predominantly a food security solution (De Zeeuw, Van Veenhuizen & Dubbeling, 2011; Frayne *et al.*, 2009). As such, the municipal narrative indicates a certain idea of the type of urban agriculture supported, as a small-scale, home-based activity for households' food security. However, further analysis showed that some social and environmental benefits of urban agriculture are acknowledged within the municipal narrative, but seen as positive externalities.

In terms of urban adaptation benefits, the key practitioner and NGO narratives suggest that sustainable urban agriculture is contributing to the adaptive capacity of the farmers and therefore could be supported by the municipality. If sustainable farming practices were emphasized instead of farming practices towards small-scale, home-based activity to improve households' food security, the adaptation framework at the municipal and provincial level would be aligned with practitioners and NGOs narratives. Highlighted also by this study is the divergence between the municipal and practitioner narratives on the potential benefits brought by urban agriculture. Nonetheless, the research showed that the emerging resilience framework at the municipal level could help to address the gap between the practitioners' and the institutional narrative on urban agriculture and adaptation to climate change as the resilience framework tackles social justice, environment integrity and take into consideration adaptation to climate change.

The critical discourse analysis used to review the different narratives on urban agriculture in Cape Town has shown that narratives' evolutions could reconfigure the relationship between stakeholders' narratives. Of particular interest is how this study relates to other researches on sustainable adaptation measures (Eriksen *et al.*, 2011), to the metabolic rift theory (McClintock, 2010) and to the critical discourse analysis method (Fairclough, 2012). Indeed, urban agriculture practices as expressed by the narratives, studied with the critical discourse analysis method, represents a metabolic rift, which reconnects city officials and citizen to their food system and more generally cities to their environment.

LIMITATIONS

Since the study turned out to focus on sustainable urban agriculture practitioners' narratives, as they appeared to be the most knowledgeable on the issue of climate change, the correlation with the literature on sustainable urban agriculture, amongst the body of urban agriculture literature is not surprising. Indeed, concepts and views on the aims and benefits of sustainable urban agricultural

practices might have been derived from the literature and the items literature influenced by practitioners' narratives.

The same statement can be made of the international literature, emerging from international NGOs, institutions and universities. International literature on urban agriculture and food security and the municipal narrative might have influence each other, therefore their correlation is self-explanatory.

It should also be emphasized that the qualitative nature of the methodology used and the small, purposive sample size, limits the applicability of the results to another study setting.

RECOMMENDATIONS FOR FURTHER RESEARCH

However, this study may have started to fill the knowledge gap on sustainable urban agriculture and sustainable adaptation to climate change in South Africa and Cape Town specifically, by providing first hand material and local analysis of the issue. Further analysis of urban agriculture practitioners' narratives in general and on a larger sample size would be likely to prove valuable to understand further the proponents and motivations to farm in Cape Town and be able to further understand the incentives to farm sustainably in the city. Future and additional research on the emergent municipal resilience narrative in regard to urban agriculture would extend the knowledge pool on the benefits for a city to support sustainable urban agriculture. To help formulate recommendations, socio-economic evaluation of the value of urban agriculture in Cape Town would further inform the decision-making process at the municipal level. Economic assessment of the value of urban agriculture to society, the environment and more specifically to soil health, water quality and availability, air quality, temperature reduction, improved storm water management, well-being and mental health would be valuable. Such analyses would equip municipal decision-makers with economic data, to help inform their decision process.

CONCLUSION

Urban agriculture in Cape Town offered a singular case study in relation to the urgent climate change issue. Sustainable urban farming could increase the adaptive capacity of the farmers individually and at a city scale by reducing the vulnerabilities of the farmers and of the city, while matching the municipality's requirements to manage the risks in terms of environment and public health and adapt to climate change. This research established that, according to narratives, sustainable urban agriculture has the potential to contribute to the sustainable climate change adaptation of the City of Cape Town.

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APPENDICES

APPENDIX A. INTERVIEW GUIDE FOR SUSTAINABLE URBAN AGRICULTURE INFORMANTS

INFORMANT

Gender M F
Where were you born:
Where did you grew up:
Where do you call home:
How long have you lived in South Africa:
Are you part of a cape townian community, or an NGO in Cape Town? What is your position within this community / NGO?
Why did you move to the city? Is farming what you planned to do at first?
What's your profession? Farming: primarily economic activity?
What's your salary per month? (less than R 5000; from R 5000 to R 20 000; more than R 20 000)
What is your level of education? (Primary, secondary? Matric? Tertiary?)

URBAN AGRICULTURE

The questions of this sections are related to urban agriculture specifically. By asking data, and information on urban agriculture areas, the questions aim at framing the informants' narrative on urban agriculture.

Why do you farm?

How farming contributes to your income?

How did you learn to farm?

What type of products do you grow and sell? Most important to you?

Where do you farm?

How big is your farm?

Can you explain to me how do you sell your products?

ADAPTATION TO CLIMATE CHANGE

The questions of this sections are related to adaptation to climate change. By asking questions on perception of adaptation to climate change, the questionnaires aim to examine the extend of which urban agriculture is contributing to the adaptation capacity of the farmer and the city.

How has the climate change in the past 10 years (according to how long they have been farming)? Seasonal change, rainfall and temperatures? Floods or droughts events?

Have you notice a change in biodiversity? Change in species (flowers, animals, insects…)

Has this changing climate impact your household / production?

Have you changed your farming practices since you started farming?

- Do you recycle, reuse waste / organic waste?
- Application of water-saving techniques and rainwater harvesting: Do you collect, recycle, reuse water?
- Do you use drought- or flood-resistant species?
- Have you adapted the timing of cultural practices; improved time-management of production?

Do you think these techniques changes are related to climate change?

- Have you change your farming techniques to cope with water scarcity or climate variability?

APPENDIX B. INTERVIEW GUIDE FOR INSTITUTIONAL INFORMANTS

INFORMANT

Which institution do you represent?

What does your position entails? Department, job, function…

ADAPTATION TO CLIMATE CHANGE

The questions of this sections are related to adaptation to climate change policies (and the link with urban agriculture). By asking questions on adaptation policies and climate change, the interview guide aim to examine the extend of which adaptation to climate change is understood and implemented by institutional informants.

What do you understand by 'climate change' and 'climate variability'?

Implementation of adaptation to climate change strategy

- How do you perceive your role in the implementation of adaptation strategy to climate change?
- How is you work on climate change influenced by or driven by other spheres of government?
- Does this enable or limit your work on climate change?
- Are there issues you feel you are unable to respond to? (as a result of policies, processes, funding, that apply alternative focus)

URBAN AGRICULTURE IN CAPE TOWN

The questions of this sections are related to urban agriculture policies. The questions of the interview guide aim to reveal the discourses and practices of institutional informants on urban agricultural areas management and the contribution of urban agriculture to adaptation to climate change.

What can you tell me about urban agriculture in Cape Town? (What do you know about urban agriculture?)

- Location of urban agriculture production in Cape Town. Maps?
- Scale of urban agriculture production in Cape Town. What type of products are grown and sold in Cape Town? main products, most important ones.
- Farming practices (recycling, waste and water use).

- How are the vegetables sold? product destination, food system in Cape Town. And to whom? (How is the market organized for the vegetable value chain? Type of economic activities in urban agriculture areas. Informality.)

How do you perceive your role regarding urban agriculture in Cape Town? Mandate

- Does external influences supersede what you see as your own mandate regarding urban agriculture?