

MAINSTREAMING URBAN CLIMATE ADAPTATION INTO URBAN PLANNING AND DESIGN

*Exploring
the
current
situation
in Kenya*



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Wageningen University Master Thesis

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Abstract

Climate change and rapidly urbanizing cities are two of the most defining urban issues of the coming decades. Climate change therefore, presents a threat as well as an opportunity for climate adaptation. Climate adaptation is urgent, all over the world, but especially in the global south. However due to multiple priorities and limited resources climate adaptation is often not given timely attention. Therefore, it is valuable to approach adaptation measures as cross-sectoral solutions that can be integrated or mainstreamed within sectors that are already prioritised by politicians, as *“too many people show them problems, politicians need to see solutions”*. Hence urban planning and design professionals need to explore ways of integrating climate adaptation into existing priorities. This thesis studies the current state of urban climate adaptation in Kenya on two levels. Firstly, on the national level to explore the awareness and implementation of urban climate adaptation through interviews with urban professionals. Secondly, on the local level to investigate how urban climate adaptation measures can be feasibly mainstreamed within the public space of low-income neighbourhoods.

Key words: Urban climate adaptation, planning, mainstreaming and low-income neighbourhoods.

1. Introduction

Climate change is causing more frequently occurring extreme weather events, such as extreme rainfall peaks, coastal flooding, drought and heat waves. Urban areas are often the most vulnerable to climate change (UN-Habitat, 2014a). Additionally, the urban climate is also significantly different from the climate in the rural area. This is because the urban area is disproportionately affected by climate change due to city morphology, sealed surfaces, less green, large quantities of particulate matter, as well as the energy produced in a city (Ongoma et al., 2013; Climate proof cities, 2014). Therefore, urban areas due to their structure are susceptible the Urban Heat Island effect (UHI). This is the difference in temperature between urban areas and more suburban or rural areas (van Hove, et al., 2011). Due to this effect, the air in urban areas is at least 1 °C warmer than in the surrounding suburban areas, with a difference of up to 10 °C at night (Lenzholzer, 2015).

Urbanization will be a defining trend in the coming decades. As the world's urban population increases from 50% today, to 70% by 2050 (UNSDSN, 2013). Furthermore, rapid urbanization that takes place unsustainably, will exacerbate the negative effects of climate change on cities. In the 2016 COP 21 conference in Paris, it was stressed that cities have an active role to play in carrying out climate adaption (European commission, 2016). Cities in the future will experience more and more extreme city climate. If they are not prepared this will negatively impact the health of the population in terms of heat stress, as well as less labour productivity (Climate proof cities, 2014). In addition, climate change will affect the comfort and quality of life in neighbourhoods i.e. due to flooding or damage to infrastructure. The Intergovernmental Panel on Climate Change synthesis report, states that all climate change impacts cannot be prevented either by mitigation or adaptation alone, however that a combination can significantly lessen the impact of climate change (IPCC, 2007). Furthermore, there is "high agreement and much evidence" that at the current state of sustainable development practices and climate change mitigation policies, the global emission of GHG (greenhouse gases) will continue to increase during the next decades (IPCC, 2007).

Consequently, adapting to climate change is necessary to reduce climate risks and support the goal of sustainable urban development (Uittenbroek et al., 2013; UN-Habitat, 2014b). Currently the awareness is growing that addressing climate change on its own, can result in less effectiveness, compared to linking it to other relevant sectors such as water management or urban planning (Sandhu et al., 2014). Robust urban planning seeks to make synergies between climate adaptation, developmental goals and the capacity of local actors (Kithiia, 2011). Thus, urban planning can effectively address climate adaptation as well as other goals as, i.e. by adapting city morphology and increasing urban green. However, in the global context climate adaptation has in the past received less attention, compared to climate mitigation (IPCC, 2007; NCCRS, 2010). Over the last few years, some countries and cities are seen to adapt to urban climate challenges, while others are still in the early phase or have not yet started. In order to gain more information about the state of urban climate adaptation in different countries the Landscape Architecture and Land Use Planning groups of Wageningen University have launched a joint international research goal.

Currently, Kenya is in the early stages of preparing climate adaptation plans and measures. Such as the National Climate Change Response Strategy (Government of Kenya, 2010) and recently a National Climate Change Action Plan 2013 -2017 (Government of Kenya, 2013). Furthermore, Kenya has stated in its ambitious Intended Nationally Determined Contribution (INDC) in 2015 to the United Nations Framework Convention on Climate Change (UNFCCC) that adaptation is Kenya's priority response to climate change (MENR, 2015). This makes Kenya an interesting case, to study the current state of adaptation and what local level urban climate adaptation measures are possible.

1.1. Problem statement

Climate adaptation is a crucial issue for the future sustainability of cities. However, it is either not addressed or not placed high on the agenda of many countries. This is a problem as the effects of climate change will negatively affect the social, economic and environmental aspects of quality of life in the future (UN Habitat, 2014). Furthermore, it has been investigated that it is more cost effective to create a climate-proofing strategy now, rather than taking more severe measures later (Kabat et al., 2005). Thus the importance of researching urban climate adaptation is increasing due to its interwoven nature with other environmental issues as well as developmental goals (Uittenbroek et al., 2013; Prowse et al., 2009; UN-Habitat, 2014a; Sandhu et al., 2014). The fact that there is no international study that compares the urban climate adaptation of different countries, indicates a knowledge gap and limits progress to understanding the global state of climate adaptation. For Africa, especially, there is less literature available about climate adaptation (Mburia, 2015) and it is unknown what the state of urban climate adaptation is in Kenya. Thus, this research aims to contribute more knowledge about this.

Moreover, within cities there are multiple urgent issues that compete for attention. Paradoxically, although issues such as urban development and health are high on the agenda of countries like Kenya, they are not addressed together with climate adaptation. This is a missed potential, as today's development gains may be lost in the near future if they are not capable of coping with climate change (UN-Habitat, 2014b). In order to address this lost potential, the issue of urban climate adaptation can be mainstreamed. Mainstreaming is a method to integrate different goals to make more efficient use of human and financial resources (Uittenbroek et al., 2013). Hence, urban climate adaptation, reduction of vulnerability, greening and urbanization can all be addressed together by a mainstreaming approach (Uittenbroek et al., 2013; UN-Habitat, 2014b). According to the Kenya National Climate Change Response Strategy (NCCRS), both non-governmental and governmental institutions projects should focus on mainstreaming and climate-proofing (Government of Kenya, 2010). However it is unclear what mainstreaming is actually taking place. Therefore, this study aims to contribute to knowledge about mainstreaming climate adaptation for urban planning practices in Kenya.

Kenya, as country in the global south, is vulnerable to climate change due to the unequal exposure to climate hazards (Kithiia, 2011). Furthermore, the urban-poor and their often less environmentally robust low-income neighbourhoods are disproportionately affected by heat stress and other climate impacts (Kithiia, 2011). Thus, it is critical that Kenyan planners are aware of and find feasible and cost-effective ways to adapt to climate change. According to the IPCC (2014) enhancing the capacity of vulnerable communities and low-income groups can be an effective local level urban climate adaptation. Furthermore, according to Climate proof cities (2014), many effective adaptations can be implemented in on a small scale together with local stakeholders. Therefore, the participatory planning of public spaces can enable the local capacity of actors to be utilized to address urban climate adaptation as well as meeting other social goals (Kithiia, 2011; UN-Habitat, 2014a).

However, in Kenya the lack of knowledge about the state of urban climate adaptation, as well as the unexplored possibility of mainstreaming adaptation measures within urban public spaces is a barrier towards the implementation of climate adaptation. Therefore, the problems addressed in this thesis are twofold. The first is the lack of knowledge about the state of urban climate adaptation is in Kenya. The second is how urban climate adaptation can be feasibly mainstreamed within the public spaces of low-income neighbourhoods.

1.2. Scientific objective

This thesis has two objectives, firstly an exploration of the current state of urban climate adaptation in planning and design in Kenya. This aim is descriptive in nature. It will be studied by investigating the awareness of climate adaptation, the communication about adaptation as well as the instruments and implementation of climate adaptation measures. This study will be done on the national level using in-depth interviews. People interviewed will be experts in the field of urban planning and design, policy or politics and urban climate. The main goal of this study is to provide an understanding of urban climate adaptation within Kenya. Furthermore, this study collects valuable information from Kenyan experts in different fields, which informs the planning context for the second objective. The first pre-defined research question and sub-questions 1.1- 1.2 below, are taken from the Wageningen university research project.

The second objective, is to study how climate adaptation measures can be mainstreamed into urban planning, specifically within the participatory public space development of low-income neighbourhoods. This aim is explorative in nature. This study will therefore explore options to link climate adaptation measures with public space development. This study will be done on a local level to investigate how mainstreaming climate adaptation measures can be combined with public space development in low-income neighbourhoods. This study will identify types of climate adaptation measures that are feasible to implement in the context of public space development in low-income neighbourhoods. The found measures can serve as recommendations of feasible measures for other neighbourhoods in Kenya. The second research question and its sub-research questions 2.1-2.4, are derived from a literature review as explained in the next chapter.

1.3. Research questions

First research question:

1. What is the state of urban climate adaptation in Kenya within urban planning and design processes?

Sub-research questions:

- 1.1. What is the awareness and communication about climate adaptation?
- 1.2. Which urban climate adaptation instruments and concrete implementations are used in urban planning and design?

Second research question:

2. How can urban climate adaptation be mainstreamed within the participatory public space development of low-income neighbourhoods?

Sub-research questions:

- 2.1. What is the local perception of climate change?
- 2.2. What is the local understanding of climate adaptation?
- 2.3. What urban climate adaptation measures are feasible to be mainstreamed into the public space development of low-income neighbourhoods?
- 2.4. What are criteria, in terms of costs, resources and functionality, for maintaining climate adaptation measures in low-income neighbourhoods?

2. Theoretical framework

This chapter will briefly explain the theories and concepts that are used to guide the scope of this research namely climate adaptation, the urban heat island and mainstreaming. A theoretical framework was needed to analyse the role of mainstreaming climate adaptation (CA) into the process of urban planning, specifically into the participatory public space development of low-income neighbourhoods.

2.1. Climate change and climate adaptation

Climate change is the large-scale change of climate which is caused indirectly or directly by human activity which alters the composition of the global atmosphere, which is in addition to natural climate variability (IPCC, 2014). According to the IPCC, the effects of climate change are anticipated to continue for at least a few decades and lead to significant disruption of natural and human systems.

Adaptation is the process of adjusting to actual or expected climate change and its effects. Adaptation is crucial as it has been established that mitigation alone, is not enough to reduce climate change effects (Nzau, 2013; IPCC, 2014). Effects such as increased risks of drought, heat stress and flooding are dangerous as they lead to social disruption, damage of property and significant casualties (IPCC, 2007). Furthermore, it has been established that early-adaptation measures that are well planned actually save money and lives in the long-term (European Commission, 2016).

Climate adaptation is the process of anticipating negative effects of climate change and striving to take action to prevent or reduce the damages caused or take advantages of the opportunities that can arise (European Commission, 2016; IPCC, 2014). Kenya is one of the 195 countries that in December 2015 signed the Paris climate conference (COP21), binding global climate deal. Adaptation goals stated by governments in the COP21 convention are to strengthen their societies ability to deal with the impacts of climate change (European Commission, 2016). Examples of adaptation measures range from on the one hand technical measures, such as constructing flood defence or setting aside land for peak-water collection (European Commission, 2016). Another type of adaptation option is through behavioural change at the individual level, such as using mosquito nets and reducing use of water in time of drought and using natural plant species less vulnerable to storms or heat (UNFCCC, 2007). Both adaptation and mitigation are needed to lessen the impact of climate change (IPCC, 2007). But adaptation has received less attention than mitigation so far, while according to climate proof cities (2014) adaptation is more efficient on a local scale and hence is relevant to explore for urban planning.

Furthermore, it is important to note adaptation and mitigation strategies are also inherently linked, even though they operate on different levels and for different reasons (Laukkonen et al., 2009). For example, a simple mitigation measure for vehicles is to install anti-lock brakes in a car, which reduces the likelihood of an accident, while an adaptation is to have seatbelts which reduce the harm if an accident occurs (Laukkonen et al., 2009). Therefore, adaptation and mitigation efforts can go hand in hand in the form of 'no-regret' measures. For example, a tree absorbs air pollution and greenhouse gases therefore helps mitigate the effect of pollution, additionally it acts as an absorption of stormwater runoff which is an adaptation to excess precipitation. Furthermore, while adaptation often requires investment, not adapting to climate change effects such as urban heat islands, as also has economic costs like the increased need for air-conditioning, smog development in cities and the degraded quality of green spaces (Satterthwaite, 2008). Notably, when implementing adaptation measures attention must be paid to prevent adverse secondary effects or maladaptation (Satterthwaite, 2008). For example adaptation measures, such as air-conditioning, have adverse

effects for mitigation of greenhouse gases, through electricity consumption and thus can actually worsen the UHI effect.

Climate change can deepen poverty, thus pro-poor adaptation strategies are important to develop holistic adaptation measures for a country (Laukkonen et al., 2009). As it is widely accepted that poorer communities are most vulnerable to climate change due to lack of basic services and the often precarious location of lower-income houses in developing countries (Satterthwaite, 2008; (Laukkonen et al., 2009). For example, it has been stated that heat stress causes more premature death (WHO, 2003). However, the structure of where people live, if there is enough green and shade, the availability and affordability of ventilation or air-conditioning etc. affects how vulnerable people are to heat stress. Therefore, the urban-poor and their often less environmentally robust neighbourhoods are disproportionately affected by heat stress and other climate impacts (Kithia, 2011). Hence, enhancing the capacity of vulnerable communities and low-income groups as well as improving partnerships with administration can be an effective local level urban climate adaptation (IPCC, 2014).

2.1.1. The Urban Heat Island (UHI) effect

This study selects one urban climate phenomena to study, namely the urban heat island effect or UHI. This phenomenon is chosen because heat stress is one of the main risks of climate change on human health, apart from extreme events and infectious diseases (UNFCCC, 2007; Heinrich Böll Foundation, 2010). Apart from urban heat, there are other urban climate phenomena such as air pollution and wind dynamics. However, to limit the scope of this thesis as well as considering which climate effects are most possible to influence, by participatory urban planning, the urban heat island effect was the most relevant effect to study.

The urban heat island effect refers to the phenomena that built-up urban areas are usually warmer than their rural counterparts with more natural landscapes. Awareness about heat waves and the UHI effect has been increasing since 2003, when a strong heat wave place in Europe which claimed 20,000 lives (Satterthwaite, 2008). The IPCC (2007) report took away many uncertainties about climate change by stating that the warming of the climate system is unmistakable (UNFCCC, 2007). Over the last 100 years' scientists say that there has been the fastest and largest warming trend in the history of the earth, with an average global temperature rise of 0.74° C (UNFCCC, 2007). In addition, according to the UNFCCC (2007) 11 of the 12 warmest years on record, have occurred only in the past 25 years. Thus, research shows that climate change will increase the strength and frequency of heat waves and very hot days during the summer period in temperate regions and thus the risk of heat stress increases (WHO, 2003; UNFCCC, 2007). Due to the UHI effect, cities can be up to 12°C warmer than surrounding areas, because of less vegetation to promote evaporation as a cooling effect and the extra heat captured by urban materials like concrete and asphalt (WHO, 2003; Lenzholzer, 2015). In the majority of cities in tropical regions like Africa, Latin America and Asia, more heat waves will occur due to climate change (Satterthwaite, 2008.) Therefore, adaptation to heat is critical as, even with small increases in average temperature, it is expected that the intensity of extreme events like droughts, heavy precipitation and heat waves are expected to increase (UNFCCC, 2007; Satterthwaite, 2008).

Thus, urbanization effects the climate of a city (Ongoma et al., 2013; Lenzholzer, 2015). With more densely built up areas, the land surface reflectivity or albedo decreases due to the canyon effect which reduces the number of surfaces which allow reflection of solar energy (Ongoma et al., 2013). Therefore, there is more heat is being trapped within the city (retained longwave thermal radiation) and this together with reduced evaporation due to less plants and water as well as anthropogenic heat and lead to higher temperatures in cities (UNFCCC, 2007; Lenzholzer, 2015). Change in land use and

hence surface cover is the main factor of urbanization that influences a city's microclimate (Ongoma et al., 2013). Additionally, Lenzholzer (2015) points out that although the UHI effect is present, it does not nuance between different temperatures within a city. Differences in temperature are caused by the building density, amount of water and green as well as the use of materials in different areas (WHO, 2003; Satterthwaite, 2008; Lenzholzer, 2015). For instance, a city centre, although built-up often contains parks, tree-lined streets, water bodies thus, is less warm than a densely built and largely asphalted industrial zone with little space for greenery. Therefore, according to Lenzholzer (2015) the term 'heat archipelago' is a more appropriate term to use, to as cities can contain diverse heat areas and that this does not always apply to the whole city.

2.1.2. Impacts of the urban heat island on health

The increase in temperatures in cities is harmful to human comfort and health (WHO, 2003; UNFCCC, 2007; Satterthwaite, 2008; Ongoma et al., 2013). Therefore, climate change and UHI effect have significant health impacts, especially in the tropics. Such as heat stress, the spread of infectious diseases i.e. cholera, dengue, yellow fever and malaria (WHO, 2003). In addition, extreme weather events such as the El Niño, are affected by climate change and can also exacerbate the spread of diseases. According to the World Health Organisation the estimates of the impact of climate change on DALYs (Disability-Adjusted Life Years¹), the total DALY burden per population for Africa is the highest of all the continents (WHO, 2003). Specifically, Malaria, creates the largest DALY burden. Furthermore, research in urban areas shows a link between the increased mortality and rising temperatures (WHO, 2003). To sum up, heat stress can affect the health, leisure activities, work conditions and labour productivity of the population (Satterthwaite, 2008). Urban populations are the most sensitive to heat stress. Moreover, while the most vulnerable groups in urban areas are the young, elderly and the urban poor, while these groups are also the least equipped to cope (WHO, 2003; Heinrich Böll Foundation, 2010). Therefore, effective adaptive responses, should target these most vulnerable people.

Kenya is an urbanizing country and has a rapid population growth rate of 1.93% a year and it is the fastest urbanizing sub-region of the world, East Africa (UN-Habitat, 2014b). Kenya is also one of the fastest growing economies in sub-Saharan Africa (Worldbank, 2015). This will result in rapidly growing urban areas, which presents significant economic, social and environmental challenges. This rapid urbanisation increases the amount of built up area which has a significant impact on the creation of the urban heat island affect as well as the potential for heat stress in the city (Ongoma et al., 2013). Evidence for increasing temperatures in Nairobi due to urbanisation has been found by a 40 year study of minimum and maximum temperature and land surface albedo (Ongoma et al., 2013). In Nairobi, both maximum and minimum temperatures, have been observed to increase over the city due to human activities and changes in both the size and materialisation of urban surface cover (Ongoma et al., 2013). Additionally, the minimum temperature is found to rise at a higher rate compared to the maximum temperature, this is due to the combined effect of global warming and urbanisation and indicates the warming of cities (Ongoma et al., 2013).

¹ DALYs or Disability-Adjusted Life Years measure the population health-deficit, thus overall health burden made up of disability, chronic illness and premature death.

2.2. Urban climate adaptation options

Urban climate adaptation can be done through different measures technical or behavioural, pro-active or reactive. They can be focused on adaptation specifically or be part of holistic, environmental and mitigation measures such as conserving biodiversity. According to Knowledge for Climate in the Climate proof cities report (2014) climate adaptation measures will almost always be integrated or 'linked' with other projects. This research will explore two measures that can be linked with public space development in low-income neighbourhoods, these are vegetation and use of materials

I. Urban green spaces and vegetation

Within the urban landscape green spaces are a main environmental asset (Mensah, 2014; WHO, 2016). According to the WHO (2016) the most common definition of urban green spaces is, publicly accessible green areas for all social groups, that are used mostly for recreation purposes such as forests, zoos, parks, gardens, street trees, places with natural surface or urban green areas that are managed. Green spaces, especially well-functioning and connected networks, provide opportunities for physical activity, recreation, opportunity for social interaction and recovery from stress (Menash, 2014; WHO, 2016). Green spaces also provide benefits for adapting to climate change, such as increasing resilience to extreme events such as rainfall by infiltrating storm water and reducing heat stress by evapotranspiration, as well as mitigation by absorption of air pollution (WHO, 2016). Examples of green measures are public green spaces such as forests, parks and gardens, as well as private or public measures such as trees, green walls and green roofs (Climate proof cities, 2011).

Due to the many benefits of urban green spaces and vegetation, land should be reserved for them. However, according to Menash (2014) statistics show that for urban areas around the world, green spaces are currently being degraded or destroyed faster. In Africa, the reduction in green space is worse than in Europe or the USA, due to enormous pressure on green spaces to be used for human activities most significantly in urban areas (Menash, 2014). Meanwhile according to UN-Habitat (2014b), a good cover of vegetation will play a role in mitigating the effects of already rising temperatures. Therefore, it is important to protect, utilise and expand the vegetation and green spaces in urban areas. In Sub-Saharan Africa, with already high temperatures even slight increases in temperature will place more pressure on existing systems of air-conditioning and refrigeration, which will lead to more greenhouse gas emissions which contributes to global warming (UN-Habitat, 2014b). According to a meteorology study on temperature in Kenya, implementing vegetation and increasing green spaces is a highly-recommended measure to mitigate the UHI (Ongoma et al., 2013). Measures include using green such as green roofs, walls or trees to cool down the area due to shading and compensate the warmth using evapotranspiration (Climate proof cities, 2011).

For Africa, the urban poverty rate is deemed critical according to the State of African cities report (UN-Habitat, 2014b; Mensah, 2014). Meanwhile, urban poverty is strongly connected to the degradation green spaces, as especially the urban-poor are heavily dependent on these resources i.e. fresh water wells and firewood (Heinrich Böll Foundation, 2010). Climate adaptation, through creation of green spaces and proper materials, has a strong link to other sectors such as planning and environmental management through increasing quality of life, thermal comfort and reducing serious health impacts such as air pollution and heat stress. According to Mburia (2015) Ecosystem-based adaptation (EbA), to help people cope with climate change, is a very suitable, efficient and affordable option of the African region. EbA uses biodiversity and ecosystem services as part of an overall approach to adaptation with the aim of helping people cope with the harmful effects of climate change (Brink et al., 2016). This strategy and its concrete measure of green spaces or vegetation are considered effective soft engineering responses to climate change. Moreover, these soft responses are considered more cost effective and feasible adaptation responses over the longer term than hard engineering measures, as they also provide a range of other benefits to society (Kithiia and Lyth (2011)). However, even though green measures contribute to social-ecological resilience and are considered no-regret

measures, they are not free from costs (Mensah, 2014).

II. Materials

The type and colour of materials used affects the amount of heat that is absorbed and retained from the sun. Research in Singapore showed that the temperature difference between an outside wall with a dark colour compared to a light colour, had a maximum temperature difference of 8-10°C between the day light hours of 1pm to 4pm (Climate proof cities, 2011). This has to do with the amount of albedo, which is the reflectivity measure or whiteness of a surface. Surfaces with a high albedo are white surfaces that reflect most of the light radiation, while surfaces with a low albedo are dark in colour and do not reflect incident radiation (Ongoma et al., 2013; Lenzholzer, 2015). The metallic materials used in construction and concrete pavements in the city lead to a large amount of heat absorption which increases the temperature in the city (Ongoma et al., 2013). Measures to make materials cooler include painting surfaces white to increase reflectivity and reduce heat absorption and shading (Climate proof cities, 2011). According to Climate proof cities (2011) white surfaces need a much larger surface area to cool the same amount as a much smaller area of green roofs. For an overview of climate adaption measures and possible materials see below, Table 1.

Table 1: Overview of climate adaptation measures for green spaces and materials. Adapted from table 4.1 Climate proof cities (2011).

Climate adaptation options	Measures
Green spaces and vegetation	Public green spaces, parks, forests, gardens
	Trees
	Green walls
	Green roofs
Materials	Increase Albedo or reflectivity of roofs and walls; white paint
	Shading of streets
	Thermal mass

2.3. Barriers to climate adaptation

Climate adaptation research is important in Africa due to the fast population growth, high urbanization and dependence on rain-fed agriculture, the effects of climate change will be significant. However, there is a critical lack of scientific climate data availability in the sub-Saharan region, specifically on accurate information on climate variability (Mburia, 2015). According to the World Meteorological Organisation as cited by Mburia (2015), the climate monitoring in Africa is deteriorating and hence many countries lack the information to deal with climate change adaptation. The 2007 IPCC report (AR4) identifies that in general the effect of urbanization is missing from climate model predictions, therefore the actual scale of climate change risk is not known for major urban areas in East Africa (Kithiia, 2011). Which means there is a need for more local analysis on risks as well as opportunities to increase adaptive capacity to climate change.

Kenya has recently developed a climate change strategy and action plan and has more recently started to take specific actions in terms of implementation through the National Adaptation plan (NAP). Furthermore, Kenya has stated that adaptation is it priority response to climate change in its INDCs (Kenya's Intended Nationally Determined Contribution to the UNFCCC (MENR, 2015). However, the majority of the policies are not specific to climate adaptation but to mitigation. Furthermore, according

to Mburia (2015) conflicting laws and policies as well as the mainly sectoral approach in Kenya are a severe hinder to climate adaptation. In addition, there is generally often unclear responsibility for who is meant to implement a specific policy (Mburia, 2015).

2.4. Mainstreaming

There are two ways to involve climate adaptation into policy and implementation, a dedicated (specialized) or a mainstream (integrated) approach. A dedicated approach introducing climate adaptation as a new policy domain and reversing the effects of climate change is the main goal, often with being climate-proof or resilient as the ultimate goal (Uittenbroek et al., 2013; Uittenbroek et al., 2014). The second approach is mainstreaming. Mainstreaming is the process of linking or integrating a specific sector i.e. climate adaptation into other policy domains such as urban planning, public health, water management or disaster risk management (Uittenbroek et al., 2013; Uittenbroek et al., 2014). According to Uittenbroek et al. (2013) mainstreaming is defined as the integration of climate adaptation policies and measures into decision-making processes and sectoral planning. Mainstreaming climate adaptation is defined by the UNFCCC (2007) as a dynamic and long-term process which involves multiple stakeholders and it is built on the idea of the mutual benefit and synergies between working for poverty reduction and the Millennium Development Goals. Additionally, according to the IPCC (2014) alignment of policies and incentives, local community and government adaptive capacity leads to gains for urban adaptation.

Ideally adapting to climate change would result in a reduction of vulnerability to climate change impacts to nil. However, this is difficult and is not considered realistic (Kabat et al., 2005). Since there is a large amount of uncertainty around the range of climate impacts, there is no set 'zero' norm (Uittenbroek et al., 2013). Kabat et al. (2005) argue that within a 'climate proofing' approach, climate adaptation mainstreaming should be driven by multiple opportunities such as; societal benefit, technological and institutional gain and not merely the 'fear' of negative consequences of climate change (Kabat et al., 2005). Therefore, mainstreaming focuses on integrating climate change mitigation and adaptation with other problems and sectors to create comprehensive solutions. Consequently, a mainstreaming approach does not see being climate proof as an ultimate or achievable goal, but instead focuses on the process of 'climate proofing' as well as other objectives (Kabat et al., 2005; Government of Kenya, 2010; Uittenbroek et al., 2013). In order to realize climate proofing, mainstreaming theory considers how to reduce the vulnerability to climate effects on the different sectors and what implementation is needed to reach this (Uittenbroek et al., 2013, UN-Habitat, 2014b). To sum up for climate adaptation, mainstreaming is preferred over a dedicated approach. As mainstreaming provides multiple possible benefits for combining goals, comprehensive solutions, more opportunities for innovation and the effectiveness of policy making (Nzau, 2013; Uittenbroek et al., 2013).

Considering the above arguments, mainstreaming is considered the most appropriate approach for addressing climate change adaptation within urban planning. As according to Uittenbroek et al. (2013) actors are looking for solutions that do not solely address climate adaptation as a standalone issue, but instead integrate the goal of adaptation into existing policy fields such as urban planning, public health and water management. Hence while the dedicated approach has merits, climate adaptation is a complex issue which is interwoven with other urban issues such as urban development and public spaces and can thus benefit from being tackled in an integrated fashion. Furthermore, mainstreaming provides a window of opportunity to tie together issues that are lower on agenda, that are important but not seen as urgent due to lack of awareness, cost etc., with issues that are high on the agenda. The mainstreaming approach can also access political commitment more readily (Uittenbroek et al., 2014). As it requires less direct agenda setting and relies on finding synergies to develop climate adaptation measures by combining goals and pooling resources. Therefore, political commitment and

planning priorities can also be gained indirectly by ‘piggybacking’ on already established political priorities (Uittenbroek et al., 2014).

This thesis used Uittenbroek et al. (2013) theory of mainstreaming climate adaptation and its three main concepts of ‘understanding, planning and managing’, to structure the sub-research questions of the second research question. Therefore, the second research question, *how can urban climate adaptation be mainstreamed within participatory public space development of low-income neighbourhoods*, was answered through the three concepts of understanding, planning and managing. The explanation of Uittenbroek et al. (2013)’s theory of mainstreaming climate adaptation and conceptual model is shown below.

According to Uittenbroek et al. (2013), a good understanding of the process of mainstreaming is currently lacking. Furthermore, in practice, although more attention is being paid to adaptation, the actual implementation of adaptation measures has been limited by the difficulties of governing and implementing measures (Uittenbroek et al., 2014). In order to enhance the understanding of mainstreaming the authors developed a conceptual model for mainstreaming climate adaptation.

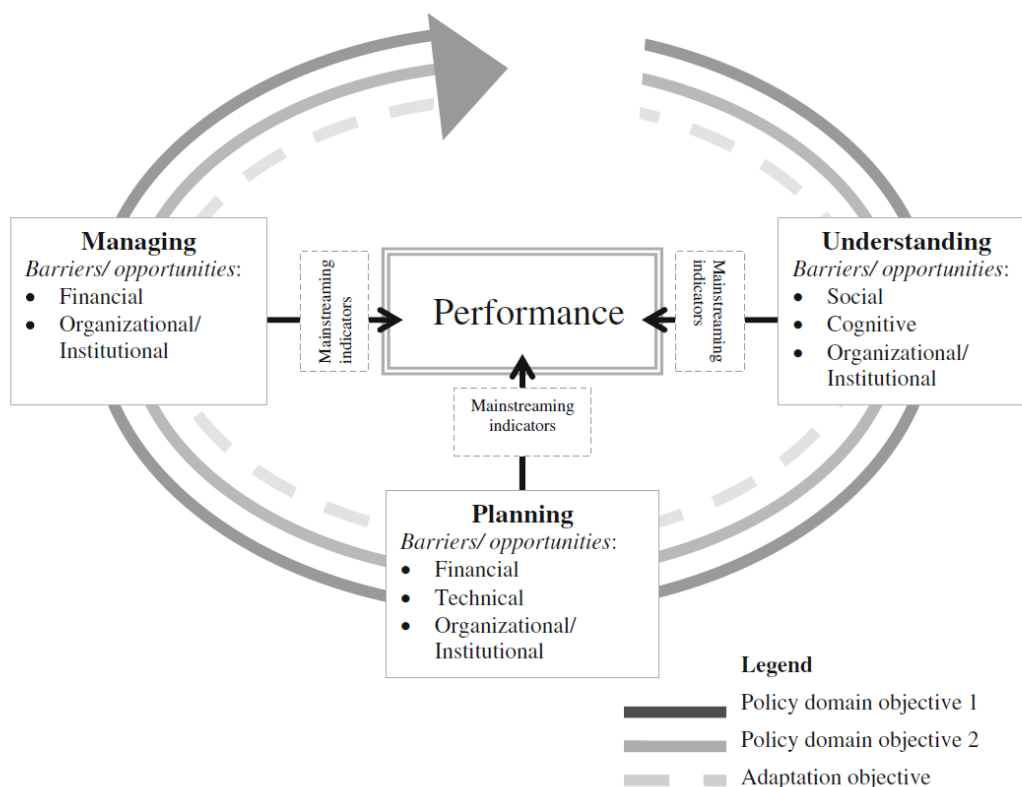


Figure 1: Conceptual model of mainstreaming climate adaptation (Uittenbroek et al., 2013).

The conceptual model by Uittenbroek et al. (2013), shown in figure 1, illustrates three policy processes or mainstreaming indicators for mainstreaming climate adaptation namely; understanding, planning and managing. Uittenbroek et al. (2013) described the three phases of policy processes using planning documents. Additionally, the policy process was conceptualised by the authors as focusing on multiple objectives, within which climate adaptation needs to be mainstreamed or included. The first policy phase is considered to be *understanding* which means a kind of ‘consistency’ in the type of shared understanding or knowledge of both the impacts and measures of climate change (Uittenbroek et al., 2013). This is operationalized by Uittenbroek et al. (2013) as “*Documents including first intentions or conceptualization of the issue*”. The second policy phase is *planning*, which is operationalized as “*Documents presenting alternatives or including technical, financial or*

environmental considerations". Finally the third policy phase is *managing*, which is operationalized as "*development agreements or maintenance plans*" within planning documents. Furthermore, as mainstreaming aims to address several objectives within one policy process or plan and therefore this approach requires performance-decision making and an evaluation based on *performance* (Uittenbroek et al. 2013). As performance enables an actor to find the potential synergies with other objectives in the policy process and therefore find context specific opportunities to combine different goals. Hence, the focus of mainstreaming with a performance approach is not the outcome or conformance, but on the feasibility of mainstreaming (Uittenbroek et al. 2013). Therefore, the author has included performance as a central issue around which mainstreaming occurs. Finally, the types of barriers or opportunities that can influence the integration in each policy phase are shown in figure 1.

The starting point of Uittenbroek et al. (2013)'s conceptualisation of mainstreaming climate adaptation came from the field of environmental policy integration, which looks at how environmental objectives can be included into the already existing policy domains (Uittenbroek et al., 2013). Consequently, the specific focus on mainstreaming of adaptation is perceived as a specific type of environmental policy integration (Uittenbroek et al., 2013). According to Uittenbroek et al. (2013), integrating adaptation into policy documents and processes increases the chance of 'climate proofing' the society. Additionally, the authors find that the synergies between sustainable development and climate policy are the most evident at a local level as cities are directly impacted by climate change and hence focus on mainstreaming within urban planning (Uittenbroek et al., 2013). Mainstreaming or integration of an issue into other policy areas, is becoming increasingly recognized as an important and relevant response towards the governance decentralization trend, which requires comprehensive and integrated plans to be developed by local level governments. According to Uittenbroek et al. (2013) mainstreaming has the goal of climate-proofing, and thus is not an end-state with the goal of conformance, but instead is an on-going process and thus has the goal of performance. Consequently, the extent of mainstreaming is constantly being re-evaluated due to the changing barriers and opportunities that come from other objectives in the policy process Uittenbroek et al., 2013).

The authors of the conceptual model of mainstreaming climate adaptation, suggest that to further refine their model, it is necessary to apply it to more cases in different countries and within other policy domains that are affected by climate change. Additionally, the authors of the climate adaptation mainstreaming model, Uittenbroek et al. (2013), specify that that it is particularly important to investigate the *perceptions* actors have concerning climate adaptation. Furthermore, within these perceptions it should be explored whether or not these views stimulate performance of the mainstreaming process and if they hence are a barrier or opportunity towards climate adaptation.

Adaptation of the theory

The mainstreaming theory and conceptual model by Uittenbroek et al. (2013), provided a strong framework which guided the formulation of the sub-research questions for the second research question as well as structured how the data was collected in the field. Nevertheless, the conceptual model needed to be adapted to fulfil the aims of this research. Adaptation was necessary because the Uittenbroek et al. (2013) model is about mainstreaming climate adaptation in the policy domain of urban planning in the Netherlands (Uittenbroek et al., 2013). However, there was a lack of sufficient policy documents to study as policy base in Kenya is not sufficiently developed in climate adaptation. Thus, this thesis was mainly an explorative study using a case study approach, which examined how the real-world phenomena of mainstreaming climate adaptation could take place within the public space development of a low-income neighbourhood. Furthermore, the authors recommended the application of this theory to more cases outside the Netherlands and to different domains that are affected by climate change Uittenbroek et al., 2013). Hence, for this thesis the conceptual model was adapted to study the field of mainstreaming climate adaptation and public space development.

Moreover, this new conceptual model reflected the relevant data which was possible and feasible to collect during the thesis research in Kenya. Therefore, the Uittenbroek et al. (2013) conceptual model was simplified to only the three concepts of understanding, planning and managing and does not include barriers or opportunities within the model.

Furthermore, Uittenbroek et al. (2013) state that in future research it is important to expand knowledge on the barriers and opportunities to mainstreaming adaptation, specifically it is important to understand more about the perceptions actors have concerning climate adaptation (Uittenbroek et al., 2013). This is because the perceptions about climate adaptation can negatively or positively affect the performance of the mainstreaming, depending on whether it is recognized as an important goal (Uittenbroek et al., 2013). Therefore, this suggestion for further research, was relevant for this thesis as perceptions form an important a basis for understanding the potential for the participatory mainstreaming of climate adaptation in public space. Thus, for this thesis a subsection of perception was added to the understanding concept in the conceptual model,. In order to reflect the perception and awareness of climate change on a basic level, before the more advanced concept of understanding of climate adaptation was addressed.

Consequently, for this thesis the model on mainstreaming climate adaptation by Uittenbroek et al. (2013) was adapted to be applied to the field of public space development and carry out research in the Kenyan context. Hence the perception concept was added to the understanding, planning and managing concepts, to reflect the four analytical concepts which affect the performance of mainstreaming. See figure 2 below.

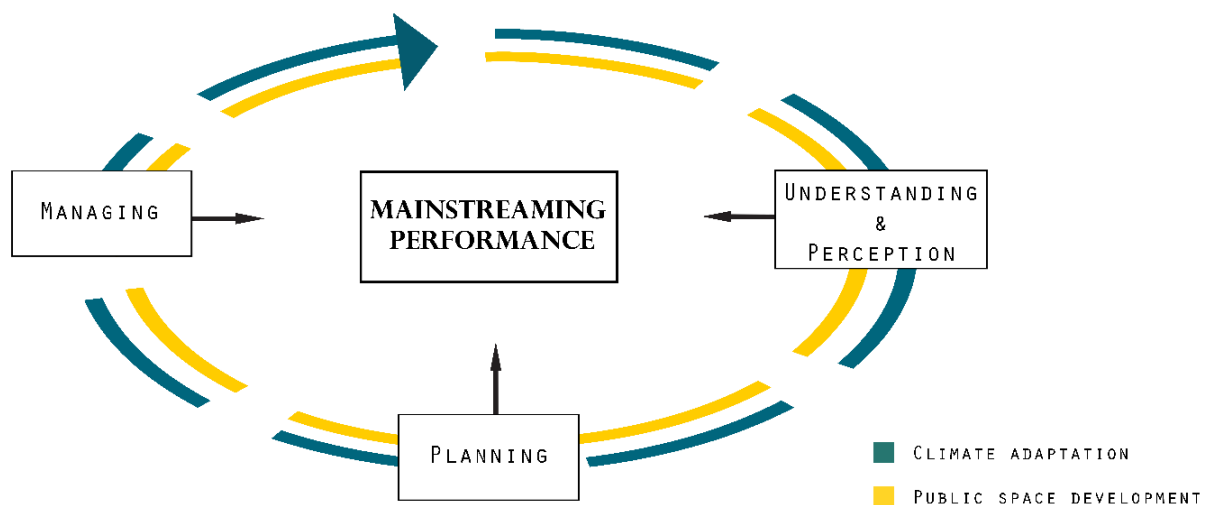


Figure 2: Mainstreaming performance model, adapted from Uittenbroek 2013.

I. Perception

Perception has been added to the three original concepts by Uittenbroek et al. (2013) in order to reflect the perception and awareness of climate change, as this will determine the perceived urgency of people to take climate action on the local level. As Uittenbroek et al. (2013) state that it is necessary to gain more knowledge about what the perceptions are that actors have concerning climate adaptation, as this affects the performance of mainstreaming. Therefore, before further questions are addressed on adaptation, it was important to establish the perceptions of people towards climate change. This concept guides the second research question's sub question:

2.1. What is the local perception of climate change?

II. Understanding

Understanding is defined as “*documents including first intentions or conceptualization of the issue*” (Uittenbroek et al., 2013, page. 404). According to Uittenbroek et al. (2013), this can include “*programs, visions and ambitions*”. Hence understanding consists of the shared ideas people about climate adaptation and possible intentions or plans to deal with the issue of climate adaptation. This concept builds on the previous concept of perception. As based on the perceptions of climate change, this concept can explore what people’s understanding, knowledge or ambitions are for dealing with adaptation to climate change, and hence how they see adaptation. As changing value systems or perceptions, will be one of the strongest drivers of action over the coming 30 years, and the forging of collective visions is a requirement for strategic planning (Ratcliffe and Krawczyk, 2011). Thus, investigating people’s shared understanding of climate adaption is essential to be able to form a basis for mutual understanding and prepare a participatory discussion on possible climate adaptation measures. This concept guides the answer to the sub question:

2.2. *What is the local understanding of climate adaptation?*

III. Planning

Planning is defined as “*documents presenting alternatives or including technical, financial or environmental considerations*” (Uittenbroek et al., 2013, page. 404). According to Uittenbroek et al. (2013), this can consist of “*master plans or assessment of options*”. Therefore, this concept of planning focuses on the different alternatives for adaptation that are feasible. Hence addresses the climate adaptation alternatives that are possible to implement in a local context as well as the considerations about their suitability. This concept guides the answer to the sub question:

2.3. *What urban climate adaptation measures are feasible to be mainstreamed into the public space development of low-income neighbourhoods?*

IV. Managing

Managing is defined as “*development agreements or maintenance plans*” (Uittenbroek et al., 2013, page. 404). According to Uittenbroek et al. (2013), this concept refers to already “*developed plans or agreements*”. Thus, managing refers to the plans or actions that are necessary to support the implementation and maintenance of urban climate adaptation measures. Hence, this concept addresses the potential criteria that affect the maintaince of adaptation measures, which for this thesis are defined in terms of costs, resources and functionality of the adaptation measures. This concept guides the answer to the sub question:

2.4. *What are criteria, in terms of costs, resources and functionality, for maintaining climate adaptation measures in low-income neighbourhoods?*

3. Methodology

This thesis had two objectives. The first objective was to qualitatively analyse the current state of urban climate adaptation in Kenya. This will be done through a case study on Kenya, which will answer the first research question. Similar research has been carried out by other students for different countries. Hence, the first part of this research, forms one part of a larger research of the Wageningen international research team to create a global overview of urban climate adaptation. The second objective was an exploratory study to investigate the mainstreaming of urban climate adaptation into public space within a low-income neighbourhood in Kenya. This was done through a case study on Dandora, which was used to answer the second research question.

In order to fulfil these two research goals different methods were used. These are described below under the two sections; Case study Kenya to answer the first research question and Case study Dandora to answer the second research question. These are individual case studies on two levels, on the national level and on the local level. According to Kumar (2011) it is important to gather information from all available sources, to attempt to understand a case in its entirety. Therefore, the research methodology uses triangulation of data, using multiple sources to answer the research questions, namely document study, in-depth interviews with diverse urban experts, expert consultations and focus group discussions (FGD) with two resident groups. Triangulation was done in order to try address the validity of the collected data and to enable a more comprehensive understanding of the research topic. For an overview of which methods were used per case study, research question, and sub-questions see below, Table 2.

Table 2: Overview of methods used per case study.

CASE STUDY KENYA	METHODS WITHIN CASE STUDY KENYA:			
Main question:	Document study	In-depth interviews		
1. What is the state of urban climate adaptation in Kenya within urban planning and design?	x	x		
Sub-questions:				
1.1 What is the awareness and knowledge of climate adaptation?	x	x		
1.2 Which urban climate adaptation strategies and concrete implementations are used in planning and design?	x	x		
CASE STUDY DANDORA	METHODS WITHIN CASE STUDY DANDORA:			
Main question:	Document study	Expert consultations	FDG no.1	FDG no.2
2. How can urban climate adaptation be mainstreamed within participatory public space development of low-income neighbourhoods?	x	x	x	x
Sub-questions:				
2.1 What is the local perception of climate change and climate change adaptation?			x	x
2.2 How can the relevance of climate adaptation be communicated to citizens?	x	x	x	x
2.3 What types of urban climate adaptation measures can be identified that are feasible, in terms of costs, resources & functionality, to be mainstreamed into public space development in low-income neighbourhoods?	x	x	x	x
2.4 What are criteria for maintaining these climate adaptation measures in low-income neighbourhoods?		x	x	x

Reasoning for case study method

A case study seeks to provide an in-depth perspective of a current planning issue (Yin, 2009). Hence, a case study enables the study of one or a few specifically selected cases intensively. The goal of a case study is to explore holistically a situation, group or phenomenon (Kumar, 2011). It is especially useful to provide an overview and in-depth understanding of a specific case or context. According to Flyvbjerg (2006) researchers should strive to seek context-dependant knowledge and thus base their research on real-world situations, to deal with a complex interplay of environment, actors and choices.

The investigation of the state of urban climate adaptation is a complex question and requires the answers of a broad scope of urban professionals and policy makers, to be able to provide an overview of the state of urban climate adaptation in planning and design process in Kenya. Therefore, a case study method was used for the first research question, to explore the phenomena of urban climate adaptation on a national level in Kenya. Furthermore, according to Uittenbroek et al. (2013) the perspectives of different actors were relevant to consider in order to explore the possibilities of mainstreaming climate adaptation. Therefore, a case study method was also used for the second research question, to investigate how climate adaptation can be mainstreamed on a local level, within the public space of a low-income neighbourhood.

3.1. Case Study Kenya

This case study was used to explore the first research question about state of urban climate adaptation in Kenya and its two sub-questions, firstly the awareness and communication about urban climate adaptation, and secondly the instruments and concrete implementations of climate adaptation. For the Kenya case study, the cities Nairobi and Mombasa were chosen as the main examples of urban areas as they are both important rapidly urbanizing cities in Kenya. They are respectively the capital and second largest city, with different geographical characteristics of respectively an inland and coastal city. Therefore, they are fairly representative for different urban areas in Kenya, furthermore both cities are featured in climate change and climate adaptation research thus more climate information is available. Therefore, the in depth-interviews below were carried out with urban experts with knowledge about these cities and Kenya generally. Due to time limitations, it was not possible to take more cities into account. Within the Kenya case study, the methods used are document study and in-depth interviews.

Kenyan context

Kenya is a fast urbanizing country in East Africa, the fastest urbanizing sub-region of the world (UN-Habitat, 2014b). Kenya is showing rapid population growth at a rate of 1.93% a year and it is also one of the fastest growing economies in sub-Saharan Africa (Worldbank, 2015). This rapid population growth will result in rapidly growing urban areas, which presents significant economic, social and environmental challenges. Moreover, Kenya is highly vulnerable to the impacts of climate change due to a high level of dependence on climate-sensitive sectors, such as dominantly rain-fed agriculture, tourism and energy. Over 80% of the country consists of arid and semi-arid land with poor infrastructure and other developmental challenges (MENR, 2015). In Kenya, the attention for climate change governance has recently increased, due to the creation of a high-level cabinet committee to coordinate the mainstreaming of development and climate change (Ministry of Environment and Natural resources 2014, as cited by Mburia, 2015). Moreover, the Government of Kenya has stated that adaptation is Kenya's priority response to climate change (MENR, 2015; GoK, 2016a).

3.1.1. Document study

A document study was carried out for scientific papers and national documents about urban climate adaptation in Kenya. The keywords below are used to gather data about the awareness of urban climate adaptation in Kenya as well as information about adaptation strategies in Kenya. This information was used to help answer my first research question and to prepare for the in-depth interviews. The document study was conducted by research on internet for publicly available government policies and strategies.

Keywords: Adaptation, Urban Climate Adaptation, Awareness, Climate Adaptation Strategies, Kenya, Nairobi, Mombasa.

Key Kenyan Government policy documents: The National Climate Change Response Strategy (NCCRS 2010), National Climate Change Action Plan (NCCAP 2013), National Adaptation Plan (NAP, 2016), these documents plan for responses to the challenges of climate change in Kenya.

3.1.2. In-depth interviews

Diverse experts in Kenya were interviewed to gain a deeper understanding of the national situation and characteristics. The interviews were semi-structured in-depth interviews as this method allows a flexible response if an interesting topic or story presents itself during the interview, as the experts interviewed were from different backgrounds thus had different insights to contribute. Previous studies on the same topic had found that three categories of urban experts were relevant to be interviewed namely; Urban planners and designers (UP+D), policy or political actors (POL) and urban climate experts (UCE). The interview questions used were the ones that were developed by previous studies (Qui, 2016; Arabadzhieva, 2016; Schans, 2017). Therefore, I have used these questions as the basis for exploring the first main question about state of urban climate adaptation in Kenya.

Selection of interviewees

In order to gain an understanding of the state of urban climate adaptation for Kenya within planning and design a broad view of this topic needed to be taken. In order to achieve this, diverse urban experts within the three different categories were selected for interviews. Furthermore, the experts should have experience with one or more of the major cities in Kenya i.e. Nairobi and Mombasa, and not all be specialised in one city, so as to also cover different geographic regions. The areas of an expert's expertise are shown as follows in table 3; NAI for Nairobi, MOM for Mombasa and Kenya for country-wide experience. The experts were identified based on online reviews of relevant organisations or professionals, attending a planning conference and using introductions through my personal networks. As the interviewees were experts in their field, I interviewed 11 people and this amount was also what was feasible within the time constraints of my study. Ten of the interviews were done face-to-face, while one interview was done over Skype due to time limitations. During the interviews notes were taken as well as an audio recording, this allowed me to focus on the interview and have a means to check facts during the transcription of the interview notes. The transcriptions were sent back to the interviewees for transparency and providing the chance to add comments or correct any misunderstanding that may have occurred. An overview of the types of urban experts interviewed is shown in table 3, on the next page. Abbreviations are used in the table for the experts namely; urban planners and designers (UP+D), policy or political actors (POL) and urban climate experts (UCE).

Table 3: Overview of the urban experts interviewed.

Interview	Expertise	Organisation	Occupation	Expert Category
1	NAI	Centre for Urban Studies at the JKUAT university	Architect/Planner. Director CUST at JKUAT University	UP + D
2	NAI	Jomo Kenyatta University (JKUAT)	Landscape architect and Assistant Lecturer	UP + D
3	NAI	Consultant planner for UN-Habitat	City Planning Extension and Design Unit	UP + D
4	NAI	Ex. Nairobi county government / now ALISE consulting group	Nairobi City County Government Environment Chief Officer	POL
5	NAI & MOM	Eco-Build Africa Architecture firm	Principal Researcher, Eco-Build Africa, PhD in Environmental architecture, Advisor on Climate change for the Kenya Council of Governors and the African union	UP+D & UCE
6	NAI & MOM	Government of Kenya, Directorate of urban development	Senior Urban Planner / Urban Land Management Expert	POL
7	Kenya	UN-Habitat	Associate Expert Urban Planning and Climate Change.- Climate Change Planning unit.	UCE
8	Kenya & Africa	UNISDR (United Nations Office for Disaster Risk Reduction)	Deputy Head of Office UNISDR- Africa	POL
9	NAI & Kenya	UNISDR & the previously Kenya Metrological Institute	Focal point Kenya for UNISDR-Africa	UCE
10	Kenya	UNISDR (United Nations Office for Disaster Risk Reduction)	Programme Assistant & Urban resilience focal point	POL
11	MOM & NAI	African Centre of Technology Studies	Research Fellow on Climate change in the Energy and Water Security Programme	UCE

3.1.3. Link between case study Kenya and Case study Dandora

The research and results of the first research question on the case study Kenya partially forms the context for the research on case study Dandora. A large part of the research and most of the interviews for case study Kenya, were done before the research for case study Dandora, in order to first generate an understanding of the urban planning and design context in Kenya with relation to climate adaptation. As the interviews for the first research question, although they did not concern Dandora directly, provided valuable insights about the level of awareness citizens and other actors have of urban climate adaptation. Hence these results informed the knowledge basis and helped to prepare for the second case study research in Dandora.

3.2. Case study Dandora

The Dandora case study was an exploratory study that aimed to answer the second research question, concerning the mainstreaming of climate adaptation into participatory public space development of low-income neighbourhoods in Kenya. The second research question and its 4 sub-questions are guided by the four concepts 'perception', 'understanding', 'planning' & 'managing' adapted from the mainstreaming climate adaptation in urban planning theory by Uittenbroek et al (2013), see figure 2. Dandora was chosen for the urban case study, because it is a highly vulnerable area to climate change impacts such as flooding, heat stress and air pollution. Furthermore, it was necessary to have to have contacts with local residents to do an in-depth case study and discuss potential climate adaptation options in a participatory way (Flyvbjerg, 2006). As successful climate adaptation at a local level, should include participatory approaches to include the community needs, such as public spaces, into environmental goals (Ratcliffe and Krawczyk, 2011). Participatory discussions were possible through the help of a community based organisation in Dandora. Since the case study intends to build on the local capacity that was already present, involving Dandora residents, finding out what they considered environmental problems and what climate effects they experienced was an important part of this research. Additionally, to study the potential for mainstreaming climate adaptation into public space, it was useful to do research in a neighbourhood where there was an on-going public space project, as was the case in Dandora. Furthermore, it was important to link to an existing project with trusted representatives as going into Dandora alone was not possible due to safety issues, as there is a high rate of criminality in Dandora. For the reasons above Dandora was selected as the site for the case study, as other cases that were considered do not meet the requirements of having local contacts that could assist with safe data collection. Within the case study Dandora, the methods used to gather data were document study, expert consultations, site visits and focus group discussions.



Figure 3: Example of a courtyard in Dandora

Dandora context

Dandora is a large neighbourhood, located in the eastern part of Nairobi, Kenya's capital city, see figure 4. Dandora was built in 1977 with partial financing of the World Bank, to provide a higher standard of housing for low-income families outside the city centre (UNCHS, 1987). However, the project did not turn out as planned with over 75% of residents being tenants instead of permanent landlords because the housing was too expensive. Meanwhile a high demand for cheap housing led to uncontrolled private rental housing schemes (UNCHS, 1987). Consequently, living conditions in Dandora deteriorated over the next decades with many more people moving there than was planned for as well as numerous illegal structures being built, see figure 10 and 11 for pictures of deteriorated areas in Dandora. Dandora residents today live in close proximity to the Nairobi dumpsite which is an environmental hazard, as well as near to the banks of the Nairobi river, which makes them very vulnerable to changes in the environment. (Making Cities Together, 2015; IFHP, 2015). According to the Kenyan newspaper (Daily Nation, 2016) the image of Dandora for many citizens of Nairobi is “*an estate littered with dirt, overflowing sewers, high levels of crime and idle youth*”. Climate change as well as a continued rapid urbanization of the area make the location highly vulnerable to climate change impacts. Hence, climate adaptation is an urgent challenge for this area.

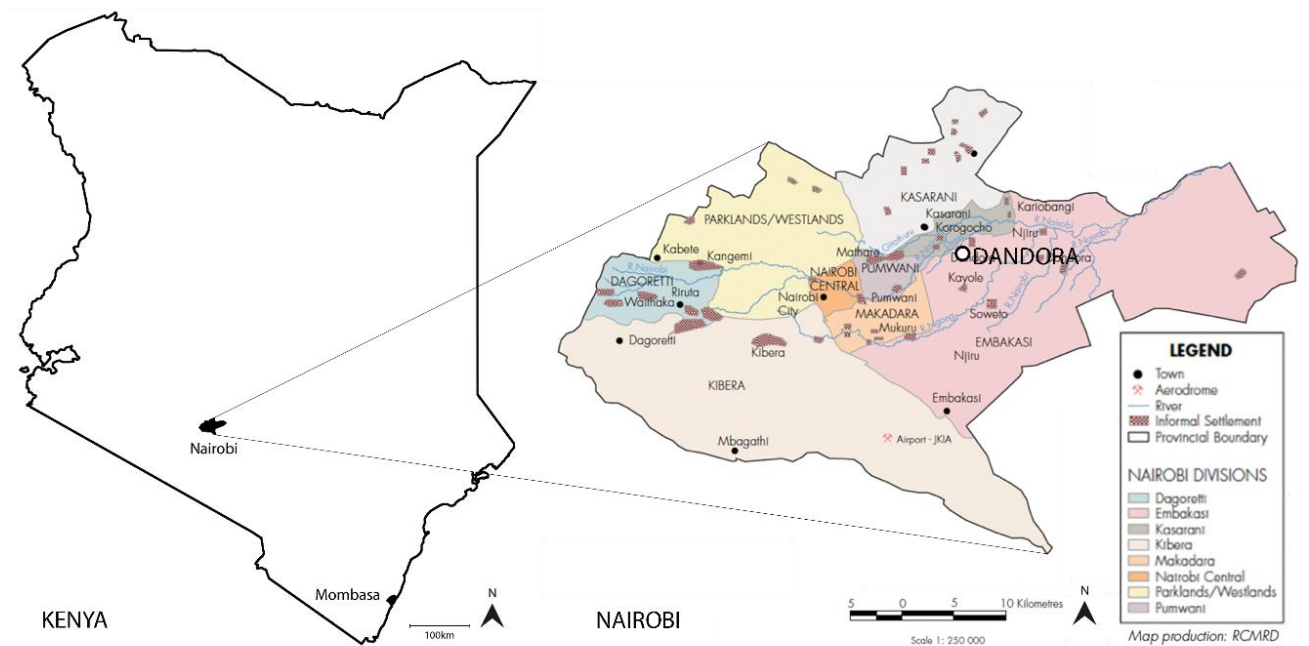


Figure 4: Overview of the location of Dandora within Nairobi and Kenya. Source of map of Nairobi adapted from Hungry Cities Partnership (2017).

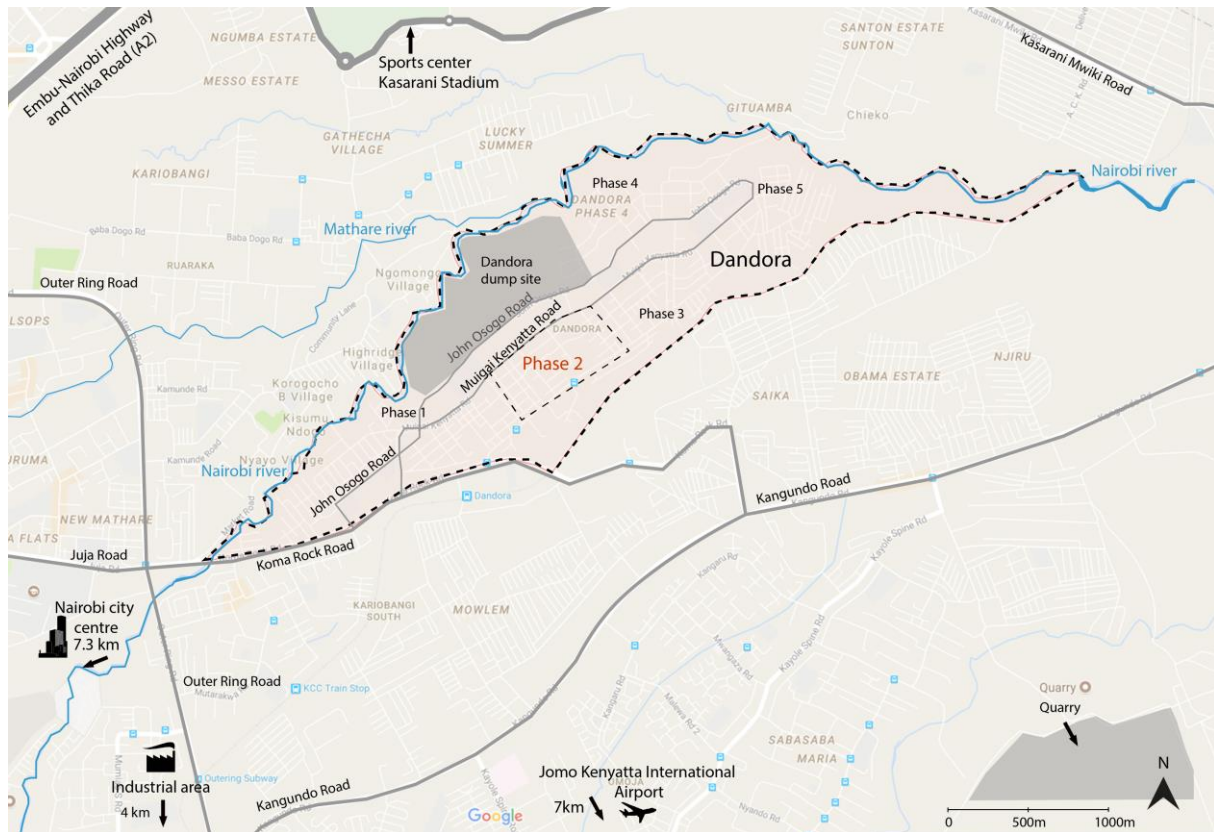


Figure 5: Overview of the context of Dandora, showing the five main parts or 'phases' that make up Dandora. The case study area, Phase 2 (also called Phase II interchangeably) is indicated in red.

The case study approach was used to study a specific subgroup of Dandora residents, namely people living in the Dandora neighbourhood called Dandora 'Phase II', see figure 5. Dandora was built according to 5 'areas' or 'phases' (large neighbourhoods) which are still commonly called phases today i.e. Phases I, II, III etc. Hence, within the larger Dandora neighbourhood, specifically Dandora 'phase II', was the focus of a holistic and in depth-study of how urban climate adaptation can be mainstreamed within participatory public space development within low-income neighbourhoods. This neighbourhood of Dandora phase II, though representative in built environment, is atypical in the larger Dandora neighbourhood, because here the Dandora transformation League (DTL) was founded. DTL is a strong community-led youth movement to clean up their neighbourhood. Consequently, Dandora 'phase II' has considerable local potential to improve the area, due to the very committed local residents and numerous youth and community groups. In addition, there have been considerable improvements in some public spaces and there was a participatory place making project the 'Model Street' taking place on a part of the Muigai Kenyatta Road, see figure 6. The 'Model Street' project was planned as an inspiring example of a well-designed public space, that was co-created by the community and hence successfully used (Placemakers, 2016). The negative image of Dandora is changing due to the DTL organisation who are employing youth to take care of the estate to fence neighbourhood areas to create what they call courts and courtyards, see figure 3, as well as clean up the neighbourhood by unclogging drainages and taking care of grass and plants, especially around phase II (Daily Nation, 2016).

Therefore, the Dandora Phase II neighbourhood, was interesting to study as many changes in public space and community projects are on-going, as opposed to in many other parts of larger Dandora. For an overview of the location of Phase II see figure 5. Moreover, according to Placemakers (2016) and (IFHP, 2015), the current quality of the public space is still low, which due to limited resources, limited vision and unexplored options. Therefore, there was an opportunity to investigate how the current

initiatives could be improved by mainstreaming climate adaptive measures into the current public space development. Furthermore, the analysis of how environmental improvement and participatory public space development, in Dandora Phase II, can be combined with climate adaptation, could provide recommendations for similar low-income neighbourhoods (Flyvbjerg, 2006).

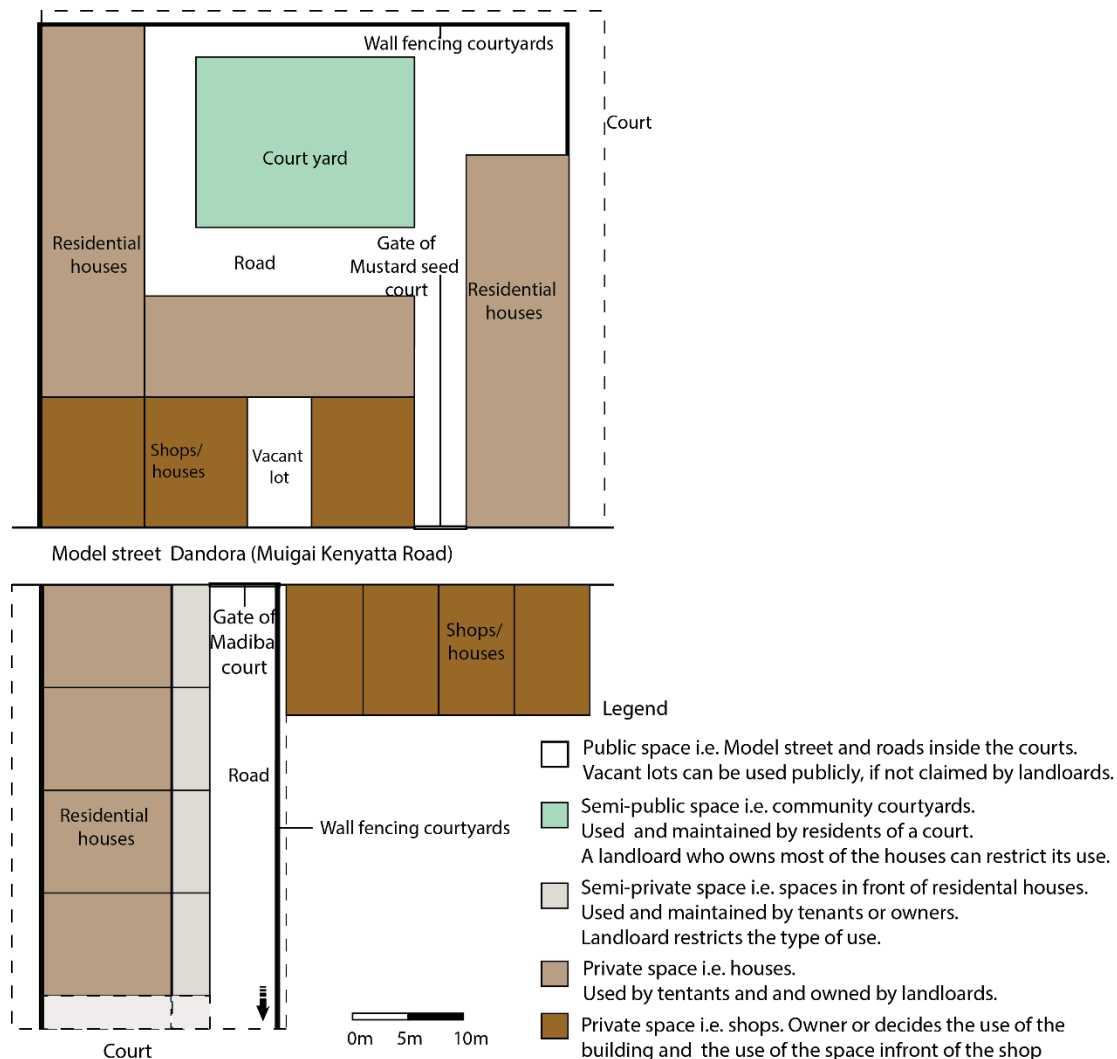


Figure 6: Example of the court structures, courtyard and the model street in Dandora phase II



Figure 7: Picture of the 'Mustard Seed' courtyard in Dandora Phase 2. As shown in figure 6.



Figure 8: The model street on Muigai Kenyatta road, Dandora phase 2. As shown in figure 6.



Figure 9: Madiba court² in Dandora, Phase 2. As shown in figure 6.

² A court is a clustered group of neighbouring houses around a shared open space. In Dandora courts are often enclosed by walls or fences and separated from the main road with a lockable gate.

3.2.1. Document study

A document study was carried out of scientific papers and Kenyan documents about local urban climate adaptation in low-income neighbourhoods. The keywords below were used to gather data about mainstreaming climate adaptation, linking climate adaptation and development or public space, local level adaptation measures, adaptation measures for low to middle-income countries, the vulnerability of the urban poor, the urban heat island effect, participatory climate adaptation options and adaptation in low-income neighbourhoods like Dandora. This information was used to partly answer my second research question and to prepare for the expert consultations, site visits and focus group discussions.

Keywords: Urban Climate Adaptation, Mainstreaming, Public Space, Urban Green Spaces, Urban Heat Island, Nairobi, Vulnerability, Low Income/ Urban Poor and Participation.

3.2.2. Expert consultations

Expert consultations were used as a method to broaden the knowledge of the context of planning and design in Dandora. There was no primary data collected from these experts apart from helping to structure and preparing for the meetings with Dandora residents. The consultations were held both before the start of the case study, as well as during the case study and focus group discussion process, to evaluate the meetings. The consultations had diverse aims; to ask about specific experience with environmental planning and climate adaptation, explore synergies with climate adaptation and the on-going model street public space project, and mainly to act as a sounding board to plan for the content of focus group discussions. An overview of the expert consultations and the number of meetings is given below in table 4 and a summary of the discussions is given in Annex 3. Consultations on the preparations and progress of the focus group discussion were done mainly with the representative of Placemakers, Kenya with whom I had two meetings. The Chair of the DTL organisation gave feedback on my proposed case study plan and questions via email. The PhD researcher on urban climate adaptation and city morphology in Nairobi, was consulted to ask about the feasibility of the initial case study approach and for feedback on the questions asked. Finally, an Environmental consultant was contacted to discuss the Environmental Impact Assessment (EIA) plan their company made for the construction of the proposed model street project in Dandora phase II. The environmental consultant was asked for advice on possible adaptation measures for Dandora and what would make these measures feasible.

Table 4: Overview of expert consultations.

Expert	Profession	Link to Dandora	Meetings
1	Urbanist and architect Placemakers, Kenya	Co-initiated the model street public space project in Dandora. Involved in meetings with residents and design	2
2	Business developer	Chair of the DTL (Dandora Transformation League) organisation	1
3	PhD researcher on climate adaptation	Researching climate adaptation and city morphology in Nairobi	1
4	Environmental consultant Green by Choice	Carried out the Environmental Impact Assessment for the proposed Dandora model street project	1

3.2.3. Site visits

Site visits were made to Dandora to explore the context and learn more about the community. Specifically, the Dandora neighbourhood (Dandora phase II³) as the case study area was visited four times and the larger neighbourhood of Dandora was visited one time. Similarly, as to the expert consultations, there was no primary data collected from these visits apart from helping to get an overview of the Dandora neighbourhood and preparing for the meetings with Dandora residents.

The first visit explored the Dandora neighbourhood by walking around the area of the model street and to visit some courts in Dandora with a community representative, see figure 6 for an overview of the court structure. The second visit occurred during the first meeting for the first focus group discussion, with group two (DTL group). The third visit, was when I was asked to help with a community prize giving and judging activity for the most improved courtyards in the suburb in terms of greening and clean-up. While this was not an initially planned activity and does not contribute to results directly, it was a chance to show my dedication to the residents and learn more about the process of environmental care in Dandora. Furthermore it allowed me the opportunity to see the wider area of Dandora and discuss informally with some of the focus group members. The fourth visit to Dandora, was during the second focus group discussions with group two (DTL group). These site visits were a way of learning more about the case study setting and getting a clearer idea of the context in which the potential climate adaptation measures can take place. Therefore, this method did not contribute directly to the results, but helped in giving an overview of the case study context as well as helps to build a relationship with the residents by participating in social activity that is necessary to lay a basis for the focus group discussions (Flyvbjerg, 2006). See figure 3, 7-11 for pictures from the site visits.



Figure 10: Picture taken in Dandora Phase 1, close to the Nairobi dumpsite. The houses are made of brick or from corrugated iron and there is some trash dumped in the already polluted stream.

³ For simplicity, the focus area of the Dandora case study 'Phase II', will henceforth be referred to as just the Dandora neighbourhood or Dandora.



Figure 11: This picture was taken in Phase 1 close to the boarder with Phase 2. Children play in the street near a small open fire, which has been lit to burn some trash and was giving off strong smelling smoke.

3.2.4. Focus group discussions

Focus group discussions (FGD) are a qualitative research strategy which are often used to investigate the opinion, perception or feelings towards an issue (Kumar, 2011). According to Ratcliffe and Krawczyk (2011) the effective long-term planning for the future of cities requires widening perspectives on planning, building community awareness and creating public support. Hence developing climate change adaptation measures would require public understanding, and this can be fostered through participatory discussions (Flyvbjerg, 2006; Ratcliffe and Krawczyk, 2011). Thus, participatory focus group discussions with Dandora residents about climate change and adaptation measures, are a suitable way to explore relevant options for Dandora according to the perception of local residents. Thus, this method was chosen to facilitate the answering of the second research question and sub-questions within the Dandora case study. Focus group discussions were carried out by the means of an open discussion between the researcher and the group members, where the researcher facilitates discussion by raising concepts or posing questions (Kumar, 2011). This method is useful for urban planning to explore knowledge, identify important issues and develop strategies in a collaborative way (Kumar, 2011; Ngau, 2013). The ideal size of a group is between 8-10 people (Kumar, 2011). The concepts selected for discussion should be carefully considered while providing the flexibility to address emerging relevant issues.

I. Content of the focus group discussions

The goal of the focus group discussions (FGD) was to explore what the Dandora residents know about climate change, what climate impacts affect them and how adaptation measures can reduce the residents' vulnerability or improve living conditions. The approach of the focus group discussions was based on the climate adaptation mainstreaming theory by Uittenbroek et al. (2013). This theory uses three main concepts of 'understanding', 'planning' and 'managing' to analyse the mainstreaming of climate adaptation (Uittenbroek et al., 2013). For this research, I initially applied these three main

concepts to develop sub-questions and so investigated the potential mainstreaming of climate adaptation into the public space of the Dandora neighbourhood.

However, during the process of developing the sub-questions a fourth concept was found to be needed, to expand the 'understanding' concept, namely 'perception', see figure 12 below. As the 'understanding' concept, as used by the developers of the mainstreaming theory, already assumes a more advanced and explicit understanding of climate change. According to Uittenbroek et al. (2013), 'understanding' means that people can already develop detailed "documents and conceptualisations" that describe how to they intend to address climate adaptation. Though during the preparation of the case study, I found that this level of understanding did not yet exist in Dandora, as the concept of climate change, let alone climate adaptation was not well-understood by residents. Consequently, a more basic concept of 'perception' needed to be addressed first. In order to lay a foundation for the following questions, by finding out what people actually thought about climate adaptation, before more complex questions could be asked. Therefore, the first concept of understanding was adapted to include perception.

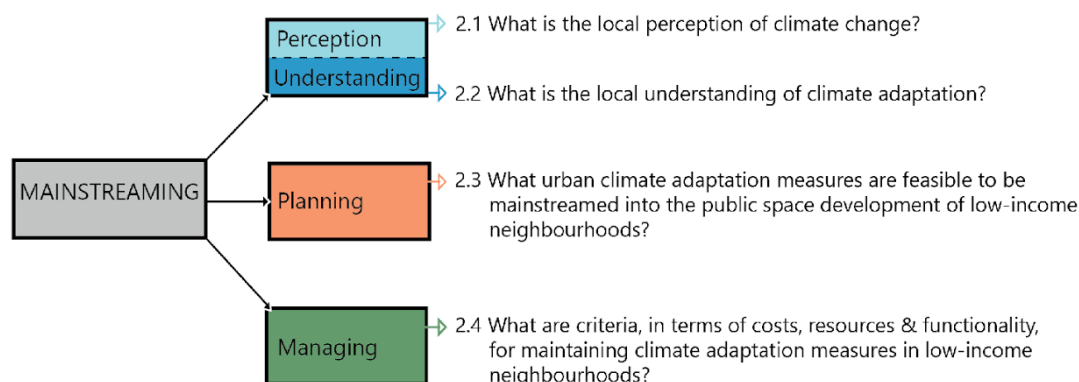


Figure 12: Relation of the four mainstreaming concepts to the sub-research questions. Adapted from the climate adaptation mainstreaming theory (Uittenbroek et al., 2013).

The adapted mainstreaming theory from Uittenbroek et al. (2013) was applied using four concepts, see section 2.4. Firstly, the 'perception' concept referred to people's basic knowledge of climate change and its impacts. While secondly, the 'understanding' concept, assumed a more advanced and explicit understanding or knowledge of climate adaptation as such that people can develop visions on how to address climate adaptation. Thirdly, the 'planning' concept referred to looking at alternative adaptation measures using different considerations i.e. technical, financial or environmental. Finally, the last concept 'managing' concerned agreements or maintenance plans for climate adaptation measures. The four concepts progress in complexity, as the first two concepts lay the basis for mutual understanding about what climate adaptation is and why it is important to address climate adaptation. The last two concepts address which climate adaptation alternatives are suitable and how they can be implemented and maintained. The four main concepts were used to analyse the mainstreaming of climate adaptation in Dandora. The four main concepts were consequently also used to develop the sub-research questions 2.1-2.4, which stem directly from these concepts as shown in figure 12 above.

However, these sub-questions 2.1-2.4, were not suitable to be asked to the Dandora residents directly, as they are theoretical and too complex. Therefore, these concepts needed to be operationalized into questions that are simplified and suitable for discussion during the focus group discussions. The operationalization of these four sub-questions led to the 12 case study questions that can be seen in figure 13 and table 5 on the next two pages. The starter questions and case study questions 1-2 arose from the perception concept, so ask about the priorities and problems of the residents, what they know

about climate change and how they are affected by it and what they know about climate adaptation. Question 3-4 were developed from the understanding concept, hence discuss which climate effects are the most important to adapt to, what adaptation measures are needed and are possible, and how this can be combined with public space development. Question 5-10 arose from the planning concept, thus they address how the community can adapt to a specific climate effect, considering behavioural and structural adaptations. Furthermore, which adaptation measures, based on an adaptation catalogue, are the most relevant for Dandara are addressed. Questions 11-12 came from the managing concept, which addresses which criteria could make these adaptation measures work in practice.

Table 5: Operationalization of sub-research questions into focus group interview questions.

Theoretical concepts & research sub-questions	Focus group interview questions
PERCEPTION 2.1 What is the local perception of climate change?	1. What do you think about when you hear about climate change?
	2. What climate effects or risks affect you most in Dandara, and who is most vulnerable?
UNDERSTANDING 2.2 What is the local understanding of climate adaptation?	3. What is climate adaptation in your view?
	4. Which climate effects are the most important to adapt to in Dandara?
	5. What behavioural or physical adaptation measures are possible?
PLANNING 2.3 What urban climate adaptation measures are feasible to be mainstreamed into public space development in low-income neighbourhoods?	7. Which one climate effect can you adapt to yourselves in Dandara?
	6. What do you already do about climate adaptation or improving the environment?
	8. What climate adaptation solutions are possible in Dandara? (Small scale, low-cost & community-led)
	9. How can climate adaptation be combined with public spaces in Dandara?
	10. Which adaptation measures, based on the options from Lezholzer's (2015) catalogue, are considered suitable to be implemented within the public space of Dandara?
MANAGING 2.4 What are criteria, in terms of costs, resources & functionality, for maintaining climate adaptation measures in low-income neighbourhoods?	11. Which three adaptation measures are considered the best in terms of costs, resources and functionality?
	12. What criteria makes these measures work?

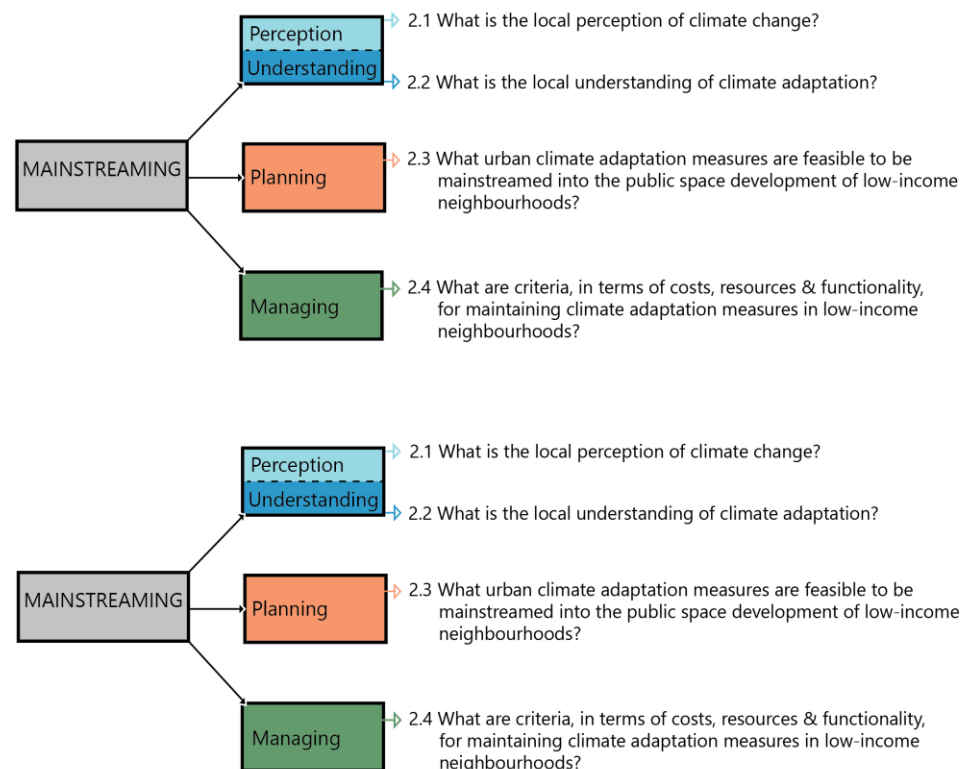
On the next page, figure 13, gives an overview of the methodology for the second research question. It illustrates the three methods used within case study method for Dandara. The figure also illustrates how the four mainstreaming concepts were used to develop the four sub-research questions 2.1-2.4, and how these sub-questions were operationalized into 12 questions for the focus group discussions. The colour of the lines indicates by which concept the sub-questions and case study questions were guided. The number of lines reflects the extent to which a concept was addressed in the two focus group discussions. The grey questions lines indicate that a question could not be addressed. The figure shows an overview of which questions were asked per FGD group and per meeting.

OVERALL METHOD USED FOR THE SECOND RESEARCH QUESTION

THEORETICAL CONCEPTS

RESEARCH QUESTIONS

2. How can urban climate adaptation be mainstreamed within the participatory public space development of low-income neighbourhoods?



METHODOLOGY

Overall Method: Case Study On Dandora

Method 1: Document study

On mainstreaming climate adaptation, public space & CA in low-income areas

Method 2: Expert consultations

1a, 1b, 2, 3 & 4 about the case study design and questions to the Dandora residents

Method 3: Site visits to Dandora

Method 4: Focus group discussions (FDG)

Operationalisation of research questions into case study questions (below) & case study plan Annex X2)

Developing starter questions to relate climate change to daily life in Kenya (Annex X)

Selection of two groups of residents for the FDG meetings

Group 1 FDG with residents of Dandora phase 4&5

Introduction & starter questions about climate change impacts in Kenya and Dandora

NB: Questions in grey were not addressed due to time limits

1. What do you think about when you hear about climate change?
2. What climate effects or risks affect you most in Dandora, and who is most vulnerable?

3. What is climate adaptation in your view?
4. Which climate effects are the most important to adapt to in Dandora?

5. Which one climate effect can you adapt to yourselves in Dandora?
6. What behavioural or physical adaptation measures are possible?
7. What do you already do about climate adaptation or improving the environment?
8. What climate adaptation solutions are there? (Small scale, low-cost & community-led)
9. How can climate adaptation be combined with public spaces in Dandora?
10. Which adaptation measures, from Lezholzer's (2015) catalogue, are considered suitable and on which level (public, semi-public/ courtyard or private) would they work?

11. Which three adaptation measures are considered the best in terms of costs, resources&functionality?
12. What criteria makes these measures work?

Group 2 FDG with residents of Dandora phase 1-3 (Members of DTL)

Introduction & starter questions about climate change impacts in Kenya and Dandora

1. What do you think about when you hear about climate change?
2. What climate effects or risks affect you most in Dandora, and who is most vulnerable?

3. What is climate adaptation in your view?
4. Which climate effects are the most important to adapt to in Dandora?

5. Which one climate effect can you adapt to yourselves in Dandora?
6. What behavioural or physical adaptation measures are possible?
7. What do you already do about climate adaptation or improving the environment?
8. What climate adaptation solutions are there? (Small scale, low-cost & community-led)
9. How can climate adaptation be combined with public spaces in Dandora?
10. Which adaptation measures, from Lezholzer's (2015) catalogue, are considered suitable and on which level (public, semi-public/ courtyard or private) would they work?

11. Which three adaptation measures are considered the best in terms of costs, resources&functionality?
12. What criteria makes these measures work?

Figure 13: Overall method used for the second research question.

II. Structure of the focus group discussions

According to Kumar (2011) if the goal of the case study is a specific community or group, it is important and ideal to spend sufficient time dedicated to building a relationship with the community or group before collecting data from them. For this reason, as well as from the philosophy of participative approach, there were several meetings with the Dandora residents, five in total. Multiple meetings with residents were considered necessary, in order to give room to explore issues that residents find important. As well as show that their opinion was considered valuable and attempt to link the issues they raised back to the topic of climate adaptation in ways that would benefit them, hence create mutual knowledge (Flyvberg, 2006). Multiple meetings were also important because of the relative complexity and time-consuming nature of answering the questions, as it was more suitable to address the 12 case study questions in two meetings where possible. The structure of the focus group discussions was determined using the theoretical concepts and the 12 case study questions as explained above, but the FGD method also allowed for flexibility if the group addresses a certain topic or loses focus. The answers to these questions often came in an iterative process, where an answer to one question also reflects on a previous question or provides the basis for the next. Furthermore, the structure and output of the discussions were also determined by the type of input that the group gave.

The case study focus group discussions took place with two different groups of residents. As according to Kumar (2011), Dandora as low-income area can be considered as single case. Thus having a more comprehensive view of the area is important. The inclusion of two groups, with residents from different phases (neighbourhoods) of Dandora (1-5), was therefore done to give a broader view of Dandora residents responses to climate adaptation measures. The two groups could be characterized as containing two types of people. Firstly, people that were actively involved with improving the general environmental, garbage collection and creating and reclaiming green public spaces. This is an interesting group to study for this research and they were very willing to participate, however, they may not be very representative of the wider Dandora residents. As they could have a biased perspective because they are part the Dandora Transformation League (DTL) a community based organisation. The second group of residents was characterized by people that are not actively involved in environmental improvement, but focused on garbage collection, separation and recycling. Furthermore, the residents in group 1, come from other parts of Dandora than residents from the DTL group, thus increase the diversity of the Dandora residents represented. The inclusion of two groups enables triangulation of data for the answers to the case study questions, as in the results I could compare the answers of the two groups. Unfortunately, a limitation was that I could not select the residents myself and only certain residents were selected by my contact persons, hence the groups were not very diverse in terms of age or gender. Finally, it was my intention to address the 12 case study questions with the two groups. However, group 1 was only able to meet once, thus it was not possible to address all questions with them, as question, while with group 2 this was possible. Thus due to time constraints as well as the fact that showed less willingness to brainstorm, it was not possible to explicitly address questions; 5,6&9 with group 1. However, some answers to these questions were partly given while the group was answering other questions.

FGD group 1

The first group for the focus group discussions was made up of 5 residents of Dandora from phase 4&5. This group was contacted via a personal contact, who knew a community leader in phase 4. This group was contacted after arranging contact with the second group via the DTL organisation, as the second group was found to not be diverse in terms of the Dandora residents it represented. Therefore, this first group served as a means to diversify the respondents by including residents from phase 4&5, and to explore the issue of climate adaptation for residents of Dandora who were not involved with the

DTL organisation. Therefore, these residents are possibly less likely to have an organisation-driven incentive to give certain answers. A brief overview of the group 1 members is given below in table 6.

Table 6: Overview of Group 1 for the FGD (Phase 4&5).

Group 1 (Phase 4&5)				
No	Age	Gender	Dandora Phase	Years lived in Dandora?
1	35	M	4	30
2	27	M	4	27
3	19	M	4	18
4	20	M	5	18
5	23	M	5	19



Figure 14: Picture of four out the five Group 1 residents. The fifth resident took the picture.

Meeting 1

The first and only meeting with the five residents of phase 4&5 for the focus group discussions was held in the Nairobi city centre. See figure 14 for a picture of most group members. As the focus group discussions were carried out in two groups, the aim was to address the four main concepts through the 12 case study questions with the two groups. However, it was not possible to have more than one meeting with the first group due to their commitments and my field work time constraints. Therefore, due to time limits, the meeting attempted to address all the mainstreaming concepts more broadly in one session.

Consequently, it was chosen to leave out some case study questions due to time limits as well as this group's apparent lack of openness to discuss detailed information about their own background or their community priorities. Hence in this group the focus group interview questions 5, 6, 9 and 12 were not able to be addressed. See figure 13 for an overview for the questions asked per FGD group. These questions that were addressed together give an overview of some of parts the perception, understanding, planning and managing concepts. This meeting focused mostly on the perception and the planning concept, with more time being spent to discuss the residents knowledge of climate change and its effects on them as well as time to discuss the alternative adaptation measures possible.

FGD group 2

The second group, including two meetings was made up of 10 and 9 residents respectively, mostly from Dandora phase 2 and some from phase 1&3. See figure 15 for a picture of the group members present during meeting 1. These residents are all members of the DTL organisation, hence were selected and asked to come by the DTL CEO. The focus group discussions mainly focused on the second group as this group was located in or near the specific area of study, the Dandora neighbourhood near the model street. Importantly, this group was also the most accessible through the DTL chair Charles, had the most time to meet and was willing to participate in meetings. Additionally, for this focus group a fixed safe location, namely the DTL office could easily be used, see figure 16 for a picture of the focus group in the office. For the results, the numbers of residents in group 2 differ for some answers to the focus group questions as these were answered over two meetings.



Figure 15: Picture of the 11 group 2 residents present at the first meeting. The man in the hat is the DTL representative (CEO) of the DTL organisation who did not join the meetings, but helped to organise the meetings.



Figure 16: Picture taken during a group 2 focus group meeting in the DTL office.

Meeting 1

The first meeting with group 2 was held in the case study location, the Dandora phase 2 neighbourhood. The first meeting was to get to know the group, introduce the topic and start asking the starter questions and the case study questions for this session. The questions in the first meeting focus mostly on the concepts of perception and understanding, by exploring what the residents perception was of climate change and how they felt its impacts and what climate effects were

important for them to adapt to. In addition, this session also laid the basis for discussing to the planning concept in the second session next sessions, by discussing ideas of how the residents already did or could adapt their neighbourhood. After the meeting the residents were asked for their feedback on the first meeting and asked if they would be interested to come for the second meeting, most of the residents confirmed this. During this meeting 10 DTL members were present, for an overview of the group see table 7 below.

Table 7: Overview of Group 2 for the FGD (DTL group, phase 1-3) over two sessions.

Group 2 (Phase 1-3, DTL group) M1					Group 2 (Phase 1-3, DTL group) M2					
No.	Age	Gender	Dandora Phase:	Years lived in Dandora?	No.	Age	Gender	Dandora Phase:	Years lived in Dandora?	Present at First meeting?
1	21-30	M	3	9	1	35	M	2	30	Yes
2	21-31	F	2	25	2	32	M	2	24	Yes
3	32	M		24	3	35	M	2	35	Yes
4	46	M	2	46 years	4	20	F	2	26	Yes
5	31-45	M	2	20 years	5		M	2		No
6	35	M	2	35 years	6	46	M	2	46	Yes
7	35	M	2	30 years	7	31-35	M	2	20	Yes
8	20	F	2	10 years	8	25	M		25	No
9	21-30	M	1	Not specified	9	21-30	M	2	9	Yes
10	21-31	M	1	20 years						

Meeting 2

The second meeting with group 2 took place during the fourth visit to Dandora. During this meeting 9 residents were present, 7 of which were present during the first meeting and 2 new residents. Due to other commitments at the start of the meeting 5 DTL members were present, while the other four residents joined after the start of the meeting.

The beginning of the meeting was used to reflect on the results of the first meeting and discuss if the residents still agreed with the outcomes of the meeting. The meeting focused mainly on the planning concept by discussing possible adaptation measures. As well as on the managing concept, by exploring the criteria for why identified adaptation measures would or would not work. Some of the case study questions overlapped as they addressed aspects of one or more concepts. This is also indicated in the coloured lines in figure 13, which shows the overall methodology used for the case study Dandora and specifies the approach used for the focus group session.

The number of meetings with the two groups was limited by my time in the field. Working on the in-depth interviews simultaneously as well as the difficulty of setting up meetings with residents due to conflicting schedules and their priority to work when they could find temporary jobs (most residents look for work on a daily or weekly basis). Although it would have been preferable to meet group the first group a second time, this was not possible with their schedule and my limited time in the field. Additionally, it was planned to meet the second group a third time during the fieldwork. However, the second meeting was postponed several times by the community representative and thus there was no time to meet a third time to reflect on the outcomes of the second focus group meeting.



Figure 17: Example of a public space project in Dandora

4. Results and Discussion case study Kenya

4.1. Results case study Kenya

Results and Discussion of Interviews

This section will present the results of the in-depth and semi-structured interviews, see Annex 4. The results will be presented in the same sequence as the interview questions were carried out. This structure following the four main parts namely; awareness and knowledge, communication, instruments and implementation. For the closed questions tables are used to illustrate the results, while for the open questions the respondents answers are summarised and compared. The people interviewed were categorised as urban planners and designers, urban climate experts and experts on policy or politics, for an overview of people interviewed see table 3 in the methodology chapter).

4.1.1. Awareness and knowledge

Q1. What is the sense of urgency to adapt the urban environment to climate change amongst the following groups in the future in your city?

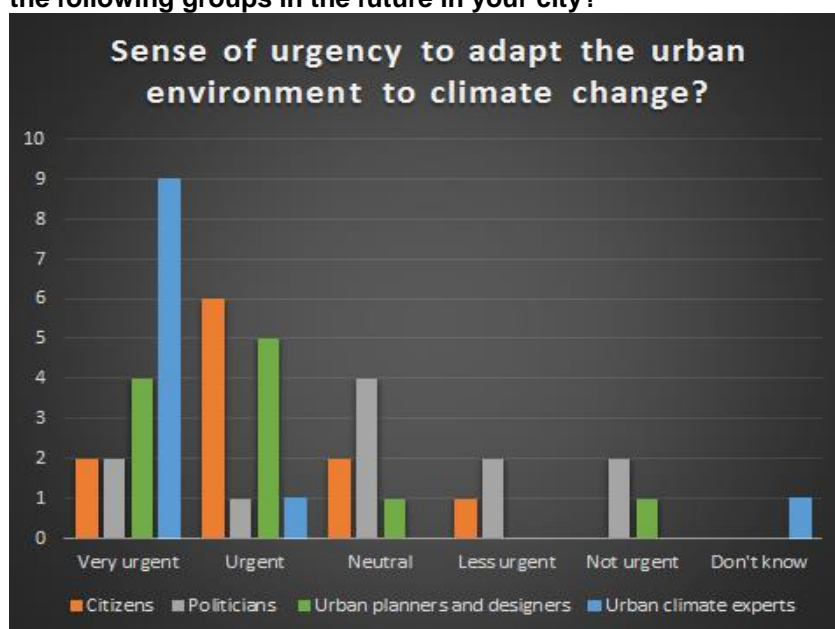


Figure 18: Sense of urgency to adapt the urban environment to climate change.

As shown in figure 18, most of the interviewees stated that a majority of the stakeholders (citizens, urban planners and designers to urban climate experts) see adapting to climate change as very urgent to urgent. The urban climate experts are considered to see the most urgency, with nine out of 11 interviewees, stating that within this group the sense of urgency is perceived as the highest. The urban planners are estimated to have a very urgent to urgent perception of adaptation by nine out of 11 interviewees. The majority of the interviewees, eight out of 11, estimate within the citizens group adaptation is perceived as urgent to very urgent. Furthermore, the majority say that the citizens, although they may not understand the terminology or interpret phenomena as climate change, do clearly feel the effects i.e. changing rainy seasons. Numerous interviewees state that the citizen awareness of climate change effects has been growing compared to a few years ago, as the direct impacts of climate change i.e. drought and floods are becoming more visible. Politicians are considered by the most of the interviewees to be the category for which the sense of urgency for adaptation is considered neutral or the least urgent.

Q2. In case the sense of urgency is low, what is needed to make those groups feel more urgent about adapting the urban environment?

The majority of the interviewees, seven out of 11, say that there needs to be enhanced awareness creation and civic education programmes about climate change. Citizens are generally thought to be aware of the effects of climate change as this impacts their daily life i.e. the changing raining seasons. However, this awareness does not translate into a deeper understanding of the consequences of their actions such as cutting down trees and how they can take action themselves.

For the politicians, most interviewees consider that this group perceives the relevance of climate change adaptation as low. Due to the fact that they focus on topics which they consider the most relevant topic to citizens, namely service provision, and they can't see the link between service provision and climate adaptation. Therefore, according to interviewees, politicians need to first see climate adaptation as a relevant political topic in terms of widespread citizen interest, before they will take action on this. An urban resilience expert says *"Climate change action is always overpowered by other issues i.e. economics or livelihood losses, thus ...adaptation is not prioritised"*. On the other hand, interviewees say that the politicians also have a responsibility to educate citizens on the implications of climate change on economic and societal growth. Finally, one interviewee stated that *"national and county government should play a more prominent role in climate change adaptation, hence institutionalize this as a goal, to prevent this from becoming an issue that is dependent on individuals"*.

Urban planners and designers are generally considered to be aware of the urgency to adapt. However, two interviewees mention that this group *"does not necessarily see climate change as an urban planning and design issue"*. Instead they *"see this as a sectoral or global issue and hence some lack the understanding to connect climate effects with the cause"*.

According to almost all the interviewees, 10 out of 11, the urban climate experts need to have more engagement with the politicians and urban planners and designers and *"demonstrate without a doubt the need for climate adaptation"*. Therefore, workshops and symposiums are seen as useful as for the majority of the both the planners and designers as well as the politicians. As the interviewees feel that there may be a gap in their knowledge which leads to poor prioritisation of urban climate adaptation.

Q3. How aware are the groups of the following two urban climate phenomena?

Urban Heat Island

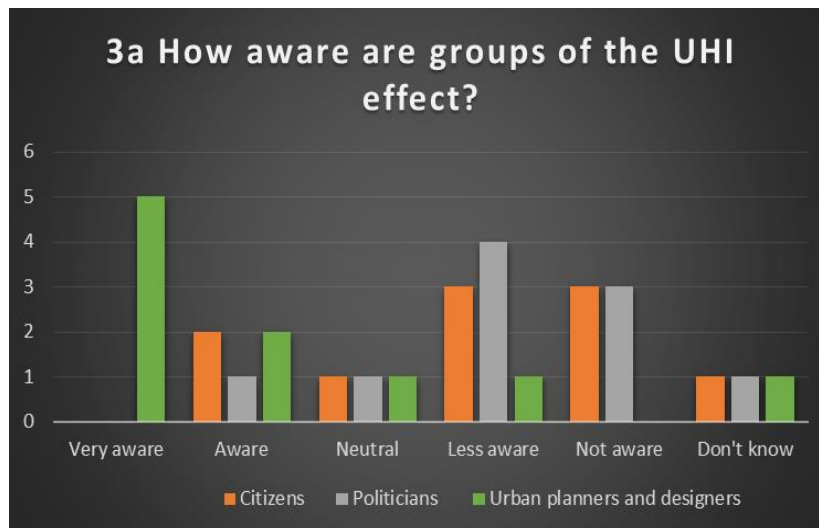


Figure 19: Awareness on the Urban Heat Island in Kenyan cities.

The interviewees' estimations of the awareness of the three groups about the Urban Heat Island (UHI) in Kenyan cities is shown in figure 19. According to the majority of the interviewees, seven out of 10, the urban planners and designers are aware to very aware of the UHI effect. As this is part of the curriculum of their study, they are considered the most aware of this effect, as seen in figure 19. Although, one planner interviewed said this group is *“aware of the UHI effect, however they are not aware it is massively exacerbated by climate change”*.

The citizens are considered by the majority of the interviewees to not be very aware of the UHI effect. However according to four interviewees, this is due to a lack of awareness about specific climate effects or terminology, as the citizens do feel the effects and are aware of climate change generally. According to one interviewee *“if you ask any citizen do you feel hotter in a city compared to a rural area, they will say yes. Thus, they do understand the effect, but do not link it to climate change phenomena”*. One interviewee did not answer this question. According to most interviewees, eight out of 10, politicians are less aware to not aware about the UHI effect. While one interviewee indicated, the politicians are aware of this effect, thus the interviewees are quite divided about the knowledge of the politicians towards this effect.

Wind Discomfort

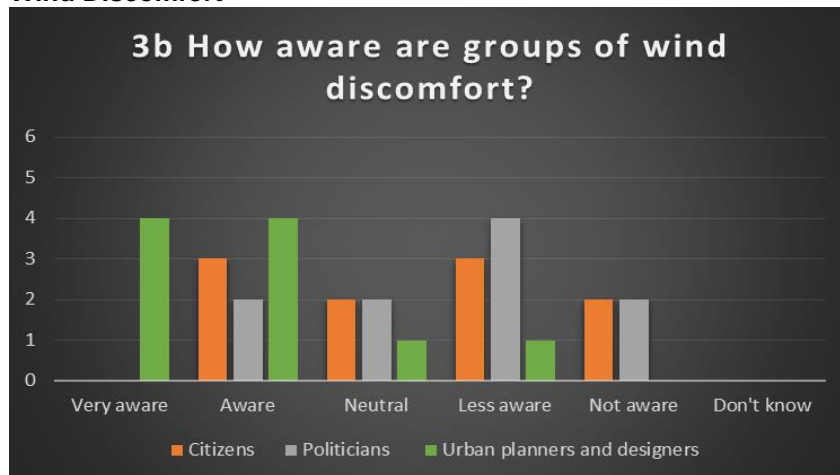


Figure 20: Awareness of wind discomfort in Kenyan cities.

The awareness of wind discomfort is shown in figure 20 above. The urban planners and designers are considered to be the group that is most aware of wind discomfort, as they are often taught about wind orientation during their studies. However, most interviewees state that wind is not a very important issue for most Kenyan cities like Nairobi, *“due to the equatorial altitude”*. Notably, four interviewees mention that the awareness about wind differs significantly between the coastal city of Mombasa where it is high, and the inland capital Nairobi where wind is not a significant factor and hence the awareness is low. According to three interviewees, in Mombasa all stakeholder groups have indigenous knowledge of how to build optimally for the wind flows. Similarly, the citizens were generally considered aware to neutral of wind if they lived in coastal areas like Mombasa, and less aware to not aware if they lived in inland cities like Nairobi. Another interviewee also stated that *“the awareness of wind discomfort is dependent on the level of education a citizen has”*. One interviewee did not answer this question. Politicians are considered less aware by four out of 10 interviewees, while most interviewees are divided about the politician’s awareness. Once again the level of awareness is depended on if the politicians are located in coastal or inland cities. Overall there is considered to be more awareness of wind discomfort than the UHI effect in Kenya.

Q4. In case awareness is low, what is needed to increase the awareness among those groups of two urban climate phenomena mentioned in question 3?

The media is considered an important platform to create more awareness for all stakeholders and especially for the citizens. Five out of 11 interviewees, the mass media can help to make the subject of urban climate phenomena easier to understand as well as create more sensitisation of the urban climate phenomena for citizens and the politicians. One interviewee states that *“the majority of the urban population has mobile phones, today technology is seen as a good way to link climate news to citizens for example through local weather data”*. Two interviewees state that practical demonstrations are very important to help citizens understand. Finally, one interviewee states that citizens need to follow a specific training on weather and climate impacts on the environment. Politicians also need to attend conferences where urban climate experts can advocate for adaptation measures. According to interviewee who works on city planning and climate change says this is important as *“too many people show them problems, politicians need to see solutions”*.i.e. *public green space as a way to counter the UHI and partly help to reduce the death rate of citizens. This can help them market it to citizens*. Thus politicians also need to engage more with urban planners and designers around climate issues.

For urban planners and designers, there needs to be more knowledge development. Six interviewees out of 11, state that knowledge of climate change and adaptation should become more integrated with the field of urban planning and design. Two interviewees suggest that this should become a compulsory subject for university students in this field and to integrate it with other knowledge i.e. through the CPD (compulsory professional development) trainings that are mandatory for architects and similar trainings for planners. Urban planning for climate change is considered an upcoming relevant field. However one interviewee who works on city planning and climate change stated that *“there are currently very few urban practitioners working on urban climate adaptation in the world and in Kenya”,* and stated *“you can probably count the number of people in Kenya that are working on this (urban climate adaptation) on one hand”.*

Q5. How aware are the groups of the following four urban climate adaptation measures?

City design (e.g. street orientation, adapting to wind and solar orientation of building and streets)

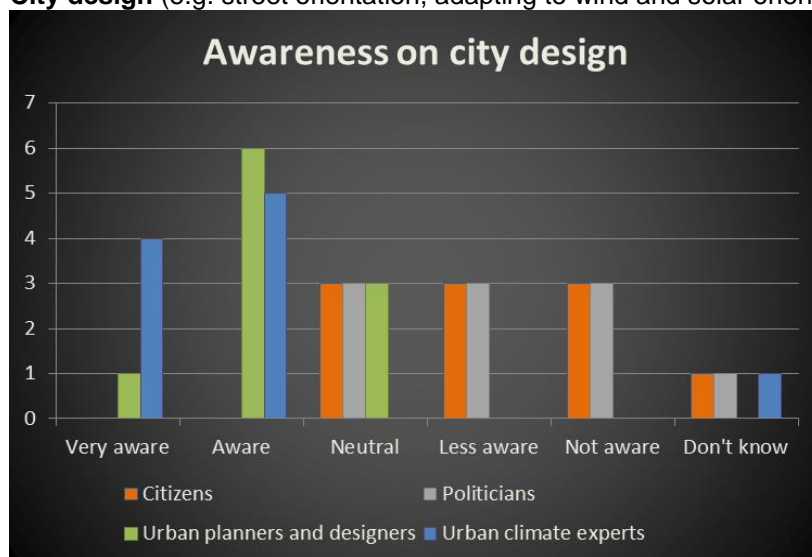


Figure 21: Awareness on city design in Kenyan cities.

The awareness on city design is shown in figure 21. Almost all interviewees, nine out of 10, state that there is awareness of the use of city design as a climate adaptation measure, by urban climate experts. As the group has the most knowledge on the topic and are considered very aware to aware by all but one respondent, who indicated to not know the level of awareness. Urban planners and designers are also considered aware by the majority of interviewees, six out of 10. One interviewee thinks this group is very aware, while the remaining three interviewees consider urban planners and designers to be neutral. The interviewee did not answer this question. One interviewee also stated that *“the greater part of Nairobi is quite old, over 100 years. Thus, the design was done by during the British colonial period, and hence took into account many factors of urban design for the master plan of the city”.* Furthermore, one interviewee states that *“urban planners and designers are aware, but do not do a good job in plans if you ask me, as are aware of the issues but there is no implementation of the knowledge. What must happen is more than technical training, we need a cultural paradigm shift”.*

Both the citizens and politicians are considered mostly neutral or less aware of the use of city design as an urban climate adaptation measure, by six out of 10 interviewees. While three interviewees state they feel these groups are not aware and one person states that they do not know what the level of awareness is. According to two interviewees, there is again an important difference between the cities

Nairobi and Mombasa, as in Mombasa citizens and politicians are very aware of adapting to wind, while they are less aware of adapting using street orientation.

Urban vegetation (e.g. green roofs, urban forestry)

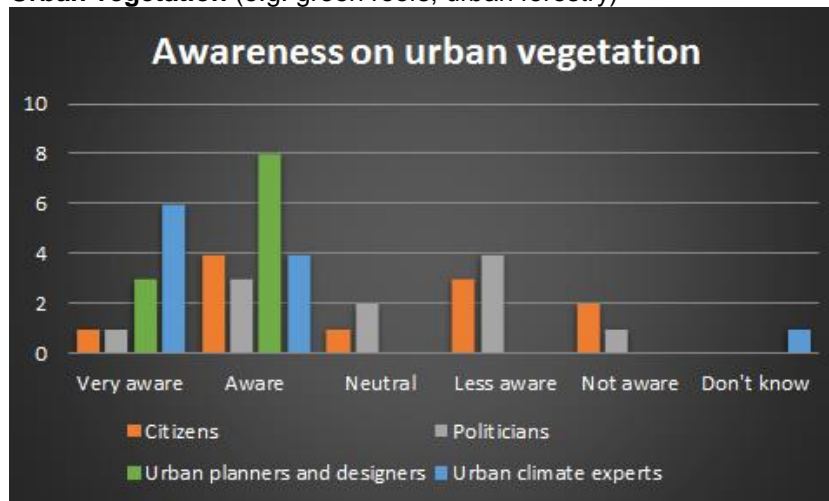


Figure 22: Awareness on urban vegetation.

Figure 22 shows the awareness of urban vegetation as an urban climate adaptation measure. The urban planners and designers and the urban climate experts are both considered aware groups. Overall the urban climate experts, are seen as very aware by six out of 11 interviewees, while the rest consider this group aware and one person does not know the level of awareness. Urban planners and designers are considered to generally be aware with eight out of 11 interviewees, while three interviewees consider this group very aware of vegetation as a means of urban climate adaptation. According to an interviewed planner *“the group of urban planners and designers in Kenya are currently more focused on social issues than environmental issues”*. Furthermore, an academic professional addressed that *“urban planners and designers and the urban climate experts “are very aware but there is lack of implementation. We have plot coverage restrictions that are supposed to support urban vegetation... but somehow people do not implement this”*.

Regarding the citizens, almost half of the interviewees (5) state that this groups awareness of vegetation or urban green as an adaptation measure is aware to very aware. While the other half of the interviewees (6) consider the citizens neutral to not aware. One interviewees states that *“citizens mostly see green as a recreational element”*. Additionally, another interviewee stated that *“there is a tendency in urban areas to pave green spaces because there is no law against it”*. Finally, according to an academic professional *“citizens see the importance of greenery but not explicitly for climate adaptation purposes”*. Politicians are considered neutral to not aware by the majority of the interviewees, seven out of 11.

Use of materials (e.g. low albedo and longer cooling time-lag materials)

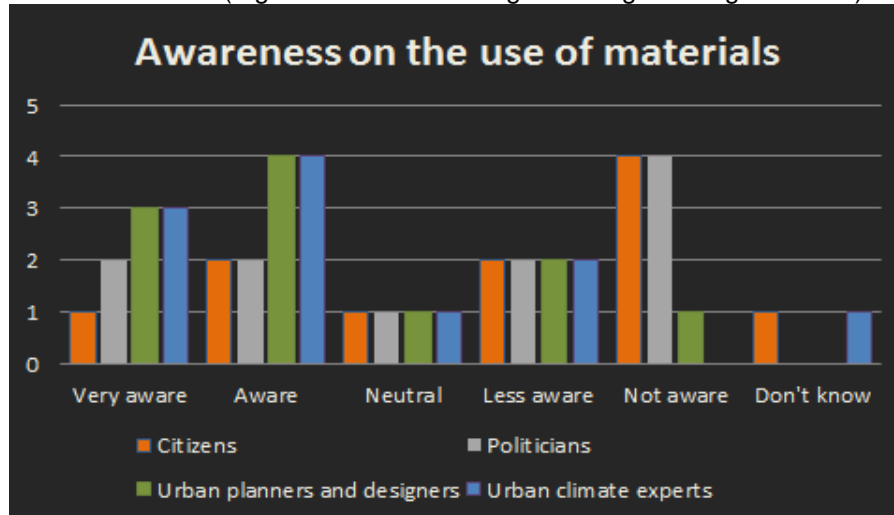


Figure 23: Awareness on the use of materials.

The use of materials with low albedo is a climate adaptation measure. Figure 23, shows that the awareness on the use of materials is generally considered to be very aware to aware for both urban planners and designers and the urban climate experts by the majority, seven out of 11 interviewees. Although, one interviewee states that *“urban planners and designers are aware but there is a lack of implementation”*. According to two interviewees, the urban planners and designers are more selective in the type of materials they use in Mombasa which makes materials work for better for climate adaptation there. The politicians are seen to be very aware by four interviewees and to be neutral to not aware by the remaining majority of the interviewees. Finally, the citizens are the group that are considered to be the least aware of materials, with seven out of 11 interviewees saying their knowledge is neutral to not aware. One interviewee said *“many materials used i.e. corrugated iron roofs, are not optimal as they are hot when they are supposed to be cool and vice versa”*. Additionally, an academic interviewee mentioned that material use is an issue as *“materials are used in cities that look beautiful i.e. the colour, there is no consideration of the property of the materials. I.e. we use materials because we think they make our houses and spaces look expensive...however a lot of glass used in buildings will lead to excessive heating and result in the need of air conditioners”*.

Anthropogenic heat (e.g. less air conditioners)

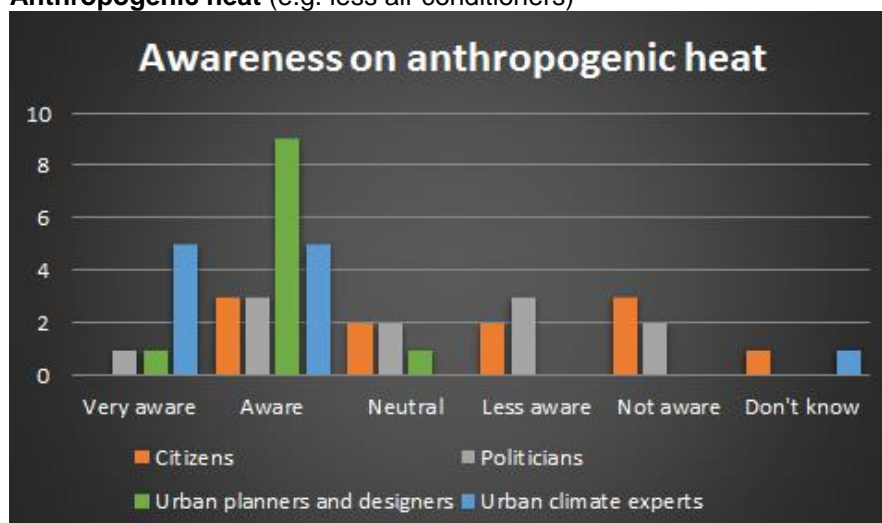


Figure 24: Awareness on anthropogenic heat.

Figure 24 illustrates the awareness of anthropogenic heat by the four groups in Kenya. The urban climate experts, followed by the urban planners and designers are considered to be most aware of the relationship of anthropogenic heat and climate adaptation. Although one interviewee noted that *“for the urban planners and designers the level of knowledge depends on their specialisation”* and once again *“there is a lack of implementation”*. All interviewees have different opinions of how aware the politicians are, therefore there is no clear idea about the awareness of this group. Similarly, for the citizen awareness the interviewees have different opinions, but overall this group is considered the least aware with seven respondents naming this group neutral to not aware. Three interviewees stated that *“the citizens are not aware of the relation between materials i.e. heat inefficient”* and that *“for citizens there is a disconnect between the use of materials and the consequences for anthropogenic heat i.e. less efficient cooling due to materials with a high albedo”*. Furthermore, due to this disconnect *“the majority will not consider adaptation but just individual measures against heat i.e. placing a fan”*. Once again, a difference was noticed by three interviewees between the citizen awareness in Nairobi and Mombasa. *“As in Mombasa people are aware of the value of good ventilation to reduce the need for air conditioners and hence the cost of electricity bills”*. While in Nairobi, *“little use of air conditioning occurs due to the temperate climate”*.

Q6. In case awareness is low, what is needed to increase the awareness among those groups of four urban climate adaptation measures mentioned in question 5?

To increase awareness the most needed action is have more civic education, public meetings, media awareness creation around climate change effects. Practical demonstrations of climate change impacts and the cause and effect relationships are needed so that citizens and the other groups have a clear idea of the issues involved in climate adaptation and how this affects their environment.

For the politicians, there needs to be more engagement with the other groups, especially the urban planners and designers and the urban climate experts. This is necessary as education and exchange on climate issues can help create a political sense of urgency and increase the perceived relevance of taking adaptation measures. Finally, there need to be accessible online information and publications of climate information for the wider public and to stimulate more cross-sector work in the planning and design field. Currently some universities are working on integrating climate change course into different disciplines. For urban planners and designers CPD (compulsory professional development) trainings courses are considered important.

4.1.2. Communication

Q1. Which roles do citizens, politicians, planners and designers and urban climate experts have in the process of planning, designing and implementing urban climate adaptation measures?

According to the interviewees the four stakeholder groups mentioned above have the following roles:

Citizens have an important role to participate in all stages of the plan making process. Citizen participation is a legal requirement in the Kenyan planning process as laid out in the Kenyan constitution. Ideally, they should have a supervisory role through participation and giving feedback, however this role is currently vaguely understood due to lack of awareness. All the interviewees state that it is necessary for citizens to be involved in the planning process as they need to present the problems they have due to climate change and inform the urban planners on what they need and hence help to create context-fitting solutions. Furthermore, citizens have a role to follow the

regulations and designs being made by other actors as they are the clients or end-users of climate adaptation measures and can also be implementers of measures.

Politicians have a strong role to lead the process for climate adaptation in which the citizens need to participate and are involved in all the phases. They create guidance by developing the right laws, regulations and policies for climate change adaptation for the citizens to follow. Politicians need to allocate resources i.e. budgets, human resources and materials to support in the implementation of urban climate adaptation measures. According to almost all the interviewees, politicians are the group that citizens listen the most to. Hence politicians are critical in terms of promoting and enforcing existing advisory measures coming from the urban climate experts and the urban planners and designers. As they have a big platform to create awareness and can influence citizens to uptake new technology or encourage behavioural changes. However, corruption is an issue that affects the effectiveness of institutions and political decision-making.

Planners and designers have a main role to inform and guide the policy and plan making process and advise which plans should have adaptation measures. Planners also have a role to include citizens in the planning stages as well as other stages, to create solutions that are relevant for them. Another role is to implement measures that are required by law or what they as professionals see as necessary, hence be facilitators of solutions on an urban scale. Planners should be involved during implementation, monitoring and evaluation of climate adaptation. However, according to interviewees involved with city planning, planning is currently not being done in terms of climate.

Urban climate experts have a key role to play in terms of providing information about climate change scenarios, forecasts as well as giving advice and leading the other groups in terms of spearheading climate issues. All the interviewees state that these experts have very significant role in terms of creating awareness, advocacy and the input for policies and plan making as they understand the link between urban issues and climate change. Thus, they need to give technical advice and be involved in reviewing and creating plans. However, according to four interviewees there are few to no urban climate experts in Kenya *“they can probably be counted on one hand”*. One interviewee who is conducting an urban adaptation research in Kenya, *“does not believe that the urban climate expert professional currently exists”*.

Q2. What are the relationships between these actors in the communication strategies?

Citizens/ Politicians:

Almost all interviewees defined it as weak relationship as there is a lack of clear communication between these two groups. Furthermore citizens have difficult access to politicians as it is mostly one-way communication from politicians with limited feedback opportunities and hence it is hard to hold them accountable. A minority of interviewees feel that the relationship is two-way and strong, as citizens can give feedback and speak their mind in public forums i.e. some counties have regular forums that facilitate dialogue and finally they say the citizens can ultimately dictate the politicians agenda.

Citizens/ Urban planners and designers:

The majority of the interviewees say there is a mostly indirect relationship between citizens and urban planners and designers. Most state that the relationship is mostly one-way and unclear as there is little communication between the citizens and the urban planners and designers so far. The drive to participation is a recent development, while most planners still practice a traditional top-down

approach, hence it is difficult for citizens to access this expert. Notably one interviewee stated that *“in the communication process with citizens urban planners are dependent on the politicians”*. As their own forum is mostly elitist i.e. seminars or professional organisations, while politicians are the ones who reach out to the ordinary citizens. Although, according to two interviewees, *“the relationship is becoming more two way and dynamic, as the new constitution of 2010 requires public participation processes”*. Thus *“it is the obligation of urban planners and designers to seek the opinion and feedback of citizens”*.

Citizens/ Urban climate experts:

Almost all interviewees do not see a direct relation relationship between urban climate experts and citizens. Ideally the urban climate experts should explore how citizens react to the climate data i.e. forecasts and scenarios to see if they feel the same or if their scenario is only based on models. However, according to the majority of the interviewees this relationship is not clear due to several different factors namely; the non-existence or serious shortage of urban climate experts, lack of communication and not including citizen perceptions as part of valid data into the models and communication about climate. According to several interviewees *“the urban planners and designers and the urban climate experts are currently basically the same people”*, as there are no distinct climate specialisations. Comparatively, two interviewees consider the relationship respectively moderate and good, as some urban planners and designers or urban climate experts hold public forums with citizens. According to one interviewee *“urban climate experts share climate information through the mass and telecommunications media regularly”* and they need to help with regulation, implementation and consultation. However, many interviewees state there is no set process of communication between these groups, thus it is necessary to make an institutionalized arrangement of citizen input that can inform policy. Finally, the citizens also have role to play in enhancing the perception and this could be done through more crowdsourcing of climate information.

Politicians/ Urban planners and designers:

According to all the interviewees the relationship between politicians and urban planners and designers is weak and unclear. The majority of interviewees mention that there is a lack of interaction between these groups. A politician is considered the ‘go-between’ between the citizens and other groups i.e. the urban climate experts and urban planners and designers. Hence, the politicians should consult the urban climate experts on urban adaptation measures but the link in this process to the urban planners and designers is not clear for the interviewees. As in theory they advise the politicians but several interviewees state that they think this role is not strong in Kenya. An academic architect characterises the relationship as *“uneasy, especially if what the politician wants done is not what the planners wants done...and both claim to be representing the citizens”*. Finally, the interaction is considered one-sided by another interviewee who says that *“for the largest part politicians do not feel they need the urban planners and designers as their focus is on the citizens, consequently their only interaction comes at the point of legislation where they lack information and need to seek this from the urban planners and designers”*. Conversely, *“the urban planners and designers are heavily dependent on politicians”*, according to this interviewee, as they approve the building plans and implementation strategies and play significant roles in controlling funding.

Politicians/ Urban climate experts:

The majority of the interviewees consider the relationship between the urban climate experts and politicians are very unclear as there is a lack of communication between these groups. Additionally, most interviewees currently consider urban climate experts in Kenya to be the same people as slightly specialised urban planners and designers. Furthermore, *“the advisory role of urban climate experts to the politicians is considered weak”* by one interviewee although another interviewee states that the

urban climate experts share information via mass media thus making it accessible to all politicians. However, according to a climate expert *“the strength of the relationship varies depending on whether politicians have an interest in climate change, as this affects whether they engage with climate experts”*.

Urban planners and designers / urban climate experts:

The majority of the interviewees consider this relationship to be unclear or non-existent. As several state that there is a lack of communication between the urban planners and designers and the urban climate experts and others state that they *“do not think urban climate experts currently exist as a separate profession but are the same people as the urban planners and designers”*. Furthermore, several interviewees state that a communication forum to translate climate information from the climate experts into action for urban planners is missing. They say *“the interaction between the urban and climate domain is not strong enough in Kenya”*. However, one urban climate expert, states that he *“has observed a growing relationship between these two groups in the climate forums i.e. the COP 21 and COP 22 as well as during national forums”*. Therefore there is more communication taking place as the climate field is growing in prominence, and thus climate experts are increasingly being consulted also within the urban field. Several interviewees say the lack of specialised urban climate experts and the communication gap between the urban planners and designers and the urban climate experts largely contributes to the politicians lack of climate information.

Overall the interviewees statements are not in agreement whether the relations are strong or weak between the different actors. Generally it can be said that most relationships are considered unclear. One interviewee commented that this question was posed from *“a very European perspective...on governance and democracy. The idea that that if there is a link with politicians then things will move smoothly”*. While in Kenya he states *“a planner can dine with them (politicians) every day but still there is no change, due to power relations”*. Therefore according to one interviewee, *“the relations can be strong between all the actors but they have no impact. It depends on who is more powerful on what will happen”*. Therefore *“understanding power relations in governance is key, otherwise policy is not effective as laws are on paper and practice is different”*.

Q3. What is the role of communication to support the planning, design and implementation of adaptation measures?

The role of communication is considered very important by all the interviewees. Communication has a role to create awareness, share information, set the agenda, shape policy, bringing together different actors and ideas as well as supporting the implementation of climate adaptation measures in urban areas. Awareness of urban climate adaptation is currently lacking hence communication plays an important role in creating the awareness of the need to adapt. Furthermore, communication is important to integrate different ideas and players as well as integrating different adaptation measures to enable implementation. Consequently, the quality of communication is essential to be able to successfully support context-dependant adaptation measures as without communication people would work past each other. Proper communication helps to involve the diverse views of citizens and experts to create a proper problem diagnosis, shared ownership of the project and a sustainable strategy. Therefore, interviewees say that communication supports the planning, design and implementation process by clarifying information and making the issue of adaptation understandable to all stakeholders. According to several interviewees there are currently communication gaps between the four actor groups mentioned. All the groups need to be able to communicate, share information and give feedback to each other to enable the realisation of adaptation measures. Thus, communication should not only be technical but be adapted to common understanding.

Q4. Are there formal guidelines or policies that drive the use of communication in the planning, design and implementation of adaptation measures? If yes, can you please name them?

There are no specific formal guidelines or policies that drive the use of communication within the planning, design and implementation of climate adaptation measures.

Most of the formal guidelines the majority of the interviewees mention refer to the need for participation i.e. the Constitution of Kenya (2010), Urban Areas and Cities Act (2011), the Nairobi City County Public Participation Bill (2016). The legal requirement for participation as stated in the 2010 Kenyan constitution and other documents mean participation should be implemented in the planning process but does not refer specifically to communication or adaptation. Most interviewees think there should be some guidelines or policies for communication but cannot name specific ones. According to one interviewee, who is directly involved with the Kenya national working group on climate change, *"there are attempts at formal guidelines, but they are in fact participation guidelines made by the ministry of devolution and the World Bank."* According to an interviewee doing research on climate adaptation, *"there are formal frameworks around climate mitigation and adaptation i.e. the National Climate Change Action Plan (NCCAP, 2013) and the National Climate Change Response Strategy (NCCRS, 2010), but it is unclear if they guide the use of communication"*. According to an interviewee working on urban planning and climate change, *"there is no policy on any communication use for adaptation"*. *There is probably a policy on stakeholder engagement and planning, i.e. the Planning Act.* Hence there is a clear policy on communication between different stakeholders within the planning field, however this is said to be more for planning in general than specifically for adaptation measures.

The additional document study I conducted on formal guidelines or policies that drive the use of communication finds that the NCCRS (2010) states that there should be improved communication, awareness and education as well as early warning systems, disaster management and monitoring concerning climate change. According to this document the key responsible parties for this are the Kenyan government, local authorities, universities, the private sector and the wider civil society and NGOs. The Environmental Management and Coordination Act or EMCA (1999) has no mention of climate change. While in the revised EMCA (2015) there is a mention that *"the Cabinet Secretary shall, in consultation with relevant lead agencies, issue guidelines and prescribe measures on climate change"*. However, both documents contain no references to either adaptation or communication. The NCCAP (2013) states one of its goals to disseminate climate change knowledge through enhancing public awareness creation and communication. It mentions specific communication improvement goals between farmers and the government about adaptation strategies. Furthermore it proposes that a "Climate Change Resource Centre should be created and it should be hosted by the Ministry responsible for climate change affairs. This centre will become the one-stop online space for Kenya's climate change information and knowledge" (NCCAP, 2013). Finally, there is no mention of the use of communication in the Kenya National Adaptation Plan 2015-2030 (GoK, 2016a). To sum up, the document study finds the same results as the interviews, that there are no formal guidelines or policies that drive the use of communication specifically for the purpose of climate adaptation.

Q5. What are the strengths and weaknesses of the communication process?

Strengths:

There are efforts being made to involve citizens in decision making, and participation in planning processes. According to the interviewees the communication process becomes more effective by involving many people. Furthermore, planners have a key advocacy role in the planning process *"to*

involve and consult citizens” and not just to inform citizens. Ultimately the communication process will lead to better planning outcomes as there is more information being shared and collaboration between different stakeholders is possible. This contributes to the planning, implementation and monitoring of climate adaptation. One interviewee says that there seems to be an increase in the amount of climate information being provided although it is currently still through informal structures i.e. twitter updates about flooded road sections. Furthermore, deliberate efforts are being made to collect data and spread it through mass media which can reach many people at once. It is increasingly possible to get instant feedback depending on the medium of communication used i.e. social media.

Weaknesses:

According to most interviewees participation processes and hence communication processes with citizens are often unstructured or ad hoc. Thus, the public participation meetings organized are sometimes seen as *“inefficient and time consuming which demotivates people to come and to organise them”*. The communication process is also heavily affected by power relations between the actor groups as well as corruption according to one interviewee and this in turn affects the quality of communication. It is considered difficult to include all people due to a lack of resources and to enable people to participate on the same level, hence it is not inclusive. Moreover, not all politicians and planners are interested in participation as many come from a top-down planning culture, thus there is need for more transparency. According to a few interviewees the participation and communication to citizens in Kenya is currently mostly consultation, hence citizens do not have a lot of influence. Finally, the urban planners and designers do not seem to be actively engaged in communicating with other actors about climate adaptation.

According to a few interviewees the climate information communicated is often not focused enough i.e. the Meteorological department climatic forecasts exists but are not focused on climate adaptation but instead very sectoral information which have a limited level of penetration into the society. Furthermore, the information that is mass-communicated is blanket information and lacks site-specific data i.e. rainfall expected in the Nairobi region and parts of a neighbouring province. Consequently, it is difficult for citizens to know whether this will affect them or not. Additionally, the information communicated is often too complex to understand for ordinary citizens and lacks advice on what actions to take to react to the climate changes. Hence dissemination of data is still a challenge as apart from blanket data, payment is required for area-specific data and this would often require going to a physical department. Finally, current communications in the urban context are often one-way i.e. from climate experts or politicians to citizens. Hence citizens have few opportunities to share their experiences based on climate and adaptation with the experts. Therefore, more modern communication technology i.e. Sms or WhatsApp needs to be used to communicate to a larger audience who may not use online media.

Q6. Is there need to improve the communication process? If yes, how to improve?

All the interviewees, except for one, state that the communication process needs to be improved. Firstly, the communication channels especially those used by the government should be expanded by embracing the diverse online media platforms i.e. WhatsApp etc., to have a wider coverage and hence make the communication more inclusive and democratic. Supporting strong citizen forums and enabling two-way dialogue and feedback among diverse stakeholders will improve the communication process. Secondly, formalisation of the communication can aid in this, as in Kenya an interviewee states that a lot of communication is informal and hence it is not transparent. Urban planners and designers and politicians are seen to have a responsibility to improve the communication and participation process. They should frequently communicate with the public and other relevant urban

stakeholders using appropriate platforms and make it clear what actors are involved in the process. Thirdly, the politicians need to have more interaction with climate experts to be critically armed with the right information as they have extensive reach and power to affect decisions, but they can only communicate and enforce what they are aware of. Furthermore, climatic data from diverse sources but especially from the KMD (Kenya Meteorological department) needs to be made freely available. An online repository should be created to collect and analyse climate-relevant social media data. This will counter the current shortfall that information is collected, but there is no advice given on what citizens should do. According to one interviewee researching climate adaptation in Kenya, the climate information exist within the KMD, but the people working there do often not know how to translate the information into a form that can be easily communicated to other stakeholders.

4.1.3. Instruments

Q1. Are there legally binding instruments (e.g. zoning plans) used to implement urban climate adaptation measures? If yes, please explain how they work?

There are no legally binding instruments such as zoning plans specifically to implement urban climate adaptation measures in Kenya. According to seven interviewees, there are binding instruments however these are not being used for the purpose of implementing urban climate adaptation measures. For instance zoning plans, the Nairobi Masterplan, the Kenyan Constitution's chapter on environment, Forestry Act, integrated strategic plans for cities or towns, Physical planning act (1996), Urban Areas and Cities Act (2011), the Environmental Management and Coordination or EMCA Act (2015). These instruments can broadly be interpreted as referring to climate adaptation measures but this is currently done through incidental contributions i.e. development regulations, and not targeted action. One interviewee who works with the Kenya Climate Change working group says *"we do have instruments but they are climate blind, as zoning plans and county development plans but they are not being developed for the goal of climate change adaptation"*. Furthermore, *"the legally binding instruments are not specifically made for counties (local level), only the national level"*. Another interviewee who works on city planning and climate change says, *"urban climate adaptation is a rudimentary field in Kenya, you really have to put two steps in between to link it to urban adaptation"*. Two interviewees mention the Climate Change Act (2016) which is a regulatory framework to address the climate change. According to one interviewee, *"Kenya has been making process in working on climate change through the instilled climate change secretariat and a climate change research centre"*.

Some interviewees mention there are policies or regulations that can contribute to climate adaptation. For example using LED lights, a ban on harvesting mangroves and the requirement for some developments to have solar panels on roofs according to the Energy Act. Other examples are the building code and regulations and the planning by-laws i.e. zoning by-laws that control levels of development which are enacted by the county governments and can hence be specified as needed for a county. Nairobi for instance unlike rural areas, has a maximum plot coverage percentage rule which states that a buildings can only occupy a certain maximum surface area and the rest should be left open. However according to an urban climate expert *"no measure speaks that this open land is used for tree cover or to paint surfaces white"*, hence it is a missed adaptation opportunity. Furthermore the EMCA act (1999), led to the establishment of NEMA (National Environmental Management Authority) which ensures that the environmental guidelines that they create are adhered to. This organisation, according to one interviewee, *"is very serious about climate change"*. However two interviewees state *"that in practice these environmental guidelines do not work well as even though a legal framework exists there is a lack of follow up and hence enforcement and monitoring is a challenge"*. Furthermore

one interviewee who works on climate change states that “so far the measures are more for mitigation. We should look more at adaptation options i.e. wind design at the coast and flood-responsive and temperature responsive design for both Nairobi and Mombasa.” However, these measures do not receive a lot of attention in zoning and building policies.

Q2. What are the strengths and weaknesses of the legally binding instruments used?

Strengths:

Legally binding instruments are seen by a few interviewees as the ultimate instrument as they are binding, ensure conformity to the law, setting standards and enable scaling up. Furthermore, legally binding instruments often create transparency and more public awareness as there needs to be accountability when using these instruments. According to one interviewee *“the people are able to go and question, why is this project taking place here?”*. Furthermore the fact that they are written in law supports implementation as it is more likely that actions are carried out and helps to institutionalize the process of working on climate change.

Although current laws are not very specific, according to several interviewees they provide a broad basis to provide for other specific laws. Some laws are serious in punishment if broken; thus laws are a deterrent towards the destruction of the environment. Furthermore Kenya is progressively developing the institutions needed for climate change adaptation such as the national climate change committee enacted by the Climate Change Act. Furthermore according to an interviewee researching climate adaptation *“the new constitution (2010) guarantees the human right to a clean and healthy environment which can be expanded on by the Climate Change Act for how this can be provided as a right at the local level”*. Devolution is also seen a strength as it has enabled more climate change action on the local level. As devolution enables the conceptualisation of these documents to become locally specific, this is more relevant than a generic national policy or document.

Weaknesses:

Most interviewees state that the instruments that exist are not specific enough. Therefore they contribute more incidentally than specifically to address climate change or adaptation, and hence the potential for adaptation can only be inferred. Many regulations do not refer to already existing plans. Therefore they are not in synergy or can even contradict already existing plans. Furthermore, most country laws are dated and were largely enacted before climate change adaptation was well-understood, therefore they are not relevant or specific enough to address current climate change vulnerabilities. According to one interviewee, *“although Kenya has developed very ambitious policies and laws but some of it is cut and paste from international best practices such as Germany and hence not related to the local context”*. Resulting in laws that often lack the specific provisions and detailing to stimulate adaptation in the local reality and furthermore currently there are not specifically made for counties but only for the national level.

Due to weak institutions there is a lack of implementation, monitoring and evaluation. i.e. plot coverage maximums are provided for in law but this will not be checked as enforcement mechanisms are not clear. Thus although there are rules, what is allowed for by law and what is built by developers can vary. According to one interviewee *“This lack of follow up may render some legally binding requirements useless”*. A government planner states *“the laws are very silent on how to make sure these things are done (enforced)”*. Two interviewees say that there can be interference by politicians which affect where a project takes place and therefore *“you find that things don't work really as planned”*.

Q3. Are there certain chances / potentials missed when using the legally binding mentioned instruments (e.g. coupling with other instruments)?

All interviewees say that there are chances missed when using the legally binding instruments.

Many interviewees say it is a missed potential that there is no policy coherence or references between policy documents and existing plans. For example the Climate Change Act, INDC (Intended Nationally Determined Contribution) and the Urban Areas and Cities Act, it is unclear how far they influence and refer to each other. One interviewee states *"It is clear that Acts are being made in isolation and often they are in contradiction to each other"*. As *"the INDC must have committed to reducing the carbon footprint, temperature and Kenya's contribution to emissions but if the Urban Areas and Cities Act is not amended enough it will never be able to achieve its target"*. A government planner adds that *"there is some ambiguity in the law i.e. Urban Areas and Cities Act talks of the integrated strategic urban development plan, but they don't mention at what point the EMCA (Environmental Management and Coordination Act) is applicable"*. Thus there is generally a lack of vertical coherence between policy and laws.

There are also chances missed in the harmonisation or integration of adaptation within other sectors and professions especially for the implementation of measures. Therefore plans are not being critically revised to include climate change considerations i.e. the energy sector looks at solar panels and the forestry sector looks at increasing tree cover mostly in rural areas. These could also work together with urban planners to look at urban vegetation and the use of open space in the city. An interviewee who is part of the Kenya national working group on climate change says that *"now mainstreaming is ad hoc, it is not yet a requirement in law. Plans talk about mainstreaming and considering climate change adaptation but it is not legally binding"*. Additionally, another interviewee states that *"in most local governments of urban areas, the departments that deal with climate change are different than those dealing with DDR (disaster risk reduction) or related sectors"*. Thus although there is overlap in department goals, there is a lack of synergy or even conflict in the implementation and enforcement between the departments. Hence *"when drafting new plans existing plans are not taken into account"*.

According to two interviewed planners, *"there are technical capacity gaps where institutions like NEMA National Environmental Management Authority do not have the adequate people to implement legal instruments like the EMCA Act"*. Moreover, the institution is seen to *"approve everything, therefore plans are less effective as contractors can ignore or change a sustainable plan to a more convenient option and here will be no enforcement"*. Furthermore a government planner adds that *"most cities do not have enough planners and experts in the built environment, so because of this implementation is a bit low"*. Hence clear laws and enforcement of consequences is an area of potential as well as civic education on the sensitization of the importance of environmental issues. As *"in Nairobi people do not see the necessity of (improving the) environment, housing is the main concern"*. Consequently it is seen as important to improve the awareness of climate change in different sectors. This is in line with what an interviewee researching adaptation finds *"climate change was (till recently) not being felt as a relevant issue for urban areas, it was felt mostly in the rural areas"*. Furthermore according to this interviewee, there is currently a lot of progress on climate adaptation with the climate change policy, bill and action plan, however the success or failure can only be judged in due course of mainstreaming.

Q4. Are there other policy instruments used to implement urban climate adaptation measures? If yes, please explain how they work?

The majority of the interviewees, say they do not know of any policy instruments used to implement urban climate adaptation measures. One interviewee who is directly involved with the Kenya national working group on climate change, says there are no policy instruments being used for implementation instead *“urban climate adaptation is being done on a project by project basis”*. Furthermore according to him *“it (adaptation) is now not driven by local but by international regulations i.e. the green climate fund or the adaptation fund.”* Which have their own regulations that affect how *“climate adaptation is done on the ground more than local laws”*.

According to five interviewees there are policies which, although most are not directly created for urban climate adaptation goals, nevertheless implement measures that can have a contribution to urban adaptation. Namely the urban development policy which is still to be gazetted, the national adaptation plan, the forest and water Act, the building code, the urban areas and city act and the general development policies. Additionally, for the new master plan for Nairobi, the Nairobi Integrated Urban Development Master Plan (NIUPLAN 2014-2030), Un-Habitat has recommended urban adaptation measures but these have not been approved yet. County by-laws are mentioned as policies that can support adaptation *“i.e. for Mombasa a by-law that says don't cut mangroves or do not start sand harvesting it could help the urban climate adaptation measures as it restricts exploitation and helps the environment”*. Two interviewees mention that there is a recent climate change policy that consists of several strategies and plans for Kenya. Finally, the common country program for Kenya, is a United Nations agencies policy instrument that combines the approach and implementation of all the 23 UN agencies in Kenya to have coherent implementation and avoid duplication.

Q5. What are the strengths and weaknesses of the other policy instruments used?

The majority of the interviewees are not aware of other policy instruments used thus cannot name relevant strengths or weaknesses.

Strengths:

The instruments give an indication of the country's climate goals and help to protect the environment. Policy instruments are very flexible instruments and have the potential to have an integrated approach to guide various aspects of adaptation in the country while instruments such as the urban planning act can only address limited aspects of adaptation.

Weaknesses:

The existing policy instruments are not specific or detailed enough to cover aspects of adaptation. One reason for this is that they are likely not being made by experts on urban climate. Furthermore, the other policy instruments are not legally binding i.e. the Climate Change Action Plan is not legally binding; it is more of a guideline for the country. The different NGOs (Non-Governmental Organisations) that drive implementation of adaptation all have their own regulations for climate adaptation and these international regulations are not always suited to the local context. It is generally noted that the interaction between different policies is not clear and this can be a barrier for implementation.

Q6. Are there certain chances/ potentials missed when using other policy instruments (e.g. coupling with other policies)?

The interviewees that have knowledge of policy instruments say that it is a missed chance that there is a lack of coherence and poor integration between different policies. For instance an urban development policy misses comprehensiveness and the climate change policy is focused only very sectorally on the environment which could miss broader aspects of adaptation. Furthermore one interviewee working on climate change and urban development says *“there is no policy coherence with climate relevant instruments. As although the INDCs (Kenya's Intended Nationally Determined Contribution to the UNFCCC goal) and the Climate policy, are created mainly by the same ministry in the last 5-10 years there is very little coherence between these two”*. The integration of adaptation in different sectoral policies is needed in order to have more concerted efforts that support adaptation. According to one interviewee who is a climate expert *“currently some sectors and documents speak of integration but Kenyan sectors are not really integrated in implementation”*. Furthermore she adds that *“pockets of funds for climate adaptation are housed within the National Disaster Management Agency, however this is not enough as they typically deal with (disaster) response and not anticipatory measures”*. Overall, policy coherence, harmonisation, integration or mainstreaming are seen as necessary to ensure that relevant policies are speaking to each other.

There is a lack of experts who understand both climate change and urban planning. This leads to only a sectoral implementation of policy as often professionals do not understand each other's field. Currently it is a problem that *“planning law does not recognize environmental planners as licensed planners”*. To create more understanding, *“all planners and designers should have the same basic education so that all can raise awareness for basic climate and environmental considerations”*. Additionally, civic education is important as according to one urban planner there is currently a misinformed concept *“of a flourishing city being skyscrapers”*. Hence *“we need to sell prosperity in a different way” and value “the quality of nature”*. Therefore new budgets need to be allocated for climate change projects and sensitisation of people as one interviewee says *“the laws may not change the reality (of what adaptation is carried out)”*. Additionally, existing policies are not used to their full potential due to lack of specificity i.e. the maximum plot coverage regulation does not define what to do with the required residual space where it could state that this should be used for green measures or not allow paving. According to several interviewees a potential for adaptation is that the counties have their own budgets and independence, thus have an opportunity to support the implementation of adaptation. Moreover, cities and small towns should develop internal policies that contribute to climate adaptation. Finally a government planner states that although *“strategies are not binding, yet some strategies are very strong and actually more explicit than the law”*. Thus they can provide guidance *“like the COP22”*. Furthermore several interviewees say a coordinating agency or multi-stakeholder national platform is needed to act as facilitation for a dialogue between different institutions i.e. ministries from the government, NGOs and civil society. This will help in the implementation of different policy instruments as the actors can ensure they are in coherence with each other.

4.1.4. Implementation

Q1. Which concrete urban climate adaptation measures/ interventions are currently implemented or have been implemented in your city?

Almost half of the interviewees, five people, are not able to name any concrete urban climate adaptation measures. The interviewees who named concrete adaptations are shown in table 8. Most measures concern Nairobi, those concerning Mombasa have been indicated. Most answers were given by urban planners and designers and the urban climate experts. The most mentioned measures were mangrove protection in Mombasa, street tree planting and green public spaces in Nairobi.

Two interviewees are able to name some adaptation measures shown in table 8, however do not think that they are being done specifically for the purpose of adaptation. According to one interviewee *“we are not consciously working at CC but planting trees and cleaning up the environment”*. An urban planner confirms this by saying *“most implementations are incidental, not specific”*. One interviewee, involved directly with the Kenya national working group on climate change says *“for non-urban adaptation there are quite a few examples. But urban examples are not clear”*. According to this interviewee *“the Thika highway was presented in an international report as an urban climate change mitigation action, due to reduced congestion (in Nairobi). But this is not a proper mitigation or adaptation. We pick and choose anything due to lack of technical understanding”*. Therefore according to this interviewee no good urban climate adaptation measures are taken. Furthermore there are some regulations being developed i.e. solar power requirements for certain developments, but this is still very limited. Progress is being made as *“Nairobi, Mombasa and Kisumu are developing requirements with the green economy guidelines”*. Furthermore an interviewee who is an expert on urban planning and climate change says that *“in the master plan for Kisumu they want to adapt to fluctuation of the lake-level rise”, thus if there is a climate impact on the water level of the lake, this could be an adaptation measure”*.

Table 8: Concrete urban climate adaptation measures mentioned by interviewees.

Interview category	Concrete measures
Urban planners/designers	Tree planting in streets(2)
	Mangrove protection (Mombasa) (4)
	Stabilise slopes near rivers and reduce erosion in informal settlements
	Introduce greenery as urban agriculture in informal settlements
	Changing use of building materials
	Rehabilitation of public spaces i.e. along Nairobi river, JeevanJee gardens in the city centre and protecting Karura forest. (2)
	Citizen tree planting initiatives
Urban climate experts	Adaptation to flash flooding from rain in Nairobi by digging trenches, cleaning drainage and basic maintenance of existing drainage infrastructure.
	Nairobi city wide public space strategy/ project. Can have a positive effect on heat islands and air quality if carried out well.
	Coastal flood protection and fortification of key infrastructure sites against sea-level rise (Mombasa)
	Adaptation in the tourism sector for the maintenance of beaches (Mombasa)
Politicians / policy experts	New zoning promotes for harvesting and reuse of rainwater in affluent suburbs in Nairobi

Q2. What are the strengths and weaknesses of these mentioned urban climate measures/ interventions?

The majority interviewees, seven out of 11 people, cannot discuss strengths and weaknesses as they are not aware of any urban climate adaptation measures or interventions.

Strengths:

Trees cool down the city, provide shade and are improving the environment as well as provide a habitat for certain species i.e. bees. During the process of improving the public space near the river, the Nairobi River was cleaned up. Urban climate adaptation measures are getting support from the local citizens and some measures are also citizen-driven like the planting of trees. According to an expert working with cities and climate change, *“there are innovative approaches being used that you would not expect from cities of this development level”*, however no clear examples were mentioned. Furthermore there is a clear potential to adapt a large amount of the population to climate impacts, hence projects have the potential to be replicated and up-scaled in other parts of Kenya. Indirect strengths related to climate adaptation is an increased ownership of urban greenery in the form of urban agriculture. Thus there is more protection of these spaces than if greenery was just green infrastructure. Furthermore adaptation measures encourage the promotion of sustainability. Additionally, there are lobby groups who stand up for environmental protection and will protest against public space grabbing such as parks.

Weaknesses:

When planting trees, the wrong species could be planted that causes too much leaf litter or trees could quickly die due to lack of maintenance. Irrigation could also be an issue but this was not mentioned by the interviewees. The adaptation measures implemented are mostly limited to tree planting which is not extensive. There is currently a fragmented planning approach which does not really cover mitigation or adaptation for large surface areas such as a town. As adaptation is sometimes focused on very small initiatives like a pilot study, instead of city-wide measures. Furthermore, most of the implementations done are not specific to climate adaptation, which means they do not achieve their full potential i.e. species used for urban agriculture may not be the most appropriate for urban climate adaptation. Finally, the urban climate adaptation measures can be difficult to implement as legal requirements and policy are not useful if there is no supervision or monitoring of building developers. According to a government planner, there is a lack of political support across different levels for these measures as *“they rarely focus on climate adaptation. That is not where their interest is. It does not bring votes”*.

Q3. Are there conflicts between aesthetics and these mentioned urban climate adaptation measures?

The majority of the interviewees, nine people out of 11, say there are no to minimal conflicts between aesthetics and urban climate adaptation measures. Trees and other green adaptation measures are considered beautiful by most interviewees and hence are actually seen as improving the aesthetics of an area. Minimal conflicts named are that drainage measures and solar panels are less aesthetic but there are currently no conflicts. One interviewee says conflicts may occur in the future when engineered solutions are degraded. Furthermore *“Aesthetics may not be a priority. If the solar energy reduces bills no one will care how it looks”*. Therefore, functionality is considered more important than aesthetics.

Two interviewees say there are conflicts between aesthetics and urban climate adaptation measures. Firstly, urban greenery is often in the form of urban agriculture which is not critical of urban aesthetics. Secondly, an urban expert says that most of the urban adaptation measures are not designed by

trained people but are *“rudimentary and survivalist”*. They are implemented by citizens with the least amount of costs and no design consideration with the goal of protecting their assets, property etc., which often do not meet the basic aesthetic standards that would be appropriate especially for public spaces”. Secondly, an interviewee researching climate adaptation says there is a conflict between aesthetics and the government’s main goal to meet basic needs. The government, due to other urgent priorities, does not see the value of aesthetics. This becomes a problem for the implementation of adaptation as *“they see the adaptation endeavour as a beautification problem, which does not warrant a large budget of 60 million but maybe only 1 million”*. Therefore more awareness needs to be created by urban planners on first and foremost the functional value of the urban adaptation measures i.e. improving the microclimate, reducing heat stress, preventing flooding and only secondly the beautification aspect. Thirdly, it is a significant barrier to adaptation to that *“the value of space in Kenya is seen only in monetary terms”*. Consequently there is conflict is when the space is limited or costs of adaptation are higher, as then priority is given to maximising development over climate. Hence according to the interviewee researching adaptation *“it needs to be demonstrated or visualised how an individual can benefit from an adaptation measure”*.

Q4. Are there conflicts between urban functions and these mentioned urban climate adaptation measures?

The majority of the interviewees, six people, don't know of conflicts between urban functions and these mentioned urban climate adaptation measures. Moreover, some say local urban adaptation is driven by both adaptation and social needs and urban adaptation measures can add value i.e. trees.

Two interviewees say whether there is conflict depends on the measures used. Urban climate adaptation measures need to work in the local context, thus having a car free day would conflict severely with normal life in Nairobi as there is no proper public transport. Additionally, one interviewee says *“private development is a conflict to urban adaptation in the sense that it is not regulated.”* Consequently, private developers often do not take proper drainage measures as they built up all possible area even the vulnerable zone next to the rivers. Additionally *“an area can be zoned as public space but be completely built up by private development. This is not necessarily a conflict of functions but of economic interests”*.

According to three interviewees adaptation does conflict with urban functions. As according to an urban climate expert *“interventions by citizens are spontaneous and devoid of systematic thought and design, they use whatever materials they can collect, sometimes for functions that are ill suited to achieve their goal”*. I.e. they block roads with barriers to prevent flooding which hampers the road transport function. Another example is that in order to reduce the amount of traffic and cars in the Nairobi city centre a central street was changed from a two-way to a one-way street. This measure contributed to green on the pavement and more space for people to walk, however car owners saw this as a conflict as the road system became less efficient for them. Therefore conflicts can also be subjective, as this measure does provide for the majority of the people who are not car owners. Additionally, poor maintenance of urban climate adaptation measures i.e. trees, can lead to conflicts of damaging cars and blocking roads. The leaves or flowers of certain tree species i.e. Jacaranda flowers are considered litter. Additionally if these are not swept away, they attract birds which leave faeces all over city cars, streets and windows. Also if the wrong species of trees is planted, they can attract undesirable species of birds i.e. Marabou storks which eat garbage and are carriers of disease as well as can be a danger to planes landing in the vicinity.

Q5. Are there certain chances/ potentials (e.g. coupling with other interventions / ‘no regret’ measures) missed when implementing these mentioned urban climate adaptation measures?

Almost all the interviewees say there are chances/ potentials missed when implementing these mentioned urban climate adaptation measures. A few interviewees say they don't know of urban adaptation measures being implemented.

One potential missed is that there is *“only a focus on planting trees, but are not putting vertical green or green roofs”*. Thus this limited use of green measures could lead to missing adaptation options for implementation especially for the newer buildings. However *“the suggestions for urban climate adaptations also need to be within a framework of affordability and suitability i.e. can afford to plant trees but may not afford a green roof due to engineering required”*. Hence appropriate technology is required that is suitable for the Kenyan context. A second potential miss, is that often the knowledge i.e. about materials, solar orientation, improving public transport and decongesting the city to reduce the urban heat island is not implemented. A third chance missed for implementation named by several interviewees, is that the cost of adapting should start to be considered versus the missed opportunity cost from not implementing adaptation measures. Hence the value of adaptation needs to be shown by the urban climate experts. *“This consideration is critical, so that politicians and the government see why adaptation is necessary and how it competes with other financial interests or costs”*. Furthermore, a stronger link between the national and urban or local level is needed to align and demonstrate the need for adaptation which will help in budgeting for adaptation. *“As spending on this does not really give a result that is tangible, and then it becomes harder to convince the government to give money”*.

Fourth, for urban areas there are opportunities missed in the framing of urban problems as sectoral, while they are closely interlinked. *“If flooding problems are addressed only as flooding or environmental disasters then there is a lot of potential missed to link this to climate change”*. Consequently, *“there should be a comprehensive policy that covers a combination of different sectors i.e. housing, climate, environment etc.”*. *In order to do this, “policy should be made by engaging with UP&D, and UCE and engineers”*. *As urban climate adaptation is a cross-cutting issue, it is not only in the domain of urban planning and design but also includes diverse other engineering, social and technological fields”*. Therefore by addressing different sectors all the factors are considered and conflicts can be limited. Furthermore, this policy should be flexible and location specific and hence should be created at the country level where it provides a chance to address the relevant climate factors for an area. Fifth, although many no regret measures can be implemented, *“this opportunity is sometimes missed because the interventions are unplanned, haphazard and spontaneous response to extreme weather events”*. I.e. rain water management can produce an aesthetic terraced landscape, water catchment ponds can be used as recreation areas etc. Sixth, two interviewees including a climate expert say some adaptation measures such as drainage are approached as very technical adaptations and *“opportunities could be missed by not placing them in the wider ecosystem-based adaptation approach”*. This is hence a missed opportunity to consider adaptation measures holistically which look beyond cities and at the exogenous resources i.e. water catchment areas, however a difficulty is that ecosystem-services are not very well regarded. A seventh opportunity is conducting an awareness campaign to inform the community alongside the implementation of measures. This is considered a low cost and positive side benefit to the measures to *“harmonize the design with the local community. I think the community would be interested, especially low-income or economically weak communities”*. Moreover, an interviewee researching adaptation says that within informal settlements, vulnerability is a key issue hence *“the risk of non-adaptation i.e. flooding sweeping parts of a settlement away are so high that adaptation does not lose any potential and there is almost no chance for mal-adaptation”*.

4.2. Discussion case study Kenya

This sub-chapter will discuss the results of the interviews and document study. The discussion is located in chapter 4.2. The discussion will be structured according to the two sub-questions of the first research question namely; 1.1 What is the awareness and communication about climate adaptation in Kenya. and 1.2 What urban climate adaptation instruments and concrete implementations are used in urban planning and design. A comparison will be made between the results from the interviews, relevant scientific literature and similar research done in China, Bulgaria, South Korea, the Netherlands and Flanders.

4.2.1. Awareness and communication about climate adaptation

Research sub question 1.1. What is the awareness and communication about climate adaptation?

Awareness

Most interviewees say that for all the stakeholder groups, with the exception of politicians, the sense of urgency to adapt to climate change is considered urgent. Citizens are generally considered to be aware of climate change effects in terms of feeling the impacts on their daily life. Moreover, this awareness is said to be increasing due to more frequent droughts and extreme rainfall. However, it is notable that although most interviewees state that citizens have need to adapt to climate change effects, most citizens may not understand the terminology “climate change”, understand how their actions affect the climate, or see how they could take adaptation measures themselves. This indicates a gap between having some basic awareness of climate change effects and a more in-depth understanding of climate change. This finding is supported by research on citizen awareness in Kenya by the Heinrich Böll Stiftung (2010), the NCCRS (2010) and the NCCAP (2013) in which citizen surveys show that climate change awareness and knowledge of climate change impacts is low countrywide. Furthermore, according to interviewees, Kenyan citizens do not clearly understand adaptation and cannot distinguish between climate adaptation and climate mitigation. This is comparable to findings from similar research in China (Qui, 2016) where citizens cannot differentiate between adaptation and mitigation. While it differs from research done in South Korea where the awareness of climate change and adaptation by citizens is high (Park, 2015) and from the Netherlands where half of the cities studied do not feel a need to increase citizen awareness, which is at a neutral level (Schans, 2017).

Overall, the sense of urgency to adapt to climate change effects is fairly high according to the interviewees. However, due to the lack of awareness or detailed understanding about climate change and adaptation, it is currently not prioritised. Results from the interviews show citizens and especially politicians are the groups for which climate adaptation is considered the least urgent. This is similar to findings by Arabadzhieva (2016), in Bulgaria that citizens and politicians are the least informed about urban climate change. As well as in China, where the politicians place less urgency on adaptation compared to mitigation (Qui, 2016). Therefore, to improve the sense of urgency and awareness in Kenya, most interviewees and policy documents state that there needs to be more civic education, media coverage, public meetings and practical demonstrations which should make the topic easier to understand (NCCRS, 2010; MENR, 2015). This is in line with findings by the European Environmental Agency (EEA, 2012), that there is a need to create more understanding about climate change. There is also a need to improve political attention to the topic (MENR, 2015). According to the interviews, the perceived political relevance of carrying out urban climate change adaptation is seen as low by the

majority of politicians. One reason for this is that politicians focus on topics that are seen as important by citizens i.e. service provision. Consequently due to the fact that climate adaptation is not being advocated for, by the citizens it is not prioritised. On the other hand, the politicians also have responsibility to educate the public and carry out adaptation measures. Thus the lack of political awareness or support can be considered a significant barrier to climate adaptation, this finding is similar to that of Arabadzhieva (2016). Hence politicians need to see how climate adaptation can also contribute to other pressing social issues which are important to citizens. Meanwhile, urban planners and designers need more training and knowledge development in how they can affect the urban climate. However, a difficulty with improving awareness about climate adaptation is that, according to the interviewees, there are currently very few urban climate adaptation professionals in Kenya. This is supported by findings of the NCCRS (2010), which state that capacity-building is important because of the few climate change specialists in the areas of science, policy, adaptation and mitigation.

Communication

Communication is a critical means to creating awareness and more understanding about urban climate adaptation. Adaptation is closely linked to other urban sectors and environmental issues (Uittenbroek et al., 2013). Therefore, effective communication is necessary to connect the different actors that need to be involved in the process of planning, designing and implementing climate adaptation measures. There are currently no specific formal guidelines that determine the use of communication within the planning, design and implementation of climate adaptation measures. Creating such guidelines are thus an opportunity to spread awareness about urban climate adaptation and support the implementation of adaptation measures in Kenya. Furthermore, citizens are considered key stakeholders who should participate in the planning process for climate adaptation. However, in order to participate meaningfully, citizens need to have awareness of urban climate adaptation issues. Thus, improving civic education, holding media campaigns about climate and integrating climate education into school programmes are part of Kenya's government plans to increase public awareness (NCCRS, 2010; MENR, 2015). The finding that education and mass media campaigns are important means to increase awareness and improve communication was also found in Bulgaria, where interviewed experts agreed unanimously on the importance (Arabadzhieva, 2016). While in China education was considered important, but targeted training was considered more effective by most interviewees (Qui, 2016). For Flanders education was also considered important as well as showing examples of problems and adaptation options (Schans, 2017). In the Netherlands it was considered the most important to show politicians that no-regret measures are a good starting point for action, while only half of the studied cities stated that education about climate phenomena and possible adaptation measures are valuable (Schans, 2017).

According to the interviewees, the government has a leading role in communicating, developing and implementing climate adaptation measures. This is in line with the findings of similar research done in China, Bulgaria and Flanders, where the municipality clearly plays a leading role and is often the main decision maker in the process of planning urban climate adaptations (Qui, 2016; Arabadzhieva, 2016; Schans, 2017). While this outcome is different to the Netherlands, where the municipality was said to play a mostly facilitatory role (Schans, 2017). However, context-fitting solutions and implementation of urban climate adaptation cannot be realized without the support of the local citizens and local businesses (Uittenbroek, 2014). Therefore, it is important that these different groups communicate with each other and are able to give input into the planning process. For Kenya, almost all the interviewees state that the communication process between the different stakeholders needs to be improved. More diverse and online communication channels are needed to enable a wider coverage

as well as allow feedback to be given through online media. Furthermore, the content of the information should not be only technical but also adapted to an average citizen's understanding.

Notably, the interviewees state that there needs to be more communication between urban climate experts and the other three groups, as they have the most knowledge on climate adaptation. A barrier to community involvement in the planning process on climate adaptation is that most information available on climate is mostly not easily accessible or relevant for non-climate experts (Moser and Dilling, 2007). This finding is similar to that of Arabadzhieva (2016) in Bulgaria. Furthermore Moser (2010) found that the largest barrier to communicating about climate its temporal and invisible characteristic. This finding is confirmed by Park (2015) who consequently proposes that visualisations of climate through images and designs, are a useful means of communicating a message and hence increasing understanding.

To sum up, there is willingness in Kenya to create more communication and education about climate change and adaptation and there is progress being made to create and support institutes that will coordinate and advise on adaptation (NCCRS, 2010; NCCAP, 2013; MENR, 2015). However, the current communication between stakeholders is seen as unclear. Furthermore, more urban climate experts are needed who can take the lead on engaging with politicians, urban planners and designers and citizens and demonstrate the need for urban climate adaptation. Finally, it is important to consider that according to Moser (2016), there is a limit to what provision of information and education can achieve in terms of supporting climate adaptation. As there is an 'attitude-behaviour gap' (Ballantyne, 2016). Therefore, education alone is not enough to support adaptation. Instead, changing both attitudes and behaviour is considered essential to increase social engagement and motivate actors to actively implement adaptation measures (Ballantyne, 2016; Moser, 2016).

4.2.2. Instruments and implementation of climate adaptation

Research sub question 1.2. What urban climate adaptation instruments and concrete implementations are used in urban planning and design?

Instruments

In Kenya, there are currently no legally binding instruments in place to implement urban climate adaptation measures according to the interviewees. This is a barrier to adaptation as large changes are needed in terms of regulation and policy to support climate change adaptation policies and the implementation of climate adaptation measures (EEA, 2012). Several interviewees mention that there are diverse instruments and policies that can potentially contribute to climate adaptation such as zoning plans, the Nairobi Master plan, integrated strategic plans for cities or towns, plot coverage regulations, solar panel requirements etc. However, these instruments are currently not used for the goal of urban climate adaptation. Similarly, some legally binding instruments can broadly be interpreted as supporting the creation of climate adaptation measures i.e. the Kenyan Constitution's chapter on environment, Forestry Act, Physical planning act (1996), Urban Areas and Cities Act (2011), the Environmental Management and Coordination or EMCA Act (2015). However, most interviewees state that these instruments only partially and incidentally contribute to climate adaptation i.e. development regulation. There are no targeted instruments for urban climate adaptation. Hence, the current legally binding instruments are described as generally "*climate blind*" by one interviewee in the Kenya Climate Change working group, as although they have the potential to address adaptation, this is currently not being considered.

From document studies the following government documents are found which relate to climate change and climate adaptation; the National Climate Response Strategy (NCCRS, 2011), the National Climate Change Action Plan (NCCAP, 2013) and the Kenya National Adaptation Plan 2015-2030 (NAP, 2016). These are not directly legally binding or enforceable in court, but can support the creation of policy and guidelines and the proposal of adaptation measures. This in turn helps Kenya to meet international obligations as agreed in the Intended Nationally Determined Contribution (INDC) in 2015 to the United Nations Framework Convention on Climate Change (UNFCCC) (MENR, 2015). However, although Kenya states in the INDC that adaptation is its priority response to climate change (MENR, 2015), the policy documents found are more detailed about mitigation than adaptation responses. This finding is also found by research done in South Korea, Bulgaria and China where there is also still more focus on mitigation than on adaptation (Park, 2015; Arabadzhieva, 2016; Qui, 2016). Moreover, Kenya's focus on climate has mainly been on disaster reduction and response as well as humanitarian action (NAP, 2016). Currently, there are more tools being developed to look at climate change in rural areas. The National Climate Change Action Plan (NCCAP, 2013) and the Kenya National Adaptation plan (NAP, 2016), are both not legally binding. However, these plans express intentions to prioritise actions that protect against climate change impacts. In addition these plans aim to, reduce emissions through the creation of a low carbon climate resilient economy, within the sectors of agriculture, livestock, water, environment, infrastructure, sustainable livelihoods, energy, infrastructure and tourism. The Climate Change Act (2016) is a recently enacted legal framework and guideline to address the consequences of climate change. It provides a regulatory framework to respond to climate change, provide measures and achieve low carbon climate development. Finally, county government approved plans are legally binding, thus if climate adaptation measures are included in approved plans they can be used to mainstream adaptation into other sectors, i.e. the CIDP (County Integrated Development Plans (CIDPs)).

To sum up, although there has been progress made towards creating policies on climate change adaptation, these documents are not legally binding and this could affect the quality of the instruments. This finding is also found in Bulgaria (Arabadzhieva, 2016). These findings contrast with those of Schans (2017), where in Flanders building regulations are used to make adaptation compulsory. While in the Netherlands legally binding instruments also exist, and are used as flexible instruments to support adaptation measures (Schans, 2017). Furthermore, a large difference is that both in the Netherlands and Flanders, subsidies were used in varying degrees, to simulate adaptation measures. While this is not an instrument that was mentioned in the interviews or was come across in Kenyan policy documents. Finally, the existing policy instruments, although not very detailed, indicate the country's ambition to work on climate change mitigation and adaptation. However, results of the interviews state the linkage between existing laws and different instruments needs to be significantly improved in terms of mainstreaming or policy coherence. As currently these do not adequately refer to each other and hence the legally binding instruments, which are considered one of the most effective tools to improve the urban climate in terms of large scale interventions (Lenzholzer, 2015) are not used to their full potential.

Implementation

The urban climate measures implemented in Kenya can be summarised as; urban vegetation, mangrove planting, preventing coastal and river flooding, maintaining drainage infrastructure, public space projects (to protect and increase the amount of mostly unbuilt green space), protection of vulnerable infrastructure against sea-level rise and the use of building materials. Urban vegetation is the most named measure which is supported by the findings by almost all similar research (Park, 2015; Qui, 2016; Schans, 2017). However, the differences are that for South Korea and China there is a focus on green roofs and green buildings, while Netherlands and Flanders adopt both general green

measures and green roofs. In Kenya, green roofs are rare and they were not mentioned by any of the interviewees as an adaptation measure. As although green roofs are a short-term no-regret adaptation measure which provide benefits in terms of reducing heat stress and storm water retention, several interviewees do not consider the measure affordable and hence not appropriate for the Kenyan context. Furthermore, according to Lenzholzer (2015), only intensive green roofs contribute to cooling and the cooling effect is mostly limited to the area above the roof, thus this is not a measure that effectively influences thermal comfort on the street level.

Notably, almost half of the interviewees could not come up with any concrete climate adaptation measures thus the awareness about these measures is relatively low. Moreover, the interviewees that did mention adaptation measures, stated that these are generally not carried out specifically for the purpose of adaptation. Instead, measures are taken for other purposes like economic gain, cleaning up the environment or because they contribute to beautification i.e. urban agriculture, cleaning drainage infrastructure and planting trees. Therefore, most of the measures that are implemented, are not specifically being done for the motive of climate adaptation, but may nevertheless be beneficial for adaptation. In addition, research by Kithiia (2011) has identified that if climate change is viewed as an extra cause of stress on different sectors, then adaptation responses can take place within the existing planning frameworks. Hence, it is valuable to view climate change not only as a stress factor on its own, but instead in terms of how it impacts different sectors or objectives i.e. water management or public spaces. Of the mentioned adaptation measures, the strengths are that even though they are not targeted at adaptation, especially the urban vegetation measures provide benefits in terms of shading and cooling down the city. Furthermore, greenery is popular in Kenya, therefore urban vegetation is a measure that citizens support and there are also citizen led-initiatives for tree planting. The pitfalls of the adaptation measures are that they are mostly limited to urban vegetation, which is not part of a comprehensive planning approach and hence often fails include large scale adaptation projects that would be suitable for larger settlements like towns or cities. In terms of conflicts with urban adaptation measures and aesthetics, no interviewees see significant conflicts, except that measures are often not implemented with aesthetics in mind. Furthermore, most interviewees think that urban vegetation enhances city aesthetics, this financing is similar in South Korea (Park, 2015).

Overall, urban climate adaptation measures are difficult to implement in Kenya as interviewees state that there is a lack of political support for these measures. This finding supports similar results in Bulgaria and China (Arabadzheva, 2016; Qui, 2016), however in China the lack of knowledge about the differences between adaptation or mitigation measures present an extra difficulty. For Kenya, interviewees state that the lack of political support is reflected in the lack of clear legal requirements and no adequate monitoring or supervision of the implementation of adaptation measures. Furthermore, technical capacity gaps complicate implementation, where both cities and environmental authorities do not have enough or adequate professionals to oversee implementation, which leads to low implementation. According to Uittenbroek et al. (2013), a mainstreaming approach could be more suitable to address adaptation in a context of diverse priorities as this approach can access political commitment more readily through pooling resources and combining different goals. Furthermore, even if there is less political will or the urgency for adaptation is low compared to other priorities as is seen in Kenya, the mainstreaming approach enables 'piggybacking' on already established political priorities (Uittenbroek et al., 2013).

A main barrier to climate adaptation is that some political actors, due to lack of awareness, consider adaptation as a beautification goal and hence do not recognize the functional value of adaptation measures. Therefore, for adaptation to be taken seriously, the focus should be firstly be on the functional benefits and secondly on the possible aesthetic value. Furthermore, according to some

interviewees, conflicts between urban adaptation measures and urban functions exist because the value of land in Kenya is seen mainly in monetary terms. Private developers have a great deal of influence over the land use of the city and in order to maximise profit, development is prioritised over climate actions or leaving land open. This outcome supports research done in South Korea and China, where conflicting interests between individuals, private property owners and the government make implementation of adaptation difficult as economic development and high value returns on land are often considered more important than environmental protection sustainability (Park, 2015; Qui, 2016). Therefore, there needs to be more awareness and critical understanding of what the value is of adaptation measures.

To sum up, although recent policies are creating more awareness about climate change impacts, the actual amount of concrete climate adaptation measures is low in Kenya. This was also found in Bulgaria, where there is a lack of implementation of adaptation measures and many chances to adapt to climate change have been missed (Arabadzhieva, 2016). While in the Netherlands and Flanders, the implementation of urban climate adaptation measures was often difficult due to conflicts with other urban functions (Schans, 2017). According to most interviewees, the implementation of adaptation measures is lacking as there is little focus on adaptation in Kenya and moreover the policies or actions that can incidentally contribute to climate adaptation are not being used to their full potential. Therefore, a targeted or dedicated approach could increase awareness about adaptation. On the other hand, a targeted approach may not be feasible due to lack of resources, many competing political priorities and the fact that climate adaptation is currently not placed high on the agenda. Furthermore, using a targeted approach could lead to missed opportunities to link adaptation with other sectors such as water management and disaster management. Hence, considering the multiple urgent priorities of the Kenyan government, mainstreaming could be a more appropriate approach to address urban adaptation in Kenya. A concrete way to mainstream climate adaptation measures in Kenya could be done by including adaptation goals into the Kenyan government's existing goals to create a low carbon climate resilient economy, water management, improving the environment and infrastructure (NCCAP, 2013; NAP, 2016). Hence, adaptation measures such as trees and open green spaces implemented in flood-prone areas in the city could be used to help make this part of the city less vulnerable to flooding by providing water catchment areas, provide an attractive green environment, absorb air pollution as well as provide thermal cooling benefits.

5. Results and Discussion case study Dandora

5.1. Results case study Dandora

Results of Focus group discussions

The results of the focus group discussions will be presented according to the conceptual model's four main concepts; namely perception, understanding, planning and managing. The data collected for these four concepts will be provided by the answers to the 12 focus group interview questions. For an overview of the relationship between the four concepts and the focus group questions, see table 5, in the methodology chapter and Annex 2). The answers to each focus group interview question is structured according to three levels; firstly an overview of the main answers to the question. Secondly a comparison between the answers of the two groups. Thirdly, an analysis of the answers with illustrative verbatim quotes to provide more detail.

Where possible the answers of the groups have been compared in a table. There are two categories in the table shown in the rows, firstly to indicate the answers that are relevant to climate change (CC) or climate adaptation (CA). Secondly, a row for other answers, to illustrate the answers that the group gave to a question that were not directly relevant to climate effects but serve as an insight to analyse the motives or interests behind the answers. The inclusion of other results also provides more details about the research that can assist in the reproduction of a similar study. Furthermore, for the analysis the tables are organized into three columns namely; answers by both groups showing the common answers of both residents groups, and two columns showing a summary of the answers of each of the two groups separately. Tables that present data about specific elements or measures chosen by the groups are visualized with the subject in the left column, and it is indicated in the other two columns whether the specific group mentioned that aspect.

5.1.1. Perception

1) What do you think about when you hear about climate change?

The Dandora residents see climate as the average weather in a place, there is agreement about this by all the 15 focus group participants. However, the concept of climate change is not clear for all the participants, as some residents see climate as something that is constant and not as something that is changing. This is because that some residents say they cannot impact the climate. On the other hand, other residents show a quite developed understanding of climate as well as climate change and its impacts on their lives.

Table 9: What Dandora residents think about climate change.

Answers relevant to CC:		
Answers by both groups	Answers by group 1	Answers by group 2
Climate is the average weather of a place	Dandora is hotter than other places in Nairobi i.e. the city centre	Climate change is change in weather that affects the planting seasons.
Crop planting has become unpredictable	CC is how chemicals affect the ozone layer and how glaciers melt, fish in ocean affected	Seasons before had more long rain or short rains, now it is unpredictable

Dandora is hotter than other places in Nairobi, as it is in the eastern area of Nairobi.		The effects of climate change are not seen but are felt in Dandora, through fewer crops and higher prices for crops, more heat, more rain and unpredictable weather patterns
Heat is felt in the street and houses		All the residents feel heat in the street, as there is more air pollution and less shade and fewer trees in Dandora.
		Climate change is how weather is changing and has changed, now it is hotter compared to the past.
		There are differences in heat compared to the past.
		Climate change is change in weather that affects the planting seasons.
Other answers:		
	We are not experts on CC but deal with garbage and the court systems	Most food is perishable and this is affected by increased heat.
		Residents are 'hand to mouth kind of people' as they work in the informal sector and cannot plant crops.

The concept of climate change is clear for group 2, but not for group 1. One resident from group 1 seems to have knowledge about the effects of climate change as *“how chemicals affect the ozone layer and how glaciers melt and how fish in the ocean are affected”*. However, the other four members of the group do not have knowledge of these effects. While the same one resident, indicates their knowledge is not deep by saying *“we are not experts on CC but deal with garbage and the court systems”*. Thus group 1 does not think that they can discuss climate change, as it is too abstract for them and they state *“how can we (human race) change natural factors i.e. rain or sun?”*. Meanwhile, all the residents in group 1 do agree that *“Dandora is hot compared to the city centre and other places in Nairobi”*. Overall, group 1 has less knowledge on climate change and has a more passive attitude compared to group 2, which is shown in their lack of interest to discuss these concepts and result in a limited response from the whole group to this question, as seen in table 9.

Group 2 has heard about climate change from *“media information i.e. the Paris agreement or newspapers, banners in the street and from the US presidential campaign, where Trump is a climate change denier”*. When asked about their opinion on Trump, one of the group 2 residents responded *“somehow he is correct, as the Chinese are careless about the environment, they build too many factories and see how the environment is reducing”*. On the other hand other residents disagreed with Trump’s idea that climate change can be denied *“We need to try reduce emissions of petrol, diesel and have clean energy”*. However the same residents, who disagreed with climate change denial, also mention that they agree with Trump in the sense that they depend on petrol as it is the only feasible option for them. *“We use petrol, it creates jobs. Petrol is easier and available, and it is the only option in Nairobi”*. Therefore, compared to group 1, Group 2 has a more developed perspective of the phenomena of climate change as well as its impacts on them. Although the link between climate change and the urban areas like Dandora was not clear to them during the beginning of the discussion *“We don’t see but feel the effects or repercussions of climate change”*. After some examples the whole group of 10 residents, showed awareness about climate related effects during the discussion, see the answers under group 2 in table 9. For example, there was a strong consensus about the link between *“changing planting seasons, less growth and higher prices for crops”*. Furthermore, the reasons the group gives for why it is *“hotter in Dandora than in the city centre”* or other areas, apart from being easterly located, is because *“there is more air pollution and no trees around Dandora”*. This shows an understanding of the link between the effects of air pollution and lack of shade both increasing the

experienced heat. Additionally, the group says that *“there is a difference in heat compared to the past, especially between 7pm and 5am”*. Hence the residents agree that *“it is hotter now than it was five years ago...because many trees from the Mau forest have been cut down as well the building of more factories and skyscrapers”*. According the group 2 residents *“temperatures can be too high in Dandora, especially during August-September and February- March, with an average of 28-33 degrees in Nairobi”*.

Compared to group 1, group 2 overall, has a more developed understanding of climate change *“how weather is changing and has changed now it is hotter (in Dandora) compared to the past”*. Thus the group recognizes that climate is not a constant state but is changing and they notice these changes.

2) What climate effects or risks affect you most in Dandora, and who is most vulnerable?

The resident's answers that directly refer to climate effects describe two effects namely that of *“heat and sun, as well as rain and flooding”*. These effects are clearly felt by most of the residents as the majority of residents in both groups mention them. However, this question appears difficult to answer, as many of the answers given by the residents (see table 10), do not relate directly to climate effects. The answers that do not directly refer to climate effects are most strongly the *“dumpsite and health hazards”*. The dumpsite is the issue that all 15 residents across the two groups state that its presence affects them the most. Furthermore, all 15 residents from both groups found that *“children”* are the most vulnerable, however, it is not sufficiently clear from the answers if the groups mean specifically to climate effects or to general health hazards such as the dumpsite and illnesses.

Table 10: Climate effects that affect residents most in Dandora.

Answers relevant to CC:		
Answers by both groups	Answers by group 1	Answers by group 2
Answers relevant to CC:	Dust	Air pollution (10 residents)
Heat and sun	Erosion	Shortage of food/ higher prices
Rain and flooding		Wind, air borne diseases i.e. TB
		Water shortage
Most vulnerable are:	Children especially those between 0-10 years	School children have a loss of concentration due to dumpsite gases and heat
Children	Phase 5 and especially phase 4 is most vulnerable to flooding and erosion as they are low-lying.	Phase 1&2 due to garbage vehicles dumping trash on the road to the dumpsite
		Phase 2, 3& 4 - as are directly adjacent to the dumpsite
		Poor families
		Women
		Whole community
Other answers:		
Health Hazards	Sickness in the community	Reduced business of open markets
Dumpsite	Smoke of the dumpsite is toxic. It travels further at night when there is more wind.	Congestion of youth
Solid waste blocking drainage systems	Water collection is not possible because the roofs are dirty and the dust would enter the water	Disease outbreaks in the community i.e. Cholera
		Development

The answers in table 10 that relate to climate change effects apart from heat and rain, are provided mainly by group 2, while group 1 names two other climate effects *“dust and erosion”*. All 10 residents in group 2, name air pollution as something that affects them strongly. Although it is noticeable that they mention *“air pollution and the dumpsite together”*. Thus, they may refer to both the air pollution caused by the dumpsite and the general air quality in Dandora. Other answers by group 2 refer to *“wind and airborne diseases, water and food shortages”*, these last two are not direct effects of climate change but are indirectly impacted by climate change. Apart from children, a minority of three residents in group 2, state that the poor families, women and whole community are the most vulnerable to climate effects. In terms of locational vulnerability both groups mention that *“phase 4 & 5 are vulnerable, according to group 1 due to their low lying location and flood risk”*. While according to a minority of residents in group 2, *“phase 4, as well as phase 2 and 3, are vulnerable due to their proximity to the dumpsite”*. While *“phase 1 and 2 are vulnerable because of garbage vehicles dumping trash in their neighbourhood on route to the dumpsite”*.

To sum up, most of the answers given to this question do not have a direct link to climate effects, which make it necessary and interesting to analyse what interests lies behind these answers. The interest behind most of the other answers for both groups concerns health, *i.e. “sickness in the community, disease outbreaks in the community, the dumpsite presence and the toxic smoke of the dumpsite”*. For example, examining answers related to climate change shows that for group 2 residents, even a specific factor of climate such as wind, is mainly relevant because of the role wind plays in the spread of *“airborne diseases i.e. T.B”*. Similarly, group 1 residents say *“the smoke from the dumpsite travels further at night, as there is more wind then”*. However, wind is only relevant for them in terms of the spreading of the toxic dumpsite smoke. Another example is that group 2 mentions *“development”* as an answer to this question, which is not directly related to climate effects. However this is explained further by a resident saying *“Development is harder as climate affects rain, sun and wind, and we are affected by climate while we are trying to do business”*. As residents are *“hand to mouth kind of people”* as they *“work in the informal sector and cannot plant crops”*. Consequently, *“if it's raining we can't look for jobs”, as most jobs are in open air markets or open air garages*. Therefore residents speak about climate change effects in terms of how it impacts their health and livelihood.

5.1.2. Understanding

3) What is climate adaptation in your view?

None of the 15 residents from the two groups had an answer to this question. It was difficult for them to answer as even though most residents showed an understanding of climate effects and climate change, they were unclear on its direct impact on an urban area. The lack of response to this question is also a significant result. Residents from both groups did not give answers this question, although the groups did describe some accurate adaptation measures that are discussed as under question 7. To prepare for the next questions, I used an analogy of football, to explain the concept of adaptation as adjusting to your opponents strategy. This simplified explanation helped residents to answer the next questions.

4) Which climate effects are the most important to adapt to in Dandora?

“Heat and sun” is the one climate effect that the majority of resident’s state is important to adapt to. This effect is not chosen unanimously; as most of the residents from both groups say that the most urgent effect to adapt to is the dumpsite. However this is not a climate related effect and too large of an issue to address in the scope of this thesis.

Table 11: Climate effects that are the most important to adapt to in Dandora.

Answers relevant to CA:		
Climate effects that need to be adapted to	Answers by group 1	Answers by group 2
Heat & Sun	X	X
Rain		X
Wind		X
Shortage of food		X
Other answers:		
Dumpsite health hazards	X	X
Recycling and waste management	X	X

The answers to this question, as shown in table 11, reflects large differences between the two groups. As group 1 does not give answers that are directly relevant to climate adaptation apart from “heat”, while group 2 mentions three other relevant climate effects. This difference is explained by the fact that the residents of group 1, do not believe that humans can influence the climate. As four of the five group 1 residents, comment on climate change that *“some things are beyond human beings i.e. drought is not manmade it is due to more sun. Something’s you can plan for, but some things are God”*. One of the five residents was the exception and stated that *“things are changing, like the chemicals being used and people try to plant trees to reduce soil erosion”*. This indicates that he understands how the changing aspects of climate apply also on a local scale. However, the remaining four residents of group 1, posed the question *“how can we (human race) change natural factors i.e. rain or sun?”*. Furthermore, the group 1 residents stated *“You can plan your life, but you cannot plan weather or climate. We found season’s already here on earth, we cannot change this”*. Therefore their answers indicate strongly that they feel that they cannot influence or hence adapt to climate effects. However, after further discussion and explanation of the fact that local effect of climate change can be adapted to, they mentioned; heat as a local climate effect that can be adapted to. As well as the non-climate related effects of the dumpsite and waste in the area.

In Group 2, the majority of the 10 residents, seven people, say that *“heat and sun”* and *“rain”* are the climate effects that are most important to adapt to. After this the climate effects of *wind and shortage of food* are considered important by a minority of group 2, three residents. For the other answers, the majority of the group states that the dumpsite is the most important to adapt to with *“proper waste management and disposal which in turn will help to have a clean and conducive atmosphere”*. This shows that group 2 overall has an understanding of the climate effects they can adapt to. However, they also have a broader interpretation of climate adaptation than what is considered adaptation in this thesis, to include actions like generally improving the environment by cleaning the area and tackling the dumpsite.

In conclusion, the answers show that knowledge about climate change varies widely between the Dandora residents. From not believing in man's role in climate change, to recognizing the link between climate change, changing planting seasons as well as local effects of heat, rain and wind.

5.1.3. Planning

5) Which one climate effect can you adapt to yourselves in Dandora?

After further discussion the majority of the Dandora residents, five from group 1 and seven from group 2, agree that *“heat”* is a climate effect that they can adapt to themselves in Dandora, as seen in table 12. Apart from heat, *“air pollution”* is mentioned together with the *“dumpsite”* as factors that are important to adapt to. This question was rather difficult to address as the residents focused mostly on non-climate effects such as the dumpsite in their answer.

Although question 5, of which climate effects residents can adapt to themselves, is similar to question 4 on which climate effect are important to adapt to in Dandora. Question 5 was nevertheless asked, as during the focus group discussions the limited response of group 1 and the diverse answers within group two, led to the conclusion that further questioning was needed to decide which one factor residents could agree on that they could address themselves.

Table 12: Climate effects Dandora can residents adapt to themselves.

Climate effects residents can adapt to	Answers by group 1	Answers by group 2
Heat& Sun	X	X
Air pollution	X	X
Answers not related to CA		
Dumpsite	X	X
Recycling		

Although, it was not possible to fully address this question with group 1 due to time constraints, however in the answers the group gave to the previous question, they indicated that heat is a climate effect they find important to adapt to. Furthermore, later in the discussion group 1 also mentions the *“dumpsite”*, as well as *“air pollution”* as an effect they can control using *“vegetation”*. Therefore, these answers have been included here. As mentioned above, this question was rather difficult to address as the groups both focused mostly on non-climate effects such as the *“dumpsite”* in discussions on adaptation. In the answers that are not directly about climate adaptation, group 2, spoke mostly about *“the dumpsite, it takes our oxygen; a lot of CO2 is exhaled from the Dumpsite. It affects us seriously, it affects our health. We need to demonstrate against it, if the dumpsite can be managed well it can be of great use”*. The overall answer in table 12 indicates that the group also sees the dumpsite as an issue that needs to be addressed. Their answers shows that addressing waste management and the dumpsite is what they also understand as an example of adaptation, however this is not related to a scientific definition of climate adaptation.

Group 2, after more discussion, mentions two climate effects that refer to climate adaptation, *“heat and air pollution”*. According to three of the five participants that were present at the beginning of the meeting, *air pollution is “most easily addressed. Can be done by unblocking sewers and planting of*

trees". Later in the discussion, seven group 2 residents, say *"Dandora is hot because there are not enough trees"*. Furthermore the residents say there is a *"health effect of heat and sun i.e. sunburns, we have adapted to the heat but we do not do anything about it"*. Therefore, heat is an issue that affects the residents as it *"affects comfort and health"*. However it is interesting to note that they say they have *"adapted to the heat"*, while not having addressed the cause. The group 2 residents unanimously agreed that they notice the heat during the night and were negatively affected. All seven residents have experienced this *"late at night it is very warm, you find yourself sleeping and sweating. I don't even use a blanket and there are many mosquitos"*. When asked to choose one factor to adapt to, the majority of group 2 agreed on heat, with the exception of one person. This resident reiterated that *"air pollution is also important"*. Therefore it was decided to focus heat but also keep in mind benefits for addressing air pollution at the same time i.e. plants that provide shading as well as absorbing pollution.

Overall, the two groups say that heat is a climate effect that they can adapt to themselves in Dandora. However, adapting to heat does not seem to be a main goal compared to managing the pollution from the dumpsite or recycling waste, which appears to be the top priority of the residents. This is because the most of the residents spoken to, are 'jua kali' (the Swahili term for people who work outdoors), or as they call themselves *"hustlers"*, hence people who work in the informal sector and need to look for work from day to day. Thus economic opportunities such as recycling have the main interest of the group. As in the group 2 mentions their main opportunities as *"future jobs from the dumpsite, factories or recycling, opportunity for changes in the future to have a good and conducive atmosphere (fresh air, good environment), more jobs in the street and reclaiming and inventing public spaces"*. Therefore the resident's answers show it is important that adaptation measures help to address health aspects and create more jobs in the street.

6) Which behavioural or physical adaptation measures are possible?

The answers that refer to physical adaptation measures are *"creating shades, planting trees and unblocking drainages"*. These are three adaptation measures that work to adapt against different climate effects mentioned by the residents i.e. heat, wind, rain and air pollution. The other answers to structural measures show that the residents do not differentiate between adaptation and mitigation. As *"using solar panels"* is mentioned as an adaptation to reduce heat, while it is mostly a mitigation action. Furthermore, the answers to the behavioural measures indicate a strong belief that *"civic education, showing by example and starting with small actions"* is the key to get the wider community involved and making the adaptation measures possible.

Table 13: Behavioural or physical adaptations that are possible in Dandora.

Answers relevant to CA		
Answers by both groups	Answers by group 1	Answers by group 2
Behavioural measures		Civic education, people need to understand what is going on. We need to inform
		Tell people it starts with you, show by example
		Start with little actions and show people they can do something themselves
Physical measures		Make shades
		Plant trees

		Unblock drainage, as a flooding adaptation
Other answers:		
Behavioural measures		We need each other to be able to deliver
		We need to act very seriously i.e. even a bottle dropped needs to be picked
		Need to separate waste into 3 dustbins, plastic, metal and green waste. Which can be recycled separately.
		Show examples and make laws i.e. no smoking
		A community law for courts would be a good place to start. It is possible to talk to landlords about this.
		Use media and other communication i.e. flyer, newspaper. These can show what is done in phase 2, one flyer can already help.
		Be aware of what you are trying to do, so people can support
Physical measures		To reduce heat -use solar panels instead of charcoal stoves. Or use the solar stove for cooking.
		Litter cleaning

The answers in table 13 show a difference between group 1 and group 2, in terms of the time that was available to discuss the questions. It was not possible to address with group 1 due to time constraints. Moreover group 1 had a more passive attitude, compared to group 2. As they were not willing to brainstorm about measures they could take themselves, but instead wanted to see examples, thus this lack of response is reflected in table 13. Hence the answers given to this question in table 13 are all given by group 2 residents. Their answers to behavioural and structural adaptation measures, which do not refer directly to climate adaptation, outnumber the climate adaptation specific answers. These non-adaptation specific answers to behavioural measures are general action points for the community, with three out of the seven measures, are centred around waste disposal i.e. *“even a bottle dropped needs to be picked, need to separate waste... and litter cleaning”*. This illustrates that the issue of waste remains central to the residents, even if the discussion is not about waste. The residents therefore seem to see a connection between a good environment, which means no litter or waste, and climate adaptation. Additionally, all the group 2 residents indicate that engaging the community is key for implementing environmental measures in general i.e. *“show examples and make laws i.e. no smoking, a community law for courts..., be aware of what you are trying to do so people can support, we need each other to be able to deliver, we need to act seriously...”*. Therefore the residents say they need the support of each other and the wider community *“to be able to deliver”*. In conclusion, it can be noted that the motives to take structural or behaviour adaptation measures, do not only come from a wish to adapt to climate change. The motives of the residents are to provide a clean physical environment as well as engage the wider community.

7) What do you already do about climate adaptation or improving the environment?

This question was asked in a broad sense to combine climate adaptation and improving the environment to make it easier to answer for the residents. As it was found in question three, the residents were unable to answer the question if it was solely focussed on climate adaptation. The answers of the Dandora residents show that the understanding of climate adaptation is not very deep. Although they mention several accurate adaptation measures such as *“unblocking trenches against rain, planting trees and flowers and greening public spaces to improve air quality, educating each other and in-house planting”*. However as seen in table 14, the residents also perceive *“waste management and recycling”* as a way to improve the environment, which does provide direct benefits

to the physical environment in terms of aesthetics and health. Nonetheless, waste management alone does not contribute to environmental sustainability or climate adaptation. This outcome, follows from the result from question 3, that the concept of climate adaptation is unclear, and moreover that the residents understand climate adaptation in the broad sense of carrying out environmental improvements.

Table 14: What residents do about climate adaptation or improving the environment.

Answers relevant to CA:		
Answers by both groups	Answers by group 1	Answers by group 2
Tree planting	Planting trees against soil erosion and dust. Trees tap the dust. The trees will attract more rain and lead to less soil erosion. The problem is that trees need people to maintain them.	Digging outdoor and unblocking trenches around the estate courts
		Planting trees and flowers and making public spaces green to provide fresh air
		Educating each other about the environment (passing on knowledge i.e. climate adaptation)
		In house planting e.g. planting food in the sacks or containers
Other answers:		
Waste disposal and recycling	Separate plastics and sell them for recycling per kg. Sell the following per kg; plastic 15 KSh, Chuma metal - 20 KSh, Aluminium 100 KSh and Carton - 5 KSh.	Cleaning streets & Volunteering
	There are higher temperatures, because of how rain is affected by burning substances. Try to prevent burning plastics by recycling.	Proper waste disposal
	Need a place for separation i.e. plastic, food items. Now they put it all in one place. Can put three different bin types, for different waste.	

As seen in table 14 group 2 gives more answers that are directly relevant to climate adaptation than group 1. Both the group's 15 residents agree unanimously that *"tree planting"* is an adaptation measure *"to provide fresh air"* and a means of environmental improvement that they already carry out. However, group 1 mentions that *"the problem is that trees need people to maintain them"*, this is therefore an issue in the current environmental actions and maintenance is an issue that needs to be considered for the implementation of adaptation measures. Group 2 has a wider understanding of adaptation measures as apart from trees, the majority of group 2 residents, seven people, also see *"unblocking trenches"* as an adaptation to flooding. While three group 2 residents, also see educating each other as a means to support adaptation measures and *"in-house planting"* as a way to adapt to food prices or shortages by *"planting food"*. However they also mention general measures for the environment, such as *"cleaning the streets and volunteering"* and *"waste disposal"*, which are not directly related to climate adaptation. Group 1, apart from trees, does not mention any climate adaptation related measures. Instead group 1 focuses on the *"separation of waste and plastics, needing a place for recycling and creating a recycling system based on three different bin types"*. On the other hand group 1 also mentions they *"try to prevent burning plastics by recycling"*, as the *"rain is affected by burning substances"*. Although this is not a measure with climate adaptation as a goal, but to earn some money from selling the trash, it does contribute to climate mitigation as it prevents the release of air pollution by burning.

In conclusion, Dandora residents give several answers of relevant climate adaptation measures i.e. *“planting trees and greening public spaces”*, but these measures do not come from a perspective of needing to address climate change, or at least not directly. As the group 2 residents say their *“priorities are to make the area look clean and plant trees”*. Additionally the group feels they need to *“replace the trees that were lost, the government cut them down 20 years ago”*, consequently the goal to plant trees is not a climate adaptation goal. Instead it is a general environmental goal for the residents, to restore the Dandora environment to how it was before the trees were cut. This is important to note as the interests of the community are driven by the need, to have as one group 2 member put it, *“a clean and conducive environment”*, or as stated in the group 2 analysis a *“good and conducive atmosphere (fresh air, good environment)”*. Moreover the group 2 residents say *“the biggest challenge for Dandora is environmental”* and *“clean ups are a priority, we do this almost every day”*. Therefore the group aims to create areas that are clean. Especially for children, as these are found by all residents, in the two groups, to be the most vulnerable to climate effects or risks in question 2. Furthermore, based on the analysis, the group 2 residents see, the *“dumpsite and health hazards”* as their main environmental weaknesses, while their environment-related threats are *“long term illness from the dumpsite and vegetables grown in the area, and sickness and diseases”*. Therefore resident priorities are to have a healthy environment. This health-driven motive is further supported by the outcome to question 2, which asked which climate effects affect the residents most, and residents referred to health in many answers. Finally, as shown in question 4, most of the residents from both groups say that the most urgent effect to adapt to is the dumpsite. Therefore, with a clean environment and health as a goals, it follows that the majority of group 2 residents mention *“cleaning streets & volunteering”* as an adaptation measure. While all the residents of both groups see *“waste disposal and recycling”* as an adaptation measure.

To sum up, it is apparent that some residents mention adaptation measures, while others do not, for both cases it is important to understand the motives behind what the residents see as adaptation measures. If the motives are understood, it is more understandable why residents would want certain adaptation measures. There are currently developments in Dandora occurring such as planting of trees and community clean ups which are not done with climate in mind, but are also beneficial from the perspective of climate adaptation.

8) What climate adaptation solutions are possible in Dandora? (Small scale and community-led)

The Dandora residents name *“planting of trees and the community-led organisation DTL (Dandora Transformation League)”* as small scale and community-led adaptation solutions. The residents say that DTL needs to sensitize the residents on the benefits of carrying out climate adaptation measures for the community, and hence engage with and support all the phases in Dandora.

Table 15: Small-scale and community-led climate adaptation solutions that are possible in Dandora.

Answers relevant to CA:		
Answers by both groups	Answers by group 1	Answers by group 2
Planting of trees	Every court and all phases should have a day when they plant trees. Leaders of the youth groups can arrange how to maintain the trees.	Planting of trees brings shade and flowers bring fresh air - for heat & rain

DTL needs to engage with all residents	DTL (Dandora Transformation League) only focuses on phase 2, does not engage with everyone. It should support all the phases.	Sensitization of residents of the benefits of living in a clean, safe & healthy environment (small-scale)
	Have a meeting with all groups that deal with environment	Building on high ground
	Phase 2 court system should be replicated	Erecting of shades - for heat, rain and wind
		Adapt to health hazards
		Adapt to heat and the shortage of food
		Community-led organisation (DTL)
Other answers:		
		Creating jobs
		Dumpsite recycling activities by individuals or businesses & proper ferrying of the garbage (enclosed lorries)
		Safety gear and health check-ups for dumpsite workers to reduce chronic illnesses (community-led)

Overall the *“planting of trees”* is mentioned as an adaptation solution by both groups in table 15. However, only a minority of residents, 3 people in group 2 and two from group 1, out of 15 residents say planting of trees is an adaptation measure. Even though all residents of both groups mention *“tree planting”* as a common answer to question 7, what they already do about climate adaptation or improving the environment. Consequently this shows that the majority of the Dandora residents from both groups do not perceive planting trees as a climate adaptation solution, while they do see it as a means to improve the general environment. This confirms the outcomes of question 7, that the adaptation measures that the group mention, do not necessarily come from the aim of climate adaptation but from other motives.

Furthermore, this outcome suggests that the concept of climate adaptation is still quite difficult for the residents to understand, as they do not see the synergies of greening actions with improving the local climate. Only three residents from group 2 are an exception to this, they mention that *“planting of trees brings shade and flowers bring fresh air and are an adaptation against heat & rain”*. Additionally a few residents in group 1, say that *“every court and all phases should have a day when they plant trees. Leaders of the youth groups can arrange how to maintain the trees”*. These residents do not explain how the trees can contribute to climate adaptation, but as stated before their motive stems from the need to improve the environment. As in question two group 1, also mentions *“trees trap the dust. The trees will attract more rain and lead to less soil erosion”*, therefore the group sees trees as a way to improve their direct environment. The second adaptation solution that is mentioned by both of the groups is, *“DTL needs to engage with all residents”*, and thus both groups see DTL as a contributor to climate adaptation solutions. Group 1 mentions that *“DTL only focuses on phase 2, does not engage with everyone”*. They state that the organisation should help residents work on the environment therefore, they feel that DTL *“should support all the phases”* and that the *“phase 2 court system should be replicated”*. This fits in with the view of the majority of group 2 residents that *“sensitization of residents of the benefits of living in a clean, safe & healthy environment”* is an adequate small-scale adaptation measure that is possible in Dandora.

To sum up, group 1, apart from trees, mentions only behavioural adaptation solutions to this question. In comparison, a few residents from group 2, apart from behavioural actions, give several concrete adaptation measures such as *“building on high ground, erecting of shades against heat, rain and wind”*. As well as more open answers such as *“adapt to heat and the shortage of food”* and *“adapt to*

health hazards". This shows that group 2 has a deeper understanding of possible physical adaptation measures compared to group 1. The other answers that do not directly refer to climate adaptation are *"creating jobs"* and *"dumpsite recycling activities by individuals or businesses"*. These answers indicate that creating job opportunities in Dandora from the dumpsite trash is an important goal. Finally the residents state that *"safety gear and health check-ups for dumpsite workers"* are a good community-led means to *"reduce chronic illnesses"*. To conclude, residents indicate that apart from physical adaptation measures, the support of the DTL organisation and sensitization of residents to diverse benefits of adaptation is important.

9) How can climate adaptation be combined with public spaces in Dandora?

According to the residents in Dandora, climate adaptation can be combined with public spaces in several ways namely, through greening public spaces with plants and trees, erecting of shading devices, creating children's playgrounds and litter-free areas.

Table 16: How can climate adaptation be combined with public spaces in Dandora.

Answers relevant to CA:		
Answers by both groups	Answers by group 1	Answers by group 2
		Through DTL, the public spaces are being greened and transformed to parks by planting trees, grass, flowers etc. This gives fresh air to the community and helps reduce the amount of carbon from the dumpsite
		Good management of public spaces will curb flooding because of well-established drainage system
		Erecting of shading devices
		Access for children to a playing ground
Other answers:		
		Good and clean area without litter

As seen in table 16, this question was not possible to be addressed with group 1 due to time constraints. The answers thus show a difference between group 1 and group 2, in terms of the time that was available as well as the fact that group 1 was less willing to brainstorm about the combination of climate adaptation measures with public space. This question was addressed more generally with group 1, within question 10, by discussing per adaptation measure whether it was suitable to be used in public space or not.

For group 2, their answers demonstrate an understanding of the potential combination of public space and climate adaptation measures. The group unanimously agrees that through the projects of DTL *"public spaces are being greened and transformed to parks by planting trees, grass, flowers etc."* They see these public space developments as beneficial for climate adaptation as *"this gives fresh air to the community and helps reduce the amount of carbon from the dumpsite"*. This shows an understanding of the role public green spaces play in providing oxygen and absorbing carbon dioxide from the air. Additionally, a minority of group 2, the three residents, seems to be aware that public spaces can help to *"curb flooding because of well-established drainage system"*. This answer refers to the fact that they think that if public spaces are well "managed" this also includes the reduction of blockages in the open street drains, which will prevent flooding due to water blockage. Furthermore group 2 was concerned that *"land grabbers grab the open spaces"*, thus there is little space to use for adaptation actions. This grabbing of land refers to the unclear "use rights" in Dandora,

as owners of land should have the ultimate say over it. However, if these owners are absentee owners other people can 'grab' control of this land. In Dandora, there is no clear responsible party for public space management as according to residents the city council does not oversee the area. Hence, unless there is a shared court system in place, see figure 6 there is no organised management of the public spaces.

While the existing spaces *"are neglected, they need management"* therefore their answers show that small-scale adaptation options are more suitable. Finally, suggestions by a minority of group 2 residents of *"erecting of shades"* and *"creating children's playgrounds"* are a practical way to adapt to several climate effects such as heat and rain. These answer shows that group 2 can considers the combination of practical adaptation measures as well as adding extra value through functions such as playgrounds. The answer that does not relate directly to climate adaptation, *"good and clean area without litter"*, is understandable from the perspective of the residents that public spaces in Dandora are currently dirty and filled with trash. Therefore, for the residents public spaces mean a good general environment which means it should be clean and healthy, hence free from litter. As addressed in question 7, the *"biggest challenge for Dandora is environmental"* according to group 2 residents, and thus even though not directly related to climate adaptation measures, *"clean-ups are a priority"*.

Overall, group 2 has different concrete ideas of how public spaces can be used to adapt to climate in Dandora. Although it varies widely within the group how diverse their understanding of climate adaptation measures is, the majority understands public space and climate adaptation to be mainly beneficial for adapting against air pollution. A minority of the residents also see the potential for public space adaptation measures, to contribute reducing risk or damages from flooding, providing shade for residents to work, rest or play under, creating clean and safe spaces where the children can play. Thus, is noteworthy that the different examples residents mention apart from being beneficial towards the climate and environment, serve multiple functions. Therefore, resident's climate adaptation measures can go in hand with providing multiple functions to the community.

10) Which adaptation measures, based on the options from Lenzholzer's (2015) catalogue, are considered suitable to be implemented within the public space of Dandora?

From the catalogue on adaptation measures in the book by Lenzholzer (2015) different adaptation options were discussed with the Dandora residents. In table 17, a selection is shown of the discussed adaptation measures, based on whether the residents mentioned that they found a measure suitable or unsuitable for implementation in public spaces. Overall the Dandora residents said the four climate adaptation measures most suitable to be implemented within the public space of Dandora are *"trees, painting roofs white or light colours, green demarcation elements i.e. fence or hedges planted with climbers and parasol or umbrella shades"*.

Table 17: Adaptation measures that are considered suitable or unsuitable to be implemented within the public space of Dandora.

Suitable adaptation measures	Considered suitable by group 1	Considered suitable group 2
Trees	X	X
Painting roofs white or light colours	X	X
Green demarcation elements i.e. fence or hedges planted with climbers	X	X
Parasol or umbrella shades	X	X

Shading material, Built shadow elements in streets	X	
Canopies or closed roof		X
Planted pergola		X
Wind plus shadow elements		X
Unsuitable adaptation measures	Considered unsuitable by group 1	Considered unsuitable by group 2
Canopies and Louvres		X
Large plants	X	X
Planted shadow elements on pergolas		X
Concrete furniture with low albedo		X
Green ponds	X	X
Wind plus shadow elements	X	
Shading structure, shadow roof	X	
Raised plant beds	X	

Due to time restrictions with group 1, 12 measures were discussed, while with group 2, 15 measures were discussed from Lenzholzer's (2015) catalogue on climate adaptation. Moreover, the answers of group 1 are less extensive compared to group 2, as they had less time and willingness to contribute. The measures discussed with group 1 were planting trees, green facades, vertical green, painting roofs white or light colours, large perennial plants, shading structures, built shadow elements in streets, raised plant beds, plants in pots, green ponds, green masts and parasols or umbrella shades (see Annex 2, FG1). The measures discussed with group 2, included the same measures, except for raised plants in pots, and including canopies and louvres, planted shadow elements, outdoor furniture with high or low albedo and wind plus shadow elements (see Annex 2, FG2). Table 9, shows an overview of the measures that residents all mentioned as well as what the two groups individually found suitable. To restrict the scope of the research results, the measures described below are limited to the four overall measures both resident groups consider best.

The measures considered not suitable were found to too expensive i.e. concrete furniture with low albedo or shadow roofs. Alternatively, measures were not considered relevant for Dandora due to difficulties for tenants to physically change the landlords property i.e. for building canopies or louvres, planted shadow elements or pergolas. However, the wind plus shadow elements were considered possible for the model street by group 2 as these are similar to the envisioned public space elements that will be placed here. Furthermore some green measures i.e. large green plants, although low cost were not found suitable for public spaces as they are considered unrealistic as they need to much water to stay alive and there is little space to place them. Similarly, green ponds are considered undesirable as the space is limited to have water elements and more important there are concerns that pests like mosquitos and frogs would breed there.

Firstly, the two groups agree unanimously that *“trees”* are a good option to implement in public space. According to group 1, *“trees are “easy to maintain in line trees. They look clean, air is fresher and atmosphere is better with more shade”* and in terms of aesthetics a *“tree line is awesome”*. Therefore trees can be used as an adaptation measure against air pollution and heat, while they contribute to making the public spaces more beautiful. Group 2 says *“trees are the best option, if they are taken care of by the community”* therefore if there is proper maintenance trees are the most suitable option for Dandora. According to group 2, *“every court can take care of a tree such as in the MSO (Mustard Seed Organisation), who have one of greenest courts and were the first to set up the taking care of*

their open space and tree's system i.e. there are rules for children to not climb trees". Hence, both groups agree that community support and maintenance is important to enable the trees to grow. Furthermore "it matters what kind of trees are put. The shorter one's under 5m are better as then the roots can't spoil the tarmac and can't spread. Best tree types are mango and avocado". Group 2 residents are very specific about the kind and height of tree that will work the best, while group 1 specifies that they prefer line trees.

Secondly, *"painting roofs white or light colours"* are considered by both groups as a suitable measure for public spaces, however it appeals to group 2 more than group 1. According to group 1, this measure is *"difficult to do individually. As every plot has its own landlord who often owns all the houses"*. Therefore, it is possible only if the landlord agrees or on public space. *"Group 1 is largely not in favour of this option as it is "too expensive"*. In contrast, group 2 residents say painting *"is an option for every scale. The cost is attractive, paint is cheap and available"*, additionally, they observe *"If people knew the benefit they would want to paint the roofs. Painting the mabati (corrugated iron sheet roofs) could work"*, During the discussion all group 2 residents, nine people, say that if the wider community was aware of the cooling benefits due to the reflection of solar radiation they would want to adopt this as an adaptation measure. Therefore there is disagreement between the two groups about the cost and feasibility of painting.

Thirdly, *"green demarcation elements i.e. fence or hedges planted with climbers"*, are considered feasible by both groups, and both groups are familiar with these elements from *"the fences near the football fields"*. According to group 1, they see *"no problems"* with implementation, however *"maintenance will be difficult as goats, who roam free during the day, will eat the green. To solve this need to put trees to fence the fence, or also fence the trees to protect them"*. Thus according to group 1, this option is feasible however, maintenance will be an issue as animals could eat the fence if left free. According to group 2, *"this option needs the support of the community, it is possible in phase 2, for other phases it is not clear if it will work"*. Therefore, group 2 believes that this measure depends on community support for success; this is strong in phase 2 due to the presence of the DTL organisation. Furthermore, in *"phase 2 many communities can talk to landlords" and "every court has volunteers"*, hence residents have the potential to make more changes to their environment.

Fourthly, *"parasol or umbrella shades"* are a suitable measure according to group 1 as, *"they add value to the street and are easy to be created"*. Simple local materials can be used to create it like *"iron sheet etc...as it needs to be strong to hold the rain"*, therefore it is a durable measure and is *"a useful option for the women selling vegetables"*. As these women or 'mama mboga' sell fruits and vegetables on the street, often without shelter from the sun and heat. Additionally, group 1 mentions *"due to the size it is not likely to be stolen"*, which is a notable point as the adaptation measures need to be suitable for the public space of a low-income neighbourhood. Thus, expensive options are not suitable, but neither are measures that stimulate thieves to use the measures for personal profit. According to group 2, some residents say shades *"are possible if it is made commercial i.e. then the women selling vegetables could invest in this or it could be combined with people who sell other items"*. However, the residents are not in agreement whether *"there is enough discipline to have it work in courts or public areas"*, as some think it is only suitable for private areas. Finally, both groups indicate that potential thieves are an issue as they say *"being movable is a good option to keep it safe, as thieves in the community is an issue"*.

In conclusion, community support is an important factor in whether adaptation measures are suitable to be implemented in public spaces. As community support influences the ability to maintain and protect the climate measures i.e. against private interest taking advantage of community green areas by grazing goats. Furthermore, *"most residents are not owners but tenants"*, hence they need

permission from landlords *“to build extra structures or to change something in the courtyard”* even for measures in the public space. According to residents *“problem with public space, is that the owner of the premise decides”*. Finally, the attractiveness of the measure to thieves is a relevant consideration for whether it is suitable to be placed in public spaces. As several options that were not considered suitable by group 2 i.e. raised plant beds and built shadow elements, because *“people would commercialise it i.e. sell it off, as there are thieves in the community. Thieves make building difficult, as you put poles in one day to protect trees or plants and they are gone the next day”*. Thus, both groups of residents agree the success implementing a measure in the public space of Dandora is also affected by whether there is an interest in removing or stealing it.

5.1.4. Managing

11) Which three adaptation measures are considered the best in terms of costs, resources and functionality?

Considering all the options discussed from Lenzholzer's (2015) catalogue on climate adaptation, the residents were asked which adaptation measures were the 3 best options and to explain why they consider these are the best. Overall, the residents mentioned *“trees and parasol or umbrella shades”* as the two best measures. Per resident group there was a different hierarchy in which measures were considered best and this is shown in table 18 below.

Table 18: Adaptation measures considered the best in terms of costs, resources and functionality.

Adaptation measures	Answers by group 1	Answers by group 2
(Fruit) Trees	X	X
Parasol or umbrella shades	X	X
Flowers in pot	X	
Green facades i.e. wall plants like creepers		X
Painting roofs white or light colours		X
Parasol or umbrella shades		X

Firstly, both groups name *“trees”* as good adaptation measure in terms of costs because, trees are *“the cheapest option”* and are suitable in all spaces according to group 2. For functionality, group 1 says *“trees are for the benefit of the community”*, thus trees provide good functionality for climate adaptation in terms of filtering air pollution, as well as providing shade and aesthetics value. However, resources are an issue *“need people to bring trees”* therefore, although this measure is feasible it requires resources or plants from outside or the purchase of seedlings. Furthermore, both groups agree that the management of trees is an issue *“as many houses are rental, so the tenants will relocate and not take care of trees”*. Thus *“trees need a group to take care of it not individuals”* says group 1. Group 2 residents add *“for trees to be in public spaces, we need community support for this”*. Therefore, community support can be considered a resource, and several community members needs to be that oversee the management of trees in a neighbourhood, otherwise they may be neglected. Finally, according to group 1 the trees *“should not all be the same type of tree, as of 15 of the same type planted previously only 4 managed to survive”*. They say *“Marubaini (Neem tree) is a good tree as it has medicinal properties”*

Secondly, Parasol or umbrella shades are considered a good option by group 1, in terms of costs. As they are *“affordable”* and affordability is an important criterion to make measures feasible in a low-income neighbourhood like Dandora. In term of resources, shades can be made from local materials such as corrugated iron, thus cost can be kept low and the resources are not hard to find. Furthermore, group 1 states that shades *“can be used for individual shading”* which makes the measure flexible in terms of functionality as it can provide shade for different groups or individuals. Group 2, is divided on whether shades are a good option as some say it provides added value and it can be used for commercial use such as for the women selling vegetables in the street. Furthermore there is disagreement about if this measure is suitable for public space, as some say it is only possible on the private level. Consequently, the two groups disagree on whether the functionality of a shade would need to be fixed or movable. Group 1 says, shades need to be *“strong to hold the rain”* and thus durable and fixed to one area, this is beneficial as *“due to the size it is not likely to be stolen”*. However, group 2 says that shades that are *“movable”* are suitable as this enables them to be used for private or commercial goals and protect it from being stolen.

Apart from these two common measures, group 1 also selected *“flowers in pots”* as a suitable measure as it is *“portable and plastic pots are inexpensive”*. Moreover, *“sack gardening (growing vegetables) is possible in the pots”*. Thus, the measure is attractive in terms of costs and functionality. However, one group 1 resident who used to have this at home says it is *“hard to maintain”*, but *“if organised in courts, it is possible combined with trees”*. Hence this measure is considered as a complementary public space adaptation measure to having trees.

Group 2, as seen in table 18, selects two other measures apart from tree and shades. Firstly, green facades i.e. wall plants like creepers are suitable because *“creepers are workable, phase 4 already has some”* and *“a phase one court also has it”*. Hence this is a measure that already exists in some parts of Dandora it is attractive due to low costs as the creepers can be grown by the residents. Residents have already seen that it can work, thus they think the creepers *“should be possible on all levels from public to private space, possibly also for schools”*. Therefore, creepers are attractive in terms of functionality as they are appropriate to be used in many places. Furthermore, the residents say that places with this measures are *“cool there”* in terms of temperature, therefore creepers are an effective means to reduce the effect of heat. However, this measure is *“difficult as there is no ownership by most residents, there are often no permanent residents living in houses”*. Most group 2 residents like the idea but they mention that especially the older residents will not want it, as they will *“think the people who put creepers want to destroy the house”*. Furthermore, in terms of functionality some residents worry that *“it can bring a lot of snakes”*, while others say *“snakes are not the problem, but the idea (of attracting snakes) about it is the problem”*. Hence the creepers *“must not grow too high, maintain it to below a window”*. Overall this measure has quite mixed reactions in terms of functionality, due to problems with perception and maintenance.

Secondly, painting roofs white or light colours, is mentioned by group 2 as *“good option for every scale as it is cheap”*. Thus, this measure is attractive in terms of costs and functionality as it can be used in all spaces, provided there is agreement from the landlords and the community. However, as mentioned in question 10, the group says Dandora residents are not yet aware of the cooling properties. Therefore, this measure itself is functional but its value must be communicated to the residents for its implementation. This could mean that the resources that are needed to make this measure work, apart from the costs of the paint, are community awareness and willingness to let roofs be painted.

In conclusion, in terms of costs, resources and functionality the best overall measure is trees. As trees are not very costly and are functional and effective for providing climate adaptation to diverse climate

effects such as rain, air pollution and specifically to heat by providing shade and cooling the air by evapotranspiration. Secondly, parasol or umbrella shades are a best measure, as they are functional in adapting to heat or rain as well as providing extra value of providing commercial spaces that people selling goods can use to protect their goods i.e. the women selling vegetables. Shades are cost-effective as they can be made from local material and hence the resources required are also available in the community. Finally, the functionality or maintenance can be an issue, this depends on what types of shades, metal or fabric, are made and who will have responsibility for managing them. For all the measures to be implemented, the community would need to support the measure and certain people i.e. the youth groups from DTL, would need to oversee the maintenance. Which measure would be the best as a third option is difficult to determine as the two resident groups do not agree on the functionality of the creepers or the feasibility and costs of painting roofs white or light colours.

12) What criteria makes climate adaptation measures work in Dandora?

The Dandora residents name three common criteria that affect the implementation and functioning of adaptation measures. These criteria were partially mentioned by residents during the evaluations of the different adaptation measures and asked as a specific final question. Based on the answers the residents gave, a ranking has been made of the most important overall criteria as well an overview of the answers of the two groups, in table 19 below. The answers to this question are concise as the discussion was limited by the time the residents could be present.

Table 19: Criteria for making climate adaptation measures work in Dandora.

Answers by both groups	Answers by group 1	Answers by group 2
1. Affordability/ cost	1. Affordability	1. Options for public & private areas
2. Easy to maintain	2. Provides benefit to the community	2. Easy to maintain
3. Measure or benefits of measure should be visible	3. Good/ easy management	3. Low-cost
	4. Sensitisation for community	4. Visible
	5. Examples that are easy to replicate	5. Multiple functions

This question was not possible to be addressed specifically with group 1 due to time constraints, however in the answers to question 10 and in their final comments, the group mentioned several relevant criteria which have been included in table 1.

Firstly, the most important criteria is the affordability of the measure, as low-cost solutions are the most suitable to be done by the residents themselves in a low-income neighbourhood. Secondly, the ease of maintenance of a measure is important as the residents need to perform these themselves. Group 2 says *“behavioural adaptation such as private (adaptation) options as well as community support, is hard for us now”*. The only people who currently work on public space and greening Dandora are the volunteers from the youth groups, *“volunteers maintain, so working depends on volunteers”*. Thus implementing adaptation measures depends on the volunteers from youth groups being able and willing to carry them out. Therefore, it is important that maintenance is not time consuming and simple, as group 2 says *“it needs to be easy to maintain i.e. trees, painting, and vertical green. Pruning plants is easy, 20 minutes work”*. Finally group 1 mentions that they want to see climate adaptation measures *“examples that easy to replicate”*, this means that the measures should also be simple and easy to carry out. The third criteria, is that measures benefits of measure

should be visible and hence the benefits should be clear i.e. group one says trees *“provides benefit to community, i.e. fruit trees whose fruits can be sold”*. Additionally group 2 says measures should be *“visible i.e. so people see tree grow and see benefits later”*. This visibility and the fact that the (multiple) benefits of the measure are clear can help to convince landlords and the community members to support or enable the measure.

Apart from the 3 common criteria, group 1 mentions that they *“need sensitisation for community”* about the environment. As *“some people are ignorant and put garbage in one place, they don’t know the nuisance of build-up”*. Finally they say for Kenya in general, the *“local literacy on environment needs to be improved, as there is no program on Kenyan TV about environment”* as one of the group watches *“National Geographic”* but says no such environmental content is stimulated on local television.

Finally group 2 states that *“adaptation options should be possible for public and private area*. Thus it is useful for the measures to be suitable to be placed in both the public, private and semi-public spaces as this increases options for implementing the different measures, as well as increases awareness due to more visibility.

5.2. Discussion case study Dandora

This discussion chapter on the case study Dandora will be structured along the sub-research questions of the second research question. The sub-research questions will be answered and discussed in the context to the conceptual model on mainstreaming climate adaptation and other literature on the topic. The discussion on of results of the focus group sessions describes the overall answers of the Dandora residents.

5.2.1. Perception

Research sub-question 2.1. What is the local perception of climate change?

The Dandora residents perception of climate change varies between the Dandora residents. The majority of residents appear to be aware of climate change and the effects of climate change. While a minority of residents, do not believe the climate is changing noticeably or that they can affect it. According to the authors of the climate adaptation mainstreaming model, is important to investigate the perceptions actors have concerning climate adaptation (Uittenbroek et al., 2013). The difference in perception between residents towards climate change was reflected in the quantity and quality of responses to the focus group questions. Furthermore, it was observed that the perceptions the residents had of climate change and climate adaptation influenced their willingness to discuss potential climate adaptation measures. This result is in line with the conclusion of Uittenbroek et al. (2013), that perceptions of actors can be either barriers or opportunities for mainstreaming climate adaptation. As a minority of the residents do not believe that they can influence the natural climate or climate factors, i.e. rain or sun, thus were not motivated to discuss about potential measures. While most of the residents, are aware of climate change and feel the need to react to climate effects, thus were actively interested to discuss and explore the measures they could carry out themselves.

Overall the Dandora residents perception and awareness of climate change is low to medium. This is in line with the research done by the Heinrich Böll Foundation (2010), who found that in Kenya the

awareness of climate change is low throughout the country. Generally, the knowledge of the Dandora residents is limited to the more easily visible climate related consequences, i.e. the changing planting seasons in the rural areas. However, this finding is in contrast to the outcome of the Heinrich Böll Foundation (2010), who states that especially rural citizens are unaware of climate change. Although only a small sample of residents were spoken to in Dandora, the majority of them stated that climate change effects are very clear in rural areas. Furthermore, even though the residents are not rural dwellers, there is a very strong rural-urban link in Kenya (Interview 5). Most urban residents have families who farm in rural areas, the urban dwellers support people in the rural areas financially, while the rural areas provide food in return (Interview 5). The Dandora residents, most of whom have families who farm in rural areas, state that their families notice climate effects due to the changing planting seasons. Hence, for Kenya the awareness of climate change and adaptation strategies is linked to both the rural and urban situation i.e. if rural harvests fail the urban relatives will notice (Interview 5). Moreover, Moser and Stein (2011), state that politicians and government agencies still view climate change as mostly a rural issue. This is reflected in the fact that the Kenyan government's climate action efforts are largely concentrated on rural areas (NAP, 2016; Interview 5&11).

In urban areas, Dandora residents find it difficult to conceptualize climate change effects. This finding is supported by research by Moser and Stein (2011), who found that in Kenya there is a general lack of understanding how urban areas are impacted by climate change, which is also stated in Interview 5. However, after further questioning and discussion, some residents showed accurate knowledge of some climate change impacts in urban areas like Dandora. Generally, the Dandora residents stated that they are most affected by the climate effects of heat and rain. The heat effect is felt by all the residents. However, there is disagreement about whether the heat effect is present only because of the eastern location of Dandora in Nairobi, or as a result of environmental degradation such as the cutting of trees and air pollution. Although some climate impacts mentioned for Dandora are relevant to climate change, the majority of the residents answers are more concerned with general environmental management than with climate change. These non-climate specific answers indicate that the residents perception of climate effects is overly broad, and erroneously includes general environmental hazards i.e. the dumpsite which are not related to climate change. This outcome supports the finding of a study on climate change awareness in Kenya, where the average citizen could not differentiate between climate change impacts and problems caused by other factors such as local environmental degradation (Heinrich Böll Foundation, 2010). Consequently, the fact that all the Dandora residents mention the dumpsite as a climate-related factor, indicates that they do not have an accurate interpretation of climate change.

Nonetheless, the non-climate related answers provide a valuable insight into the reasons behind the answers given by the residents. For example, the motive behind residents selecting the dumpsite and health hazards as the climate effects that affect them the most, is a health-driven motive. The issue of health clearly comes out of the focus group discussions as an important issue for the residents. Health is stated numerous times as a factor that affects them the most i.e. due to disease outbreaks and sickness in the community. This confirms the studies of Satterthwaite (2008), Moser et al. (2010) and Kithiia (2011), that although health is already an urgent issue, is made even more urgent to address for the poorer urban populations as they are already more exposed to unequally distributed urban environmental health hazards. Furthermore, these existing hazards will be exacerbated by climate change i.e. air pollution and the urban heat island (WHO, 2003; Moser et al, 2010). Additionally, in Kenya the public health sector is found to be under resourced and overstretched to meet demand (Heinrich Böll Foundation, 2010). Consequently, health is named one of the main climate sensitive sectors by the Government of Kenya (2015) and addressing healthcare is one of the Government's top priorities (Mensah, 2014).

To sum up, the Dandora residents responses to how climate change affects them, indicate that they perceive climate effects through a health perspective. Therefore, the climate effects they mention such as heat, wind and rain are evaluated according to how they affect their health. For example, according to the residents; heat causes sunburns and affects their health and comfort, wind affects the spread of the toxic smoke and airborne diseases such as Tuberculosis. Rain affects them negatively as it can cause flooding and prevent them from looking for jobs or doing business in the open-air markets or garages. Therefore, climate effects are not perceived as standalone phenomena, but are linked to how they impact the livelihood and health of the residents. Identifying the perceptions of Dandora residents towards climate change, is important to be able to discuss and address how climate change impacts can contribute to realizing community priorities. Hence, the relevance of climate adaptation measures can be made clear to residents in terms of the added value adaptation measures can also provide to the community and their health. Therefore, synergies that are possible for mainstreaming climate adaptation should relate to the resident priorities.

5.2.2. Understanding

Research sub-question 2.2. What is the local understanding of climate adaptation?

The residents understanding of climate adaptation is limited in depth and overly broad in scope. As although some residents can come up with climate adaptation options, these measures do not come from the motive of climate adaptation, but from the goal for general environmental improvements or a reduction of health hazards. This was also found by the Heinrich Böll Foundation (2010) and Kithiia (2011). The residents all mention both heat and the dumpsite as two main factors to adapt to. In addition, apart from accurately mentioned climate-related factors, residents also mention unrelated measures such as recycling and waste management as part of the concept “climate adaptation”. Hence, although some residents appear to have some understanding of what climate adaptation is, this interpretation of adaptation is too broad to be very accurate as there is a poor distinction between understanding the concepts “environment” and “climate”. According to Moser and Stein (2011) politicians and government agencies in Kenya still view climate change as broadly an environmental issue. Therefore, this could lead to this perception being spread to and accepted by the local residents as well.

Overall, the focus group discussions show that the understanding of climate adaptation is not clear, as none of the 15 residents were able to answer what climate adaptation meant. Hence the lack of response to focus group interview question 3, what is climate adaptation in your view, is a clear result. It illustrates that the concept of climate adaptation is not well-understood by the Dandora residents spoken to. Residents were unable or unwilling to answer this question. However, reflecting critically on this result, it could also be the case that the residents did have an answer but did not want to give it for diverse reasons such as being concerned about being wrong or being too shy to speak up. Most of the Dandora residents are aware of climate change, however not all residents believe the climate is changing or that they can hence react to it through adaptation. This is supported by the findings of Pelham (2009) who found that according to an opinion poll on global warming, 44% of Kenyans, had no knowledge of climate change and its effects. Hence, for a minority of residents, the depth of understanding of climate adaptation is very limited as direct cause and effect relationships cannot be drawn. These findings support the results of the 2007-2008 Gallup worldwide opinion poll, which found that although 56% of Kenyans had some knowledge of climate change and global warming, most citizens however, could not explain the cause of the increase in temperature (Pelham, 2009).

On the other hand, the majority of the Dandora residents' answers appear to mainly contrast with the same results of Pelham (2009), that citizens cannot explain the increase in temperatures. As most residents are aware that it has become hotter in Dandora than it was in the past and state that it has

become hotter over the last five years. Furthermore, all residents agree that it is hotter in Dandora than in other areas of Nairobi. Although a few residents do not see an explanation for the increased heat beyond the eastern location of Dandora, most residents attribute the increased heat to changes in the local environment. Such as the trees were cut 20 years ago and not replaced and the fact that there is more air pollution in Dandora. Thus from the answers it seems that most residents, although they lack the terminology, notice the effect of the urban heat island and more specifically the fact that a city can contain heat archipelagos (Lenzholzer, 2015). In which industrial or built up areas with little space for vegetation, like Dandora, can be even warmer than a densely built city with more parks and greenery like Nairobi. The conclusion that temperature in Nairobi has been increasing is supported by Ongoma et al. (2013). The higher temperatures are caused by increased emissions, urban surface sealing as well as increased waste collection and storage, the decomposition of which generates heat (Ongoma et al., 2013). Therefore, the local effect of the Nairobi dumpsite located within Dandora, could influence Dandora's microclimate. This is confirmed by Kithiia (2011) who states that the heat released from waste collected in dumpsites is one of the documented influences on the urban microclimate.

When critically evaluating the focus group results, it is difficult to determine whether Dandora residents actually see a link between air pollution and climate change i.e. increases in heat or extreme weather, as they do not explicitly mention this. As some residents say that the Chinese are careless about the environment, which leads to environmental degradation. Which seems to indicate an understanding of the consequences of air pollution and human actions on climate. However, residents do not mention the link between these actions by the Chinese to specific climate effects such as an increase in temperature, and neither do they mention how to adapt or respond to deal with the careless use of the environment. Furthermore, some residents say citizens need to reduce fuel emissions and use clean energy, which also seems to indicate that they recognize the need to reduce air pollution. However, again the residents do not mention this explicitly. Therefore, reflecting on these results, it is possible that in contrast to the findings of Pelham's (2009) opinion poll, more in-depth knowledge on climate effects could be present among some Kenyan citizens. Yet residents were limited in their ability to explain the relationship between human actions and climate change further. This could be due to a lack of knowledge of the terminology i.e. the urban heat Island. Or conversely, residents could have been using information about climate they have heard in the media to make it appear like they were informed about the topic, without actually having an in-depth understanding. Based on the results found there is not enough information to draw a definitive conclusion about this.

In conclusion, the local understanding of climate adaptation varies between the Dandora residents. A minority of residents does not believe the climate is changing or that man can influence climate change, and thus does not think climate adaptation is possible. While the majority of the residents, recognize the link between climate change, changing planting seasons as well as see the local effects of heat, rain and wind as factors that can be adapted to. Overall, most residents have some understanding of climate change impacts and many residents feel the urgency to adapt to some existing urban climate effects. However, the residents currently see climate hazards and environmental hazards both as climate factors to adapt to, thus although some understanding of climate adaptation is present it seems to be only on a basic level and overly broad in its scope. Moreover, the depth of the residents understanding of climate change and adaptation is difficult to evaluate within this study, as more follow up questions would need to be asked to investigate this. Nonetheless, although evidence of aims for climate-adaptation specific measures is lacking in Dandora, it can be stated that there are possible synergies with other priorities of residents that can lead to climate adaptation taking place i.e. adapting to heat. Finally, it was relevant to explore how the residents understood climate adaptation and to what climate affects residents found it important to

adapt to, in order to lay the foundation to discuss which concrete climate adaptations are considered relevant by the citizens in the following questions. Hence to investigate the mainstreaming of adaptation goals with existing sectoral or community goals for Dandora (Uittenbroek et al., 2013).

5.2.3. Planning

Research sub-question 2.3. What urban climate adaptation measures are feasible to be mainstreamed into the public space development in low-income neighbourhoods?

According to Uittenbroek et al. (2013), other objectives in the policy process can result in both hindrances or opportunities for adaptation. For example, in terms of adaptation to climate affects all the residents focused mainly on the dumpsite and health hazards as urgent issues that should be dealt with. This led to difficulties in discussing about climate adaptation measures, as this is not directly-related to climate, and the dumpsite is not an issue that can be dealt with within the scope of what the residents can do themselves. However, there were clear differences between the residents in whether their objectives for environmental management were broad enough to be combined with climate adaptation. A part of the residents only focused on the dumpsite, recycling and cleaning the streets. While other residents, have broader goals to focus on a healthy environment in general by creating a clean environment, engaging the community and creating green public spaces to provide fresh air and places to play for children. Thus, the narrow objectives of some residents form a barrier to climate adaptation as they are difficult to combine with climate adaptation related measures, while the broader goals of other residents, provide more opportunities for finding synthesis between community goals and climate adaptation goals.

Overall the Dandora residents identified two climate factors that they could adapt to themselves namely, heat and air pollution. The majority of the residents agreed on heat as the most important factor to adapt to, however this was not unanimous. Thus, it was decided to focus on urban climate adaptation measures that address heat and where possible also have a positive on air pollution i.e. trees provide shading as well as filter air pollution. Some residents stated that climate effect of heat and sun affects their health, as it influences their comfort and health i.e. sunburns. The residents experience of heat stress is supported by the findings of Ongoma et al. (2013) that there is an increase in minimum and maximum temperatures in Nairobi. While the WHO (2003) confirms that increasing temperatures are harmful to human comfort and health. Additionally, all the residents notice that it is hotter in Dandora than other areas and furthermore several residents stated strongly that they notice the heat especially during night and were negatively affected. This effect of warm nights and heat stress is caused by the urban heat island effect (UNFCCC, 2007; Lenzholzer, 2015).

Apart from heat, all residents continue to mention the dumpsite as a factor to adapt to. Even though this is not a climate factor, it seems to be a priority to deal with this more than heat, as all the residents state strongly that the dumpsite affects their health seriously i.e. through air pollution from garbage tracks passing through the area and the toxic gases that the dumpsite emits. Moreover, all the residents link adapting to the dumpsite, thus reducing health hazards, with economic opportunities gained from recycling. Several residents say that if the dumpsite is well managed it can be of economic value to them i.e. setting up recycling businesses to create jobs. Therefore, the residents view adaptation as both managing the negative effects of the dumpsite such as pollution and health hazards, while at the same time trying to benefit economically from its management. This perspective, although not-adaptation driven, relates to the climate-proofing approach, where adaptation measures are not only driven by fear of the negative effects of climate change but also by the opportunities for societal and institutional innovations (Kabat et al., 2005). The priority for Dandora residents to find

work is a very relevant point to note within low-income neighbourhoods. As many residents call themselves “hustlers” and hence need to look for jobs on a day to day basis. Hence, the residents answers to adaptation options indicate that, apart from addressing health hazards, it is important for them that adaptation measures help to create more jobs in the street. This finding links to research of Moser et al. (2010) that urban climate adaptation measures should also consider diverse aspects of vulnerability in the community they are planned for. Hence for Dandora, a low-income neighbourhood, the reality of poverty should be taken into account in the consequent choice of adaptation strategies.

Climate adaptation can take place through behavioural or physical adaptation measures (UNFCCC, 2007; European Commission, 2016). Some residents were not willing to address questions of how they could carry out behavioural or physical adaptation options, while the majority of the residents mentioned a broad range of measures. The behavioural adaptation measures mentioned were civic education, demonstrating examples as well as residents giving guidance and support to others for implementing adaptation measures. The physical adaptation measures mentioned were making shades, planting trees and unblocking drainages. Again, residents mention both accurate climate adaptation measures as well as inaccurate interpretations of climate adaptation measures. The inaccurate answers show that the residents do not differentiate between adaptation or mitigation. For example, using solar stoves are mentioned as an adaptation to reduce heat, while it is mostly a mitigation action. This finding confirms the outcome of the 2009 Gallup opinion poll, that although 56% of Kenyans are aware of climate change, many however, cannot differentiate between issues like adaptation and mitigation (Pelham, 2009). Furthermore, according to the Heinrich Böll Foundation (2010) the same outcome was found in 2010 during the consultative workshops in the preparation of the Kenya NCCRS (National Climate Change Response Strategy). Overall, residents state that in order for physical and behavioural adaptation measures to be possible in Dandora, the community leaders and youth groups present i.e. the DTL organisation, need to support civic education of residents about climate adaptation. Furthermore, it is important that these resident advocates for climate adaptation start with small manageable adaptation actions themselves, to show by example and illustrate that other residents can also implement similar adaptation measures themselves.

Regarding the residents current concrete actions for climate adaptation, tree planting and vegetation are mentioned as a means of climate adaptation. Vegetation is found to be an effective means of climate adaptation through infiltration of storm water, reducing heat stress via evapotranspiration and mitigation through absorption of air pollution (Ongoma et al., 2013; Lenzholzer, 2015; WHO, 2016). Residents say that, trees help to trap dust and prevent soil erosion, furthermore they will attract rain. This answer shows, that although an accurate climate adaptation measure is mentioned, the reasoning for implementing it is not for climate adaptation but for its effect on their direct physical environment i.e. reducing dust. Similarly, other residents state that they want to plant trees and flowers to make the public spaces green and provide fresh air, thus aim to improve the neighbourhood environment. Furthermore, it is notable that many Dandora residents say they have “*adapted to the heat, but do not do anything about it*”, this indicates that the residents have adapted or adjusted in terms of their individual coping capacity, but have not taken any targeted action against the effect of heat in the physical environment. Therefore, although residents say they plant trees for shade and in order to improve the environment, they do so from a motive of comfort and health, not with the motive of climate adaptation. Consequently, although the Dandora residents generally mention vegetation as an adaptation measure, specific climate effects that are addressed by vegetation are not mentioned. Nonetheless, even if the main goal for planting trees or implementing vegetation is not climate adaptation, these actions are still beneficial for climate adaptation.

Adaptation measures can be effectively implemented on a small scale, i.e. in public spaces, together with or by local stakeholders (Kithiia, 2011; UN-Habitat, 2014a; Climate proof cities, 2014). Residents

state that climate adaptation measures can be implemented within the public spaces in Dandora through greening public spaces, good management of public spaces to curb flooding, erecting of shading devices, creating children's playgrounds and litter-free areas. These are effective measures to adapt to several climate effects such as heat and rain. The majority of residents seem to understand the value of combining public green spaces with adaptation measures and furthermore, advise that to be successful, adaptation measures should be "small-scale and not take a lot of space". In addition, the adaptation measures residents prefer, apart from being useful for climate adaptation, serve multiple functions. Hence, it is apparent that for resident's climate adaptation measures can and should go in hand with providing multiple functions to the community. Community support is also identified an important factor in influencing whether adaptation measures are suitable to be implemented at all and especially in the public spaces. This outcome is also found by Moser et al. (2010), who says that climate adaptation measures must be embedded in the local knowledge and centred on participation of community members to be sustainable.

The urban climate adaptation measures that are considered most suitable for Dandora from Lenzholzer's (2015) catalogue are trees, painting roofs white or light colours, green demarcation elements i.e. fence or hedges planted with climbers and parasol or umbrella shades. The residents identify two most preferred adaptation measures, namely trees and shading devices. However, it is important to notice, that many adaptation measures mentioned by residents i.e. trees, although accurate, come from different priorities or goals other than for climate adaptation. Therefore, it is important for the residents to see how climate adaptation measures can complement existing goals that the community has, as this will enable community support for these measures to widen. This is supported by the findings of Uittenbroek et al. (2013), who state that if there are several objectives present, the focus of adaptation should be on a performance perspective, rather than conformance. This is because a performance approach to mainstreaming is more dynamic and it enables actors to find adaptation solutions that fit the context as it seeks to find synergies between adaptation goals and the existing sectoral goals (Uittenbroek et al., 2013). This idea of fitting to the context, is essential for Dandora, as there are multiple strong community priorities i.e. health, job opportunities a clean environment and waste management which are affected by climate change but are not necessarily recognized as such. Therefore, due to multiple priorities, an approach that combines adaptation with community needs is more feasible than a dedicated adaptation approach or a climate-proof performance approach with adaptation as a main priority (Uittenbroek et al., 2013).

It can be summed up that in Dandora several community priorities and actions are carried out to improve the environment. Although these actions are not carried out for the goal of climate adaptation, they are nevertheless beneficial from a climate perspective i.e. planting trees, unblocking trenches, greening public spaces and educating residents about the environment. This outcome is similar to the outcome in a Dutch case study of Uittenbroek et al. (2013), where although a municipality pro-actively addressed flooding caused by climate change, they did not label it as 'climate adaptation'. Instead, flood proofing was done from the goal of supporting sustainable development by reducing the risk of water problems. According to Uittenbroek et al. (2013), mainstreaming aims to addresses multiple objectives within one policy process or plan. Therefore the community actions taking place i.e. greening the environment, present synergies to link climate adaptation to other objectives in Dandora through mainstreaming. There is already broad support from the community to address issues such as heat stress, health, waste management and job opportunities. Therefore, for Dandora approaching adaptation measures purely from an adaptation perspective, is less useful, as opposed to linking or mainstreaming it to other community interests.

5.2.4. Managing

Research sub-question 2.4. What are criteria, in terms of costs, resources & functionality, for maintaining climate adaptation measures in low-income neighbourhoods?

The concept of managing was the most difficult to address as it was challenging for residents to discuss this in detail, without having the experience of carrying out different adaptation options. However, it was possible to discuss the theoretical criteria for the adaptation measures, based on the adaptation measures from Lenzholzer's (2015) catalogue. According to the residents, the criteria that affect the implementation of adaptation measures in Dandora are suitability, affordability and value for the community. Suitability was mentioned in terms of the appropriateness of a measure for Dandora, hence the maintenance requirements should be simple as volunteers that will carry this out have limited time and resources available. Affordability is very important issue as only low-cost options are feasible. Finally, the value for the community is considered essential in terms of the functionality of a measure, as residents evaluate the use of an adaptation measure in terms of how it can also contribute to their community priorities such as health and livelihood. Thus, adaptation measures that apart from reducing vulnerability to climate factors, also provide other functions or benefits are more useful and hence attractive to the residents i.e. fruit trees for their shade and food value. In addition to these main criteria, community support as well as the permission of landlords are also seen to be key factors in whether adaptation options are feasible in Dandora. Furthermore, for measures to be suitable for implementation in public spaces, they need to be protected from theft or be unattractive to be monopolised for individual gain i.e. feeding livestock. Theft is a serious barrier to implementation according to residents and furthermore, this is also a relevant consideration for the implementation and maintenance of climate adaptation measures in similar low-income neighbourhoods (Moser et al. , 2010).

The two best measures for climate adaptation in Dandora from Lenzholzer's catalogue (2015), in terms of costs, resources and functionality, are trees and parasol or umbrella shades. Firstly, trees are considered the best in terms of costs as they are the cheapest option and relatively little resources i.e. water are needed to maintain them. Furthermore, although there are some resources and volunteers needed to maintain and protect the trees, residents say unanimously that trees are worth the investment as they also provide benefits for the whole community. Finally, trees are considered valuable as they provide benefits to the whole community and can also provide added value if fruit trees are selected, i.e. provide food or a small source of income from selling the fruit. However, the main issue with implementing trees is the difficulty of maintenance, as trees need dedicated people to look after them for a long period of time and hence volunteers and community support are requirements for this measure. Therefore, community support can be considered as resource that is needed to implement and maintain adaptation measures. Furthermore, although notably the amount of water needed is not mentioned by residents, unstable water supply could contribute to making maintenance more difficult. Secondly, parasol or umbrella shades are considered good option according to several residents, however this is not unanimous due to potential problems with theft. Parasol or umbrella shades are considered a good measure for climate adaptation as they are affordable and can be made from local resources, which increases the feasibility of the measure significantly in a low-income neighbourhood. The residents are divided on whether this measure should be used for private or commercial use. Depending on where the measure will be placed it would need to either be more flexible for private use and more strong and fixed for commercial or public use.

The majority of the other adaptation measures that are considered the most suitable for Dandora relate to vegetation. The popularity and effectiveness of vegetation i.e. trees or green spaces as climate adaptation measures is supported by diverse research on ecosystem-based adaptation, which

find that the concept is gaining popularity and advocates from national to international levels (Mesah 2014; UN-Habitat, 2014b; Mburia, 2015, Wamsler, 2015 Brink et al., 2016). Furthermore, a meteorology study of increasing temperatures in Nairobi, recommends the use of vegetation and green spaces as a climate adaptation response to the urban heat island effect (Ongoma et al., 2013). According to Kithiia and Lyth (2011), implementing urban green spaces has a great potential for contributing to both climate change mitigation and adaptation. This is true for cities around the world, but especially for cities in low-income countries. However, the potential and value of vegetation as an adaptation measure is not well exploited or applied in Africa (Mensah, 2014). This is also stated in Interview 7, by an interviewee working on cities and climate change that “there is a missed opportunity ecosystem services are not very well regarded”. Nonetheless, ecosystem-based adaptation is considered to be a suitable, affordable and efficient strategy for climate adaptation in the African region (Mensah, 2014). Ecosystem-based adaptation (EbA), is based on the principles of biodiversity and ecosystem services and uses these elements as part of an overall adaptation measure, with the aim of helping people cope with the harmful effects of climate change (Brink et al., 2016). The added value of green spaces and ecosystem-based adaptation, lies in the fact that apart from proving climate adaptation responses, they provide a range of other benefits to society (Kithiia and Lyth, 2011). Such as improving urban air quality, biodiversity, aesthetic value as well as social recreation sites (UN-Habitat, 2014b; Mensah, 2014). Therefore, ecosystem-based adaptation and green adaptation measures are considered highly suitable for Dandora in terms of the mentioned maintenance criteria of; costs, resources & functionality. Moreover, green adaptation measures, enable ‘piggybacking’ or mainstreaming with other policy goals such as health and a pleasant living environment which is said to be a catalyst for political commitment (Uittenbroek et al., 2013; Brink et al., 2016).

The level of maintenance required for adaptation measures could be a larger or smaller barrier to the implementation and functioning of measures, depending on the amount of community support available. As although all residents state they strongly prefer measures with low maintenance, residents that live within phase 2 have access to more community support thanks to the DTL organisation and its established group of volunteers and being concentrated there. This is relevant especially for the longer-term adaptation measures such as planting trees as this requires the continued investment of resources and time. Thus, according to the residents, successfully maintaining trees, requires the support of the whole community to organise the maintenance and protect it. Hence, sensitisation about why and how people should care for their environment, is considered important for Dandora residents as this will increase understanding and possibly increase the willingness of other residents to support adaptation measures. Overall, the community organisation DTL and the youth groups volunteers it coordinates in phase 2, seem to be more willing to play a proactive role in maintaining adaptation measures, than other residents from other phases. This could be due to the fact that the DTL volunteers have broader goals, in addition to waste management, and are made more aware about the value of a green environment. Furthermore, the DTL organisation through addressing broad goals seem to use a performance-based decision making. Which involves not having one main goal i.e. waste or climate proofing as an ultimate aim, but also greening public spaces and community engagement (Uittenbroek et al., 2013). According to Uittenbroek et al. (2013), this type of decision making, enables more flexibility in finding opportunities for the mainstreaming of urban climate adaptation and hence, is more likely to be successful.

Another significant barrier to implementing adaptation measures, is that most residents in Dandora are tenants and many are also temporary. Therefore, the resident tenants need permission from the owner of the house or the courtyard (enclosed sub-neighbourhood) where they live, to do almost any changes. Hence, it can be an issue to convince landlords to see the value of adaptation measures like vertical green through creepers or pergolas. Therefore the control and willingness of landlords is a

factor that affects the implementation of measures from the semi-public to the semi-private spaces in the Dandora courtyards. However, in phase 2, many tenants can talk to the landlord's according to the residents, thus implementation may be easier here. Finally, the fact that there are thieves in the community make implementation of many measures difficult. The support of a community or clear responsibilities for courts or youth groups, such are established in phase 2, would be needed for protection of the measures, even from simple threats such as roaming goats who could eat the green fences intended for shading.

To sum up, according to Uittenbroek et al. (2013), the implementation and responsibility for climate adaptation lies with the involved stakeholders. These stakeholders determine the type of approach, the extent to which this is focused on climate adaptation and the allocation of resources (Uittenbroek et al., 2013). Therefore, the feasibility of mainstreaming depends on the goals of the residents, as well as on what is financially and socially feasible in the context of Dandora. However, either ignoring adaptation in the planning process or implementing norms without understanding their relevance is considered 'unsuccessful mainstreaming' (Uittenbroek et al., 2013). Hence, this is a criterion by which to evaluate the potential for climate adaptation mainstreaming in Dandora. Currently, Dandora residents ignore adaptation as explicit criteria in the planning process and do not understand the urgency or full value of adaptation. Although several residents have some understanding of adaptation, other residents do not have a developed understanding of adaptation, beyond short term positive effect on their direct environment i.e. cleaning drains and preventing of flooding. Therefore, due to the lack of awareness and in-depth understanding of adaptation, mainstreaming would currently not be fully successful until these gaps in knowledge and understanding are addressed. On the other hand, the goal of performance-based mainstreaming is not an end-state of realising a climate proof situation, but to include adaptation in the current policy processes or projects. Therefore, the process of mainstreaming climate adaptation could be valuable in Dandora to address the potential synergies between adaptation and the goals of Dandora residents.

6. Conclusion

This chapter will present the conclusions of this research based on the analysis and discussion of the research results in the two previous chapters. This section is divided into five parts, 6.1 and 6.2 to answer the two main research questions. Section 6.3 will give an overview of the link between the case study Kenya and the Case study Dandora. While section 6.4 will discuss the limitations of the research and section 6.5 will give some social and scientific recommendations for further research while 6.6 presents the practical application of the results.

6.1. Conclusions case study Kenya

The conclusions on the case study Kenya will answer the first research question: What is the state of urban climate adaptation in Kenya within urban planning and design processes? This question will be answered in two sections according to the two sub-questions. Firstly on awareness and communication and secondly on instruments and implementation.

Conclusions on Awareness

Increasing the awareness about climate adaptation is important in order for urban climate adaptation measures to be planned for and implemented. Although Kenya has shown international and national commitment to work on climate change mitigation and adaptation, the general level of political and citizen awareness and consequent commitment on the subject is considered low. Furthermore, it is a significant barrier to adaptation, that interviewees state there are few to no urban experts specialised in urban climate adaptation. Therefore, there urgently needs to be more education and training targeted specifically at urban planners and designers and the people working in climate related fields, about understanding the effects of climate change on an urban level and how adaptation is possible.

To improve the civic awareness effectively, mass media and education are needed. However, theoretical climate information is not sufficient, as there is currently a gap between basic awareness of climate change and the knowledge of how the climate change impacts urban areas and how to respond to or prepare for these impacts. Hence, there is a great need for visual demonstrations to create awareness about the impacts of climate change and the functioning of adaptation measures. Demonstrations make this visually explicit and understandable for the average Kenyan citizen. Politicians are considered to have the lowest sense of urgency to act on climate adaptation, this is a clear barrier to adaptation as political support is crucial in order to implement adaptation measures. Hence it is important to increase the political will and sense of urgency to address adaptation. In order for this to happen, politicians need to be made aware of how climate change negatively impacts existing social issues that they and citizens care about i.e. health, and where the synergies lie for addressing multiple issues. To increase awareness about urban climate impacts, urban climate experts and urban planners and designers need to work together to demonstrate, the need for adaptation in Kenya. Furthermore, politicians should not only be told about the problems of climate change, but also shown how adaptation measures can be solutions to these problems, so that possible approaches are made concrete.

Conclusions on Communication

The Kenyan government is making progress in communicating more about climate change, however this is often limited to one way communication. Consequently, more feedback possibilities and online media use are considered important improvements to increase the value and widen the reach of the

current communication process. Furthermore, although there is climate data being developed in Kenya, it is not accessible or understandable for everyone. As blanket climate data is provided publicly, but specific local data largely requires payment to government or private organisations. Therefore, in Kenya more location specific climate data needs to be made freely available on online sources. Furthermore, even though climate information is collected by the Kenya Meteorological department, the people working there often cannot translate the information into a form that is understandable to non-climate experts. As a result, there is currently a missed opportunity in utilizing available data. As climate data is collected, but not adapted to the understanding of ordinary citizens or translated into possible climate adaptation strategies. Therefore, the data collected should be further analysed for the benefit of the wider public, to not simply provide information, but also give citizens locally relevant advice on how they can respond to deal with the impacts of urban climate phenomena.

Currently, there are communication gaps between urban planners and designers, politicians, citizens and urban climate experts. Therefore, more engagement and communication is needed between the urban climate experts, politicians and urban planners and designers. Increased engagement will improve awareness and bridge the knowledge gap about urban climate adaptation and help to convince these groups of the urgency to carry out climate adaptation. Most significantly there needs to be more advocacy from urban climate experts to the other groups, to share their knowledge and to facilitate addressing urban climate adaptation within the urban field. However, there is considered to be a lack of urban climate experts in Kenya and most urban planners and designers see urban climate adaptation as a sectoral issue outside their field. Therefore, more urban climate experts need to be trained who can demonstrate the necessity and value of a cross-sectoral approach to addressing urban climate adaptation. Hence, engaging with politicians, citizens and urban planners and designers to develop locally relevant urban climate adaptation strategies.

Conclusions on Instruments

Kenya has made progress in recent years by developing several policies on climate adaptation as well as publishing ambitious international communications on addressing climate change to the UNFCCC. However, legally binding instruments to implement urban climate adaptation are lacking. Furthermore, although adaptation is officially Kenya's priority response to climate change, the research finds that there is still more focus on mitigation than on adaptation. A possible reason for the lack of climate adaptation instruments in Kenya is that globally, there has so far been less attention to adaptation than to mitigation, while Kenya is also dependant on international funds to reach adaptation goals. A clear barrier to progress for urban climate adaptation in Kenya, is the fact that until recently, climate change was not considered a relevant issue for urban areas. Therefore, there needs to be knowledge disseminated about the importance of urban climate adaptation for Kenyan cities. In order to increase the prioritisation of urban adaptation it should be addressed as complementary measures to existing goals for sustainable urban development.

The main issue with the existing laws and instruments is a lack of policy coherence, which prevents the different instruments from effectively working together. Hence, a lack of policy coherence prevents a comprehensive response to climate adaptation. Although, Kenya has an aim to mainstream climate adaptation, this is not yet a requirement in law. Consequently, there are potentials missed to address urban climate adaptation in an integrated and cross-sectoral approach. Therefore, because adaptation affects multiple sectors and the Kenyan government needs to address multiple urgent climate-related issues with limited resources, a mainstreaming approach is considered the most valuable approach.

Mainstreaming is suitable, as compared to standalone approaches, as it enables more effective policy making and the pooling of resources. Furthermore, mainstreaming can be combined well with the current devolution process as it provides opportunities for climate adaptation to be addressed on local level by the counties together with the local priorities.

Conclusions on Implementation

Despite the fact that Kenya aims to adapt to climate change, the actual implementation of adaptation measures remains slow. This is because of the fact that in Kenya, urban problems are perceived and framed as sectoral, while they are actually interlinked. Addressing adaptation sectorally is a missed potential, as the integration or mainstreaming of climate adaptation with other sectors such as water management, public space design and disaster prevention leads to more robust adaptation measures. Furthermore, an important finding of the research on the state of urban climate adaptation in Kenya, is that although there are actions taking place that benefit urban climate adaptation, most are not considered to be done for the specific purpose of climate adaptation. Therefore, there are currently considered to be few to no targeted urban climate adaptation measures due to a lack of understanding and commitment as well as technical capacity gaps in supervision or monitoring of implementation.

The implementation of adaptation measures is lacking as there is little political attention for adaptation in Kenya and moreover the policies or actions that can incidentally contribute to climate adaptation are not being used to their full potential. The fact that there are no specific legal requirements, or detailed policies for urban climate adaptation illustrates the lack of political attention for adaptation. There is a lack of political attention is because there are many other urgent priorities competing for the governments attention, while the need and value for adaptation measures is not well understood. Therefore, it is necessary to show the politicians the consequences of climate change impacts on key government priorities i.e. health care, agriculture, poverty, education etc. In addition, adaptation measures are currently evaluated in terms of their cost, however the government should also consider the future cost of not taking adaptation measures. Therefore, the political sector needs to be clearly informed by climate experts of the negative effects of not adapting as well as the benefit of adaptation measures in order to make an informed decision.

6.2. Conclusions case study Dandora

The conclusions on the case study Dandora will answer the second research question: How can urban climate adaptation be mainstreamed within the participatory public space development of low-income neighbourhoods? This question will be answered in four sections according to the four sub-questions on perception, understanding, planning and managing.

Conclusions on the perception of climate change

The perception of climate change varies between the Dandora residents. Most residents recognized the fact that the climate was changing, while some did not believe in climate change. However, all residents found it more difficult to recognize climate change in urban areas. Consequently, the awareness of urban climate impacts is less developed than the awareness of rural climate impacts. Furthermore, residents were not aware of how they could respond to climate impacts themselves. Therefore, it was important to evaluate which climate effects affect the Dandora residents the most and to discuss how they could respond to them. Dandora residents were found to have an overly broad view of climate change effects, which mistakenly also includes environmental factors that are not directly related to climate change. The answers from the residents illustrate that they interpret climate effects as all the environmental factors that directly impact their health, livelihood or well-being. Therefore, their perception of climate effects is coloured by this interpretation and they are concerned with climate, not as a stand-alone phenomenon, but in so far as it impacts their daily lives. Thus, in order to develop adaptation strategies that residents consider relevant, their perception of climate effects needs to be taken into account, by taking measures that address both climate effects and the priorities of residents.

Furthermore, the residents inaccurate perception of climate change impacts, show that there is a clear need to create more awareness and understanding about climate change. The method of increasing awareness should be appropriate to the current awareness level of the residents. Hence, climate concepts should be explained in simple language with sufficient examples that illustrate the relevance of a changing climate for the daily lives of the residents. Therefore, making the concepts understandable for the average Dandora resident and making use of creative examples when necessary. The use of a football analogy, to explain the concept of adaptation as reacting to an opponent's strategy, was found to be very useful to create more understanding. More awareness and knowledge of the effects of climate change, will help residents to be better prepared to deal with these effects and hence more able to reduce their vulnerability and adapt to climate change.

Conclusions on the understanding of climate change adaptation

Overall, the Dandora residents have a limited understanding about climate adaptation. Residents had trouble coming up with targeted urban climate adaptation measures, as they could not differentiate between local environmental degradation and climate change impacts. Thus, residents aimed to adapt to both climate related and non-climate related measures. The residents understand adaptation as actions that reduce health hazards, create a clean and attractive physical environment through greening public spaces or create opportunities for generating income. The reason for this understanding is because most residents work outdoors in temporary jobs, thus environmental factors directly impact their livelihood and wellbeing in the neighbourhood. Consequently, residents do not consider climate adaptation as an urgent goal on its own, but as a means to address other community priorities. Therefore, in order to convince residents of the value of adaptation measures, these should also address community priorities.

After further discussion about climate effects, the residents say they are the most affected by heat and air pollution. Hence, these are the most relevant climate effects to adapt to in Dandora. Some

residents, although lacking the terminology, have some understanding of the urban heat island effect. Furthermore, most residents considered Dandora a heat archipelago, as it is hotter than other nearby urban areas. Finally, although residents do not prioritize climate adaptation measures, the results show that there are synergies for climate adaptation mainstreaming with the current priorities of residents that can be taken advantage of i.e. adapting to heat which affects the residents health and livelihood.

Conclusions on the planning for climate adaptation measures

Heat and air pollution were chosen as the two climate factors that are the most important to adapt to in Dandora. Furthermore, apart from climate factors, Dandora residents state that health and job opportunities are very important aspects to consider within the selection of adaptation measures. Thus, the residents perception towards carrying out climate adaptation measures and the understanding of its resulting benefit for them, are important factors that affect the feasibility of implementing adaptation measures. Consequently, a successful adaptation strategy for Dandora, should be linked to the community priorities. Thus, demonstrating the value of adaptation measures for the community's health and livelihood. There are currently community-led actions being taken in Dandora, which are not done with climate in mind, but nonetheless are also beneficial from the perspective of climate adaptation. Although residents do not use the terminology of adaptation, they do take some actions which serve this goal incidentally. Due to the multiple urgent priorities of the residents, a dedicated approach to climate adaptation is not considered feasible. Instead, as mainstreaming approach is considered suitable as it can enable the successful 'piggybacking' of climate adaptation within already established local priorities. Therefore, it is important for the residents to be shown how the mainstreaming of climate adaptation measures can complement existing community goals, as this will enable community support for taking adaptation measures to widen.

This study has identified two adaptation measures, trees and shading devices, that are considered the most feasible to implement within the public space of Dandora. These two measures, can also be recommended as feasible, cost effective and functional measures to be implemented in other neighbourhoods in Kenya. Notably, the outcome of this research supports the idea that the scope of the existing objectives can be either a barrier or opportunity to mainstream climate adaptation. As narrow objectives form an obstacle to address climate adaptation, while broader objectives enable more opportunities to find synthesis between climate adaptation goals and the goals of a community. Therefore, this means that in order to mainstream effectively, the breadth of the existing objectives should be evaluated in order to assess whether these will form potentials or hindrances to the mainstreaming process. This is a useful consideration for the mainstreaming of climate adaptation into other sectors.

Conclusions on the managing of climate adaptation measures

Criteria that affect the implementation of adaptation measures in Dandora are suitability, affordability and value for the community. Furthermore, the amount of community support as well as the risk of measures being stolen are important factors that affect the feasibility of implementing and managing adaptation measures within the public space of Dandora. The climate adaptation measures found most suitable by residents, in terms of costs, resources and functionality were mostly related to vegetation. Therefore, there is potential to start the process of mainstreaming climate adaptation to heat and improving air quality through ecosystem-based adaptation in Dandora. While also addressing potential synergies between adaptation and the goals of Dandora residents i.e. reducing health hazards, adapting to, creating jobs, creating green public spaces and more community engagement.

However, although vegetation is a low-cost and no-regret adaptation measure, which is a suitable measure to be used within low-income areas, there is currently a lack of attention to the value of green spaces as a climate adaptation response in Kenya. Therefore, a challenge for urban planning in Kenya is to identify and create awareness about the climate impacts that can be addressed using green adaptation measures in low-income neighbourhoods.

6.3. Link between case study Kenya and Case Study Dandora Results

As mentioned in the methodology section, the case study Kenya research helped to form the context for the research on case study Dandora. As the results of the interviews in terms of awareness, communication and implementation of urban climate adaptation measures provided useful information to establish an overview of the urban climate adaptation context in Kenya and prepare for the focus group discussions. Insights from case study Kenya include the outcome that so far Kenyan citizens are more aware of the effects of climate change than of the actual phenomena or terminology. Furthermore, the climate knowledge of most citizens is limited to rural areas. This outcome supports the results found in the Dandora case study, where the residents also indicated that they understood climate change through its effects on them and the only examples they could initially think of were related to changing planting seasons in rural areas. Thus, there are no differences found between the national level and local level in terms of the citizen awareness of climate change.

Furthermore, the interview results clearly showed that most of the interviewees found that there needs to be more awareness creation, education and practical demonstrations of urban climate adaptation in order to make this understandable to residents. This information was useful to prepare detailed questions and explanations of climate change in a local context for the Dandora case study. Another commonality between the two case study findings, was that most interviewed experts state that, although there are some measures taken that contribute to adaptation, there are no targeted urban climate adaptation actions being carried out. This was also found in the Dandora case study, as residents carried out certain actions that incidentally benefited climate adaptation, however this was not their main goal. In both cases, a lack of awareness about what climate adaptation entails and ways to integrate measures into already existing policies or projects are barriers to implementing climate adaptation measures.

Finally, one of the most important outcomes of the Kenya case study, is that all interviewees stated that there were potentials missed in addressing climate adaptation. The main potential missed was a sectoral approach to climate adaptation which was only looking at specific sectors i.e. agriculture and disaster management instead of how adaptation could be addressed in several sectors through integration or mainstreaming. Consequently, based on the interview results a valuable way to address climate adaptation, is to show how adaptation can be integrated or mainstreamed within different sectors. As mainstreaming, will support more policy coherence and enables addressing multiple objectives together with urban climate adaptation. This is useful as the Kenyan government has multiple urgent priorities and limited financing for climate adaptation. Similarly, in Dandora the residents have multiple competing priorities as well as limited finances and resources. Therefore, the most suitable approach to climate adaptation is where options are cost-effective and can combine different goals. Moreover, residents are not motivated to address adaptation intrinsically or as a standalone phenomenon, but to improve their living environment or support their livelihoods and health. In conclusion, a mainstreaming approach was found to be valuable and most feasible within both case studies. Mainstreaming urban climate adaptation provides value in terms of reducing vulnerability to climate effects as well as meeting other priorities or providing other net benefits.

6.4. Research limitations

For case study Kenya

A limitation of the in-depth-interview method is that it was difficult to access people to interview individually, especially from the government departments. Therefore, although through personal connections I could contact people, the fact that ideal policy or political experts could not be contacted may affect the depth and quality of the results. Furthermore, of the urban climate experts spoken to, few considered themselves actual urban climate experts therefore this could mean they are less specialised professionals than urban climate experts in other countries and hence this could mean less of information was collected than potentially existing about the urban climate adaptation in Kenya. Furthermore, citizens were now not included as potential respondents, therefore the results may miss the opinions and knowledge of citizens who are important actors in urban climate adaptation efforts.

Finally, time limits were a constraint to speaking to more urban experts. As the process for getting a research permit for Kenya was long and ended up delaying the start of the research and hence shortened the time available for interviews and analysis in Kenya.

For case study Dandora

The theoretical framework for the case study Dandora was based on the theory and conceptual of Uittenbroek et al. (2013) on mainstreaming climate adaptation. Due to the time limits of this thesis, the original model was simplified. Although this simplification suited the research scope, it is possible that by leaving out elements of the model, like explicating naming the barriers or opportunities for mainstreaming per research concept, a chance for a further detailed analysis were missed.

In addition, the small sample size of residents in the focus group discussions and the number of different groups talked to influences the quality of the data collected as well as the representativeness of the results. As it is not possible to state how far the results of these focus group discussions can be generalized for wider Dandora residents. Furthermore, the largest weakness of the research is that the majority of the DTL group appeared to be more informed than the residents that were not part of the group. Therefore, the results of the DTL group, could possibly not be very representative for the wider Dandora residents. Furthermore, another limitation is that there was not an equal amount of contact with the two focus groups. As the first group was less able and willing to meet, thus this group was talked to less and ended up only being able to meet for one session to answer most of the focus group interview questions. The reduced time with this group, is clearly reflected in the fact that less questions were answered by this group. Because it was not possible to meet again, it was not feasible to ask the questions that were not answered again or see if the group still gave the same type of answers. This is a significant limitation, as the results currently reflect that this group was less aware of climate change and adaptation measures as well as less willing to answer questions than the second group. However, this could also be due to less opportunities to express themselves but this cannot be verified.

Another important limitation is that due to practical and safety reasons, it was only possible to go to Dandora four times. As it was not considered safe to go there without a community representative meeting me, due to criminality and insecurity in the neighbourhood. Therefore, although the DTL organisation helped to carry out research through facilitation of meetings, the research meetings were also limited by the availability of the DTL members. It would have been valuable to meet a third time with this group, to ask for feedback on the results that I collected and analysed from them, however this was not possible due to time limitations. Furthermore, for the residents in the DTL or second group, there is a possibility that the residents were influenced by their organisation to give more socially pleasing answers, or cooperate more than they usually would to create a favourable image. Although, I found no direct evidence of this, it is a potential limitation. Additionally, although the focus

group discussion setting was a valuable way to encourage interaction and responses, for some questions it was difficult to determine whether the majority of the group understood a question or agreed on an answer as a few residents were clearly more vocal than others. Some residents did not give their opinion or showed clearly whether they agreed or disagreed, thus there is a danger that a silent majority was sometimes not heard. However, there was no time or possibility to discuss with individual residents or ask them to write down their individual answers.

6.5. Recommendations for further research

Scientific recommendations:

For case study Kenya

It would be valuable to define and explore who an urban climate expert is within the country that is being studied. As for Kenya, this did not turn out to be one kind of profession, but instead different experts on urban planning and design, climate, environment and architecture working together. This could be interesting to explore for different countries, as if similar results are found, the type of professions that are involved with urban climate expertise can colour the kind of urban climate adaptation measures that are developed and implemented. Furthermore, the interviews should also include citizens as respondents, to include their opinion and widen the range of the results

For case study Dandora

For further research, a case study approach is valuable to study the feasibility of mainstreaming climate adaptation measures within a specific area, as it provides valuable context-dependant results. Furthermore, due to the simple structure of the focus group discussions and the detailed focus group interview questions developed, this format can be easily replicated to be done with other groups in other cities. A recommendation to collect more detailed information from a group is, apart from holding from group discussions, to also collect information from residents through questionnaires or open ended question lists. As this would provide the chance to ask residents to answer the same questions as discussed in the group individually. This is valuable as it enables a researcher to see whether the answers are the same or if someone that did not speak up in the group, actually has an alternative opinion to the group opinion. Furthermore, individual questionnaires can be used to ask more open answers or to generate more quantitative data to support findings concretely. For example, through Likert scale rankings i.e. comparing measures in terms of suitability, cost and the resources needed etc. However, in order for this to be successful the respondents need to feel comfortable doing this, have enough knowledge to write this down as well as be willing to spend the extra time. Applying extra research methods such as climate mapping can contribute to more detailed data collection and provides opportunities to also visually analyse and design possibilities for urban climate adaptation.

In order to improve the quality of the data that can be collected from a focus group discussion, it would be helpful to have a minimum of two people be present to conduct the session. Where the one person could take detailed notes of who said what and observe the process and content of the discussion as well as the group dynamics and individual responses. This would help in the analysis of the discussion as there would be more information as well as possibly a less bias interpretation of the discussion, as at least two people need to compare their interpretations of the answers and opinions expressed. Alternatively, recording the whole discussion with a video would be a good alternative, if this is acceptable to the focus group subjects and does not affect the quality of type of the answers given if people know they are being recorded. Furthermore, carrying out more focus group discussions with different residents groups and having the same level of contact with all the groups is a way to improve the representativeness and comparability of the results. Finally, in the selection of a focus group it is

valuable to try to speak to a group that is more diverse in terms of age and gender as this may lead to different insights.

Societal recommendations:

In order to improve the knowledge and hence feasibility of implementing urban climate adaptation measures, civic education is needed in Kenya. The plan of the government to introduce climate topics to schools is a good start. In addition, more diverse platforms are needed where people can engage with diverse stakeholders to discuss climate vulnerability and possible solutions. Platforms where multiple actors come together will also facilitate the sharing of knowledge and possibly the mainstreaming of climate adaptation, if common grounds can be found for integrating adaptation and other objectives. Furthermore, more efficient communication is needed between urban planners and designers and urban climate experts in order to come up with clear explanations and visuals of the effects of climate change. As well as illustrative examples of the net benefits of climate adaptation, thus addressing the problem that people do not consider the opportunity cost of not adapting to climate change.

In terms of the suitability of the focus group discussion method for social research it is a valuable method to generate discussion about a complex subject. The starter questions used for the focus group discussion were found to be an essential part of the preparation for the research, as it enabled a connection to be made between theoretical concepts and the concrete effects in a local setting. This linking of global phenomena to local effects is essential to communicate clearly the effects of urban climate and the relevance of adapting to climate change in a person's daily life. Furthermore, simple analogies to explain complicated concepts for example, using football, to explain the concept of adaptation as reacting to an opponent's strategy increase the understanding of these concepts.

In striving for adaptation, cities need to consider not only the urban climate phenomena but also the social needs. Especially for Dandora and other low-income neighbourhoods, due to limited resources and multiple urgent priorities, climate adaptation will not be addressed as a stand-alone goal. Thus, the challenge is to find possible synergies between urban climate adaptation goals and the social needs of a community such as health or economic opportunities. In order for residents of low-income neighbourhoods, to be convinced of the value of adaptation measures they need to understand the benefits that they can practically provide. For example, Dandora residents preferred adaptation measures that apart from addressing health hazards, also helped to create more jobs in the street. Therefore, mainstreaming climate adaptation within public space with the aim to contribute local priorities is a useful strategy for stimulating citizen-driven adaptation measures.

6.6. Practical application of the results

In the beginning of my research in Kenya, someone posed the question: climate change is a large-scale phenomenon and affects large areas, so why would you address it on a small scale? The answer is that although climate change is indeed a global phenomenon, its effects are felt very local such as increased flooding, shortage of food, climate-induced migration, heat stress and spread of diseases. Furthermore, to Climate proof cities (2014), a city's vulnerability to the effects of climate change differ widely per area. As depending on local characteristics such as the environment and build-up of an area, economic prosperity, a heat archipelago may or may not negatively affect the residents of a neighbourhood (Lenzholzer, 2015). Therefore, the most efficient means of adaptation is on a local scale, through many relatively small and local climate adaptive measures (Climate proof cities, 2014). Consequently, climate adaptation can be done through for instance changing a certain area's environment to adapt to extreme weather conditions and increasing a buffer capacity that reduces or prevents climate damage. Therefore, in order to make the results of a study on urban climate adaptation more practically applicable to citizens, it must be made clear how they can actually

affect the microclimate in their neighbourhood. Finally, the adaptation measures that are considered the most suitable by Dandora residents, trees and shading devices can also be used as adaptation measures for other neighbourhoods in Kenya. As these measures are functional, affordable and are found the most suitable for implementation, even within a low-income context.

Bibliography

Literature

- Arabadzheva.G. (2015). *Urban Climate Adaptation in Bulgaria*. MSc. Minor Thesis Research. Wageningen, Netherlands: Wageningen UR library.
- Asian Development Bank. (2014). *Enabling GrEEEn Cities: An Operational Framework for Integrated Urban Development in Southeast Asia*. Mandaluyong City: ADB.
- Ballantyne.A.G. (2016). *Climate change communication: what can we learn from communication theory?* Wiley Interdisciplinary Reviews: Climate Change, 7, 329-344.
- CIA (Central Intelligence Agency). (2015). *The World Factbook. Country comparison to the world: population growth rate (%)*. Retrieved October 6, 2016, from cia.gov: <https://www.cia.gov/library/publications/the-world-factbook/>
- Climate proof cities. (2014). *Final report Knowledge for Climate*.
- Daily Nation Newspaper. (2016). *Welcome to the new Dandora: it is clean, safe, and better organised*. Retrieved November 11, 2016 from www.nation.co.ke: <http://www.nation.co.ke/lifestyle/DN2/GREEN-Dandora-DUMPSITE-NAIROBI-ENVIRONMENT/957860-3028186-q3exir/index.html>
- Eriksen.S, & Brown.K. (2011). *Sustainable adaptation to climate change. Climate and Development*, 3-6.
- European commission. (2016). *Climate Action: Paris Agreement*. Retrieved September 09, 2016 from https://ec.europa.eu/clima/policies/international/negotiations/paris_en
- European Environmental Agency (EEA). (2012). *Urban adaptation to climate change in Europe. Challenges and opportunities for cities together with supportive national and European policies*. Copenhagen, Denmark.
- Flyvbjerg.B. (2006). *Five Misunderstandings About Case-Study Research. Qualitative Inquiry*, vol. 12, (no. 2.), 219-245.
- Heinrich Böll Stiftung East and Horn of Africa. (2010). *Climate Change Vulnerability and Adaptation Preparedness in Kenya*. Nairobi: Heinrich Böll Stiftung East and Horn of Africa.
- Hungry Cities Partnership (2017). *Informal settlements in Nairobi*. Based on the map made by the City Council of Nairobi. (2007). *City of Nairobi Environment Outlook Report (NHDP) 2003-2007*. Hungry Cities Partnership and respective authors. Retrieved September 5, 2017 from <http://hungrycities.net/city/nairobi-kenya/>
- Intergovernmental Panel on Climate Change (IPCC). (2007). *Fourth Assessment Report: Climate Change 2007 (AR4) Summary for Policymakers*. Geneva.

- Intergovernmental Panel on Climate Change (IPCC). (2014a). *Climate Change: Impacts, Adaptation and Vulnerability*. Geneva: IPCC.
- Intergovernmental Panel on Climate Change (IPCC). (2014b). *Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Geneva: IPCC.
- International Federation for Housing and Planning (IFHP). (2016). *Making Cities together Lab: Call for application*. Retrieved September 02, 2016 from www.ifhp.org:
<http://www.ifhp.org/news/making-cities-together-lab-call-application>
- Kabat, P., van Vierssen, W., Veraart, J., Vellinga, P., & Aerts, J. (2005). *Climate proofing the Netherlands*. *Nature*, 283-284.
- Kithiia, J. (2010). *Climate change risk of responses in East African cities: Need, barriers and opportunities*. *Current Opinion in Environmental Sustainability*, 176-180.
- Kithiia, J., & Lyth, A. (2011). *Urban wildscapes and green spaces in Mombasa and their potential contribution to climate change adaptation and mitigation*. *Environment & Urbanization*, 251-265.
- Kithiia, J., & Rowling, D. (2010). *An integrated city-level planning process to address the impacts of climate change in Kenya: The case of Mombasa*. *Cities*, 466-475.
- Kumar, R. (2011). *Research Methodology. A step-by-step guide for beginners*. 3th edition: Sage Publications Ltd.
- Laukkonen, J., Blanco, P.K., Lenhart, J., Keiner, M., Cavric, B., Kinuthia-Njenga, C., (2009). *Combining climate change adaptation and mitigation measures at the local level*. *Habitat Int.* 33, 287–292.
- Lenzholzer, S. (2015). *Weather in the City: How Design Shapes the Urban Climate*. Rotterdam: Nai010.
- Making Cities Together. (2016). *Improving public spaces in Nairobi*. Retrieved September 27, 2016 from [www.makingcitiestogether.com](http://makingcitiestogether.com): <http://makingcitiestogether.strikingly.com>
- Mburia, R. (2015). *Africa Climate Change Policy: An adaptation and development challenge in a dangerous world*. Climate Emergency Institute.
- Mensah, C. (2014). *Urban Green Spaces in Africa: Nature and Challenges*. *International Journal of Ecosystem*, 1-11.
- Moser, C., & Stein, A. (2011). *Implementing participatory climate change adaptation appraisals: A methodological guideline*. *Environment & Urbanization*, 463-486.
- Moser, C., Norton, A., Stein, A., & Georgieva, S. (2010). *Pro-Poor Adaptation to Climate Change in Urban Centres: Case studies of Vulnerability and Resilience in Kenya and Nicaragua*.

- Washington. The World Bank Sustainable Development Network, Social Development Department.
- Moser, D., & Dilling, L. (2007). *Creating a Climate for Change: Communicating Climate Change and Facilitating Social Change*. Cambridge: Cambridge University Press.
- MOSER.S.C. (2016). *Reflections on climate change communication research and practice in the second decade of the 21st century: what more is there to say?*. *Wiley Interdisciplinary Reviews: Climate Change*, 7, 345-369.
- Mungai, C; Nyasimi, M. (2017). *Adressing climate change at the policy level*. CCAFS East Africa, Research program on Climate Change Agriculture and Food Security: https://ccafs.cgiar.org/blog/addressing-climate-change-policy-level#.V_uQFyh9601
- Ngau, P. (2013). *For Town and Country: A new approach to Urban Planning in Kenya*. London: African Research Institute.
- Nzau, V. (2013). *Mainstreaming Climate Change Resilience into Development Planning in Kenya*. London: IIED.
- Ongoma, V., Muthama, N., & Gitau, W. (2013). *Evaluation of urbanization influences on urban temperature of Nairobi City, Kenya*. *Global Meteorology*, 1-5.
- Osbaahr, H. (2007). *Building Resilience: Adaptation mechanisms and mainstreaming for the poor*. Oxford: UNDP.
- Park, Y. (2015). *Adapting and communicating urban climate by design: 'Research through designing' for improving current urban climate adaptation situation of South Korea*. Msc Thesis. Wageningen, Netherlands: Wageningen UR Library.
- Placemakers. (2016, 09 02). *Making Cities Together, Public Space Strategy for Nairobi*. Retrieved from [www.placemakers.nl: http://placemakers.nl/en/portfolio-item/making-cities-together-2/](http://placemakers.nl/en/portfolio-item/making-cities-together-2/)
- Project for Public Spaces. (2012). *Placemaking and the Future of Cities*. UN-HABITAT Sustainable Urban Development Network.
- Prowse, M., Grist, N., & Sourang, C. (2009). *Closing the gap between climate change and poverty reduction frameworks*. London: Overseas Development Institute (ODI).
- Qiu, L. (2016). *Urban climate adaptation in urban planning and design processes: Exploring the current situation in China*. Msc Thesis. Wageningen, Netherlands: Wageningen UR library.
- Ratcliffe, J., & Krawczyk, E. (2011). *Imagineering city futures: The use of prospective through scenarios in urban planning*. *Futures*, 642-653.
- Satterthwaite, D. (2008). *Climate Change and Urbanization: Effects and Implications for Urban Governance*. London: International Institute for Environment and Development (IIED).

- Schans.P.J, v. d. (2017). *The state of urban climate adaptation in the Netherlands and Flanders*. Wageningen, Netherlands: Wageningen UR library.
- TEARFUND. (2006). *Overcoming the barriers: Mainstreaming climate change adaptation in developing countries*. Teddington, Middlesex: Institute of Development Studies (IDS).
- Uittenbroek, C. J., Janssen-Jansen, L. B., Spit, T. J., Salet, W. G., & Runhaar, H. A. (2014). *Political commitment in organising municipal responses to climate adaptation: the dedicated approach versus the mainstreaming approach*. *Environmental Politics*, 1043-1063.
- Uittenbroek, C., Janssen-Jansen, L., & Runhaar, H. (2013). *Mainstreaming climate adaptation into urban planning: Overcoming barriers, seizing opportunities and evaluating the results in two Dutch case studies*. *Regional Environmental Change*, 399-411.
- UNFCCC. (2007). *Climate Change: Impacts, Vulnerabilities and Adaptation in Developing Countries*. Bonn, Germany: United Nations Framework Convention on Climate Change.
- UN-Habitat. (2014a). *Tool Series Planning for Climate Change*. Nairobi: UN-Habitat.
- UN-Habitat. (2014b). *The state of African cities 2014: Re-imagining sustainable urban transitions*. Nairobi: UN-Habitat.
- UNSDSN. (2013). *UN Sustainable Development solutions Network*. Retrieved February 02, 2016 from [www.urbansdg.org](http://urbansdg.org): <http://urbansdg.org/>
- van Hove, L., Steeneveld, G., Jacobs, C., Heusinkveld, B., Elbers, J., & Moors, E. H. (2011). *Exploring the Urban Heat Island Intensity of Dutch Cities*. Wageningen: Alterra, part of Wageningen UR.
- World Health Organization (WHO). (2003). *Climate change and human health: Risks and responses*. Geneva, Switzerland: World Health Organization.
- World Health Organization (WHO). (2016). *Urban green spaces and health*. Copenhagen: WHO Regional Office for Europe.

Policy documents

- Government of Kenya (GoK). (2007). *Kenya Vision 2030: A Globally Competitive and Prosperous Kenya*. Nairobi.
- Government of Kenya (GoK). (2008). *Nairobi Metro 2030. A World Class African Metropolis: Building A Safe, Secure and Prosperous METropolitan*. Nairobi: Ministry of Nairobi Metropolitan Development.
- Government of Kenya (GoK). (2010). *National CLimate Change Response Strategy: Executive Brief*. Nairobi.

- Government of Kenya (GoK). (2010b) The Constitution of Kenya, 2010. National Council for Law Reporting. The Attorney General.
- Government of Kenya . (GoK). (2011). Urban Areas and Cities Act, 2011. National Council for Law Reporting. The Attorney General.
- Government of Kenya (GoK). (2013). National Climate Change Action Plan 2013-2017. Nairobi: Ministry of Environment and Mineral Resources.
- Government of Kenya (GoK), (2016a). Kenya National Adaptation Plan 2015-2030. Enhanced climate resilience towards the attainment of Vision 2030 and beyond
- Government of Kenya (GoK). (2016b). Kenya Vision 2030. Retrieved September 28, 2016 from www.vision2030.go.ke: http://www.vision2030.go.ke/index.php/vision
- Ministry of Environment and Natural Resources (MENR). (2015). Kenya's Intended Nationally Determined Contribution (INDC). United Nations Framework Convention on Climate Change (UNFCCC). Nairobi

Annex 1: Urban Climate Adaptation Interview Questions

Urban Climate Adaptation Interview Questions

2017

General Information

1. Name:
2. City:
3. Position: ☐ Politician ☐ Urban planners/ designer ☐ Urban climate expert ☐ Other, _____
4. Organization:
5. Email:

Awareness

1. What is the sense of urgency to adapt the urban environment to climate change amongst the following groups in the future in your city?

Groups	Very urgent	Urgent	Neutral	Less urgent	Not urgent	Don't know
Citizens						
Politicians						
Urban planners& designers						
Urban climate experts						

2. In case the sense of urgency is low, what is needed to make those groups feel more urgent about adapting the urban environment?

Groups	Measures to sense of urgency
Citizens	
Politicians	
Urban planners& designers	
Urban climate experts	

3. How aware are the groups of the following two urban climate phenomena?

- Urban Heat Island

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens						
Politicians						
Urban planners & designers						

- Wind Discomfort

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens						
Politicians						
Urban planners & designers						

4. In case awareness is low, what is needed to increase the awareness among those groups of two urban climate phenomena mentioned in question 3?

Groups	Measures to increase awareness
Citizens	
Politicians	
Urban planners & designers	

5. How aware are the groups of the following four urban climate adaptation measures?

- City design (e.g. street orientation, adapting to wind and solar orientation of building and streets)

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens						
Politicians						
Urban planners & designers						
Urban climate experts						

- Urban vegetation (e.g. green roofs, urban forestry)

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens						
Politicians						
Urban planners & designers						
Urban climate experts						

- Use of materials (e.g. low albedo and longer cooling time-lag materials)

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens						
Politicians						
Urban planners & designers						
Urban climate experts						

- Anthropogenic heat (e.g. less air conditioners,)

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens						
Politicians						
Urban planners & designers						
Urban climate experts						

6. In case awareness is low, what is needed to increase the awareness among those groups of four urban climate adaptation measures mentioned in question 5?

Groups	Measures to increase awareness
Citizens	
Politicians	

Urban planners & designers	
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Planning and design processes for implementation

Communication

1. Which roles do citizens, politicians, planners and designers and urban climate experts have in the process of planning, designing and implementing urban climate adaptation measures?

Citizens:

Politicians:

Urban planners and designers:

Urban climate experts:

2. What are the relationships between these actors in the communication strategies?

Citizens/ Politicians

Citizens/ Urban planners and designers

Citizens/ Urban climate experts

Politicians/ Urban planners and designers

Politicians/ Urban climate experts

Urban planners and designers / urban climate experts

3. What is the role of communication to support the planning, design and implementation of adaptation measures?

4. Are there formal guidelines or policies that drive the use of communication in the planning, design and implementation of adaptation measures?
If yes, can you please name them?

5. What are the strengths and weaknesses of the communication process?

6. Is there need to improve the communication process?

If yes, how to improve ?

Instruments

1. Are there legally binding instruments (e.g. zoning plans) used to implement urban climate adaptation measures?

If yes, please explain how they work?

2. What are the strengths and weaknesses of the legally binding instruments used?
3. Are there certain chances / potentials missed when using the legally binding mentioned instruments (e.g. coupling with other instruments)?
4. Are there other policy instruments used to implement urban climate adaptation measures?

If yes, please explain how they work?

5. What are the strengths and weaknesses of the other policy instruments used?
6. Are there certain chances/ potentials missed when using other policy instruments (e.g. coupling with other policies)?

Implementation

1. Which concrete urban climate adaptation measures/ interventions are currently implementing or have been implemented in your city?
2. What are the strengths and weaknesses of these mentioned urban climate measures/ interventions?
3. Are there conflicts between aesthetics and these mentioned urban climate adaptation measures?
4. Are there conflicts between urban functions and these mentioned urban climate adaptation measures?
5. Are there certain chances/ potentials (e.g. coupling with other interventions / 'no regret' measures) missed when implementing these mentioned urban climate adaptation measures?

Thank you for answering the questions in this questionnaire. Do you have any other remarks regarding the urban climate adaptation process or the content of the questionnaire

Annex 2 Focus group discussion transcripts

I. Group 1 FGD- Dandora residents from phase 4&5

Group members

Participants are Dandora residents who live in phase 4&5. Excluding myself and an intern from green choice, there were 5 residents present at the meeting. The secretary of the Dandora Youth football team (who helped met arrange the meeting) and 4 representatives from environmental groups in Dandora, who do waste collection. The names of residents are removed for anonymity.

NB: In Dandora all environmental groups deal with garbage collection, it is a main aspect of the work.

No.	Name	Age	Gender	Phase	Youth group	Years lived in Dandora
1		35	M	4	Dandora youth*	30
2		27	M	4	Kinyago youth	27
3		19	M	4	Dandora Uprising	18
4		20		5	Dandora Deepest*	18
5		23	M	5	Dandora Amazing Valley*	19
6		23	F	n/a	n/a (Intern Green by Choice)	(Not a resident, came along out of interest and to help translate if needed).

* = these areas have experienced flooding, while in phase 2 this was not an issue

NB Colour code meanings:

Orange – my notes/ questions. **Green** - positive points . **Red** - negative points or difficulties. **Grey** – off topic points by residents. **Blue** direct answers to case study questions. **Yellow** notable points.

Notes

Flooding -Phase 5 is the lowest part of Dandora, so experiences flooding, phase 4 is a bit higher but also has some flooding. Phase 1 2 and 3 are the highest parts.

All representatives play in the football team, all know each other and are friends. 2 are in the leadership of their youth group. The groups deal with environment, mostly with garbage collection. They separate garbage into plastic, cotton and sell and so help recycle some materials.

Starter questions

- Do they have family upcountry who grow crops, has the planting season been changing over the last years? (Je wana familia mikoani ambao kupanda mazao, ina msimu wa kupanda imekuwa kubadilisha zaidi ya miaka iliyopita?)

Crops – can't predict when to plant crops

- **What do they think of the masai's coming to Nairobi, do they know why they are coming?** (Je, wanafikiri ya masais kuja Nairobi, gani wao kujua kwa nini wao ni kuja?)

Masai – come to Nairobi to get green pasture, the weather where they live does not suit them anymore then they **come seasonally.**

- **What do they use to cook, if it is charcoal do they notice something about the smoke? Does it affect them or their children negatively?** - Je, wao kutumia kupika, ikiwa ni mkaa kufanya wao taarifa kitu kuhusu moshi? Je, ni kuwa athiri au watoto wao vibaya?

Charcoal use it to cook, notice its effect on health. It produces carbon monoxide and it affects how you breathe. Affects especially young children and makes their health worse. They get sick faster.

Focus group discussion interview questions:

1. What are in general the community priorities and assets, and what are community areas to improve?

Not addressed due to time constraints. Though partially answered by question 3 – that the dumpsite has a significant effect on the quality of life in Dandora.

2. What do you think about when you hear about climate change?

David - We do not play football all the time. We collect garbage, get paid to collect it.

We are not an expert on CC but deal with garbage and the court systems. Garbage separation is a way to make more money.

According to Godfery CC is:

- How chemicals affects the ozone layer?
- Glaciers melt, fish in ocean – all Godfrey

Resident: CC is the average weather in a place, wind, rain, etc.

- **In Dando (short for Dandora) it is hot.** Compared to town (CBD/ Central business district) or to westi (westlands). But Ruiru/ kamundu are hotter (the more eastern part of Nairobi).

Are there hotter places? Ruiru/ Kamudu/ Kamulu. Yes but **Dandora is hotter than other places in Nairobi.**

Where do you notice it? You notice it in the house and outside.

What is weather? Weather – rain, hotness of a place, too chilly, temperature.

State that climate, is the weather over a long period of time, i.e. a warm climate, cold climate, rainy seasons, dry seasons

3. What climate effects or risks affect you most in Dandora, and who is most vulnerable?

Told: If different for different phases mention this.

City/ Urban areas and CC

- **When too hot, more dust – ppl get sick/ flue**
- **When it rains, drainage if blocked or not working it – floods** (It flooded recently in phase 4 and 5 even though the drainages were clean, due to location near the river and phase 4 and 5 are the lower parts of Dandora). Also when people collect garbage they dump it in the river – INCLUDING THEMSELVES (4th guy) then something can block the flow.
- The garbage they collect they do not take it to phase 6 (where the dumpsite is), as that is

expensive and they would have to pay for it

- X Water collection is not possible because it is dirty! Dirty roof and dust would get in the water.

"Ni Chafu mabati (the roof is dirty and there is too little space)- they use collected water for washing car or house not to use in the house.

Dumpsite is a hazard:

- Kids 0-10 years get really sick, people who go there also get sick (2 of the men present are used to working at the dumpsite). The smoke gets toxic and the kids get really sick
- Smoke travels further at night, than during the day as there is more wind then
- Notice erosion in Dandora, as it is located on a slope. Phase 4 is chini (lower down) so they notice more erosion and flooding.

NB: Phase 1+2 are juu (up) and 3&5 are a bit lower. This group is specific about which phases are more vulnerable to flooding, erosion.

Problem - they focus mostly on the garbage. The intern Carol who was present focused on asking about prices as she was interested in recycling. I had to steer it back to CC, but the discussion on the price for different materials did make more members speak up and so the discussion more lively.

4. What is climate adaptation in your view? What do you already do about climate adaptation or improving the environment?

What do you already do about climate adaptation/ improving the environment?

They separate plastics and sell them per kilo

- Plastic 15ksh (low quality i.e. quencher ketchup bottle 10 cents, high quality hard plastic 15ksh). They separate plastic bags to be sold separately
- Chuma metal - 20ksh per kg
- Aluminium 100ksh per kg
- Karton 5ks per kg

Effects of climate change (how to reduce them thus question on What do you do about CC?)

- So many groups in Dandora came together in 2010/2011 to plant trees. Many groups were brought to plant trees down in the river area. As during that time there was way more soil erosion, more trees would help reduce this. They planted around a million*. X -The planted trees did not grow as the riverbanks burst, so the trees died (suspect the trees planted were too small).
- Problem is that they need people to maintain them
- Trees were planted in schools, Dandora Stadium but no maintenance, only Ushirika still has trees now.
- More trees will affect more rain and lead to less soil erosion
- Trees trap the dust
- There are higher temperatures- because of how rain is affected - by burning substances, which affect maybe the ozone layer.
- Prevent burning plastics by recycling, thus reduce heat
- Need a place for separation - i.e. plastics/ food items. Now they put it all in one place. Tenants could be given 3 bags for food, plastic and takataka (rest of trash) (start separation from houses). This would be easier to manage - but are people willing? no. Now: 1 paper bag per week (50ksh), they collect it on Friday/ Saturday. 3x 50ksh -150ksh would be too expensive, as some bags go per room some per plot.
- The can put bins in 3 different types so that people know where to put it, then use one plastic bag and have many trips.
- 100ksh to hire a mkokoteni (hand cart), go 20-25 mins depending on the weight. The river is a shorter distance to dump there. Individuals who separate take it to the company i.e. tonondoka

steel, industrial area - plastics to Halar.

Introduce that I want to talk about Climate adaptation - steer back to CC

5. Which climate effects are the most important to adapt to in Dandora?

Question round clear? is the idea clear or do I need to explain it again?

CC - some things are beyond human beings i.e. drought is not manmade it is due to more sun. Somethings you can plan for, but some things are God. - See CC as something beyond them

It is cold in Russia, Finland - while Turkana (northern Kenya) is hot. See this as normal.

Things are changing, the chemicals used, try to plant trees reduce soil erosion.

Question from them: how can we (human race) change natural factors i.e. rain/ sun ? You can plan your life, but you cannot plan weather or climate.

We found season's already here on earth, we cannot change this.

Dandora has around 800- 1million people, Nairobi has 6 million . There is a ghetto near Dandora (as Dandora is not a ghetto) - has informal settlements in a water catchment area, has been there for a long time.

Me - CC is not only a global phenomenon, its effects are also very local. For example that if you cut all the trees in an area it becomes drier.

There are local climate effects which you have an impact on i.e. heat/ wind/ flooding (Lenzholzer)

Repeated question: Which climate effects are the most important to adapt to?

Remind them about the effects they talked about in the beginning. Hot, dust, flooding etc

- Dumpsite needs to be covered, smoke needs to be redirected i.e. with a chimney
- Paper to petrol - japanese? does not affect residents + young children
- Also the **heat**, Dandora > hotter than town

NB: they are thinking big, we need to specify to what community themselves can do?

6. What climate adaptation solutions are possible in Dandora? (Small scale, low-cost & community-led)

- Every court and phases should have a day when they plant trees. Leaders of the youth groups can arrange how to maintain the trees
- DTL (Dandora Transformation League) only focuses on phase 2. Supposed to be for all. They say that the winning court from the best courts competition is always from phase 2. Phase 5 did not know about prize money and the court system and competition. DTL does not engage with everyone, don't know the rep for phase 5.
- Godfrey - suggests invite all groups that deal with environment to have a meeting
- Phase 2 court system should be replicated

Problem mentioned: Kevin - hospital has very toxic waste. it burns even if you bury it. Different hospitals dump in Dandora. When you engage community, some will think of protesting against everyday dumping.

7. How can climate adaptation be combined with public spaces in Dandora?

Not addressed due to time constraints. Discussed the types of measures based on Lenzholzer's (2015) catalogue. Per measure we discussed on which scale this was suitable private, courtyard or public.

8. Which one climate effect can you adapt to yourselves?

Not able to be addressed due to time constraints.

The answers above refer to flooding, wind, heat, cold and air pollution. In the 5th question when asked what climate effects are the most important to adapt to, the only answer that refers to a climate effect is heat. The rest of the comments about the dumpsite and fuel are not direct climate effects.

Later on in the discussion the group mentions air pollution as an effect they can control with vegetation.

9. Which behavioural or structural adaptation measures are possible?

Not addressed due to time constraints.

Although under question 6, suggestions are given for physical planting of trees and behavioural changes i.e. meetings with different groups

It was difficult to prepare for this meeting in detail as it was unclear how much time different sections would take and how willing the group would be to discuss the topic and measures.

This group had a more passive attitude and did not want to really brainstorm about measures they could take themselves but wanted to see examples.

10. Which adaptation measures, from Lenzholzer's (2015) catalogue, are considered suitable to be implemented within the public space of Dandora?

Types of climate adaptation measures selected from Lenzholzer (2015) catalogue:

Due to time constraints and the need to address as many of the questions in one session. The catalogue of measures were taken along and these were gone through with the group by showing the pictures and asking them what they thought of it, if it could work or not and why. As well as attempted to discuss where it could work, private areas, semi-public (the courtyards) or public areas (the model street etc)

NB: see notes on group two for a detailed description of the adaptation measures based on the catalogue.

1. Plant trees pg. 138/141

- + Easy to maintain in line trees
- + Looks clean, air is fresher and atmosphere is better with more shade
- + Clean drainage
- + tree line is awesome

Build dumping bins to separate, Friday collect from one place. This should be done per plot, put inside it and fence it.

Focus again on dumpsite again, instead of these options. I ask them to look at what we can change.

Heat/ Rain we can't control. Air pollution we can control with vegetation and flowers

2. Green facades i.e. creepers pg. 123

Creepers are already present in phase 5 in i.e. Ukuta wall and many places

X Snakes (nyoka) green snakes can be attracted. They like green i.e. passion fruit

X More difficult

- + Could work i.e. if we keep it short, not let it grow till the roof.
- + Someone planted them before
- + Not expensive

3. Fence and green vegetation (vertical) / Green demarcation elements pg. 129

Similar to the fence at phase 3 and 4 football field

- + no problems
- maintenance more difficult
- Goats will eat the green (roam free during the day) - to solve this put trees to fence the fence, or fence the trees to protect them

4. Paint roofs white or light colours pg.150-151, 156

- Difficult to do individually. As every plot has its own landlord who often owns all the houses.
- Too expensive

5. Large plants, Perennial plants with very large leaves pg. 134

- Debate whether possible or not, maybe outside plots
- Needs too much water
- Goats will eat it

6. Shading structure, shadow roof pg.137

- Too expensive

Improvised question, structure as a plain frame can be combined with plants i.e. creepers, passion fruit i.e. Planted shadow elements pg.146

- + the money (pesa) plant can be directed easily. Kevin has a money plant in his room

7. Shading material, Built shadow elements in streets pg.140

Was commented you can use grass, leso/khangji (traditional kenyan made cotton cloth) or old clothes

- + Good idea, has worked before and does not trap heat
- + Were given shades by MP(member of parliament), the mama mboga (women selling vegetables on the street) used them
- + Material used dunia (sacks) i.e. old cement bags
- does not work for all times of the day

8. Raised plants i.e. plant beds pg.165

- Pots are better
- + Flowers are better protected in a pot/ specific bed
- + On private property i.e. veranda it can be controlled
- On large scale this is difficult, as the neighbourhood kids/ people passing can cut them
- Planting in soil is easier

9. Plants in pots pg.165

- + Portable
- + Plastic pots are 150ksh, clay is expensive
- + Sack gardening is possible,
- Sack gardening is not done in Dandora, due to ignorance
- Hard to maintain (Kevin used to have it at home)
- + If organised in courts it is possible, combined with trees

10. Green ponds pg. 169

- Not enough water
- Water is not very clean
- People would fear it, few can swim

11. Greening masts i.e. Creepers on street lighting pg.172

- + Good idea
- Would not work in Dandora
- Cannot manage to plant 20 trees well, of the 20 only 3 survive
- People would spoil it, kids like to cut flowers and leaves

Improvised question for a private level: Plants in the house (do you have them?)

- No, 3 people do not (The house/room is too small for plants)
- + Yes, 2 people do (Kevin has 7 plants, feels his room is fresher than the others because of this, they clean the air)

NB: the money plant grows from the stem, so it is easy to reproduce

12. Parasol/ Umbrella shade pg.202

- + Will work
- + Easy to create, can be used i.e. phase 5 the mama mboga (women selling vegetables) , can use it like they currently use mabati (iron sheet roofs)
- Rain can be an issue, needs to be strong
- + Not likely to be stolen
- + Add's value for the street
- + Private possible for some if they have space
- Depends on the will of the landlord - some would refuse

Good for diverse use, a sick person would not want to stay in the house all the time. With the shade they can sit outside

11. Which three adaptation measures, in terms of costs, resources and functionality?

Of the 12 options discussed I asked them to tell me what best 3 options were and why.

1. Umbrella shades were found to be the best because:

- + Affordable
- + Can be used for individual shading
- +

2. Trees

- + For the benefit of community

NB: Godfrey: should not all be the same type of tree of 15 planted only 4 managed to survive. Gave as example Marubaini (neem tree) which is seen as a good tree.

- Need people to bring trees
- Management of trees is an issue as many houses are rental, so the tenants will relocate and not take care of trees

NB from group: Trees need a group to take care of it not individual

3. Flowers in pot

12. What criteria makes these measures work?

Not addressed specifically. Time constraints. But factors in the answers of the three best indicate some criteria namely; (NB: under is my summary/ analysis of the answers from the previous question)

- Affordability/ low-cost solutions
- Provides benefit to community
- Good/ easy management

Final comments

Need sensitisation for community

- Some people are ignorant
- Put garbage in one place, don't know the nuisance of build-up
- local (Kenyan) literacy on environment needs to be improved
- There is NO program on Kenyan Tv about environment, one of the group watches National Geographic (Kevin)

They want tips on fruit you can grow i.e. avocado fruit can be sold to get some money. If they see examples they can replicate. They say I/ they want easy advice. They will do the actions.

Later notes:

Develop criteria for implementation / principles

- Cost
- Difficulty
- Maintenance
- Community-led
- Flexible/ multi-purpose
- High impact, high visibility

II. Group 2 FGD -Dandora residents from phase 1-3 (DTL)

i. Meeting 1 group 2

NB: The meetings with group two took place over two sessions

Group members

Meeting 1 - Participants live in the phases 1-3 of Dandora and are part of the Dandora Transformation League (DTL). 10 residents attended the first meeting, excluding the CEO of DTL and myself. For an overview of the residents see below. **The names of residents are removed for anonymity.**

Group 2 (DTL group) Meeting 1 in Dandora							
	Name	Age	Gender	Dandora Phase	Years lived in Dandora	Education (Not formal/ primary/ secondary / tertiary)	Occupation/ student work/
1		21-30	M	3	9	Tertiary (Kenya Polytechnic University College)	-
2		21-31	F	2	25	Secondary	Work
3		32	M	-	24	-	Hustler
4		46	M	2	46 years	Secondary	Mustard seed/ DTL/ Hustler
5		31-45	M	2	20 years	Secondary	Volunteer
6		35	M	2	35 years (whole life)	Secondary	Mechanical / Artist
7		35	M	2	30 years	Secondary	Work / student/ artist hip-hop rap
8		20	F	2	10 years	Secondary	Mechanic
9		21-30	M	1	Not specified	Primary	Work
10		21-31	M	1	20 years	Secondary	Art
11		N.S	M	2	-	-	CEO DTL
NB: Where people did not answer I have marked the field with (-)							

NB Colour meanings:

Orange – my notes/ questions. Green - positive points. Red - negative points or difficulties.

Grey – off topic points by residents. Blue direct answers to case study questions. Yellow notable points.

Is climate change clear now, can you explain it?

-> How climate is changing now, weather has changed, now it is hotter

→ Used a case study plan for Dandora to prepare. - Received feedback on this from Supervisors, Naomi and Robi.

Operationalization of research questions was done to come up with focus group discussion interview questions (To simplify concepts and make them suitable for discussion in the Dandora context)

Preparatory steps

- **Plenary explanation of what Merel's research is about.**

The aim of the research is to see how theoretically the ongoing public space development, (the model street etc.), can be combined with climate adaptation measures. Here I look at adaptation (the lowering of risks posed by current or future climate change consequences i.e. reducing vulnerability to flooding, or more extreme weather) differently from mitigation (reducing root causes, such as reducing greenhouse gas emissions/ pollution from cars, charcoal use and burning). Adaptation measures are pro-active or reactive and can also be strategies/ plans to reduce vulnerability if a disaster i.e. flooding, heat stress occurs such as emergency response or migration.

- **A short presentation on concepts of weather, climate, climate change and climate adaptation.** Gave some general examples of climate change in Kenya and why it is important to be aware of this (drought - food insecurity, flooding and changing planting seasons)

Question round: is the aim clear, are the concepts sufficiently clear?

Answer: Fairly, asked to repeat explanation of concepts again.

Ask if one of the group can explain with an example how they see climate change now?

Climate change is change in weather that affects the planting seasons. **You see that crops have shorter growing seasons maize used to be one year, now it is 9 months.** Potatoes are also reducing in time they can be grown.

Ask to fill in a short questionnaire about the characteristics of residents (see table of group 2, meeting 1).

STARTER QUESTIONS:

What do they think of the current drought, is it different from previous years?

Drought is happening this year, cannot see big difference - no real response.

What do they think of the Masaai coming to Nairobi, do they know why they are coming?

The Masaai come to Nairobi to look for pasture for their cows, due to the drought.

What do they use to cook, if it is charcoal do they notice something about the smoke? Does it affect them or their children negatively?

Notice that due to using charcoal for cooking there is smoke and this affects them and the children, but there is no cheap alternative.

Do you have family upcountry who grow crops, has the planting season been changing over the last years?

Yes most of them do. Notice planting season is changing, crops are taking longer to grow and are growing less tall. The time for planting is reducing

Do they place the charcoal stove near the windows/ doors of their house for ventilation?

No they don't, usually against a wall to save space.

Have they heard of the Jiko Koa (cleaner burning charcoal cooker, that is more energy efficient) or the community cooker?

Yes they have, they like the idea the new jiko is better to reduce pollution, but still expensive and don't have it in the area yet. The community cookers some have seen in Kibera, a slum in a different part of Nairobi, would like it here but there would need to be a system to see who takes care of it or watches over the food while it is cooking.

1. What are in general the community priorities and assets, and what are the community areas to improve?

Priorities are to make the area look clean, plant trees.

- Replace the trees that were lost - the government cut them down 20 years ago.
- Clean ups, they do this almost everyday
- Reducing gender equality (Abuodha) (all the sexes should participate in maintaining the area now it is 80% men, women also work but less). The Kenyan government says that 30% women, here we generally have 40-45% cleaning up and planting trees.

NB: during the 1st focus group discussion there are 2 women and 8 men present (one man joined after a half hour), but they do not want to speak.

I tried to give them a chance to speak by asking each of them their opinion individually, but they were not comfortable, even when the men sitting next to them tried to get them to speak they did not want to.

- Environmentally → Dandora is a big dumpsite in our neighbourhood

→ The conversation starts to lead too much to the dumpsite, I try move it back from the dumpsite to the estate Dandora

- As DTL group - we bring some change, plant some trees and more fresh air
- Garbage trucks pass by the main road - drop their main load nearby, drop parts of the garbage on the road i.e. rot fish, the juices have a very bad smell
- Biggest challenge → Environmental
- Need to better manage dumpsite, have factories, recycling plants
- We need a strategy - now 52 acres dumpsite this needs to be reduced to 22-30 acres, this would be very useful
- We need doctors/ hospital - to take care of health hazards i.e. the smoke of the dumpsite at night. Sickness, diarrhea, TB (Tuberculosis), skin diseases, stomach ache
- Health issues → Asthma
- More risks for people working at the dumpsite, they are more vulnerable and bring it home to their family

Difficulty answering this first question & say they want to be told climate adaptation options. Do not seem to feel they can contribute answers. The conversation is too much about the dumpsite and not about the neighbourhood.

Improvised method→ Used a SWOT analysis method to start a collective brainstorm and make it clear that their knowledge of the specific context of Dandora is valuable. Discussed the different problems and potential Dandora has using the SWOT framework

Swot analysis

Now/ Current situation - Strengths & Weaknesses/ Future - Threats & Opportunities

Current situation / sasa	Future/ Badayee
STRENGTHS	OPPORTUNITY
Volunteers	Future jobs From the dumpsite, factories, recycling
Change - Behavioral (educate people who use drugs) - Environmental	Gives opportunity for change in the future Good and conducive atmosphere (fresh air, good environment)
Entrepreneurship Around 70-75% of entrepreneurs stay in Dandora	More jobs in the street - collectors for plastic and metal They can sell these to vendors, jua kali etc DTL - transformation of Dandora through job creation
Religion Religion is seen as a strength, there are many churches > 1000 in Dandora, Often one every 30 meters. Border of phase 2-3; 17 churches in 700m Nb: a church is often also seen somewhat as a business	
Culture of Brotherhood Support in business and social matters	Reclaiming and inventing public spaces
Sports	
Art Musicians - hip hop, graphic art, paintings	
WEAKNESSES	THREATS
Dumpsite	Long term illness From dumpsite, from vegetables grown in the area
Country Government Lack of support to remove waste, cleaning up. The cleaning being done is done by the Dandorians and not the Government.	No rules or support Even though they have the culture of brotherhood it is hard to make it without rules and support
Drug addicts Marijuana, miraa/khat, and junkies on hard drugs i.e. cocaine	Reduction in number of youth There are fewer as some die of drugs or are killed by crime Laziness/ Idleness and impotence
Early pregnancies (<18) & Prostitution	School drop outs Young irresponsible parents, mothers early marriage <18 (mapema) Abortion and immature babies, orphans and street children
Crime and insecurity Dandorians live with the ones committing the crimes, most people who commit crimes come from outside Dandora. The residents know each other and know if a person is from Dandora or not	Insecurity and death Lack of development due to insecurity and does not attract investors (from without or within)
Health hazard Due to dumpsite, blocked sewage drainages, burst pipes Dirty water used for vegetable irrigation; sukuma wiki	Sicknesses and diseases

NB: Person from Phase 3 - is an interesting participant who has a lot to contribute. He is from Nyeri, came to Dandora in 2008/9, went to Kenya Polytechnic University College and studied HRM (Human resource management). He was a volunteer for a group in Kibera. He now has no chance to practice marketing or management. **He thinks that Phase 2 - has the upper hand due to the DTL**, it was founded here (in phase 2), so there are more benefits from the organisation (structure and environmental clean-up) here than in phase 3.

→ Spaces to plant trees - this has been grabbed, this affects the whole of Dandora

me - is the street then a good option? - yes this could work as it is more a community space so it is harder to grab, also the Placemakers foundation are working on the model street in phase 2 because it is an accessible and visible space.

2. What do you think about when you hear about climate change?

Climate change

- Change in planting seasons
- Less growth, plants become shorter or longer
- Change in harvesting seasons, less quality of plants, lower total production - which increases the price

What/ where have you heard climate change from?

- Media information i.e. the Paris agreement/ newspapers
- Banners, in the street
- **US Presidential campaign, Trump is a CC denier** - he said it is made by the Chinese
- a) Somehow he is correct (Abdoha) as the Chinese are careless about the environment, they build too many factories, see how the environment is reducing (kupunguza) and there are environmental hazards
- b) Some disagree - **with Trump, we need to try to reduce emissions (petrol, diesel, have clean energy)**
- c) **Agree - as we use petrol, it creates jobs, petrol is easier and available and is the only option in Nairobi**
- Quarry → environmental hazard (near Dandora - in Kayole, Njiru) due to risk of erosion, explosives - they use dynamite. In Dandora they feel the effects of the activity, cracks in the houses, dust in the air, sound effects - loud noise and flying stones.

The link with urban areas and climate change is not clear.

Improvised tactic → Brainstorm how CC can be seen in an urban area? Then how can it be seen in Dandora?

(NB: If there is no response then I have a few points prepared on the flip over sheet specific to Dandora, which have not been shown yet)

CC in an Urban area:

It is difficult to talk about climate change in the urban area, as in the rural area especially with planting and harvests the effect is clear but in the urban area it is harder to see.

I led a brainstorm in what kind of effects of climate change could be felt, if we go back to the general effects of climate change; drought, flooding, more/ less rain, hot/cold).

"Don't see but feel the effects / repercussions"

Effects:

- Higher prices
- **More heat / hot (joto)**
- **More rain**
- Less food coming from rural - urban areas
- Unpredictable weather patterns; day to day and hourly differences
- Hand to mouth kind of people (Jua kali - informal sector), cannot plant crops.
- If it's raining they can't look for jobs - as many jobs are located in the open air market/ open air garage and when it rains there are also less customers.

(Heat & Rain in bold as these two were talked about as two of the most relevant effects)

Heat effect

- Most food is perishable (most - to almost none own a fridge) i.e. tomatoes, milk, sukuma wiki (kale), meat and maize - these foods are seem to perish faster compared to the past
- There is a difference in heat compared to the past - especially between 7pm and 5am
- 5 years ago it was cooler (climate was not as bad)
- Now we cut down trees i.e. the Mau forest
- Have more factories and skyscraper buildings - these block wind from coming down - so less ventilation
- Carbon monoxide higher especially at night
- Feel heat in the street, as there is less shade and are less trees

Heat continued

- August/ september too high
- Feb/ march - average 28 - 33 degrees in Nairobi
- Sometimes hotter here than in other parts of Nairobi
- Hotter in Dandora than in Town

Why?

- More air pollution + no trees around this place
- Town, Nairobi city center, has more trees
- Westlands gets cooler (also has more green)
- Far east Ndiru/ Bypass - hotter than here - in the eastern area

Rain effect

- seasons had more long rain or short rains, now it is unpredictable
- Relates to the fact that (If it's raining they can't look for jobs - as many jobs are located in the open air market/ open air garage and when it rains there are also less customers)

Method: Divided the residents into 2-3 groups to get more discussion going and try involve the women more. Asked them to answer the following 5 questions by themselves, nb these are question 3-7 of the overall question list. * (question numbers may still change, but content stays the same)

3. What climate effects or risks affect you most in Dandora, and who is most vulnerable?
i.e. what do they notice the most? Who is most vulnerable to this? How is the neighbourhood affected by it?

4. What is climate adaptation in your view?

5. What do you already do about climate adaptation or improving the environment?
i.e. What are they able/unable to address? (NB: improvised tactic : added CA/ improve environment here as they saw themselves more as working on the environment and could relate better to this)

6. Which climate effects are the most important to adapt to in Dandora?
i.e. according to community priorities)?

7. How can climate adaptation be combined with public spaces in Dandora?
i.e. the current public space development project going on i.e. the Model street or the courtyards?

Group presentations by Dandora residents on the following questions number 3-7:

They explained and presented their answers to the 5 questions to each other

NB; Before the presentation of results, I asked them to within the presentation indicate the things that affect them the most from the list they have made (for those with many items), these were circled on their posters. These I have put in bold to show them in the list below.

Presentation Group 1 (Mau Mau group)

3a. What affects you the most? (NB: In bold are the which were three selected as most important)

- **Heat (Joto) effect (Globally as well as here the past 3 years a lot of heat)**
- **Dumpsite effect**
- Shortage of food
- **Health hazard etc** (Risk) vulnerable

3b, who is the most vulnerable?

- The poor families i.e. lack of funds
- School children i.e. others drop out of school, bad smell from dumpsite (smoke), health affects (these last two affect both genders and all ages)
- In Dandora Phase 1-2 : Garbage vehicles drop the plastic bags down on their way to the the dumping site causing dirt/ litter

4. Improving the Environment

- Planting trees and flowers
- Cleaning the streets
- Educating each other about environment (climate adaptation)

NB:(Video of results starts here, as first was filmed by the CEO)

5. Adorpton (own spelling of adaptation) (What we feel the most)

- a) Heat (planting of trees brings shade and flowers bring fresh air)
- b) Dumpsite (a - small recycling plant & b) proper ferrying of the garbage (enclosed lorries)
- c) Shortage of food -> lead to high prices.

6. Sollution (small-scale scale low-cost interventions)

Refer to answer no 3a -b.

7. How can this be combined with public space?

- Through DTL initiative the spaces are being transformed to parks, planting trees/ flowers etc

Presentation Group 2 (Group 100%)

3. Effects of climate change/ risks

- Flooding : blocked drainages by solid waste
- Air pollution: Emissions from the dumpsite

Affected most:

- Women & Children
- Phases 2, 3&4 - They are directly adjacent to the dumpsite

4. Measures to improve the environment:

- Digging out the trenches around the estate courts
- Proper waste disposal

- Making the public spaces green and in turn provide fresh air to the residents

5. Most important to adapt to:

- Proper waste management & disposal which in turn will help to have a clean and conducive atmosphere

6. Solutions to climate effects:

- Sensitization of residents of the benefits of living in a clean, safe and healthy environment (small-scale)
- Advocating for safety gear for the persons who go to work in the dumpsite and also to go for health check-ups after a certain duration of time. This will help in reduction of chronic illnesses (community-led).

7. Its combination with public space

- Good management of public spaces will curb flooding because of well-established drainage system
- Turning public spaces green will in turn give fresh air to the community and also help reduce the amount of carbon from the dumpsite

Presentation Group 3 (Last group)

3. What climate effects, affects the most?

1. Rain:
 - a) Blocked drainage
 - b) Rain stops people from doing business/work due to high rainfall (open markets are normal)
 - c) Disease outbreaks i.e. Cholera (Khotera* as spelt in poster)
 - d) Food shortage (high price)

Dumpsite, would be number 2- "But as you know, there is nothing we can do about it" - so for number two we have **put sun**.

2. Sun:

- a) Food shortage (price)
- b) Water shortage
- c) Affect businesses (open air market)
- d) Loss of concentration (in school, due to high humidity)

3. Wind:

- a) Air borne diseases, TB etc from dumpsite
- b) Soil erosion
- c) Distract litter
- d) Affect business

Affects us the most:

1. Dumpsite
2. Congestion youth
3. Drainage
4. Contaminated waste
5. Development (is harder as climate affects rain, sun and wind, as we are affected by climate while we are trying to do business)

Who are most vulnerable?

- All, children and community

4. What do you do about climate adaptation/ improving the environment?

- Planting trees
- Unblocking drainages (volunteering)
- In house planting e.g. planting food in the sacks or containers. (in the house or hanging containers)

5. Adaptation (What is the most important climate effect to adapt to)

- a) Rain
 - Harvesting of rainwater
 - Erecting of shades
 - Planting trees
- b) Sun
 - Erecting of shades
 - Planting of trees
- c) Wind
 - Planting of trees
 - Erecting of shades

6. Solutions

- Recycling
- Tree planting
- Building on high ground
- Creating jobs
- Community led organisation (D.T.L)

7. How can this be combined with public space?

- a) Planting of trees/ grass
- b) Good/ clean area (without litter)
- c) Access for children to a playing ground

Improvised tactic --> for the question round during the group work and the end I asked one group member who understood well to help answer group questions. As he is part of the residents so they should feel less like the researcher has all the answers.

Asked for feedback about session?

- Was interesting.
- Want more background information and explanation next time

Told the residents the plan for next session -to discuss concrete adaptation options. When asked if they would be interested in coming back for the second meeting?

- most said yes clearly.

Summary of results made of the answers of the groups to questions 3-7* (question numbers may still change, but content stays the same)

3a) What climate effects or risks affect you most?	Number of groups that mention it (out of 3)
Heat & Sun	2
Health Hazard (risk)	2
Shortage of food/ higher prices	1
Dumpsite and Air pollution	3
Rain/ flooding/ blocked drainages by solid (contaminated) waste or reduce business (open markets)	2
Wind (air borne diseases i.e. TB)	1
Congestion of youth	1
Development	1
3b) Who is most vulnerable?	
Poor families	1
School children - loss of concentration due to dumpsite gases	1
All children	3
Phase 1&2 due to garbage vehicles dumping trash on the road to the dumpsite	1
Women	1
Phase 2, 3& 4 - as are directly adjacent to the dumpsite	1
Whole community	1
4. What do you already do about climate adaptation/ improving the environment?	
Digging outdoor unblocking trenches around the estate courts	2
Planting trees and flowers and making public spaces green to provide fresh air	2
Cleaning streets & Volunteering	2
Educating each other about the environment (passing on knowledge i.e. climate adaptation)	1
Proper waste disposal	1
In house planting e.g. planting food in the sacks or containers	
5. What is the most important climate effect to adapt to? (What you feel the most)	
Heat & Sun	2
Dumpsite & Proper waste management	2
Shortage of food	1
Rain	1
Wind	1
6. What adaptation solutions are there? (Small scale and community-led)	
Planting of trees brings shade and flowers bring fresh air - for heat & rain	2
Dumpsite - recycling through individual or businesses & proper ferrying of the garbage (enclosed lorries)	2
Sensitization of residents of the benefits of living in a clean, safe & healthy environment	2

(small-scale) i.e. DTL	
Safety gear health check-ups for dumpsite workers to reduce chronic illnesses (community-led)	1
Building on high ground	1
Creating jobs	1
Erecting of shades - for heat, rain and wind	
7. How can climate adaptation be combined with public spaces?	
Through DTL initiative the public spaces are being transformed to parks, planting trees, flowers etc. (gives fresh air to the community and help reduce the amount of carbon from the dumpsite)	3
Good management of public spaces will curb flooding because of well-established drainage system	1
Clean spaces without litter	1
Access for children to a playing ground	1
Erecting of shades	1

ii. Meeting 2 group 2

(Group 2 the DTL group, mostly the same residents present with 2 new comers).

Group members

Meeting 2 - Participants live in the phases 1-3 of Dandora and are part of the Dandora Transformation League (DTL). 9 residents attended the second meeting, of which 7 were present at the first meeting with this group as well. The names of residents are removed for anonymity.

Group 2 (DTL group) Meeting 2 in Dandora							
	Name	Age	Gender	Dandora Phase	Years lived in Dandora	Occupation	Present at last meeting?
1		35	M	2	30	Student/ work	Yes - Joined at end
2		32	M	2	24	Hustler	Yes
3		35	M	2	35	Mechanic/ Artist	Yes
4		20	F	2	26	Mechanic	Yes - Joined at end
5		?	M	2	?	Activist	No
6		46	M	2	46	Hustler	Yes - Joined at end
7		31-45	M	2	20	Volunteer	Yes
8		25	M	?	25	Hustler	No - Joined at end
9		21-30	M	3	9	Student/ work	Yes - joined halfway

NB Colour meanings:

Orange – my notes/ questions. Green - positive points. Red - negative points or difficulties. Grey – off topic points by residents. Blue direct answers to case study questions. Yellow notable points.

Planning of the meeting

1. Opening + prayer?
2. Recap previous meeting and choose climate factor to address
3. Presentation on CC and question round
4. Give examples of adaptation from Lenzholzer's (2015) catalogue and discuss the relevance for Dandora and suitability for implementation in public or private space?
5. Make a shortlist of options, the 3 best measures for Dandora
6. Discuss criteria for the best options

Prayer opening and recap of the last session results

A prayer opening was done as the the last meeting with this group they had requested to pray before beginning and at the end before we had lunch together.

A recap was made of what we discussed about climate change and the community priorities they had mentioned:

- Cleaning up of the area
- Planting trees
- The strengths they had in volunteers and entrepreneurship
- Creating jobs as an important issue for them
- Improving the environment
- Improving public space
- Addressing weaknesses such as health hazards, dumpsite, pollution and diseases

A recap was done of the group presentations and their answers to the questions 3-7:

3. What climate effects or risks affect you most in Dandora, and who is most vulnerable?
4. What is climate adaptation in your view? What do you already do about climate adaptation or improving the environment?
5. Which climate effects are the most important to adapt to in Dandora?
6. What climate adaptation solutions are possible in Dandora? (Small scale, low-cost & community-led)
7. How can climate adaptation be combined with public spaces in Dandora?

Is climate change clear now, can you explain it?

-> How climate is changing now, weather has changed, now it is hotter

Comments about tension between the older (more wealthy people) and the youth, issues with suspicion and corruption.

Now only youth are volunteers, so need more energy from government and local community. The youth, the boys work but those women, older people and parents are not helping. Older people do not seem to care, neither does city council.

For all gender and ages, the older take advantage of the younger people (as older people are more wealthy). i.e. if you plant a tree - the old people cut it down and sell it. If you confront them, they take you to jail.

Big fish and cartels block the youth from making changes.

The mau forest - since 10 years it is being interfered with.

"You can't put shades, have to bribe to put it. People taking bribes are from the government or the chiefs or village elders. Anything you erect in this estate you must bribe 3-5 people. Even if you want to put a tree you will be asked - who are you to do this."

As the DTL group it is a bit easier, DTL tries to reclaim back the public spaces.

Where could the climate adaptation options be done, since it is so difficult to put anything up in Dandora?

- Has a green map, possibly the one made by Placemakers for the model street, of where kids should play, car parks and walk lanes.
- "With DTL now moving, we can make it there" One person added "Carlos 4 president" Max/ Daddy "Wangari Maathai came up with a strategy of how people can help". "Most important change comes from you as an individual. Once you change you can influence someone else"

With leaders, they wait for change, as it is a family business.

Remind group: it is important to see what you can do yourself.

→ Start with the remaining Dandora case study questions 8-12

- Through DTL we have seen changes, then people change their minds

X - to make the community understand, takes a lot of time and energy

→ Improvised tactic add question 8 as a specific question, to choose one climate factor explicitly which is most relevant for them. As question 5 still includes many different climate effects which are important to adapt to.

8. Which one climate effect can you adapt to yourselves?

- Dumpsite. It takes our oxygen, a lot of CO₂ is inhaled from the Dumpsite. It affects us seriously, it affects our health. We need to demonstrate against it; if dumpsite can be managed well it can be of great use.

-

X Landgrabbers grab the open spaces. Thus there is little space to use for actions.

The spaces that are there are neglected, they need management.

Options should be small-scale and not take a lot of space

-

When asked who should be responsible? For now, we the youth, are doing the work but it is supposed to be the community together. Most plots are owned by fathers or grandfathers.

NB: To this point too much focus on dumpsite, discuss the aspects of the SWOT to lead them back to focus on what the residents can change. i.e. the Dumpsite is an external factor, not something they have direct influence over.

8. Which one factor can you adapt to yourselves? **repeated question, focus on what you can change as residents?**

NB: question 5. **What is the most important climate factor to adapt to? Already tried to address this but there was not one clear outcome then of what they could do themselves, so needs to be discussed explicitly again.**

1. Air pollution - is most easily addressed according to one group member (3 of the 5 present agree), can do unblocking sewers, planting of trees

NB: The beginning of the meeting was only with 5 residents as the others were held up in another meeting. Halfway/ towards the end, there were 9 residents present, excluding the CEO who sometimes joined the meeting but mostly was needed for duties around the neighbourhood.

We have the strength to do something

2. Heat - affects comfort and health (2 out of 3 groups agree).

Concept of adaptation still not clear. This comes out of the discussion

I use a repeated tactic of the analogy to compare adaptation with football:

If you play a game if the other team's strength is offense or defense what do you do?

Do you do the same for both offense strong or defense strong teams?

Answer no, you change.

So you change or adapt your strategy to play i.e. placement of players etc. depending on the other team's strength (offensive/defensive), so you change according the factors you face.

This is similar to adaptation as you adjust according to environmental factors to try prepare for negative effects and strive to prevent or reduce damage caused by CC or take advantages of opportunities. (European Commission, 2016; IPCC, 2014).

When it is hot it is harder to concentrate.

Dandora is hotter - because it is more near to ukambani (later note: A more eastern region of Kenya, which is considered as a dry area)

There is a difference between Dandora to westlands (a greener part of the city located North, West) And between Dandora and uhuru park (the central park in the central business district).

Dando is hot inside vs Eastlands which has a hotter climate. As Eastern Kenya is more dry, especially North Eastern regions.

Dandora is hot because there are not enough trees

Health effect of heat & sun - sun burns, we have adapted to the heat but do not do anything about it.

When asked is it sometimes too hot during nights in Dandora?

- Yes! Even today and yesterday night (2people)
- Everyone has experienced this (7 people, at this time in session) Late in night it is very warm, you find yourself sleeping and sweating. Don't use even a blanket and there are many mosquitos.

Recap: Based on the presentations last session:

- 2/3 groups mentioned heat & sun and

- 3/3 groups mentioned dumpsite and air pollution

As climate factors that are most important to adapt to. Above you mentioned air pollution and heat as most relevant factors again.

For the scope of my study we need to focus on one factor as that is feasible to look at.

The **dumpsite is too complicated and is politically sensitive issue** thus not one community planning can address.

8. Which **one** factor can you adapt to yourselves? Which factor is most important to adapt to?

- **Heat**

Most of group show agreement

Choose climate effect to adapt to; Heat (and partially air pollution) & Discuss

Comment One group member: **Air pollution is also important**

The group has chosen heat as factor to adapt to and discuss how this affects them now. Heat will be addressed (as well as partially air pollution, to consider options i.e. plants that also benefit the reduction of pollution or the absorption of PM etc.)

NB: note to myself; possibly look for plants that repel mosquitos for advice on plants/ adaptation measures with extra benefits.

Planning in Dandora - Big parks not possible?

- Churches encroach the environment
- Sunday there is a lot of sound pollution.

Presentation on flipboard more details on CC and adaptation. First a presentation on heat and cc from the tablet, explaining the basics of climate in the city, microclimate, the UHI and heat stress. - also part of methodology? I think so, but also important to mention for results as this explanation led to broader thinking of the residents about adaptation.

Give group an overview of what climate effects can we affect: (based on Lenzholzer (2015))

- Heat

- Wind

- Flooding

Explain that different types of adaptation that are possible:

Adaptation is possible on:

1) Different scales a) private, b) semi-public i.e. courtyard, c) public space i.e. the model street. from small scale of one person, 2 or more people and to more than 5 people in use.

2) Short term (reactive/ after hazard) or Long term (proactive / before hazard or event occurs) i.e.

Improvised example → for the problem of speeding garbage trucks in Dandora. Reactive - speed bump after overspeeding to slow down speed or Proactive - gate to prevent speeding in the first place or reduce access to the street to reduce chances to litter.

3) Behavior and or structure i.e. actions/ planting tree or building structures/ houses

9. Which behavioural or physical adaptation measures are possible?

Behaviour

- We need each other to be able to deliver
- We need to act very seriously i.e. even a bottle dropped, needs to pick up.
- Need to separate waste into 3 dustbins, plastic/ metal and green waste thus into things that can be recycled separately
- Civic education, people need to understand what is going on. We need to inform.
- Tell people it starts with you, show by example
- Show it and make laws i.e. no smoking
- Can make a community law, in courts could be a good place to start. Possible to talk to landlords about this.
- Use media and other communication i.e. flyer/ newspapers etc. These can show what is done in phase 2. One flyer could help.
- Start with little actions and show people they can do something themselves.
- Be aware of what you are trying to do - so people can support

Structure

- Make shades
- Plant tree
- Unblock drainage - adaptation for flooding
- Heat - use solar panels instead of jiko, or solar jiko for cooking
- Look at sound pollution
- litter cleaning

In session 3, writing down notes while the group discussed different types and concepts of adaptation was useful to gauge their understanding of climate change and adaptation and the impact or relevance of certain actions. Furthermore it contributed to a basis for discussing which alternatives/ types of adaptation are feasible as they discussed both behavioural and physical actions, reactive actions and pro-active actions.

The terms proactive/ reactive seemed to be too complicated but the discussion was widened by the explanation of the different ways and different levels adaptation can take place on.

10. Which adaptation measures, from Lenzholzer's (2015) catalogue, are considered suitable to be implemented within the public space of Dandora?

Types of climate adaptation measures selected from Lenzholzer (2015) catalogue.

NB: the description in italics is from notes taken from the catalogue. :

Nb: to be time efficient a preselection of some options was made, i.e. the very expensive options such as arcades were not included. Most of the catalogue was flipped through with the residents to ask if they thought an option was feasible or not. - Reflection of methodology -s rik, explain this selection in methodology chapter. FGD semi-structured, due to time could not address everything so made a preselection.

NB2: notes under the options come from the catalogue description.

1. Canopies and Louvres pg. 119

A patio (closed roof) or a canopy (a cloth or other material covering hung above an area) or a louvre (frame with horizontal strips of wood as the roof).

Both provide good shading. (medium cost)

- Irrelevant. As most occupants are not owners but tenants, so cannot build extra structures. Most houses are owned by fathers, cannot build this near someone's house.
- Plots are small! So this structure is too big
- Possible in open (public) space or courtyard.
- Some say in private space is also possible if the person owns the house/land or the landlord agrees

2. Planted pergolas pg. 121

These can be attached to buildings but also be used as freestanding objects. pergola usually a lightweight construction with light beams or wires to support climbing plants i.e. kiwi, vines, ivy (evergreen) etc.

Good option for shading. But effectiveness depends on the density of the leaf cover. But the effect of solar radiation can easily be reduced up to 50%. (medium cost)

- Private level it is possible, if the owner agrees also possible on the street
- Courtyard or street only possible if community agrees
- Plot owner would need to agree, if they have the knowledge and are informed

When asked would an example be useful to explain the use and the benefits? For example before and after pictures

- Yes, giving examples before and after would be useful. People need to understand the value of doing it. As most landlords do not live here.
- (So see the pro's and con's)
- If good tenants show, this is good for me as tenant then they will agree

3. Green facades i.e. creepers pg. 123

Different types of facade planting can be used to shade buildings, in order to reduce the heating up of walls and thus also reduce the heating of indoor spaces.

Common green faces are climbers planted in the earth, which either attach themselves to walls with small 'suckers'; or root hairs i.e. Ivy, hydrangea or wild vines. The second type are plants that climb by curling around threads and lattices i.e. climbing plants.

Finally vertical gardens, which consist of many separate plants which grown from many compartments i.e. hanging pots or bags which are fixed to a grid or cloth which is attached directly to the wall. (Low cost for self-climbing plants)

- Difficult as no ownership, no permanent people living in houses often
- Creepers are already there in parts of Dandora, in phase 1 a plot near Believers court has it.
- Cool there, is a nice idea but - the older people shosho's (grandmothers) and guka's (grandfathers') will not want it,
- X think want to destroy the house
- X can bring a lot of snakes.
- Others say; snakes are not the problem but the idea about it is the problem
- Must not grow too high. If you maintain it, below the window
- Problem with public space - the owner of the premises decides
- Phase 2 - many communities can talk to landlords.

NB: every plot has a landlord, who owns 1-5 rooms etc.

- Antony knows Sandiego court for the CFC (Changing Faces Competition, of who's court is the most beautiful) wants to do creepers.

4. Green demarcation elements pg. 129

Examples are hedges or fences planted with climbers, these can provide considerable shading.

These elements offer shading and wind protection, so can protect people's property and privacy. They also help lower the air temperature through evapotranspiration. **NB: For dandora this option for privacy could be negative due to criminality and less sight over areas.**

(Low cost)

- Possible near the football field, there is a wall as a fence, can do creepers
- Possible for community level in phase 2 can support. No idea for the other phases if this will work.
- X Trouble with this option is resources.
- No access to plant it and maintain it.
- Who owns it will be unclear if it is private or public administration
- In schools can be good. Kids could take care of the wall. Can talk to the head teacher, this is not hard if they have the information, need that of benefits of the measure. **They emphasize; how you approach matters!**

- Where to find creepers, that is difficult

Nb: Look at plants that can be replicated, grown from cuttings

- X Some in community think people are being paid to volunteer, think it is benefiting volunteers.
- Corruption is a big issue
- They judge people, especially the older people. You are youth, he is old, he knows more. **You need to go with a respected person in community i.e. a priest**
- Possible to talk to churches. DTL work with a church, the revival gospel church

5. Large plants, Perennial plants with very large leaves pg. 134

- Not realistic
- There is little space

6. Trees on squares /streets pg. 138/141

Trees planted on squares are more limited than for parks, as the tree crown bottoms are preferably higher above the ground and there is often less space for roots in the built environment. Choice of species needs to suit a more limited environment and function of the square or street. Maintenance is more than for park trees. Specialists may be needed to plant trees to prepare systems for aeration and irrigation. (Medium cost)

Street Trees planted in the right spots are beneficial. Trees can block a lot of solar radiation, up to 50% falling on the street surface and facades. Thus can reduce the heating up of the surrounding environment.

Trees can also add to ecology, water management, aesthetics as well as retain fine dust and air pollution.

- Trees are the best option, if they are taken care of by the community. i.e. every court can take care of a tree such as in the MSO (Mustard Seed Organisation, who have one of greenest courts and were the first to set up the taking care of their open space and tree's system).
- Before Mustard seed court was started the trees were there
- Trees can work on private, courtyard and public areas
- It matters what kind of trees are put. The shorter one's under 5m are better as then the roots can't spoil the tarmac and can't spread
- Best tree types are mango and avocado.
- There are rules about not climbing them for children.

7. Built shadow elements in streets pg 140

Either fixed directly onto buildings, above the sidewalks or flexible shadow elements such as the shadow curtain, which can be spanned over a street. (Medium cost)

- Flexible shade can work
- But houses have different heights so that makes it more difficult
- Can be an adaptation (kukubalina) option for shops
- Problem is that people commercialize i.e. sell parts of it. E.g. sell part of streetlights
- Thieves in the community. Make building difficult put poles in one day to protect trees or plants and they are gone the next day
- Possible in private areas and courtyards, as they have security. Every court has volunteers.
- More fixed shades possible if more budget
- Umbrella can be inside courtyard used commercially for mama mboga (women selling vegetables). San Diego court has them purely as shades (Antony comment).

8. Planted shadow elements pg 146

Pergola-type green constructions (Medium cost)

- Possible in private and courtyard
- Can be stimulated and used in DTL competition 'changing faces' to make courts more beautiful
- X expensive
- How to replicate it? need to know how to grow it

When asked if some have plants in their house they responded:

- Some have plants i.e. the money plant, rose (2 people)
- Why do they have them? Plants give fresh air at night and they beautify (2 people)
- Mythical thing, the money plant as believe that those who have it will be blessed with money or help get income. If it is yellow pockets are empty, if it is green pockets are full.
- Plants can chase away mosquitoes.

When asked why others do not want plants in thier house?

- Biotechnical friend told him at night plants remove bad air, the CO₂, so not healthy to have them at night

NB: They asked if I have plants in my room.

9. Painting light colors, Roofs or facades with high albedo pg 150-151 Cool walls, painting pg 156

To prevent the outer shell of a building from absorbing too much heat a lighter colour can be used. As white or light colours have a higher albedo or amount of reflectivity of light, thus reducing the amount of solar heat heat absorption and thus also less radiation out to the surroundings Painting -(Low cost).

Cool coatings are used to reduce heat to areas. A traditional tile has an albedo of around 0.10-0.35; but painted white, the albedo is 0.75 while the albedo of a roof with corrugated iron sheets is around 0.10-0.15; but painted white with a 'cool coating', more than twice the radiation is reflected.

Effectiveness: In summer a black roof can easily have a peak temperature of 80 degrees celsius. While a white roof, can be 17 degrees celsius cooler on average. Due to the reflection (of solar radiation), less heat comes into the indoor spaces.

NB: +ve Extra adavantages, due to the moderated temperature fluctationsof the reflecting roofs, the roofing materials suffer less stress. A reflecting roof will therefore have a longer lifespan than a black roof.

X Disdadvantage: But white roofs that are dirty are less effective, thus need to be maintained regularly.

For walls:

A brick wall has a 0.20-0.40 albedo and a concrete wall has 0.10-0.35 albedo, painting this white increases the albedo to 0.50-0.90. Higher albedo results in significantly lower facade surface temperatures. A dark outer wall can easily be 8-10 degrees warmer than a light one. The over-heating in indoor spaces can be reduced by 40-80% of the heat hours.

X Disadvantage: the radiation on objects or passers-by can be increased, which can be unpleasant in the summer. Light facades can become dirty faster than dark facades.

- Is an option for every scale
- Cost is attractive, paint is cheap and available
- If people know benefit they would want to paint roof. Painting the mabati (corrugated iron sheet roofs) could work
- Having an extra ceiling under the Mabati, as in the DTL office, is already an adaptation. As this prevents the direct spreading of heat from the roof to the room below.

10. Concrete furniture, outdoor furniture with high or low albedo pg. 154

The thermal comfort of people outside depends on the type of materials they are in direct contact with i.e. the type of materials of the benches or areas to lie down or walk on. Dark surfaces become too hot in summer and people are then not likely to sit on them. Albedo should be adjusted to use (and climate). Depending on the albedo, the surface temperature can be clearly increased or decreased. (Low cost)

- Concrete is durable which is good
- X But it is expensive, so need a big budget
- Think it is better for the environment than wood
- Tyres from vehicles are good materials as they are not too hot, if you paint them its even better

11. Green ponds pg. 169

- The space is little here
- Mosquitoes and frogs would breed, Frogs give sound pollution

12. Greening masts or plants on streetlights pg. 172

If there is not enough room to plant trees, an alternative is to have plants grow up masts to limit the air temperature increase through evapotranspiration.

- Greening
- Beautiful
- Lack material to plant or use

NB: at this point there are 7-8 people

13. Parasol / Umbrella pg. 202

For a place that needs protection from both rain and sun you can use a large foldable screen. Users can press a button (or other function i.e. rope) to open the screen on demand.

- Shade is very positive
- Private level can work, On private level it is the most easy to maintain.
- Court and public areas it would be difficult due to little discipline. One person thinks it can work, others disagree that it is hard to put in the courts.
- If it was given for free it would be possible in the court/public areas. if they need to pay not possible. Depends on resources in court i.e. they charge for parking cars (to watch over them), charge to collect garbage.
- Examples of this umbrella have been seen i.e. the Coca Cola umbrella for the soda

- A woman talked! (One of the first times in the plenary) It would be possible in private, for courts depends on finance
- If commercial, the mama mboga (women selling vegetables) would invest
- Umbrella i.e. antony wants to approach people who have the umbrella like the pepsi umbrella table, bench and drink - to combine it with commercial selling. Movable functions for umbrella is useful
- Resources for umbrella; financial and kitenge (cloth) and wood can be used
- Need an expert i.e. carpenter/ creative people
- Can make different ones; material of canvas/ gunia(sacks).
- Kitenge is suggested suggested: but kitenge or kikoy is said not to last.
- Iron sheets (mabati) can be used as well to make the frame. This is possible with the rejected iron sheets.
- Plants on top are not likely, say it is impossible with mabati.
- Others say fast growing plants grow on top (NB: seen money plant growing on short roof outside the DTL office)

NB: Went through book quickly to see if we missed any useful measures, added the last two

14. Wind plus shadow elements (similar to the envisioned Model street public space units) pg. 203

- Possible for model street
- Stone can be used as benches
- Works outside the Hilton hotel and Kenya national theatre around trees.

15. Plants in pots pg. 165

- A jerry can (dumu) can be used or empty bottles
- A sack i.e. like sack gardening can be used
- Type of plants can be different like vegetables; tomato, kale and onion
- When asked about hanging on street said: can try this. But hanging is more difficult, so not do this first maybe later.

11. Which three adaptation measures, in terms of costs, resources and functionality?

1. Fruit trees (Because it is the cheapest option. To be in the public / semi private or courtyard spaces, they need community support for this).
2. Wall plants (Creepers are workable, phase 4 already has some. This should be possible on all levels, maybe also schools).
3. Painting
4. Shades (As a fourth option shades would be possible. I.e. the umbrella shade, though there is quite a discussion about this, only possible on the private level according to some. Though private is not really private according to others. They say they would need a demonstration of the shades.).

12. What criteria makes these measures work?

- Options for public or private areas
- Behavior i.e. private options as well as community support, which is hard for us now. Volunteers maintain, so working depends on volunteers. Needs to be easy to maintain i.e. tree/ painting/ vertical green, pruning is easy - 20 minutes work
- Low-cost
- Visible so people see tree grow, see benefits later
- Multiple functions specially for Dandora

Later notes:

- Relatively low time investment useful?
- Simple and visible, feel direct effect

NB: After the meeting John Wairagu, showed the way around his courts, pictures were taken of his court (Madiba) and plants in his front garden and the streets around the courts.

Comments from resident who know about gardening/ planting: John Wairagu

Drip irrigation can be used through a water bottle placed upside down and a hole put in the cap. 1 litre lasts a week. Flowers grow in plastic bottles this can work but looks messy in shapeless tone. We use local hardcores (crushed rock pieces, for concrete floor base) We paint plastic planters in colours of the court.

Notes: Places visited

Also went to the Uka flani and Mau Mau activist court space to see the type of plants they grow there with Max. This was near the DTL office.

Picture of money plant outside DTL office.

Courts visited:

- Model street (near DTL office)
- Mau Mau garden/court
- Fig court
- Madiba court

To see the type of plants and the private, courtyard and public spaces now in phase 2 and how they were being used.

Annex 3: Expert consultations

Expert consultation 1&2 –Urbanist and architect Placemakers Kenya

First meeting

Consultations were done to understand more about the context in Dandora. The first meeting discusses mainly the current situation and ongoing project in Dandora. As well as preparations for the case study questions with the residents. Feedback was asked on the case study plan and the suitability of the questions.

During the expert consultation the project in Dandora was discussed. Financing for the project is partially done by Dutch organization “DOEN”, the other part of the financing lies with the “DTL” organization. Per courtyard people pay 20 shilling to pay the young residents to collect the garbage and maintain the area. Currently there is a competition per courtyard organized by the DTL, before this there was not much movement.

The history of Dandora was also discussed, it was a World Bank project from the 1990's. Thought out as an organized neighborhoods with a better living standard compared with other living areas during that time. However the phase 6 dumpsite location was the cause for much of the impoverishment and degradation of the Dandora area.

The Dandora project was started for a number of reasons, the idea was to create a model street that solved different environmental problems that the area was plagued with. These problems varied from air pollution and flooding, to water harvesting and the use of trees to create shade and better soil quality. The project are a success because they are easy to maintain, compact and the maintenance is well organized. These aspects are required to have a successful project in Dandora or situation that is similar.

The second meeting with this expert

During this meeting we mainly discussed the results of the first focus group session with group 2. The expert was happy with the results as they were useful for her to know. She found that the answers being given were adequate and hence the questions were of a understandable level.

Her main advice for the next session was to include a recap of the first sessions results and to address climate adaptation measures that were possible for private, semi-private (courtyard) or public spaces. As there could be big differences in this.

Furthermore we discussed the possibilities of urban development and climate change adaptation to be addressed together. According to the expert this could be done with the local people by clearly defining climate change to their situation. Go from national level, to local level to Dandora, to make the effect clear that they will experience in their daily live. Similar with possible action, this should also be explained from national, to local, to actions that can be realized in Dandora. And when discussing mitigation or adaptation, always discuss the definition followed by a suitable example. To further increase the understanding and the possible effects of climate adaptation measures you can show all the possible effects of a measure. For Dandora this could be a drawing where when trees are drawn in, the shade the trees provide are also drawn, to clearly show the possible effects that are relevant for the people living in Dandora.

Expert consultation 3 – PhD researcher on climate adaptation

During the expert consultation, the effects of climate change on Dandora were discussed, and the variations between the experience of the local inhabitants, and the official statistics. For example, there were a lot of complaints about the heat this year, while the meteorology department only measured a 1 degree increase. The department is normally focused on climate change effects like heat and rainfall, wind is currently not researched, but overall climate change trends are clear.

The field of professional climate change experts was also discussed. According to the expert, most urban climate experts are the same people as urban planners, urban developers, architects and climate change experts. There are not large departments on their own, but individual experts with interests in different fields.

When discussing Dandora and possible adaptation measures the expert mentioned that implementing projects solely focused on beautification would most likely not be successful. It was important to combine these projects with measures that improve the livelihood of the local Dandora residents. A project where more trees would be planted should present the effects as more shade and comfort, instead of a more beautiful area, as people are more interested in solution to the problems they face.

The questions that would be used in the Dandora interviews were discussed. Generally, the questions were deemed to be suitable, the expert did however say that some people would not be willing to talk about climate change if they did not understand climate change, they would not want to admit they did not know about this subject.

Expert consultation 4 – Environmental consultant Green by choice

During this expert consultation, the urban heat effect in Dandora was discussed, and possible adaptation measures that could help people adapt to the issues the local inhabitants experience. The expert said that Dandora is considered hotter by many people living there compared with the central area in Nairobi, which is more green. It is understandable why people experience this as there is more concrete and less green in Dandora, and the large waste disposal site also gives off heat.

Possible green adaptation measures in Dandora should be adjusted to the local situation. Due to the compact ground and high density of construction it would be difficult to plant in open spaces. Sack gardening is a possibility and further study can be done to see if there are other locations which may offer possibilities. The Museum has botanical experts which could possibly assist by sharing knowledge with the local community. When the possible measures of creepers (wall vegetation) was discussed it was indicated this could be a possibility.

The general requirements for such an adaptation measure to be implemented and maintained successfully should be that there needs to be understanding from the community, and it needs to be cheap and easy to maintain. The challenge is to make the greening of certain areas a personal goal of the local inhabitants, if this can be done the support is there to implement and adapt the measures. Furthermore, it is important that the type of vegetation can grow in the Dandora area, and is suitable for its surroundings, for example it should not require a lot of water, or very clean air to grow.

By combining climate adaptation with another goal in Dandora, for example beautification and/or health, it becomes more feasible. By linking to immediate needs of the Dandora residents, adaptation measures can solve more problems at once. An example of this was to decrease certain diseases, rubbish areas were cleaned to destroy the breeding sites of these diseases, this also had other positive impacts on the direct area that was not cleaned.

Annex 4: In-depth interview transcripts

Urban Climate Adaptation Interview Questions

2016

Interview 1

General Information

1. Name: Interviewee 1
2. City: Nairobi
3. Position: ☐ Politician ☒ **Urban planners/ designer** ☐ Urban climate expert ☐ Other, _____
If other, please describe function.....

Architect/Planner.

4. Organization: Director of Center for Urban Studies, JKUAT (Jomo Kenyatta University of Agriculture and Technology)
5. Email:
6. Phone number:

NB: abbreviations; CC - climate change, UCA- urban climate adaptation, CA- climate adaptation, CCA- climate change adaptation, UCCA – urban climate change adaptation, C - Citizens, Pol/P - Politicians, UP&D - urban planners and designers, UCE - urban climate experts. CPDs (continuous performance development)

Colour codes meaning: **Bold** is used to show notable points, **yellow** is used to show very notable points, **red** is used to show difficult points or barriers to climate adaptation and **blue** is used to mark specific document names.

A) Awareness

1. What is the sense of urgency to adapt the urban environment to climate change amongst the following groups in the future in your city?

Groups	Very urgent	Urgent	Neutral	Less urgent	Not urgent	Don't know
Citizens		X				
Politicians		X				
Urban planners& designers	X					
Urban climate experts	X					

Citizens – “People know” Average person is aware of climate change as the rains have not come. They do not interpret it as climate change per se, but as changing seasons which have dramatic consequences. CC, CCA + CCM citizens may not tell the difference between them. “I do not think most citizens are aware, as they are rural-based and the level of education does not cover it”. May not be able to distinguish, but know there is something like CC even though they do not call it that, as they feel the effects.

Politicians – Are aware due to news coverage on CC. At political rallies talk about environmental protection, not many are aware of CCA. CC effects are known but people do not know the technical language to address it.

UP+D &UCE – are trained people, thus in their studies have been taught about CC and CCA.

However this group does not have a critical mass and often academics give more attention to mitigation. Sunday Abuye’s PhD is likely to be the first in the country on climate adaptation and the city structure. (Second interviewee)

2. In case the sense of urgency is low, what is needed to make those groups feel more urgent about adapting the urban environment?

Groups	Measures to sense of urgency
Citizens	“Baraza” a Swahili word meaning council/ seminar or exhibition. These activities could be well executed by local chiefs (local level administration) who deal with villages. In urban areas the mass media is an important tool, such as radio or tv. Many urbanites will relate to CC as that awareness information but it will need to more explanation to address CCA and increase this specific awareness and recognition of terminology.
Politicians	It is very necessary to increase awareness in this group. This could be done easily by the government. CCA should be dealt with by a specific parliamentary committee that deals with environment should take this task. So to avoid plenary discussions and enable detailed information to be provided.
Urban planners& designers	Even though awareness is high, there is a strong lack of implementation. This can be addressed through the CPD (continuous performance development) meetings which are mandatory for planners and architects to attend at least twice a year to keep their title.
Urban climate experts	Have the role to sensitize and facilitate others. Problem is that there are very few in Kenya that are specialized in this, only one professor of Nairobi university comes to mind.

NB: Most Urban designers are architects as well, UD as far as I know are not legally recognized as a profession, although there are universities like TUK (technical university of Kenya) training them. Planners are recognized.

To date; CPD architects conference has not specifically addressed CA, but they do discuss related discussions about green building etc, address elements of it. Planners I am not aware if they do.

Who should lead it? The main actor should be the government ministry concerned. Together with organisations like UN-Habitat, universities etc

3. How aware are the groups of the following two urban climate phenomena?

• Urban Heat Island

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens		X				
Politicians				X		
Urban planners & designers	X					

C- UHI – **the urban people know, but since they are not technical will not call it UHI.** But they will tell that the town is hot and feel the difference compared to the rural surroundings. I think they are aware will say it is hot in town today, referring to the effect.

P – less aware

UP+D &UCE – are trained in this as part of the curriculum

• Wind Discomfort

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens				X		
Politicians				X		
Urban planners & designers		X				

C- **the wind is not a big issue in Nairobi, more aware of heat.** But we feel the effects of the cold. There are not really strong winds here, no serious issues with winds at all due to the geographical location and a lot of open space still remains in the city.

Increase in cold is suspected to be linked with CC, but don't know if that is correct. There are unusually cold days some times per year. **The coming late of the short rainy season is also a strong signal to contribute to the awareness that the climate has changed.** We need to save water now at a time, when we should be preparing for floods.

UP+D &UCE – are trained in this as part of the curriculum

4. In case awareness is low, what is needed to increase the awareness among those groups of two urban climate phenomena mentioned in question 3?

Groups	Measures to increase awareness
Citizens	Comes down again to education . Different ways can be explored, to get the best avenue for different sectors. i.e. announcement from president in public forums such as Heroes day, Practical demonstration is essential to make people understand the effects.
Politicians	For the national government use committees in parliament, as stated before. For the devolved government (counties) use the members of the county assembly and their own committees. Can be taken for nice trainings or seminars in fancy locations to inform them, make the forum suited to the political group.
Urban planners& designers	CPDs (continuous performance development) meetings are an important forum. If you do not attend you can be removed, however this is not usually enforced. However, the agenda for architects is determined by the management of the AAK (Architectural Association of Kenya) and it is not clear how the topics of the trainings are decided. As members, we are not asked what topics we consider relevant so I think the members should be more pro-active in this.

For students and citizens similar approach can be taken to what was done for HIV Aids. In the universities it was made a compulsory subject. Every student had to follow classes and must pass it. **We could decide to teach people about civically important issues i.e. corruption, entrepreneurship but also CC start teaching citizens about it at primary school level.** Make it an examined subject through different levels.

5. How aware are the groups of the following four urban climate adaptation measures?

- City design (e.g. street orientation, adapting to wind and solar orientation of building and streets)

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens					X	
Politicians					X	
Urban planners& designers		X				
Urban climate experts	X					

C+P – not aware, this is a complex issue.

UP+D – are aware **BUT do not do a good job in plans** if you ask me, as are aware of the issues but **there is no implementation of the knowledge.** i.e. subdivision plans the orientation of roads is not correct, or respect solar orientation. Thus they are not very aware as it is not implemented.

We have a problem of implementation in Kenya, as we train architects how to respect the north, solar angles and wind harvesting, but still we don't do it. **What must happen is more than technical training, need a cultural paradigm shift.**

C- **not really aware of UC adaptation measures**. Know a certain building when walking will burn your eyes, but will not know what adaptation should be done.

- Urban vegetation (e.g. green roofs, urban forestry)

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens				X		
Politicians				X		
Urban planners& designers	X					
Urban climate experts	X					

C – **People know the importance of vegetation or greenery in the city.** Main factor contributing to awareness was the **1989 campaign of Wangari Maathai against building up Uhuru park, Nairobi city's central park**. At the time it was the he only green space in downtown Nairobi, Uhuru Park, which would be built up for a skyscraper and shopping mall.

Overall - less aware as will not know of all measures such as green roofs, but will know a bit that greenery absorbs water and green surface will control a bit of flooding. **As see the importance of greenery but not explicitly for climate adaptation purposes.**

P- politicians are in the same category as citizens. Issue is people are going about their own business so **very few P or C are really aware**.

UP +D + UCEX – **Are very aware but there is lack of implementation**, i.e. **we have plot coverage restrictions that are supposed to support urban vegetation** i.e. Kiambu county 40-50% coverage. **But somehow people do not implement this**, as it is built up in the form of non-green parking or paved space.

The problem does not lie in ignorance, other groups have to be informed so that they can take civic action.
UP +D need to convince client to leave 40% green for benefit of adaptation and also property value, if they communicate this they will have no serious quarrel with the citizen.

- Use of materials (e.g. low albedo and longer cooling time-lag materials)

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens					X	
Politicians					X	
Urban planners& designers				X		
Urban climate experts				X		

C – materials are used in cities that look beautiful i.e. the colour, **there is no consideration of the property of the materials. Thus material use is an issue.** For example, **we use materials because we think they make our houses and spaces look expensive,** with the goal to look “posh”, such as **a lot of glass** used in buildings which will lead to excessive heating and result in the need of air conditioners. Furthermore, some architects are recommending gypsum ceilings, while I have read somewhere the dust of these ceilings can bring problems due to dust and possibly cancerous materials. Or putting fancy but very slippery tiles in a public space, not functional but we will write slippery as a notice. **Citizens don’t know about material properties. Main consideration is about looks.**

Citizens can’t take civic action due to the technical nature of the issue.

UP +D - **Aware but a lack of implementation.**

UP +D & UCE – change to cause implementation needs to come from outside.

- Anthropogenic heat (e.g. less air conditioners,)

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don’t know
Citizens					X	
Politicians					X	
Urban planners & designers		X				
Urban climate experts		X				

C + P – Generally **the citizens will not necessarily see the connection between the use of heat efficient materials, anthropogenic heat and urban climate.** **The majority will not consider adaptation but just individual measures against heat i.e. placing a fan.**

UP +D are aware but similar **the lack of implementation.** (Refer back to previous question)

6. In case awareness is low, what is needed to increase the awareness among those groups of four urban climate adaptation measures mentioned in question 5?

Groups	Measures to increase awareness
Citizens	<p>We need practical demonstrations for all the groups as citizens i.e. Nairobi international agricultural show in Jamhuri Park usually opened by the president.</p> <p>. This is very important. These could be part of the education; this education should happen at different forums depending on who is being educated.</p> <p>Education specifically on CC and adaptation as well as civic education for citizens on their civic duties</p>

Politicians	For politician's demonstrations are very important to create awareness i.e. show difference between a paving slab and a grass slab, just pour water on it and show the difference between what happens. So if a cities climate causes a lot of rain, then if your city is less green, your cities will flood as the water is not being absorbed. So simple demonstrations are necessary.
Urban planners & designers	CPD and Majorly same answers as to qn 4. Current practitioners are I think not really really dealing with climate, some could be emphasizing matters of environment but not of climate change.

Every year counties **have international shows** which have become broader in their themes, in Nairobi, Mombasa and the major towns have different shows per county headquarters to show specific aspects for them to show their economy. At such fora you can also show what people can do about climate change in our urban areas. A good opportunity with a lot of media attention. i.e. **Nairobi international agricultural** show in Jamhuri Park usually opened by the president.

I know there is an urban reference sector group, in the council of governors.

Under the devolution system in Kenya you have 47 counties which make up the country, and every county has a governor. **The governors have their own council, which has a department dealing with urban issues, this is where this climate change business can be addressed.**

→ The person who represents the professionals in the urban reference sector group, in the council of governors is my friend **Interviewee number 5.**

We have an MoU with his firm, EcoBuild Africa Ltd and is a friend of the urban center. He can have a lot of information on what can happen in the council of governors. He advises the council of governors on urban issues.

Question: Are there models being made to demonstrate by UP+D? As far as I know, there are no models in architecture being made to to help people understand. **Current practitioners are I think not really really dealing with climate, some could be emphasizing matters of environment but not of climate change.** I don't think these models are there and that is where we need to go.

But this could also be my ignorance, as this is not an issue I usually research on so it is my personal view.

B) Communication

1. Which roles do citizens, politicians, planners and designers and urban climate experts have in the process of planning, designing and implementing urban climate adaptation measures?

Citizens: **Citizen participation is a requirement in Kenyan law,** to be involved in decisions that affect them. **Citizens have to be involved in all stages of making the plan and the plan making process.** Because when you are planning or designing the measures you need to call and sensitize the people, listen to them, let them give suggestions because some of the measures you want to implement i.e. cleaning up or greening urban areas, kitchen garden to clean the air. As it is the citizens who will need to implement. **If you do not involve them in making the plan, you will not be able to involve them in implementation** as they will not be in line with it and will not agree to be passed over, say "kwenda" which means go in Kiswahili.

Question: since participation is in the law, is it also being done? **Yes, it is done in the making of plans.** Once a plan is made it is advertised, and **people are invited to give comments and come to meeting.** However, whether these comments people give are implemented is another issue altogether.

The **physical planning act, maybe also the urban areas act and the constitution** are very clear on the need for citizen participation.

The Pol and UP+D are not motivating people to go and participate as the advertisements to go are present but there should possibly be more **civic education for citizens on their civic duties**. So when called to meeting to discuss the budget, you can ask where is the budget for climate change?

To participate and discuss meaningfully you need to have some level of civic awareness. For citizens we need to include adaptation into education, from primary to secondary level to increase awareness.

Question: where does Kenya stand in relation to type of participation, according to Arnstein's ladder of participation? **Kenya is more on the level of seeking feedback**, on the 4th step if very developed could be consulting. **But I have not seen an obligation that you must implement what you are told and a chance for citizens to get feedback on the subsequent decisions.**

Politicians: **They have the voice and vehicle for dissemination**, they can move around and give location specific advice on what adaptation should be done where, i.e. plant trees, don't cut trees, don't pollute rivers. Advice for kitchen compounds to help clean up the air. A good example in the urban area is the sadly late John Michuki, as the minister of environment he helped clean the Nairobi river. **The role of politicians is to lead this process (in which the citizens need to participate);** they are the leaders. **They have the platform to tell people**, also at weddings, funerals and at churches. They can also spread the **"gospel of climate change"** just as what done during AIDs awareness campaigns.

Question so is a church is a partner to consider? Yes the churches could be the most important partners in awareness campaigns. As most of the Kenyan people are Christian's. Priests and other religious officials are very powerful people, people are patient and make many allowances a service that is planned to start at 9.30 and end at 11 can start 10.30 and can end at 1 and still people will wait and listen patiently. **Church a good forum to tell people about climate change, as it was a forum to educate people about their citizen rights.** A priest is taken as a first among equals, one of the valued leaders. So if the priest, the church the temple tells you need to take care of the environment then people will listen and take it seriously. Many people are catholic, you could go to the catholic secretariat and propose it to the bishop. If he tells the priests to announce they can read a message, as is often done with messages from the pope the reach could be huge.

Urban planners and designers: These people are the ones making plans and at the moment we are making **integrated strategic plans**. I don't know if they are really looking at climate change. But the **planners and designers should guide the plan making process**, which says which plan should respond to or have adaptation measures

Urban climate experts: - There are very few in Kenya. Need to give input at the point of plan making. A plan needs to be implemented to provide mitigation or adaptation.

For citizens we need to include adaptation into education, from primary to secondary level to increase awareness. – maybe the UCE can give input?.

2. What are the relationships between these actors in the communication strategies?

Citizens/ Politicians – **Kenyan's are very techno savvy.** Many internet innovations such as money transfer M-pesa were developed in Kenya. Money transfer is all done online etc. Getting a message to a politician can be on twitter, facebook and whatsapp. Politicians also often like having citizen numbers to remind them to vote. But citizens may have difficult physical access to the person. May not know where to find the person, although can do it online.

Citizens/ Urban planners and designers – Generally quarrels between citizens and planners. As despite the requirements in law, **most have been trained in a top-down approach, in a strong master planning** tradition. It is recently that we are moving to the strategic planning and all. Old tradition survey- analyse-plan, draw and bring to the people and sometimes people's feelings are excluded. **Therefore, it is a very uneasy relationship and it is difficult for citizens to access UP+D, a discussion on equal terms is extremely difficult.** The professor himself, as a professional in the built environment took 2 months to get a meeting with a planner of another town.

Citizens/ Urban climate experts – **Pure assumption – I would say that currently the UCE and the UP+D are basically the same people,** as the specializations now are not so distinct. So the relationship will be the **same uneasy relationship.** I think if we had enough UC experts, then they would be able to communicate easily with the people. I think we have **very serious shortage of UCE.**

Politicians/ Urban planners and designers – **This relationship has always been uneasy. Because sometimes what the politician's want done, is not what the urban planner wants done.** There is generally an uneasy relationship, especially if what the urban planner wants done goes against what the wish of a **politician, who will claim to be representing the citizens. Politician will claim that he is representing the people's interests more than the urban planner.**

Politicians/ Urban climate experts – No relationship described, as **UCE currently considered the same people as slightly specialized UP+D.**

Urban planners and designers / urban climate experts – considered the same people.

In the implementation of a plan you can call all people together to a baraza (public gathering or meeting) where all people can meet in a public forum for a plan. But an issue is that politicians will take by far most of the time to speak. Your topic here is about urban climate adaptation issues, but for us and the way I see it in the country, **I do not think it has reached that level that we are planning and designing for climate adaptation.** Sunday Abuje's PhD thesis could be the very first in this country on this topic, if I am not wrong. We currently work on urban plans and hope that they have an urban climate adaptation aspect, but I think most do not. Despite the fact that we are aware of these things, we may not be doing much about them.

3. What is the role of communication to support the planning, design and implementation of adaptation measures?

The role of communication is very critical. **Communication is very important as you need to integrate.** **The role of the communication is to bring together different, diverse players and ideas and helps to integrate the different adaptation measures, so that you can start to implement.** **Integration is key here.** Without communication people would work past each other. With proper communication channels you can bring it together. **Hence hopefully have a proper problem diagnosis which is shared by the citizen not just your opinion, for the design obviously you need input from various people and for implementation we have strategies but these need to be implemented. Role of communication is to bring people together at these three and maybe more stages,** so to hopefully make a sustainable strategy. NGOs projects often fail after they leave because they do not create ownership of the program by involving enough people. Without good communication and involvement, you will create social exclusion.

4. Are there formal guidelines or policies that drive the use of communication in the planning, design and implementation of adaptation measures? If yes, can you please name them?

I don't know about formal guidelines, but there could be policies. I know the law requires that people participate. But this question addresses HOW they participate. I suspect that **maybe the urban areas act** could mention something about allowing people to participate, but **I am not aware of specific guidelines about how people participate,** how balanced the contribution is i.e. how much certain parties talk. **There is a recognized need of the importance of participation but I do not think there is no definition of what kind of participation this should be.**

5. What are the strengths(+) and weaknesses (X) of the communication process?

X- **It is not inclusive, due to the communication process.** As it is difficult for people to participate on the same level or not all people are included.

X- **unstructured,** the public participation meetings organized are sometimes experienced as time-wasting. There is no structure so people get bored and this reduces motivation to come

+ **There are attempts to involve people in decision making and trying to create ownership of plans.**

6. Is there need to improve the communication process? If yes, how to improve ?

- Make the process more inclusive, identify all stakeholders first and try to involve as many as possible
- Have a structure for public meetings and participation events
- **Timely notices of the public meetings.** Often there is no proper period of notice but it is planned within a few days or a week
- **Well publicized meetings** i.e. the change of use notice are published, as required by law if there is a change of use (land-use change) advertisement which **calls for public feedback in a minimum of two**

public newspapers. But people often hide them in the advertising column.

For example; There is an effect on CC caused by change of land use; change of use from single-dwelling to multiple houses the amount of green space will reduce. The advertisement is small and hidden between other advertisements of sale of normal products, school advertisements and assorted advertisements, thus not many people will find or read it.

Question: who is responsible for improving the communication process? **The leaders, who are calling for these meetings should improve the communication process. The politicians especially as the leaders, and also the UP +D. The law needs to be more specific.** i.e. the law requires that if you want to change your land use to publish this in at least two public newspapers. However, in the example both the individual and the government put small notices that hardly attract the attention, thus this suggests for both that they are complying with the law but do not really want involvement. But the government could set rules for this, such as restrict the minimum size of notice to make it visible. As far as he knows there is no online information of this either.

The planners, through i.e. the urban planning act should come with input for the government to set in the laws over such and other matters related to communication.

C) Instruments

1. Are there legally binding instruments (e.g. zoning plans) used to implement urban climate adaptation measures? If yes, please explain how they work?

No. **The zoning plans are there but they are not there specifically there for urban climate adaptation**, but they are there as all areas have zones. **Development control regulations and Bylaws exist.** There is **a chapter in the constitution that deals with the environment, which can broadly be interpreted to refer to adaptation measures.**

Thus overall, no they target environmental measures but do not specifically dress them.

I think we are making good progress as now we have a climate change secretariat and a climate change research centrum, near the metropolitan department. We are having an increase in these binding instruments and have developed a climate change act 2016.

Other laws that can be read broadly to encourage adaptation:

- The **physical planning act of 1996**, mentions environment and is still in force today
- **The urban areas Act**
- **The country government act**, must mention some measures that deal with sensitive environments
- **The forestry Act**
- **EMCA Act** (environmental management and coordination Act), which gave birth to the **NEMA institution who are very serious about climate change.**

How do they work? It is written in legislation so legal protection i.e. the forestry act to not cut trees, **however there are conflicting acts which will also allow this. So they are working somehow but not to their full potential.** These acts are meant for good environmental practices, so we can infer if you have good planning and environmental practices then you can mitigate and adapt to climate change.

Mombassa

- No harvesting of mangroves, then you prevent erosion and protect the environment and urban area under that extent.

2. What are the strengths and weaknesses of the legally binding instruments used?

Most weaknesses have been alluded. **There are instruments but they do not specifically mention adaptation issues or climate change. Thus we can only infer.**

X – **the laws are old, so are not alive to the current measures.** The constitution should mention climate change in the chapter of environment – I don't think it does this, As If something is specific in law then it is taken more seriously

+ some are quite punitive or serious in punishment if you break it. Thus the **laws are a deterrent towards destruction of the environment**

+ the **climate change act could be a good new step forward, to specifically address CC and CCA.**

3. Are there certain chances / potentials missed when using the legally binding mentioned instruments (e.g. coupling with other instruments)?

There is a huge missed potential because the plans are not current. Thus we are not zoning with climate change. The plans should be continuously revised. For instance the forestry act, exist but are too general not about CC like urban forests. **The issue is more to increase specificity. I hope the CC act is already operationalized and covering this.** For the other plans you need to look for something to justify the link with CC. It is only recently that Kenya begins to define how the instruments should be used to address CCA.

4. Are there other policy instruments used to implement urban climate adaptation measures?

If yes, please explain how they work?

1. I think the **urban development policy**, which has I think not been gazetted so that it is real policy. But it is in the process and **I think it should mention CC.** If this policy will mention that during development of an area, it will be a lot of progress and form the basis for including CCA into planning. Chap 6. Deals with urban land, environment and climate change.

Interview tips → Directorate of urban development – find interviews there, people like Ambwere – he may be in the directorate of urban development or similar. I can recommend to talk to someone from that office.

Problem the ministry of environment will be dealing with the environment in general, thus not be specified in CC.

2. **By-laws, these are laws produced by the counties.** i.e. Mombasa if you have a by-law that says don't cut mangroves or do not start sand harvesting it could work to help the UCA measures as it restricts exploitation and helps the environment.

5. What are the strengths and weaknesses of the other policy instruments used?

X – **lack of detail in policy instruments to cover aspects of adaptations.** The reason is that most likely **these instruments i.e. the urban development policy are not being made by experts on UC** thus a planner could be writing the chapter on climate change who is not trained in this, thus the document is not detailed.

+ - **we give a direction of where the country is headed and help protect the environment**

+ **The fact that they are written, or in law – helps for implementation** as it is more likely that it will be carried out as we are trying to institutionalize this process of CC

6. Are there certain chances/ potentials missed when using other policy instruments (e.g. coupling with other policies)?

Yes. X - For instance the **urban development policy miss comprehensiveness and inclusivity as when it was being designed there was probably little consultation. Thus does not deal with specific aspects of adaptation.**

Question: What do you think of mainstreaming as concept, as a way to connect lower priority issues i.e.

UCCA to other issues? **Linking low and high priority issues is a good idea.** The government is very dedicated to primary school education and has very clear goal about laptops for students. It is an easier approach **as it is**

difficult to introduce the climate change goal at one go. Our city is quite young, so we usually do not do re-development but we do up-grading. Slum is usually used as the word for informal. **The slums are being**

upgraded and CC can fit with this as an agenda. But your goal/ concept can be broadened/ expanded to also include middle-income in your goal to also improve the CCA adaptation and greening in those areas. i.e.

could set rules for low-middle and high-income to do green roofs or fruit trees and also the same for own bungalows in Eastland's. Thus CCA is better to be combined with the concept of housing and not just upgrading. The strategies will be adjusted according to the area you are focusing on.

When you renew leases or have by-laws you can require people to do a, b, c d that contribute to CA. Just as people are required to paint their building after x years.

→ Good thing of approach is that it can work well to mix a big idea with a small one, as it allows incremental implementation. **Incremental makes it more feasible and cheaper.**

Dandora is NOT a slum. It is a degraded neighbourhood? – **Yes. It is a site and service neighbourhood.** So there is no slum-upgrading? **I don't think so but I can ask my cousin who lives there and we can find out. She works at ministry of foreign affairs, can meet in town. Or she can take you there.**

D) Implementation

1. Which concrete urban climate adaptation measures/ interventions are currently implementing or have been implemented in your city?

Nairobi – **planting trees and greening.** **We are not consciously working at CC but planting trees and cleaning up the environment.**

Mombasa – **mangroves protection, limit of harvesting. Very good protection of the trees along mama Ngina drive** (named after the current presidents, Uhuru Kenyatta's mother), this road runs along the coast line and next to Nyali golf club.

I think there are bylaws which deals with measures to take.

2. What are the strengths and weaknesses of these mentioned urban climate measures/ interventions?

X – planting trees, the **wrong species could be planted** but could cause littler or not maintained so quickly dies

X – **not extensive, a fragmented planning approach so does not really cover mitigation or adaptation for a large area such as a town.**

+ **trees cool down the city, provide more shade and are improving the environment and habitat for species i.e. bees**

+ Cleaning up of Nairobi river

3. Are there conflicts between aesthetics and these mentioned urban climate adaptation measures?

Trees are beautiful, add to the aesthetics. Conflicts can be small due to litter or form of the tree. But generally in the tropics we like green, **so the conflict is minimal**. Nairobi is a green city, nickname green city in the sun and we are very proud of that aspect.

4. Are there conflicts between urban functions and these mentioned urban climate adaptation measures?

X **Some trees have fallen on roads during the rainy season**. People's cars are damaged and roads are blocked thus it affects the transport system. **Therefore more maintenance is needed**.

X **the litter of the leaves or flowers of some species** – such as the jacaranda flowers in the short rainy season now. The flowers also attract birds which leave faeces dropping all over the city, on cars, streets and windows. Furthermore, the wrong species of trees attract species of birds that are not desirable i.e Marabou storks which eat garbage and are carriers of disease. Furthermore these birds are also a danger to planes.

5. Are there certain chances/ potentials (e.g. coupling with other interventions / 'no regret' measures) missed when implementing these mentioned urban climate adaptation measures?

We do not do enough of UCA. Only focus on planting trees, but are not putting vertical green or green roofs. **There are chances that we are missing chances that could help us adapt. Especially the new buildings we are missing a chance to introduce green vegetation.**

Lack of implementation of taught theory is a missed chance i.e. materials or solar orientation. It has a lot to do with the training of the person if it is implemented but is more a rarity than normal.

I want to emphasise that in Kenya we need to create more awareness in the urban areas. Due to urbanisation we will feel the effects more if we do not do much now, as our urbanisation rate is very high. It is very

important that we adapt and take sustainable adaptation measures. If they are not sustainable then the measures will die out, and our resources are limited.

We need sustainable urban climate adaptation measures. Which implies that there are thus measures that are not sustainable and in the long run we need to look for those which are sustainable

High technology can be a great tool, but we still need to emphasise the need for **appropriate technology**. **The suggestions for UCA should be within a framework of affordability and suitability i.e. can afford to plant trees but may not afford a green roof due to engineering required.** Suitability – for purpose; the philosophy of a pro-tech comes in.

I like the idea of starting small and integrating the small measures, suggested by your mainstreaming approach. Which over time can be matured and upscaled. **Maintenance and affordability is are also fit to small measures. Due to economic priorities a bulk approach will not work in Kenya.**

Thank you for answering the questions in this questionnaire. Do you have any other remarks regarding the urban climate adaptation process or the content of the questionnaire?

Comments on research: The research on CC is a current, contemporary issue. It is timely and not trivial and I would encourage you to probably even look at it beyond the master's. You can look at it at doctoral level if you ask me.

Suggestions for questionnaire: **took 2hrs +. A good questionnaire should last around 45 minutes to avoid 'respondent's mortality'.** Many contacts will not have longer than 45min- 1hour. So concentrate on the open-ended questions and let the fill the closed questions faster. Emphasize on the open explain questions. Then it can be done.

If the respondents talk too much, quicken and interrupt the person (skills in cutting them short) and it can be done in 45min to one hour.

Make the questions a bit more direct, especially if you are not there to explain:

Provide definition to explain CCA/ CCM and specific technical terms such as no regret measures. A list of definitions somewhere.

Avoid asking two questions in one question (double-barreled) some ask 2-3 issues in one question. You want someone in class 6 to understand the question, unless it is really for an expert. i.e. question on planning, design and implementation – get one word to mean all or separate into 3 questions.

Question Interviewee: The study has a very serious policy orientation, it does not have a specific goal of design? No it is my choice to not focus on design, but on the local level it would be very interesting to develop participatory locally suitable measures as recommendations and a basic plan or design for the area if time allows.

Interview 2

General Information

1. Name: Interviewee 2
2. City: Nairobi
3. Position: ☐ Politician ☐ **Urban planners/ designer** ☐ Urban climate expert ☐ Other, _____
If other, please describe function.....

Landscape Architect and Assistant Lecturer in Landscape Engineering, Visual Environment and Landscape Design and Detailing. Specialties: Landscape and Environmental Planning

4. Organization: Partner Lancad Landscapes- Landscape and environmental consultants & Tutorial Fellow at Jomo Kenyatta University Lecturing on Landscape design and Engineering
Current PhD study on: Influence that the City Structure of Nairobi has on the effects of climate change like flooding and temperature changes. Study looks at urban climate adaptation.
5. Email:
6. Phone number:

NB: abbreviations; CC - climate change, UCA- urban climate adaptation, CA- climate adaptation, CCA- climate change adaptation, CCM - Climate change mitigation, UCCA – urban climate change adaptation, UP&D - urban planners and designers, UCE - urban climate experts. GoK (Government of Kenya) DRR (disaster risk reduction) NEMA (National Environment Authority) or MENR (Ministry of Environment and Natural Resources), KMD (Kenya Meteorological Department).

Colour codes meaning: **Bold** is used to show notable points, **yellow** is used to show very notable points, **red** is used to show difficult points or barriers to climate adaptation and **blue** is used to mark specific document names.

A) Awareness

1. What is the sense of urgency to adapt the urban environment to climate change amongst the following groups in the future in your city?

Groups	Very urgent	Urgent	Neutral	Less urgent	Not urgent	Don't know
Citizens	X				X	
Politicians						
Urban planners& designers		X				
Urban climate experts					X	

Pol – focus is on service provision things that are relevant for gaining votes and election issues, so **most of the time not urgent.**

UP+D – a bit urgency, **some it is incidental** in the process of providing for other urban needs. As a result of other actions.

UCE- I do not think we have, or I do not have good knowledge of availability of urban climate experts, locally. I think that if they are there they are in training to fill a gap. **In my opinion don't think they exist yet.**

2. In case the sense of urgency is low, what is needed to make those groups feel more urgent about adapting the urban environment?

Groups	Measures to sense of urgency
Citizens	Don't know if they know difference CCA and CCM
Politicians	For politicians 1- need awareness that CC affects several spheres for their voters. If re-directed as a political need for them, they can see how they can benefit from by getting votes and things like that. Very few know the difference between CCA and CCM
Urban planners& designers	Some are aware, not not necessarily a large number of them. CC people have read about it but not gone into great detail i.e. ppl know certain efforts are being made i.e. reduce carbon emission and trading carbon credits, they are doing this from a financial point of view i.e. grow forest to get some funding for that. But knowing about mitigation and adaptation and how it is done, I think that level of awareness is actually very low among probably the entire group of all the players.
Urban climate experts	Their needs to first of all be a body of urban climate experts. In my opinion what currently exists is incidental, people who have done climatology and come to fill a gap in urban areas based on the information or expertise they have that may not be specific to urban areas.

3. How aware are the groups of the following two urban climate phenomena?

- Urban Heat Island

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens				X		
Politicians				X		
Urban planners & designers	X					

C and Pol– **ppl are aware of the phenomena,** i.e. people will talk about in the warm months, Nairobi has become very hot “Jua imeshuka” the sun has moved very close. Know certain effects, but the **awareness of it being an UHI effect is very low.**

UP+D – both the terminology and phenomena they are very aware

- Wind Discomfort

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens				X		
Politicians				X		
Urban planners & designers	X					

UP+D – both the terminology and phenomena they are also very aware, **their training includes these aspects.**

C and Pol- as terminology maybe not aware, but generally the effect also less aware.

4. In case awareness is low, what is needed to increase the awareness among those groups of two urban climate phenomena mentioned in question 3?

Groups	Measures to increase awareness
Citizens	<p>C+P will go together (except the politicians who have been deliberately engaged by institutions on these issues). Most of them are not very aware. To create awareness:</p> <ol style="list-style-type: none"> 1. Technology has really penetrated all spheres and levels of income in this country. Technology is an important in creating awareness, big urban population has mobile phones and tv. i.e. give local weather data after news – could be a big opportunity 1. A sectoral aspect – in academia people interact in meeting, in settlements or communities through community activities, local activities are necessary to link the source of the impacts to the effects they experience. i.e. On community level – building roads, investing in sanitation – so that related issues are addressed with CC knowledge in mind, if explain the relation i.e. flooding and waterborne diseases. <p>Now experience the impacts but do not know the source. T</p> <p>X- seen as abstract</p> <p>Thus needs to be linked to local knowledge and sectors. CC affects all sectors of the economy. Linking to other issues very valuable to make it feasible CC should be involved in all policies</p>
Politicians	
Urban planners& designers	

5. How aware are the groups of *the* following four urban climate adaptation measures?

- City design (e.g. street orientation, adapting to wind and solar orientation of building and streets)

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens		*		X		
Politicians		*		X		
Urban planners& designers	X					
Urban climate experts						

People are more aware of green / renewable area thus are more aware of street orientation. Other measures of city design in general less awareness.

*For wind and solar average citizen and pol are more aware of wind and solar – the level of penetration for grid electricity was low but people adopted a lot of renewable energy to provide power for themselves. i.e. where to put a solar panel

Politician difficult to classify as are 2 types – career politicians or people who do it as a means of employment. Generally, rate them the same as the citizens. Opportunity to create awareness is in the national and country assemblies to discuss knowledge.

UP +D – have CPD trainings which could be used to increase the level of awareness greatly.

- Urban vegetation (e.g. green roofs, urban forestry)

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens				X		
Politicians				X		
Urban planners& designers		X				
Urban climate experts						X

We don't really have green roofs mostly it is urban forestry – mainly as a recreational measure in urban areas

UP +D coming up are aware but the older generation, which is the majority today, is more focused on social issues in their education and work than on environmental issues. Thus old generation aware, not very aware. The newer generation with courses like landscape architecture are more aware as the new curriculum addresses it.

UCE – don't think they exist, so don't know.

- Use of materials (e.g. low albedo and longer cooling time-lag materials)

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens	X					
Politicians	X					
Urban planners & designers	X					
Urban climate experts						

UP +D very aware. [part of training. Pol + C – very aware as has to do with settlement and people are very critical of low or high quality housing. **May not understand the materials in the context of CC itself, but do understand the materials they use affect the adaptability of buildings to climate.** Not necessarily within the context to adaptation to climate change.

Difficult to place – very aware, but in so far as it is adapting to climate not understanding UCCA.

Personal challenge: in discussion people understand their is climate, but see it as a totally different thing to climate change. **Divorce climate from climate change.**

i.e. **construction of settlements in informal settlements, for a building will roof with iron sheets, but walls with mud as otherwise it will get too hot inside.** But for them it is a climate issue. If you ask them about the **UHI they will not know that**, but will understand that using certain materials will make the house uncomfortably hot.

Understand there is a localized climate within the urban areas, but not within the context of climate change. **So they are adapting, but they are adapting to what they see as climate not climate change.**

- Anthropogenic heat (e.g. less air conditioners,)

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens				X		
Politicians				X		
Urban planners & designers		X				
Urban climate experts						X

UP +D Most responses is related to training, at tertiary level. Largest group of citizens has not gone through this university level education. **Mainly aware are those with background in architecture and landscape architecture.** Those trained in urban and regional planning do not have this as a critical component of their curriculum.

There is a disconnect between the knowledge of use of materials and anthropogenic heat. UP +D it depends on their level of specialization, i.e.

6. In case awareness is low, what is needed to increase the awareness among those groups of four urban climate adaptation measures mentioned in question 5?

Groups	Measures to increase awareness
Citizens	C + Pol + UP+D – sectoral specialisations should be linked Technology + sectoral approach as well as legislation
Politicians	Technology + sectoral approach + legislation ; as most politicians interact a lot with experts when legislation is being created. Legislation is a big opportunity to become more aware of this. As most politicians are lawyers by training and need advice on CC need CC laws – some existent but lacking Existing laws – from a sectoral point of view the environmental management and coordination act of 1999 , which deals with different components of the environment. It is not expressly oriented to CCA but the end results will be an incidental benefit. EMCA, the forest Act, the water Act , and so on – but specific to CCA I think we have the National CC Action plan, the National Climate Change response strategy, the climate change bill – but even the level of awareness of the provisions of this law is also very low. They have not been as hyped as other laws and regulations that are usually enacted. Because if you ask anyone right now; they know the banking act was amended to reduce interests rates, but if you ask the same person about a CC law, they are not aware. Need more information dissemination from the politicians about the CC law. As the politicians do not feel it is a critical thing, due to less understanding and focus on votes. They know the issue about interest rates will resonate with everyone, as opposed to CC. As if you tell someone about CC they will feel this is not affecting me.
Urban planners & designers	C + P U+D – sectoral specialisations should be linked i.e. Urban forester – focus is on the types of species, but not able to draw the link between those species and wholesome adaptation to CC and the resulting urban forest. Technology and CPD (which is often organised on a monthly basis is very relevant for this and allow for cross-interaction among these professionals -yearly conventions that also bring together different professionals

B) Communication

- Which roles do 1 citizen, 2 politicians, 3 planners and designers and 4 urban climate experts have in the process of planning, designing and implementing urban climate adaptation measures?

Citizens:

Planning related, one good thing that came with the new constitution in 2010 is to have **participation as a legal requirement in the planning process.** Thus the citizens have a more **expanded role in planning.** However, **whether this is being done or being done successfully remains to be seen.**

As what I have seen and felt is that for you to be able to contribute, you must be aware. If you are not aware you cannot contribute well. **The framework of participation exists, but the quality depends on the level of awareness, which could be low of some of the components.**

i.e. flood risk mitigation will understand, and be able to contribute. But talking about the UHI, they might not be aware. Depends on their level of knowledge

Politicians:

Their role is actually a lot bigger than all the others. The process of enactment, laws and decisions takes place on different levels, public participation at one level. **Before laws become binding the politicians give the last level of ratification. Also play a role in creating awareness with citizens.** **Locally citizens tend to listen a lot more to politicians, than to professionals.** Thus they have a bigger role in influencing citizen themselves and are the last level of ratification, whether of planning, designing or implementation.

Urban planners and designers:

Have 2 main roles. 1 is role in **informing planning/ design/ implementation policy which is at one level.** Once something becomes law it is implemented as a good/ bad law. Can have given their opinion on one level, but the politicians can have decided to go another way. Once it is enacted they have another **role in implementing what has been provided for in law or to provide what they feel as professionals is necessary, but is missing/ not provided for in law.** **They have an opportunity to influence this in implementation.**

Urban climate experts:

Still don't think they exist, but if they did would have a very significant role. **In creating awareness and enactment of policies as they understand the congruence between urban issues and climate.** Would be **better able to create policies that are sensitive to CCA, than a usual UP or D would,** as they would deal with smaller issues i.e. designing a street they would look at orientation but an UCE would have a more wholesome view.

2. What are the relationships between these actors in the communication strategies?

Citizens/ Politicians – **2 way relationship in terms of communication, as the C by and large feel the effects and impacts of CC, but Pol are the ones who basically guide the process of adaptation.** Heavily 2 way relationship.

Citizens/ Urban planners and designers – Dynamic relationship. **Before the enactment of the new constitution which allowed for public participation in most of these processes, the communication was mainly one way.** **The UP+D would gather information from the citizens, and plan, without necessarily giving feedback or guidance.** But with the enactment of the constitution, **now there is interaction.** **The citizens have an opportunity to give information and the UP+D have an obligation to seek that information, their opinion and give feedback on the same.**

Citizens/ Urban climate experts- **If existed, would follow the same route** as the UP+D have. Right now the UP +D are playing these roles, thus interaction likely to be the same.

Politicians/ Urban planners and designers – A very interesting kind of interaction, **Pol for the largest part feel they do not need the other UP+D, as their focus is on the citizens. Only interaction comes in at the point of legislation, as they do not have all the information** so need to seek it from the UP+D.

On the flip side, largely the UP+D feel heavily dependent on the Pol, as one they play a significant role in legislation, approval of building plans and implementation strategies and a very significant role in the funding. Even in communication process they are dependent, as the **forum that UP+D have is more often than not more elitist in outreach.** Likely to find them in seminars or professional organizations. **But the person that reaches the day to day citizen is a politician. If pertinent information needs to be communicated from the planner to the politician who can take it to the citizen.** Sometimes citizens are not even aware that some professions exist, so it becomes a big challenge for them to acquire the information if needed. **So the relationship between urban planners and designers and citizens are very unclear.**

Politicians/ Urban climate experts - The **relationship between urban planners and designers and politicians are very unclear,** same for C – UCE as same people and they are also likely to have that **elitist forum.**

Urban planners and designers / urban climate experts – **same people currently, no UCE as a separate group.**

3. What is the role of communication to support the planning, design and implementation of adaptation measures?

Communication is one of the biggest roles, it is through this that awareness can be created, which is one of the biggest things that is lacking. Communication:

- I. Creates **awareness within the context that CC is a phenomenon** that needs to be dealt with **and the need to adapt**
- II. To create awareness of case studies, this has been done here with this level of success, worked in this place etc. **The types of adaptation measures and how these can be made to suit the local situation.**
- III. **Provides people information about the different types of actors involved.** As people are now not aware. An example I see often, is that if I had an emergency right now and called the general emergency number 999, the changes that it would go through are very low. While every police station has a mobile phone number. So if people do not know how to seek information, it becomes a challenge and almost a limitation in what they are able to do.

4. Are there formal guidelines or policies that drive the use of communication in the planning, design and implementation of adaptation measures?
If yes, can you please name them?

There are formal policies and frameworks around CCA and CCM, **but I do not know if they guide communication** i.e, the National CC action plan, the national CC response strategy – **but they seem to be leaning a lot more to mitigation rather than adaptation.**

The formal guidelines probably within the context of i.e. the building code, their **end-result is more incidental than intentional.** In terms of meeting other needs and in the process contribute to some CCA, but it is **not the main focus.**

5. What are the strengths and weaknesses of the communication process?

X – **the level of focus of communication.** 1 -The **far-reaching communication infrastructure** i.e. Meteorological department climatic forecasts exists, but it is **not focused on CCA etc.**

X- And 2- those that seem to focus issues of CC, CCA, or DDR - their level of penetration is limited and **their focus is very sectoral** i.e. DDR, early warning systems – the coverage of this is very limited.

X - **The Meteorological information is more blanket information** - As now they say Nairobi region and parts of central will receive more rainfall, but these areas are so large that it is hard for people to know if it affects them. **Needs to be made more site specific.**

Medium of relevant information - online, not through sms or WhatsApp communication to reach a larger group, which would ne be necessary for specific events i.e. above normal rainfall

+ strength – there seems to be **a lot more information being provided**, even though it comes in an informal structure. i.e. twitter updates about flooded roads or parts of the city.

X -**The infrastructure and information both exist, but the information is informal** – so the person who consumes this information needs to have a high level of awareness to know what to do. **As the information is communicated as is, you are not advised on what to do.**

+ **Deliberate effort to collect data and disseminate** it, i.e. information om levels of river in the city exists, but you would need to know what you are looking for to find it. It is open source, but it is not readily available i.e. from the water boards or similar organizations.

X – **dissemination is a challenge**, need to go to office to find it and not all is free. **The main provider of climatic data in, the Kenya Meteorological department (KMD) does provide open blanket data, but not give specific data as free information.** Other sources do give free information, if you are using it for RCMRD Resource center for mapping for resource development in Kasarani, have a lot of information and it is free for students. Some information is from the KMD

6. Is there need to improve the communication process? If yes, how to improve?

Certainly. **One is making climatic information such as from KMD freely available**, especially from the KMD.

Two, is **utilizing the existing technologies, mainly through the internet** as most people have phones that can access the internet. **Three, creating a repository** where all social media gathered information can be collected, **then analyzed for advice on what someone needs to do.** **Now the information is collected, but there is no advice on what someone should do.** **Third, critically arming the politicians with information, politicians have a lot of reach and sway but can only communicate what they know.** Lastly also related to making it clear **which actors are involved** in the process.

Question: Who is responsible for these improvements? **The government using public taxes to improve spread of information**, and the **politicians – as they are the bridge between the citizens and the government** (as an amorphous body). Third the **UP+D have a significant role to play, they should aid in dissemination of information.** They have a level of interaction especially with the citizens in the planning process, where public [participation is involved so can advise and propose ideas with citizens.

What is lacking now? **The technological knowhow**, i.e. at the KMD where I who people, this **climate information exists** **but people who work there do not know basically how what they have can be translated into something that can be communicated to other people.**

Pol – some are unaware but basically what is lacking is the goodwill. The focus for them is not the information, but votes. For **UP – current shortfall is outreach, the projects done by the government where the public is involved, the level of outreach of the UP is very limited.** There is only interaction with the people that come. Whereas the level of apathy among the citizens is very high, i.e. not see how new road affects them thus many will not show up. **Funding is also a challenge due to many competing needs, our focus is mostly on basic**

services and health services, thus issues such as CCA are regulated to the back burner. Even if health and CCA have links, it is not seen, if sectoral information would be shown then people would be a lot more sensitive to that.

C) Instruments

1. Are there legally binding instruments (e.g. zoning plans) used to implement urban climate adaptation measures? If yes, please explain how they work?

The building code and regulations and the planning by-laws i.e. zoning by-laws that control levels of development. (planning by-laws: are laws enacted by the county governments which are likely to vary from country to country i.e. the locally applicable laws). The plot coverage for Nairobi is one example, which does not apply for the rural areas.

These laws work as incidental contributions i.e. Forest Act, generally provides for the protection of forest i.e. control degradation of forest, so by extension are able to address CCA or CCM. Contribute to the sectoral aspects of urban and rural areas.

2. What are the strengths and weaknesses of the legally binding instruments used?

X – **lack of implementation, monitoring and evaluation**. i.e. plot coverage provided for in law but no one will check, thus **there is a disconnect between what is in law and the plan**

X- **lack of specific provisions in terms of detailing, application and provision**, some country laws detail the type of street furniture lamps. In Kenya law will state that drainage is needed, but how you provide it is up to you.

X – **laws that exist is more incidental than specific to CCA**. Most of them were enacted before CCA become a big thing, focus on sectors that relate to CCA.

+ **broad laws** make application difficult, but the **overarching law is broad and vague enough to provide for other specific laws**. i.e. the **new constitution under the chapter on land and environment** guarantees as a human right, a clean and healthy environment. i.e. the **CCA act** can pick from that how can that be provided for as a right at a local level. **Thus ground work has been set and supports further laws**

+ **we are progressively developing the institutions that come with CCA**. **People have felt, especially the professional class and some of the higher levels of politicians have identified the need to adapt**

+ **The CC Act creates the national CC committee**, which is one of the few in the country that are chaired by the president (separate from the CC Secretariat – which deals with implementing the provisions from this body).

3. Are there certain chances / potentials missed when using the legally binding mentioned instruments (e.g. linking with other instruments)?

Yes. chances are missed, mainly due to lack of awareness. The last 3 years the Nairobi city masterplan has no clear provisions for CCA/ CCM. A milestone can be made for this i.e. in Tatu city. But now **new cities are not intentionally looking at CCA**. Many laws before the new constitution, were revised to improve coordination. **No critical revision was done to laws according to CC impacts**.

The CC Act that was done in may 2016 is binding. The timeframe used is a challenge for this act. **Other strategies did not exist specifically for CCA, but were incidental.** Adaptation was previously not legally binding but a preference.

There is not deliberate effort to not adapt, but for the longest time **CC was not being felt as a relevant issue for urban areas.** CC was felt mostly in the rural areas. Until challenges of flooding in urban areas and the waterborne diseases spread there had been no urban need to adapt.

Now there is a process ongoing guided by the UN (United Nations).

Now there is a lot of progress on CCA. **With the CC Policy, CC Bill, CC Action Plan.** The process has started and the success or failure can only be judged in due course of mainstreaming. **Mainstreaming is a specific goal.** **There is more effort to improve public awareness.**

4. Are there other policy instruments used to implement urban climate adaptation measures?
If yes, please explain how they work?

Yes, Incidentally the **forest/ water Act and the Building code, the urban areas and cities Act.**

These do not specifically contribute to CA, but incidentally they do.

5. What are the strengths and weaknesses of these other policy instruments used?

X - The CC Action plan is not legally binding, is more a guideline.

6. Are there certain chances/ potentials missed when using other policy instruments (e.g. coupling with other policies)?

The greatest potential missed is not meeting the need where it is needed the most. I.e. Breathing space or house plot space that 25% should be unbuilt land. **The regulations do not define what to do with the residual space i.e. pave it or put grass. Thus this rule is not used to its full potential.**

D) Implementation

1. Which concrete urban climate adaptation measures/ interventions are currently planned or have been implemented in your city?

Most implementations are incidental, not specific. In informal settlements, there are attempts to stabilise slopes near rivers, to reduce erosion and introduce greenery. But this is seen as urban agriculture. **In Mombasa, to protect against sea level rise people protect and add to the coastline through mangrove forests. These reduce erosion.** **Most other efforts done are private** i.e. where to put hotels is not chosen on the basis for CA but for property value.

2. What are the strengths and weaknesses of these mentioned urban climate measures/ interventions?

Strengths are not directly related to CC.

- + But there is an increased sense of ownership of urban greenery as urban agriculture thus more protection, than if it was just green infrastructure.
- + More motivation and communication to deal with increased sustainability
- Endeavours are not specific to CCA, which means they do not achieve 100% their potential i.e. species used for urban agriculture may not be the most appropriate for UCCA.

3. Are there conflicts between aesthetics and these mentioned urban climate adaptation measures?

Yes. Urban agriculture focuses on the production of food but not critical consideration of urban aesthetics. Luckily previous planning, which was modeled on the western city, means that the roads have adequate mediums and that there are properly planned green areas in the city.

There is a conflict between aesthetics and meeting basic needs . Within the government the people approving funds do not see need for aesthetics. As they are not seen as critical.

Hence they see the adaptation endeavour as a beautification problem, which does not warrant a large budget of 60million but maybe only 1 million.

To solve this requires wisdom from the Up&D. As firstly functional aspects are the most focused on i.e. trees are the first measure, as they improve the microclimate and second the beauty aspect. A Park performs other functions i.e. preventing flooding and reducing the heat stress. **A huge challenge is the value of spaces in kenya is seen only in monetary terms.** It needs to be demonstrated or visualised how an individual can benefit from an adaptation measure.

4. Are there conflicts between urban functions and these mentioned urban climate adaptation measures?

No. I don't think there are. **Urban functions i.e. the street and greenery can also support and prevent other functions such as illegal U-turns in road use.**

Local urban adaptation is driven by 1) adaptation and 2) social needs..

5. Are there certain chances/ potentials (e.g. coupling with other interventions / 'no regret' measures) missed when implementing these mentioned urban climate adaptation measures?

I don't know for the practical situation. **There are no intensive adaptation measures. They are from a theoretical view, but it is good to note that vulnerability is a key issue in informal settlements.**

The disaster/ risks of non-adaptation i.e. flooding sweeping parts of a settlement away are so high that adaptation does not lose any potential. **I feel any adaptation is good there, due to the risks people are exposed to now (the loss of life), nothing can be greater. Hence, there is almost no chance for mal-adaptation there.**

Other measures can give or decide the opportunity cost in combining measures. The UCE need to determine the value and cost of adaptation.

Especially the cost of adaptation (leaving green space and the opportunity cost in rent in building there) vs. the cost of not adapting (earning from building a 6 storey building in that location).

This consideration is critical, so that politicians and the government see why adaptation is necessary and how it competes with other financial interests or costs. Or they can hide adaptation in other requirements i.e. green roof required for buildings over 10-30 floors high.

Especially for urban areas there are potential missed as issues are very interlinked. Buildings in a low density area, the building should cover only a part of the total land. **There should be a wholesome policy that covers a combination of different areas i.e. housing, climate, environment etc.** This must also be flexible and location specific. Hence this should not be done at the national level **but at county level** i.e. the center of Nairobi is affected by flooding, wind and heat, while Runda on the outskirts of Nairobi is affected only by flooding.

This policy should be made by engaging with UP&D, and UCE and engineers.

Thank you for answering the questions in this questionnaire. Do you have any other remarks regarding the urban climate adaptation process or the content of the questionnaire?

Interview 3

General Information

1. Name: Interviewee 3
2. City: Nairobi (some information on Mombasa through
3. Position: ☐ Politician ☐ **Urban planners/ designer** ☐ Urban climate expert ☐ Other, _____
If other, please describe function.....

Consultant Urban Planner UN-HABITAT.

4. Organization: Partner ANWANI-Architects & Development Planners Ltd.
5. Email:
6. Phone number:

NB: abbreviations; CC - climate change, UCA- urban climate adaptation, CA- climate adaptation, CCM -climate change mitigation, CCA- climate change adaptation, UCCA – urban climate change adaptation, GoK - Government of Kenya, UP&D - urban planners and designers, UCE - urban climate experts.

Colour codes meaning: **Bold** is used to show notable points, **yellow** is used to show very notable points, **red** is used to show difficulties points and **blue** is used to mark specific document names.

A) Awareness

1. What is the sense of urgency to adapt the urban environment to climate change amongst the following groups in the future in your city?

Groups	Very urgent	Urgent	Neutral	Less urgent	Not urgent	Don't know
Citizens		X				
Politicians	X					
Urban planners& designers	X					
Urban climate experts	X					

2. In case the sense of urgency is low, what is needed to make those groups feel more urgent about adapting the urban environment?

Groups	Measures to sense of urgency
Citizens	Civic education is needed to understand how environmental change affects the common mwana ninchi. Impact analysis is important but it must be simplified to relate to daily life i.e. not about the Ozone layer
Politicians	
Urban planners & designers	
Urban climate experts	

Kenyan attention is to environment not to climate change. There are no debates on this. There are many environmentalists, universities and NGOs working on environment and some on CC but there is a lack of public understanding.

3. How aware are the groups of the following two urban climate phenomena?

- Urban Heat Island

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens			X			
Politicians			X			
Urban planners & designers		X				

C+ Pol. are neutral as they have some understanding but cannot connect cause and effect. UP +D aware, part of training.

- Wind Discomfort

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens		X				
Politicians		X				
Urban planners & designers	X					

designers						
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4. In case awareness is low, what is needed to increase the awareness among those groups of two urban climate phenomena mentioned in question 3?

Groups	Measures to increase awareness
Citizens	Awareness is not low, but awareness alone is not enough. Information about the issues and what can be done about is crucial. i.e. similarly awareness about cancer or malaria is not enough, you need to have information on how to prevent it or what to do about it.
Politicians	
Urban planners& designers	

5. How aware are the groups of the following four urban climate adaptation measures?

- City design (e.g. street orientation, adapting to wind and solar orientation of building and streets)

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens						X
Politicians						X
Urban planners& designers		X				
Urban climate experts		X				

C +Pol – **Kenya is not a planning society**; thus the general citizens may want to be concerned but currently do not really care. **UP+D – are aware**, but the **practice on the ground is different**. Actualization is not there. **NEMA approves anything**. Thus, room to maneuver for environmental planners is very limited i.e. know about plot coverage regulations/ solar angles but the **developer and architects are only interested in the value per m2 of investment return**. **UP+D risk losing their job with too many demands, the customer (often developer) is always right**. Thus Environmental considerations and UCA are not part of culture of UP +D Just seen as an extra cost for the developers, they need to pay experts to look at that.

Although they are aware of the potential benefits, developers don't care, the **short term is the priority**. i.e. in rental housing the UHI effect will just be interpreted as more heat, they are not conscious of the phenomenon and will relate it to the tropical climate. **Either way the extra cost of heating or cooling will be put for the tenant to pay**.

NB: Nairobi – not so much attention to heating/ cooling -temperate climate. Maybe mombassa there is more.

- Urban vegetation (e.g. green roofs, urban forestry)

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens		X				
Politicians		X				
Urban planners & designers		X				
Urban climate experts		X				

Everyone is aware of urban vegetation and its value. In the built environment more built up space and concrete, means more dust, less water absorption. Most people in NBI 2/3 come from **rural backgrounds thus know of the value of nature**. Most go home to the countryside (ushago) during the weekends or the holidays. People are thus aware but choose to do different practices.

NB: Urban vegetation, material use and anthropogenic heat are very different for Mombasa and Nairobi. So cannot generalize between these two cities. **Mombasa is very selective of the materials they use, these also work for CCA** as it leads to less heating due to white walls with high albedo and materials that do not retain heat for long. Considering Kenyan traditional housing this was mostly very smart in terms of cooling and ventilation for CCA.

- Use of materials (e.g. low albedo and longer cooling time-lag materials)

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens						X
Politicians		X				
Urban planners & designers		X				
Urban climate experts		X				

For Mombasa they are aware, for Nairobi I don't know. As Mombasa is a specific scenario for climate as a coastal city. **I don't know has been taken as an average answer for generally cities in Kenya.**

- Anthropogenic heat (e.g. less air conditioners,)

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens						X
Politicians		X				
Urban planners & designers		X				
Urban climate experts		X				

The difference in urban vegetation and material use between NBI and MSA also affects the difference in anthropogenic heat awareness. Similarly to above Mombasa citizens are aware and for Nairobi it is unknown, hence I don't know has been taken as an average answer for generally cities in Kenya.

6. In case awareness is low, what is needed to increase the awareness among those groups of four urban climate adaptation measures mentioned in question 5?

Groups	Measures to increase awareness
Citizens	Awareness is present and is not low, but actions on CC are not seen. In policy we have the CC act and planning regulations. There is need to redesign how to engage with the policy – environment actions. There are many strange combinations or contradictions i.e. high energy consumption buildings, or the railway through the national park.
Politicians	
Urban planners & designers	

We need to re-define awareness, I see it as people possessing the awareness and hence quality of information to make decisions.

Need to show the value of public space, environment i.e. through standards, parks, walkways. Strategic institutions need to lead this; the GoK (Government of Kenya), NEMA (National Environmental Management Authority), Universities these actors need to change the game on how we deal with CC. If the comprehensive awareness is low due to not enough information, this will lead to more speculation and less confidence to be involved in decisions. More engagement is needed with stakeholders to improve the quality of knowledge for awareness.

B) Communication

1. Which roles do 1 citizen, 2 politicians, 3 planners and designers and 4 urban climate experts have in the process of planning, designing and implementing urban climate adaptation measures?

Citizens:

Politicians:

Urban planners and designers:

Urban climate experts:

More generally speaking any development project needs to involve all stakeholders. As participation is supposed to be there and enable a level of involvement.

Citizens -X – negative today citizen consultation, has now become seen as participation. However, this consultation may not take the opinions of the citizens into account.

Pol. & UP+D – need to make the right decisions, but **corruption makes it difficult**. We need effective institutions and thus politicians. Citizens will have more power and motivation to engage in P +D if they know their needs are being taken into account. If not there is little incentive to participate.

2. What are the relationships between these actors in the communication strategies?

Citizens/ Politicians

Citizens/ Urban planners and designers

Citizens/ Urban climate experts

Politicians/ Urban planners and designers

Politicians/ Urban climate experts

Urban planners and designers / urban climate experts

Communication strategy are now not citizen strategies; they are engagements with these players. **Social media plays a big role in communication.**

C -If there is no awareness this is also means or results in the fact **that the structure of engagement is not clear**. As citizens should be able to hold their member of parliament accountable for the decision on an issue, but the MP can just say they did or did not approve it, **but the citizen can't check this, thus can't hold them accountable.**

P – Planners no one takes them seriously. Because of the lack of culture of planning in Kenya. **Understanding power relations in governance is key, if you do not know this policy is not effective as laws are on paper and the practice is different.** Every plan should include solar angle consideration, rain water harvesting but developers do not care about sustainability. There is need to engage developers, now there is little engagement of experts.

UCE / other expert's responsibility – supported by the government to ensure success of public interest and engage local architects and plan the area. For example, city hall should do this. **There used to be regulations about roofing that stated that tile roofing materials should be used instead of mabati (corrugated iron sheets), but their reason for this was not explained.** Tiles are more energy conservative as they allow less heat to enter the house and prevent excessive cooling due to heat loss to outside temperatures. However, because this was not known and mabati is cheaper it is being used more widely now than previously.

The change needs to start up there with experts and government so that citizens can take them seriously. Attitude can change if the side with the responsibility is more proactive.

Relations can be considered strong between all the actors but they have no impact. Planners discuss laws which affect them, know their member of parliament and can even meet them very often but this does not enable them to change/ impact them greatly.

Comment by interviewee: this idea of governance and democracy discussed in this question is set in a very European perspective. The idea that if there is a link with politicians then things will move smoothly. **Here a planner can dine with them every day but still there is no change, due to power relations.** Lobbying can also

be malicious against good policies for planning. **All the actors have good relations – but it depends on who is more powerful on what will happen.** i.e. now property developers are more powerful than planners.

Trying to understand the role of actors is especially difficult – **experts need to be more smart in politics to counter developers.** (if they are not smart or choose not to be in politics they cannot engage with them)

3. What is the role of communication to support the planning, design and implementation of adaptation measures?

Communication is very powerful. Depends on how it is done if it is adequate. **Thus the quality of communication is essential.**

4. Are there formal guidelines or policies that drive the use of communication in the planning, design and implementation of adaptation measures?
If yes, can you please name them?

Yes, **Nairobi has passed a public participation bill.** Furthermore, the **constitution** is clear as well as the **urban areas act and the country government act on the need for participation.** **NEMA also has a protocol for doing projects.**

5. What are the strengths and weaknesses of the communication process?

Discussed already in the above comments

6. Is there need to improve the communication process? If yes, how to improve.

No response.

C) Instruments

1. Are there legally binding instruments (e.g. zoning plans) used to implement urban climate adaptation measures? If yes, please explain how they work?

I am not sure. At one time Nairobi said buildings would not be approved if no solar panels were installed but I don't know if that was talk or a legal regulation. **Again going back regulations are also not always monitored or implemented (i.e. Nema approves anything).**

Now we do have specific laws like the CC bill and CC act (which is a law). Furthermore, **plans once approved by the county government are legally binding.** Thus **CCA measures in an approved plan can also be used to mainstream it into other sectors.**

Planning is a very useful means to mainstream CCA – very powerful tool if included in plans, but it needs strong institutions to create more impact.

2. What are the strengths and weaknesses of the legally binding instruments used?

X – weak institutions,

X – **some legally binding tools are not effective as do not work in local reality**

+/X– Kenya has very ambitious **policy and laws but some of it is ‘cut and paste’ from international best practices** such as Germany and thus is not related to the local context.

3. Are there certain chances / potentials missed when using the legally binding mentioned instruments (e.g. linking with other instruments)?

Chances to link to other areas are there i.e. CC Act is trying to establish a body to do so, however personally I do not think this is a good idea.

X – **a new authority on climate change – will lead to fighting with NEMA** – thus divide funds and hence be less effective

- Need to be conscious of existing related tools – to see the complimentary options
- **Now roles are duplicated, thus miss the chance of implementation.**
- **Developmental control and Planning together have more potential to mainstream CCA**

X – NEMA approves everything, therefore plans are less effective, as contractors can ignore or change a sustainable plan to a more convenient option but there will no enforcement.

Thus **enforcement (clear laws and consequences)** is an area of potential. “that’s how they do things here” is a bad attitude which prevents taking environmental issues seriously.

- **Need sensitization (civic education) on importance of environmental issues** i.e. in South Africa; Cape town people are informed and conscious. **If communities have more real awareness, then the level of resistance is lower to change plans for the environmental reasons.** Until that awareness is present, it is hard to adapt to CC.

Nairobi people do not see the necessity of environment. Housing is the main concern.

Vs in cape town – in people own their own shacks, in Nairobi most people (especially in slums) are tenants. Less security of tenure, hence need to engage the right people, the landlords, and even the tenants will be happy.

In Kenya little priority to improve the rented environment, as if the is not nice and the opportunity to move exists this is more realistic as sending an email etc won't work. Thus there is little fight for the existing place moreover, people also have a backup – their countryside home (ushago). “We have given up and lost trust in institutions” thus it will take a long time to engage citizens again. This cycle can be broken by public authority.

Kenyans have other priorities than the environment; like the 5 billion ksh that was recently stolen from hospitals or education for their children. **They know cutting trees for charcoal is not good for the environment, but many people live for today also due to the lack of social security and uncertainty.** It is difficult to make society proactive to CC, as other issues have priority.

4. Are there other policy instruments used to implement urban climate adaptation measures?
If yes, please explain how they work?

I don't know, the old school way is very present.

5. What are the strengths and weaknesses of these other policy instruments used?

Not applicable, hence no response.

6. Are there certain chances/ potentials missed when using other policy instruments (e.g. coupling with other policies)?

Financing – in municipal budgets, laws may not change reality. **Need new budgets for sensitization and for projects on CC.**

Cities can also have an internal city policy that can implement paving, spaces etc that contribute to CCA. Thus exercising their mandate in environment.

Potential missed – **not only looking at the cities, as small towns also have a lot of potential to address urban issues.** Rural people are used to simple basic life, thus already less pollution in their suburban lifestyle.

- Misinformation – **concept of a flourishing city being skyscrapers** or huge consumption norms. Whereas the potential to demonstrate the quality of city life is not brought by skyscrapers but by being able to walk, cycle in a dense and compact city etc. Thus we need to sell prosperity in a different way, and value the quality, simplicity and serenity in rural areas. Hence the quality of nature.

D) Implementation

1. Which concrete urban climate adaptation measures/ interventions are currently planned or have been implemented in your city?

Not aware, maybe they are there.

2. What are the strengths and weaknesses of these mentioned urban climate measures/ interventions?
Not aware

3. Are there conflicts between aesthetics and these mentioned urban climate adaptation measures?

This is very subjective. If there is a solar panel, no one will care about aesthetics as the functionality is the main concern. It depends on the intervention, **for vegetation there is no conflict as nature is seen as beautiful.** On **Diani forest road** – there **is solar lighting** used, this panel may look less good but people don't mind as if the solar energy reduces bills no one will care how it looks. **Aesthetics may not be a priority**

4. Are there conflicts between urban functions and these mentioned urban climate adaptation measures?

Depends on the measures i.e. if city is to create new housing with solar panels. If this is fully enforced, the cost of housing could have been higher **however these costs will just be transferred to the consumer. The cost of**

sustainable measures/ CCA will fall on the tenant/ consumer. Thus the economics of the measures should be thought out carefully. i.e. many cities have policy of a car free day in a week or month, in Nairobi without proper public transport the people will not be happy with this, **thus the measure should work in the context.**

5. Are there certain chances/ potentials (e.g. coupling with other interventions / 'no regret' measures) missed when implementing these mentioned urban climate adaptation measures?

In a way it comes down to how we frame problems. i.e. **if we address flooding problems only as flooding, then we miss a lot of potentials.**

Especially environmental disasters if we see them as a single problem, then we miss the link to CC. Thus only a sectoral approach leads to missing opportunities than a comprehensive approach.

CC is easy to identify if you backtrack. **We need to engage with people and show the link by using data and information to design more sustainable approaches.**

Thank you for answering the questions in this questionnaire. Do you have any other remarks regarding the urban climate adaptation process or the content of the questionnaire?

Interview 4

General Information

1. Name: Interviewee 4
2. City: Nairobi
3. Position: ☐ Politician/ **Policy** ☐ Urban planners/ designer ☐ Urban climate expert ☐ Other.
Considers herself more active in the policy field than in politics.
4. If other, please describe function.
5. Organization: ALISE Consulting Group, working on environmental issues and improving livelihoods.
Formerly worked at the Nairobi City County Government as a chief officer on planning, budgeting and implementing city environmental programs that included, solid waste management, sanitation, beautification and landscape.
6. Email:
7. Phone number:

NB: abbreviations; CC - climate change, UCA- urban climate adaptation, CA- climate adaptation, CCA- climate change adaptation, UCCA – urban climate change adaptation, C - Citizens, Pol/P - Politicians, UP&D - urban planners and designers, UCE - urban climate experts. MENR - Ministry of Environment and Natural Resources.

CC - climate change, UCA- urban climate adaptation, CA- climate adaptation, CCA- climate change adaptation, CCM - Climate change mitigation, UCCA – urban climate change adaptation, UP&D - urban planners and designers, UCE - urban climate experts. GoK (Government of Kenya) DRR (disaster risk reduction) NEMA (National Environment Authority) or MENR (Ministry of Environment and Natural Resources), KMD (Kenya Meteorological Department).

Colour codes meaning: **Bold** is used to show notable points, **yellow** is used to show very notable points, **red** is used to show difficulties points and **blue** is used to mark specific document names.

A) Awareness

1. What is the sense of urgency to adapt the urban environment to climate change amongst the following groups in the future in your city?

Groups	Very urgent	Urgent	Neutral	Less urgent	Not urgent	Don't know
Citizens	X					
Politicians & Policy	X					
Urban planners & designers	X					
Urban climate experts	X					

NB: Interviewee wanted to add the category of **policy** to politicians as she can speak more about that and considers them linked. (She worked in local government and considers policy to be more her field than politics).

Interviewee 4 answered according to what she thinks it should be, she could not answer how it is currently per category i.e. citizens etc.

There is a difference generally between Nairobi and Mombasa. For Nairobi she does not know the urban climate phenomena the city is prone to, while for Mombasa it differs a lot.

C - for citizens generally, the sense of urgency is high, as they exposed to different climate phenomena. In Mombasa this is even stronger as they are exposed to cyclones or tsunamis.

While the impact of a rise in temperature → will for all areas likely result in heat waves

For her answers she will take Nairobi and Mombasa together.

Generally, Kenya is a signatory to a climate change agreement and the **MENR (Ministry of Environment & Natural Resources)** and hence the national government should guide the process (of climate adaptation). They should identify the risks and exposure.

All (CC) phenomena occur in urban settings, but occur at different magnitudes. Cannot say the specific ones or the ones directly involved in Mombasa or Nairobi. She can't answer for them.

2. In case the sense of urgency is low, what is needed to make those groups feel more urgent about adapting the urban environment?

Groups	Measures to sense of urgency
Citizens	All groups have a role to play i.e. the citizens to be aware and adapt
Politicians	According to her adaptation should be urgent for citizens and politicians. (This is not the view of the majority of these groups as she cannot answer for them, but this is her opinion).
Urban planners& designers	Need to come up with robust designs. There are new roles for development of Nairobi city country i.e. the building codes, which try to stimulate developers towards sustainable development. There should be more decentralized (onsite) treatment of water and more sustainable living now. There are rules for water harvesting and storage especially for affluent areas. This is a new condition that has been set.
Urban climate experts	

Overall awareness is not low it is high. But still it is useful to increase awareness more to help people participate and share programs of adaptation and mitigation. Now there is still no seamless engagement of involved groups. They need to agree and build consensus.

Still need to create platforms of engagement for all the groups.

Question: Who are UCE in your opinion?

In my view they are mainly **people working at the MENR (Ministry of Environment & Natural Resources) and independent professionals** (like herself, an environmental consultant). She wanted to meet the director of CC at MENR, but he was in Marrakesh for 2 weeks for the COP 22. They are probably reviewing where they are in policy.

3. How aware are the groups of the following two urban climate phenomena?

- Urban Heat Island

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens				X		
Politicians				X		
Urban planners & designers	X					

Politicians - at country level the awareness is not that high

- Wind Discomfort

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens				X		
Politicians				X		
Urban planners & designers		X				

Wind is not a common phenomenon in Nairobi. For Mombasa, I don't know.

4. In case awareness is low, what is needed to increase the awareness among those groups of two urban climate phenomena mentioned in question 3?

Groups	Measures to increase awareness
Citizens	To engage the C and the Pol. the MENR are tasked, they need to come up with policy guidelines and spearhead the participation of all these groups. Need to increase awareness and share information about the consequences of CC.
Politicians	For Pol. same as for citizens above
Urban planners& designers	

5. How aware are the groups of *the* following four urban climate adaptation measures?

- **City design** (e.g. street orientation, adapting to wind and solar orientation of building and streets)

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens				X		
Politicians				X		
Urban planners& designers		X				
Urban climate experts		X				

Pol and UP&D - are more aware, as it is more their field and policy area. They need to justify new changes to policy i.e. why collect rain water? etc.

Urban planners should foresee the future, thus forecast the needs for mitigation and adaptation.

Pol - it is not their daily bread. Only appointed politicians who oversee the functions of urban planning and CC experts are aware, **most of them are not.**

- **Urban vegetation (e.g. green roofs, urban forestry)**

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens				X		
Politicians				X		
Urban planners& designers		X				
Urban climate experts		X				

- **Use of materials (e.g. low albedo and longer cooling time-lag materials)**

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens				X		
Politicians				X		
Urban planners& designers		X				
Urban climate experts		X				

The interviewee does not know if the UP & D look at material use. Usually the quantity surveyors look at the use of materials. Thinks there is some level of knowledge about this, hence aware.

- **Anthropogenic heat (e.g. less air conditioners,)**

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens					X	
Politicians				X		
Urban planners & designers		X				
Urban climate experts		X				

C - citizens just think it is hot, **they do not think it is due to CC effects**

6. In case awareness is low, what is needed to increase the awareness among those groups of four urban climate adaptation measures mentioned in question 5?

Groups	Measures to increase awareness
Citizens	<p>Generally, more information and engagement in an organized way i.e. weather forecasting predictions. For example, over the last 10years if a phenomena has increased or decreased significantly this should be shared.</p> <p>Reduce, reuse and recycle.</p> <p>For citizens - there is adaptation i.e. more people, especially women, wear hats. this is a type of individual response mechanism. But they do not connect individual experience and practice to real climate phenomena.</p>
Politicians	

Urban planners & designers	
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Section 2: Planning and design processes for implementation

B) Communication

1. Which roles do 1 citizen, 2 politicians, 3 planners and designers and 4 urban climate experts have in the process of planning, designing and implementing urban climate adaptation measures?

Planning - We want to plan with everyone and not leave people out, as everyone is affected. (Politicians)

Design - The design can be done with less people once consensus have been built.

Implementation - Everyone needs to be onboard but experts implement

Citizens: Have a supervisory role

Politicians: Give policy guidance. Need to change direction for approval of plan or budget and oversee resource use. So **are involved in all the phases**. I.e. There are regulations to put in energy saving bulbs but these are more expensive to buy. The government brought in 1,000,000 free bulbs (fluorescent lights) to show citizens the value and to phase out incandescent bulbs. **Thus to convince of the value.**

Pol - **are key in mobilising residents to subscribe to adaptation and to uptake technology implementation or behavioural change in their way of living.**

Urban planners and designers:

Urban climate experts: **Are involved in all the phases and spearhead the process**

2. What are the relationships between these actors in the communication strategies?

Suggestion from interviewee: give boxes to check for this question to define the relation i..e indicating strong/weak relations.

Citizens/ Politicians: **C- Expect to be brought information. Pol - lead the citizens and do a lot of open forums to give information.** **It is two way communication,** as through communication process the citizens take the information and ask questions and hence give feedback back to the politicians. Sometimes the citizens can empower the message of the politician, **C can be more knowledgeable than politicians.**

Citizens/ Urban planners and designers: **I do not think there is a direct relation now.** Apart from a few that engage with citizens on a personal level.

Citizens/ Urban climate experts: The same as above for this relation, she cannot think of a direct relation. **There is no set process for communication. There is a procedure for interaction to follow; that makes the system work.** We should have a systematic or institutionalized arrangement of citizen input that can inform policy.

Politicians/ Urban planners and designers: **Politicians often have direct contact with citizens, they are the go-between (intermediary) between the citizens and other groups i.e. UP&D and UCE.**

Politicians/ Urban climate experts: Same for above.

Urban planners and designers / urban climate experts: Should be sharing knowledge at peer level

3. What is the role of communication to support the planning, design and implementation of adaptation measures?

To make the plan, everything and the implementation more clear. **It should not be so technical, so adapt to common understanding. The role is to clarify and make the issue of adaptation understandable to all stakeholders.**

4. Are there formal guidelines or policies that drive the use of communication in the planning, design and implementation of adaptation measures? If yes, can you please name them?

I would imagine there could be. There must be i.e. new county policy for zoning that increases high rise buildings, this leads to an increased demand on water, sanitation and open space. **Thus UP& D need to come up with ways to do policy and regulation to still keep it sustainable.**

It must be certified by the technocrats, which are the planners. **As you can't just go to the press or the media, you need permission from the policy officer in charge.**

5. What are the strengths and weaknesses of the communication process?

Strengths - It becomes more effective by involving many people

Weakness - Lack of resources, there is a limit to the possibility to include everyone

6. Is there need to improve the communication process? If yes, how to improve

Yes. We must embrace an all-inclusive strategy, through multiple media that can reach out to engage everyone hence more democratic.

C) Instruments

1. Are there legally binding instruments (e.g. zoning plans) used to implement urban climate adaptation measures? If yes, please explain how they work?

Yes there could be. I.e. **new policies, that become part of the law** such as the LED lights or high rise zoning example.

2. What are the strengths and weaknesses of the legally binding instruments used?

I don't know, I have not used them.

As an example, there is zoning in Karen (a large high class neighbourhood/ area in Nairobi), where **individual developers implement but do not have expert supervision or stringent follow up. This may render some legally binding requirements useless.** As the product is not what was expected.

3. Are there certain chances / potentials missed when using the legally binding mentioned instruments (e.g. linking with other instruments)?

Yes there are **many regulations that do not mention reference to already existing plans**

4. Are there other policy instruments used to implement urban climate adaptation measures?

If yes, please explain how they work?

Don't know.

5. What are the strengths and weaknesses of these other policy instruments used?

Don't know.

6. Are there certain chances/ potentials missed when using other policy instruments (e.g. coupling with other policies)?

There could be, **lack of knowledge could be a missed potential.**

D) Implementation

1. Which concrete urban climate adaptation measures/ interventions are currently planned or have been implemented in your city?

New zoning requirements (these differ per area) i.e. for Karen, **there is the promotion of the reuse of rainwater harvesting.** Additionally high rise buildings, their upper floor could have a specific adaptation (this is a possibility but not a current measure or strategy).

2. What are the strengths and weaknesses of these mentioned urban climate measures/ interventions?

Refer back to the other information i.e. **that legally binding requirements are useless if there is no supervision or follow up on building developers.**

There is no specific urban climate adaptation measure mentioned.

3. Are there conflicts between aesthetics and these mentioned urban climate adaptation measures?

When Planners come with new designs they try to reduce the potential conflicts. The majority is a beneficiary and happy but some **minority groups may be in conflict with the measure.** Need to consider excluded or vulnerable groups.

4. Are there conflicts between urban functions and these mentioned urban climate adaptation measures? Same answers as above, i.e. **to reduce the number of cars in the CBD** (central business district of Nairobi).

Mama ngina street changed from a 2way street to a 1 way street, thus this reduced traffic and more space for green on the pavement and more space for people to walk. **This is an adaptation and increases cooling to the city.** **However car owners see a conflict as it is less efficient in terms of their interest.** While others (non-car owners) had an overriding goal and have the most benefit as **more breathing spaces are created and hence a benefit for the majority.**

5. Are there certain chances/ potentials (e.g. coupling with other interventions / 'no regret' measures) missed when implementing these mentioned urban climate adaptation measures?

Yes there could be. **As climate adaptation measures (CAM) cut across different sectors.** As the domain of CAM is not only in UP&D, but also for engineers, social planners and technology. **It should be addressed as an issue that cuts across all sectors so that all necessary concerns and conflicts can be limited.**

Question: What do you think of mainstreaming?

Mainstreaming can be good, it (CA) should be an integral part of every sector. As the CCA measures development should be collecting and adding value to other sectors and show how their concern should be integrated in each other

Thank you for answering the questions in this questionnaire. Do you have any other remarks regarding the urban climate adaptation process or the content of the questionnaire?

Say what the information will be used for and it is very long in the parts so show how it will benefit different groups from policy and academic.

Interview 5

General Information

1. Name: Interviewee 5
2. City: Nairobi and Mombasa (Did projects there with the World bank on CC)
3. Position: ☐ Politician ☒ **Urban planners/ designer** ☐ **Urban climate expert** ☐ Other, _____
If other, please describe function.....
4. Organization: Owner, Eco-Build Africa Trust / Green Arch Architects
Associate Professor (Architecture) - The Technical University of Kenya
5. Email:
6. Phone number:

The interviewee is an environmental architect trained in architectural design, sustainable urbanism and development. He is Principal Researcher, Eco-Build Africa. He has been the Dean, School of the Built Environment at the Technical University of Kenya and Principal Researcher at Eco-Build Africa. He taught at the University of Witwatersrand, Johannesburg and University of Nairobi, Kenya, as Associate Professor of Architecture. He has published over 70 academic papers in his research areas.

The interviewee helped developed the CC (Climate change) strategy for the AU (African Union). He wrote the Kenyan report for the UNFCCC. He trained the African negotiators and wrote the African assembly declaration. He established the CC unit at the African union and for the regional economic blocs. **His recent works include African Union Common Position on Climate Change; African Union Strategy on Climate Change, State of African Cities Reports and the Swedish SymbioCity Programme.**

He established the KCCWG (Kenya Climate change working group) in 2009- a national network of Civil Society organisations uniting voices and action on climate change.

He trained civil society groups in Kenya after he came back from south Africa. He wrote the current UN (United Nations) green masterplan for the UN complex in Gigiri, Nairobi.

He is an advisor to Kenya's Council of governors on urban issues.

NB: abbreviations; CC - climate change, UCA- urban climate adaptation, CA- climate adaptation, CCA- climate change adaptation, UCCA – urban climate change adaptation, UP&D - urban planners and designers, UCE - urban climate experts, CCM - climate change mitigation, GoK -Government of Kenya), DRR -disaster risk reduction, NEMA- National Environment Authority, MENR -Ministry of Environment and Natural Resources.

Colour codes meaning: **Bold** is used to show notable points, **yellow** is used to show very notable points, **red** is used to show difficulties points and **blue** is used to mark specific document names.

Beginning of conversation – info on CC in Kenya

Deep awareness on CC still quite low, even as recently as November 2016 – he was asked; “**CC should be a meteorological issue – what do buildings have to do with it?**”

Kenya has covered a lot of ground on CC knowledge in recent years:

In 2009 it was impossible to convince the GoK to create the CC Bill and Act.

In 2016, 7 years later they have been created. But it needed to be brought to parliament by a private member Otichiba Wilbur.

Now we need requirements for mainstreaming, some counties like Makueni already have county specific CC ACT. **Before the thought would be about CC, it is just warmer, now we have more advanced projects at country and national level.** Currently we have **county spatial planning guidelines for Kenya** and it would be a **key issue to address CC and DRR (disaster risk reduction) together.**

Before we had **negative sectoral proofing and no overt attempt to combine issues**, thus isolated measures. Positively– **now CC is seen as a separate issue from only environmental issues** (not just greening with tree and waste management) → A lot of ground has been covered. There is more attention to typical widen focus from historical biases to focus mainly on rural-agricultural/ forestry/ water sectors. **Policy wise a lot of progress has been made – more talk about CC and CC mainstreaming**

Specifically → Urban climate change issues – still a bit vague in Kenya. **The focus of CC in Kenya is mostly on infrastructure and the population. The rest is shallow talk, i.e. say that development of new roads like Thika highway will lead to less traffic thus mitigate CC. The argument is not valid.**

In 2006 the COP8 was held in Nairobi, (the Eighth Meeting of the Conference of the Parties (COP8) to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal) during the time that Mrs. **Wangari Maathai**, the 2004 Nobel Peace Laureate was an assistant government minister in the Ministry of environment and Natural Resources. <http://www.iisd.ca/basel/cop8/27nov.html>

During this hosting the GoK got extra CC funding for geothermal energy. Kenya is geographically suitable for any type of clean energy.

In 2015 the Nairobi Convention for COP8, was held in June 2015, in Victoria, Seychelles, under the theme “**Conserving the Marine and Coastal Environment for the Western Indian Ocean for the next 30 Years**”.

NGOs like Oxfam Novib mostly focused on the rural areas for CC mitigation, now the attention is shifting a bit more to urban. **Real urban solutions to CC → are tied to urban planning**

It is **difficult to determine CC/CCA in urban settings as cause and effect is not clear as it is in rural areas.**

Mombasa

During his work for the World Bank they did initial studies

- Indirectly on the impacts of CC
- Directly; **on Mombasa** – where a lot of shallow latrines are used while the water level is high thus even during basic (minor) flooding the latrines are flooded and the waste spreads and mixes with the shallow water wells.

In Mombasa they have tried to **stabilize the sides of wells using tires or elevating wells** to prevent contamination → **this is an adaptation action but the people doing it see it more as a local response**

A lot of adaptation work is done directly by communities in urban or rural areas. But they don't use the climate change lens or terminology to view their actions.

Kenya still has a very strong urban -rural link. Urbanites support people in the rural areas, while rural areas can provide food for cheaper prices which can be processed in the city. The highest number of posho (maize) mills are in the urban slums. (used to make the daily staple food for most Kenyans -Ugali). **Adaptation strategies are linked to both the rural and urban situation** i.e. if rural harvests fail the urban people notice it.

For the health sector there is also a very direct link of CC to Malaria mosquito movements.

A) Awareness

1. What is the sense of urgency to adapt the urban environment to climate change amongst the following groups in the future in your city?

Groups	Very urgent	Urgent	Neutral	Less urgent	Not urgent	Don't know
Citizens		X				
Politicians			X			
Urban planners & designers		X				
Urban climate experts	X					

Pol – Don't think they see the urgency. GoK was not interested in the CC Act as it was suggested in 2008, it took 8 years for them to implement it and it needed to be brought in by a private member.

C – radio and Tv give a lot of information and awareness. **Many citizens also feel frustrated at CC.**

P+D – **huge number of people believe that CC has been taken care of under the section of environment. But this is not specific enough. Few planners clearly see the need.**

UCE – **see the urgency but most are not involved in planning** but instead work in specific sectors.

UCE in Kenya → are planners or environmentalists – **most are people that have been working with green NGOs i.e. with Oxfam Novib on climate adaptation – most have not studied on CC.** Some are working in government i.e. in NEMA (National Environment Authority) or MENR (Ministry of Environment and Natural Resources). Now there is a **CC centre at Nairobi University**

There are very few urban climate experts – I would not know anyone who considers themselves as such. If they are there they are very rare, maybe work at the Kenyan-based offices of UNDP (United Nations Development Programme) or DIFIT (UK Government Department for International Development). How and UCE could be conceived in other countries – is very difficult to find in Kenya. **You would need radically different individuals to work together** (Urban planners, urban designers, climate change experts, Disaster risk reduction experts, policy workers, government officers, meteorologists) **to try combine CC knowledge.** Then you could become an UCE with many people involved. For the AU strategy he did collaborate with many people to try form this knowledge base.

Even within planning taught at universities in Kenya, we have no CC specialization. The focus is on the traditional land use planning. Environmental planners are the closest to this (NB they are not considered to be legally recognized planners by the KIP/ GOK? – check Mugwima’s + Baraka’s statement

2. In case the sense of urgency is low, what is needed to make those groups feel more urgent about adapting the urban environment?

Groups	Measures to sense of urgency
Citizens	<p>The urgency could be high (need action) but the awareness (actual knowledge of the phenomenon) is low/ not that high.</p> <p>Mass media is needed to make it popular knowledge; program now on tv about environment – although it is mainly conservation. Newspaper, radio and tv are effective for citizens</p>
Politicians	<p>Our politicians are link Donald Trump, they are cynical about CC. They think it is a western hype. To address CC to them, it would need to be sold as sensible development. Many think that the CC effects are normal weather fluctuations.</p> <p>The interviewee works with them at the council of governors; for them water projects are seen as necessary and make them popular with the citizens. While CCA is not seen as necessary or an issue that is close to the citizens so that addressing that will make them popular.</p> <p>Politicians think that it is not needed to do CC projects in Kenya, they just pass the bill to show some progress. Only do CC projects if they can be considered as development projects. A project that addresses CCA will not be framed as this and this will not be the goal but will be to address water plans/ issues which are commonly understood.</p>
Urban planners& designers	<p>X – CC is looked at on a large scale i.e. the Ozone layer and not what we can do at an individual level (same for any citizens). While small actions also have a big effect i.e. school acreage requirements, the amount of tree cover to allow green infiltration spaces or keeping plot cover restrictions.</p> <p>A lack of understanding means we do not understand how small scale actions can contribute (i.e. energy efficient jiko’s (cooking device) can help to reduce carbon emissions.</p>

	<p>If this is scaled up it can also have more impact.</p> <p>http://www.standardmedia.co.ke/article/2000182133/towards-energy-conservation-jiko-revolution-saving-kenya-s-forests</p> <p>CCA is not about one large project – but about a million people planting one tree.</p>
Urban climate experts	<p>Planners need more technical input about CC.</p> <p>CC should be in the curriculum of all planners – missed chance that we are not doing it yet.</p> <p>Now environment is a specialisation at universities – this means that basic rules of thumb related to the environment such as solar orientation, design for wind etc are not commonly known by all planners.</p>

3. How aware are the groups of the following two urban climate phenomena?

• Urban Heat Island

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens					X	
Politicians					X	
Urban planners & designers			X			

UP+D some are aware but not fully aware.

• Wind Discomfort

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens			X			
Politicians			X			
Urban planners & designers		X				

Mombasa is aware of the wind, for ventilation. Nairobi is ambivalent about it, hence less aware as they feel the effect less. He has never heard a politician or a planner mention there was a serious issue with wind discomfort for Nairobi. **Overall would be aware then, but there is a clear difference between the two cities in awareness.**

4. In case awareness is low, what is needed to increase the awareness among those groups of two urban climate phenomena mentioned in question 3?

Groups	Measures to increase awareness
Citizens	Mass media and local CBOs (community based organisations) + CSOs (civil society organisations) I.e. NGOs or faith based organisations need to make people aware
Politicians	Politicians need to be advocates – this is also a major role for the CBOs
Urban planners& designers	CPD continuous professional development. X problem is the agenda is set randomly. It has been discussed with the board of the KIP (Kenya institute of planners) and the AAK (architects association Kenya) that they need to agree on agenda points. As now the motivation to go there is low now, as it is only done because it is mandatory while the majority actually do not find it useful.

5. How aware are the groups of *the* following four urban climate adaptation measures?

- City design (e.g. street orientation, adapting to wind and solar orientation of building and streets)

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens				X		
Politicians				X		
Urban planners& designers			X			
Urban climate experts	X					

UP+D - In general they are neutral as it is a university specialisation only those students learn building design or environmental design. **Thus in general UP do not bother with CC/ Environmental regulations as they say "they are not specialists".** Hence to broaden awareness and implementation we should not have green architecture or planning as specialisations but **everyone should know basic rules of thumb that aid the environment or mean efficient design such as solar orientation.**

- Urban vegetation (e.g. green roofs, urban forestry)

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens			X			
Politicians			X			
Urban planners&		X				

designers						
Urban climate experts	X					

C – Majority is neutral. **Tendency in urban areas to pave green areas for easier maintenance and there is no law against it.** This is harmful as there is little space for groundwater infiltration and people tend to think if they do not see a design i.e. water culverts then there is no protection against flooding.

Urban design – is seen as to be the optimisation of construction on a plot – by the planners, developers and politicians. While the idea of a garden or green space for aesthetics is not mainstream, it is for an upper market need i.e. Karen. **Thus greenery is not seen as critical (it is left to the environmental departments)** and it is not at all a developer priority neither for the majority of Pol + UP+D. The way many streets and neighbourhoods are designed, the first part of the house is reserved for cars.

Mono functional or few multifunctional areas is also a missed opportunity as some paved areas could be perforated paving to also act as green spaces. **People tend to follow the letter not the spirit of the law**

A blank space on a map is not considered an opportunity for a garden. **Green vegetation is not taken seriously by planners. C + Pol are the same on this for NBI as MSA.**

- Use of materials (e.g. low albedo and longer cooling time-lag materials)

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens					X	
Politicians					X	
Urban planners& designers					X	
Urban climate experts				X		

Material the awareness is generally very low. He had to stop using the term embodied energy in a building material as no one understood it. People are also not aware of the thermal comfort concept.

The mabati roof and single brick housing present in many low income areas or slums is very inefficient material as it heats up very fast if it is in the sun for 30mins, while it becomes very cold if the sun goes away. Thus across many fields **we need more sensitivity to material and design.**

- Anthropogenic heat (e.g. less air conditioners,)

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens			X			
Politicians			X			
Urban planners &		X				

designers						
Urban climate experts	X					

In Mombasa (aware) they are more aware of this than in Nairobi (less aware). "A lot of people think air-conditioning is a sign of a good building" when ironically it means that the design often did not take ventilation into account. Even well informed people who are aware of CC such as in government offices want to have it in their office, also a sign of status. It is seen as more investment in a building, when ironically it often means the opposite. As people however are not aware of the the VOCs emitted as a result.

6. In case awareness is low, what is needed to increase the awareness among those groups of four urban climate adaptation measures mentioned in question 5?

Groups	Measures to increase awareness
Citizens	For Pol and C – regulation is critical. Creating it increases awareness which the citizens can help enforce.
Politicians	Government regulation is a very important issue. If it is required by law i.e. developmental control – it will be looked at by the UP+D and developers. Some building codes already ensure better quality, if it could be adjusted to take greening, materials, thermal comfort and natural ventilation into account it would help a lot. It is a GoK responsibility to set standards →this will increase awareness.
Urban planners & designers	CPD (continuous performance development)

Mabati / GCI for many years was not allowed in Nairobi. The logic behind it was that it was not efficient as the heat loss/ gain was very high. So thermal roofs were used more as they increased the thermal comfort and reduced the heat gain. – these considerations should be included in CPD

However the regulator did not explain this to the people and thus the added value was not clear to the public, only the extra costs.

B) Communication

1. Which roles do 1 citizen, 2 politicians, 3 planners and designers and 4 urban climate experts have in the process of planning, designing and implementing urban climate adaptation measures?

Citizens - Politicians: Citizens **have the role of oversight - but this role is currently vaguely understood.** Ideally issues such as greening should be negotiated by the citizen. **They need more awareness and to have a say in what kind of development they want.** **Public spaces are quite important in CCA. Thus this can play a role.**

Politicians: If they are **properly aware their knowledge should percolate down** and they can easily address this and increase awareness in Barazas or meetings. **County politicians always approve development – thus have the role to set regulations and control development**

Urban planners and designers: **Should be** interpreting laws and enforcing regulations – but this is not being done.

Urban climate experts: their **most important role is to mainstream the idea of CCA into other sectors**. Their advocating is critical as well as technical input. **They need to be involved in creating and reviewing plans**

2. What are the relationships between these actors in the communication strategies?

Citizens/ Politicians

Citizens/ Urban planners and designers

Citizens/ Urban climate experts

Politicians/ Urban planners and designers

Politicians/ Urban climate experts

Urban planners and designers / urban climate experts

We need regulations to achieve adaptation – politicians. For this Pol. must consult citizens and UCE.

Planners must pick up regulations to do plans and ensure enforcement (they should be required to consult citizens and UCE again – get feedback).

This process is all interlinked. X however it rarely works this way; now everyone does their part and then leaves, no feedback. The citizen is now not in the loop. – the planner puts an advertisement for change of use or a plan in the obituary section where it will be hard to discover.

C- The citizen can play multiple roles overseeing; design and consultation.

UCE – needs to help with regulation, implementation and consultation

3. What is the role of communication to support the planning, design and implementation of adaptation measures?

A communication strategy is actually what is missing now. Actors are not aware of their roles. Awareness is needed as well as a definition and clear structure of the process and responsibilities of actors. Now there is no clear way to communicate development or a CCA plan.

4. Are there formal guidelines or policies that drive the use of communication in the planning, design and implementation of adaptation measures? If yes, can you please name them?

There are attempts at formal guidelines, but they are in fact participation guidelines made by the ministry of devolution and the world bank.

X – **however participation now is still majorly happening in the old way.** Little consultation and planners are the experts ‘background participation’ it is not seen as essential. It is in the law but people practice the same way they used to.

Thus public participation is not happening – it is a joke. People talk about it to get a stamp of approval on a project. In contested situations the **people can corruptly mobilise ‘guys’ – people who are being paid or stimulated to come out in force to endorse your development and pretend this is real participation.**

5. What are the strengths and weaknesses of the communication process?

X – **leaders are not interested in participation; they came from a top-down planning culture.** Plan +politicians – need to improve the process and thus increase participation as they control the whole process.

Planners – have a key role in the planning process thus their role of advocacy and consultation (a collaborative or participatory planning approach) is essential to not just inform the citizens.

Participation and the communication around it to the citizens in Kenya now is mostly consultation. Thus the citizens do not have a lot of influence and are not a strong partner in the process.

6. Is there need to improve the communication process? If yes, how to improve?

Yes, Both **Planners and politicians due to their roles above have a responsibility to make the communication and participation process more effective.**

C) Instruments

1. Are there legally binding instruments (e.g. zoning plans) used to implement urban climate adaptation measures? If yes, please explain how they work?

Currently none. **“We do have instruments but they are climate blind”**, i.e. Zoning plans, Country development plans, are not being developed for the goal of CCA.

The closest we come is the policy that says for certain development there should be solar energy on roofs. These policies will come up as the CC ACT and strategy come into place require that urban plans are made in according to CCM and CCA objectives.

Now the legally binding instruments – are not specifically for counties(local level), only the national level.

2. What are the strengths and weaknesses of the legally binding instruments used?

X – **they are not specific enough**

3. Are there certain chances / potentials missed when using the legally binding mentioned instruments (e.g. linking with other instruments)?

X – **now mainstreaming is ad hoc – it is not yet a requirement in law.** Plans talk about mainstreaming and considering CCA but it is not legally binding.

X – **if there are more tools then there is a less tendency for the planner to look at all of them.** In the next level the counties will pass a CCA ACT but this will be a stand-alone act. This is less effective as integrated tools i.e. zoning, developmental guidelines that are comprehensive and include CC, economic and social interests. **As**

now the laws are fragmented and this means planners will choose the law they know best to follow- this leads to loopholes in the law.

4. Are there other policy instruments used to implement urban climate adaptation (UCA) measures?

No. UCA is being done by a project by project basis. **It is now not driven by local but by international regulations** i.e. the green climate fund or the adaptation fund. The latter currently has regulations that affect how CCA is done on the ground more than local laws.

X – this is also a potential problem as the international CCA regulations are not always suited to the local context

5. What are the strengths and weaknesses of these other policy instruments used?

X different NGOs (UK AID, etc) which drive implementation all come with their own regulations of CCA
international CCA regulations are not always suited to the local context

+ the world bank and the GCF (Green climate fund) – have generally acceptable requirements for their CCA. X - **However these would still need to be lead more by the local context.**

6. Are there certain chances/ potentials missed when using other policy instruments (e.g. coupling with other policies)?

Yes. **There are a lot of chances that are missed.** **We need experts who understand both CC and UP+D and development fully.** Now it is often dependant on the one person in charge who may not understand all sectors

- **now there is sectoral use of implementation or policy** – professional's often don't understand each other's field, thus we need a new type of professional.

X – **problem planning law does not recognize environmental planners as licensed planners.**

X- **all planners and designers should have the same basic education** so that everyone understands and can raise awareness for basic environmental and climate change considerations, then after this they can specialise.

X – **sectoral approach means we are not looking at synergies.** **Currently integration is very poorly done.**

D) Implementation

1. Which concrete urban climate adaptation measures/ interventions are currently planned or have been implemented in your city?

Non-urban there are quite a few clear examples. **Urban examples are not clear, "we are a bit quiet here".**

X – **thika highway was presented in an international report as a urban CC mitigation action** – due to reduced congestion. But this is not a proper mitigation or adaptation. **We pick and choose anything due to lack of technical understanding.**

We lack good urban adaptation projects. We have no concrete projects only some regulations i.e. the solar power requirement for certain developments – but this is still very limited.

NBI, MSA and Kisumu are developing requirements with the green economy guidelines

2. What are the strengths and weaknesses of these mentioned urban climate measures/ interventions?
No specific urban measures mentioned.

NB: No response to the questions 3-5 below, due to lack of time. The interviewee answered the questions below via email at a later time.

3. Are there conflicts between aesthetics and these mentioned urban climate adaptation measures?
Currently, most of the adaptation measures are rudimentary and survivalist. They are implemented by the urban residents at limited costs and no design interventions, to protect their assets, houses, etc. While on one hand the elite may consider some of the intervention an eyesore, most of the residents look at them mainly from a functional, survivalist point of view. Again most of the interventions are not designed by trained people, so they do not meet basic aesthetics that would be appropriate especially in public spaces. Meanwhile, there are very limited government adaptation interventions, which hopefully would consider the issue of aesthetics.

4. Are there conflicts between urban functions and these mentioned urban climate adaptation measures?
Yes. This is mainly because the interventions are spontaneous and devoid of systematic thought and design. Residents use whatever materials they can collect, sometimes for functions that they are ill suited to achieve. For example residents put barriers on roads to prevent flooding, while actually interfering with the functioning of the roads.

5. Are there certain chances/ potentials (e.g. coupling with other interventions / 'no regret' measures) missed when implementing these mentioned urban climate adaptation measures?

There are a lot of measures that qualify as no regret measures, but which sometime is missed because the interventions are unplanned, haphazard and spontaneous response to extreme weather events. For example rain water management could produce an exciting undulating or terraced landscapes; greening to prevent extreme wind speeds, could be done with aesthetically appealing plants, that are actually designed. Water reservoir could lead to beautifully done outdoor ponds that can be used by residents for recreation while actually holding the harvested rainwater. this goes all the way through energy interventions, waste management, measures, etc. These could be done to create aesthetically appealing landscapes.

Thank you for answering the questions in this questionnaire. Do you have any other remarks regarding the urban climate adaptation process or the content of the questionnaire?

Interview 6

General Information

1. Name: Interviewee 6
2. City: Nairobi, some experience with Mombasa
3. Position: ☐ Politician ☒ **Urban planners/ designer** ☐ Urban climate expert ☐ Other, _____
Senior physical planner/ urban planner. Urban Land Management Expert

Works as a Senior Urban planner within the GoK (Government of Kenya) who deals with specifically urban issues within the office of urban development. He has 10+ years of experience in the urban development department. Also worked with UN habitat program manager on the Korogocho slum upgrading program. A joint initiative by the GoK + GoK Italy of 210 million shillings for the Korogocho department and development swap program. Also works for KIDPR- Kenya Italian Debt development program which is dedicated to improving living conditions; support communication and provides security of tenure through application of the land tenure system

4. Organization: Government of Kenya
5. Email:
6. Phone number:
- 7.

NB: abbreviations: CC - climate change, UCA- urban climate adaptation, CA- climate adaptation, CCA- climate change adaptation, UCCA – urban climate change adaptation, C - Citizens, Pol/P - Politicians, UP&D - urban planners and designers, UCE - urban climate experts. GoK -Government of Kenya, NEMA - National Environment Authority.

Colour codes meaning: **Bold** is used to show notable points, **yellow** is used to show very notable points, **red** is used to show difficulties points and **blue** is used to mark specific document names.

A) Awareness

1. What is the sense of urgency to adapt the urban environment to climate change amongst the following groups in the future in your city?

Groups	Very urgent	Urgent	Neutral	Less urgent	Not urgent	Don't know
Citizens			X			
Politicians				X		
Urban planners& designers		X				
Urban climate experts	X					

C- Most of them need to be guided. **They are more or less neutral** **their opinions depend on what the politicians say and what the experts say.** If they are told this is not important the majority, who do not understand what it is all about will just go with the flow

Pol- If you ask me such **climate change issues and related aren't always a priority to them.**

UP& D- Very urgent because there are other urban issues to think about. if you ask me the **city is so full of other challenges climate change just forms part of those many other challenges.**

2. In case the sense of urgency is low, what is needed to make those groups feel more urgent about adapting the urban environment?

Groups	Measures to increase sense of urgency
Citizens	<p>There is awareness creation already but it needs to be enhanced. They are aware that when you cut trees and dump things anyhow, it has an impact on the environment, but there is need to create more awareness and stress more on the consequences.</p> <p>They know they should plant trees. When people think about green they think about trees but there is more to green than just trees.</p>
Politicians	So politicians need to more or less push. All of us are bound by the law, so ensuring that legal requirements are put in place. It's only with the law that you can work.
Urban planners & designers	Issues of the environment should be pushed to be made a major component of Urban planning and design
Urban climate experts	<p>Should up their game in terms of creating awareness, in terms of pushing for the agenda of climate change because of as of now they don't come out so clearly in forums. For example the Habitat Agenda; when you call an Urban forum you find that every person in the Urban sector is invited. So when you go to the world urban forum you find experts like engineers , planners, environmentalists etc.</p> <p>But when you go to the thematic areas, like the world climate meeting like now in Morocco (COP22) you find that most of the people there are just environmentalist. Even if there are urban planners present, all the of the people there so they talk so much about the environment they fail to integrate it into the larger urban development sector. So how do you relate it to buildings and transportation?</p> <p>For your study I hope you are looking green spaces- how to integrate it in CBD as well and not only look at aesthetics</p>

3. How aware are the groups of the following two urban climate phenomena?

• **Urban Heat Island (UHI)**

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens				X		
Politicians				X		
Urban planners & designers	X					

C - are just aware. They will tell you about; we are hearing there is climate change the rains are delayed etc.

Pol - Are actually very aware, that's why they are able to manipulate everything you give them in terms of knowledge. I.e. a politician can know very well that depleting the forest cover will reduce the amount of rain. But this person went ahead to tell his constituents, because he wanted to gain political mileage that rain comes from heaven it does not come from forests. So they are always very aware. (After reflection this statement was said to relate to; general climate change not the specific effects like the UHI).

UP&D - Are also very aware.

Reflecting back on this question after discussing the wind discomfort led to different answers:

C - For the heat they are aware. If they aware of the UHI effect, I don't know.

I know what you mean, like because of tall buildings and the glass they can reflect a lot of sun, the tarmac absorbs a lot of heat. But citizens are not aware, they are less aware.

Pol- I would also say they are less aware.

UP & D- **Are always aware**, in fact their buildings before they are approved..., (broken off). You see there is a tower behind this office along Uhuru highway the planners have raised issues about the one-way glass, that it makes sitting at the balconies uncomfortable.

• **Wind Discomfort**

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens					X	
Politicians					X	
Urban planners & designers	X					

In Erasmus university, (in Rotterdam), you would walk from the old Erasmus under a passage under this building and there would be a lot of wind blowing you. But funnily there was a new building that has been done in front of it, which I would expect would have blocked the wind but it didn't. So the wind would manoeuvre around this.

Wind discomfort here - it's something I have never noticed. **Actually I am less aware of the wind.**

Though I know what you are talking about, you could walk along this street you can see it's more or less straight all the way. So if the wind direction comes from one side you will feel a stronger effect of the wind if you are walking.

But I would say there is less of that wind discomfort in Kenya, for Kenya generally for Nairobi and Mombasa. As I am aware of such a thing but I could say the effects are not so strong as they would be i.e. in Rotterdam.

NBI-CBD- Built in blocks. **Less talk of wind in General in Kenya.**

What does this question mean they notice the wind? If they notice specifically the wind discomfort or feel its affects, like they are aware of the effect of the urban heat island?

C- **Actually I have never hear people complain that it is too windy** . Citizens are only made aware when applying for a building permit and they are told which direction they should face, because of the wind direction. **But if you ask them before the development which direction does the wind come from, most of them are not aware.**

Pol- I **have never heard them raise, in any forum, issues of wind.**

UP&D- always focus on wind orientation and light, they somewhat want to get information about the light and wind orientation, which means **they are aware.**

4. In case awareness is low, what is needed to increase the awareness among those groups of two urban climate phenomena mentioned in question 3?

Groups	Measures to increase awareness
Citizens	<p>Through the media. The media should be used as a forum, to enlighten citizens on the effect. I.e. like there are people who have so much concrete. If you tell them if they have more concrete and less green you will experience this (heat).</p> <p>For the majority of the population will media be enough? Most people have access to Tv and the radio and I think print and electronic media would be adequate. Would people watch?</p> <p>That depends on how it is communicated to them. Like you see it depends on your audience, you can put it in a comic way and people get really interested. Dont make it too serious and academic. Use simplified language not those big English or Dutch words, (to an average Dutch). So that people can understand. Know your target audience.</p> <p>Let's talk about planting trees, If you start telling people to plant some funny trees which have no benefit. I.e. If you i ask someone in the village to plant Ornamental trees they will think what for? But then If you ask them to plant fruit trees they would be very happy to do that.</p> <p>Would that hold the same for informal settlements? For informal settlement they would make due with ornamental trees that make use of less space,</p>

	<p>because space is very limited in the informal settlements. So you will tell them about trees that will not crack their walls and that will grow tall and thin. Always be mindful.</p> <p>It's important to think of, along the street who will own the fruit trees? specially in the country, if you plant a mango tree in front of someone's gate they will start claiming the tree.</p>
Politicians	Media and conferences
Urban planners & designers	They are aware, but it is important to have continuous awareness creation, cause things change everyday. The other day we didn't know about climate change but now it is the Buzzword of today

5. How aware are the groups of *the following four* urban climate adaptation measures?

- City design (e.g. street orientation, adapting to wind and solar orientation of building and streets)

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens					X	
Politicians					X	
Urban planners & designers			X			
Urban climate experts		X				

C- **The majority of citizens are always surprised**, when they want building approvals or things, **when they are told to adjust their development to reface certain directions or to re-orient their buildings.** **So most of them are less aware.**

Pol - I would also say they are less aware.

UPD -are more or less neutral.

UCE- are aware, the ones I have met are aware.

Who would you consider a urban climate experts? **Urban climate experts, most of them are environmentalists who are found in most Government departments that deal with urbanism.** Are there people working specifically on urban climate adaptation? No I don't think so. **Most are general environmentalists, they are not specific to any specialization.** it's good you asked that, **I would say there are no specific people who claim to be urban environmental experts.**

- Urban vegetation (e.g. green roofs, urban forestry)

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens	X					
Politicians	X					
Urban planners& designers	X					
Urban climate experts	X					

C - majority of the city dwellers do not use water from the roofs or for water catchment.

The trees along the streets in Nairobi, came before the citizens knowing the benefits of these trees, **These trees were never there until around early 2000's, then there came a city towns clerk/ city manager who decided that we have to put trees along these streets around Nairobi, and then citizens started appreciating, so I'm saying they are very aware.**

Politicians - are very aware

UP& D and UCE- I think that **everybody in these groups are very aware.**

- Use of materials (e.g. low albedo and longer cooling time-lag materials)

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens				X		
Politicians				X		
Urban planners & designers			X			
Urban climate experts			X			

I would say, most of these people are not aware. I would say **mostly engineers and architects are aware, but they don't fall into any of these categories.** That's why you will see most of our buildings are still stone walled, the usual stone wall, the usual mabati (corrugated iron). That are hot during summer and cold during winter.

Overall -Citizens in Mombasa are a bit aware but citizens in Nairobi are less aware.

In Mombasa, they use makuti or palm leaves as roofing material. Most of the designers of Mombasa also use concrete roofs, so I would say Nairobi they are less aware but Mombasa they are somewhat aware.

- Anthropogenic heat (e.g. less air conditioners,)

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens	X	X				
Politicians		X				
Urban planners & designers		X				
Urban climate experts		X				

Anthropogenic heat, in terms of air conditioning;

Citizens - In Mombasa yes, most of the citizens are aware. **I think most people are aware in Mombasa** because if **you go to Mombasa and you find that the design of the houses is such that, there is a lot of ventilation, to reduce use of air-conditioning.** (6:14)

For Nairobi, fans are there but I think these are formalities. Even in my office, I found a fan here I have never requested for and I have never switched it on. So if you ask me.....**It's less use in Nairobi due to the climate.** But for Mombasa, there's that consideration for a lot more ventilation to reduce use of air-conditioning, because of the cost of electricity.

For citizens I would say those of Mombasa are very aware and of Nairobi are aware. (The answer for this question for citizens has been taken as aware overall, due to the answer below that creation of heat and air pollution itself is not considered explicitly.)

People are aware that motor vehicles create a lot of pollution, but the laws are not so stringent. The legal framework to control pollution by vehicles is not so stringent, **we are aware that diesel vehicles and old engines are dangerous to the air** but..... **The laws are there I believe but the enforcement is what is the problem.** For example are their concerns about importing old cars? They are considering. Okay you know in terms of **Kenya they do not import alternatives which are more than eight years old** but I don't think it is **anything on pollution.** **If it is anything on pollution, majority of citizens are not aware.** They don't know why **the car age limit is eight years. Including myself.** Because some eight year cars are better than some five year cars.

Politicians - **generally they are very aware.** Though, funnily the only building I've seen with so many air conditioners is one of the member of parliament's offices, actually I think in town it is one of the buildings with air-conditioning, not for the parking, but for the offices.

6. In case awareness is low, what is needed to increase the awareness among those groups of four urban climate adaptation measures mentioned in question 5?

Groups	Measures to increase awareness
Citizens	Across the board it is still media that is needed

Politicians	
Urban planners & designers	Awareness and a change in curriculum, which I've been fighting for, for a while. The curriculum in our current colleges are so outdated, most of them still apply the 70s and 80's books with very little reference to the current.... the syllabus is outdated.

B) Communication

1. Which roles do 1 citizen, 2 politicians, 3 planners and designers and 4 urban climate experts have in the process of planning, designing and implementing urban climate adaptation measures?

Citizens: Participating in decision making forums

Politicians: Participating in decision making forums and law making

Urban planners and designers: Shaping policy

Urban climate experts: Shaping policy. They are exploring the built environment.

2. What are the relationships between these actors in the communication strategies?

Citizens/ Politicians: Through **public forums**

Citizens/ Urban planners and designers: **Public forums and media**

Citizens/ Urban climate experts: Public forums and media

Politicians/ Urban planners and designers: They meet in **conferences and workshops**, in regional and international forums.

Politicians/ Urban climate experts: The same applies here as for the Pol and UP&D, because when you go to these forums you find urban climate experts are there

Urban planners and designers / urban climate experts: They meet in **technical meetings**. I.e. Technical meetings like let's say an issue comes up like in Nairobi needs to re-look at the urban design, a task force will be formed. And in this task force several stakeholders will be called, and among them will be urban planners.

These relationships do you think they are strong? In my view they are strong because, in the public forum the citizens speak their mind, and what they say is at times taken very seriously. When **politicians and urban planners and designers meet, of course it results in the laws** that we have created because we create it to take to them to pass. So I would say it is strong. Yes, it is always strong because it culminates in the laws that we have.

3. What is the role of communication to support the planning, design and implementation of adaptation measures?

Communication increases awareness. Communication gives forums for exchange of ideas and helps to get new ideas. We can get new ideas, exchange ideas and inform. With all that shape the way people think, and even shape the direction policy takes.

4. Are there formal guidelines or policies that drive the use of communication in the planning, design and implementation of adaptation measures? If yes, can you please name them:

There's a citizen participation framework, I think it's a legal document, and it is not specific to planning, but can be used in any other forum where you would need engagement of citizens. And even the Constitution of Kenya encourages citizen participation, I think information is available online.

5. What are the strengths and weaknesses of the communication process?

Strength- you can reach many people at one time. Another strength is that depending on the methodology used you can get instant feedback. Social media, its easy to get feedback immediately.

Weakness- Much as you can get feedback and a lot of information, always the challenge is following up that the suggestions given are implemented. So the citizens can give their ideas but it is up to the Government to implement.

6. Is there need to improve the communication process? If yes, how to improve:

Yeah actually the process should be improved, you see the government is really limited in terms of how they pass information to people. They have specific communication channels, yet today there are more other like WhatsApp. You know WhatsApp is not an official government communication neither is Facebook. So maybe expand the communication channels to adopt the new communication methods. As the reach is wider.

C) Instruments

1. Are there legally binding instruments (e.g. zoning plans) used to implement urban climate adaptation measures? If yes, please explain how they work?

I think in most cities there are, in most major urban centres. For instance most towns have plans, there are plans with specific chapters on adhering climate change.

Once it is passed by the county assembly it is legally binding. It's an integrated strategic plan, but it is not for all towns but for some towns. They are city specific.

There are also the legal frameworks. There is the **EMCA (Environmental, Management, and Coordination Act)** they exist. Like the **Urban areas and cities Act**, **the fact that it says that every town must have an integrated strategic plan, that is legal and binding right.** And of course an Integrated strategic plan like this must factor in environmental issues.

Question: How does the EMCA work?

There is a body that is called the **NEMA (National Environmental Management Authority)** that ensures that the **environmental guidelines that they create are adhered to (EMCA)**. Question: Does this happen in practice? **Actually it doesn't. That's why I have said the legal framework is there, but the challenge is enforcement. Even when there are clear penalties enforcement capacity is very low.** I think the enforcement capacity of these institutions that enforce this is low. Even if they approve plans there's no follow up (by NEMA). And sometimes the processes are there and very tedious and bureaucratic so most of the developers choose to, work behind the NEMA or whatever. Especially majority of the developers, the middle level ones, they choose not to follow those rules. But go round.

2. What are the strengths and weaknesses of the legally binding instruments used?

Mostly the enforcement mechanisms are never really clear. The rules are there but how are they enforced? The laws are very silent on how to make sure that these things are done.

3. Are there certain chances / potentials missed when using the legally binding mentioned instruments (e.g. linking with other instruments)?

What do you mean? Answer: As the legal instruments are used now are they used to their full potential or are there some chances that are missed?

I think due to technical capacity gaps, see like **NEMA may not have adequate people to implement the EMCA.** Most cities also do not have enough planners, and experts in the building environment, so because of this **implementation is a bit low.**

Question: So in terms of linking it with other instruments and policies?

There is some ambiguity in the law, for instance, in the **Urban areas and cities Act** they talk of the **integrated strategic urban development plan**, **but they don't say, at what point EMCA is applicable.**

You see we should work towards linking these laws.

If you prepare an **integrated strategic urban plan** tell us and **it should have considerations of urban climate change, in reference to act X. Whatever infrastructure is designed it should conform to Act X,** **but it is so ambiguous that you are left to play around with words and things like that.**

I think the linkage between the different legal documents is lacking.

4. Are there other policy instruments used to implement urban climate adaptation measures? If yes, please explain how they work?

I would not answer this very clearly. This question would require an environmental expert.

5. What are the strengths and weaknesses of these other policy instruments used?

I have said the ones that apply to my profession.

6. Are there certain chances/ potentials missed when using other policy instruments (e.g. coupling with other policies)?

Some strategies (while not binding instruments), yet some strategies are so strong. **Actually some strategies are more explicit than the law.** You get me? **So you could lose a lot by taking a strategy for granted.** Question: Could you give an example? **I am sure when they finish the COP 22 in Morocco, something a document will come out of it, but countries are not obliged to follow.** They can say will do A, B, C and D but nobody will punish them if they don't. It gives guidance, but the nation chooses whether to do what they said there or not. So is that similar to UN-Habitat? Yes, UN-Habitat and UNEP make very nice documents, but the government chooses whether to finance, adhere to it etc.

D) Implementation

1. Which concrete urban climate adaptation measures/ interventions are currently planned or have been implemented in your city?

The planting of trees along streets, that's one measure. Measure number two, that I see, is that of late they have **reduced the use of concrete roofs.** Like the building you see in front of you, it used to have a flat concrete roof, but it has been changed to iron sheets and the same to this one we are in.

So change of building materials I can see somewhat, but I don't know who is controlling them.

Question: So is that an adaptation, the change from concrete to iron roofs, do they work better? They claim Iron sheets work better because concrete roofs expand and contract. According to one Architect I asked, she said when it's hot concrete roofs expand when it's cold....so they are susceptible to cracks. **So I can also see the rehabilitation of public spaces.** Like what is happening along Nairobi river, that area used to be a garage and even Jeevanjee gardens in the city center. There is Karura forest, of which part of it is along Kiambu road, it has been secured.

There are citizen efforts. If you go to where I stay, it used to be a grassland, but those who are buying properties there are going to plant trees. **So tree planting initiatives by citizens.**

2. What are the strengths and weaknesses of these mentioned urban climate measures/ interventions?

Strength - I don't know if it's a strength or an opportunity, I think strengths are within (internal factors). But they **(UCA) are getting support from the local citizens and some measures are citizen-driven like the planting of trees.**

Another strength, is that there are **lobby groups.** Like now if you hear someone wants to grab a part of Uhuru park (A large park within the Nairobi city centre). There are lobby groups that will stand and fight that idea.

Weaknesses - **Lack of political support.** Question: Political support from above or from multiple levels? **From different levels of politics, you know they rarely focus on climate adaptation. That is not where there interest is. It does not bring votes.**

Question: So if it doesn't bring votes, does it mean that at some level the citizens are not that interested in it (UCA)?

No. What I am saying is a politician is interested in votes, but a citizen is not interested in votes. **So a citizen will make initiatives but because he is satisfied with what he is doing, he doesn't push so much on a politician. So the politician does not push either, maybe for funding or awareness creation.**

Question: **So citizens don't push so the politicians don't move? Yes.** Maybe because of lack of awareness that I mentioned before. They love trees but, **maybe there are no communication channels to reach the politicians.**

By the way another weakness I wanted to say, is **there is little in terms of promoting alternative building materials.**

3. Are there conflicts between aesthetics and these mentioned urban climate adaptation measures?
I think there is no conflict I think they really integrate.

The only conflict is when the space is limited, priority is given to development over climate.

Question: So that would be in dense areas, but I guess also in slums or smaller neighbourhoods? Yes.

Sometimes even when it comes to the adaptation of buildings, the available materials are just too expensive. If you want somebody to use glass compared to stone; for one glass is more fragile to break and it is more expensive per square meter than using concrete or stones.

4. Are there conflicts between urban functions and these mentioned urban climate adaptation measures?

I don't think so. **Actually the majority of them add value to each other, of course when you plant trees they enhance the aesthetics.**

Question: Even no conflicts with other urban functions i.e. transport in the business district?

No. None that I can talk of.

5. Are there certain chances/ potentials (e.g. coupling with other interventions / 'no regret' measures) missed when implementing these mentioned urban climate adaptation measures?

Let me think a bit about this. You mean new opportunities when you plant trees? Answer: Maybe, but it could also be a missed potential i.e. how the different sectors work, it could be possible that there is a sector on disaster risk reduction (DDR), on urban planning and on environment, but if they don't work together or help to inform each other's policies there could be a potential missed. As DDR often has a lot to do with environmental situations. **Agreement by interviewee on this.**

And also a relation to climate adaptation because your adaptation can serve multiple functions. So it depends on how it is addressed.

Wow. **This is a challenging question.**

Answer: No regret measures could be for example implementing a green patch, that even if it is not helping for climate adaptation i.e. heat, it can help for water infiltration

Because what I know, is that most of the interventions I have mentioned they create new opportunities. When you have a park somewhere like JeevanJee gardens, you reduce the amount of people who would be walking around in the street. They have somewhere to go to sit and meditate.

So in one way or another, you have saved someone from.. somebody who may be confused and maybe just needed somewhere to sit (social issues). **When you have Uhuru park in the city, and it is accessible to children you have made kids active and maybe people who would suffer from some health conditions that are related to....** what do you call it when people have issues that are related to sitting? **obesity.**

If you ask me this question, if the opportunities we could have missed on the challenges we could have faced had we not conducted some of the interventions.

Question: So you think the interventions that are currently being done are trying to combine goals?

If you ask me this question, **I would reframe it. If these trees were not on the streets, if this city manager had not planted these trees. What would be some of the impacts we would be suffering from? And you see the trees provide a lot of shade and aesthetically it is more beautiful to look at.** It breaks the concrete jungle that I used to see here sometime ago before. So the opportunities we would have missed had we not done this or the challenges we were facing when these trees were not there could be the best thing I could explain.

So the missed opportunity cost is what you mean? Yes.

Thank you for answering the questions in this questionnaire. Do you have any other remarks regarding the urban climate adaptation process or the content of the questionnaire?

Have you identified any citizens to interview? No as the goal of these interviews is to talk to experts, who are of course also citizens. But the questions in the interview are too specific for citizens who are not concerned with planning or environment.

Be more specific on the people you are calling urban environmental experts i.e. are you looking for an environmentalist, or someone who has done urban environmental planning and management maybe there are specific branches or environmental management that I don't know. If you go to NEMA you will find several environmentalists and you can choose who your specific target group is. As an urban planner maybe there are specific environmentalists I work with or maybe I work with environmentalists in general. **Maybe the country does not separate an urban environmentalist from your everyday environmentalist.** But you see in planning you have an urban planner, a regional planner etc. So this would confuse me.

In your research specify that in Kenya these are the kind of urban environmental experts we have, the environmental urban climate experts. There are people who deal with specifically with water and resources and they are environmentalists. There was a lady who was a lady who worked in Holland with Warma or so, on water resource management, maybe her view on urban environment is different and she could maybe direct you to someone who knows about water resources within the city.

In your final report mention what you found out in Kenya. What are people's view on an urban climate expert.

Interview 7

General Information

1. Name: Interviewee 7
2. City: Nairobi
3. Position: ☐ Politician ☐ **Urban planners/ designer** ☐ **Urban climate expert** ☐ Other, _____
Associate Expert Urban Planning and Climate Change
4. Organization: United Nations Human Settlements Programme (UN-Habitat). Urban Development Specialist - Cities and Climate Change. Climate Change Planning unit
5. Email:
6. Phone number:

NB: abbreviations; C (citizen) Pol. (politician), UP & D (Urban planners& designers) UCE (urban climate experts) CC (climate change) CCM (climate change mitigation) CCA (climate change adaptation)/ CA (climate adaptation) GoK (Government of Kenya) DRR (disaster risk reduction) NEMA (National Environment Authority) or MENR (Ministry of Environment and Natural Resources)

Colour codes meaning: **Bold** is used to show notable points, **yellow** is used to show very notable points, **red** is used to show difficulties points and **blue** is used to mark specific document names.

Section 1: Awareness

1. What is the sense of urgency to adapt the urban environment to climate change amongst the following groups in the future in your city?

Groups	Very urgent	Urgent	Neutral	Less urgent	Not urgent	Don't know
Citizens		X				
Politicians					X	
Urban planners& designers			X			
Urban climate experts	X					

Question: Who are urban climate experts? UCE – are defined by Interviewee 7 to be, people working on CC or CC practitioners. There are very few urban practitioners working on urban CC in the world. In Kenya they can probably be counted on one hand. Examples of people could be at the MENR, CC negotiation team, some people in the Mombasa or Nairobi city council.

2. In case the sense of urgency is low, what is needed to make those groups feel more urgent about adapting the urban environment?

Groups	Measures to increase sense of urgency
Citizens	
Politicians	A lot of Politicians focus on service provision, which CCA is not seen to fall under. Need to explain how CA can affect service provision negatively or positively, so that it becomes on the politician's radar.
Urban planners & designers	UP+D do not see CC as an urban planning and development issue. They see it as a sectoral and global issue. Sometimes lack the understanding of planning and CC i.e. the recent flooding where a house collapsed was not primarily connected with CC but mostly to the El Niño phenomenon.
Urban climate experts	

3. How aware are the groups of the following two urban climate phenomena?

- Urban Heat Island

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens					X	
Politicians					X	
Urban planners & designers			X			

UHI is a natural phenomenon of cities, UP+D are aware of the effect but not aware it is massively exacerbated by CC. This applies for both Mombasa and Nairobi.

- Wind Discomfort

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens		X				
Politicians				X		
Urban planners & designers				X		

Here the Citizens are aware of the effect, but probably do not link it to CC.

4. In case awareness is low, what is needed to increase the awareness among those groups of two urban climate phenomena mentioned in question 3?

Groups	Measures to increase awareness
Citizens	Aware that it is hot, but they don't know why. Would be interesting to explain this to citizens through media
Politicians	Politicians need to see a solution. Now many people are showing them problems. i.e. public green space as a way to counter the UHI and partly help to reduce the death rate of citizens – this can help them market it to citizens.
Urban planners& designers	Improving knowledge of design i.e. wind discomfort is a result of a bad design. There are many guides on issues like thermal comfort but this is generally a relatively new field

NB: Student intern at UN-habitat is doing research on thermal comfort in Hong kong.

5. How aware are the groups of the following four urban climate adaptation measures?

- **City design (e.g. street orientation, adapting to wind and solar orientation of building and streets)**

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens				X		
Politicians				X		
Urban planners& designers		X				
Urban climate experts	X					

- **Urban vegetation (e.g. green roofs, urban forestry)**

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens		X				
Politicians		X				
Urban planners& designers		X				
Urban climate experts	X					

- **Use of materials (e.g. low albedo and longer cooling time-lag materials)**

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens				X		
Politicians		X				
Urban planners& designers		X				
Urban climate experts	X					

- **Anthropogenic heat (e.g. less air conditioners,)**

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens				X		
Politicians			X			
Urban planners & designers		X				
Urban climate experts	X					

6. In case awareness is low, what is needed to increase the awareness among those groups of four urban climate adaptation measures mentioned in question 5?

Groups	Measures to increase awareness
Citizens	Generally, there needs to be more awareness. But awareness is only one thing, it is not being actively regulated.
Politicians	Rules and regulations i.e. building codes need to focus more on: the 1 type of materials and, 2 anthropogenic heat creation
Urban planners & designers	Same as for the politicians

Now it is a **law in Kenya** that every free standing, single family house has to have a solar panel for water heating. This law applies to most big cities in Kenya. Now because of this new law, many houses are installing this, as they see its value – this is a way to lead to have mass upscaling.

B) Communication

1. Which roles do 1 citizen, 2 politicians, 3 planners and designers and 4 urban climate experts have in the process of planning, designing and implementing urban climate adaptation measures?

Citizens: **Implementers, clients, end-users** of C.A.M (Climate Adaptation Measures)

Politicians: **Facilitators, responsible for implementing** these measures and creating an enabling environment

Urban planners and designers: **Facilitators of solutions** on an urban scale,

Urban climate experts: **responsible for promoting the whole idea of UCCA** (urban climate change adaptation).

Advocacy

2. What are the relationships between these actors in the communication strategies?

Citizens/ Politicians - **C- ultimately dictate the politician's agenda, can demand CCA. C- P have the strongest relation.**

Citizens/ Urban planners and designers – more indirect to moderate relationship, UP+D are in a sense a part of the C group

Citizens/ Urban climate experts – **moderate relationship**, especially if urban experts are not coming from a public field.

Politicians/ Urban planners and designers+ Politicians/ Urban climate experts – **In theory UCE & UP+D advice Politicians**, but I am not sure how strong this is in Kenya. **I think it is actually weak.**

Urban planners and designers / urban climate experts – I feel there is a **growing relationship** from what I have observed, so **moderate with the tendency of becoming strong**. This is visible in forums, i.e. COP 21-22 and national fora, there we see that both in the **climate field urban expertise is growing in prominence**, also in the **urban field their climate experts are frequently and increasingly consulted.**

3. What is the role of communication to support the planning, design and implementation of adaptation measures?

Communication is always very important i.e. to set the agenda and connect different actors.

Strong role of communication in the support of these measures (especially in planning and design). In the **actual implementation of the communication role is less strong**, as things can be implemented without much communication. I.e. for an engineering based solution the communication role is small while for a community based adaptation solution the role importance is moderate-high.

4. Are there formal guidelines or policies that drive the use of communication in the planning, design and implementation of adaptation measures?
If yes, can you please name them?

I don't think there is any policy on any communication use for adaptation. I think there is a policy on stakeholder engagement and planning, thus a **clear policy on communication between different stakeholders and planning i.e. the Planning act – stakeholder engagement.** This can be **referenced as a best practice.** But that might be more general for planning than for the planning of adaptation measures. **The actual formal guidelines and policies may be very weak, or be non-existent, I don't know.**

5. What are the strengths and weaknesses of the communication process?

You put communication, which is a narrow field.

- ✓ + So the strength is clearly that **ultimately the communication process will lead to better outcomes,** because there is more information and relevance between actions and different stakeholders.
- ☒ X- **Undefined or adhoc and it delays the planning process**

6. Is there need to improve the communication process? **Yes.**

If yes, how to improve?

- **Formalization** is always good.
- But it also **needs to be made more transparent.** **A lot of communication, especially in Kenya is informal and is not transparent.** It can be called democratic but is not done on equal terms.
- **Egalitarian or democratic** (nb: not the word inclusive as is too vague and overused)

C) Instruments

1. Are there legally binding instruments (e.g. zoning plans) used to implement urban climate adaptation measures?

If yes, please explain how they work?

Zoning plans have yet to be used for adaptation specifically. Currently may be used for this by chance. If you take it a step further, in a **sense this kind of very very low-density zoning in Kenya is positive for certain types of adaptation.** I think it is a **stretch to say that zoning plans have been used specifically for adaptation,** but you could put it down at the bottom of the list.

I would say that **the act on energy; the Energy ACT Chapter 314** as written in the laws of kenya is in a sense **an adaptation as you use solar power.** This is a positive example

ENERGY ACT Kenya Chapter 314 - laws of kenya (GoK, 2012)

There are **several environmental acts (THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT, 1999 & THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION (AMENDMENT) ACT, 2015).** and the **national climate change strategy (NCCRS, 2010),** which I am sure has some kind of legally binding character. There is a **RENEWABLE ENERGY ACT/ INITIATIVE – for investment in geo-thermal energy,** which is also a strategy to adapt to the changing rainfall patterns as the hydro dams are not functioning as they used to, although it is a stretch.

- Kenya's Last Mile Connectivity Project (LMCP) (2015- 2017) (Gok)
- The Kenya Electricity Modernisation Project (KEMP) as part of the LMCP, a \$262m World Bank-sponsored initiative
- Kenya National Domestic Biogas Programme (Biogas for Better Life Programme), (private sector strategy)
- Development of improved cookstoves and clean fuels sector (private sector strategy)
- Least Cost Power Development Plan (2013- 2033) (Gok)

- Scaling-up Renewable Energy Programme (SREP) – Investment Plan for Kenya (Gok)

As urban climate adaptation is a rudimentary field in Kenya, you really have to put two steps in between to link it to urban adaptation.

I am sure there is a **housing and construction act, which mandates individual drainage** – this is an adaptation to changing rainfall patterns, we have observed to be getting shorter rains but more heavy rains. Drainage is one way to adapt to this changing rainfall patterns, to divide the water storage more. Although there still are current problems on flooding in Kenya.

2. What are the strengths and weaknesses of the legally binding instruments used?

✓ + Legally binding instrument is always the ultimate instrument, as it is **binding, it leads to scaling up and to setting standards.**

X - Clearly these instruments are **old and not very modern.**

3. Are there certain chances / potentials missed when using the legally binding mentioned instruments (e.g. linking with other instruments)?

- **Kenya's legal policy is very very fragmented. There is no policy coherence at all.** So coherence is clearly a potential that is missed, and through that synergies are missed.
- In a sense potential is also missed in that these **legally binding instruments, are not really used or rolled out/ applied to the whole country,** that could be a missed chance.

4. Are there other policy instruments used to implement urban climate adaptation measures?

If yes, please explain how they work?

There are policies, i.e. a

-climate change policy – that consists of several strategies and plans for Kenya.

- Urban development policy

- General development policy.

There are several policies to implement certain measures that have an effect on urban adaptation. I would name these three areas; these are also national policies. There is also a **new master plan for Nairobi** (the Nairobi Integrated Urban Development Master Plan (NIUPLAN 2014-2030) being developed and as **Un-Habitat we have recommended urban adaptation measures,** but how that turns out when it is approved I don't know. These measures are included at the current drafted stage. As elements of this urban adaptation measures are also being included in plans for Kisumu and Mombasa, **so this a sign that more people are talking about the need for adaptation in different fields and areas.**

5. What are the strengths and weaknesses of these other policy instruments used?

☒ **Not legally binding,**

✓ **Very flexible instruments** to guide various sectors of the economy and country. I.e. an urban planning act can address only a small aspect of adaptation. **A policy can have an integrated approach.**

6. Are there certain chances/ potentials missed when using other policy instruments (e.g. coupling with other policies)?

- **Generally, not much coherence between policy and laws. So that is a lack of vertical coherence. But also little horizontal coherence between different policies.** So a new urban development policy which talks about urban adaptation, while the climate change policy might be a bit older and very sectorally focused on the environment, only talking about coastal erosion and forests.
- **Another chance or potential that is missed is that there is no policy coherence with the climate relevant instruments.** The INDCs(Kenya's Intended Nationally Determined Contribution to the UNFCCC goal), climate policy, although they are mainly created by the same ministry over the last 5-10 years, you see there is very little coherence between these two. As for the urban and general development policy, I doubt that there is much coherence between those two as well.

Mainstreaming – I am not a big fan of this word, something that everybody uses but nobody does. We prefer to speak about policy coherence rather than mainstreaming, as otherwise everyone picks and chooses what is most important for their own cute topic.

But I think that is exactly what is necessary, not only for UCA but also for mitigation and other important goals. To ensure coherence, the mainstreaming of certain elements is necessary.

Personally climate adaptation is the most important goal in the world, but I would prefer a coherent approach, as if a government has its top priority on education and health I can respect that.

D) Implementation

1. Which concrete urban climate adaptation measures/ interventions are currently planned or have been implemented in your city?

Nairobi

- **Adaptation to flash flooding from rain**, have happened in Nairobi after the recent flooding events and tragic events of the last rainy season such as houses being washed away in Kibera slum (<http://mgafrica.com/article/2015-05-14-kibera-floods>). **Actions being taken are dredging of trenches, cleaning of the drainage and basic maintenance of the existing drainage infrastructure – which is a huge adaptation action for Nairobi**, is currently being carried out.
- The **public space strategy/ project / program being implemented now**, which if done well can have a positive effect on heat islands and air quality. This project is being executed city-wide in Nairobi.

Mombasa

- **Coastal flood protection project / imitative** being carried out with **re-planting of coastal vegetation to counter sea-level rise, fortification of several key infrastructure sites** against sea-level rise
- **Adaptation in the tourism's sector** – constant maintenance of the beaches, this may not be an urban adaptation but clearly has its effects on adaptation

Other cities, the master plan for Kisumu, there they want to **adapt to fluctuation of the lake-level rise**. If there is a climate impact on the water level of the lake, this could be an adaptation measure.

2. What are the strengths and weaknesses of these mentioned urban climate measures/ interventions?

- ✓ **innovative approaches**, things you would **not expect from cities of this development level**
- ✓ **clear potential to** adapt a large number of people to climate impacts
- ✓ Projects have the potential to be replicated and upscaled in other parts of Kenya

- ☒ X Sometimes very focused on small initiatives, so only a pilot but not city-wide initiatives. I.e. in a sense drainage and public space initiatives in Nairobi is a city wide solution but you can address it in a small or big way.
- ☒ X Drainage is very much a technical exercise in adaptation and engineering solutions, so opportunities could be missed when looking at ecosystem-based adaptation measures and linking it to wider issues such as water or fluvial strategy.

3. Are there conflicts between aesthetics and these mentioned urban climate adaptation measures?

No, I think it's the other way around. Except for drainage is not the most aesthetically beautiful solution, but most solutions can contribute. Possibly conflicts could occur over time, due to degradation of engineered solutions.

4. Are there conflicts between urban functions and these mentioned urban climate adaptation measures?

Yes, there are conflicts but this is the nature of urban areas. The main problem of the drainage is the conflict with private developers, even the vulnerable zone next to the rivers is built up which is a major conflict. **Private development is a conflict to urban adaptation in the sense that it is not regulated. There can be an area zoned as public space, but is completely built up by private development.**

I would say this is not a conflict of functions but of economic interests. Other than that, I do not see a major conflict. Of course public space has many different possible uses, but I don't think it's necessarily a conflict as this suggests mutually-exclusive uses.

5. Are there certain chances/ potentials (e.g. coupling with other interventions / 'no regret' measures) missed when implementing these mentioned urban climate adaptation measures?

Yes. As mentioned before, all these measures, maybe except the vegetation adaptation at the coast of Mombasa.

- There is a missed opportunity to place them in the wider ecosystem-based adaptation approach. Now the focus is very much engineering-based and ad hoc in a way, due to the tragedy that happened in the last floods. It is not an integrated approach but a rather singular engineering solution. **But the ecosystem-services are not very well regarded.**
- As far as I know there are **no awareness components**, or people do not know what is going on, one day they can see the construction trucks coming in and if they were aware they could maybe oppose these measures. I think there is **no awareness raising or awareness campaign**, which **would have been easy to implement and a positive side benefit**. Through local community structure, **awareness can almost be easy or low-cost to do as well as a chance to harmonize the design with the local community**. I think the community would be interested, especially low-income or economically weak communities. Thus these two areas are missed.

Thank you for answering the questions in this questionnaire. Do you have any other remarks regarding the urban climate adaptation process or the content of the questionnaire?

Interview 8,9,10

General Information

NB: This interview was held with three people at the same time.

1. Names: Interviewee 8, Interviewee 9 and Interviewee 10 (respectively interviewees 8, 9 and 10).
2. City: Nairobi and Kenya generally
3. Position: ☐ Politician ☐ Urban planners/ designer ☐ Urban climate expert ☐ **Other Disaster Risk Reduction Experts (DDR)**
4. If other, please describe function: Interview 8 is the Deputy Head of Office UNISDR -Africa. He has worked on regional development and watershed management. Has done vulnerability assessments to CC for the WFP (World food programme) and within this programme also worked as an Adviser on Disaster Risk Reduction / Climate Change Adaptation. Interviewee 9 is also an DDR expert and the office focal point for Kenya. He has knowledge about climate adaptation and is a former employee of the KMD (Kenya Meteorological Department), where he was the head of disaster prevention and mitigation. Interviewee 10 is the office focal point for urban resilience.
5. Organization: UNISDR-Africa (United Nations Office for Disaster Risk Reduction)
6. Email:
7. Phone number:

NB: abbreviations; CC - climate change, UCA- urban climate adaptation, CA- climate adaptation, CCA- climate change adaptation, UCCA – urban climate change adaptation, UP&D - urban planners and designers, UCE - urban climate experts.

Colour codes meaning: **Bold** is used to show notable points, **yellow** is used to show very notable points, **red** is used to show difficulties points and **blue** is used to mark specific document names.

Interviewee 9 noted: that their answers will come from a Disaster perspective. Furthermore, not as a Kenyan office but as an African office thus not all the people have extensive knowledge on Kenya specifically but do have knowledge on Africa generally. Interviewee 9, himself does have experience working at the Meteorological department in Kenya.

A) Awareness

1. What is the sense of urgency to adapt the urban environment to climate change amongst the following groups in the future in your city?

Interviewee 8- Speaking about perception in **2014- 2015** we had massive rainfalls and I saw a car floating in front of me in Westlands. **I heard that many people in the market used to say this is about climate change, climate change is here.** We have so much rainfall and it is because of climate change. When the El nino phenomena was happening, in the Nairobi Expats social community they were talking about El Niño as if it is a cyclone that is coming i.e. El Niño is going to strike Kenya.

Citizens -**So I would not say if the awareness level is high or low but there is definitely a sense of urgency among the citizens, because they know more about CC than they used to know a few years ago. Because they see the impact now, the impact was not as visible earlier.** The question here is that whether what's happening

to the citizens is climate change or not, that is a different discussion. **But at least they are seeing the impact much more than they used to see it earlier.** Both in terms of direct impacts i.e. a **floating car on the highway because of high rainfall, waterfalls in parklands or El Niño striking Kenya.** **But at the same time El Niño-induced or La Niña-induced droughts in Northern Kenya and the flow of people from rural areas to urban areas, particularly to Nairobi.** Nairobi is the primary city, when the next populous city in Kenya is Mombasa which is 1/3rd the size of Nairobi and the next populous city is Nakuru which is 1/10th the size of Nairobi. So I would say that Nairobi is the primate city, it does not follow the rank size rule. So if that is the case people will eventually move to the capital city which is the primate city and hence we need to adapt to the rise of the building of informal settlements.

Politicians - are neutral because since the constitution was enacted (2010) I believe the national urban planning policy is yet not finalised, it has been in the air for a very long time and just like the disaster risk policy has also still not been finalised. Although we do have I believe a **national and urban cities act**, but I don't think the policy to implement that act is still finalised. **That shows the level of the political commitment(low); if you have an act in place but you don't know how to implement that act, that shows you don't have the right political commitment.** I believe that is because they don't see that as an issue and hence they are **neutral to the urgency of climate change.**

UP&D- I believe Nairobi has a master plan, so they have a working document and Nairobi has been classified into 9 zones so there is some sense of real estate development. Thus definitely there is a bit of understanding about it and it see most of the new townships are emerging following a bit of ecosystems approach and Nairobi is also a very green city. Unlike Addis Ababa, Ethiopia, where I stayed for 5 years and I saw it go from green to brown. **Nairobi has still maintained a lot of its greenery so the UP have at least shown that they understand climate change and see it as a sense of urgency.** Hence they have tried to maintain the city as green as possible

UCE- definitely see it as very urgent.

Interviewee 8:

Groups	Very urgent	Urgent	Neutral	Less urgent	Not urgent	Don't know
Citizens		X				
Politicians			X			
Urban planners & designers		X				
Urban climate experts	X					

Interviewee 9 :

Groups	Very urgent	Urgent	Neutral	Less urgent	Not urgent	Don't know
Citizens			X			

Politicians			X			
Urban planners & designers		X				
Urban climate experts	X					

I understand that is a template you are using to do research in different countries. But for Kenya when you are talking of citizens you are talking of the populace. **It is very difficult to know the awareness for the whole population, because there are groups, there are groups that are more educated and others are really illiterate.** When you talk of citizens and you group all of them together, it becomes really difficult to say with a lot of objectivity which group you are talking of. Of Course I have tried to fill in, but I had that concern in mind. That we need maybe to classify, **people living in cities are normally expected to be more aware than people living in rural areas,** so for the **populace I have assumed we are talking about the city population and I have answered your questions from that perspective.**

In terms of awareness;

Citizens- of course I don't think there is there is much awareness of UCA. Even the learned citizens are not aware. What they need is facilities, the need water, electricity they need all the supplies.

Politicians - **very few of them will be able to tell you what is what.** Some of these people are not very well informed of climate issues, same for citizens and politicians.

UP&D - the city planners they have some awareness of course.

UCE - **they are very much aware but they urgently need to bring their knowledge and share with others.**

Interviewee 10

Groups	Very urgent	Urgent	Neutral	Less urgent	Not urgent	Don't know
Citizens		X				
Politicians			X			
Urban planners & designers	X					
Urban climate experts	X					

I agree with what they say, I will add on in terms of citizens and their sense of urgency.

It tends to not come out very clearly on how urgent they think adaptation is, the reason being is that it's (CCA) **always overpowered** by other urgent matters i.e. economic losses or livelihood losses. **So then they tend to**

look at more at what is critical at the time, which takes quite a long time to recover so by the time they actually get to prioritise adaptation time has already gone far.

Thus it does not come out clearly if they are committed or even aware of climate change adaptation (CCA)

2. In case the sense of urgency is low, what is needed to make those groups feel more urgent about adapting the urban environment?

Groups	Measures to sense of urgency
Citizens	Interviewee 10 - Sensitize on citizen driven initiatives Interviewee 9 - Accelerate awareness programmes at all levels of the society + with clear examples
Politicians	Interviewee 10 - Educate on implication on economic and social growth Interviewee 9 - Stronger engagement with climate efforts
Urban planners & designers	Interviewee 9 - Stronger engagement with climate efforts
Urban climate experts	Interviewee 10 - Synergize expert efforts Interviewee 9 - Demonstrate beyond doubt the need for adaptation. Show impacts, economic losses, modelling and use other analytical methods to drive the message home.

3. How aware are the groups of the following two urban climate phenomena?

- Urban Heat Island

Interviewee 8

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens		X				
Politicians		X				
Urban planners & designers	X					

Citizens - if you ask citizens in general do you feel hotter in a city compared to rural areas, they will say yes. Which means that there is definitely an understanding that in general the temperature in Nairobi is higher than the surrounding areas. But then how far this is linked to the technical aspects of the climate change phenomena, this awareness may not be there. So yes they do understand that there is something, that the temperature changes drastically in the city. I would thus say aware.

Politicians - the same aware, they are part of the citizens

UP& D - very much aware. In fact someone was mentioning to me that the average temperature in Nairobi is 2 degrees higher than its surrounding areas so I am sure that there has been some research done on this and that must have been done in domains relevant to urbanisation i.e. geography or meteorology.

Interviewee 9 - the met service (Kenya Meteorological Department) will have this information. They have very good trends and graphs and all that on how temperature has changed in Nairobi and in many other cities in Kenya.

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens					X	
Politicians					X	
Urban planners & designers		X				

Citizens - are impacted by the UHI effect but do not understand. The UHI effect, if I can talk for Nairobi sometimes brings very serious flooding because the radiation has been trapped and then when there is an influx of radiation there is convection and it rains just within a localised area and produces very heavy floods. However in terms of pollution and the human comfort index, it is noticed i.e. it is too hot and need to remove my jacket, but they don't realise what causes it.

Hence citizens are not aware.

UP&D - have some little awareness i.e. know about the wind tunnel etc., so they can have some understanding of how the UHI effect works. The same story applies for the wind.

Interviewee 10 - Did not answer the multiple choice question on UHI or wind discomfort as there was a page missing from her interview sheet (this was discovered at the end of the interview). She said she had nothing to add to the questions when asked before moving the next question.

- Wind Discomfort

Interviewee 8

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens		X				
Politicians		X				
Urban planners & designers	X					

Citizens - in terms of wind there is definitely cultural and indigenous knowledge of this. If you go to the coastal areas in the urban environment you will see the construction of the houses have been made in a way

that the wind does not flow into the house very clearly and hence does not bring dust. I have seen these constructions in Malindi (Mombasa). So how does wind discomfort link with the indigenous knowledge that people have including those in urban areas is something to further inquire about. **So I would definitely say that the citizens have awareness.**

Would you answer the question different if you specify between Nairobi and Mombasa?

UP & D - For Nairobi, the planners definitely have awareness about it they would make the house sun and wind facing etc. This would be the same for a coastal city, they would need to take into account the local ecology of the area so that there is no discomfort.

How far they are taking into account the increasing discomfort because of wind speed or heat, I am not sure about that for any of the cities.

As they understand that this is a sun facing area or that due to how the house is constructed the wind will definitely blow the house but the effort is either to stop it or accelerate it.

But how far they are taking into account the changing dimensions of wind discomfort I am not really clear on that. **So I would put aware to neutral for climate situations.**

Generally, wind discomfort is not a very big issue in Kenya. As Kenya lies on an equatorial altitude and it does not impact much in Nairobi. As the wind discomfort would equate with the heat of the wind which is not an issue in Nairobi.

Interviewee 9

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens					X	
Politicians					X	
Urban planners & designers		X				

As Interviewee 8 mentioned, Nairobi has a masterplan made a long time ago by the British, thus even though the citizens are not aware this plan had taken concern of all these impacts. The way the streets were designed took care of climate related issues i.e. the wind, the flow of air. We have done some studies to look at pollution within the city and found that the city design was done well for the wind flow. **UP&D** - have some little awareness

To add on to Interviewee 8, In Kenya you find that urbanisation and especially in the developing areas i.e. dwelling estates, the government has stopped supplying these estates. **So you know when the government has a project it is much better as it is really analysed and there are a lot of expectations that goes into that.** **Now urbanisation or the estates that are coming up there are normally from individual developers and these are people who don't know the building codes, the put the estates the way they want with very little supervision from the government.** So you will find issues of wind flow handling etc. are not issues to them.

4. In case awareness is low, what is needed to increase the awareness among those groups of two urban climate phenomena mentioned in question 3?

Groups	Measures to increase awareness
Citizens	All- Generally low awareness of terminology but not of the effect. Interviewee 9 - Awareness can be created by engagement with these people and training on climate impacts and to understand the dynamics of the built up environment. These people need to be engaged, not only the citizens but also as one group with the politicians and the UP&D all of them as one group need to develop critical awareness and knowledge of how climate factors impact on the environment.
Politicians	Interviewee 9 - Engage with UP& D
Urban planners& designers	Interviewee 9 - More knowledge development to increase awareness

5. How aware are the groups of *the* following four urban climate adaptation measures?

- City design (e.g. street orientation, adapting to wind and solar orientation of building and streets)

Interviewee 8

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens			X			
Politicians			X			
Urban planners& designers			X			
Urban climate experts		X				

The greater part of Nairobi I believe is pretty old, so i am not sure how far city design took into account climate adaptation measure. The real design of the city has been made by the British it is now almost 100 years old. I have been given to understand there was also a kind of apartheid being followed in the city during the British time when the majority city dwellers couldn't go to certain parts of the city. That has reflected in the design in that part of the city.

Interviewee 9 could inform about how the real estate development and construction is happening in the new areas, are they taking these principles into account?

Interviewee 9

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens					X	

Politicians					X	
Urban planners & designers		X				
Urban climate experts	X					

UP&D -->Interviewee 9 - (in response to Interviewee 8 question) **actually officially they are supposed to know that, but due to what we call lack of conformance you find that many of these developers are not following the rules.**

I think Interviewee 8 can tell you we have had quite a **number of major disaster corrupting our city**. All of this is a reflection of how the city council that is supposed to deal with conformance and ensure that the codes and regulations need to be followed have not been very effective. This is also reflected in the estates, you find **actually there is very little transparency and therefore they can build things the way they want. They change the plan or the original plan has changed; i.e. a one story building is made into three buildings, all these things contribute to the adaptation problems at the end of the day.**

Interviewee 8 - I would definitely agree on that part and also I have seen that in terms of the new infrastructure development of the roads, naturally taking into account the existing environmental aspects of the city i.e. **i was mentioning the floating car, in the riverside of westlands and the whole area got flooded simply because the road has been made on the river.** Again once again near a school a main road is built on the lowest bank of the river so naturally it floods there if it rains. If you construct a non-porous infrastructure on top of a natural resource it will naturally conflict.

Which means city design often is not really taking into account the adaptation measures or common sense at times.

Interviewee 10 - **I think I would put that on neutral because, i think it correlates with the importance or use of buildings.** As you will find that the high-end buildings are usually made by experts who take into account all the climate issues that need to be taken into account. **But then if it is a commercial building for instance, in an area that is not a high-end environment the chances of a quack doing the job or laws being bent are higher. i.e. fundi's. They use a fundi (a handyman), instead of an architect. As long as you know how to put one stone on top of another and make a building well and good.**

Interviewee 8- It's a shame that it is actually happening given that the fact that the urban watershed of Nairobi is pretty natural. There is not much effort needed to for example do sewage management because the natural landscape is such that the water will certainly flow into a certain direction. So not much construction in terms of infrastructure measure is required compared to a city like Dhaka or Mumbai, when flooded there is no way water can make its own flow because it is a flat land.

For Nairobi, still I don't see any kind of a measure to be adapted to reduce the use of plastic, which leads to flooding in Nairobi because the sewage gets blocked by plastic. Also there is no measure for solid waste

management in the city. It has been often referred to in the policy level, but i don't think they have a solid waste management plan nor do they have a kind of way to dump the garbage of the city into a specific open hole.

So those things, in terms of the city design, it is an ignored aspect of the city's design. I.e. i come from Delhi in India and plastics are banned in my city. I don't want Nairobi to have to move to that point where you have to ban something, the culture needs to develop to the point where you stop using plastics. And if you use plastics use it in a way that you don't need to dispose of it in a non-logical manner. When I often drive along parklands, I see there are so many plastic bottles just thrown into the dry drain.

Interviewee 10 - there is actually a policy or law or an urban law that has been implemented in Nairobi that if someone is seen with a (plastic) bag you will be fined. I don't think that even lasted a week.

Interviewee 8 - If I walk into Nakumat (a main shopping centre chain), I need to tell them that I don't need so much of plastics. If I am not carrying my own bag, you can put all the washing soap and the milk together in one bag. **Interviewee 9** - But they want to give you several for each. What Interviewee 8 is saying is that the East African community itself, they passed a law to stop the usage of plastic bags. Some countries refused to sign, Kenya being one. It was only signed by Rwanda, who had already banned plastics and is doing excellent work. The rest of the partners have not signed.

Interviewee 10 - I was amazed that when I bought meat in Rwanda, in Kigali and it was packed in the kaki, a strong kind of brown paper.

- Urban vegetation (e.g. green roofs, urban forestry)

Interviewee 8

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens		X				
Politicians		X				
Urban planners& designers		X				
Urban climate experts	X					

On urban vegetation the climate of Nairobi in itself, with temperate rainfall, equatorial heat and everything really permits naturally the growth of plants and low maintenance of kitchen gardens, of green roofs.

This luxury is not present in many other tropical countries. So I think that these conditions the citizens in a way that if they would need to make a lot of effort they wouldn't do it. But because they do not need to make a lot of effort to make it green, (though I am not sure if the awareness is high or not) but I think this is naturally permeating a part of the culture.

I would say all of them are aware, but climate experts are more aware. The awareness is guided or qualified by the natural growth, (which is hence enabling urban vegetation).

Interviewee 9

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens					X	
Politicians				X		
Urban planners & designers		X				
Urban climate experts		X				

So if I may comment he (Interviewee 8) has talked very well about the ecology and the green forest, all these are things that the experts and the urban planners know. They know all about this but of course they are starting to be practiced slowly. Like now we have changed our roofing material as asbestos is being discouraged everywhere, so we are getting rid of that. We are also having technology coming from other countries, the experts are aware of this. **The climate experts are very much aware of this and of new technology to bring about adaptation.**

Interviewee 10

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens		X				
Politicians			X			
Urban planners & designers	X					
Urban climate experts	X					

- Use of materials (e.g. low albedo and longer cooling time-lag materials)

Interviewee 8

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens		X				
Politicians		X				
Urban planners& designers	X					
Urban climate experts	X					

Interviewee 9

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens					X	
Politicians					X	
Urban planners& designers				X		
Urban climate experts		X				

Interviewee 10

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens		X				
Politicians	X					
Urban planners& designers	X					
Urban climate experts	X					

- Anthropogenic heat (e.g. less air conditioners,)

Interviewee 8

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens			X			
Politicians				X		
Urban planners & designers		X				
Urban climate experts	X					

Anthropogenic heat, I am not so sure if this is very applicable to Nairobi. so GHC generation maybe through refrigerators may be high. **But what is very unfortunate in Nairobi, is that there is no pollution control measure for vehicles.** I don't think there is any and I have never been checked. All the matatu's or car that generate so much of carbon monoxide which in turn leads to anthropogenic heat. **There is no measure to control that in the city and there is also no measure to have a regulation on the age of the vehicle i.e. in many cities of the world you have the rule that if a vehicle is more than 10-15 years old you can't have the vehicle in the city. We don't have any such measure so there is no measure on pollution control in the city.**

Interviewee 9

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens					X	
Politicians					X	
Urban planners & designers			X			
Urban climate experts	X					

Interviewee 10

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens		X				
Politicians	X					
Urban planners & designers	X					
Urban climate experts	X					

The newer buildings are more adapted to having air conditioners installed. If you look at the newer office blocks, almost all of them have a/cos. Reason being, for us the colder season has been July, but **over time people are realising it is becoming longer and the summer time is becoming hotter so to try and maintain some comfortable temperatures people have resorted to having the aircon installed.**

Interviewee 8 - I have never stayed in a hotel in Nairobi, so I am not sure if they have them.

Interviewee 10 - even the older hotels that didn't have them, have now installed air cons.

6. In case awareness is low, what is needed to increase the awareness among those groups of four urban climate adaptation measures mentioned in question 5?

Groups	Measures to increase awareness
Citizens	<p>Interviewee 9 - Practical demonstrations of CC impacts (cause and effects). Supply of alternative gadgets and policy orientation by government</p> <p>Interviewee 8 - Emphasize on anthropogenic heat is the most important factor that needs to be acted on for all the categories, given the vehicular and industrial pollution. The lack of awareness in terms of people reducing the use of plastic or enhancing solid waste management, these are the key things that especially regulations are needed for.</p>
Politicians	<p>Interviewee 9 - Practical Education to create a political buy in in policy and governance.</p> <p>Interviewee 8 - Politicians have a big role to play. The politicians need to use and bank on that information from the UP&D and UCE to have the right regulations. Because unless a regulation is made to be in place, particularly for anthropogenic measures nothing will happen. Plastic will always be cheaper than anything else and it is cheaper to drive a car that is old or generates emission. Most of the cities i.e. Delhi, you car will be impounded if old, you cannot drive a car without a pollution certificate which should not be more than 3 months old. While there was nothing (in terms of regulations) in Delhi until 2000. The pollution certificate came in to place only in 2002.</p> <p>I will say regulation is important thus politicians have a big role to play in making the right regulation.</p>
Urban planners & designers	<p>Interviewee 9 - More orientation in CCA & mitigation measures</p> <p>Interviewee 8 - More information is needed from the UCE and the UP&D to inform the process.</p>

Interviewee 9 - I have nothing further to add, we have read from the same script.

B) Communication

1. Which roles do 1 citizen, 2 politicians, 3 planners and designers and 4 urban climate experts have in the process of planning, designing and implementing urban climate adaptation measures?

Citizens:

Interviewee 8- Citizens need to **follow the regulations and design.**

Interviewee 9 -Need to present problems to do with CC. (Assuming they have them). **So they can be involved** and say this is what we are observing and what they think needs to be done.

All groups need to come up with a communication strategy together.

Interviewee 10 -Citizens need an analysis and to **inform the UP&D on what they need.** Because many times i.e. the slum upgrading project that has been a super flop (failure) in Mathare, reason being, what the experts thought of as a solution is actually **not** a solution for the people it is being designed for.

Politicians:

Interviewee 8- For the citizens to follow the regulations and design for CCA, **the politicians need to generate the right regulations.**

Interviewee 9 - Come up with laws and policies and as said before **regulations.**

Interviewee 10 - **Are critical in terms of enforcing existing advisory measures coming from the UCE and the UP&D.** Also they can promote to reduce pollution, **as they are the voice that the citizens actually listen to more.** If they can urge the citizens to come up with innovative solutions to deal with their own problems, then it can improve the areas that have been planned and designed in the long run.

Urban planners and designers:

Interviewee 8- **The government UP &D role is to take that information from UCE and ensure that they develop the right mechanisms for the citizens to follow.** To ensure that we don't deteriorate the situation but adapt in a way that also adds to the lives of citizens and is also something they can do. **Thus UP&D should take into account the scenarios of the UCE and then do the designing part in what should be done for adaptation.**

Interviewee 9 -Do some **enforcement to ensure that CA is implemented.**

Interviewee 10 - **It is critical to include citizens voice in the planning stage** as well as of course in the other stages is vital (to come up with relevant solutions).

Urban climate experts:

Interviewee 8- **Climate experts have a key role to play in terms of providing information of the long and medium term forecasts of how a scenario is going to look like if we continue business as usual.** Or how are the scenarios going to change and how will they impact the population.

Interviewee 9 - **Advisory.** They are the experts they **need to advise the rest of the groups.**

2. What are the relationships between these actors in the communication strategies?

3.

Citizens/ Politicians

Interviewee 8 - I think what we often miss in all the communication strategies and policies is 1, the flow of information from the politicians/ regulators down to the implementers and citizens. But especially 2, the backflow of information from the citizens to regulators. That two way communication often is missing, between the citizens and all the other actors that are indicated here.

Citizens -I.e. **Nairobi is such as IT oriented city, but there is no mechanism that you can communicate through online means to your constituency MP (member of parliament).** Or to a regulator such as NEMA (national environmental management authority). **This should be facilitated, so that citizens can voice their opinions.**

Politicians - at the same time **need to be responsive enough to take this information.**

Interviewee 9 - Talking from recent experience, **there has been no clear communication between these parties i.e. between the citizens and the politicians, there is only interaction only when the politician is looking for votes to become elected.** After that the citizen has got no way of reaching the politicians. As Interviewee 8 has said, this is an area that needs to be explored, how can we enable these two groups to communicate at all times so that at least they can share information.

Citizens/ Urban planners and designers

Interviewee 9 - The same communication issue between citizens and politicians is relevant for the urban planners. **The planners just do their work, they don't consult or bring the citizens together to give their voice,** therefore they make structures which alter on the citizens will say no we were not involved and therefore we are not taking this.

Thus I agree with Interviewee 8, **there needs to be a back and forth communication, forward and backward feed, so that the information can flow. At the moment I would say that for Nairobi, there has been very little communication between these groups.**

Interviewee 10 - **That's true, (there has been little communication between these groups in Nairobi).** It also comes out clearly when we were helping cities or governments to carry out a local government self-assessment on how they carry out their work. What came out clearly at the workshop is that when we gave moments to everyone for giving a remark and it was often said; thank you very much for bringing all these people together, it's a good thing to have so many actors in one place.

So you find that even among the experts themselves, there is a lack of synergy as when it comes to communication either they don't speak with the same voice, or the language is not understandable or there are other such communication challenges. **The major gap is that we don't have a (communication) forum, it doesn't really exist.** If the parties in a city are not aware that the audience is not just themselves, but they also have an audience of other people ranging in terms of the expertise that they have.

Citizens/ Urban climate experts

Interviewee 8 - **Should see or explore how the citizens are reacting to a forecast or scenario they have made. Thus they should explore do citizens also feel the same or is their scenario just based on models. Thus the**

perceptual part of the forecasts, or the data they are generating, should also validate their data. We often miss that part, we go to the statistics but the perception of the citizens is also valid, as you can say temperature is increasing by 2-3 degrees but maybe we (the citizens) don't feel the heat. Thus the perceptual part should also be enhanced and that can come only from the citizens. So the crowdsourcing of information, while very much feasible in Nairobi, has not been explored yet.

Politicians/ Urban planners and designers

All three mentioned a lack of interaction between these different groups in general in Nairobi. See below, communication gap between UP&D and UCE affects the lack of information the politicians have.

Politicians/ Urban climate experts

All three mentioned a lack of interaction between these different groups in general in Nairobi. See below, communication gap between UP&D and UCE affects the lack of information the politicians have.

Urban planners and designers / urban climate experts

Interviewee 8 - One thing that is often missed is the link between the UP&D and the UCE, because these two groups really need to talk. There is no key forum at this stage where the climate information that is generated by the climate experts, is translated into action by the urban planners. This leaves a gap. They do their own respective researches but it is not really following climate information.

I.e. the case of Kenya as a leader on climate change, we have a national climate change policy, and an national adaptation plan, a national action plan. Kenya was one of the first 25 countries to submit the INDCs (Intended Nationally Determined Contributions) to the UNFCCC before the 2015 United Nations Climate Change Conference in Paris in Conference (COP, 21) (This document details the intended reductions in greenhouse gas emissions). A Kenyan representative, Macharia, was a co-chair of the SDG (Sustainable Development Goals) generation process. So Kenya has been very much in the lead on the climate front, and has made a lot of commitments on the climate change aspects. Despite the fact that Kenya hosts the UN focal center on urban issues i.e. UN-Habitat and also being one of the most rapidly urbanising countries, particularly Nairobi, and also hosting one of the largest slum of Africa in Kenya. The interaction between the climate domain in Kenya and the urban domain is not strong enough. There is a huge communication gap that is happening in the country. Which has implications on the politicians, as the outcome of the interaction between UCE & UP&D need to inform what the politicians do in the parliament.

Interviewee 10 - There is a disconnect between the policy makers and the implementers. The policies are made up there and the implementers have no idea what the policy is or how to go about it.

What would they define as an UCE in Kenya; who or what fulfils this role? Who do you think of?

Interviewee 8- **The meteorological institution (met.)** i would say. **The models that they have in Kenya are pretty good and if they cover the whole of Kenya they also cover the urban parts of Kenya.** I.e. we have our databases of disaster and we do cover Nairobi, **but I would say apart from some of the publications I have seen from UN-habitat, there is not much very strong research or publication on urban climate expertise or analysis.**

Interviewee 9 -If you could check with the **Kenya met. department (meteorological), there is a lot of research they have done on the urban climate. Including the fact that there is an international paper on the urban heat island,** I think it was done a long time ago on Nairobi.

(NB: After the interview I confirmed that this paper was the one by Ongoma, Muthama and Gitau (2013), which I had already used as a reference for this thesis).

The Met. department has a whole unit on urban pollution and has instruments to suck in and extract the air pollution. One is at the UNEP office, at Chiromo, at the airport. They are measuring what they call the background air pollution. **The only measurement station in the tropical region, is at the top of Mount.Kenya which they call the global atmospheric watch station** which looks at the **ozone concentration for the tropical region.**

As Interviewee 8 said, we don't have a real institution that is charged with this, but the met. is taking the lead on this research.

Question on the met: Is it is possible to get blanket data from the met department without any problems i.e. from Kenya as a whole ?

Interviewee 9 - No it is not easy. They have their own data policy unless you partner in your research such that you share data and publish together. **Unless that is the case, they will not part with their data. They do have the general domain or common domain data for which they allow use, that one is also in the world meteorological information website.** For seven stations in Kenya they are allowed to give but not the data for the whole country.

Interviewee 10 -Doe the regional centre for mapping deal with pollution?

Interviewee 9 - Not exactly, they are mapping resources i.e. deforestation and looking at the vegetation performance, floods, drought extent. So the spatial extent of these resources.

4. What is the role of communication to support the planning, design and implementation of adaptation measures?

Interviewee 9 - I have left this question for Interviewee 8, I think he can answer.

Interviewee 8 - When all the citizens and all these four actors have one role or another, **they are communication gaps among the four actor groups. Which need to be transcended. If this is not done the information provided by the UCE may not be realistic or be tested enough. UP&D may not have the right information to design adaptive infrastructure. Politicians may not have the right information to do the regulation. Citizens will then suffer at the end. If the citizens don't inform the the other actors or they don't have the mechanisms to inform then the people will be working on baseless statistical models.**

I think the communication channels between these four actors have a very strong role to play.

Interviewee 10 - nothing to add.

5. Are there formal guidelines or policies that drive the use of communication in the planning, design and implementation of adaptation measures? If yes, can you please name them?

Interviewee 9 - Especially for communication I would say the instruments that Interviewee 8 mentioned, that are **national (National adaption plan, Adaptation strategy etc)** have **clearly mentioned things to do with population, urbanisation and housing including the adopting the green concepts in housing.**

We have other instruments like **one of the most powerful agencies called NEMA, the National Environmental Management Agency.** NEMA controls all these issues of pollution, water and waste pollution etc. They are the people that are really charged with this and I think they have a act which we call the **EMCA (Environmental Management and Coordination Act)** of 2000 , which I think was revised recently (**The Environmental Management and Co-ordination (AMENDMENT) ACT revised in 2015**). **This amended act overrides any other act.** I.e. So if NEMA came here and said the UNEP this is not acceptable, there is no other act that counter this. It is the strongest and really respected in the country.

Those are the other instruments that can be used in communication, as once you are building somewhere they are regulations. I.e. you must put this or advertise this, the public can come and give their comments the neighbours can say no we cannot allow this to be put here as this will interfere with the environment or whatever. So the NEMA is the one that is charged with the transparency (of planning)

Interviewee 10 - I was just wondering is this in relation to the country, to the city or what?

Answer: To the country and you can mention if there is something specific for a city.

Interviewee 10 - I was going to mention that **some areas give guidelines on how stakeholders can be engaged in the planning and implementation, in all the cities there are efforts on this.**

6. What are the strengths and weaknesses of the communication process?

Interviewee 9 - will bring out the **issue of corruption as a barrier.**

7. Is there need to improve the communication process? If yes, how to improve

Interviewee 9 - **Improving the communication channels and improving the transparency.**

Interviewee 8 - **Having a strong citizen forum and online mechanisms is very important.**

Interviewee 10 - nothing to add.

C) Instruments

1. Are there legally binding instruments (e.g. zoning plans) used to implement urban climate adaptation measures? If yes, please explain how they work?

Interviewee 8 - **The Nairobi Masterplan is there, I think that is the most legally binding thing that they have. I believe it has a 20 year validity or something like that.**

The national urban and cities act is also there. There are also several provisions in the constitution from which the act has been drawn and the policies are being made. So I think these are the legally binding instruments, but they also have the policies, the draft (unclear of what draft, possibly the climate change act) one is in place.

There is the **national drought management authority Act (NDMA Act)**, of course that is legally binding because it is an act, but. There is also a **draft disaster risk management bill and policy**.

Interviewee 9 - the climate change act, also legally binding with Nema? The national adaptation plan draft.

One of the most important legal instruments which can be used effectively is the devolution process. because this is a key contribution of the constitution and how does the devolution process speak to the urbanisation part?. Because the devolution process has decentralised the country and given a lot of power to the counties, how to do the county leaders or the county governors speak with the municipal corporations at the country level? **What does the act say about it, i don't think it says anything.** But the policy must be saying something about it. That is something that I am sure, although I have not read it, there must be something concerning the devolution process, the relationship between the country government and the municipal corporations.

How does it work for Kisumu for instance? (Question for Interviewee 10)

Interviewee 10 - **There is actually a lot of friction right now. because it is not clear where to draw the boundaries, as for Kisumu the city is just a subset of the country.** As in Nairobi it is different as the city is the county. So in Kisumu there is still a lot of friction because they don't automatically inherit everything from the city i.e. the management. It actually has a replica of the county government.

Interviewee 8 - we mention Kisumu because we have a project running there on planning.

Hence devolution is a key instrument, as it is drawn from the constitution of the country, but it is not clear how does the interplay between this devolution process and urbanisation.

What makes it an instrument? **It gives the authority from the national level, so instead of having one national act, plan or policy that is binding for all the counties at local level, the counties will have their own authority, autonomy** (and finances - Interviewee 9) to generate their own policy and financing it at the same time. **Furthermore devolution helps in contextualising.** As the national plan (for adaptation) may not be contextual enough to a cities local reality.

Interviewee 9 -And of course **each city has got its own strategies, i.e. strategic plan which maybe could refer to (adaptation).** Every city has its own plan for development within itself.

The national urban and cities act (also seconded by Interviewee 9).

Interviewee 9 - If I comment in general on the issue of communication, here at the UNISDR, we have what we call a national disaster risk reduction platform. **This is an open forum for all stakeholders, it is a multi-sectoral kind of meeting and everybody comes including urban planners and we are able to share all the information and we are able to urge the government on the areas and priorities that need to be taken.** So this is an instrument that we use, which is not legally binding, but it is a forum that really helps us to create awareness and bridges the gap between different actors. **This is a forum that can be very helpful. NB: this is not specific to UCCA, but can be useful to address it.**

2. What are the strengths and weaknesses of the legally binding instruments used

Interviewee 8 - **We have not gone through that yet, so are not able to say something about the strengths and weaknesses of that act.** I have not gone through it, but I believe there is an act existing; **the urban and cities act.**

Interviewee 9 - Strengths: In fact it falls on what you have just said (in response to Interviewee 8) **Devolution is something that has really made some things possible.** Of course when you have the **legally binding instruments, it means the conformity of the law and rules is much easier.** As then there is **more public awareness and there is of course transparency** that comes with all this, including of course accountability. As the people are able to go and question, why is this project taking place here? Why is a project not taking into account something?

These are some of the strengths that the legally binding instruments give.

Interviewee 9 - Weaknesses: **There is interference by politicians (Interviewee 10 another interviewee agrees - I just wanted to say this).** There is political influence i.e. **a politician can move a project from here and move it to another place where he has more votes.** So there is always that political interference and therefore you find that things don't work really as planned.

Interviewee 10 - Strengths: Interviewee 8 has mentioned about **devolution and conceptualising some of these documents which of course becomes a strength as it's more relevant than a blanket national policy or document would be.**

Weaknesses: There is interference by politicians.

3. Are there certain chances / potentials missed when using the legally binding mentioned instruments (e.g. linking with other instruments)?

Interviewee 10 - what I can point out is that most of the local governments in what you would call the urban centers or urban areas, **many times you find that departments that are dealing with climate change are different than those dealing with DRR or many other actors.** So naturally what happens, is the implementation or the enforcement of a department this is not necessarily have synergized with another that is almost the same. **So when they are drafting them they don't take into account that there are already existing plans. They just approach it as a totally new parallel process.**

So this follows also with the partner engagement approach, it's the same people being called for meetings. But they are called differently (separately) for one DDR meeting as opposed to another climate change meeting. (Even if they have overlapping issues).

Interviewee 8 - In fact it might be in **conflict (with other departments or goals)**.

These interlinkages (between departments) I think are very important concerning the topic under discussion now (CCA). Particularly, for example, I have not studied either but how does the **climate change policy and the INDCs, which are legally binding, how does that combine with the urban cities act**. And how far are they interchanging, I mean whichever came after or later than the other, did they study the previous act or not. This is not very clear.

It is very clear that the Acts are being made in isolation and often they are in contravention to each other. For example, I am not sure how far the rapidly urbanising environment takes into account i.e the climate related issues that it might generate. Which will be mitigated by the act that is on climate change. So in fact, these acts are often in conflict with each other.

Interviewee 10 - When was the **INDC** submitted? (2015). Because the **urban cities Act** is quite old, made in 2011.

Interviewee 8 - yes, because somebody was drafting the INDC or the climate change strategy may not have thought that the urban act is relevant for climate.

Interviewee 10 - This is considering that these are experts (drafting the acts) at the national level so they wouldn't of courserefer to the urban act.

Interviewee 8 - For the INDC, it must have committed itself to reducing the carbon footprint as well as reducing the temperature level and kenya's contribution. **If the cities Act is not amended enough it will never be able to achieve its target.**

4. Are there other policy instruments used to implement urban climate adaptation measures?
If yes, please explain how they work?

Interviewee 9 - there are others like **the architectural association of Kenya who have go their own plan or strategy**, I am not sure what, but this is a professional body that really monitors how construction goes and can approve some things.

Interviewee 10 - **But do they really monitor those guys?** Because they always say that when a building collapses then they start saying; oh this person (the architect) is not registered by the board of architects. But nonetheless the building has been built with 6 stories. You know? **So this makes me doubt the enforcement of these policies.**

Interviewee 9 -The others of course which are not directly linked are the ones interviewee 8 had mentioned before, the **NAP (national adaptation plan)** etc. You get some bits of focus on urbanisation and things like that and climate adaptation.

How do these policy instruments that are there work to help implement UCA measures?

Interviewee 8 - They should be able to facilitate it. **But unfortunately all of these legally binding and non-binding instruments that we have, don't really talk to each other.** I.e. I would say that the Cities Act has been in place, the policy would definitely ensure that the act is implemented through a variety of measures. **But when it comes to the other policy instruments; how do these interact with the urban policy instrument is not very clear.**

(The fact that interaction between policies is not clear can be a barrier for implementation).

You can mention under 4; that **the common country program is a policy instrument** that **combines all the UN agencies approach in a country to work together.**

5. What are the strengths and weaknesses of these other policy instruments used?

We have mentioned these above, the same answers hold for the legally binding as for the non-legally binding.

6. Are there certain chances/ potentials missed when using other policy instruments (e.g. coupling with other policies)?

Interviewee 9 - **As we are saying of course no single policy would be sufficient to address a certain problem. The need to inter-interlink and make sure that all of them are speaking to one another. As for efficiency you need to have a kind of integrated approach.**

Interviewee 8 - What is very important is that although it is almost impossible in a policy environment to have a kind of policy instrument which will speak to all the challenges of society. **But that there the role of a coordinating agency** comes into the picture for example, Interviewee 9 was earlier mentioning about the national platform, which was defunct for some time but we have tried to re-activate it. The platform is one where multiple stakeholder come, including different ministries from the government and NGO's and civil society at large could actually participate. **If such as coordination forum exists in a country, it will facilitate the smooth dialogue between different institutions. It actually helps the implementation of the different policy instruments. The actors will ensure that they are in coherence with each other while implementing them. The national platform for disaster risk reduction (DRR) is just one of them, there could be many other forums like the this, which could have a formal or non-formal existence.** The national platform still has a non-formal existence because it is not backed by a legal instrument, because the DRR bill has not yet been approved by the parliament. But there are other forums which have a legal backing, the decisions made there may affect implementation as well.

The key issue here is an opportunity missed when every time a meeting is had even if it's an informal gathering of experts i.e. the water cap that (Interviewee 9 often participates in), it's a good gathering of all experts on water issues it could be similar forum where different people come together and have a dialogue. A dialogue should come out of the right advocacy instruments to inform the policy implementation. Its an opportunity because it ends up like a workshop.

From the UN side - I would give the point on the common country programming that we have worked on. So Kenya, just like many other countries has something called the UN-development assistance framework **NDAF**,

which is completely aligned with the Kenya vision 2030 by the Government (of Kenya). And In fact this vision follows one of the same structures as many of the policy instruments. Of Course it's maybe just a small fraction of what the country does.

But from the UN community we have one common country program, which all the UN agencies active in a country follow to implement their programs which generates a lot of coherence in terms of implementation and avoids duplication that all the plethora of UN agencies could generate. As there are 23 UN agencies in Kenya, they have programmes and they are not often in sync with each other.

Interviewee 9 - under the non-binding, you are aware of the UNISDR Kenai framework for DRR. We (Kenya) are a signatory to that we are bound to follow it, although not legally. It's good to mention it somewhere.

D) Implementation

1. Which concrete urban climate adaptation measures/ interventions are currently planned or have been implemented in your city?

All state they are not aware for either.

Interviewee 9 - I am not aware. Maybe the urban cities resilience?

Interviewee 10 - Kisumu had drafted an adaptation document, but it is still undergoing a lot of reviews. As they had already drafted something for DRR and they wanted to combine it. Of course there is then still the aspect of descaling a department, **because one department owns the DDR plan and another department owns the climate change one.**

So to bring them together is a difficulty, but that seems to be the approach that most cities are actually adapting. In Kenya, but also if I can quote Kampala for instance, I know they have already prepared something for CA and something else for DRR. But then at the regional platform in mauritius, that we had in November last year 2015, **there was dialogue on how to actually synergize and to bring implementation to one thing.** As for one we also lack the capacity to actually implement ...(intelligible). **So we need more conversation on how to mainstream both urban climate change adaptation (UCCA) and DDR.**

2. What are the strengths and weaknesses of these mentioned urban climate measures/ interventions?
Cannot discuss strengths and weaknesses as the three interviewees are not aware of any adaptation measures or interventions.

3. Are there conflicts between aesthetics and these mentioned urban climate adaptation measures?

Interviewee 8 - I think there is no conflict as such because the fact that Nairobi is such a green city, shows that people normally would like to have greenery. (Interviewee 10 , another interviewee agrees).

But in terms of the city, the CBD (Central business district and main business area of Nairobi city), I am not sure whether it was done by design or by default but every part one building there will be in shade. It has a

triangular shape, like a star or asterisk, so there is always a shade on one part of the building. It has been done to ensure that the building does not need air conditioning because it is a glass building. So otherwise the building will get over heated.

Interviewee 10 - where is it? Interviewee 8 - It is very close to Alliance Francaise building, as I was going there when I saw it. I was thinking of this while sitting on the balcony of Alliance Francaise.

Interviewee 10 - we have brilliant minds in terms of architecture.

Interviewee 8 - what I don't understand in Kenya is the size of the roads. All the city roads are so narrow and the cars are so big.

Interviewee 10 - you brought the big cars. Before we had the little cars like the mini coopers and the Dacia's, actually the Dacia's used to be the big cars and they are still very small cars.

But anyway, think we are done with this question.

Interviewee 8 - **It (CA) actually promotes aesthetics - Interviewee 10 , another interviewee agrees. It's always good to see greenery, especially in the part of the city all the houses follow the green climate. Knowingly or unknowingly the follow it and it adds to the aesthetics of the houses and roads.** It always feels good to drive in a city which has greenery planted on the sides of the roads.

One thing I noticed when I moved to Nairobi, while **Addis converted to a concrete jungle and it's the ugliest city I have ever seen now. One of the reasons why that happened is that there is no private ownership of land.** All of it is government owned and at any time the government can take over any part of the land, so if you have a garden the government has every right to construct their building over it. The only rationale for not doing that, is if your land is being used for commercial purposes. If you can show that your land is generating revenue on land you defacto own, while they don't have a paper to prove that, the government will desist from taking over that land. I moved to Addis in 2008 and moved away in 2013 and saw how it converted from a reasonably good city into a chaotic city. Which essentially means that if you have a garden it doesn't have any commercial value. If i construct a shop over that it will have a commercial value. So it's to protect your garden? Exactly. So that has led to conversion of green space into a concrete jungle in Addis, which is not the case in Nairobi.

In Nairobi, you can own your land which means that whatever you do with your house or your land is up to you. So the regulation aspect is very important to note here, that aesthetics also follow the regulation if the government promotes green architecture, knowingly, unknowingly or by default.

Interviewee 10 - **It's a very interesting culture which we (Kenyans) have inherited. For my parents generation, every home you would go to had potted plants all over and the flower beds were all full of either vegetables or plants. We never had paved playgrounds it was always grass.** So maybe consciously or unconsciously, either way it's there **(the wish for greenery).**

4. Are there conflicts between urban functions and these mentioned urban climate adaptation measures?
Interviewee 9 - I would put that one to the city council.

Interviewee 10 - **Budgets**. The budget tends to be a national thing. **Budget has to come from a national level, but the implementation is left to the urban level.** But then, for you to get the budget you need to actually have spent (on this) in the previous financial year to show that you actually need the money. **Which is basically a catch-22 situation** (paradoxical situation which occurs because of contradictory rules and mutually dependent or conflicting situations -Wikipedia). So budgets have been the biggest challenge. So if you have not spent in one year (on something specific) you can't ask for spending in the next year? Yes.

Interviewee 8 - What do you mean with urban functions? This is anything from infrastructure provision, traffic regulation, sewage, education etc.

One thing I note about Kenya, in Nairobi in particular, **is that often urbanisation mirrors economic growth. That is the reality all over the world, while in Kenya that is not the case.**

I have seen that in Kenya, the majority of the population still lives in the rural areas.

What is the current urbanization percentage in Kenya? (To Interviewee 9 another interview) 27? 30?

Interviewee 9 -Between 25-30.

So that's ⅓ of the population in urban areas. **Despite high urbanisation growth rate, the absolute number of people living in urban areas is not very high. Furthermore, poverty eradication has not been in sync with urbanisation. Which means that urbanisation does not necessarily reflect poverty reduction. This will disastrously affect the urban services and functions,** because the urban growth happens just because of the increasing population. But the services don't catch up to that sprawl in urban population and that is mostly the reason that why people move to the slums and informal settlements.

That poses a huge challenge to the sustainability of urbanisation in Kenya, because poverty reduction should happen coterminous with urbanisation. It is actually not happening. Services are declining in most of the cases.

I.e. **In the case of Nairobi, if you look at the access to electricity, water and sanitation, of the urban dwellers in Kenya and compare it to any other urban population in the world, Kenya is very much down below.** So the access to the social services for the urban population is not very high. **Its definitely a challenge, but at the same time an opportunity** because **the economic policies of the government can then tune itself to the needs of the rapidly urbanizing population.** Which often may not happen in many other countries. So that is definitely an opportunity for the economic policies of the country.

In terms of the UCA measures, there is not much to say.

Interviewee 9 - To add on, **some of the services that Interviewee 8 is mentioning, are sought from outside the city for example water resources,** this is the water that is required for domestic and industrial use in the city. **This of course goes very clearly with adaptation because of the population size growing you need more water. As we talk they have started rationing, because the water coming into the city is not enough.** So those are some of the conflicts, maybe you can say that there has to be urbanisation in tandem with the resources that are required by the people i.e. infrastructure, water resources, housing. **Normally you find that urbanisation is overtaking the resource supply.**

Interviewee 8 - Do you know how far the electricity sourced from green sources? (To Interviewee 9) - Yes, within a short time we, Kenya, will be very much on green. We are the biggest now on wind, we have surpassed Ethiopia, using wind in Turkana and on geothermal we are leading in Africa. The geothermal is putting something close to 300 something megawatts to the grid. If the momentum is maintained we can go very far.

In Kibera, a very big slum, everyone has electricity now.

Hydro power is contributing the highest percentage of Kenya's energy now, but it is becoming less and less as we develop the other resources.

5. Are there certain chances/ potentials (e.g. coupling with other interventions / 'no regret' measures) missed when implementing these mentioned urban climate adaptation measures?

There are currently no urban climate adaptation measures that are known by the interviewees.

Would there theoretically be chances that could be missed nonetheless?

Interviewee 10 - I think if there was a **stronger connection between the national level and the urban or local government level** there would be a lot of effort saved even in drafting these documents. Because then they would not have to start from scratch they would have an understanding of what is required at the national level and scale it down to the city.

At the same time, the **national budget process** should take into account all the needs of different cities. Because cities definitely have different kind of needs actually when it comes on spending on such measures. **As spending on this does not really give a result that is tangible, and then and it becomes harder to convince the government to give money.** As you cannot automatically map out the impact of having these activities or not having them (adaptation measures), in terms that the government will understand i.e. economically or socially. Then it becomes quite hard. If there was a stronger linkage I think it would be easier to deal with budgets.

Interviewee 9 - Maybe the only comment I can have on that is that **we need to look at these adaptation measures holistically.** Not just from the city perspective. The city does not survive alone in terms of resources, it is relying on other exogenous sources. For example water is being sourced from far from Nairobi and is being sourced to Nairobi, if we do not develop the catchment areas the water is coming from then of course.. (this is an issue). **Thus doing so is an adaptation measure,** but if you look at it from the urban centre, people only need water to come there. But we also need to look at where are we sourcing these resourcing these resources. **Therefore, as we go on with the adaptation measures, in the city we also need to look at where the city is getting its resources** and therefore we also develop those resources. We adapt the catchment areas to keep supplying the required resources.

Interviewee 8 - In terms of no regret options or opportunities that are missing:

Firstly, while there is so much of infrastructure development happening, **there is no focus on decongesting the city.** Both in terms of vehicular movement and the people in the CBD (centre of Nairobi) and in the rest of the residential localities of the city. Decongestion in terms of the loads of traffic movement and the jams that all of us have gotten so much used to. **Which in turn creates problems in terms of adding to the climate change in**

terms of vehicular pollution emission. We don't have public transportation which a decent person would use. I mean go to Europe and no one uses their own car because the public transportation is so good. We don't have any kind of good public transportation that you use and also if you are going to the airport you have to rely on a taxi. How many taxi's actually go to the airport every day if 15,000 people use Nairobi JKA airport every day? I would say that the number of cabs there is at least the same if not a bit less than the amount of people going there. You can imagine how many cars are going there as well as passing through the CBD of the city and congesting the whole traffic.

So that is a big opportunity missed. In a meeting I gave a suggestion why don't you create a sky-bus from Westlands roundabout to Mombasa road, or at least to the airport for people to use right away. Or at least create a high rise flyover for all the people who want to go to the airport, take them directly there and charge them for that. That is not being thought about at all, I don't know if that is part of the masterplan for the city or not.

Secondly, **in terms of using green fuel,** I don't see anyone using green fuel in the city i.e. desulfurized fuel. Sulphur in fuel is banned in India, because it creates respiratory problems. I don't see any regulations that could have been used here. **People just use any kind of fuel, Matatu (transport mini vans) sometimes use kerosene or unregulated fuel.**

So one (opportunity) is decongesting the city, as a means to reduce the urban heat. For one, **through reducing vehicular movement by enhancing public transport.** And two, **by facilitating the easy transport of people not going through the CBD i.e. to go to the airport.** At the same time, is there a plan that if the city is growing at this rate, for the next 10 years how will it grow. What is the plan in terms of expanding the city? And which are the new construction townships coming up in the city? I have seen a few on the Mombasa road but what about on the other side of the city? **How is the urban sprawl being measured? As the city becomes more and more congested there should be more opportunities for the urban dwellers to live in locations which are pollution-free and greener.** Then there should be mechanisms for them to move to the city with a good environment.

Thank you for answering the questions in this questionnaire. Do you have any other remarks regarding the urban climate adaptation process or the content of the questionnaire?

Interview 11

General Information

1. Name: Interviewee 11
2. City: Mombasa
3. Position: ☐ Politician ☐ Urban planners/ designer ☒ **Urban climate expert (and rural expert)** ☐
If other, please describe function.....

She is broadly a climate adaptation expert, but is mostly focused on rural areas although she some experience in urban climate adaptation, like for her scientific paper on Mombasa (2008)

Previously she worked as an Advisor to CARE International on Community Based Adaptation to Climate Change.

Furthermore she was a Research Fellow African Centre for Technology Studies where she was responsible for Coordinating the Capacity Strengthening in the Least Developed Countries for Adaptation to Climate Change (CLACC) project in East Africa. Relevant publication to for study: *Climate Change and Coastal Cities: the Case of Mombasa, Kenya (2008) Adapting Cities to Climate Change: Understanding and Addressing Development Challenges. Earthscan, London, England.*

4. Organization: Climate, Environment and Development Consulting in Africa
5. Email:
6. Phone number:

NB: abbreviations; CC - climate change, UCA- urban climate adaptation, CA- climate adaptation, CCA- climate change adaptation, UCCA – urban climate change adaptation, UP&D - urban planners and designers, UCE - urban climate experts, CCM - climate change mitigation, GoK -Government of Kenya), DRR -disaster risk reduction, NEMA- National Environment Authority, MENR -Ministry of Environment and Natural Resources.

Colour codes meaning: **Bold** is used to show notable points, **yellow** is used to show very notable points, **red** is used to show difficulties points and **blue** is used to mark specific document names.

Section 1: Awareness

1. What is the sense of urgency to adapt the urban environment to climate change amongst the following groups in the future in your city?

Groups	Very urgent	Urgent	Neutral	Less urgent	Not urgent	Don't know
Citizens				X		
Politicians				X		
Urban planners & designers					X	
Urban climate experts		X				

C – Not sure, as my sense is that urban residents caught up with several problems. May notice CC, but mostly priorities basic needs, especially those in poorer neighborhoods so **don't think citizens prioritize UCA per se, others things take priority.**

P – **For them as well as the citizens unfortunately, CA is less urgent.** Part of this reason is that the **impacts of CC that are more pronounced occur in rural areas**, increase in temperature, increased occurrence of drought and flooding. In terms of the impacts especially of drought, they are felt more in the rural areas, where their livelihoods are directly affected by changes in weather i.e. pastoralists, fishers. **For urban areas where people work mostly in industries and office jobs, people will also feel the increase in the temperature and tell you it is hot but their exposure is relatively lower compared to rural area, so feel some impact less.**

Politicians consider CA as less of a priority. Will, talk about other projects i.e. putting into place infrastructure & beautifying the city center not seen as direct value for adaptation but seen as a way to create some jobs.

Responses to CC impacts in urban areas have been more reactionary than anticipatory in response to cc hazards. Adaptation should create measures that reduce the intensity of impacts even before the hazard/ event occurs as well as respond to hazard and post-hazard recovery. **But in the urban areas mostly, even if weather forecasters indicate high above average rainfall forecasts in central parts of Kenya which includes Nairobi, the policy makers will normally not do anything until it is published in the mass media,** then they will start saying we have allocated extra money to i.e. clear the trenches of blockages. Thus measures of policy makers are mostly reactionary in urban areas, not focusing on anticipating the hazard of climate change. While in rural areas, although still predominantly reactionary there is an improvement in the **anticipatory aspects of climate adaptation and are doing better in this than counterparts in urban areas.**

UP+D – mostly CA is not urgent. As **in Kenya we are mostly still working with old urban/ planning policies.** Despite things having changed i.e. how climate is impacting land use in both rural and urban areas **– at the policy level it is telling that we have not taken it up. I.e. we need to modify building codes per area, take into account rising temperatures and increase in coastal flooding – especially for Mombasa. I think it is actually not urgent for this group of stakeholders.** The impact of CC I think is clear for all to see, but **see no motivation of urban planners and designers to do something about it** – i.e. due to insufficient information, possibly lack of resources. But I doubt it is through lack of information, it seems they are not doing anything about it.

UCE – They realize the urgency. In terms of action, they have played a **role in raising awareness and engaging with key actors in the GoK, civil society and the general public.** Have been able through forums such as workshops and other events, **to share their expertise i.e. for suggestions and recommendations on appropriate adaptation measures.** They have done this more or less to a fairly good amount, the **challenge is that the stakeholders that they inform with this information are listening but have not taken action on their part– especially with respect to putting into anticipatory measures,** though reactionary measures are being taken. (Recording time, 17.20)

Who is an UCE? – can be people working in different sectors that surround urban development i.e., urban land use planners, people concerned with urban environmental issues, architects and civil engineers and the

policy makers as well as the KMD and people from the industrial sector. Not leaving out the **meteorological services agency**, as are a critical agency in climate change adaptation and mitigation work. These people come together and play complementary roles. Need to integrate CC info to create measures to reduce impacts and foresee them and minimize the negative consequences and take advantage of positive impacts. Thus these individuals can help support urban development, in a way that is climate-sensitive.

Ideally should also include people running the industrial sectors, as industry is a big contributor to the urban economy. Now in Kenya the industrial sector is getting more into CC adaptation and I would consider them part of the UCE group for example the **KEPSA- association** of the industrial manufacturers. This group has been taking role in mitigation and being involved in the adaptation discourse in recent years. Several individuals I have interacted with from this association have a very good understanding.

2. In case the sense of urgency is low, what is needed to make those groups feel more urgent about adapting the urban environment?

Groups	Measures to increase sense of urgency
Citizens	Engagement with civil society actors. C themselves, their voice needs to be heard , this can contribute to a positive change for actions that need to be taken. This relates to the importance of citizens being mobilized, or mobilizing themselves better to engage with issues and politicians . Especially in this age of social media, they should take initiative.
Politicians	National and county government should play a more prominent role on issues of UCA , this could potentially help. Also country-driven initiatives are useful due to devolution, and then we do not need to wait for the national government to drive this. Both national and county governments have a role to play. Important to have champions in both sectors. If we institutionalize some of these priorities, rather than leave it only to individuals then sustained change is more likely as even if the initiator is out of office the initiative can continue.
Urban planners& designers	More or less similar to what applies to the politicians. More awareness and sensitization is useful and specific targeting of this group would be helpful as some may be very aware, but for many there may be a gap in knowledge which leads to the low prioritization of UCA . Targeting can be done through forums i.e. workshops/ symposiums by UCE should explicitly bring on board the UP+D to learn but also contribute knowledge from their respective fields to come up with feasible measures .
Urban climate experts	Very high awareness . Only improvement in awareness could be they should seek to strengthen the knowledge sharing between their sector and to other sectors . Linking or bringing together different stakeholders in a network.

3. How aware are the groups of the following two urban climate phenomena?

• Urban Heat Island

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens						X
Politicians						X
Urban planners & designers						X

- Unsure about awareness on UHI. I am not sure what the level of awareness is, as I don't know if these actors are aware of the terminology. But they are probably aware of the effect or have come across the terms somewhere. They may not associate their observations with that name label.
I think they understand the effects, from experience

• Wind Discomfort

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens			X			
Politicians			X			
Urban planners & designers			X			

Wind discomfort awareness will depend on the location, so difficult to answer this question generally i.e. citizens in Nairobi may have not experienced wind discomfort, compared to citizens in Mombasa where wind discomfort is more pronounced.

Example – Citizens in Mombasa more aware than Nairobi, because of their geographical location and wind is a prominent phenomenon at the coast. Overall neutral? ** would leave out differences so need to note it.

Pol – Mombasa very aware to aware, as many reside there and many are aware of what affects the citizens i.e. wind discomfort.

Overall awareness very different for all groups depending on their city. So for all groups the awareness of the ones in Nairobi is lower than in Mombasa where it is generally high. Taken separately the citizens, politicians and urban planners and designers of Mombasa I consider very aware to aware and the same groups in Nairobi as not aware.

4. In case awareness is low, what is needed to increase the awareness among those groups of two urban climate phenomena mentioned in question 3?

Groups	Measures to increase awareness
Citizens	<p>More awareness creation and sensitization.</p> <p>Within the UCE -especially the KMD plays a role in providing information about the wind patterns and the heat issues. With heat the KMD provides temperature information. They work in rural areas with stakeholders to develop scenarios and are now starting to do as well for urban areas. KMD and other stakeholders should look more into wind and pass this in to other actors, same for the UHI there needs to be more awareness creation. As people may experience the UHI effect, but not understand what it is or develop measures to counter it.</p>
Politicians	
Urban planners & designers	

5. How aware are the groups of the following four urban climate adaptation measures?

- City design (e.g. street orientation, adapting to wind and solar orientation of building and streets)

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens					X	
Politicians					X	
Urban planners& designers		X				
Urban climate experts		X				

C + Pol – probably not aware. UP+D may be some awareness, probably aware not very aware.

- Urban vegetation (e.g. green roofs, urban forestry)

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens					X	
Politicians					X	

Urban planners& designers		X				
Urban climate experts		X				

C – most not aware, same for Pol. UP+D – some awareness.

- Use of materials (e.g. low albedo and longer cooling time-lag materials)

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens					X	
Politicians					X	
Urban planners& designers		X				
Urban climate experts		X				

NB: Struggle with responses – difficult to answer for a category, as some with the category UP +D will be very aware and others not at all. Answer will apply to the overall group, as it is not possible to reflect all differences within the groups in this study.

- Anthropogenic heat (e.g. less air conditioners,)

Groups	Very aware	Aware	Neutral	Less aware	Not aware	Don't know
Citizens		X				
Politicians		X				
Urban planners & designers		X				
Urban climate experts	X					

C – recently a lot of sensitization on these issues from mass media. C aware. Especially around the time of the climate conference i.e. COP's many news programs focus on climate. In addition, now even some programs on wildlife they talk about anthropogenic heat. There is a general sense of awareness among a fairly good chunk of the citizenry.

Pol – Are aware due to the news media coverage and typically when hazards of flood occur, the commentary on TV references CC.

UP+D – Ranges from neutral to aware. Some are aware some not, I imagine the majority are aware i.e. featuring in their curriculum when they study, if they work with more experienced colleagues they may discuss this.

UCE –very aware to aware.

6. In case awareness is low, what is needed to increase the awareness among those groups of four urban climate adaptation measures mentioned in question 5?

Groups	Measures to increase awareness
Citizens	Currently already many actions are being done to increase awareness, mostly by the civil society in conjunction with the media. Especially organizations working with CC + CCA, they produce accessible publications on this which are also accessible online. From the online communication and spread of information a lot is being done. Not sure what can be done further. Universities are also integrating the topic on CC as a general course within different disciplines.
Politicians	
Urban planners & designers	More engagement and cross-sector talks also relevant questions.

Section 2: Planning and design processes for implementation

NB: No response to these questions, due to lack of time. Chosen to discuss section on instruments and implementation first and then the interviewee was out of time.

The interviewee answered the questions in section 2.1 via email later.

2.1 Communication

1. Which roles do 1 citizen, 2 politicians, 3 planners and designers and 4 urban climate experts have in the process of planning, designing and implementing urban climate adaptation measures?

Citizens: Obtaining relevant information, engaging in the planning process (as feasible), and participating in the implementation and monitoring of UCA

Politicians: Obtaining relevant information, developing appropriate UCA policies and programs, allocating resources e.g. budgets, materials, human resources etc. to UCA, participating in planning and supporting implementation of UCA

Urban planners and designers: Obtaining relevant information, informing the development of UCA policies and programs, planning and designing appropriate UCA programs, participating in implementation (as feasible), and participating in monitoring and evaluation of UCA

Urban climate experts: Obtaining relevant information, informing the development of UCA policies and programs, contributing to the design of UCA, supporting the implementation of UCA e.g. by providing climate & other relevant information during program implementation, contributing to monitoring and evaluation (as feasible)

2. What are the relationships between these actors in the communication strategies?

Citizens/ Politicians- Generally good. In some Counties, there are fairly regular forums that facilitate two-way communications between these groups. However, other countries don't have such forums in place.

Citizens/ Urban planners and designers- Generally poor. Apart from a few TV features aired once in awhile on TV and radio where the planners and designers share information (usually not directly related to climate adaptation), I'm not aware of forums where they engage directly with the citizenry. Some Urban planners and designers might have information online, but these would typically be accessed by people with specific interests e.g. researchers, students and civil society.

Citizens/ Urban climate experts- Generally good. Some Climate experts hold forums with citizens. They also share climate information through the mass and telecommunications media regularly.

Politicians/ Urban planners and designers- Not known.

Politicians/ Urban climate experts- This varies. Some politicians have a strong interest in climate change. They deliberately engage with climate experts. Those who don't have a particular interest in climate change usually don't engage with climate experts. However, the climate experts share information via mass media making it accessible to all politicians. They also seek to engage with politicians while developing and implementing programs.

Urban planners and designers / urban climate experts- Not known. Apart from the information shared by climate experts via mass media, I'm not sure whether they communicate deliberately or directly through other forums.

3. What is the role of communication to support the planning, design and implementation of adaptation measures?

Communication is very important. It facilitates sharing of information, generation of knowledge, emerging designs and technologies that can support and improve climate adaptation in urban areas.

4. Are there formal guidelines or policies that drive the use of communication in the planning, design and implementation of adaptation measures? If yes, can you please name them?

I'm not aware of the existence of these guidelines in Kenya. Not applicable

5. What are the strengths and weaknesses of the communication process?

Strength- **It facilitates sharing of information and knowledge amongst different actors that contributes to planning, implementation and monitoring of climate adaptation.**

Weakness- **In the urban context, the communications among actors are often one-way** e.g. climate experts to citizens (or politicians and citizens). There are few instances where citizens get to provide information to experts based on their experiences with climate and adaptation.

- **The Urban planners and designers also seem not to communicate with other actors on climate adaptation much.**

6. Is there need to improve the communication process? If yes, how to improve?

Yes. **Strengthen two-way dialogue and feedback processes among critical stakeholders.**

- **Urban planners and designers should communicate appropriately with the public and other relevant urban stakeholders frequently.**

2.2 Instruments

1. Are there legally binding instruments (e.g. zoning plans) used to implement urban climate adaptation measures? If yes, please explain how they work?

Zoning plans exist, but they are quite dated. So they do not deliberately include UCA goals – this is where a challenge lies.

Ideally building codes should also be sensitive to adaptation codes, i.e. they should differ from Mombasa to Nairobi – **but it don't believe we are deliberately doing this.**

All buildings in Kenya are now required to use solar heating – but this is focused on mitigation not adaptation. **So far the only measures are more for mitigation.**

We should look more at adaptation options i.e. wind design at the coast and flood-responsive and temperature responsive design for both Nairobi and Mombasa.

Even issues such as urban forestry as a contributor to adaptation that would also help, **but measures like this do not receive a lot of attention in our zoning and building policies.**

For example - One thing that is lacking in the **land Act or building code** – states that a proportion of your land you build on, the building should occupy a maximum percentage i.e maybe 75 %, while the rest of the land is left open. **But no measure speaks that this land should be used for tree cover/ paint surfaces white etc. – while this can contribute to adaptation as well as many other goals.**

- **Many measures are possible but not used yet** i.e. in Southern Asia the ceilings are very high with vents and due to this you have natural ventilation with the wind. **People should come up with new measures to make changes in urban planning and design to make it more adaptive** i.e. institutionalize rain water harvesting – being done a lot in rural areas but not in urban areas i.e. don't have reservoirs for floods to use in droughts.

2. What are the strengths and weaknesses of the legally binding instruments used?

- **Out dated**
- **Enforcement of the instruments is generally weak** – i.e. planning departments in all counties which should control developments with permits for construction but beyond this **follow up on site-visits is necessary, but this is not happening**
- **Issue of corruption** – i.e. **leads to illegal structures in vulnerable areas** such as near the ocean shore or river banks. Some have been authorized illegally or there is spontaneous construction and city officials turn a blind eye- this can also be due to lack of resources and staff which make monitoring challenging.
- ✓ **Existing instruments**, despite them being dated, **they are in place so have a place to start from - hence a foundation for further specific adaptation measures**
- ✓ **Building code** – supposed to be enforced at county level,
- ✓ **Devolution of some instruments** could also be a strength, with enough staff at proper levels.
- ✓ **Core structure for enabling adaptation is in place.** As it is possibly within the current legal framework and decentralization and devolution of them allows adaptation to run from county levels.

3. Are there certain chances / potentials missed when using the legally binding mentioned instruments (e.g. linking with other instruments)?

Chances missed in – **harmonization with other sectors and professions especially for implementation of measures in ways that complement each other.** i.e. the energy sector will look at issues of solar panels. Forestry sector be interested in increase in tree cover – now mostly focused on water sheds and towers in rural areas – **but they could also work together with the UP+D to look at urban vegetation and use of open land. A big chance is missed in the conceptual harmonization of adaptation.**

Mainstreaming – is important to do. There is a **debate on mainstreaming versus integration.** Some say mainstreaming across is asking too much as some sectors have specific priorities, so integration is better. **Mainstreaming CA into development – looks at different sectors and makes CCA a prominent part of forestry & water sector development.**

People feel integration – is that you build it into what is existing, i.e. in water sector build into goals of increasing water availability. **Implementation of both may not be a big difference, as may achieve goals in the same way.** **Some people maybe comprehend mainstreaming leads to competition of CA as a goal and requires**

more prominence over other things. Debate is about comprehension of the concept and use of the terminology.

Comment: Mainstreaming can also be seen as integration depending on which definition you use.

4. Are there other policy instruments used to implement urban climate adaptation measures?
If yes, please explain how they work?

None come to mind at this point.

But **potentially a mobilized citizenry can create informal instruments for adaptation** – such as **neighborhood groups that implement initiatives**

For example in **Dandora** – a group of young men who are fancy and making their areas clean. **These organic and informal instruments have the potential to scale up urban adaptation measures.**

An explanation was thereafter given by the interviewer of the Dandora project and mainstreaming adaptation with with public space.

The National Construction Authority of Kenya can also play a role in enabling implementation of adaptation in urban areas e.g. by providing guidelines in construction of buildings and other infrastructure that are adaptive to climate in different areas

5. What are the strengths and weaknesses of these other policy instruments used?
Not relevant.

A lot of potential strengths with community-based environmental/ CA measures with upscaling and replication in other neighborhoods.

6. Are there certain chances/ potentials missed when using other policy instruments (e.g. coupling with other policies)?

Besides harmonization, at county level where they all have their own budget and independence – **this gives and opportunity to basically resource and concretely support the implementation of adaptation. Pockets of funds for CA are housed within the National disaster Management Agency – but this is not enough as they typically deal with response not anticipatory measures.**

While infrastructure development or environmental units – different departments have different budgets, **if we integrated adaptation in different sectoral policies there is a potential for more concerted efforts that support adaptation. This chance is missed now.** Some sectors many say they do integrated efforts in the documents they speak well of integration, **now Kenyan sectors are not really integrated in implementation.**
Not sure what evidence would be there.

Even though it could be very simple – water harvesting reservoir demands with constructions or trees in open spaces.

2.3 Implementation

1. Which concrete urban climate adaptation measures/ interventions are currently planned or have been implemented in your city?

Difficult to answer – as have not checked lately what the urban plan for Mombasa looks like, as paper was written in 2007. We're excited about the high level prime minister's office which was concerned with adaptation in 2012. So knowledge is a bit rusty in this regard.

We have made recommendations on what to implement but don't know which have been taken up or planned.

- Can check with the county planning office and UN-Habitat on their documents.
- Mangrove reforestation

2. What are the strengths and weaknesses of these mentioned urban climate measures/ interventions?
NA

3. Are there conflicts between aesthetics and these mentioned urban climate adaptation measures?
NA

4. Are there conflicts between urban functions and these mentioned urban climate adaptation measures?
NA

5. Are there certain chances/ potentials (e.g. coupling with other interventions / 'no regret' measures) missed when implementing these mentioned urban climate adaptation measures?

Difficulty answering this as I am not clear on the current adaptation options. As the examples I know are the recommendations people have made on adaptation measures and not on what has actually been taken up lately.

Thank you for answering the questions in this questionnaire. Do you have any other remarks regarding the urban climate adaptation process or the content of the questionnaire?