

## Poverty Reduction Co-benefits through Indigenous Knowledge in Climate Change Adaptation: A Study within the eThekweni Municipality

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**ABSTRACT** The research utilizes mixed methods to discuss the incorporation of concepts of sustainable livelihoods for climate change adaptation in the eThekweni municipality, South Africa. The municipality identified and implemented climate change adaptation programs incorporating biodiversity, human elements of local economic development and poverty reduction. In poverty reduction co-benefits, the intervention incorporated 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 utilization of indigenous knowledge in the project's sustainability and future continuation within the community. The study recommended that climate change adaptation programs for environmental protection can be holistic if local communities' cultural practices are incorporated for effective and sustainable interventions.

### INTRODUCTION

This paper is based on an exploratory study, examining the transition of conventionally natural science based research move to combine socio-economic human developments, particularly in recent climate change programs. The broader study intends to help formulate a set of social criteria to better evaluate understanding of specifically "poverty reduction co-benefits," or the indicators used to ensure that such global climate change projects are genuinely adopting interventions, which directly address the plight of the poor. The paper specifically wishes to tackle the paucity of information and research on the role of indigenous knowledge in these new approaches of looking at climate change and human development. After a desktop literature analysis of one municipality's climate change adaptation programs, the researchers 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 intends to both, improve local and national practice, and influence wider debates on a global scale.

Recently there has been an increased interest by government and donors around climate change or adaptation related projects, and in

particular, 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, and convince the reader to see human and ecological aspects together in an integrated ecosystem. Rather, current models are moving towards inclusion of multiple dimensions, which are viewed together as factors for consideration, for example, in climate change projects. Furthermore, local communities are also playing an important role within these approaches, providing feedback when mechanisms are in place for participatory action. 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 the global level. How does one identify projects that legitimately take on board multidimensional approaches, and is there transparency of such projects to share these experiences? The eThekweni municipality has approached the University of KwaZulu-Natal to assist in better understanding the social aspects of their climate change adaptation projects. This project hopes to better inform the future of climate projects especially those, which

state that they have included poverty reduction co-benefits.

Climate change adaptation projects have the potential of contributing to urban food security, income and job creation and subjective well-being. These effects however, have not been systematically evaluated, nor has a set of criteria been established, which authors such as an evaluation technology in both natural and social sciences. This action can be remedied by this exploratory study in identifying what exists as criteria for climate change projects as human and natural science indicators. More specifically, the 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 communities.

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

The main objective of the study was to evaluate the relationship between climate change adaptation and poverty reduction policy co-benefits. This objective was met by examining the Buffelsdraai Reforestation project on climate change, located in a rural township in eThekweni municipality. This project attempted to combine climate change adaptation strategy, biodiversity and community livelihood interventions. The intention was that in the future, the activity would improve community resilience and well-being in the context of future ecological and biodiversity threats.

Ultimately, the long-term project is to develop a framework which can help 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 programs. A further 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 their 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 or CCBS).

Furthermore, cities are also developing their 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 foster good practice in the development of such concepts.

This current 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 reviewed and analyzed this government intervention, which addresses poverty in the context of local planning around environmental initiatives. Furthermore, it is clear from initial discussions with stakeholders that an element of indigenous knowledge helped certain beneficiaries succeed in livelihood strategies using the *treepreneur* case study. A well-developed framework on climate change adaptation and poverty reduction co-benefits have been developed collaboratively between municipalities and the local tertiary institution (Perch 2010). The inclusion of indigenous knowledge within the project would complement and strengthen the global South’s capacity to lead its own development path in future.

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.

The national Department of Cooperative Governance and Traditional Affairs of South Africa (COGTA) aims to help municipalities de-

velop their local climate change strategies. Although COGTA helps municipalities with technical expertise, they provide some financial support for climate related programs. Under the latest municipal programing, 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, and specifically understand how climate adaptation programs have changed the behavior of local community members who are directly involved with on-the-ground interventions. Local municipalities have a daunting task to prioritize entry points of social cohesion with diverse communities while protecting their citizens from inevitable environmental changes. This challenge in itself 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.

Despite the paucity of current evaluations around community-based ecology with socio-economic co-benefits, several conceptual approaches are becoming of great use to addressing a multidisciplinary area of research. Firstly, an adoption of multidimensional approaches to measure well-being and societal change is necessary in understanding an integrated and complex research program (Blignaut et al. 2013). Within the discipline of development studies, the capabilities approach (Sen 1999) attempts to look beyond narrow economic indicators. Rather, 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). Studies on environment and poverty reduction note that some climate projects have tried to include human development aspects, however most projects under-prioritize the social dimension (Perch 2010).

Of recent times, climate change projects appear to be identifying synergies and mutual links between human development and natural biodiversity systems. More specifically, they attempt to include the multiple components of environmental change, ecosystem modifications and socio-economic development.

This study also benefits in reviewing the definition of the terminology, “poverty reduc-

tion co-benefits.” Zusman (2008) 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 shows the need for policy implementation to carry both climate change and development benefits together and also puts particular emphasis on the developmental elements of growth, gender equality, poverty reduction and environment (GGPE). Therefore, marginalized groups become central to such development projects.

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). Under this study, the eThekweni municipality further adapts EbA through weight behind local ownership and participation, thereby building the concept of ‘community ecosystem based adaptation’ or CEBA. As the cornerstone to their programing, CEBA is described as the synergistic relationship and mutually dependent nature between human development and ecosystem-based adaptation (Roberts et al. 2012). The eThekweni municipality is working within the holistic framework of CEBA, and creates various co-partnered projects, which attempt to work with local communities in the natural habitat restoration projects within their area. The municipality has had flexibility in designing some of these projects, and some specific projects are taking a “learn-by-doing” tactic. This flexibility allows officials to partner with local organizations and people on an iterative 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 determine 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 provide guidance in evaluating com-

plex projects. These approaches can also work together to clarify the concept of poverty reduction co-benefits, which essentially places a pro-poor perspective on the forefront within the integrated multidimensional approach.

### **Buffelsdraai Community Reforestation Program**

This study aims to observe the application of an integrated framework but with specific emphasis on elements around “poverty reduction co-benefits.” This exploratory work is a starting point for reviewing one innovative approach that tries to incorporate equality, growth and sustainability. The Buffelsdraai Community Reforestation Program is an existing joint collaboration with the KZN 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, key research areas wish to incorporate social-economic impact work, while this action aims to potentially create generic measurement criteria for potential rollout across South African government and beyond.

The area is located in the KwaZulu-Natal (KZN) Coastal Belt Grassland, where vegetation includes grasses, woodlands and indigenous forest. Besides sugarcane, 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 work is run by the Wildlands Conservation Trust as their implementing partners and they run other tree restoration projects under the Indigenous Trees for Life program. The Buffelsdraai project’s idea is to rehabilitate a landfill buffer zone area (it lies between the landfill and the adjacent communities), which was formally sugarcane to its former indigenous forest state. There are some risky exposures to climate related issues in the region and this project could help improve water security (in the catchment area), enhance indigenous biodiversity, and reduce flooding risk within the catchment, among other benefits.

Firstly, this rural reforestation project involves local community members to restore parts of the woodland and riverine forest, which allows some resilience to the land for the possibil-

ity 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 program where they collect indigenous seeds from locally indigenous extant stands of forest. 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. Therefore, the idea is to incorporate the community through their involvement as “tree-pre-neurs,” or as self-motivated individuals who decide the extent to be part of the voluntary 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 multifold. The project would help restore natural habitat, biodiversity and ecosystems, and the planting of indigenous trees would help sequester atmospheric carbon. The project highlights the need to reduce vulnerability of the poor, nearby community through new forms of “green work” or employment. In ongoing discussions with the municipality and university partners, the relevance of 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 has expanded to include important elements of human well-being. Socio-economic research proposed by this project fills the gap in knowledge and expertise within the current social science research frames. There is a suggestion that climate change could be a building block for poverty reduction, and therefore further investigation is required to verify relevant indicators and its impact.

### **METHODOLOGY**

This is the first exploratory case of the eThek-wini Municipality’s work on climate change projects that have poverty reduction co-benefits. It is also a desktop review of the project and its multidimensional approaches to socio-economic and geopolitical challenges faced by the surrounding communities. The research reviews available reports and archives, mainly analyzing the text around socio-economic and poverty re-

duction benefits from this one Buffelsdraai case study.

In order to understand the nature of the project, the research utilizes a qualitative method, namely textual analysis of poverty reduction co-benefits as spelled out in previously written documents. Some of the documentation samples include the eThekweni Community, Climate and Biodiversity Standard Project Design Document (without Appendices, and this was successfully processed for certification), international reports, national reports (that is, South African National Treasury), university documents, international journal papers, 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.

Preliminary stakeholder engagements were conducted with one of the super-growers. Her personal account shed some light on the benefits and concerns of her involvement in a project. Her rich knowledge about the project originates from her working understanding of indigenous trees, and their various benefits, which were not well spelled out in the documents.

For her, the primary benefit of an indigenous forest is the supply of medicinal plants and edible wild fruits. This knowledge was passed to her through her parents ever since she was a young girl. The very same knowledge continues to be part of her life, and 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 15 cm trees. The seeds are collected at the Hazelmere Dam, for they are not allowed to take seeds within a 50 km radius from the landfill site. The reason lies in health issues and hazards associated with unpleasant conditions of landfill sites environment. Regardless of distance from her place of stay to the harvest sites, this super-grower continues to find her source of livelihood from the treacherous environment of the far forests.

Her passion for growing trees remains the only driving force that helps her continue identifying tree species that will be necessary for the different types of reforestation projects. Although she might 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

as well as the primary benefits of planting a particular tree.

Mrs. Gumede explained that she had experienced problems such as a cutback in the amount of trees that the project was taking, and this decreased her income. Originally they were selling an unlimited number of trees and this was cut down to 300 trees per trepreneur. The site manager explained that this was done to evenly distribute the benefits among the trepreneurs. It was felt that a real forest was one that had a wider variety of plants and encouraged trepreneurs to grow other species as well. Therefore, they had to ask the trepreneurs to also focus on other species of plants especially those that take longer to grow. Payment is measured by the size of the plant, quick growing plants are sold when they are 30 cm and slow growing plants are sold at 15 cm, at a price of R5 per tree. There are extra incentives for rare species, but many of the trepreneurs have never received this incentive.

#### **Analysis of the Research Methodology used for the CCBA**

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. The trepreneurs had to formulate a retrospective baseline with a purpose to reflect on the living conditions before joining the program and measure it against current living conditions. It meant adopting a process called ‘recall’, 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 program.

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. For instance, the beneficiary might have had difficulties with paying for electricity in the past. However, due to participating in this project the beneficiary may have bought a fridge. Knowing that a fridge consumes more electricity, it will add to the burden of electricity costs. When the beneficiary is asked to state how his/her life has improved, comparison will be done between previously not own-

ing a fridge and current ownership of a fridge, even though the burden of electricity costs continues to steepen. The recall method is a limiting method for comparing before and after scenarios and particularly for determining the successes or improvements and failures or challenges of one's life.

Others might feel coaxed to only point what has been of benefit to them and not state the problems or difficulties being faced, for if they do not state benefits they might not continue to be part of the project.

The study included three of the four communities involved in treepreneurship in which 305 households were interviewed. The sampling frame only included those that were participants (treepreneurs) in the project. However, it was not clear how the participants were selected into the focus group. It was also unclear as to how WCT decided on a sample size of 15 people per group per community when other communities have more treepreneurs than the others.

Gender representations were not well stated in most documents (although it can be established that the majority of the treepreneurs 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 well-being of the treepreneurs before and after the project. Semi-structured interviews, focus groups and secondary data were some of the methods used as part of the triangulation technique. The semi-structured interviews aimed at analyzing what the treepreneurs found valuable about the project. These interviews were conducted with the 'minor' program participants. In this case, the issue of language becomes very important and critical. Language in terms of context, 'minor' program participants might mean children workers or it might mean growers who have just joined the project and are not yet super-growers. Therefore, it is imperative that the language remains clear and appropriate in distinguishing these participants and to avoid confusion of terms. Because, it was only after engaging with one of the facilitators that clarity was gained regarding the minor growers who are said to be learners who participated in the project during school holidays.

Secondary data consisted of statistical information that was obtained from the municipality. Using primary and secondary data in a 'mixed

method' research is a powerful triangulation method (Nachmias et al. 1992). 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 way into the literature. The research tools that were used were translated into IsiZulu.

Representatives from Durban Solid Waste (DSW) and councilors from Buffelsdraai and KwaMashu were also interviewed as key informants. Workshops were held with stakeholders such as the WCT Chief Executive Officer (CEO) and the WCT greening the future program manager and representatives from the eThekweni municipality. The data was analyzed using comparative analysis, to allow for the analysis of the project impacts on social well-being of the participants since the inception of the project. It was vital that key informants such as DSW representative be interviewed in order to enhance the knowledge base of the project and what it seeks to achieve. Knowing that the project is also active at Osindisweni, yet no one from Osindisweni authorities was interviewed regarding the project raised suspicions. It brought the issues of bias and power politics. In addition, Osindisweni and Buffelsdraai still have traditional leaders who are not represented in the interviews.

This might have other implications when it comes to acceptance of data reliability if there are other power bodies that were not consulted whilst the project is running under their jurisdiction.

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, thus denying them the option of saving money either individually or as part of a group such as a "stokvel". A stokvel is a form of a saving club that many individuals in low-income communities in South Africa use to save money. Stokvels allow the beneficiaries the option of accruing interest on their savings as well as the option of deciding for themselves how best to use their benefits. Allowing the beneficiaries to receive remuneration in cash through bank transfers will introduce the beneficiaries to the banking system. The benefits of this would be that they might be able to secure financing for future business endeavors in the future, should they wish to do so. This is important because banks do not offer the option of financ-

ing an individual without a bank account and regular income. If the project could give them such an opportunity, it may open up doors for other opportunities in the future that may allow beneficiaries to break the poverty cycle.

The treepreneurs are not employed but are rather beneficiaries of the project. They are not entitled to any employment benefits whilst they are the most at-risk during the collection of seeds in the forest. It would be reasonable if the treepreneurs were employed on a contractual basis to allow them to be entitled to basic employment benefits and a better remuneration. This would also assist them in acquiring other sources of employment since they could add the work experience gained from the project to their curriculum vitae. It is a known fact that having some work experience can significantly improve one's chances of securing future employment. This allows the project to have a long-term impact on the beneficiaries.

Currently, there are some project benefits, but these are unlikely to have any long-term impact on either the treepreneurs or the broader community. The primary aim of the project is to have an indigenous forest in the future where the community will benefit sequester carbon emissions and provide cleaner air and water. The human development co-benefits are not as long-term since they may end with the completion of the planting. Even where the co-benefits 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. 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.

## RESULTS AND DISCUSSION

A document analysis was conducted and the results were as follows.

Buffelsdraai is stricken by abject rural poverty in which ninety percent of the population lives below the national poverty line, with very limited prospects of employment (Greater Capital Final Report 2011). Such a condition became the basis for 'employment' creation through the idea of growing indigenous trees in exchange for goods and services. Those who participate

in this project as tree-growers are regarded as equipped with entrepreneurial skills.

Those skills are central in making a living out of this initiative, and hence the individuals are referred to as 'treepreneurs'. Besides the term being an amalgamation of the word 'tree' plus 'entrepreneur' it refers to an "unemployed person or orphan that has the self-drive and commitment to generate a livelihood if given a chance" (CCB Design Document).

The treepreneurs are the local community members from Buffelsdraai and Osindisweni who propagate indigenous tree seedlings into slightly grown trees. Any produce is then exchanged with the Buffelsdraai reforestation project in return for items such as building materials, food and prepaid electricity coupons (Greater Capital Final Report 2011). However, it is worth noting that the treepreneurs are not in any way employed by the project. They are just volunteers who gain experience and economic benefits from the project. Therefore, they are not affected by employment equity and labor issues (CCB Design Document).

Through this form of participation, the treepreneurs are granted an opportunity to access goods and services through a bartering scheme for their trees. As stated earlier, treepreneurs are not considered employees, but rather as volunteers who are mostly referred to as 'beneficiaries' (Greater Capital Final Report 2011). Nonetheless, those that participate in the project are now said to be better off compared to their previous socio-economic status or to those who refused to participate.

One area that seemed to be under 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. It is somewhat interesting that the very skills that are anchoring the projects are not fully appreciated in some of the documents. Those that are participating as tree-growers rely heavily on the use of indigenous forest in order to carry out their duties. The duties include prior harvest preparations in which the super-grower pointed out the use of other traditional medicine to protect one from the forest's venomous animals. It means that there is no attire or gear that one wears as a protective outfit, but the understanding of the repellents that are readily available in nature provides immunity to the harvesters. Such repellents may include ingestible mix-

tures or burnt materials and even topically applied homemade solutions. All this knowledge rests with the very individuals who are said not to possess any skills or knowledge. But here they are utilizing that which was left for them by their forbearers. It is therefore important to look at employment opportunities that can be created to further assist those with indigenous skills.

In 2011, the project had officially employed 21 people full-time, 6 part-time and 220 on a temporary basis. The project notes that there has been an increase in occasional work (from 10% to 17%), and this is attributed to the fact that the Wildlands Conservation Trust (WCT) has employed some of the trepreneurs on a part-time basis for the planting operations. 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 regularly these intervals are spaced. For instance, once every month or twice a year, thus such questions still remains unanswered.

During the planting drives, community members receive income from the project. Even though there are such remunerations, the income at the household level has not changed substantially. It is said that ninety percent of the beneficiaries lived below the South African Poverty line of R8,845 per annum (Greater Capital Final Report 2011). In the context of the project, this is due to the way in which the project is structured, as beneficiaries are not given money, but goods and services instead.

Since the "payment is 'in-kind,' changes in household income cannot be attributed to the reforestation project" (Greater Capital Final Report 2011). Therefore, quantifying exchanged goods for each household and adding them to the other existing modes of income might bring some form of challenges. It is assumed that other households receive remittances or are living on social grants. However, the type of social grants that most households were receiving and the amount amassed from remittances was problematic to assess. This includes an assessment of the adverse effects of the project incentive process (barter).

The Buffelsdraai project appears to provide a good example in linking human elements to a tree restoration initiative. Thus far, there have been various national and international organizations that have been utilizing 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 journal papers such as *Environment and Urbanization*, citing the Buffelsdraai projects.

It is worth pointing out that not much has been written on the subject that focuses on such projects. The most recent and detailed document for the project is the successful application of the Climate, Community and Biodiversity Standard, which identifies three key dimensions namely, climate, community and biodiversity. In this document the municipality was required to provide a thorough description of the current socio-economic changes as a result of the project in order to qualify for international standards. While much documentation repeats various aspects of the project, they provide a chance for some triangulation of the available Internet archives.

There are various communities involved in the reforestation and one will specifically focus on the poorest area, which is the Buffelsdraai community. This Buffelsdraai community has shown high unemployment rates coupled with many households with no annual income (eThekweni and WCT n.d.: 11). The living conditions are relatively poor for the rural township. From Buffelsdraai, there are seventeen percent of households with access to running water access and there is a mix of formal and traditional dwelling found in Buffelsdraai.

The community is a low-income, rural township, however the people live on privately owned land, not under the traditional authority.

Of the latest available data, the project participants restored and replanted 284 hectares by October 2012 (5 years after project inception) (Midgley et al. 2012). Initial research on the program 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. School fees were paid through the tree bartering system. However, 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 the Wildlands Conservation Trust. The 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 of help in the long run impacting the lives of the children in several ways. For example, it may help them qualify for new work opportunities.

As for work activities, the initiative provides an example of the emerging possibilities of environmental awareness or 'green' employment. Many of the work activities are provided to unemployed persons. The project has certainly grown, starting in 2008 with the project being introduced to 90 people. From the documentation, the last five years reflect a total of 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 sugarcane farmers. Trepreneurs may have also been picked for full-time, part-time and temporary labor, although they are generally volunteers (more than 600 registered) who are nurturing the seedlings for trade. From the trade system, the trepreneurs have been shown to have increased their disposable income. Trepreneurs mainly used the trees to trade in for food. This food resource is identified as part of human resources in the CCBS document, but in this case, food is placed under economic empowerment. In one of their baseline studies, the report states that less people are going to bed hungry (thereby accessing sufficient food). 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.

Furthermore, poverty is multidimensional, and in order to grasp the complexity of the context, the project would need 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 utilizes the current local ward councilor, and local leadership for support from the ward committee (for example, to help advertise jobs and recruitment). There is also a rural area coordinator who would help the project.

The Wildlands Conservation Trust asks local leadership to give names for facilitators to help pick out possible trepreneurs. There was also a project steering committee that used to meet on a monthly basis during the inception of the project. In the CCBS report, social resources include informal connections and a "sense of belonging" but now further detail is provided. Such proxy indicator examples 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 dimension aspects, which had some reference, but not necessarily highlighted in the documentation review. Other resources mentioned include land, which is privately owned. However, it is unclear the proportion of households with land ownership (eThekweni and WCT n.d.).

While there is obvious mention of biodiversity, that which is related to human development was the possible use of wood harvested from the forest for fuel. While there is obvious mention of biodiversity, that which is related to human development was the possible use of wood harvested from the forest for fuel. One report states that such activity would be on the decline should project awareness continue to take place in the communities.

Furthermore, it is difficult to pinpoint whether trepreneurs also engage in other income diversification activities or are also receiving social grants from the government to supplement their current income. For example, there is also a note that sugarcane farming continues to operate in the area. However, it is unclear as to whether any of the trepreneur households are currently involved in this activity (although it is noted that the work is seasonal) or if they were

previous contract workers for the sugarcane company. Secondly, the clearing of invasive alien plants also appears to be work conducted by the municipality as well as trained 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 firstly offer such opportunities to treepreneurs (eThekwini and WCT n.d.: 29). There is also potential of work 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 understand whether there are income diversification practices also taking place. Furthermore, part of social capital could be the volunteers who would come from outside the community (for example, Comrades Marathon participants or the South African Scouts Association) to do 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 project is well detailed around the biodiversity, which exists in the area. This biodiversity ranges from the tree, vegetation and plant species, animal species as well as their conservation status (that is, protected areas, threatened and endemic species) (eThekwini and WCT n.d.). There is also detailed calculation of carbon sequestration, which will result from tree planting.

### CONCLUSION

This is only an exploratory study examining one metropolitan'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. 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 multidimensional. The Buffelsdraai project also includes institutional structures and processes as a component whereby local authority participation was key to working with the implementing partners in the reforestation of the area.

### RECOMMENDATIONS

Many issues remain unresolved around the project and can be further pursued such as further thinking around the 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 then can these skills transition into decent employment or new microbusinesses especially once the project meets its final implementation objectives? One question that also comes to mind after some personal correspondence with eThekwini officers is, 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 dealt with outstanding historical matters, which can use further thought and consideration.

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 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.

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