An Investigation into the Poverty Reduction Co-Benefits of Climate Change-Related Projects in eThekwini Municipality, South Africa

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Contribution statement

This paper is one of a series which examine a common data set of research materials, interview transcripts, pictures, documents and grey literature produced as part of the European Union-funded Programme to Support Pro-Poor Policy Development (PSPPD) Phase II in partnership with the Presidency of the Republic of South Africa, Department of Performance Management and Evaluation. The project was led by Professor Sarah Bracking, SARCHi Chair in Applied Poverty Reduction Assessment at the University of KwaZulu-Natal, with Dr Mvuselelo Ngcoya and Ms. Kathleen Diga as Co-Investigators and Dr Andrew Okem as Senior Researcher. The programme of research was also contributed by a number of research assistants: Mr Stephen Olivier (Co-ordinator), Siyabonga Ntombela, Phindile Ngubane, Mandy Lombo, Smanga Mkhwanazi, Ntando Ninela, Nokubonga Shezi, Ayanda Tshabalala and Bahle Mazeka. The overall methodology referred to here was collectively pursued and is thus also referred to in forthcoming papers.

Executive Summary

Climate change constitutes a real existential threat to humanity in the 21st century. Although natural events contribute to climate change, climate change in the Anthropocene era has been attributed to the unstainable development trajectory that is underpinned by the consumption of fossil-based fuels and the resulting emission of Greenhouse Gas (GHG). The realisation that the negative impacts of climate change on the ecosystem (and by extension human existence) are being accelerated by human activities has resulted in global negotiations and agreements on mitigating climate change. While countries have signed agreements in reducing their GHG as mitigating strategies, the impacts of climate change are already being felt around the world thus necessitating the need for the implementation of climate change adaption strategies. Although the impacts of climate change are experienced by all, the poor are the least adapted and are therefore more adversely impacted when climate change disasters occur. In addition, the realities of climate change are eroding the livelihood opportunities of vulnerable communities and pushing them further into poverty. Against this backdrop, the inclusion of poverty reduction co-benefits in climate change related projects has gained prominence in recent years.

This study examines 13 purposively selected climate change related projects in eThekwini Municipality to determine their poverty reduction potentials or the lack thereof. The study builds on the document analysis of the poverty reduction co-benefits of 104 climate change-related projects in the Municipality. Using a qualitative research approach, municipal staff and project beneficiaries were interviewed to gain insights into the co-benefits of these projects. Findings of the study show that all the projects assessed have poverty reduction co-benefits (although this varied across projects) and are important sources of livelihood for project beneficiaries. Some of the projects have improved local communities' access to and appreciation of nature. Another critical finding is that some projects provide accredited training to their participants which they have leveraged to access employment beyond the climate change projects. Despite these benefits, there are concerns about contractual issues with a preference for permanency and a greater involvement of the municipality in the management of projects. Linked to this is the dissatisfaction with the current salaries by most project beneficiaries. Insufficient work gear (which could expose workers to health risks) was another concern raised by beneficiaries. In light of the benefits of the climate change projects, the study recommends that there is a need to move beyond a project-based approach to institutionalising climate change in order to provide permanent employment. The projects also could potentially contribute to poverty reduction if scaled to the projects to the provincial and national levels. There is also a need to emphasise the multiple dimension of poverty reduction in project design beyond job creation.

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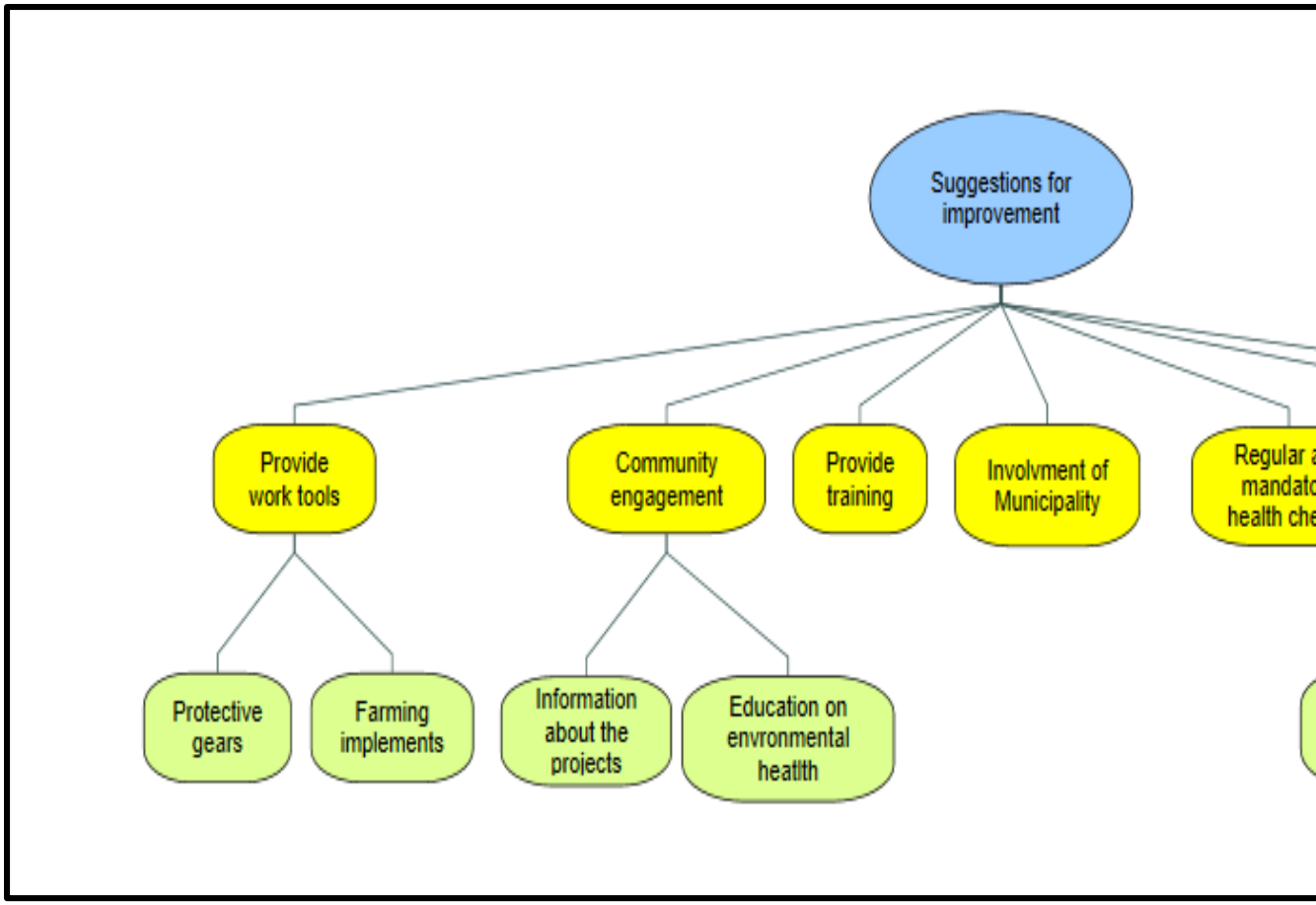

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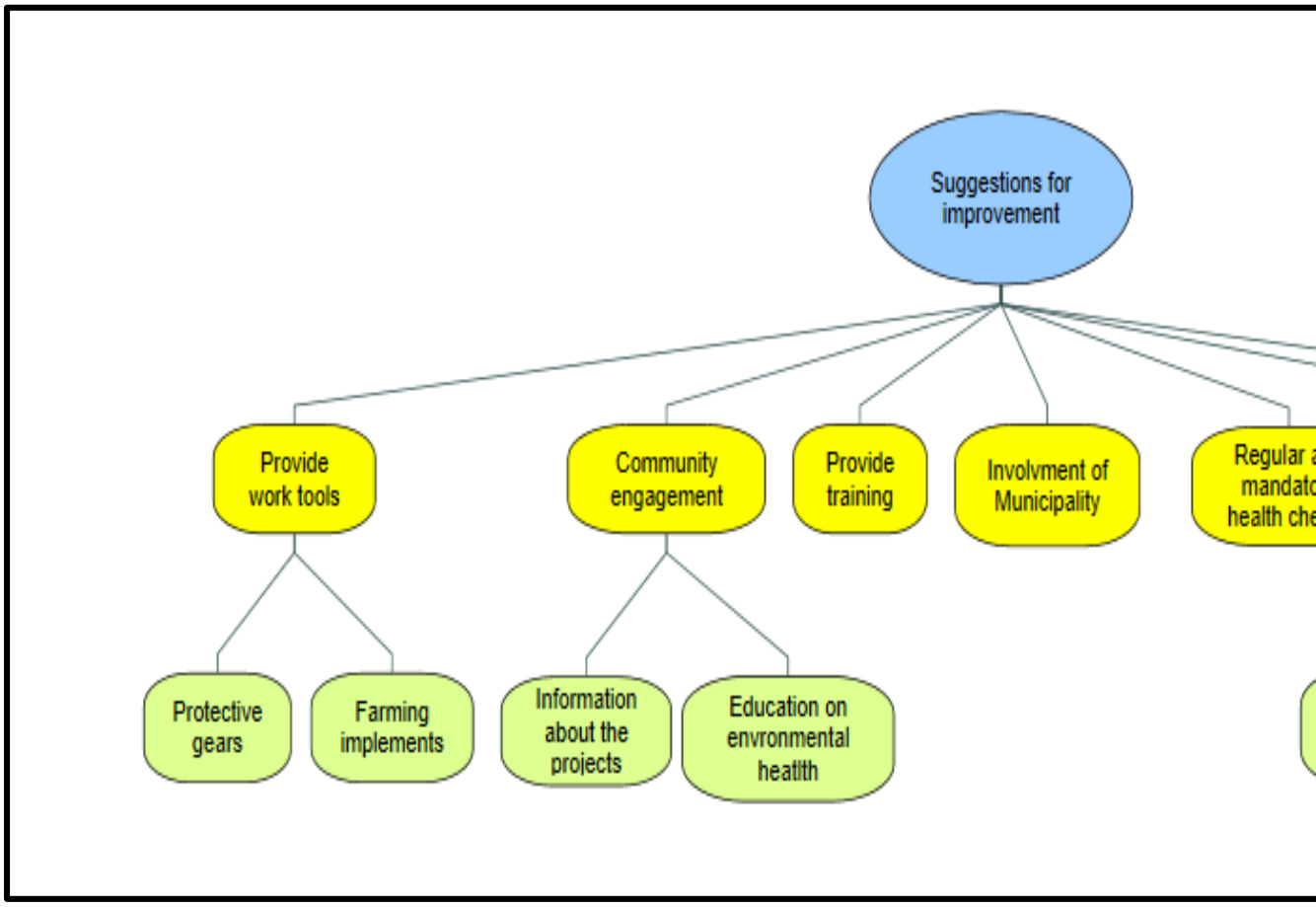
FIGURE 8: SUGGESTIONS FOR IMPROVEMENT



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Abstract

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1. Introduction

Climate change constitutes a real existential threat to humanity in the 21st century. Although natural events contribute to climate change, climate change in the Anthropocene era has been attributed to the unstainable development trajectory that is underpinned by the consumption of fossil-based fuels and the resulting emission of Greenhouse Gas (GHG). The realisation that the negative impacts of climate change on the ecosystem (and by extension human existence) are being accelerated by human activities has resulted in global negotiations and agreements on mitigating climate change. While countries have signed agreements in reducing their GHG as mitigating strategies, the impacts of climate change is already present thus necessitating the need for the implementation of adaptive strategies. Although the impacts of climate change are felt by all, the poor are the least adaptive and are therefore more adversely impacted when climate change disasters occur. In addition, the realities of climate change are eroding the livelihood opportunities of vulnerable communities thus pushing them further into poverty. Against this backdrop, the inclusion of poverty reduction co-benefits in climate change related projects has gained prominence in recent years.

This study examines 13 purposively selected climate change related projects in eThekwini Municipality to determine their poverty reduction potentials or the lack thereof. The report builds on the document analysis of the poverty reduction co-benefits of 104 climate change-related projects in the Municipality. Using a qualitative research approach, the study interviewed municipal staff and project beneficiaries to gain insights on the co-benefits of these projects. The remaining parts of this report are divided into eight sections. In section 2, I present an overview of climate change and its implications for the environment and poverty reduction challenges. This is followed by an examination of municipal approaches to climate change. In this section, I present some examples from different contexts focusing on the challenges in contextualising the climate change agenda at the municipal level. I also present the background and approach to climate change in eThekwini Municipality. In section three, I discuss the methodology that underpinned the study. The section highlights the strengths and weaknesses of the approach. This is followed by the presentation of findings of the research. Section six presents reported socioeconomic benefits associated with the climate change projects while section seven identifies challenges associated with the implementation of climate change projects in eThekwini. The report concludes with recommendations in section nine.

2. Climate Change and its Implications for Human Society

Climate change-related disasters have multiple impacts on different spheres of human life as they disrupt services such as transportation, communication, water, sanitation and other services critical to the functioning of settlements (Carmin, Anguelovski, & Roberts, 2012; McGranahan, Balk, & Anderson, 2007). Each of these domains is interlinked thereby compounding the impacts. While the impacts of climate change are experienced by all, the world's poorest are the most affected (Fay et al., 2015; Jarrar, 2015). The high impact of climate change on poor populations is linked to the fact that they have limited adaptive resources and capacities which make them highly vulnerable and less resilient[1] to the impacts of climate change. According to O'Brien et al. (2008, p. 195), "multiple vulnerabilities and risks form chronic and cumulative burdens for people living in poverty, particularly in situations where customary coping strategies are already at – or beyond – the brink of collapse, or alternatively work against longer-term adaptation initiatives". This is particularly true of non-catastrophic climate change related events that erode people's livelihood (such as agricultural) overtime (O'Brien et al., 2008).

Agriculture, which is one of the main economic activities of poor communities, is a sector that is the most affected by climate change resulting in lower yields (VijayaVenkataRaman, Iniyan, & Goic, 2012). In Sub-

[1] "Resilience is defined as the social capacity to resist and recover from shocks" (O'Brien, O'Keefe, Meena, Rose, & Wilson, 2008, p. 196).

Saharan Africa, the impact of climate change on agriculture is expected to result in about an approximate 12% average increase in food prices (The World Bank, 2015). This reality will put additional "strain on poor households, who spend as much as 60 percent of their income on food" (The World Bank, 2015). Undoubtedly, such a change will lead to an increase in the incidence of malnutrition and associated negative effects including a 23% increase in severe stunting and associated ill-health.

The World Bank (2015) paints a bleak picture of the impact of climate change on global poverty reduction efforts noting that climate change could potentially render over 100 million people poor in the next one to two decades. The increasing frequencies of climate change related disasters will push those above poverty lines further down the line as climate change related disasters impact their livelihoods (Fay et al., 2015). This stark reality is undermining the past and current poverty reduction efforts particularly in regions of the world such as Sub-Saharan Africa and South Asia that are already characterised by high levels of poverty. The growing lethargy in the proportion of development aids that go towards poverty reduction initiatives suggests that global poverty is set to rapidly increase since additional funding required to address this reality will not be forthcoming.

In terms of health, climate change is contributing to the spread of communicable and non-communicable diseases. For instance, a warmer climate is resulting in the spread of malaria to areas that were previously free of malaria-bearing mosquitoes. This reality puts the life of millions at risk of malaria infection (Githeko, 2009; Hay et al., 2002; Mia, Begum, Er, Abidin, & Pereira, 2011; The World Bank, 2015). Relatedly, these increases the incidence of water-borne illness due to water scarcity as well as contamination of water bodies due to flooding (Hunter, 2003; Patz, Campbell-Lendrum, Holloway, & Foley, 2005; The World Bank, 2015). Water scarcity and contamination will contribute to a spike in infant mortality.

The disruptions brought about by climate change has momentous economic and non-economic costs both in the short and long-term (Ackerman & Stanton, 2007; Bierbaum et al., 2013). About 20% of global GDP could be affected if actions are not taken to adapt to and mitigate the impacts of climate change (O'Brien et al., 2008, p. 200).

Thus, adapting to the impact of climate change is a critical component of sustainable development (Okem, 2017). The argument here is that adaptive strategies help vulnerable communities to become resilient in the face of a changing climate (Laukkonen et al., 2009; O'Brien et al., 2008, p. 196). In doing this, adaptation provides new opportunities for local communities as new ways of addressing local challenges. In addition, adaptation entails equipping local communities with capacities to respond to new demands/realities that emerge due to changing the climate (Adger, Arnell, & Tompkins, 2005). Adaptation action, in this way, constitute both private and public activities/decisions and comprises five components: "observation; assessment of climate impacts and vulnerability; planning; implementation; and monitoring and evaluation of adaptation actions" (United Nations Framework Convention on Climate Change, 2014). The foregoing takes cognisance of the fact that climate change degrades the ability of local communities to utilise their livelihood strategies.

Although improving the vulnerability of poor communities is often used as a justification for the implementation of climate change adaptation programmes, there is, however, little effort in assessing the pro-poor dimension of such programmes (Eriksen et al., 2011). When this occurs, the poverty reduction agenda becomes an appendage to climate change adaptation programmes. While not all adaptation programmes have the potential to reduce poverty, it is critical that conscious efforts are made in the design phase of adaptation programmes to explore if there are possible poverty reduction dimensions of such programmes as well as their potential to exacerbate vulnerabilities (Okem, 2017).

3. Contextualising Climate Adaptation Interventions in Local Municipalities

In recent years, there has been a growing emphasis on the design and implementation of climate change adaptation at the local level of governance. This shift is underpinned by the view that adaptation, unlike mitigation, needs to be contextual and responsive to local needs, utilise local resources, and adapt local knowledge (Bakera, Peterson, Brown, & McAlpine, 2012; Measham et al., 2011). The call for the contextualisation of climate change has resulted in the concept of 'place-based' adaptation. According to Measham et al. (2011, p. 890), "'place-based' refers to a spatially distinct group of bio-physical and social conditions, which can, in principle, occur at any scale but tend to focus at local and regional scales where global and local drivers manifest themselves in particular ways". The notion of 'place-based' adaptation is particularly important when considered against the fact that local governments play critical roles in the actual implementation of climate change adaptation projects.

Despite the ongoing recognition that municipalities constitute the level of government where the impact of climate change is most felt, the contextualisation of the climate change agenda in municipal planning has not gained much traction (Carmin et al., 2012, p. 18). There appears to be a lethargy at the municipal level in the design and implementation of climate change mitigation and adaption policies. This has been attributed to a number of factors including the lack of resources as well as information constraints particularly in resource-poor countries (Measham et al., 2011; Moser & Luers, 2008). In better resourced advanced economies where local governments have made advances in the design and implementation of climate change adaptive responses, climate change adaption continues to be seen as an issue that is putting additional strain on municipalities already burdened with the provision of a basket of services to their constituents (Bakera et al., 2012). The challenge is acute in developing countries that are traditionally characterised by capacity constraints and limited political support for the inclusion of the climate change agenda in municipal planning.

3.1. The Context of the Study: Climate Change in eThekwini Municipality

In eThekwini Municipality, climate change presents a real danger for the Municipality's ecosystem and infrastructure particularly those that support the livelihood of many of its residents (eThekwini Municipality Environmental Management Department, 2007). According to The World Bank (2015c, p. 11), the municipality is already experiencing multiple climate change related events including an "annual sea level rise of 2.7 mm that threatens coastal wetland and dune ecosystems". Climate change is degrading the natural capital including terrestrial and aquatic assets of the Municipality. Ironically, eThekwini is one of the highest emitters of GHG in developing nations despite being highly vulnerable. This pattern is consistent with the national picture with South Africa producing more GHG than the rest of Sub-Saharan Africa (eThekwini Municipality Environmental Management Department, 2007). In 2013 alone, South Africa's GHG emissions stood at 28,741,558t CO2 (Roberts et al., 2016).

Both the social and physical contexts of eThekwini make climate change adaptation and mitigation key priorities (Roberts et al., 2016). This reality has prompted the implementation of proactive mitigation and adaptation measures. An outcome of this is the conscious effort geared towards aligning the Municipality's development plans to the realities of climate change. eThekwini has committed to ensuring a low carbon future by reducing its carbon footprint. This includes transitioning to efficient utilisation of energy including retrofitting of buildings, enhancing a functioning ecosystem and obtaining energy from renewable sources (Environmental Planning and Climate Protection Department, 2012).

The Municipality is working in a holistic framework which is underpinned by ecosystem-based adaptation (EBA) and community-based adaptation (CBA) (Laros, Birch, Clover, & ICLEI-Africa, 2013). In implementing EBA, the Municipality creates various co-partnership projects which attempt to work with local communities in natural habitat restoration in local communities. Through such partnerships, the municipality seeks to design and implement climate change projects that are responsive to local needs

(Roberts *et al.*, 2012). Embedded in this approach is designing climate change programmes that are pro-poor (eThekwini Municipality, 2011). This is a pragmatic approach that enables the Municipality to learn while implementing climate change mitigation and adaptation projects (Roberts et al., 2016).

The municipality recognises that both climate change mitigation and adaptation as critical responses to climate change. In the context of the Municipality, "mitigation refers to reducing the amount of GHGs entering the atmosphere from human activities" (eThekwini Municipality Environmental Management Department, 2007, p. 14). The municipality notes that mitigation includes "decreasing or eliminating fossil fuel use and other activities that produce GHGs" (eThekwini Municipality Environmental Management Department, 2007, p. 14). Mitigation activities in the Municipality are geared towards contributing to the global efforts of reducing GHG emission. While mitigation is about reducing GHG, "adaptation refers to changing human activities and planning to take climate change into account and minimise the negative impacts it may have on quality of life" (eThekwini Municipality Environmental Management Department, 2007, p. 15).

In eThekwini Municipality, the implementation of climate change related projects began in 2007. The inclusion of the climate change agenda in the municipality was prompted by exogenous factors. However, its sustainability is largely attributed to local champions who continue to drive the climate change agenda within the Municipality. In addition, the hosting of the 2010 World Cup and the Conference of United Nations Framework Convention on Climate Change COP17/CMP7 were also instrumental in institutionalising the climate change agenda across the municipality (eThekwini Municipality, 2013; Roberts et al., 2016). These events facilitated the implementation of a number of climate change-related projects including the creation of local awareness around issues of climate change as well as "reforestation projects with mitigation, adaptation and social upliftment co-benefits, as well as urban greening initiatives" (eThekwini Municipality, 2013, p. 3).

Over the years, the municipality has made strides in developing its portfolio of climate change resulting in Durban becoming one of the first cities in the global South to develop a climate change adaptation strategy (Carmin et al., 2012). In its climate change adaptation strategy, the Municipality notes the disproportionate focus on mitigation in developed countries and argues that for less developed countries that are characterised by negative adaptive capacities, addressing current adaptation needs are critical. This is particularly true in improving the adaptation of the ecosystem since many depend on them for their sustainability. The Municipality, therefore, calls for the prioritisation of an EBA model of climate protection (eThekwini Municipality, 2013, p. 3). This argument is evident in the predomination of EBA projects in the Municipality's portfolio of climate change projects. Over the years, the municipality has implemented a number of climate change-related projects.

4. Research Method

This report is based on a qualitative study design that builds on the document analysis of 104 climate change related projects in eThekwini Municipality (see Diga, 2017). The document analysis was preceded by a critical literature review to gain a robust understanding of climate change. This literature review was then used to identify the poverty reducing attributes as well as other socio-economic benefits of climate change projects (Lombo, Ntombela, Okem and Bracking, 2016). The poverty reduction attributes identified are:

1. Income/ financial wealth for the poor communities.
2. Improvements and access to jobs/ entrepreneurship opportunities for the communities.
3. Improvement and access to utilities or public services.
4. Improvements and access to education/skills/training.
5. Improvements and access to health.

6. Improvements and access to assets.
7. Improvements and access to natural capital
8. Improvements and access to social capital
9. Any other poverty reduction themes that were not originally identified but emerged from the document review.

These attributes were used to measure the performance of climate change related projects in eThekwini Municipality. Each project has a possible score of 9 poverty reduction potential (PRP). Using the nine poverty reduction variables listed above, we aggregated the projects into four groups according to their PRP using the ratings below:

1. 0= No poverty reduction potential
2. 1-3= Low poverty reduction potential
3. 4-6= Moderate poverty reduction potential
4. 7-9= High poverty reduction potential

A spreadsheet was created on Google Drive where project characteristics were plotted to compare projects on their poverty reduction co-benefits. The spreadsheet gave a visual representation of the projects and made it easier to identify projects with high, medium and low poverty reduction benefits. This was followed by an assessment of whether projects have avowed poverty reduction intent(s) as contained in project documents. By comparing projects' avowed poverty reduction intent(s) with reports of what the projects are presently doing in terms of poverty reduction, a matrix which reflects matches/mismatches between projects' avowed poverty reduction intent(s) and the actual implementation of the project emerged (Diga, 2017). The analysis produced the following possible scenarios for the projects:

1. Intended to reduce poverty and currently doing so (Positive Match)
2. Did not intend to reduce poverty but is currently reducing poverty (Negative Match)
3. Did not intend to reduce poverty and is currently not reducing poverty (Negative Match)

Table 1: Result of Document Analysis[2]

Avowed Intent	High PRP*	Moderate PRP	Low PRP	No PRP	Negative Match	Positive Match	Mismatch
18	2	9	36	57	53	13	38

*PRP=Poverty Reduction Potential

The first column in table 1 indicates that only 17.3% (N=18) of the 104 projects have avowed poverty reduction intent. The table also shows that most of the projects have low to zero PRP. To empirically verify the findings from the document analysis, we implemented an empirical study of the PRP of 15 selected climate change related projects in eThekwini Municipality. The initial projects selected for empirical investigation were based on the scenarios presented in Table 1 above. Some projects were excluded from the empirical study whatever their rating. This was because they were:

a) Intangible Projects: These were just policy documents that do not have any tangible project that could be evaluated or visited for future review.
b) Purely Technical Projects: These were technical papers that came out of feasibility studies.
c) Completed Projects: These are projects that had been concluded and were no longer running.

[2] See appendix A for the comprehensive result.

In the planning stage of the research, the intention was to take into consideration, the following when selecting projects for empirical investigation: a) balance between adaptation and mitigation projects; b) balance between projects match and mismatch in terms of the PRP of the climate change projects.
However, the list of selected projects had to be constantly modified due to unforeseen circumstances encountered in the field. These included various projects that had reached completion or had been terminated[3], security risks in accessing project sites[4], non-response from designated municipal officials as well as a change of personnel responsible for certain projects resulting in the inability to locate pertinent project information. As a result of these challenges, projects that were finally included in the empirical investigation were those that we were able to access with the support of municipal staff. Although we interviewed municipal officials of 15 projects, only 13 project sites were visited and those employed in those projects were interviewed. One project was terminated because the pilot study showed that the project is a potential biohazard[5] while we were unable to get municipal officials to take us to the site of the project by the time we completed the data collection.

Primary data was collected by means of individual and focus groups (FGDs) with purposively selected respondents. A total of 22 municipal officials and 45 project beneficiaries were interviewed either individually or as part of a focus group. Although our initial intention was to individually interview project beneficiaries, we had to implement focus groups in instances where there are many beneficiaries and there was little time to interview them individually. In total, there were 14 individual interviews and 22 FGDs. Approximately 60% of these were conducted in isiZulu while the rest were in English. All interviews (besides one[6]) were audio-recorded with the permission of respondents. The interviews were transcribed and exported to Nvivo for analysis. With the aid of Nvivo, data for the study were analysed thematically along the lines of the research objectives. The analysis was an iterative process and entailed reading and re-reading transcripts to ensure that all the study nuances were captured in the themes. Direct excerpts from transcripts are italicised in the presentation of research findings. In the following sub-sections, the findings from the empirical study are presented.

5. Research Findings

In the following sub-sections, I present the findings that emerged from the empirical work. The section begins with an overview of the empirical work and then delves into providing research findings based on the key objectives of the research.

5.1. Overview of Empirical Work

As shown in table 2 below, a total of 13 projects were included in the empirical investigation. Projects under agroecology constituted 5 of the 13 projects investigated while 6 are categorised as ecological enhancement projects. The table also shows that most of the projects are classified[7] as climate change adaptation with the exception of projects 1 and 6.

[3] For these projects, we were not able to establish from the document analysis that the projects had reached completion or has been terminated.
[4] Some projects are located in hostels which have become notorious for violent crimes. It must also be pointed out that the empirical study came at a point when the country was preparing for municipal elections and local communities were politically charged during this period. We, therefore, visited projects that we were informed posed low security risks to our fieldworkers.
[5] Interviews for the project was discontinued once the municipal staff informed us that the project no longer existed.
[6] Participants in the projects objected to being audio-recorded.
[7] This is the classification in the list of climate change related projects provided by the Municipality.

Table 2: Overview of Empirical Work

	Project	Nature of Project	No. of Interviews with Municipal Officials	No. of individual Interviews with Expert Respondents	No. of FGDs	Carbon Registry Classification
1.	Paradise Valley Reforestation	Ecological Enhancement	1	9	0	Mitigation action with secondary focus on adaptation
2.	Working on fire	Ecological Enhancement	1	0	2	Adaptation action
3.	Durban Green Corridor	Ecological Enhancement	2	2	5	Adaptation action
4.	Newlands Mashu Dewats - Evaluation for Waste Water Treatment and Reuse for Urban Horticulture	Water Reuse	2	1	0	Adaptation action
5.	Invasive Alien Plant (IAP) Control Programme	Ecological Enhancement	1	0	0	Adaptation action
6.	Mhlangane Catchment Rehabilitation	Ecological Enhancement	1	0	1	Adaptation action
7.	Green Street Retrofit	Residential Energy Efficiency	1	2	0	Mitigation action
8.	Sihlanzimvelo Stream Cleaning	Ecological Enhancement	1	0	9	Adaptation action
9.	Inkululeko Garden	Agroecology	0	0	1	Adaptation action
10.	Ubumbulu Hub	Agroecology	1	0	0	Adaptation action
11.	Sibukeni Project	Agroecology	1	0	0	Adaptation action
12.	Scorpio Place	Agroecology	1	0	0	Adaptation action
13.	Sphikeleni	Agroecology	1	0	0	Adaptation action
	Total		15	14	18	

Figure 1 presents a Word Cloud of the most frequently occurring 1000 words in the interview transcripts. As shown in the figure, the word 'project' has the most frequency (used 490 times in the transcripts) followed by 'climate' and 'people' both of which were used 243 and 334 times respectively. The word 'change' was used 211 times. Combined, 'climate' and 'change' were used a total of 454 times by the respondents. The foregoing shows that these words are important for most of the respondents and account for why they were used this many times in the transcripts. This is not unexpected given the subject of enquiry in the study. What is unexpected, however, is that the word 'project' was the most frequently occurring word. This could be attributed to the fact that climate change in eThekwini in its current form is largely project based and as a result, the word was commonly used in referring to these.

Figure 1: Word Cloud of Most Occurring Words

5.2. Why Projects are considered a Climate Change Project

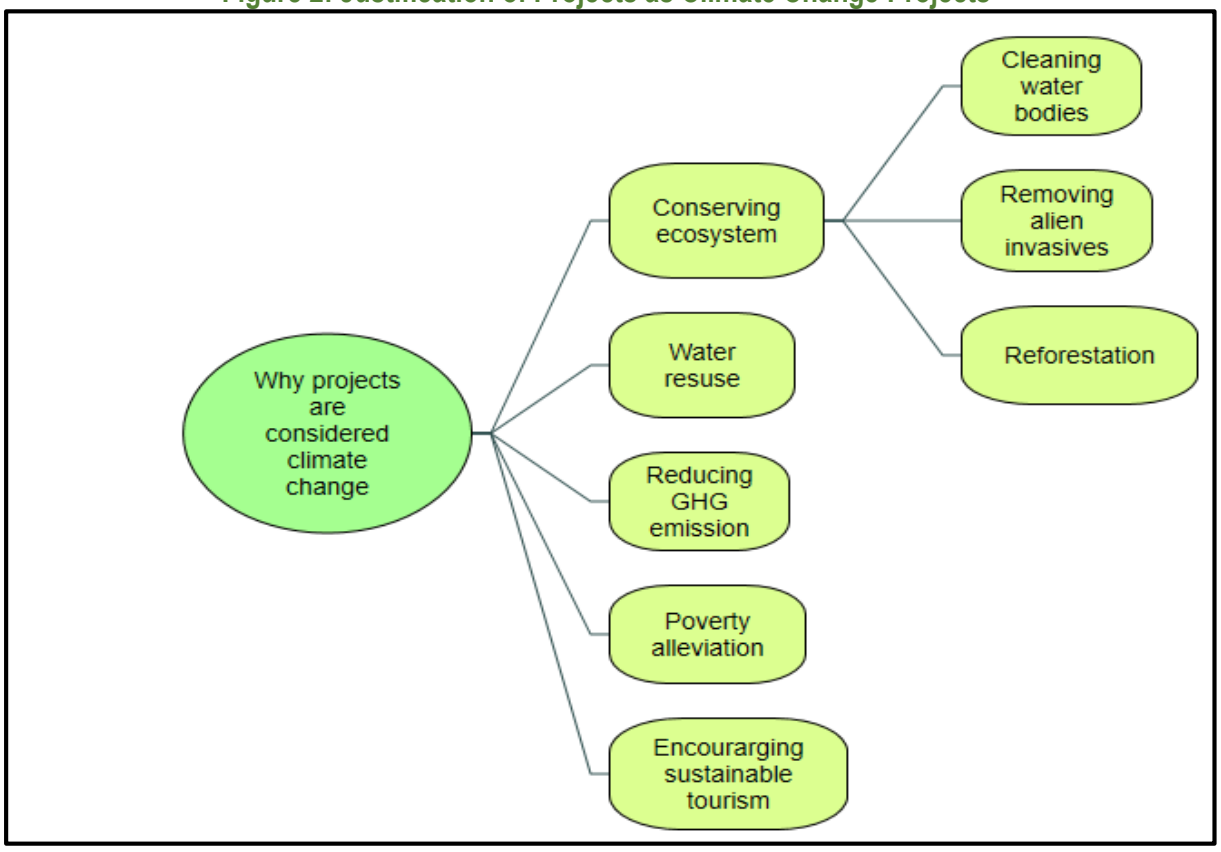
One of the aims of this study was to understand why the selected projects were considered as climate change projects. In responding to the question posed, expert interviewees advanced four reasons to justify why the projects are considered as climate change projects:

a. Conserving the ecosystem (ecosystem rehabilitation are further divided into those that deal with cleaning of water bodies, removal of invasive alien plants and reforestation),
b. Water reuse,
c. Reducing GHG emission,
d. Poverty reduction, and
e. Encouraging sustainable tourism.

According to the respondents, all the above themes are linked in one way or another to climate change either as a climate change mitigation or adaptation strategy. For instance, in justifying why the invasive alien species programme (IAS) is a climate change project, an expert notes that the *"IAS as a programme is building a system that is resilient to climate change"* (Expert Interview IAS, 2016). The argument here is that by removing invasive alien plants, the ecological system is restored to its natural form and thus ensures that communities become more resilient to climate change. Another expert interviewee notes that their project is considered climate change related because it encourages water reuse as well as the reuse of human waste as a replacement for fertiliser. The respondent argues that "*if we use waste water to irrigate in agriculture and we are not using fertiliser you are offsetting a bit of your fertiliser production as it is known to be very high on energy demand, especially for nitrogen. In that way that's how I think it is linked to climate change"* (Expert Interview Reuse of Treated Waste Water, 2016). The same

respondent further notes that *"there is a decrease in rainfall, prolonged drought and rapid rainfall. There is less water for domestic and agricultural use. Our project is to recover water to assist in vulnerable times of drought. By recovering water back to land there is long term sustainable cycle"* (Expert Interview Reuse of Treated Waste Water, 2016). Another project was defined as a climate change project since *"the solar water system use less electricity thus allowing the generators of electricity to use less energy"* (Expert Interview GSR, 2016). The decrease in demands for grid electricity, according to this respondent, contributes to reducing GHG emission. A summary of the key justifications of the projects as climate change projects is presented in figure 2.

Figure 2: Justification of Projects as Climate Change Projects



5.3. Understanding of Climate Change by Project Beneficiaries

One of the goals of this study was to examine the conceptualisation of climate change among project beneficiaries. To gain this understanding, respondents were asked to explain what they understood climate change to mean. In explaining the meaning of climate change, most respondents described it in terms of phenomena associated with the impacts of climate change such as weather extremes or unpredictable weather patterns. For instance, climate change, according to one respondent, refers to *"the changing state of weather conditions. As winter is approaching the trends of then and now have changed a lot in terms of wind and rainfall patterns"* (FGD 3 Durban Green Corridor 2016). Another respondent offered a similar explanation noting that *"the weather conditions have changed, there's more rain and thunderstorm compared to decades ago"* (Individual Interview1 Green Street Retrofit, 2016). Describing climate change as unpredictable weather condition, a respondent notes that *"years ago the weather conditions were stable and predictable. Nowadays there's a lot of droughts, less rain and uncertainty"* (Individual Interview 2 Green Street Retrofit, 2016). For these respondents, extreme weather patterns are what constitute climate change. For one respondent, these extremes are a new phenomenon that makes weather prediction difficult. The respondent notes that *"it has never happened ever since I was born that the sun becomes so hot in winter. It was warm just because the sun is out, but not to such an*

extent that it becomes hot. We could even feel when seasons were changing and you could tell which season it was. Now, in this era, it is confusing to tell which season it is. You cannot even tell if it is summer or winter accept if you notice the times for sunrise and sun set" (Individual Interview 11 Paradise Valley Reforestation, 2016). A respondent sums the understanding of climate by stating that climate change is *"a phenomenon that is life changing in a negative way"* (Individual Interview Durban Green Corridor, 2016).

Unlike the above respondents, one respondent did not only define climate change in terms of its impacts but also pointed to the cause of climate change. According to this respondent, climate change is *"the changing weather conditions influenced by human activities such as pollution. The pollution then alters weather conditions"* (Individual Interview 2 Paradise Valley Reforestation, 2016). The respondent points to the recent drought in South Africa as an example of a climate change disaster (Individual Interview 2 Paradise Valley Reforestation, 2016). This account of climate change is reminiscent of the accounts in academic literature.

A respondent added a spiritual dimension to the climate change discourse arguing that climate change is an act of God. The respondent notes that *"the changing climate is oppressive to us farmers. Sometimes you want to cover your crops as we experience harsh weather conditions but as farmers, we can't do anything because it's something that is natural…..it's created by God"* (FGD Sphikeleni, 2016). Seen from this perspective, there is nothing that can be done about climate change according to the respondent.

While most respondents offered an explanation of the meaning of climate change, one respondent was not sure of what climate change means due to the lack of an equivalent concept in *isiZulu*. In *isiZulu*, the same word is used for climate change and weather. The respondent notes this concern stating that *"I do not know of climate change. There's no specific word that directly translates in isiZulu of the word"* (Individual Interview 5 Paradise Valley Reforestation, 2016). The foregoing is, perhaps, a challenge faced by most of the respondents in this study and could, therefore, be used to explain why climate change was defined in terms of its impacts. Figure 3 below shows some of the common words used to describe climate change. As shown in the figure, the majority of these words refer to the impacts of climate change rather than climate change itself.

Figure 3: Understanding of Climate Change

5.4. Reported Impacts of Climate Change among Project Participants

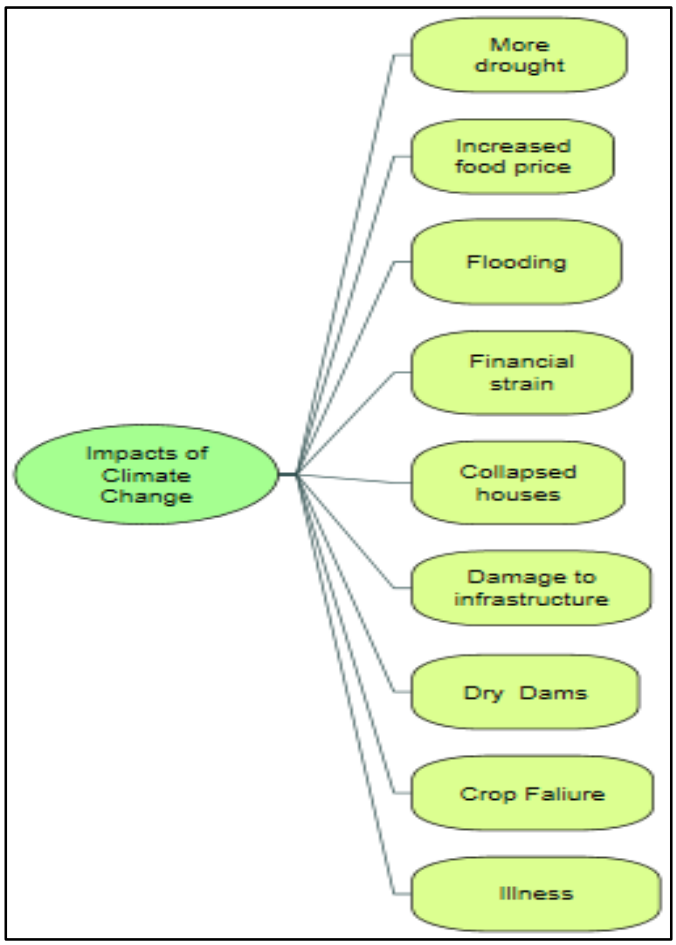
As noted above, most definitions of climate change were presented in terms of weather extremes and associated negative impacts. It was, therefore, expected that respondents would not have difficulty in discussing how climate change affect their lives. Table 3 below lists the projects and identify whether the impacts of climate change was cited by respondents. The table shows that the impacts of climate change was cited for all agroecology projects. However, participants in some of the ecological enhancement projects did not cite any impact of climate change. Respondents in this study made several references to the impacts of climate change. These range from the impacts of climate change on agriculture, human settlement, food security, water, and health.

Table 3: References to Impact of Climate Change by Projects

	Project	Impact of Climate Change Cited?
1	Residential Energy Efficiency Programme	Yes
2	Newlands Mashu Dewats - Evaluation for Waste Water Treatment and Reuse for Urban Horticulture	Yes
3	Sihlanzimvelo Stream Cleaning Programme	Yes
4	Paradise Valley Reforestation Project	Yes
5	The Umhlangane Catchment Rehabilitation Programe	No
6	Durban Green Corridor	Yes
7	Invasive Alien Plant (IAP) Control Programme	No
8	Working on Fire	Yes
9	Scorpio Place in Mariannridge	Yes
10	Ubumbulu Agri-Hub	No
11	Inkululeko Garden	Yes
12	Sibukeni Project: Hammersdale	Yes
13	Sphikeleni	Yes

Figure 4 presents some of the most frequently occurring words used to describe the impacts of climate change by respondents. In highlighting the impact of climate change on agriculture, a respondent notes that *"It* [farming] *has not been the same, we were challenged by the fact that it was not raining last year, and then the cabbage was small and it changed the colour and we thought that it was the effect of the rain that made that change, but this year there is some change. But in some other years, it always had been beautiful"* (FGD Inkululeko, 2016). Another respondent from the same focus group expressed a similar concern about the impact of climate change on farming noting that *"I will say it is drought, because we are farming there is nothing that will be fine because there is drought"* (FGD Inkululeko, 2016).The excerpts from the FGDs demonstrate that the respondents are aware the relationship between climate change and food production. The impact of climate change has cost implications for these farmers since poor quality produce implies that there will be less return on investment thus driving these small-scale farmers further into poverty. In addition, farmers are not able to plant when there is drought (attributed to climate change) and this has significant implications for them.

Figure 4: Impacts of Climate Change



A respondent in another FGD also reported the negative impact of climate change on agriculture. For this respondent, the impact of climate change is a depressing topic due to how it affects their livelihood. The respondent notes this by saying "*that* [climate change] *is a very depressing topic for us because when it's hot it gets too hot that destroys our crops and when it rains it's the same because the ground will get over saturated and the roots of the plants rot and dies. So the weather conditions that we experience are just extreme weather conditions. It gets too hot that the soil dries up, roots can't absorb water and hail also destroys"* (FGD Sibuken, 2016).

Besides the direct impacts of climate change on agricultural produce, it also has a bearing on the amount of time that farmers spend in working their lands. For a respondent at Sibukeni, climate change has made it difficult for them to work in the garden over an extended period of time since it becomes unbearably hot by mid-morning. The respondent notes that as a result of this reality, they have now resorted to getting up early and commence working in the garden as early as possible before the sun becomes too hot. To adapt to this change, the respondent notes that they have resorted to doing bead work after leaving the garden when the sun becomes too hot (FGD Sibukeni, 2016).

The ongoing impact of climate change on food security was another concern raised by respondents. This is linked to the impact of climate change on agriculture cited above. Some of the respondents note that drought has resulted in increased food prices and given their fixed budget, it is becoming increasingly difficult for them to afford food. In citing the impact of climate change on food prices, a respondent notes that *"it's hard, most of the time one has to have a garden. Supermarkets have expensive food"* (Individual Interview 2 Green Street Retrofit, 2016). Another respondent raised a similar concern about the impact of climate change on food prices stating that "*climate change has impacted my life by the increased food prices"* (Individual Interview DGC, 2016). Increasing food prices is pushing these individuals into poverty. This point was raised by a respondent who states that *"the state of the weather condition have increased poverty, people have been forced to rely on supermarkets for food which is expensive"* (Individual Interview 8 Paradise Valley Reforestation, 2016).

The impact of climate on health and wellbeing was also cited by some respondents. One respondent notes that *"drought has affected the community at large. High temperatures make the workers inhale a lot of dust which has health issues together with diseases and sicknesses due to the changing weather patterns which are harsh. Drying up of the reservoirs and rivers (drought) make people drink polluted water*" (FGD3 Durban Green Corridor, 2016). For this respondent, climate change related disasters such as drought and excessive heat leads to ill-health as people are forced to consume polluted water, are

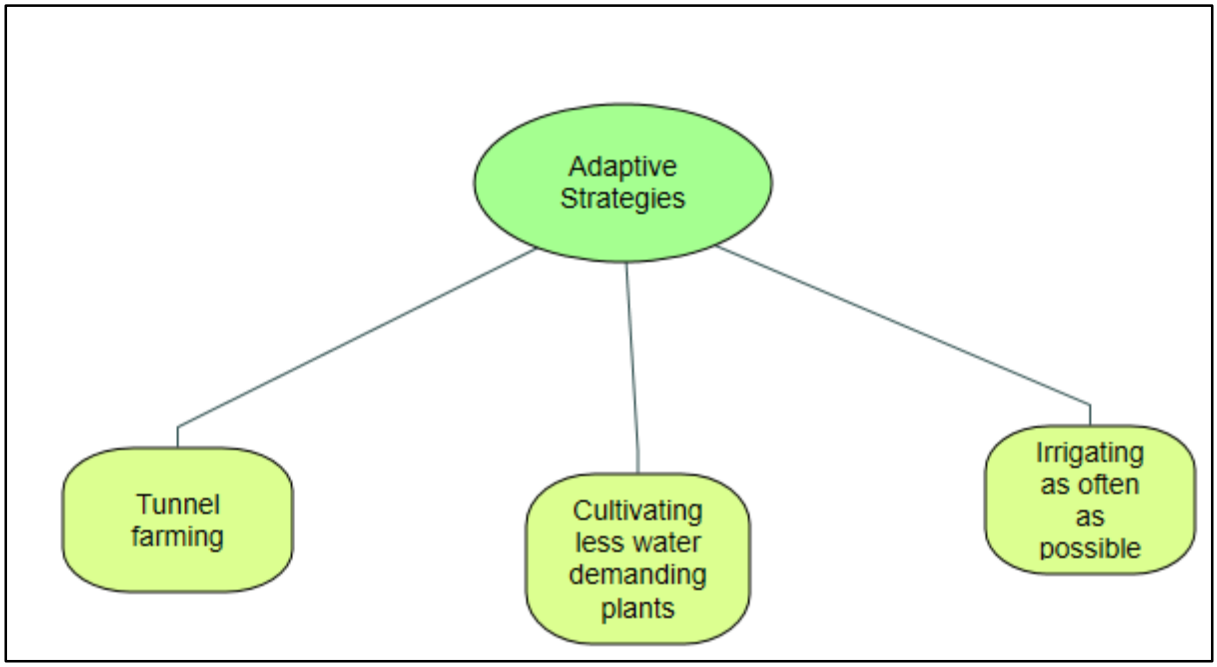
exposed to extreme dust (which can result in respiratory illness) and heat (which can result in heat stroke and other skin diseases). Another respondent reported the impact of extreme heat on illness stating that *"due to the heat generated from the sun people tend to fall sick and they become dehydrated. This is a new phenomenon to me that we can experience water shortage"* (Individual Interview 11 Paradise Valley 2016). A respondent further states that excessive heat can result in a fatality as "*others* [other workers] *can no longer cope with the scorching sun which has become severer and has actually cost people's lives"* (Individual Interview 11 Paradise Valley Reforestation, 2016). Another respondent reported having *"severe skin outbreaks due to the harsh sun exposure"* (individual Interview Newlands Mashu, 2016).

Climate change has also impacted infrastructure particularly the housing of respondents. This is a concern for participants living in low-income residential areas located in flood plains and bereft of proper drainage. In discussing the impact of climate change on housing, one respondent notes that "*due to heavy rains, we slack at work. At home, housing infrastructure gets damaged, most participants live in RDP houses"* (FDG 4 Sihlanzimvelo, 2016). Another respondent noted that "*The rain is harsh because houses are flooded and damaged which is a financial strain"* (FGD 3 Sihlanzimvelo, 2016).

5.4.1. Adapting to the Impacts of Climate Change

Besides listing the impacts of climate change, respondents were also asked to indicate how they are adapting to the changing climate. Responses to the adaptive strategies came only from respondents involved in agroecology projects although it is evident from other responses that respondents from all projects, even when they were not explicitly aware of it, were displaying adaptive behaviour. As shown in figure 5 below, there three adaptive strategies listed by the farmers: tunnel farming, cultivating less water demanding crops and irrigating as often as possible. These strategies are geared towards responding to climate changes such has hailstorm, water shortages and increased temperature.

Figure 5: Climate Change Adaptation Strategies



5.5. Poverty Reduction Co-Benefits of the Selected Climate Change Projects

The primary aim of this project was to investigate the poverty reduction co-benefits of climate change related projects in eThekwini Municipality. As noted earlier, the first component of the study was a document analysis of all climate change related projects in the Municipality (Diga, 2017). The table below compares the PRP of the projects from the empirical research and the document analysis. The table

shows that of the initially selected projects after the document review, 1 had a negative match, 6 had mismatches while 3 had a positive match. In comparing the PRP of the projects, the table shows a positive difference for most of the projects. Besides projects 2 and 10, there is an improvement in the scoring of the PRP of the other projects. This finding shows that project related documents may not provide all the information required for accessing the PRP of climate change related projects.

Table 4: Poverty Reduction Potential: Document Analysis Vs Empirical Study

			Document analysis	Empirical research
	Projects	Match/ Mismatch*	Poverty reduction potential**	Poverty reduction potential**
1	Residential Energy Efficiency Programme	-M	N	M
2	Newlands Mashu Dewats – Evaluation for Waste Water Treatment and Reuse for Urban Horticulture	MM	M	L
3	Sihlanzimvelo Stream Cleaning Programme	MM	L	M
4	Paradise Valley Reforestation Project	MM	M	M
5	The Umhlangane Catchment Rehabilitation Programme	MM	N	L
6	Durban Green Corridor	+M	L	M
7	Invasive Alien Plant (IAP) Control Programme	+M	M	N/A
8	Working on Fire	MM	L	M
9	Scorpio Place	MM	N	L
10	Ubumbulu Agri-Hub	+M	H	L
11	Inkululeko Garden	N/A	N/A	L
12	Sibukeni Project	N/A	N/A	L
13	Sphikeleni	N/A	N/A	L

* -M = Negative Match, +M Positive Match, MM = Mismatch
** N = No PRP, L = Low PRP M = Moderate PRP, H = High PRP

As noted earlier, this study was guided by the Multi Criteria Analysis (MCA) generating a poverty reduction potential (PRP) index. The MCA was used to assess climate change related projects on the basis of 9 outcome criteria (PRP). The PRP of the projects was then reassessed based on the analysis of the interviews. The outcome of the analysis is presented in table 5. In sum, six of the projects initially assessed for their PRP in the document review improved their rating based on the empirical investigation. The cells shaded green show that the listed PRP was cited/mentioned in the transcript to have that item while those that have no mention of the item are left blank. The table shows that access to jobs was true for all the projects followed by access to income/financial wealth for poor communities. Improvement and access to social capital were cited by only 3 projects while improvement and access to public utilities and health were not cited as benefits of any of the projects investigated. In addition, no respondents cited any other dimension of poverty reduction besides those identified by the research team prior to implementing the research.

Table 5: Poverty Reduction Co-Benefits of Projects

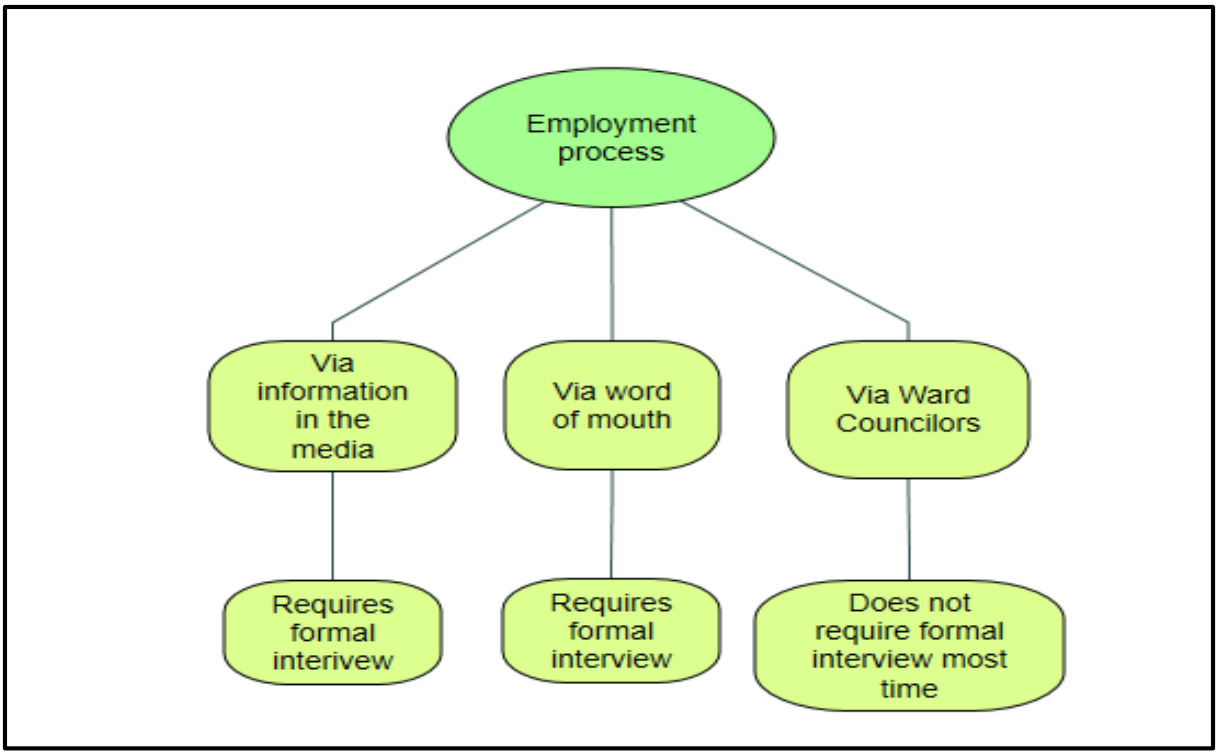
	Durban Green	Paradise Valley	Green Street Retrofit	Working on Fire	Umhlangane catchment	Newlands Mashu	Sibukeni	Mbumbulu	Inkululeko	Sphikeleni	Sihlanzimvelo
Income/ financial wealth for the poor communities	■	■	■	■	■	■	■	■	■		■
Improvements and access to jobs/ entrepreneurship opportunities	■	■	■	■	■	■	■	■	■	■	■
Improvement and access to utilities or public services											
Improvements and access to education/skills/training	■	■	■	■		■	■	■			■
Improvements and access to health											
Improvements and access to assets	■	■	■	■							■
Improvements and access to natural capital	■	■	■	■	■						■
Improvements and access to social capital	■							■	■		
Other											

5.5.1. Employment in Climate Change Projects

All projects selected for empirical investigation provided employment opportunities. There were two forms of employment. The first form refers to those employed under the project who are paid a salary. The second form refers to those that form a group and are assisted by the government. The second category is mainly those involved in agroecology projects as cooperatives. The income they earn is through the sale of their farm produce.

Those employed in the projects gained their employment via one of three employment paths: information in the media, word of mouth and local councillors. As shown in figure 5, paths one and two require a formal application and interview while path three does not require any formal application nor formal interview. Most respondents in the projects secured their jobs via the third path. According to the respondents, local councillors have databases containing names of unemployed individuals in the community and once employment opportunities become available, these individuals are then contacted and offered the position. A respondent made this point stating that *"I came to know about the project through the ward councillor. The councillor brought us to this site and introduced us to the project leaders"* (Individual Interview 11 Paradise Valley Reforestation, 2016). This path of employment was the preferred option for most projects as project implementers wanted to be delinked from local politics which can have negative implications for project implementation. By delegating recruitment to local councillors, the project implementers devolve any conflict that emerges to the local level without the project being adversely affected. Municipal officials and other project implementers interviewed for this study noted that they have not experienced any challenge in terms of employment as this is dealt with locally. An interviewee sums up the recruitment process noting that *"the selections of the workers depend on whether the position is skilled or not. If it's a general worker vacancy, low skill job, the workers are recruited locally. Specialist vacancies are advertised on newspaper and on the internet. A priority is getting workers from a community of the project; the project liaises with the councillor which the project goes through a committee. It is imperative to work with the councillor"* (Expert Interview 2 Durban Green Corridor, 2016).

Figure 6: Paths to Employment



Those involved in climate change related projects have been part of the project for varying numbers of years. Some have been part of the project for about ten years while others have been involved for only two months. The nature of employment differs across projects with the majority of participants being employed on a temporary basis. Only those involved in high skilled jobs were employed directly by the municipality as permanent employees. The preference for short-term contract was attributed to funding implications. According to the municipal staff, climate change in the municipality is largely project-based with time bound funding commitments. Some are externally funded by international donors while others are funded through the Expanded Public Works Programme. As a result of this, it was not feasible to offer people permanent employment since there is not a guarantee of continued funding. This was lamented by many respondents.

5.5.2. Income and Financial Wealth to Beneficiaries

Involvement in the climate change project is a critical source of income for project beneficiaries. Income, as stated earlier, is either through salary or through the sale of farm produce. For those employed, the amount of money earned varies across projects with some earning as much as R142 per day while others earn only R60 per day. The difference in salary is linked to the skills level as well as the funding model of respective projects. The income gained through involvement in the project has resulted in notable improvement in the lives of some of the respondents. One respondent in a focus group made this point stating that *"some farmer's lives have improved, you can see that before and after they have started participating in the farming sector they are now able to make some money and afford to buy bread every day something that wasn't happening before, eat healthier, give some cash to their children and send them to school"* (FGD Mbubulu, 2016). Another respondent reports that *"since I have been unemployed for a while, I am now able to pay for my children's education and buy important school necessities. I can feed them well now compared to before when we would struggle to get something to eat"* (Individual Interview 11 Paradise Valley Reforestation, 2016). For a respondent from the Durban Green Corridor, being employed is more than earning income; it also gives a sense of belief and self-confidence.

According to this respondent, *"being unemployed makes one think of stupid things, being employed makes one a better person. Those with children are able to provide for them. It's motivating to have something constructive to do"* (FGD 3 DGC, 2016).

Besides the above benefits, beneficiaries also cited acquiring various kinds of assets as a result of being involved in the projects. These assets included a television, cell phone, fridge, beds, and radio. Others reported being able to renovate/extend their houses. One respondent (who is now a contractor) reported building a five-bedroom house through the money earned from the project. Other benefits listed include obtaining driving and hyster licence, paying house rents and other bills, buying groceries and clothes and being able to support their extended family. A respondent sums up the impacts of the income through the climate change project by stating that

> *"the socio-economic conditions from the past and now have changed considerably for the better. My husband was retrenched from work life was hard but now I'm able to pay for our children's school fees and I have recently renovated our house. I have built cottages where people will lease monthly. The knowledge I got from being a field guide, I utilise here as our studies were funded by our company. The knowledge I have learnt here"* (Individual Interview 7 Paradise Valley Reforestation, 2016).

For some respondents, the benefits of the project extend beyond individual beneficiaries to the community at large. A respondent notes this point stating that *"the community at large is improving because of job opportunities"* (FGD3 Durban Green Corridor, 2016). Another respondent noted that *"the project also employs locals to help the locals. The youth development project assists the community for teenagers especially to find a purpose or something to do than being in the streets"* (Individual Interview Durban Green Corridor, 2016).

5.5.3. Access to and Appreciation of Nature

Involvement in the climate project has increased respondents' access to as well as an appreciation of nature. According to an expert interviewee, *"community benefit together with sport and recreation were other objectives to drive the project. The Umngeni Valley is also a tourist destination where local people are involved*" (Expert Interview 2 Durban Green Corridor, 2016). Similarly, an interviewee in a focus group noted that community members "*are able to access natural resources like the river, some are fishermen"* (FGD3 Durban Green Corridor, 2016) as a result of the project. Another respondent noted that *"since joining the project, I have managed to access the natural environment*" (Individual Interview Durban Green Corridor, 2016). In terms of appreciation of nature, a respondent stated that

> *"working with the trees has taught me the respect and recognise the trees anywhere that it is an extension of my life. Therefore, I know now that I need to treat the trees as I treat myself because the trees are just like me. As I work with trees here, I greet the trees in the morning because now I know that they are just like me. Furthermore, trees give me life through purifying the air I breathe"* (Individual Interview Paradise Valley Reforestation, 2016).

The same respondent further adds that *"trees assist all communities through their "breath"* (umphefumulo wazo- suggesting a living entity) *that they give out and take our warm breath called carbon dioxide. So if we keep these trees here and not plant them in the forest they will not help everyone, because the trees will be able to absorb greenhouse gases in all directions"* (Individual Interview Paradise Valley Reforestation, 2016). The recognition of these benefit of trees has made the respondent see trees from a different perspective thus appreciating the important role that trees play in the survival of human beings.

Climate change related projects, according to some respondents, have resulted in improving the environment which has positive benefits on community members. One respondent noted that "*there are a lot of positive impacts from the project. There's a free flow in the rivers, the houses around the rivers aren't flooded anymore and there's a cleaner environment free from alien plants"* (FGD5 Sihlanzimvelo, 2016). The same respondent added that *"the rivers were dirty previously; the children would play there and be sick most of the time. With the rivers being cleaned, the children do not have any sicknesses related to dirty water*" (FGD5 Sihlanzimvelo, 2016).

5.5.4. Skills, Training and Education through Climate Change Projects

Skills, training, and education is another dimension of poverty reduction explored in this study. Findings of the study show that although most of the projects provide training, the nature of the training differs across projects. For instance, some projects offered only short (1-3 days) unaccredited training while others offered fully accredited training. In discussing the nature of training received, one respondent notes that *"we have got the certificate even though it for a three-day training course, but we will make it through with it"* (FGD Inkululeko, 2016). In one of the projects, respondents reported being offered skills and training including skills for mountain biking (BMX), plumbing, and carpeting (FGD 3 Durban Green Corridor, 2016). Another respondent notes that *"there is some SMME development and training people to create coops. The training also includes new skills of bookkeeping. Also, there were some who were trained in abseiling for difficult to reach areas and some of those with the training now work for Eskom"* (Expert Interview Invasive Alien Species, 2016).

Participants involved in ecological enhancement projects reports they were offered specific training in identifying and clearing invasive alien plants. In addition, it was noted that "*some of the workers did Safety and First Aid courses"* (Individual Interview1 Paradise Valley Reforestation, 2016). This was an important training since there was a risk of injury associated with carrying out the required duties for some of the projects.

Various forms of formal training were provided to some respondents. For instance, an expert interviewee reported that *"invasive alien training and snake training, also QGIS software training. All the certification is SETA accredited"* (Expert Interview Sihlanzimvelo, 2016). A respondent in an FGD notes that *"there are a plant identification, health and safety and firefighting courses. Candidates make a choice to choose which course they want to do. Firefighting course is 25 days and Health & Safety certificate is 10 days. All the certificates are recognised by SAQA[8]. The skills and training in the project are not just based on work but life-related skills"* (FGD1 Working on Fire, 2016). These specialised training have given some of the beneficiaries the opportunity to seek employment beyond the climate change project. An expert interviewee notes this point stating that there *"are the workers doing high landscape duties, they are employable beyond Working on Fire. The workers have been given different opportunities like branching off to greener pastures. Some of them now work in ships. The programme focuses on 50:50 and employs youth preferably"* (Expert Interview Working on Fire, 2016). Another expert interviewee further highlights this benefit of the training by giving an example of a teacher who is

> *"now a contractor, she was able to buy a car cash. Another guy started as a groundsman now a project manager. There is extensive and specialised training, some are employed by other private companies. Some workers have left to Canada. The training is a development strategic tool. Health & Safety Officers trained within the programme have also been employed by other companies as it is a scarce skill. The workers are not leaving because they are unhappy, but they leave due to greener pastures"* (Expert Interview Invasive Alien Species, 2016).

[8] SAQA is the South African Qualifications Authority.

5.5.5. Stakeholder Engagement and Linkage of Projects with Local Communities

A dimension of this study was to understand whether local communities are involved in the climate change projects. To do this, we asked both project beneficiaries and experts about local community engagement in the selected projects. Experts were also asked to expound on the community engagement strategy they employed in community engagement and comment on its success or failure. Findings of the study show varying perceptions about the involvement of local communities. From the perspectives of project beneficiaries, local communities are involved in the projects either as beneficiaries or as partners. For instance, a respondent notes that "*the schools in and around our community are part of the feeding scheme programme so the service providers buy their vegetables from us, so we get to share what we produce with the community especially the kids"* (FGD Sibukeni, 2016). Just like this respondent, another notes that *"community engagement is the exposure of the local community to tourists. The Non-Profit Organisation is an HIV/AIDS crisis centre, there's a crèche, leadership business school, gardeners, river maintainer clearing, site maintenance to improve the working conditions of the local people"* (Individual Interview Durban Green Corridor, 2016). Training communities on the identification and removal of invasive alien plants were also considered as a strategy for involving local communities. Some of these are through direct engagement with the communities while others are through local ward councillors.

According to the expert interviews, various strategies are used to involve local communities in the projects. These include using community engagement officers, holding community meetings and using project implementers to organise training for local communities. Through these strategies, local communities are informed about the projects in order to elicit their perceptions. Experts in this study note that these strategies have been effective in increasing local acceptance of the projects. As one expert noted, "*the vision of something that needs to be done initially starts from the project managers, thereafter consultation then starts with government structures, councillors, and then local people are consulted through community workshops"* (Expert Interview 2 Durban Green Corridor, 2016). More importantly, local communities are involved in most of the projects as employees. In most instances, only projects that require technical skills employ people from outside of the local community.

6. Incorporating socioeconomic issues into Climate Change Related Projects

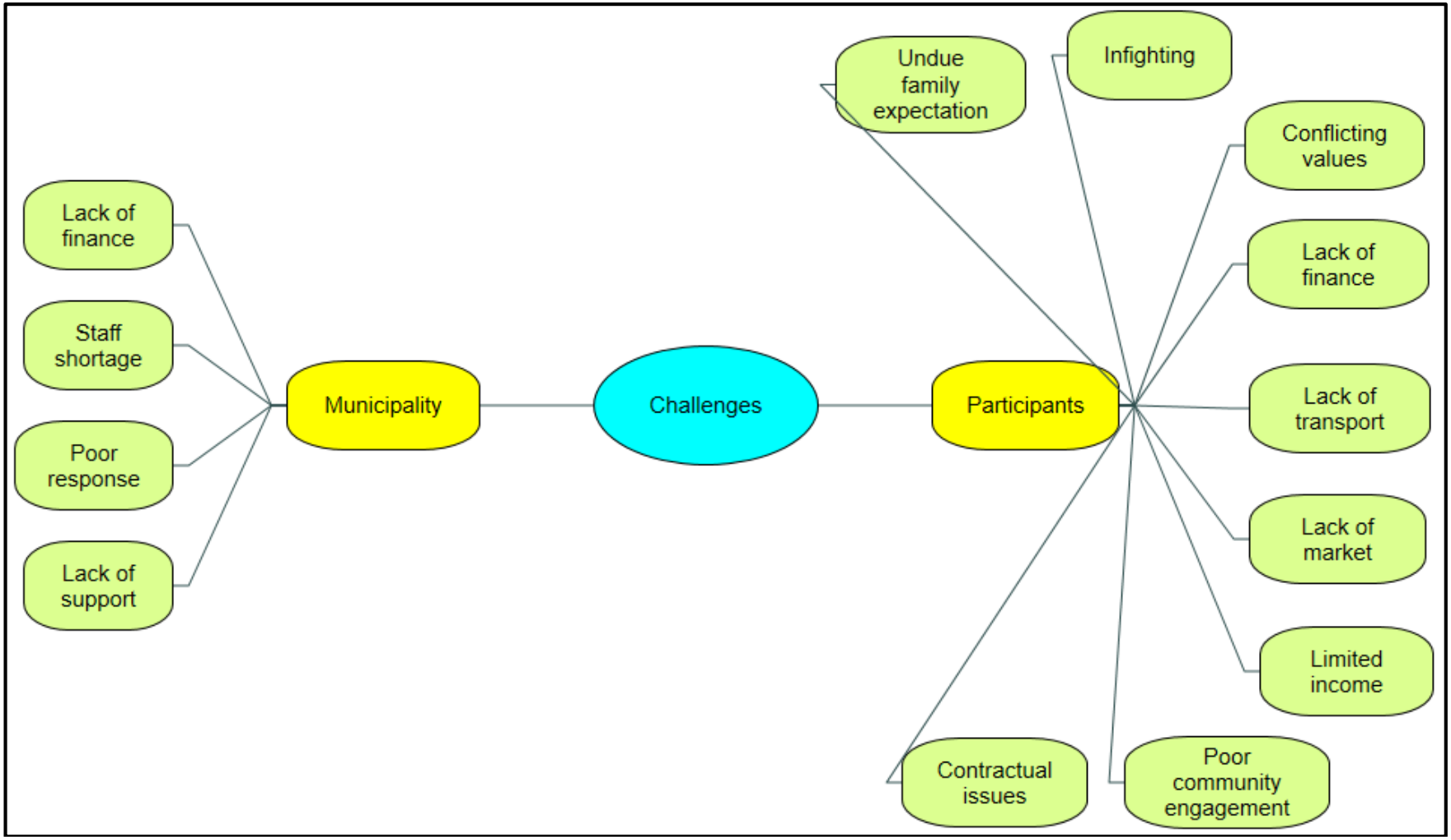
One of the concerns about the ongoing interest in climate change is whether socioeconomic issues are considered in the planning stages or are added merely as an afterthought. In this study, most of the expert interviewed noted that the inclusion of socioeconomic issues was a core component of the project design. For instance, an interview noted that "*They* [socioeconomic issues and climate change] *are linked, one cannot separate the two. The charter mentions that adaptation strategies should create employment. The challenge is involving the beneficiaries in the planning processes of a project"* (Expert Interview UCR 2016). However, there were some respondents for whom the inclusion of socioeconomic issues was merely a question of convenience rather than being as a result of a genuine interest in addressing local needs. For instance, an expert interviewee reported that employment creation was only considered in their project as a strategy to leverage funds from the Expanded Public Works Programme (EPWP). The respondent notes that the core function of the Unit is ecological enhancement and EPWP was leveraged as a strategy due to funding constraints facing the project. Another respondent notes that incorporating socioeconomic issues can and does delay project implementation. According to this respondent, they are experts and are, therefore, focused on the technicality of delivering a given service. The incorporation of socioeconomic issues in projects, according to the respondent, delays project implementation as it will require lengthy community engagement, training and recruitment. The respondent notes that projects can be more efficiently implemented by contracting projects to consultants instead of going the lengthy route of involving local communities and having to deal with local political intricacies.

7. Challenges Emerging from the Empirical Data

The empirical study uncovered a number of challenges confronting the selected projects. The challenges are grouped into two categories: municipality related and project beneficiaries related. Both categories of problems and related challenges are presented in figure 6. On the part of the municipalities, the challenges identified include lack of support and poor response. These challenges were reported by those involved in agroecology projects. The respondents note that the lack of response to request for support was a substantial barrier to their success as this sometimes implies that they are unable to plant crops on time. For instance, one respondent states that "*we are still waiting because the councillor (municipal) promised us to fence that land. We have already prepared that land and we have removed weed and it has grown back. We are waiting for the fence and the tractor to turn the soil. They have promised us that it will be done in July but now July is ending"* (FGD Inkululeko, 2016).

Related to the foregoing is the lack of financial support from the municipality due to the limited amount budgeted for agroecology. Municipal staff interviewed for the projects note that the financial needs for agroecology in the Municipality far outweigh the current budget. This has implications for the amount and nature of support that can be offered to project beneficiaries. In addition, staff constraints were also raised as a challenge by those involved in agroecology projects. Respondents also note that staff constraints implied that they are not regularly informed of new agricultural practices by the Municipality. They further noted that staff constraints also imply that their concerns/complaints are not taken to the Municipality on time and this has implications for timeous response to their needs.

Figure 7: Challenges from Empirical Research



On the part of project beneficiaries, four challenges were identified. Of the four challenges, three (lack of finance, conflicting values and infighting) were only pertinent to participants involved in agroecology. The lack of finance, according to respondents implies that they are unable to purchase inputs required for farming activities. In relation to the lack of transport, a respondent notes that "*we didn't have transport to go out and sell our produce to schools, so we were selling to people who pass by our garden and buy"* (FGD Inkululeko, 2016).

Dependency was an issue raised in some of the interviews. The major concern here is that although some of the projects were conceptualised with the aim of beneficiaries becoming self-reliant, they have failed to achieve this goal despite extensive training and support. An expert sums up this concern saying that *"another thing is to alter the mindset of the people; the project offers the first step but the people need to educate themselves for them to reach greener pastures"* (Expert Interview Sihlanzimvelo, 2016). For this expert, the cooperatives contracted to clean streams cannot operate on their own without the contracts provided. This, according to the expert, is not a sustainable way to run the project. A similar concern about dependency was raised by some participants who note that youth are not interested in agricultural activities but only form cooperatives in order to access government funds. A respondent cites an example of a youth cooperative in the following excerpt:

> *"However, the problem with the youth is that they want quick cash. With that programme they conducted poultry farming because crop really don't generate that much of amount than selling chickens. They assessed four sectors and they did environmental assessment and they all pass, they started with one which is located in Dassenhoek area where the area was fenced and equipment was install and they were supplied with three months' chicken feed and 500 one day old chicks as a start, so the plan was that they will raise these 500 chicks and sell them with that money they would buy the second round. So what happened is that they ate most of these chickens and sold few and there were unable to buy the second round. As a result, the other three sites that were proposed ended up being cancelled and the chicken feed was left abandoned and it got rotten. So municipality has tried some means to attract youth in agriculture however, it's the youth that hasn't reacted well, you can't wake people in the morning for work if they don't want to work"* (FGD Mbumbulu, 2016).

There were also a number of concerns raised about contractual issues. These include salary being too little and insufficient in bringing about meaningful changes in the life of project participants. A respondent in one of the FGDs alluded to this issue stating that "*the money is little to make a significant change in the family's life. There is a fixed salary of R80*[9] *per day"* (Individual Interivew10 Paradise Valley Reforestation, 2016). Similarly, another respondent notes that "*the money is little. It is only for grocery and school fees. The women rely on social grants more than the money in the project*" (FGD 2 Sihlanzimvelo, 2016). In addition to the foregoing, respondents in the Sihlanzimvelo project were particularly concerned about the supervision strategy used as a measure for payment. A respondent noted this concern stating that *"salary depends on whether the evaluators are satisfied with the work. For instance, if the workers clean five kilometres but the evaluators are satisfied with four kilometres, the workers will only be paid for four kilometres"* (FGD2 Sihlanzimvelo, 2016). The concern here is that supervision is sometimes not done the same day that the streams are cleaned. By the time the streams are supervised, it has been polluted by local communities who dump their household wastes. When this happens, the cooperative is not paid for the job done.

Unhappiness with being offered temporary employment was another contractual issue raised by respondents. One respondent raised concern about temporary employment stating that "*every six months*

[9] Approximately $6.02USD (at a rate of $1USD to R0.08 as at 10 March 2017).

contracts are renewed. Between contracts, it occurs that contracts are not renewed immediately, for instance, there has been 2 months gap resulting in unemployment" (FGD1 Sihlanzimvelo, 2016). Another respondent raised a similar concern stating that "*we get three-year contracts which at times have breaks in between the three years causing unemployment. Initially, the contract was five years"* (FGD3 Sihlanzimvelo, 2016). This was a concern raised in most of the projects since the majority of the projects operated on a contract basis with participants left unsure of whether their contracts will be renewed at expiration. Relatedly, some respondents raised concerns about the quality of pay slip that they receive. According to a respondent, *"the pay slips are useless because one cannot open an account or even apply for a loan. Tools are not sufficient to a point that, the participants use their own tools"* (FGD1 Sihlanzimvelo, 2016). The respondent attributes this challenge to the fact that the municipality is not actively engaged in the project.

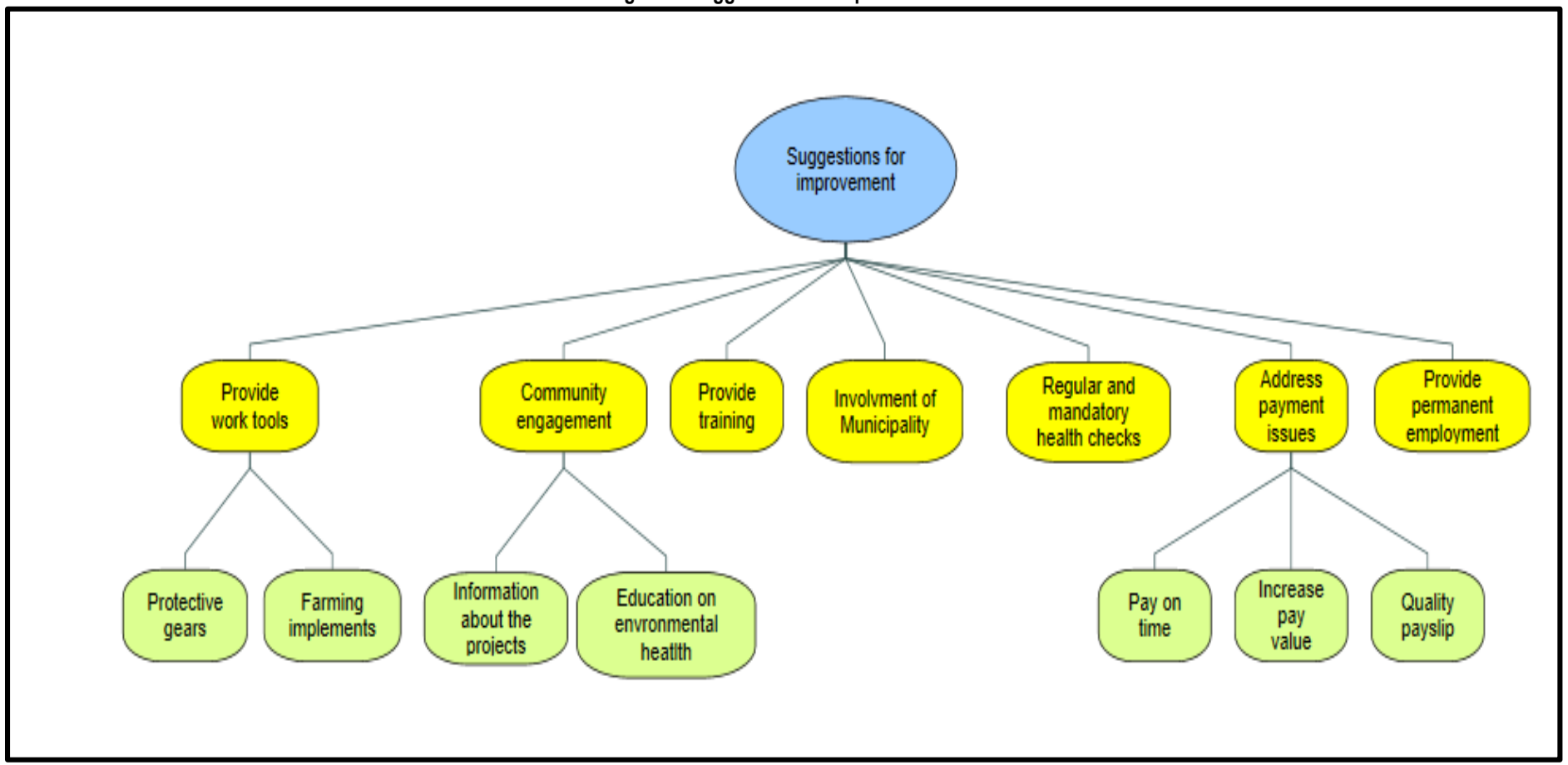
Not being provided with adequate work gear was another challenge in relation to the contractual issue raised in this study. This issue was particularly important for some respondents since their work requires coming in contact with biohazards. One respondent notes this point stating that *"we buy our own masks, boots, gloves and goggles. Even if we buy work equipmentnt for ourselves, we are not reimbursed. Things like rakes, we buy for themselves"* (FGD3 Sihlanzimvelo, 2016). Another respondent notes that *"the job is highly dangerous but one of the colleagues were hurt but she had to pay for her own medical bills. There is no union to represent the workers to voice their opinions to the superior"* (FGD 3 Durban Green Corridor, 2016). During the interviews, there were reported cases of the project participants accidentally cutting themselves with machetes s in the process of clearing out alien invasive plants.

Another concern that was raised by respondents is the issue of fighting among project participants. Linked to this is the issue of differing values on how the projected should be managed. A respondent in an FGD raised this concern stating that "*they were fighting because they want to consume cabbages with their children's, yet they don't finish it. And some of the older people do not believe in selling food. They believe that it should be consumed"* (FGD Inkululeko, 2016). The different values in relation to how to handle the food produced by the farmers was a cause of infighting. In other instances, in-flight was a product of dissatisfaction with some members who free ride on the efforts of others. This challenge was unique to cooperatives involved in the stream cleaning project.

8. Suggestions for Improving Climate Change Related Projects in eThekwini Municipality

Having identified the various challenges in the projects, the project beneficiaries were asked to provide insights on how these challenges can be addressed. A summary of the suggestions is presented in figure 7. These include the provision of work tools that will enable the project beneficiaries to efficiently carry out their responsibilities. Linked to this is the request for the provision of regular health checks. This is important for those involved in projects such as stream cleaning which entails contacts with biohazards. Another suggestion deals with the need to improve community engagement. This was borne out of the concern that some local community members are not well informed about some of the projects (such as invasive alien clearing and stream cleaning) and therefore behave in a manner that undermines the success of the project.

Figure 8: Suggestions for Improvement



Some of the respondents also noted that there is a need for further training with a preference for the provision of accredited training. The motivation for this suggestion is that such training will enable them to look beyond the projects for further employment. This was a particular concern for those employed on a contract basis. As noted earlier, the provision of accredited training has been instrumental for some of the project beneficiaries in taking up other forms of employment. Relatedly, participants want contractual issues such as poor quality of pay slip as well as low remuneration addressed. More importantly, most participants asked whether they could be employed permanently as a distinct prference.

9. Conclusions and Recommendations

This report is based on the empirical investigation into 13 climate change related projects in eThekwini Municipality. This study is part of a broader project investigating the poverty reduction co-benefits of climate change adaptation projects in eThekwini. Findings of the current study show that the municipality is aware of the implications of climate change and is committed to implementing both mitigation and adaptation projects. The use of the CBA approach in the Municipality is an important strategy in making these projects pro-poor. Findings of the study show that all the 13 projects that formed part of this study provide some form of employment/income for individuals from poor communities. Through this, project beneficiaries reported having acquired various kinds of assets. Those employed in the projects also reported improvement in other socioeconomic aspects of their lives including paying children's school fees and extending financial support to family members. Other benefits of the projects to local community/project beneficiaries include improved access to and appreciation of nature, the acquisition of skills and training. The provision of accredited training has made it possible for some beneficiaries to seek employment beyond the climate change projects.

Despite the stated benefits of the projects, there are concerns about contractual issues with a preference for permanency and a greater involvement of the municipality in the management of projects. Linked to this is the dissatisfaction with the current salaries by most project beneficiaries. Insufficient work gears (which could expose workers to health risks) was another concern raised by beneficiaries.

In light of the research findings, the study recommends that there is a need to move beyond a project-based approach to institutionalising climate change to give permanence to the employment of people. In addition, the Municipality should play a deepened oversight role in projects contracted to other organisations. Given the benefits of the projects, scaling the projects to the provincial and national levels is important. There is also a need to emphasise the multiple dimension of poverty reduction in project design beyond job creation.

Based on the experiences of this research, we recommend that future research should further examine the quantification of the PRP of climate change projects. It is not enough to simply state that a project is reducing poverty. The qualitative and quantitative dimensions of the PRP of the projects must be assessed to establish which projects are the most suited for addressing poverty in local communities.

Reference List

Ackerman, F., & Stanton, E. A. (2007). The cost of climate change: what we'll pay if global warming continues unchecked. *The cost of climate change: what we'll pay if global warming continues unchecked*.

Adger, W. N., Arnell, N. W., & Tompkins, E. L. (2005). Successful adaptation to climate change across scales. *Global environmental change, 15*(2), 77-86.

Bakera, I., Peterson, A., Brown, G., & McAlpine, C. (2012). Local government response to the impacts of climate change: An evaluation of local climate adaptation plans. *Landscape and urban planning, 107*, 127-136.

Bierbaum, R., Smith, J. B., Lee, A., Blair, M., Carter, L., Chapin III, F. S., . . . McNeeley, S. (2013). A comprehensive review of climate adaptation in the United States: more than before, but less than needed. *Mitigation and adaptation strategies for global change, 18*(3), 361-406.

Carmin, J., Anguelovski, I., & Roberts, D. (2012). Urban climate adaptation in the global south planning in an emerging policy domain. *Journal of Planning Education and Research, 32*(1), 18-32.

Diga, K. (2017). *A review of poverty reduction within local climate change initiatives: a case of eThekwini Municipality*. Retrieved from Durban:

Environmental Planning and Climate Protection Department. (2012). *Durban: A climate for change –Transforming Africa's Future*. Retrieved from Durban:

Eriksen, S., Aldunce, P., Bahinipati, C. S., Martins, R. D. A., Molefe, J. I., Nhemachena, C., . . . Sygna, L. (2011). When not every response to climate change is a good one: Identifying principles for sustainable adaptation. *Climate and Development, 3*(1), 7-20.

eThekwini Municipality. (2013). *Durban: A climate for change – Transforming Africa's Future: A selection of Durban's Climate Change Projects*. Retrieved from Durban:

eThekwini Municipality Environmental Management Department. (2007). *Climate Change: What does it Mean for eThekwini Municipality?* Retrieved from Durban:

Fay, M., Hallegatte, S., Bangalore, M., Kane, T., Rozenberg, J., Vogt-Schilb, A., . . . Treguer, D. (2015). *Shock Waves: Managing the impacts of climate change on Poverty*: World Bank Publications.

Githeko, A. K. (2009). Malaria and climate change. *Commonwealth Health Minister's Update 2009*, 40-43.

Hay, S. I., Cox, J., Rogers, D. J., Randolph, S. E., Stern, D. I., Shanks, G. D., . . . Snow, R. W. (2002). Climate change and the resurgence of malaria in the East African highlands. *Nature, 415*(6874), 905-909.

Hunter, P. (2003). Climate change and waterborne and vector-borne disease. *Journal of applied microbiology, 94*(s1), 37-46.

Jarrar, S. (2015). No Justice, No Adaptation: The politics of climate change adaptation in Palestine. *La balsa de piedra: revista de teoría y geoestrategia iberoamericana y mediterránea*(10), 1-26.

Laros, M., Birch, S., Clover, J., & ICLEI-Africa. (2013). *Ecosystem-based approaches to building resilience in urban areas: towards a framework for decision-making criteria* Paper presented at the Ecosystem-based approaches to building resilience in urban areas: towards a framework for decision-making criteria.

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 International, 33*(3), 287-292.

McGranahan, G., Balk, D., & Anderson, B. (2007). The rising tide: assessing the risks of climate change and human settlements in low elevation coastal zones. *Environment and urbanization, 19*(1), 17-37.

Measham, T. G., Preston, B. L., Smith, T. F., Brooke, C., Gorddard, R., Withycombe, G., & Morrison, C. (2011). Adapting to climate change through local municipal planning: barriers and challenges. *Mitigation and adaptation strategies for global change, 16*(8), 889-909. doi:10.1007/s11027-011-9301-2

Mia, M. S., Begum, R. A., Er, A. C., Abidin, R. D. Z. R. Z., & Pereira, J. J. (2011). Malaria and climate change. *American Journal of Environmental Sciences, 7*(1), 73-82.

Moser, S. C., & Luers, A. L. (2008). Managing climate risks in California: The need to engage resource managers for successful adaptation to change. *Climatic change, 87*(309-322).

O'Brien, G., O'Keefe, P., Meena, H., Rose, J., & Wilson, L. (2008). Climate adaptation from a poverty perspective. *Climate Policy, 8*(2), 194-201.

Okem, A. E. (2017). *Conceptualising Climate change Mitigation and Adaptation: A Review of Conceptual Challenges and the Prospects of a New Understanding*. Retrieved from Durban:

Patz, J. A., Campbell-Lendrum, D., Holloway, T., & Foley, J. A. (2005). Impact of regional climate change on human health. *Nature, 438*(7066), 310-317.

Roberts, D., Morgan, D., O'Donoghue, S., Guastella, L., Hlongwa, N., & Price, P. (2016). Durban, South Africa. In S. Bartlett & S. David (Eds.), *Cities on a Finite Planet: Towards Transformative Responses to Climate Change*. New York: Routledge.

The World Bank. (2015). Rapid, Climate-Informed Development Needed to Keep Climate Change from Pushing More than 100 Million People into Poverty by 2030. Retrieved from http://www.worldbank.org/en/news/feature/2015/11/08/rapid-climate-informed-development-needed-to-keep-climate-change-from-pushing-more-than-100-million-people-into-poverty-by-2030

United Nations Framework Convention on Climate Change. (2014). Focus: Adaptation. Retrieved from http://unfccc.int/focus/adaptation/items/6999.php

VijayaVenkataRaman, S., Iniyan, S., & Goic, R. (2012). A review of climate change, mitigation and adaptation. *Renewable and Sustainable Energy Reviews, 16*(1), 878-897.

World Bank Group. (2016). *Promoting Green Urban Development in African Cities eThewkini, South Africa: Urban Environmental Profile*. Retrieved from Washington:

Appendix A: Overview of Document Analysis

	Project	Adaption/Mitigation	Avowed Intent?	PRP				Match/ Mismatch
				H	M	L	N	
1	Greening Moses Mabhida Stadium	Adaptation action with secondary focus on mitigation	No				✓	-M
2	Greening of Training Stadia for the 2010 FIFA World Cup TM	Adaptation action with secondary focus on mitigation	No				✓	-M
3	COP 17/CMP 7 Event Greening Programme	Adaptation action with secondary focus on mitigation	Yes			✓		+M
4	Green Guideline Series	Adaptation action with secondary focus on mitigation	No				✓	-M
5	COP17 Durban Responsible Accommodation Campaign	Adaptation action with secondary focus on mitigation	No			✓		MM
6	Buffelsdraai Landfill Site Community Reforestation Project	Mitigation action with secondary focus on adaptation	Yes		✓			+M
7	Inanda Mountain Reforestation Project	Mitigation action with secondary focus on adaptation	Yes		✓			+M
8	Paradise Valley Reforestation Project	Mitigation action with secondary focus on adaptation	No		✓			MM
9	Durban Metropolitan Open Space (D'MOSS): Planning and Implementation	Adaptation action	No				✓	MM
10	eThekwini Municipality Systematic Conservation Plan	Adaptation action	No				✓	-M
11	Non-User Conservation Servitudes (NUCS)	Adaptation action	No				✓	-M
12	Working for Ecosystems	Adaptation action	Yes		✓			+M
13	Working on Fire	Adaptation action	No			✓		MM
14	Invasive Alien Plant (IAP) Control Programme	Adaptation action	Yes		✓			+M
15	Sihlanzimvelo Stream Cleaning Programme	Adaptation action	No			✓		MM
16	Design Floodline Planning	Adaptation action	No				✓	-M
17	Sea Level rise mapping	Adaptation action	No				✓	-M

18	Durban Central Beachfront Dune Rehabilitation	Adaptation action	No			✓		MM
19	Sliding Scale of Tariffs	Adaptation action	No			✓		MM
20	Non-Revenue Water Reduction - Water Pressure Management Programme	Adaptation action	No				✓	-M
21	Community Adaptation Plans (CAPs)	Adaptation action	Yes				✓	MM
22	Luganda School Water Harvesting and Micro Agricultural Water Management Technology	Adaptation action	No		✓			MM
23	Durban Green Corridor	Adaptation action	Yes			✓		+M
24	Wind Resource Map for eThekwini Municipality	Mitigation action	No				✓	-M
25	Municipal Adaptation Plans Cost-Benefit Analysis	Adaptation action	No			✓		-M
26	The Integrated Assessment Tool for Climate Change Adaptation	Adaptation action	No				✓	-M
27	Low Carbon Durban Research Project	Mitigation action with secondary focus on adaptation	No				✓	-M
28	Disaster Operation Centre	Adaptation action	No				✓	-M
29	Establishment of eThekwini Municipality's Energy Office	Mitigation action	No			✓		MM
30	Establishment of eThekwini Municipality's Climate Protection Branch	Adaptation action	No				✓	-M
31	Durban Botanic Gardens; A climate change and biodiversity awareness	Adaptation action with secondary focus on mitigation	No				✓	-M
32	The integrated rapid public transport network (IRPTN)	Mitigation action	No			✓		MM
33	Electric Bikes Pilot	Mitigation action	No				✓	-M
34	Non-motorised Transport Green Circuit and Key Buildings	Mitigation action	No			✓		MM
35	Priority Zone Facilities Management	Adaptation action	No			✓		MM
36	Green Roof Pilot Project	Adaptation action	No				✓	-M
37	EThekwini Water & Sanitation (EWS) Customer Service Centre	Adaptation action with secondary focus on mitigation	No				✓	-M

38	South Durban Basin Biodiversity and Greening Programme	Adaptation action	No			✓		MM
39	COP17/CMP7 Concentrated Photovoltaic (CPV) Solar Project	Mitigation action	No				✓	-M
40	Wonderbag™ Residential Cooking Efficiency Programme	Mitigation action	No			✓		MM
41	Community Renewable Energy Projects	Mitigation action	No				✓	-M
42	Low Cost Solar Water Heater Programme	Mitigation action	Yes		✓			+M
43	Shisa Solar Programme	Mitigation action	No				✓	-M
44	KwaDabeka Hostel Hot Water Pilot	Mitigation action	No			✓		MM
45	Energy Efficiency Demand Side Management (EEDSM)	Mitigation action	NO				✓	-M
46	2010 eThekwini Municipal Greenhouse Gas Inventory	Mitigation action	No				✓	-M
47	KwaZulu-Natal Sustainable Energy Forum (KSEF)	Mitigation action	No				✓	-M
48	Towards a Sustainable Pit Latrine Management Strategy Through LaDePa	Mitigation action with secondary focus on adaptation	No			✓		MM
49	Decentralised Wastewater Treatment (DEWATS)	Adaptation action	No				✓	-M
50	Durban Water Recycling	Adaptation action	No				✓	-M
51	Durban Landfill Gas-to-Electricity Project	Mitigation action	No				✓	-M
52	Mariannhill Landfill Conservancy	Adaptation action with secondary focus on mitigation	No				✓	-M
53	Domestic Orange Bag Recycling Programme	Mitigation action	No			✓		MM
54	Durban Climate Change Partnership (DCCP)	Adaptation action	No				✓	-M
55	Durban Industry Climate Change Partnership Project (DICCPP)	Mitigation action	No				✓	-M
56	Staff Bicycle Programme	Mitigation action	No				✓	-M
57	Residential Energy Efficiency Programme	Mitigation action	No				✓	-M
58	Solar Map (Reunion Partnership)	Mitigation action	No				✓	-M
59	Wind Repowering	Mitigation action	No				✓	-M

60	Ocean Current Energy Demonstration Project	Mitigation action	No				✓	-M
61	The GEOSUN project	Mitigation action	No				✓	-M
62	Fluid Bed reactor	Mitigation action	No				✓	-M
63	Mini Hydros	Mitigation action	No				✓	-M
64	Western Aqueduct Hydro	Mitigation action	No			✓		MM
65	WWTW methane to Electricity	Mitigation action	No				✓	-M
66	Online Energy Efficiency Courses	Mitigation action	No				✓	-M
67	South Durban Basin Recycling Pilot Project	Mitigation action	Yes		✓			+M
68	Durban Solar Cities	Mitigation action	No				✓	-M
69	Solar City Framework	Mitigation action	No			✓		MM
70	Development of the Durban Climate Change Strategy	Adaptation action and mitigation action	No	✓				MM
71	Durban Adaptation Charter	Adaptation action with secondary focus on mitigation	No			✓		MM
72	The Durban Community Ecosystem Based Adaptation (CEBA)	Adaptation action	No			✓		MM
73	KwaXimba Photovoice Project	Adaptation action	No				✓	-M
74	Municipal Adaptation Plan for Climate Change	Adaptation action	No			✓		MM
75	Sustainable Horizons Project (formerly Safe Operating Space)	Adaptation action	No			✓		MM
76	The 100 Resilient Cities Programme	Adaptation action	No			✓		MM
77	The Biodiversity Stewardship Programme	Adaptation action	No			✓		MM
78	The Disaster Management Advisory Forum	Adaptation action	No			✓		MM
79	The eThekwini Municipality - UKZN Durban Research Action Partnership (DRAP)	Adaptation action with secondary focus on mitigation	Yes				✓	-M
80	The Umhlangane Catchment Rehabilitation Programe	Adaptation action	Yes				✓	MM
81	The uMngeni Ecological Infrastructure Programme	Adaptation action with secondary focus on mitigation	No			✓		MM
82	Northdene Agroecology Research and Development Centre	Adaptation action	No			✓		MM

83	Newlands Mashu Dewats - Evaluation for Waste Water Treatment and Reuse for Urban Horticulture	Adaptation action	No		✓			MM
84	Inchanga	Adaptation action	Yes				✓	MM
85	Scorpio Place in Mariannridge	Adaptation action	Yes				✓	MM
86	Mariannhill Monastery Agrihub	Adaptation action	Yes			✓		+M
87	Ubumbulu Agri-Hub	Adaptation action	Yes	✓				+M
88	The Metis Project	Mitigation action	no				✓	-M
89	Flood Early Warning System	Adaptation action	No				✓	-M
90	Sister City Programme		No				✓	-M
91	Promoting Sanitation & Nutrient Recovery through Urine Separation	Mitigation action	No			✓		MM
92	Nutrient recovery from Wastewater Treatment Works	Mitigation action	No				✓	-M
93	Black Soldier Flies for the processing of Urine Diversion Toilet Sludge	Adaptation action	Yes			✓		+M
94	Rainwater Harvesting	Adaptation action	No			✓		MM
95	Water Reuse for Potable Water	Adaptation action	No				✓	-M
96	Grey Water Reuse – Agritubes	Adaptation action	Yes			✓		+M
97	Grey Water Reuse – Community Gardens	Adaptation action	No			✓		MM
98	Reuse of Treated Wastewater for Agriculture	Adaptation action	No			✓		MM
99	Permitting to Promote Industrial Wastewater Reuse /Recycling	Climate Change Mitigation	No				✓	-M
100	Reinvent the Toilet Challenge: Data Aquasition and Field Support	Adaptation action	No				✓	-M
101	Biodiesel from Microalgae	Adaptation action	No				✓	-M
102	Co-digestion of sewage sludge and industrial concentrates	Mitigation Action	No				✓	-M
103	Improved Energy Efficiency at Water and Wastewater Infrastructure	Adaptation action	No				✓	-M

104	Aquaponics	Adaptation action	Yes			✓	✓	+M

Appendix B: Poverty Reduction Co-benefits Attributes of the Projects

Projects	Income/Financial Wealth	Job	Public Utilities	Education/ Skills	Health	Assets	Natural Capital	Social Capital	Poverty reduction
1. Greening Moses Mabhida Stadium									
2. Greening of Training Stadia for the 2010 FIFA World Cup TM									
3. COP 17/CMP 7 Event Greening Programme									
4. Green Guideline Series									
5. COP17 Durban Responsible Accommodation Campaign									
6. Buffelsdraai Landfill Site Community Reforestation Project									
7. Inanda Mountain Reforestation Project									

8. Paradise Valley Reforestation Project									
9. Durban Metropolitan Open Space (D'MOSS): Planning and Implementation									
10. eThekwini Municipality Systematic Conservation Plan									
11. Non-User Conservation Servitudes (NUCS)									
12. Working for Ecosystems									
13. Working on Fire									
14. Invasive Alien Plant (IAP) Control Programme									
15. Sihlanzimvelo Stream Cleaning Programme									
16. Design Floodline Planning									
17. Sea Level rise mapping									
18. Durban Central Beachfront Dune Rehabilitation									
19. Sliding Scale of Tariffs									
20. Non-Revenue Water Reduction - Water Pressure Management Programme									
21. Community Adaptation Plans (CAPs)									
22. Luganda School Water Harvesting and Micro Agricultural Water Management Technology									
23. Durban Green Corridor									
24. Wind Resource Map for eThekwini Municipality									
25. Municipal Adaptation Plans Cost-Benefit Analysis									

26. The Integrated Assessment Tool for Climate Change Adaptation									
27. Low Carbon Durban Research Project									
28. Disaster Operation Centre									
29. Establishment of eThekwini Municipality's Energy Office									
30. Establishment of eThekwini Municipality's Climate Protection Branch									
31. Durban Botanic Gardens; A climate change and biodiversity awareness									
32. The integrated rapid public transport network (IRPTN)									
33. Electric Bikes Pilot									
34. Non-motorised Transport Green Circuit and Key Buildings									
35. Priority Zone Facilities Management									
36. Green Roof Pilot Project									
37. EThekwini Water & Sanitation (EWS) Customer Service Centre									
38. South Durban Basin Biodiversity and Greening Programme									
39. COP17/CMP7 Concentrated Photovoltaic (CPV) Solar Project									
40. Wonderbag™ Residential Cooking Efficiency Programme									
41. Community Renewable Energy Projects									
42. Low Cost Solar Water Heater Programme									
43. Shisa Solar Programme									
44. KwaDabeka Hostel Hot Water Pilot									

45.	Energy Efficiency Demand Side Management (EEDSM)									
46.	2010 eThekwini Municipal Greenhouse Gas Inventory									
47.	KwaZulu-Natal Sustainable Energy Forum (KSEF)									
48.	Towards a Sustainable Pit Latrine Management Strategy Through LaDePa									
49.	Decentralised Wastewater Treatment (DEWATS)									
50.	Durban Water Recycling									
51.	Durban Landfill Gas-to-Electricity Project									
52.	Mariannhill Landfill Conservancy									
53.	Domestic Orange Bag Recycling Programme									
54.	Durban Climate Change Partnership (DCCP)									
55.	Durban Industry Climate Change Partnership Project (DICCPP)									
56.	Staff Bicycle Programme									
57.	Residential Energy Efficiency Programme									
58.	Solar Map (Reunion Partnership)									
59.	Wind Repowering									
60.	Ocean Current Energy Demonstration Project									
61.	The GEOSUN project									
62.	Fluid Bed reactor									
63.	Mini Hydros									
64.	Western Aqueduct Hydro									
65.	WWTW methane to Electricity									
66.	Online Energy Efficiency Courses									

67. South Durban Basin Recycling Pilot Project									
68. Durban Solar Cities									
69. Solar City Framework									
70. Development of the Durban Climate Change Strategy									
71. Durban Adaptation Charter									
72. The Durban Community Ecosystem Based Adaptation (CEBA)									
73. KwaXimba Photovoice Project									
74. Municipal Adaptation Plan for Climate Change									
75. Sustainable Horizons Project (formerly Safe Operating Space)									
76. The 100 Resilient Cities Programme									
77. The Biodiversity Stewardship Programme									
78. The Disaster Management Advisory Forum									
79. The eThekwini Municipality - UKZN Durban Research Action Partnership (DRAP)									
80. The Umhlangane Catchment Rehabilitation Programme									
81. The uMngeni Ecological Infrastructure Programme									
82. Northdene Agroecology Research and Development Centre									
83. Newlands Mashu Dewats - Evaluation for Waste Water Treatment and Reuse for Urban Horticulture									
84. Inchanga									

85. Scorpio Place in Mariannridge									
86. Mariannhill Monastery Agrihub									
87. Ubumbulu Agri-Hub									
88. The Metis Project									
89. Flood Early Warning System									
90. Sister City Programme									
91. Promoting Sanitation & Nutrient Recovery through Urine Separation									
92. Nutrient recovery from Wastewater Treatment Works									
93. Black Soldier Flies for the processing of Urine Diversion Toilet Sludge									
94. Rainwater Harvesting									
95. Water Reuse for Potable Water									
96. Grey Water Reuse – Agritubes									
97. Grey Water Reuse – Community Gardens									
98. Reuse of Treated Wastewater for Agriculture									
99. Permitting to Promote Industrial Wastewater Reuse /Recycling									
100. Reinvent the Toilet Challenge: Data Aquasition and Field Support									
101. Biodiesel from Microalgae									
102. Co-digestion of sewage sludge and industrial concentrates									
103. Improved Energy Efficiency at Water and Wastewater Infrastructure									
104. Aquaponics									

Appendix C: Successful Project Attributes

Projects	Addresses the needs of affected communities	Build communication with communities	Accepts local community as stakeholders and equal partners	Use/adapt local knowledge, tools and methodologies to meet the broader development needs	Forms strategic intelligence with the local community	There is a plan for sustainability after the project ends	Project is gender responsive	Public inclusivity and/or multi stakeholder participation throughout the period	Project documentation sufficient for analysis	Are there any adverse consequences identified in project evaluation	Has unique/innovative aspect to the project
1. Greening Moses Mabhida Stadium											
2. Greening of Training Stadia for the 2010 FIFA World Cup TM											

3. COP 17/CMP 7 Event Greening Programme											
4. Green Guideline Series											
5. COP17 Durban Responsible Accommodation Campaign											
6. Buffelsdraai Landfill Site Community Reforestation Project											
7. Inanda Mountain Reforestation Project											
8. Paradise Valley Reforestation Project											
9. Durban Metropolitan Open Space (D'MOSS): Planning and Implementation											
10. eThekwini Municipality Systematic Conservation Plan											
11. Non-User Conservation Servitudes (NUCS)											
12. Working for Ecosystems											
13. Working on Fire											
14. Invasive Alien Plant (IAP) Control Programme											
15. Sihlanzimvelo Stream Cleaning Programme											

16. Design Floodline Planning											
17. Sea Level rise mapping											
18. Durban Central Beachfront Dune Rehabilitation											
19. Sliding Scale of Tariffs											
20. Non-Revenue Water Reduction - Water Pressure Management Programme											
21. Community Adaptation Plans (CAPs)											
22. Luganda School Water Harvesting and Micro Agricultural Water Management Technology											
23. Durban Green Corridor											
24. Wind Resource Map for eThekwini Municipality											
25. Municipal Adaptation Plans Cost-Benefit Analysis											
26. The Integrated Assessment Tool for Climate Change Adaptation											

27. Low Carbon Durban Research Project											
28. Disaster Operation Centre											
29. Establishment of eThekwini Municipality's Energy Office											
30. Establishment of eThekwini Municipality's Climate Protection Branch											
31. Durban Botanic Gardens; A climate change and biodiversity awareness											
32. The integrated rapid public transport network (IRPTN)											
33. Electric Bikes Pilot											
34. Non-motorised Transport Green Circuit and Key Buildings											
35. Priority Zone Facilities Management											
36. Green Roof Pilot Project											
37. EThekwini Water & Sanitation (EWS) Customer Service Centre											

38. South Durban Basin Biodiversity and Greening Programme											
39. COP17/CMP7 Concentrated Photovoltaic (CPV) Solar Project											
40. Wonderbag™ Residential Cooking Efficiency Programme											
41. Community Renewable Energy Projects											
42. Low Cost Solar Water Heater Programme											
43. Shisa Solar Programme											
44. KwaDabeka Hostel Hot Water Pilot											
45. Energy Efficiency Demand Side Management (EEDSM)											
46. 2010 eThekwini Municipal Greenhouse Gas Inventory											
47. KwaZulu-Natal Sustainable Energy Forum (KSEF)											
48. Towards a Sustainable Pit Latrine Management											

Strategy Through LaDePa											
49. Decentralised Wastewater Treatment (DEWATS)											
50. Durban Water Recycling											
51. Durban Landfill Gas-to-Electricity Project											
52. Mariannhill Landfill Conservancy											
53. Domestic Orange Bag Recycling Programme											
54. Durban Climate Change Partnership (DCCP)											
55. Durban Industry Climate Change Partnership Project (DICCPP)											
56. Staff Bicycle Programme											
57. Residential Energy Efficiency Programme											
58. Solar Map (Reunion Partnership)											
59. Wind Repowering											
60. Ocean Current Energy Demonstration Project											
61. The GEOSUN project											

62. Fluid Bed reactor											
63. Mini Hydros											
64. Western Aqueduct Hydro											
65. WWTW methane to Electricity											
66. Online Energy Efficiency Courses											
67. South Durban Basin Recycling Pilot Project											
68. Durban Solar Cities											
69. Solar City Framework											
70. Development of the Durban Climate Change Strategy											
71. Durban Adaptation Charter											
72. The Durban Community Ecosystem Based Adaptation (CEBA)											
73. KwaXimba Photovoice Project											
74. Municipal Adaptation Plan for Climate Change											
75. Sustainable Horizons Project (formerly Safe Operating Space)											
76. The 100 Resilient Cities Programme											
77. The Biodiversity Stewardship Programme											

78. The Disaster Management Advisory Forum											
79. The eThekwini Municipality - UKZN Durban Research Action Partnership (DRAP)											
80. The Umhlangane Catchment Rehabilitation Programme											
81. The uMngeni Ecological Infrastructure Programme											
82. Northdene Agroecology Research and Development Centre											
83. Newlands Mashu Dewats - Evaluation for Waste Water Treatment and Reuse for Urban Horticulture											
84. Inchanga											
85. Scorpio Place in Mariannridge											
86. Mariannhill Monastery Agrihub											
87. Ubumbulu Agri-Hub											
88. The Metis Project											
89. Flood Early Warning System											

90. Sister City Programme											
91. Promoting Sanitation & Nutrient Recovery through Urine Separation											
92. Nutrient recovery from Wastewater Treatment Works											
93. Black Soldier Flies for the processing of Urine Diversion Toilet Sludge											
94. Rainwater Harvesting											
95. Water Reuse for Potable Water											
96. Grey Water Reuse – Agritubes											
97. Grey Water Reuse – Community Gardens											
98. Reuse of Treated Wastewater for Agriculture											
99. Permitting to Promote Industrial Wastewater Reuse /Recycling											
100. Reinvent the Toilet Challenge: Data Aquasition and Field Support											
101. Biodiesel from Microalgae											
102. Co-digestion of sewage sludge and											

industrial concentrates											
103. Improved Energy Efficiency at Water and Wastewater Infrastructure											
104. Aquaponics											

Appendix D: Projects Information

S/N	**Project Title**	**Budget**	**Location**	**Sector**
1	Greening Moses Mabhida Stadium	R6, 6 million	Masabalala Yengwa Ave.	Cross-sector including Built Environment, Tourism, Eventing, Parks
2	Community Adaptation Plans (CAPs)	R 2.5 million	Amaoti, Ntuzuma and Ntshongweni	Food sovereignty, Community Development, Water
3	Greening of Training Stadia for the 2010 FIFA World Cup TM	R4,3 million	King Zwelithini Stadium in Umlazi; Princess Magogo Stadium in KwaMashu and Sugar Ray Xulu Stadium in Clermont	Local communities; professional services; construction
4	Luganda School Water Harvesting and Micro Agricultural Water Management Technology	R 350,000	Luganda	Water, Agriculture
5	COP17/CMP7 Event Greening Programme	R5,8 million	Municipality-wide	Cross-sector including Built Environment, Tourism, Eventing, Parks
6	Durban Green Corridor	R 4,5 million (in addition to R3 million from external partners) to date	uMngeni River catchment	Renewable Energy.
7	COP17/CMP7 Durban Responsible Accommodation Campaign	R200,000	Municipality-wide.	Cross-sector including Built Environment, Tourism, Eventing, Parks
8	Municipal Adaptation Plans Cost-Benefit Analysis.	R 1,449,643	Municipality-wide	Health, Water and Disaster Management.

9	COP17/CMP7 Durban Responsible Accommodation Campaign	R200,000	Municipality-wide	Cross-sector including Built Environment, Tourism, Eventing, Parks
10	Integrated Assessment Tool for Climate Change Adaptation.	R 4,211,859	Municipality-wide	Water, Coastal and Catchment Management, Health, Natural Environment
11	Buffelsdraai Landfill Site Community Reforestation Project	R 13,163,689 to date	Buffelsdraai	Community, Natural Environment, Water, Energy.
12	Low Carbon Durban Research Project		Municipality-wide	
13	Disaster Operation Centre.	R42 million	Municipality-wide	Disaster Management across all sectors
14	Paradise Valley Reforestation Project	R3,3 million in 2011/12 financial year for invasive alien plant control	Pinetown	Community, Natural Environment, Water, Energy.
15	Establishment of eThekwini Municipality's Energy Office	R2,4 million to establish the office; R 5.57 per annum	Municipality-wide	Climate Change Mitigation
16	Durban Metropolitan Open Space System (D'MOSS): Planning and Implementation	R2 million annual capital budget for land acquisition since 2002. This will increase to R3,99 million in 2013/14	Municipality-wide	Natural Environment.
17	Establishment of eThekwini Municipality's Climate Protection Branch.	Approximately R1 million per annum	Municipality-wide	Climate Change Adaptation
18	EThekwini Municipality Systematic Conservation Plan	R100,000 in 2010/11 financial year	Municipality-wide	Natural Environment, Development Planning.
19	Durban Botanic Gardens: A Climate Change and Biodiversity Awareness		Durban Botanic Gardens	Parks and Gardens, Community, Natural Environment, Urban Agriculture
20	Non-User Conservation Servitudes (NUCS).	None	Municipality-wide	Natural Environment, Development Planning.
21	Integrated Rapid Public Transport Network (IRPTN)	Not yet finalised, but billions of Rands during first phase	Municipality-wide	Transport
22	Working for Ecosystems	R3, 5 million for this project in 2007/2008. EThekwini	Municipality-wide	Natural Environment

		Municipality provided. R1, 71 million in 2008/9; R 1, 3 million in 2009/10; R 1, 2 million in 2010/11. And has budgeted R3, 5 million in 2011/12.		
23	Electric Bicycles Pilot	R 18,000.	Municipality-wide	Transport, Energy.
24	Working on Fire	R5 million to date	Municipality-wide	Natural Environment.
25	Non-motorised Transport Green Circuit and Key Building	R23 million	M4 route over uMgeni Estuary , KE Masinga, Bram Fischer and John Zikhali	Transport
26	Invasive Alien Plant (IAP) Control Programme	R9 million	Municipality-wide	Natural Environment.
27	Priority Zone Facilities Management			
28	Green Roof Pilot Project	R1,587,903 to date	166 K.E. Masinga Road	Built Environment, Storm Water
29	Design Flood line Planning	R830, 000 operational budget for 2011/12, this work is ongoing as budget allows.	Municipality-wide	Catchment Management, Water, Community, Development
30	EThekwini Water & Sanitation (EWS) Customer Service Centre	R24 million	133 K.E. Masinga Road	Local Government, Water, Energy
31	Sea Level Rise Assessment	R500,000	EThekwini Municipality coastline	Coastal Policy, Natural Environment.
32	South Durban Basin (SDB) Biodiversity and Greening Programme Recycling Pilot Project.	R200,000	Clairwood and SDB schools	Education, Community, Waste.
33	Durban Central Beachfront Dune Rehabilitation	R6 million capital expenditure and R1,5 million per annum operating	Durban's 'Golden Mile' Beachfront.	Coastal Management, Economic, Health and Recreation.
34	Sliding Scale of Tariffs.	No direct costs to the municipality excluding staff time	Municipality-wide	Water
35	COP17/CMP7 Concentrated Photovoltaic (CPV) Solar Project.	R30 million capital investment	Verulam	Renewable Energy

36	Non-Revenue Water Reduction: Water Pressure Management Programme.	± R20 million per annum	Municipality-wide	Water, Energy.
37	Wonderbag™ Residential Cooking Efficiency Programme.	R190,000	Chesterville	Energy
38	Community Renewable Energy Projects	R 400,000; R185, 000; R685, 000 & R689, 000 respectively.	Durban Market (Clairwood), Alice Street Bus Depot, Thusong Centre	Community, Markets, Transport, Renewable Energy
39	Low Cost Solar Water Heater (SWH) Programme	The programme was fully funded by an ESKOM subsidy for low pressure	Welbedacht, Parkgate, Nazareth Island and Cato Crest.	Built Environment, Housing, Energy
40	Shisa Solar Programme	R 190,000	KwaDabeka	Housing, Built Environment, Energy.
41	Energy Efficiency Demand Side Management	Total grant allocation over 3 years is R 68 million: 2009/10: R 8 million 2010/11: R25 million and 2011/12: R 35 million.	Municipality-wide	Built Environment, Energy Efficiency
42	2010 eThekwini Municipal Greenhouse Gas (GHG) Inventory.	R 280,000.	Municipality-wide	All sectors
43	KwaZulu-Natal Sustainable Energy Forum (KSEF).			
44	Towards a Sustainable Pit Latrine Management Strategy Through LaDePa.	R70 million over 3 years (including pit emptying).	Tongaat Central Waste Treatment Works.	Wastewater
45	Decentralised Wastewater Treatment System (DEWATS) at Newlands	Construction of the plant cost R 2.3 million, while testing and research	Newlands East	Water and Sanitation, Urban Horticulture
46	Durban Water Recycling	Privately sourced funding	Southern Wastewater Treatment Works	Water and Sanitation
47	Durban Landfill Gas-to-Electricity Project	R 110 million; Operating costs: R 10 million per annum	Bisasar Road and Mariannhill Landfills	Solid Waste, Energy
48	Mariannhill Landfill Conservancy	Approximately R 550,000 per annum.	Landfill lane, Mariannhill.	Local communities, Education, Tourism

49	Domestic Orange Bag Recycling Programme	R 9 million to date	Municipality-wide	Residential waste.
50	Durban Climate Change Partnership (DCCP)	R 800,000 to date.	Municipality-wide	Various sectors across the municipality.
51	Durban Industry Climate Change Partnership Project			
52	Staff Bicycle Programme	Donated by UNIDO, R100 000.00 to be invested for additional bicycles	CBD bound	City Fleet
53	Residential Energy Efficiency Programme			Energy
54	Solar Map (Reunion Partnership)			Energy
55	Wind Repowering			Energy
56	Ocean Current Energy Demonstration Project	R155 million (by developer)		Energy
57	The GEOSUN project			Energy
58	Fluid Bed reactor			Energy
59	Mini Hydros			Energy
60	Western Aqueduct Hydro	R860 million		Energy
61	WWTW methane to Electricity	R2.5bn 2013-2015	Between Cato Ridge in the west, Ntuzuma in the north, New Germany in the east and Tshelimnyama	Solid Waste Energy
62	Online Energy Efficiency Courses			Solid Waste Energy
63	South Durban Basin Biodiversity and Greening Programme			Water, Coastal and Catchment Management, Health, Natural Environment
64	Durban Solar Cities			Energy
65	Solar City Framework			Energy
66	Development of the Durban Climate Change Strategy		Municipality-wide	Energy
67	Durban Adaptation Charter		Municipality	Energy
68	Durban Community Ecosystem Based Adaptation (CEBA)		Municipality-wide	Energy
69	KwaXimba Photovoice Project			Climate Change Adaptation

70	Municipal Adaptation Plan for Climate Change			Climate Change Adaptation
71	Sustainable Horizons Project (formerly Safe Operating Space)		Municipality	Health, Water and Disaster Management & CSIR
72	The 100 Resilient Cities Programme		Municipality-wide	Climate Change Adaptation
73	The Biodiversity Stewardship Programme		Municipality-wide	The Environmental Planning and Climate Protection Department's (EPD)
74	The Disaster Management Advisory Forum		Ethekwini Metro Municipality	Health, Water and Disaster Management
75	The eThekwini Municipality - UKZN Joint Research Partnership			Education, Community, Waste
76	The Umhlangane Catchment Rehabilitation Programme		Umhlangane Catchment	Cross-departmental
77	The uMngeni Ecological Infrastructure Programme			Cross-departmental
78	Northdene Agroecology Research and Development Centre			Agroecology Programme
79	Newlands - Mashu Permaculture Centre	Construction of the plant costR 2.3 million, while testing and research cost R 1, 15 million. R900,000.00 (other)		Agroecology Programme
80	Inchanga	Not stated		Agroecology Programme
81	Scorpio Place in Mariannridge	Not stated		Agroecology Programme
82	Mariannhill Monastery	R350,000.00		Agroecology Programme
83	eMbumbulu	R98,587.50 (donated by Angela Mail) R1,769,160 funded by eThekwini		
84	The Metis Project			Agroecology Programme
85	Flood Early Warning System			
86	Sister City Programme			
87	Promoting Sanitation & Nutrient Recovery through Urine Separation			

88	Nutrient recovery from wastewater treatment works			
89	Black soldier flies for the processing of urine diversion toilet sludge			
90	Rainwater harvesting			
91	Water reuse for potable water			
92	Grey water reuse - agritubes			
93	Grey water reuse - community gardens			
94	Reuse of treated wastewater for agriculture			
95	Permitting to promote industrial wastewater reuse / recycling			
96	Reinvent the toilet challenge: data acquisition and field support			
97	Biodiesel from Microalgae			
98	Co-digestion			
99	Improved energy efficiency at water and wastewater infrastructure			
100	Aquaponics			
101	The uMngeni Ecological Infrastructure Programme			Cross-departmental