

# Poverty reduction co-benefits through indigenous knowledge in climate change adaptation

A study within eThekweni municipality<sup>1</sup>

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## Abstract

This study evaluates the extent to which the eThekweni municipality is incorporating concepts of sustainable livelihoods and socio-economic benefits within its climate change adaptation programmes. It examines the theoretical use of a community ecosystem based adaptation approach in order to understand the multiple dimensions which necessitate this climate change adaptation project. The study reveals that climate change projects, which were previously categorised under the natural sciences, are today spending substantial effort in identifying synergies and mutual links between human development and natural biodiversity systems. However, local and indigenous practises of adaptation to changing aspects of climate remain an underutilised resource in relation to formal public intervention and invite further research aimed at enhancing benefits to participants based in creating deeper synergies with immanent knowledge and practise.

**Keywords:** *climate change adaptation, poverty reduction, biodiversity, indigenous knowledge, KwaZulu-Natal, South Africa*

## Introduction

This research paper is an exploratory study, examining the transition of conventional natural science-based research as it moves to combine socio-economic human developments, particularly in recent climate change programmes. The broader study hopes to help formulate a set of social criteria to better evaluate the understanding around 'poverty reduction co-benefits'. More specifically, the aim is to ensure adequate social indicators are used within global climate change projects and are genuinely adopted within interventions which directly address the plight of the poor. This paper seeks to tackle the paucity of information and research on the role of indigenous knowledge in these new approaches to climate change and human development. After this desktop literature analysis of eThekweni's climate change adaptation programmes, we hope to use the analysis to help inform or recommend improvements in indicator development for this project along with other locally-based projects. Such an exercise would both improve local and national practice and influence wider debates at global scale.

Recently, there has been an increased interest by government and donors in climate change or adaptation related projects, and in particular, such institutions wish for these projects to include human and social dimensions. Kubiszewski *et al.*, (2013) look beyond solely economic terms (like Gross Domestic Product or GDP), or those projects only concentrating on the natural sciences or biodiversity. Rather, they persuade the reader to see human and ecological aspects together in an integrated ecosystem (*ibid*). Current models are moving towards the inclusion of multiple dimensions which are viewed together as factors for consideration in climate change projects. Furthermore, local communities are playing a stronger role within these approaches, providing feedback when mechanisms are in place for participatory action (Whatmore, 2009; Lane *et al.*, 2011). However, there are questions and concerns around socio-economic classifications in projects, and evidence of these dimensions within climate change projects have not been clarified as best practice principles particularly at a global level. How does one identify projects that legitimately take on-board multi-dimensional approaches, and is there transparency of such projects to share these experiences? eThekweni municipality has approached the University of KwaZulu-Natal (UKZN) to assist in better understanding the social aspects of their climate change adaptation projects. This project seeks to better inform the future of climate projects, especially those which aim to include poverty reduction co-benefits.

When poverty reduction co-benefits are placed within the core of projects, climate change adaptation programmes have the potential of contributing to urban food security, income and job creation and subjective wellbeing. Co-benefits have been defined as "the additional and locally-desirable developmental benefits of climate actions" (Zusman, 2008:88). These effects however, have not been systematically evaluated, nor has a set of criteria been established which authors such an evaluation technology in both natural and social sciences. This exploratory study seeks to remedy this situation, at a local scale, by identifying what exists as criteria for climate change projects as human and natural science indicators. More specifically, this paper hopes to identify what is meant by a "poverty co-benefit," a concept being used to better understand the socio-economic changes in climate change projects particularly targeting disadvantaged and vulnerable peoples.

The paper first explores the context and geography of our case study; reviews the conceptual map used in respect of climate change adaptation and poverty reduction co-benefits evaluations; explores the specific case of the Buffelsdraai Community Reforestation Programme; and then reports our preliminary findings. The research utilises mixed methods through textual analysis, revealing the observations of what is identified as 'poverty reduction co-benefits.' This paper is based on a desktop review of available government reports and archival internet documentation on climate adaptation projects conducted by the eThekweni municipality, in KwaZulu-Natal, South Africa. The study uses content analysis to assess the extent to which socio-economic observations and indigenous knowledge are identified within the documents.

Our findings show that poverty reduction co-benefits have included community-focused incentives which mix local biodiversity awareness and efforts to compensate community members who are serving to protect their surrounding natural habitat. Although there is a noted shift in the inclusion of human development, little is reported around the utilisation of indigenous knowledge in the project's sustainability and future continuation within the community. We conclude that climate change adaptation programmes in South Africa can move towards a holistic approach in environmental protection and biodiversity conservation alongside local communities in effective and sustainable interventions. That said, more efforts may be needed to understand the implicit conservation efforts through indigenous cultural practices which may already be embedded within local communities.

## Poverty and climate change adaptation in KwaZulu-Natal, South Africa

South Africa experiences persistent unemployment and high income inequality. South Africa's location also places its terrain and population at risk of climate change phenomena, ranging from major flooding to heavy land erosion and degradation. Under its Municipal Climate Protection Programme (2004), the eThekweni metropolitan municipality has mapped its role in helping citizens confront climate change. This role includes the challenge of maintaining ecological infrastructure and natural biodiversity under the pressures of urban development and expansion of industrial growth. The programme includes developing innovative initiatives which try to incorporate both human elements and natural restoration together for improved response to future climate change hazards.

The national Department of Cooperative Governance and Traditional Affairs of South Africa aims to help municipalities develop their local climate change strategies, while municipalities have provided some financial support for climate-related programmes. Under the latest municipal programming, greater emphasis has been placed on understanding the socio-economic effects or co-benefits from projects which promote the enhancement of biodiversity and ecosystems. It would thereby be timely to take stock of the measures or indicators of socio-economic changes within such initiatives. More specifically, municipalities can be assisted in understanding how climate adaptation programmes have changed the behaviour of local community members who are directly involved with on-the-ground interventions. Local municipalities have a daunting task to prioritise entry points of social cohesion with diverse communities while protecting their citizens from inevitable environmental changes. This challenge in itself all falls within the South African context of persistent unemployment, high income inequality and continuous degradation and competition for various land use to allow for ecological biodiversity.

### ***An overview of eThekweni's climate change projects***

In response to the city's climate change challenges, eThekweni municipality has committed resources and exorbitant finances to launch 57 climate change adaptation/mitigation projects. The projects are predominantly themed around: Greening Event Projects; Natural Environment Projects; Coastal & Catchment Protection Projects; Water Projects; Research Tools Projects; Developing Institutional Capacity; Durban Botanic Gardens Projects; Transport Projects; Built Environment Projects; Renewable Energy and Energy Efficiency Projects; Waste Water Treatment Projects; Solid Waste Projects; Partnership Projects and are all in a budget range of R100,000 – R70 million [refer to Appendix A for figures]. The Buffelsdraai Reforestation Project has successfully managed to secure an incrementing budget of about R13,163,689 to date under the Community, Natural Environment, Water, Energy sector. Therefore, eThekweni has spent substantial amounts of resources to facilitate synergies and create mutual links between social and natural systems for the purposes of poverty reduction and climate change adaptation benefits.

This paper specifically examines the Buffelsdraai Reforestation Project located in a rural township in the eThekweni municipality. This project has attempted to combine a climate-change adaptation strategy, biodiversity and community livelihood interventions. Project implementers hope that, in future, the activity will improve community resilience and well-being in the context of future ecological and biodiversity threats. Some of the municipal environmental restoration initiatives have been in operation for less than ten years. While much of the collaboration agreements in climate change focus on natural biodiversity, this project identifies some of the climate change and poverty reduction co-benefits which have been distributed to the community, households and individuals in the context of their holistic well-being.

## **Research objectives and relevance**

This paper comes at the beginning of a programme of research which aims to:

1. Evaluate the relationship between climate change adaptation and poverty reduction policies, and their co-benefits, in the eThekweni municipality, South Africa.
2. Study immanent and indigenous responses to poverty and climate change, particularly in food systems and agriculture, which may exist outside of formal government interventions.
3. Develop a framework which can monitor whether climate change initiatives or projects have quality outputs, including, but not exclusively, whether they have taken an integrated approach to integrated pro-poor development within their programmes.

The development of a framework using locally-based criteria on climate change interventions could help resource-limited, yet capacitated local governments to enact their own evaluation of projects. This capacity is an alternative to costly global certification (as is the example of the reforestation project which has successfully applied for their Climate, Community and Biodiversity Standard – CCBS). Furthermore, the city is also developing its own climate-adaptation principles under the auspices of the ‘Durban Adaptation Charter’. The secretariat is at an opportune moment in developing criteria across signatory cities to see whether they are upholding their commitment to the principles of the Charter. Such principles may include socio-economic elements, and this project may help to progress forward good practice in the development of such concepts.

This project also aligns well with a national objective to strengthen the use of evidence and research in improving the efficiency, efficacy and pro-poor targeting of policymaking and implementation – in this case, at the local and provincial municipality level. The study reviews and analyses this one government intervention which addresses poverty in the context of local planning around environmental initiatives, and marks the beginning of a sequence of evaluations scheduled for 2015-16.

## **Indigenous knowledge and practice**

There is an increasing realisation in development research and policy making that the sustenance of future ecological biodiversity will increasingly rely on indigenous knowledge. Bohensky and Maru (2011) claim that the integration of science and local knowledge is not only important for solving environmental problems and going beyond the scientific merit; this integration is valuable in increasing social justice, autonomy and the identity of indigenous or lay people by distributing power more equally across the range of knowledge producers.

Indigenous knowledge (IK) is often contrasted to ‘global knowledge’ which is today accepted as western imperialistic knowledge which has penetrated all parts of the world in the North and South and is a form of scientific-technical knowledge. Thus Warren (1991: 1) says:

*IK contrasts with the international knowledge system generated by universities, research institutions and private firms. It is the basis for local-level decision-making in agriculture, health care, food preparation, education, natural resource management, and a host of other activities in rural communities. Such knowledge is passed down from generation to generation, in many societies by word of mouth. Indigenous knowledge has value not only for the culture in which it evolves, but also for scientists and planners striving to improve conditions in rural localities.*

In such definitions, indigenous knowledge is often trapped in place (always rural), or assumed to be passed down from generation to generation (elders to youth). The problem with this view of indigenous knowledge as place-bound and as a set of “inter-generationally transmissible instructions or rules” (Lauer and Aswani 2009, 323) is that indigenous peoples are often seen as spatially isolated and their knowledge systems as static. It is not surprising that this view of indigenous knowledge makes conventional natural scientists sceptical of its value unless it has been recast in natural scientific terms. Otherwise they lump indigenous knowledge with superstition, irrationalism, and tribalism (Mauro and Hardison, 2000, 1263).

We see indigenous knowledge as generated and regenerated within specific settings for particular purposes. It is not a static set of facts deposited from generation to generation but an embodied, situational process of knowing. This view concurs with Lauer and Aswani’s (2009, 323) view that indigenous knowledge takes place “within the context of people’s practical engagement, experience, and performance of tasks in dynamic and changing local environments.” However, to argue that all knowledge (including western scientific knowledge) is situated is not to say that the values that underpin knowledge are reconcilable. The goal should be equitable negotiation which is more complex but more profitable and appropriate for sustainable development (Sillitoe 1998, 206).

More importantly, our view of indigenous knowledge is not a romantic fixation with ‘noble savage’ wisdom. Instead, as many scholars have pointed out, (Kothari 2001 for example), the elevation of previously subjugated knowledge may have unexpected and potentially negative interactions with predominant power structures, partly because they are not fixed and stagnant and merely part of the past. Indigenous knowledge is contested and its practitioners are “situated agents” who often “rework, update, and change their knowledge within the often prejudicial environments in which they fashion their livelihoods” (Bebbington 1993, 289). Due to this reworking and updating of knowledge, combined with the uncertainties of our research project, we have had to develop theoretical tools that can help us negotiate this terrain.

However, this effort is certainly worthwhile in respect of research quality. It is clear from initial discussions with stakeholders, in regard to research question 2 above, that an element of indigenous knowledge helped certain beneficiaries succeed in livelihood strategies within the trepreneur initiative, in a form of reflexive and innovative practice which was not costed but of significant value to the implementation of the programme. At scale, we can deduce that a well-developed framework on climate change adaptation and poverty reduction co-benefits which has been developed collaboratively between municipalities and the local tertiary institution, and which incorporates and builds on indigenous knowledge, has the potential to complement and strengthen capacity in the Global South in independent and sovereign practice.

### ***Research design***

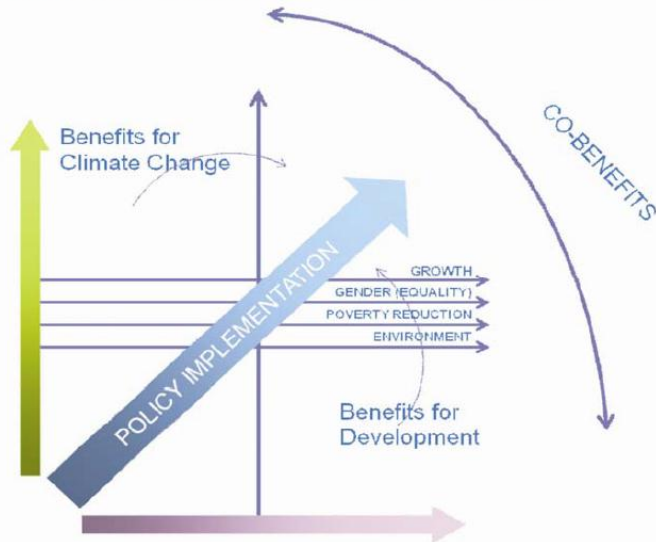
Despite the paucity of current evaluations around community-based ecology with socio-economic co-benefits, several conceptual approaches can be viewed as useful to addressing a multi-disciplinary area of research. Firstly, an adoption of multi-dimensional approaches to measure well-being and societal change is necessary in understanding an integrated and complex research programme (Blignaut *et al.*, 2013). For example, within the discipline of development studies, the capabilities approach (Sen, 1999) supersedes narrow economic indicators to encompass multiple variables of being and doing. Here, human development or well-being can be understood as “a process of expanding the real freedoms people enjoy to lead the lives that they value” (Sen, 1999:3). Studies on environment and poverty reduction note that some climate projects have tried to include human development aspects; however most projects under-prioritise the social dimension (Perch, 2010).

This study also uses the concept of ‘poverty reduction co-benefits’, following its recent inauguration and use in international technical papers, most particularly in respect of the Green Climate Fund and its operating instruments, although this is not to say that its meaning has been fixed, but more that it is currently being



strategically negotiated and fought over (Bracking, 2015). Zusman (2008: 88) states “co-benefits have been treated variously as the climate benefits of developmental actions and the developmental benefits of climate actions”. Poverty reduction co-benefits make a case for social value found in ecological changes. The framework below shows the need for policy implementation to carry both climate change and development benefits together and also puts particular emphasis on the developmental elements: growth, gender equality, poverty reduction and environment (GGPE). With such elements considered, marginalised groups can become central to such development projects.

Adjusted Co-Benefits Framework Based on GGPE Considerations



**Source:** Perch, 2010, adapted from Nishimae, 2010

Another useful integrated framework is Ecosystem Based Adaptation (EbA), which explores the multiple components of environmental change, ecosystem modifications and socio-economic development. EbA is defined by international standards as “the use of biodiversity and ecosystem services as part of an overall adaptation strategy to help people to adapt to the adverse effects of climate change” (United Nations, Convention on Biological Diversity, 1992). The eThekweni municipality under this study further adapts EbA through putting weight behind local ownership and participation, thereby building the concept of ‘community ecosystem based adaptation’ or CEBA. As the cornerstone to its programming, CEBA is described as the synergistic relationship and mutually dependent nature between human development and ecosystem-based adaptation (Roberts *et al.*, 2012). eThekweni municipality is working in the holistic framework of CEBA, and creates various co-partnered projects which attempt to work with local communities in natural habitat restoration projects within their area. The municipality has had flexibility in designing some of these projects; some specific projects are taking a “learn-by-doing” tactic. This flexibility allows officials to partner together with local organisations and people on an interactive design and incremental change process as they make interventions relevant to local communities involved (Roberts *et al.*, 2012). In other words, the project team goes out, tests and adjusts through an ongoing improvement design to see what works best in the community.

The capabilities approach and CEBA have complementary socio-economic aspects of nature, communities and local citizenry, and together, the theories can help to provide guidance in evaluating complex projects. These approaches can also work together to clarify the concept of poverty reduction co-benefits, which essentially places a pro-poor perspective to the forefront within the integrated multi-dimensional approach. It is recommended that co-benefits should be measurable, reportable and verifiable (Japan, 2015). The co-benefits approach requires a bottom-up development approach but it unfortunately also depends on how development is defined and measured (Zusman, 2008).

## Buffelsdraai Community Reforestation Programme

This study observes an application of an integrated framework but with specific emphasis on elements around 'poverty reduction co-benefits.' This exploratory work is a starting point of reviewing one innovative approach that tries to incorporate equality, growth and sustainability together. The Buffelsdraai Community Reforestation Programme is an existing joint collaboration between eThekweni municipality and the University of KwaZulu-Natal (UKZN) with co-funding through the municipality and the South African National Green Fund in the area of biodiversity conservation. The project started in 2008, and within the current project phase, one of the key research areas is to incorporate social-economic impact work. This research aims to begin with Buffelsdraai and then roll out evaluations to interactively create generic measurement criteria for proposed and potential roll-out across the South African government and beyond.

The Buffelsdraai area is located in the KwaZulu-Natal (KZN) Coastal Belt Grassland – vegetation is grasses, woodland and indigenous forest. Besides sugar cane, there are some grasslands and woodlands which also have the coverage of invasive alien plants. Various plants and invertebrates endemic to KZN are located here. The Buffelsdraai tree project work is managed by the Wildlands Conservation Trust as its implementing partners, who also manage similar tree restoration projects under a programme called Indigenous Trees for Life. The Buffelsdraai project aims to rehabilitate a landfill buffer zone area which was formally sugar cane. The buffer zone will be turned into its former indigenous forest state, although there is some disagreement around whether this area was ever indigenous forest or savannah, and when historically a 'natural' state could already be viewed as an ecological state already conditioned by the consequences of human activity. There is some risky exposure to climate-related issues in the region, and this project could help to improve water security (in the catchment area), enhance indigenous biodiversity, and reduce flooding risk within the catchment, among other things.

With regard to human development, some of the project elements are clear. Firstly, this rural reforestation project involves local community members to restore parts of the woodland and riverine forest. Such activities would allow for some resilience of the land to the possibility of climate change-related impacts like extreme weather events, and the devastating impacts of flooding and drought. More specifically, community members are involved in a livelihoods programme where they collect indigenous seeds from the local forests. These seeds are planted and are then grown into seedlings, which can be exchanged or traded in for local goods purchases including food, clothes, building materials and school fees. The concept is to incorporate the community through their involvement as "trepreneurs," or as self-motivated individuals who decide the extent of their involvement in the restoration project. This particular project, which began as a mitigation measure to offset carbon emissions, is now being replicated further in the municipality and in other regions.

The climate change goal is multi-fold: the project would help to restore natural habitat, biodiversity and ecosystems, and the planting of indigenous trees would help to sequester atmospheric carbon. The project hopes to reduce the vulnerability of the poor within the community through new forms of 'green work' or employment. In on-going discussions with municipality and university partners, the relevance of the socio-economic effects of these projects is well noted in their current work. Their former climate change adaptation work has concentrated around ecology and biodiversity, but today it has expanded to include important elements of human well-being. Socio-economic research proposed by this project hopes to contribute to a gap in knowledge and expertise within the current social science research frames. There is a suggestion that climate change activities can simultaneously contribute to poverty reduction, and therefore further investigation is required to verify relevant indicators and impact.

## **Methodology**

This is the first exploratory case of eThekweni municipality's work on climate change projects that have poverty reduction co-benefits. It is also a desktop review of the project and its multi-dimensional approaches to socio-economic and geopolitical challenges faced by the surrounding communities. The research reviews available reports and archives, mainly analysing the text around socio-economic and poverty reduction benefits from this one Buffelsdraai case study. In understanding the nature of the project, the research utilises qualitative methods, namely textual analysis of poverty reduction co-benefits referred to in previously written documents and one in-depth interview, to date, with one of the participants. Some of the documentation samples includes eThekweni Community, Climate and Biodiversity Standard (CCBS) Project Design Document (without Appendices, and this was successfully processed for certification); international reports; national reports (i.e. South African National Treasury); university documents; international journal articles; and local and international websites (including two YouTube videos). In addition, the Greater Capital consultants consolidated a social assessment document which became the pillar of this review.

This desktop research is complemented by a single case interview. Yin (1994) demonstrates that single case studies are powerful tools to challenge or confirm theories and to present unique or extreme cases. Taking this cue, so far we have undertaken preliminary stakeholder engagements with Mrs Ndlovu,<sup>2</sup> one of the 'supergrowers'. Because of her in-depth knowledge of indigenous plants, we take her to be an extreme or intense case (Morse, 1991). Her personal accounts shed some light into the benefits and concerns of her involvement in the project. Her rich knowledge about the project originates from her work in understanding indigenous trees, and their various benefits which were not well spelled out in the documents. For Mrs Ndlovu, the primary benefit of an indigenous forest is the supply of medicinal plants and edible wild fruits. This knowledge was passed to her from a young age by her parents. The very same knowledge continues to be part of her life; she now uses it for her own family. Her role as a trepreneur is to collect seeds from the surrounding indigenous forests and propagate them into 15cm trees. The seeds are collected at Hazelmere Dam, since they are not allowed to take seeds within a 50km radius from the Buffelsdraai landfill site. This restriction is due to health concerns and hazards associated with unpleasant conditions of the landfill site environment. Regardless of the distance from her place of residence to the harvest sites, this 'supergrower' continues to find her source of livelihood from the local environment within these distant forests.

Her passion for tree growing remains a driving force that helps her to continue identifying tree species that will be necessary for the different types of reforestation project. Although she may have limitations in terms of knowing precisely why each tree grows where it grows, she fully understands the suitable environment necessary to grow a particular species. Mrs Ndlovu is also knowledgeable around the primary benefits of planting a particular tree.

Mrs Ndlovu explained that she experienced problems from the project such as a cut back in the amount of trees that the project was taking, which decreased her income. Originally, they were selling an unlimited number of trees, but today, tree trade had been reduced to 300 trees per trepreneur. The site manager explained that this was done to evenly distribute the benefits among the trepreneurs. The same site manager explained that a forest required a wide variety of plants and that because of this, the trepreneurs were encouraged to grow a mixture of plant species, not merely the ones whose seeds were found closest to their residences or the fastest growing. Therefore, they had had to ask the trepreneurs to focus on species of plants that take a longer time to grow. Payment is varied based on the measured size of the plant, whereby quick growing plants are bought when they are 30cm and slow growing plants are bought at 15cm, at R5 per tree. There are extra incentives for rare species, but many of the trepreneurs have never received this incentive.

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<sup>2</sup> Name changed.

## ***Analysis of the research methodology used for the CCBS***

One of the main documents that was analysed for this study was the CCBS report. Within the report, survey work was completed by Greater Capital (2011) in order to apply for the CCBS standard. In order to qualify for the standard, set community development criteria had to be fulfilled. As such, the report utilised certain methodologies which we have reviewed in this section. From the study reports, reliable baseline data was absent, resulting in the need to construct a baseline which would reflect the situation prior to the start of the project. A retrospective baseline was for the trepreneurs to formulate; the purpose was to reflect on the living conditions before joining the programme and measure it against current living conditions. It meant adopting a recall process, in which the trepreneurs were asked to provide information on their social and economic conditions as well as access to services prior to joining the programme.

Problematically, the recall method allows the respondent to make a comparison of the current situation based on how one remembers the previous state of well-being. Subliminally, the respondent is conditioned by the prospects of the present success to compare them with the past failures or challenges instead of comparing the challenges of the past to those that one might be facing currently. For instance, the beneficiary might have had difficulties with paying for electricity in the past. Now, due to participating in this project, the beneficiary may have bought a domestic good such as a refrigerator. Knowing that a refrigerator consumes electricity, it will add to the burden of electricity costs. But when the beneficiary is asked to state how his/her life has improved, comparison will be done between previously not owning a fridge and current ownership of a fridge, even though the burden of electricity costs continues to steepen. Thus the recall method is a limiting method for comparing before and after scenarios because the respondent may forget, not know or even deliberately withhold information (Brennan *et al.*, 1996). Interviews are usually allocated a certain amount of time therefore the respondent is required to recall information in a short space of time (Schwarz & Oyserman, 2001). This occurs especially if they are asked to recall an event that they feel is undesirable (Brennan *et al.*, 1996). These limitations cause the value of the information reported to be unreliable. Others might feel coerced to only point out what has been of benefit to them and not state the problems or difficulties that they also face, for fear of not being allowed to continue in the project.

A company named Greater Capital was contracted to provide critical input, for the completion of the proposal for accreditation under the 'community section', as well as to better understand the impact the project is having on the participant communities and their livelihoods. In particular, Greater Capital was tasked to undertake baseline and social impact assessments including knowledge transfer and training (Greater Capital Final Report, 2011). This would enable Wildlands Conservation Trust (WCT), which is the implementing agent of the project, to fulfil the Monitoring and Evaluation (M&E) requirements for the social impact assessment of the project on an on-going basis. Greater Capital used surveys to conduct its research. The surveys included three of the four communities involved in the project in which 305 households were interviewed, while focus groups were also used. The sampling frame only included those that were participants (trepreneurs) in the project. However, it was not clear how the participants were selected. It was also unclear how WCT decided on a sample size of 15 people per group per community when some communities have more trepreneurs than others. Also, gender representations were not well stated in most documents, (although it can be established that the majority of the trepreneurs are women). Again, regarding the sample, the document does not state how the sample was extrapolated.

A questionnaire was designed to collect information regarding the wellbeing of the trepreneurs before and after the project. Semi-structured interviews, focus groups and secondary data were some of the methodologies that were used as part of the triangulation technique. The research tools were translated from English into isiZulu. The semi-structured interviews aimed at analysing what the trepreneurs found valuable about the project. These interviews were also conducted with the 'minor' programme participants, who presumably were not 'supergrowers', but it was not clear from the report who were minor participants and how

this was measured or established. After engaging with one of the facilitators, we clarified that the minor growers are learners who participated in the project during school holidays.

The secondary data consisted of statistical information that was obtained from the municipality. Using both primary and secondary data in a 'mixed method' research is a powerful triangulation method. It captured both what is in the literature, as well as what is in reality. Using such an approach also expands the scope of the discourse and allows for new discoveries to find their way into the literature.

Within the report, representatives from Durban Solid Waste (DSW) and ward councillors from Buffelsdraai and KwaMashu were also interviewed as key informants. Workshops were held with stakeholders such as WCT Chief Executive Officer (CEO) and the WCT Greening the Future programme manager and representatives from eThekweni municipality. It was vital that key informants such as DSW representatives be interviewed in order to enhance the knowledge-base of the project in relation to how socio-economic benefits are understood, established and measured. However, it is arguable that a full stakeholder sample was not included in the report, since the project is also active at Osindisweni, yet no authorities from Osindisweni were interviewed. In addition, Osindisweni and Buffelsdraai still have traditional leaders who were not represented in the interviews. This might have other implications when it comes to acceptance of data reliability if there are other government structures that were not consulted whilst the project is running under their jurisdiction, and suggests the necessity for further research to establish the extent of consequential bias and whether power and politics are involved in the selection of participants for either, or both of, the project and its research evaluation.

The treepreneurs are not employed but are rather beneficiaries of the project. They are not subjected to any employment benefits whilst they are the most at risk during the collection of seeds in the forest. The fact that remuneration is in the form of vouchers means that the beneficiaries do not have the option of deciding how to spend their remuneration; this denies them the option of saving their money. Allowing the beneficiaries to receive remuneration in cash through bank transfers would have the additional benefit of introducing and enabling the beneficiaries to act within the banking system. The benefits of this might include, in future, access to credit resource for future business endeavours: South African banks do not offer the option of financing to an individual without a bank account and regular income.

As the project stands there are benefits but they are unlikely to be long term for the treepreneurs or the community at large, except in the longevity of the human capital gain from increased access to education for the participants' children. Also, there are ecological benefits in terms of the immediate vicinity, should they remain there. The primary aim of the project is to grow an indigenous forest in the future where the community will benefit through the sequestered carbon emissions that will provide cleaner air and water. However, the human development co-benefits are not as long term, and may end with the completion of the planting phase. Even where they do provide a source of income it is short term and it is unlikely to develop the beneficiaries in a way that will allow them to live above the national poverty line in the future. The focus of the project may need to shift toward securing more sustainable and longer-term human development co-benefits for the community. This will allow the community to continue to survive after the project has drawn to a close.

### ***Research findings***

Buffelsdraai is stricken by abject rural poverty in which 90 per cent of the population live below the national poverty line and where prospects of employment are very limited (Greater Capital Final Report, 2011: 4). Such a condition became the basis for 'income' creation through the idea of growing indigenous trees in exchange for goods and services. Those who participated in this project as tree-growers are said to be equipped with entrepreneurial skills. Those skills are central in making a living out of this initiative; hence the individuals are

referred to as 'trepreneurs'. Besides the term being the amalgamation of the word 'tree' plus 'entrepreneur' it refers to "Unemployed person or orphans that has the self-drive and commitment to generate a livelihood if given a chance" (CCB Design Document, nd: 23). The trepreneurs are the local community members from Buffelsdraai and Osindisweni who propagate indigenous tree seedlings into slightly grown trees. Through this form of participation the trepreneurs are granted an opportunity to access goods and services through a bartering for their trees. Those who participate in the project are now said to be better-off when compared to their previous socio-economic status or to those who refused to participate. However, a potential limitation here is that they were not framed as 'employees' but as 'beneficiaries' (CCB Design Document, nd: 34; Greater Capital Final Report, 2011: 4) which may have attendant negative effects in terms of dignity and feelings of aid dependency.

One area that seemed to be less explored by the researchers, who were involved in the first few stages of the reforestation project, was that of the role of indigenous knowledge systems (IKS). From our review of project documents, it is apparent that the very skills that are anchoring the projects were not fully appreciated in some of the documents. Trepreneurs rely heavily on the use of indigenous knowledge in order to complete their duties. The use of indigenous knowledge by the trepreneurs in Buffelsdraai has been wide ranging, for starters such knowledge has assisted the project participants (trepreneurs) to confidently partake in the identification, harvesting, and propagation of indigenous tree seeds. These include prior harvest preparations such as the use of other traditional medicines to protect one from venomous animals in the forest. These traditional medicines are referred to as "*izihlungu*". These traditional blends (*izihlungu*) are said to repel snakes, therefore the trepreneurs do not have to wear protective gear, but rather use these protective repellents that are readily available in nature. Such repellents may include ingestible mixtures or burnt materials and even topically applied home-made solutions. All this knowledge rests with the very individuals who are said not to possess any skills or knowledge. But here they are utilising knowledge which was left for them by their forbearers. Such is usually not captured in the literature, nor recognised as what forms part of IKS. Concurrently, such knowledge recognises the importance of the forest and its significance as that which provides plant/ trees for medicinal purposes. Therefore it contributes to the preservation of indigenous forests and thus ultimately contributing to climate change mitigation.

In order to achieve the long-term desired goal which is to sequester the greenhouse gases and to ultimately curb climate change, those with indigenous knowledge should be involved in the process. That includes the management of the forest and other activities which might take place in and around the forest, just like any other department with a particular discipline that is managed by specialists in that field. Therefore, an indigenous forest ought to be managed by a person with the indigenous knowledge needed, such as the trepreneur. These people will use their knowledge to monitor the state of the forest and also, contribute their knowledge to the discourse and assist in the expansion of the literature pertaining to environmental management. There is now a need to use the 'lived experiences' of the community to better understand both the needs of such a community and to help manage the solutions proposed. However, at present, the knowledgeable rural participant is more likely to be framed in project documents as being deficient or lacking in skills or knowledge.

The project notes that there has been an increase in occasional work (from 10% to 17%). The project started in 2008 with 90 people. From the documentation, the last five years now reflect 374 community-based jobs (24 full-time, 10 part-time, 340 temporary) (Midgley *et al.*, 2012). These are particularly those who are tree planting and facilitators and the payments were approximately the same as regular pay for permanent staff as sugar cane farmers. Trepreneurs may have also been picked – there is no clear indicator for this – for these full-time, part-time and temporary labour, but they are generally volunteers (more than 600 registered) who are nurturing the seedlings for trade. Besides the regularly employed, mass planting drives are held, during which up to 60 members from the local communities are employed to assist with planting the trees out at the project

site. The documents do not state specifically how often these mass planting drives take place, but they point-out to regular intervals. Again, it becomes unclear as to how regular these intervals are spaced.

During the planting drives community member receive monetary income from the project. Even though there are such remunerations, the income at household level has not changed substantially, partly because outside of the planting drives participants are given non-pecuniary benefits. Since the payment is 'in-kind' any changes in household income cannot be attributed to the reforestation project (Greater Capital Final Report, 2011: 21), while 90 per cent of the beneficiaries remain below the South African poverty line of R8,845 per annum (Greater Capital Final Report, 2011: 21). Therefore, quantifying exchanged goods for each household and adding them to the other existing income represents a measurement challenge. The nature of the project incentive process (barter) may itself adversely contribute to the challenges associated with correctly calculating household incomes, which may also include remittances and social grants. However, the baseline survey in the CCBS document indicates that treepreneurs mainly traded the trees for food, and that less people are going to bed hungry (thereby accessing sufficient food) as a result of the project. While poverty can be measured through various indicators, this economic improvement through income and change of food security levels are sufficient baseline outcome measures for life improvement.

It may be that because vouchers were redeemable at a local food store this was their most logistically convenient use for participants, who then fungibly reassigned their normal incomes away from food purchases to other goods, itself problematising the ownership of hunger reduction as an output measure of the project. However, while not specifically tested for by the impact assessment, this can still be discounted as unlikely given the extremely low levels of income in the community: hunger reduction was a probable consequence of this intervention. What is clear is that poverty is multi-dimensional, and in order to grasp the complexity of the context, any project of this type needs to understand the needs of the community. The documentation provides evidence of close local community engagement in this respect. More specifically, through community consultation and workshops, the project utilises current local ward councillors, and other local leadership, for example, to help advertise jobs and recruitment. In the CCBS report, social resources include informal connections and 'sense of belonging' but no further detail is provided. Such proxy indicators of social capital are important and play out as a necessary resource for households in reducing current poverty levels. Such communication with municipal institutions also sets up processes and frameworks in working with formal structures which solidifies the project within the community and improves the likelihood of its community ownership. There were also lesser known poverty dimensions which had some reference in the evaluations, but were not necessarily highlighted in the documentation review, such as issues of land and the proportion of households with land ownership (eThekweni and WCT, nd).

Furthermore, it is difficult to pinpoint whether treepreneurs also engage in other income diversification activities or are also receiving social grants from government to supplement their current income. For example, sugar cane farming continues to operate in the area but it is unclear whether any of the treepreneur households are currently involved with this activity (although it is noted that the work is seasonal) or if they were previously contract workers for the sugar cane company. Secondly, the clearing of invasive alien plants also appears to be work conducted by the municipality as well as training staff in fire management, but documentation is not clear if they use the same treepreneurs for such tasks. There is mention of temporary work which comes into the community and the implementation team would use a local facilitator to first offer such opportunities to treepreneurs (eThekweni and WCT, nd: 29). There is also employment potential as rangers should the buffer zone become a conservation area. There is no mention of potential informal work at the landfill site itself. Such information could help determine whether there are income diversification practices taking place as a consequence of the intervention. These might also occur as a result of increased social capital and connection, as a consequence, for example, of joint activities with the Comrades Marathon participants or the South African Scouts Association, who visit and participate in the mass planting drives. It would be interesting

to know if such social philanthropic activities and such club associations contribute to the social capital of the community.

The Buffelsdraai project appears to be furnishing a good example in linking human development elements to a tree restoration initiative. There have been various national and international organisations that have utilised the Buffelsdraai project as a case study to demonstrate climate change and poverty reduction co-benefits. Furthermore, eThekweni municipality has also been active within the academic space, contributing five articles in journals such as *Environment and Urbanization*, highlighting some of the features of the Buffelsdraai project. The project is well detailed around the various biodiversity which exists in the area. This biodiversity ranges from the tree, vegetation and plant species, animal species as well as their conservation status (i.e. protected areas, threatened and endemic species) (eThekweni and WCT, nd). There is also detailed calculation of carbon sequestration which will result from tree planting. Of the latest available data, the project participants restored and replanted 284 hectares by October 2012 (five years after project inception) (Midgley *et al.*, 2012).

On the recorded socioeconomic benefits to date, initial research on the programme has provided some evidence of poverty reduction, mainly identified as job creation and improvement of schooling conditions. More specifically around education, reports speak about the alleviation of expenses such as school fees for their children (*ibid*). School fees were paid with the tree bartering, however only when the community knew about them. Some of the communities were not aware of this incentive and thereby did not participate in this exchange. As a result of the trade stores facilitating the payment of school fees, the report shows that children were able to attend better schools in the area. There was also an improved awareness and engagement of the local community around conservation and ecosystems and various trainings were conducted by WCT. Training also included basic first aid, plant propagation and business skills courses. An improvement in schooling access and new knowledge and training are human capital proxy measures to resources now available to poor households. Such human capital would be help in the long run for the lives of the children as well as help to qualify for new work opportunities. As for work activities, the initiative provides an example of the emerging possibilities of environmentally aware or 'green' employment. Many of the work activities are provided to unemployed persons.

However, it is worth noting that not much has been written on the problem of the limited potential longevity of the project, or that it arguably is not contributing to the type of structural change required in the rural economy for the emergence of formal paid work, as opposed to 'developmental' intervention for 'beneficiaries'. There is also little comment on the use of indigenous knowledge in the project. The most recent and detailed document about the project is its successful application for the Climate, Community and Biodiversity Standard (CCBS) certification which identifies three key dimensions namely: climate, community and biodiversity. In this document the municipality was required to provide a thorough description of the socio-economic changes that have occurred as a result of the project. While much documentation repeats various aspects of the project, they provide a chance for the triangulation of the available internet archives.



## Conclusion

This is an exploratory study examining one municipality's climate change project which incorporates concepts of poverty reduction co-benefits. From the project, there has been some work around identification of the multiple indicators which can contribute to a climate project from a community ecosystem based adaptation approach. These indicators have particularly been articulated in the project monitoring and evaluation framework used within the CCBS standard document (eThekweni and WCT, nd: 54). These indicators may be set by international standards in order to assist with comparability with other similar standard projects. It would be important to go further to examine its relation to the CEBA approach and particularly coming from a pro-poor perspective and with the incorporation of elements around indigenous knowledge systems. From the study, there are indications of some poverty outcome measure results and the measures are multi-dimensional. The Buffelsdraai project also includes institutional structures and processes as a component whereby local authority participation was a key to successfully working with the implementing partners in the reforestation of the area.

However, many issues remain unresolved around the project and can be further examined such as how to deepen institutional arrangements beyond the project timeline. In other words, once funding is exhausted and contracted planting is complete, how can the project evolve and continue and perhaps be embraced by local ownership? There appears to be a team leader who has the task of identifying markets for the produced trees. Secondly, treepreneurs have gained useful knowledge around indigenous tree planting and other soft skills. How can these skills translate into decent employment or new micro-businesses especially once the project meets its final implementation objectives? Personal correspondence with eThekweni officers raised another key question: why do certain members of the community tear down the surrounding fence infrastructure around the buffer zone even with this livelihood improvement available to them? Such a question may be interrogated with an understanding of outstanding historical matters and land-ownership patterns, as well as by considering remaining usufruct land use conventions and norms.

Lastly, a further systematic evaluation is required of this and the other projects to establish both how climate change and poverty reduction can be holistically pursued; and of how a framework of measurement can be designed to embed an evidence base for decision-making over future spending choices in relation to this category of projects. The funding that flows from developed countries to the developing for climate change mitigation strategies is substantial, making climate change initiatives a lucrative business. Hence the need to study the workings of such financing and the projects it funds is crucial. However there have been some concerns about climate change mitigation initiatives, such as the issues with the transparency and accuracy of how climate finance is allocated, measured and verified. As it stands now it is difficult to distinguish what qualifies as a climate change mitigation initiative and on what basis. How these initiatives should be measured and verified against the backdrop of human development is not clear.

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### ***Greening Event Projects***

**Project Title:** Greening Moses Mabhida Stadium.

**Location:** Masabalala Yengwa Ave.

**Budget:** R6.6 million to implement greening measures at the stadium and precinct.

**Sector:** Cross-sector including Built Environment, Tourism, Eventing, Parks, Hospitality, Energy, Water, Waste and Biodiversity.

**Project Title:** Greening of Training Stadia for the 2010 FIFA World Cup TM.

**Locations:** King Zwelithini Stadium in Umlazi; Princess Magogo Stadium in KwaMashu and Sugar Ray Xulu Stadium in Clermont.

**Budget:** R4.3 million.

**Sector:** Local communities; professional services; construction.

**Project Title:** COP17/CMP7 Event Greening Programme.

**Budget:** R5.8 million.

**Location:** Municipality-wide.

**Sector:** Cross-sector including Built Environment, Tourism, Eventing, Parks, Hospitality, Energy, Water, Waste and Biodiversity.

**Project Title:** Green Guideline Series.

**Location:** Municipality-wide.

**Budget:** R516,000.

**Sector:** Cross-sector including Built Environment, Tourism, Eventing, Parks, Hospitality, Energy, Water, Waste and Biodiversity.

**Project Title:** COP17/CMP7 Durban Responsible Accommodation Campaign.

**Budget:** R200,000.

**Location:** Municipality-wide.

**Sector:** Cross-sector including Built Environment, Tourism, Eventing, Parks, Hospitality, Energy, Water, Waste and Biodiversity.

### ***Natural Environment Projects***

**Project Title:** Buffelsdraai Landfill Site Community Reforestation Project.

**Budget:** R13,163,689 to date.

**Location:** Buffelsdraai.

**Sector:** Community, Natural Environment, Water, Energy.

**Project Title:** Inanda Mountain Reforestation Project.

**Location:** Inanda.

**Budget:** R4.1 million to date.

**Sector:** Community, Natural Environment, Water, Energy.

**Project Title:** Paradise Valley Reforestation Project.

**Location:** Pinetown.

**Budget:** R3,3 million in 2011/12 financial year for invasive alien plant control.

**Sector:** Community, Natural Environment, Water, Energy.

**Project Title:** Durban Metropolitan Open Space System (D'MOSS): Planning and Implementation.  
**Location:** Municipality-wide.  
**Budget:** R2 million annual capital budget for land acquisition since 2002. This was planned to increase to R3.99 million in 2013/14.  
**Sector:** Natural Environment.

**Project Title:** eThekweni Municipality Systematic Conservation Plan.  
**Budget:** R 100,000 in 2010/11 financial year.  
**Location:** Municipality-wide.  
**Sector:** Natural Environment, Development Planning.

**Project Title:** Non-User Conservation Servitudes (NUCS).  
**Location:** Municipality-wide.  
**Sector:** Natural Environment, Development Planning.  
**Budget:** None.

**Project Title:** Working for Ecosystems.  
**Sector:** Natural Environment.  
**Location:** Municipality-wide.  
**Budget:** The Department of Environmental Affairs and Tourism provided R3.5 million for this project in 2007/08. eThekweni Municipality provided R1.71 million in 2008/09; R1.3 million in 2009/10; R1.2 million in 2010/11 and has budgeted R3.5 million in 2011/12.

**Project Title:** Working on Fire.  
**Budget:** R5 million to date.  
**Location:** Municipality-wide.  
**Sector:** Natural Environment.

**Project Title:** Invasive Alien Plant (IAP) Control Programme.  
**Sector:** Natural Environment.  
**Location:** Municipality-wide.  
**Budget:** R 9 million.

### ***Coastal & Catchment Protection Projects***

**Project Title:** Sihlanzimvelo Project.  
**Location:** Inanda, Ntuzuma & KwaMashu.  
**Budget:** R15 million per annum over 3 years.  
**Sector:** Water, Catchment and Stormwater Management, Community.

**Project Title:** Design Floodline Planning.  
**Location:** Municipality-wide.  
**Budget:** R830,000 operational budget for 2011/12, this work is ongoing as budget allows.  
**Sector:** Catchment Management, Water, Community, Development.

**Project Title:** Sea Level Rise Assessment.  
**Location:** eThekweni Municipality coastline.  
**Budget:** R500,000 to date.  
**Sector:** Coastal Policy, Natural Environment.

**Project Title:** Durban Central Beachfront Dune Rehabilitation.  
**Location:** Durban's 'Golden Mile' Beachfront.  
**Budget:** R6 million capital expenditure and R1.5 million per annum operating expenditure.  
**Sector:** Coastal Management, Economic, Health and Recreation.

### ***Water Projects***

**Project Title:** Sliding Scale of Tariffs.  
**Location:** Municipality-wide.  
**Budget:** No direct costs to the municipality excluding staff time.  
**Sector:** Water

**Project Title:** Non-Revenue Water Reduction: Water Pressure Management Programme.  
**Location:** Municipality-wide.  
**Budget:** ± R20 million per annum.  
**Sector:** Water, Energy.

**Project Title:** Community Adaptation Plans (CAPs).  
**Budget:** R2.5 million.  
**Location:** Amaoti, Ntuzuma and Ntshongweni.  
**Sector:** Food Sovereignty, Community Development, Water.

**Project Title:** Luganda School Water Harvesting and Micro Agricultural Water Management Technology.  
**Location:** Luganda.  
**Budget:** R350,000.  
**Sector:** Water, Agriculture.

**Project Title:** Durban Green Corridor.  
**Location:** uMngeni River catchment.  
**Budget:** R4.5 million (in addition to R3 million from external partners) to date.  
**Sector:** Tourism, Natural Environment, Economic Development.

### ***Research Tools Projects***

**Project Title:** Wind Resource Map.  
**Location:** Municipality-wide.  
**Budget:** R200,000.  
**Sector:** Renewable Energy.

**Project Title:** Municipal Adaptation Plans Cost-Benefit Analysis.  
**Budget:** R1,449,643.  
**Location:** Municipality-wide.  
**Sector:** Health, Water and Disaster Management.

**Project Title:** Integrated Assessment Tool for Climate Change Adaptation.  
**Location:** Municipality-wide.  
**Budget:** R4,211,859.  
**Sector:** Water, Coastal & Catchment Management, Health, Natural Environment and Agriculture.

**Project Title:** Low Carbon Durban Research Project.  
**Location:** Municipality-wide.  
**Budget:** R2.1 million.  
**Sector:** Transport, Electricity, Development Planning.

### ***Developing Institutional Capacity***

**Project Title:** Disaster Operation Centre.  
**Location:** Municipality-wide.  
**Budget:** R42 million.  
**Sector:** Disaster Management across all sectors.

**Project Title:** Establishment of eThekweni Municipality's Energy Office.  
**Location:** Municipality-wide.  
**Budget:** R2.4 million to establish the office; R5,57 million per annum.  
**Sector:** Climate Change Mitigation.

**Project Title:** Establishment of eThekweni Municipality's Climate Protection Branch.  
**Location:** Municipality-wide.  
**Budget:** Approximately R1 million per annum.  
**Sector:** Climate Change Adaptation.

**Project Title:** eThekweni Metro Connect.  
**Location:** Municipality-wide.  
**Sector:** ICT service provision throughout all sectors of eThekweni municipality.

### ***Durban Botanic Gardens Projects***

**Project Title:** Durban Botanic Gardens: A Climate Change and Biodiversity Awareness Centre of Excellence.  
**Location:** Durban Botanic Gardens.  
**Sector:** Parks and Gardens, Community, Natural Environment, Urban Agriculture.

### ***Transport Projects***

**Project Title:** Integrated Rapid Public Transport Network (IRPTN).  
**Location:** Municipality-wide.  
**Budget:** Not yet finalised, but billions of Rands during first phase.  
**Sector:** Transport.

**Project Title:** Electric Bicycles Pilot.  
**Location:** Municipality-wide.  
**Budget:** R18,000.  
**Sector:** Transport, Energy.

**Project Title:** Non-motorised Transport Green Circuit and Key Building Connections: Phase 1.  
**Location:** M4 route over uMgeni Estuary, KE Masinga, Bram Fischer and John Zikhali Roads.  
**Budget:** R23 million.  
**Sector:** Transport.

### ***Built Environment Projects***

**Project Title:** Priority Zone Facilities Management.  
**Location:** Durban Central Business District.  
**Budget:** R34 million to date.  
**Sector:** Public Realm and the Built Environment.

**Project Title:** Green Roof Pilot Project.  
**Location:** 166 KE Masinga Road.  
**Budget:** R1,587,903 to date.  
**Sector:** Built Environment, Storm Water.

**Project Title :** eThekweni Water & Sanitation (EWS) Customer Service Centre.  
**Location:** 133 KE Masinga Road.  
**Budget:** R24 million.  
**Sector:** Local Government, Water, Energy.

**Project Title:** South Durban Basin (SDB) Biodiversity and Greening Programme and Recycling Pilot Project.  
**Location:** Clairwood and SDB schools.  
**Budget:** R200,000.  
**Sector:** Education, Community, Waste.

### ***Renewable Energy and Energy Efficiency Projects***

**Project Title:** COP17/CMP7 Concentrated Photovoltaic (CPV) Solar Project.  
**Location:** Verulam.  
**Budget:** R30 million capital investment.  
**Sector:** Renewable Energy.

**Project Title:** Wonderbag™ Residential Cooking Efficiency Programme.  
**Location:** Chesterville.  
**Budget:** R190,000.  
**Sector:** Energy.

**Project Title:** Community Renewable Energy Projects.  
**Locations:** Durban Market (Clairwood), Alice Street Bus Depot, Thusong Centre, Claremont Taxi Rank.  
**Budget:** R400,000; R185,000; R685,000 & R689,000 respectively.  
**Sector:** Community, Markets, Transport, Renewable Energy.



**Project Title:** Low Cost Solar Water Heater (SWH) Programme.  
**Location:** Welbedacht, Parkgate, Nazareth Island and Cato Crest.  
**Budget:** The programme was fully funded by an Eskom subsidy for low pressure SWH units (90% of cost) and Carbon Credits through the Clean Development Mechanism (10% of costs).  
**Sector:** Built Environment, Housing, Energy.

**Project Title:** Shisa Solar Programme.  
**Location:** Municipality-wide.  
**Budget:** R1 million.  
**Sector:** Built Environment, Housing, Energy.

**Project Title:** KwaDabeka Hostel Hot Water Pilot.  
**Location:** KwaDabeka.  
**Budget:** R190,000.  
**Sector:** Housing, Built Environment, Energy.

**Project Title:** Energy Efficiency Demand Side Management.  
**Location:** Infrastructure Municipality-wide.  
**Budget:** Total grant allocation over three years is R68 million: 2009/10: R8 million, 2010/11: R25 million and 2011/12: R35 million.  
**Sector:** Built Environment, Energy Efficiency.

**Project Title :** 2010 eThekweni Municipal Green House Gas (GHG) Inventory.  
**Location :** Municipality-wide.  
**Budget :** R 280,000.  
**Sector :** All sectors.

**Project Title:** KwaZulu-Natal Sustainable Energy Forum (KSEF).  
**Location:** Municipality-wide and throughout KwaZulu-Natal.  
**Budget:** Approximately R15,000 per month.  
**Sector:** Energy.

### ***Waste Water Treatment Projects***

**Project Title:** Towards a Sustainable Pit Latrine Management Strategy Through LaDePa.  
**Location:** Tongaat Central Waste Treatment Works.  
**Sector:** Wastewater.  
**Budget:** R70 million over three years (including pit emptying).

**Project Title:** Decentralised Wastewater Treatment System (DWATS) at Newlands-Mashu Agricultural Hub.  
**Location:** Newlands East.  
**Sector:** Water and Sanitation, Urban Horticulture.  
**Budget:** Construction of the plant cost R2.3 million, while testing and research cost R1.15 million for the infrastructure to facilitate field trials and testing of water.

**Project Title:** Durban Water Recycling.  
**Location:** Southern Wastewater Treatment Works.  
**Budget:** Privately sourced funding.  
**Sector:** Water and Sanitation.

### ***Solid Waste Projects***

**Project Title:** Durban Landfill Gas-to-Electricity Project.

**Location:** Bisasar Road and Mariannahill Landfills.

**Budget:** Capital: R110 million; Operating costs: R10 million per annum.

**Sector:** Solid Waste, Energy.

**Project Title:** Mariannahill Landfill Conservancy.

**Location:** Landfill lane, Mariannahill.

**Budget:** Approximately R550,000 per annum.

**Sector:** Local communities, Education, Tourism.

**Project Title:** Domestic Orange Bag Recycling Programme.

**Location:** Municipality-wide.

**Budget:** R 9 million to date.

**Sector:** Residential waste.

### ***Partnership Projects***

**Project Title:** Durban Climate Change Partnership (DCCP).

**Budget:** R800,000 to date.

**Location:** Municipality-wide.

**Sector:** Various sectors across the municipality.

**Project Title:** Durban Industry Climate Change Partnership Project (DICCPP).

**Budget:** R700,000.

**Location:** Municipality-wide.

**Sector:** Various sectors across the municipality.

**Project Title:** Sister City Programme.

**Location:** Municipality-wide.

**Sector:** Various sectors across the municipality.