MKHUZE FLOODPLAIN CEBA PROJECT REPORT

1st JULY 2013 – 30th JUNE 2014

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1. Background

The Mkhuze Floodplain Community Ecosystem Based Adaptation (CEBA) Project is located in KwaZulu-Natal's uMkhanyakude District Municipality (DM) (Figure 1), within the Jozini Local Municipality (LM), approximately 320km north of Durban and 60km due east of Mkhuze village. The project area lies on the north-eastern boundary of the Mkhuze section of the iSimangaliso World Heritage area, South Africa's first World Heritage Site. iSimangaliso encompasses 332 000 hectares of spectacular scenery including vast lake systems, accompanying wetlands and rolling ancient dunes covered in forest and grassland. The Mkhuze section is home to an incredibly diverse range of species and is a designated Ramsar site with a complex mosaic of rivers, pans and wetlands that extend into the neighbouring communities and feed into Lake St Lucia.

The neighbouring KwaJobe, KwaNgwenya, KwaMabaso and KwaMnqobokase communities are heavily reliant on the natural environment for resources. This dependence has put the environment under increasing pressure with the result that ecosystem services are collapsing – boreholes have dried up, woodlands have been severely diminished and grazing opportunities are over utilized. The Wildlands activities are focused on the KwaJobe community, and are rooted in projects going back to 1997. Emphasis is on innovating holistic approaches to sustainable rural development, which improve local livelihoods whilst restoring and nurturing ecosystem function. This is one of 3 Wildlands CEBA Projects within this District, the other projects being the Lubombo Corridor and Dukuduku Forest CEBA Projects.

The project footprint and impact within KwaJobe is significant, encompassing three wards and a number of sites along the length of the Mkhuze River as it flows thru the community (Figure 2). There is little doubt that the Wildlands work in this community is material to local socio-economic development and it is likely that Wildlands is the largest single contributor in this regard, after the Department of Education.

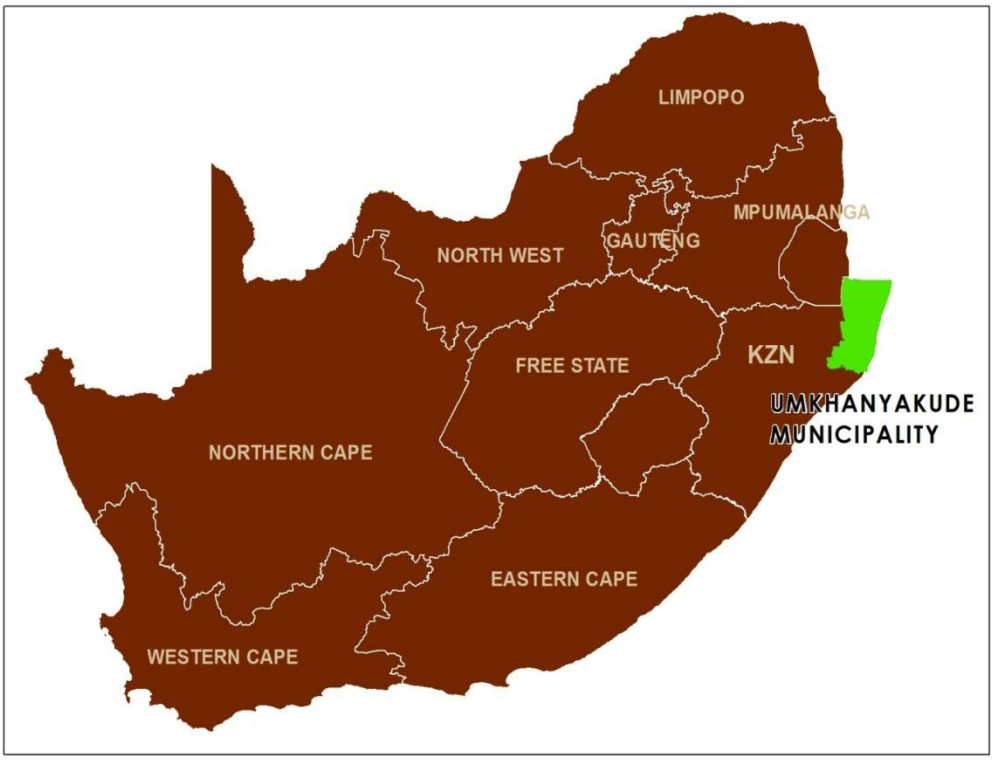

Figure 1: uMkhanyakude District Municipality's location within KwaZulu-Natal.

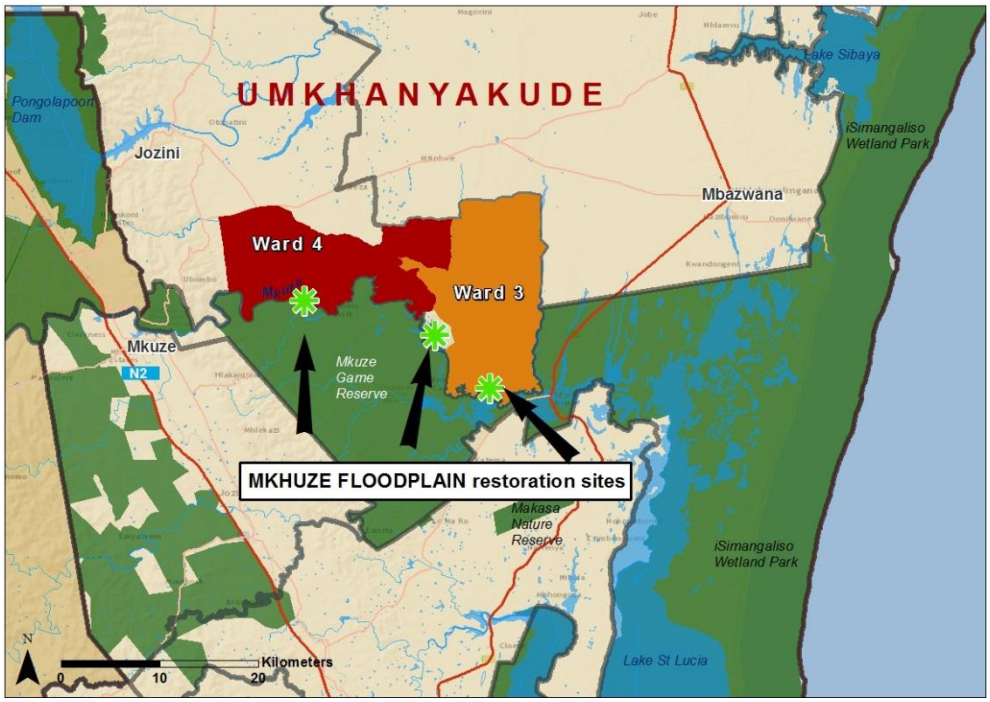

Figure 2: Location of the CEBA Project community wards and ecosystem restoration sites

The Wildlands planning, implementation, monitoring and evaluation processes are guided by the Community Ecosystem Based Adaptation (CEBA) philosophy. This is an African response to current development and environmental challenges, moving beyond the more traditional concept of Ecosystem Based Adaptation (EBA), and including a strategic focus on social cohesiveness, inclusiveness, sustainable development and the realisation of Green Economy related opportunities.

The CEBA philosophy highlights the link between local communities and their supporting ecosystems, emphasising the holistic aspects of human interaction and biodiversity. This inter-relationship between communities and their ecosystems is seen as an essential element of the adaptation concept. The CEBA philosophy therefore draws on Africa's strengths of its people, traditional knowledge and the natural environment.

The overall objectives of this project:

i. To enable and nurture the progressive transformation of these communities into more sustainable and vibrant communities.
ii. To enable the restoration and conservation of the eco-systems which underwrite the livelihood of these communities and buffer them against the impacts of Climate Change.

2. Socio-economic context

The KwaJobe community falls within Wards 3 and 4 of the Jozini LM. While South Africa as a whole has experienced consistent economic growth since the arrival of democracy in 1994, rural areas such as the Jozini LM have lagged behind, with limited investment in infrastructure and local economic development. The overall uMkhanyakude DM has the highest municipal poverty rate in KwaZulu-Natal.

Table 1 presents a summary of the key socio-economic statistics for the uMkhanyakude DM and the Jozini LM wards affected by the Project. The first obvious issue is the strong female bias (56%), this probably reflects the migrant nature of these communities, with men working in the Cities, mines or other industrial centres. The unemployment statistics area also very significant with only 13% of DM and 9% of LM residents aged between 15 and 64 are employed. This is extremely low and reinforces the importance of local conservation, eco-tourism and agricultural activities, which are the primary Local Economic Development drivers. 58% of local DM households and 65% of local LM households generate less than R 19 600 per annum, which is the equivalent of US$ 1.5 per person per day (global poverty indicator),

emphasis the high poverty levels across the region. The youth development need is emphasized by the reality that 40% of residents are under 14, and 36% are in the official 15 – 34 "youth" bracket.

Table 1: Relevant socio-economic indicators

	uMkhanyakude	Wards 3 & 4
Population	625 846	17 713
African	619 114 (99%)	17 671 (100%)
Coloured	1 153 (0%)	8 (0%)
Indian	1 390 (0%)	17 (0%)
White	4 189 (1%)	17 (0%)
Gender		
Female	337 200 (54%)	9 598 (54%)
Male	288 646 (46%)	8 115 (46%)
Age		
0 - 4	90 186 (14%)	2 818 (16%)
5 - 14	161 744 (26%)	4 821 (27%)
15 - 34	226 409 (36%)	6 296 (36%)
35 - 64	119 453 (19%)	2 965 (17%)
Over 65	28 049 (5%)	813 (4%)
Employment status		
Employed	58 924 (13%)	855 (9%)
Unemployed	366 938 (87%)	8 406 (91%)
Household income per annum*		
None	17 943 (14%)	438 (15%)
R 1 - R 4 800	8 826 (7%)	241 (8%)
R 4 801 - R 9 600	17 974 (14%)	495 (16%)
R 9 601 - R 19 600	29 838 (23%)	786 (26%)
R 19 601 - R 38 200	26 759 (21%)	641 (21%)
R 38 201 - R 76 400	12 096 (9%)	190 (6%)
R 76 401 - R 153 800	7 726 (6%)	102 (3%)
R 153 801 - R 307 600	4 435 (4%)	79 (3%)
Over R 307 601	2 596 (2%)	48 (2%)

** Average household = 3.4 members*

Table 2 presents a summary of the basic services for uMkhanyakude District Municipality and the wards affected by the Mkhuze Floodplain CEBA project. The wards affected by the Project are particulary poorly serviced, with some interesting differences being:

- 25% of DM residents have no sanitation vs. 69% of the Ward 2 & 3 residents.

- 45% of DM residents enjoy water borne sanitation vs. 1% of the Ward 2 & 3 residents. Use of water from local rivers and wetlands is wide spread across the District (47%) and even higher in Wards 2 & 3 (89%).
- Municipal waste removal is non-existent in the 2 wards.

Table 2: Relevant basic services indicators

	uMkhanyakude	Wards 2 and3
Sanitation		
Municipal	16 870 (13%)	29 (1%)
Chemical toilet	20 754 (16%)	113 (4%)
VIP	32 775 (26%)	344 (11%)
Pit latrine	25 286 (20%)	541 (18%)
Bucket latrine	1 594 (1%)	135 (4%)
None	23 624 (18%)	1 721 (57%)
Other	7 292 (6%)	137 (5%)
Refuse removal		
Municipal	13 351 (11%)	43 (1%)
Communal dump	1 975 (1%)	111 (4%)
Own dump	94 294 (74%)	1 914 (63%)
No disposal	21 337 (17%)	952 (32%)
Water source		
Municipal	54 302 (45%)	45 (1%)
River/Stream/Dam	57 214 (47%)	2 674 (89%)
Rain water tank	3 524 (3%)	84 (3%)
Water vendor	1 663 (1%)	44 (1%)
Water tanker	4 550 (4%)	18 (1%)
Other	164 (0%)	156 (5%)
Fuel source for cooking		
Electricity	41 045 (29%)	144 (5%)
Gas	9 901 (7%)	174 (6%)
Paraffin	16 692 (12%)	19 (1%)
Wood	74 114 (51%)	2 581 (85%)
Coal	391 (0%)	84 (3%)
Animal dung	96 (0%)	2 (0%)
Solar	160 (0%)	1 (0%)
Other	797 (1%)	15 (0%)

3. Ecosystem services

Ecosystem services are a suite of deliverables from the environment that ensures and sustains life on Earth. To understand the vast and complex array of environmental services that our planet provides, they are divided into four basic categories;

- Provisioning – these are physical goods and materials.
- Regulating –services that ecosystems provide by regulating the quality of air and soil, or providing flood and disease control.
- Habitat/Supporting – these services underpin almost all other services; ecosystems provide living spaces for plants and animals, as well as maintaining species diversity.
- Cultural services – these include the non-material goods that we obtain from contact with the natural environment such as aesthetic, spiritual or psychological benefits.

The value of these services that act as a buffer to some of the negative impacts of climate change as well as underwriting community livelihoods is increasingly being recognised, and significant effort is being made to restore and conserve these services.

The alluvial soils alongside the Mkhuze River are of higher fertility than the soils of the surrounding landscape and have a more reliable water supply at greater depths. Therefore making the river favourable to vegetation such as riparian forest. Notwithstanding the small area that this forest occupies, the ecosystem services that it provides are significant. Such forests are an important source of medicinal plants, building material and provide other ecological infrastructures, for example firewood and fruits that the communities also use to generate income. Given the rural nature of the KwaJobe community the local eco-systems are still reasonably intact and local communities rely on these systems extensively. Table 3 below provides a high level summary of these services, rating them according to their importance within the context of the Mkhuze Floodplain CEBA project, and Figure 3 illustrates the catchment areas which are the focus of the Mkhuze Floodplain CEBA Project restoration area.

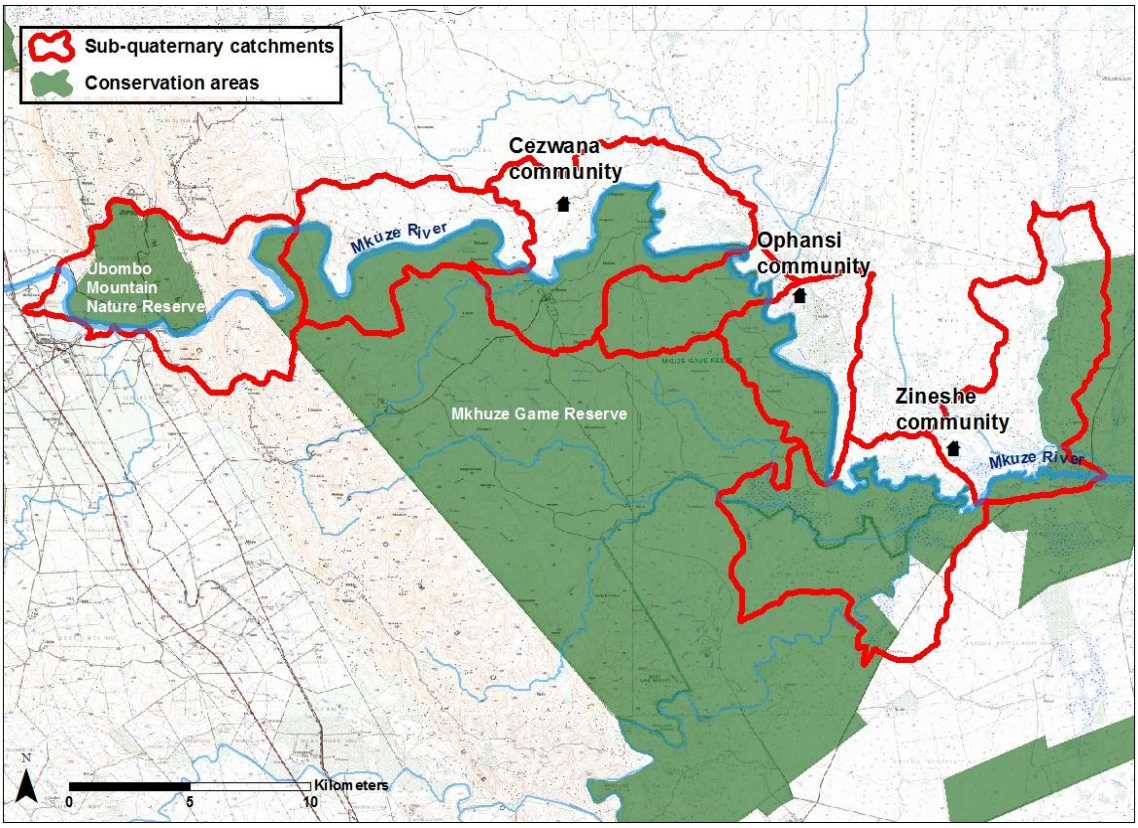

Figure 3: Mkhuze River catchment areas associated with the Project

Table 3: Relevant importance of local ecosystem services

Importance	Provisioning	Regulating	Habitat or supporting services	Cultural services
High	• Raw materials • Medicinal resources • Fresh Water • Food	• Raw materials • Medicinal resources • Fresh Water • Food	• Habitats for species • Maintenance of genetic diversity	• Culture • Recreation • Tourism
Medium		• Carbon sequestration and storage • Climate regulation • Soil fertility		• Aesthetic appreciation • Tourism
Low		• Pollination		• Mental and physical health • Art

3.1 Riverine ecosystem

The complex of wetlands, pans, streams and Mkhuze River that comprise the Mkhuze floodplain are critical to the livelihood of the surrounding communities. At least 70% of households derive their drinking water from this system, and all the livestock (± 3 000 cattle) of the area are dependent on it. Riverine (or riparian) forest occurs as a narrow, evergreen band flanking the Mkhuze River. The alluvial soils alongside the river are of higher fertility than the soils of the surrounding landscape and have a more reliable water supply at depth. As a result, the boundary between riverine forest and the surrounding woodland is abrupt, with the forest being only a few metres wide. Notwithstanding the small area that this forest occupies, the eco-services that it provides are proportionally enormous. Dominated by towering and deep-rooted figs *(Ficus spp.*), quinine *(Rauvolfia caffra*) and fever trees (*Acacia xanthophloea*), the forest serves to stabilise the riverbank and reduce erosion, thus improving water quality by acting as a natural biofilter. This vegetative buffer acts to dissipate river energy which results in less erosion and a reduction in flood damage, as well as preventing sediment from reaching the river channel. Restoration activities are currently focused on cleared areas directly adjacent to the river channel in an effort to restore riparian forest along this critical river system.

The specific ecosystem services associated with the forest areas include:

- Flood regulation - trees intercept rainfall thereby increasing water absorption into the soil and slowly releasing the water back into the catchment
- Erosion prevention and maintenance of soil quality – plant cover reduces water velocity and therefore its erosive impact
- Modulating climate
- Reduce air pollution
- Carbon sequestration and storage
- Economic services - wood for fuel; plants for medicine
- Habitat service – maintains species diversity
- Recreation
- Aesthetics and cultural service

Furthermore, the associated reeds and grasses provide essential building materials, fishing provides valuable (and free) protein, and the sediment rich back-channels and pans are important for small-scale subsistence agriculture. From a landscape perspective

it is notable that this wetland ecosystem is of international conservation significance, while also a significant contributor to the livelihood of neighbouring communities.

The specific ecosystem services provided by these streams include:

- Drinking water - 78% of households rely exclusively on natural streams;
- Water for agriculture i.e. livestock and vegetable gardens;
- Recreational service – Swimming, fishing;
- Habitat service – maintains species diversity;
- Aesthetic and cultural service;

From a functional point of view the forests, wetlands and streams provide the goods and services listed above, but only in a limited capacity. By improving the forest, wetlands and stream integrity we will not only greatly enhance the delivery of ecosystem goods and services, but also ensure sustained services that as climate change progresses.

4. Stakeholders

The Dukuduku Project activities are being progressively developed and implemented in consultation with:

- The KwaJobe Traditional Council and local Councillors – specifically with regards the recruitment and nurture of tree-preneurs and waste-preneurs, identification of restoration sites and recruitment of local team members.
- The iSimangaliso World Heritage Area Management Authority – specifically with regards the planting of indigenous trees.

They are supported by a number of donors, including:

- The KZN Integrated Greening Program, through the KZN Department of Public Works – providing on-going support for the local tree-preneur network.
- The National Department of Environmental Affairs (DEA) Natural Resource Management (NRM) Land Users Incentives (LUI) Program – supporting the establishment and activation of the local Greening Your Future Restoration team.
- The DBSA Green Fund – supporting the establishment and activities of a local waste-preneur network.

- Global Nature Fund and the Living lakes Network – supporting environmental education, responsible tourism and Trees for Life activities around Lake St Lucia, and profiling the lake, its conservation and challenges through the global network.
- Umfulana – A German based Travel Company that has supported the costs of planting and caring for trees within the CEBA.
- Rand Merchant Bank Fund – supporting the development of the Wildlands Ambassador model.

5. Project Implementation

5.1 Objective 1: Enable sustainable community development.

5.1.1 Employ and nurture CEBA Project team

Effective 30th June 2013, Wildlands employed a local team consisting of 56 local community members (Figure 4).

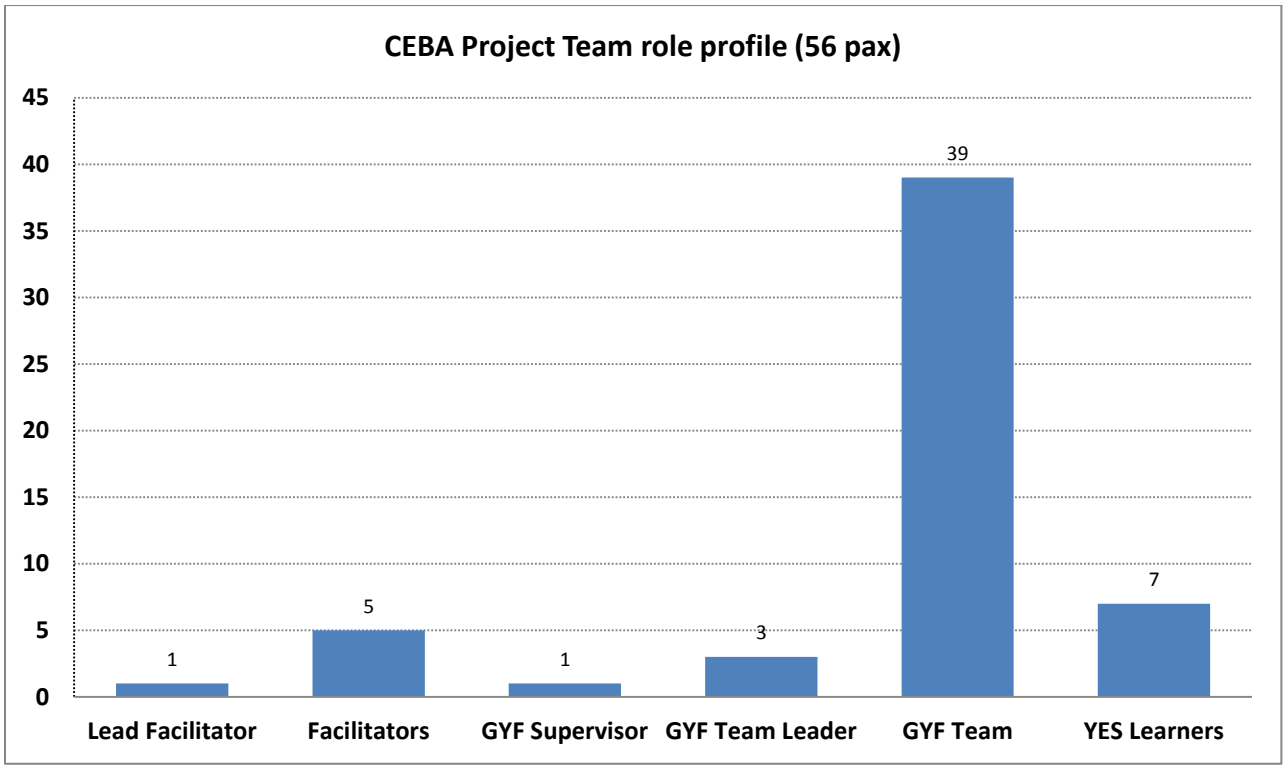

Figure 4: Project team profile (56 pax, 2013/2014).

The Project team are all local residents. They provide direct livelihood support to 511 extended family members and earn a collective R 1 404 733 per annum. These figures demonstrate the

significant local social and economic impact on the extended community. Figure 5 presents a demographic overview of the Project team.

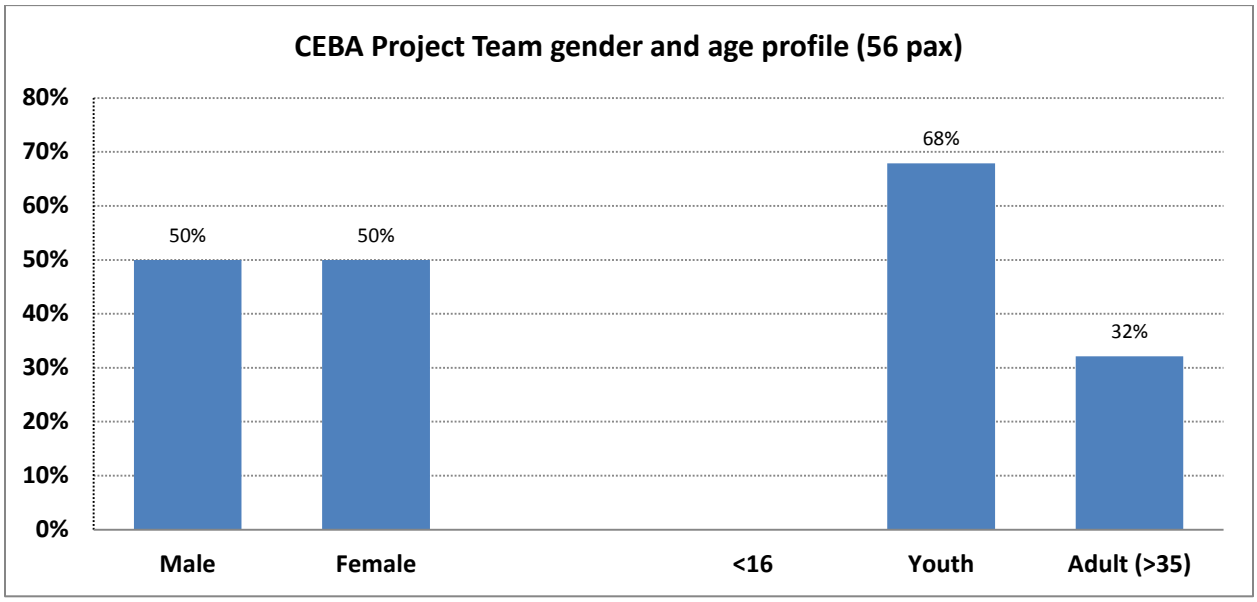

Figure 5: Gender and age profile of the Project team (57 pax, 2013/2014).

Wildands, along with the National Department of Environment Affairs (DEA) and KwaZulu-Natal Department of Public Works (KZN DPW), support both women and youth empowerment in South Africa. In this project context the majority of the tasks are manual and physically challenging, and thus we have simply achieved employment parity rather than the targeted 60% female bias (Figure 5). This parity is offset by the strong female green-preneur bias (Figure 8). The nature of the work does lend itself to the recruitment, nurture and development of young South Africans, hence the significant youth bias (68%).

It is widely recognised that one of South Africa's greatest challenges, is the proverbial "youth time-bomb". There is an urgent need to establish opportunities for school leavers to further develop their technical skills whilst gaining working experience. The educational profile of the Project team highlights this need (Figure 6). Almost all the team members have Grade 10 – 12 qualifications. However, not a single team member has a post Matric qualification, highlighting the difficulties faced by rural youth looking to further their education. With the majority holding a lower grade schooling career from grades 4 – 9.

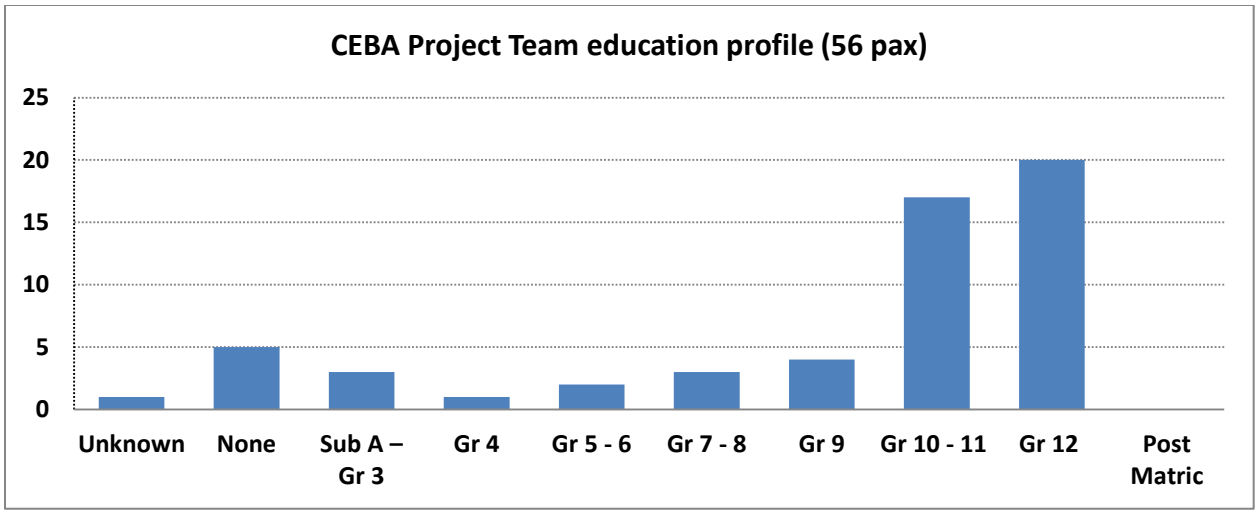

Figure 6: Education profile of the Project team (56 pax, 2013/2014).

Recognising this challenge, and in the interest of improving the capacity and ability of the greater Wildlands project team the Wildlands uBuntu Earth team have been piloting and progressively developing and implementing a team training and capacity building process. This is structured around complimentary skills development and enterprise development interventions which are progressively being developed and implemented. Over the past financial year, emphasis was placed on improving the Mkhuze Floodplain CEBA Project team's life, conservation and agriculture skills and literacy – through a total of 519 person days of training (Figure 7).

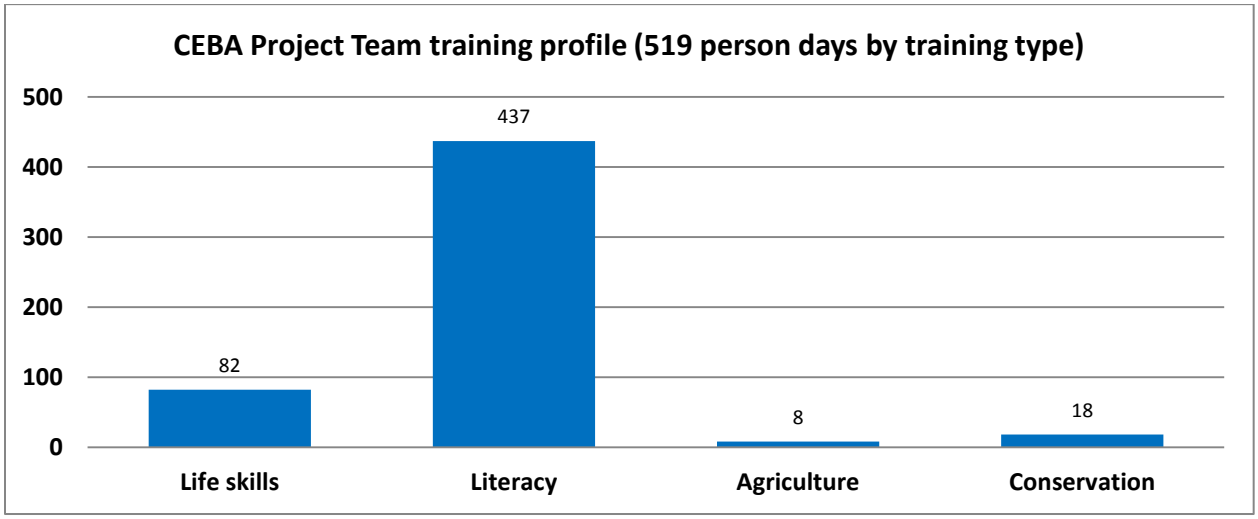

Figure 7: Project team training profile (519 person days, 2013/2014).

5.1.2 Recruit and nurture network of local Green-preneurs.

Effective 30th June 2014, Wildlands had 808 registered Green-preneurs within the KwaJobe community. Of these, 226 individuals traded trees and 8 traded recycling over the past financial year. Recognising an average household size of 3.4 pax, the extended green-preneur impact translates to 768 community members. When combined with the team impact (511 dependents), the Project has an indirect impact on over 1 335 community members. This is a significant contribution given the high unemployment and poverty state of these communities.

Figure 8 below presents demographic overviews of the traded Tree-preneurs and Waste-preneurs for the 2013/2014 financial year.

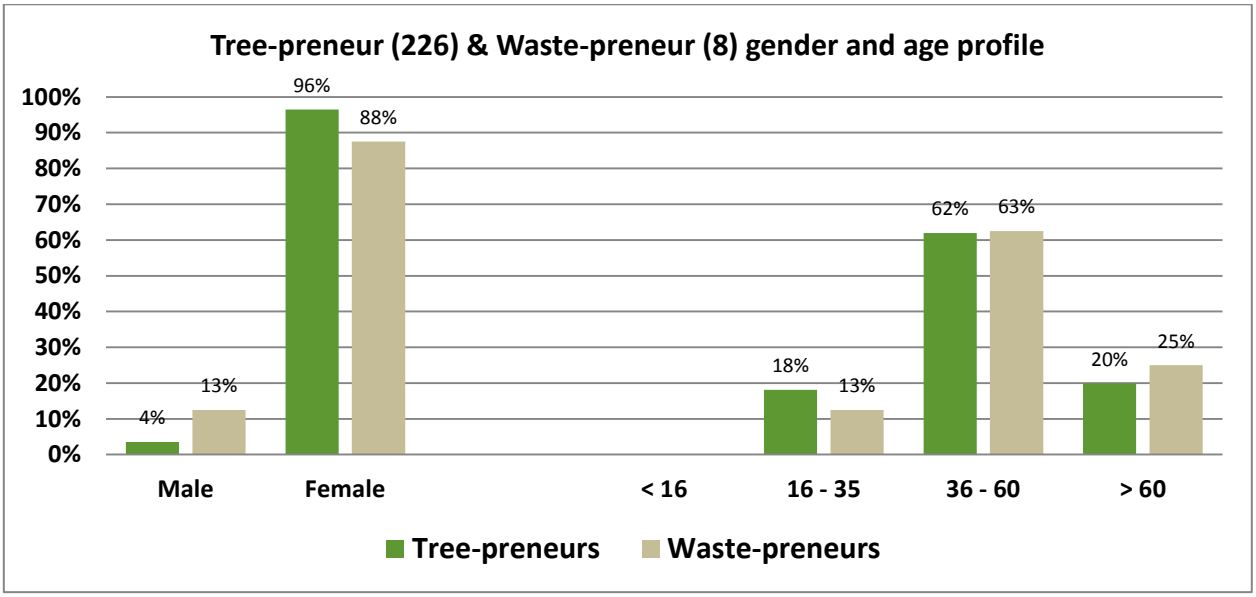

Figure 8: Gender and age profile of the Project's Green-preneurs

The vast majority of the Green-preneurs are female, demonstrating the value of this livelihood support model to the mothers and grand-mothers in these communities. In practise, the green-preneur opportunity allows them to generate additional livelihood support whilst continuing to anchor the day-to-day lives of their extended families. The vast majority of the Green-preneurs have no schooling (Figure 9), or are functionally illiterate or innumerate. Although these statistics reinforce the reality that education is a real challenge, it is clear that the Wildands Green-preneur model provides an opportunity for members of the community who are trapped at the "bottom of the pyramid" through their social circumstances and limited education.

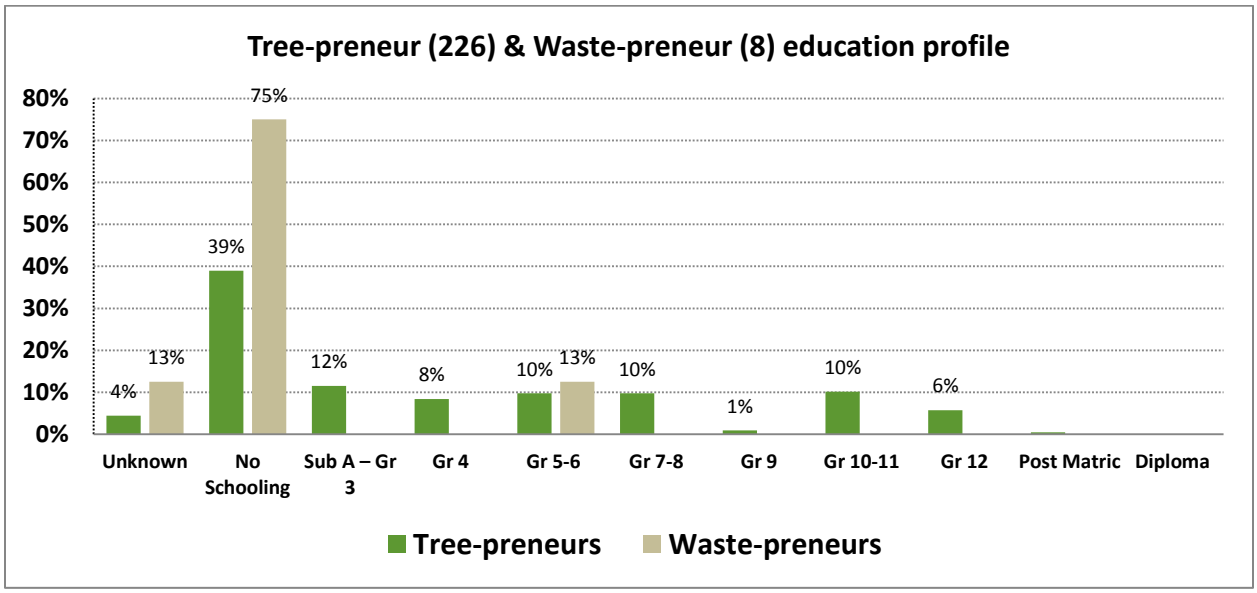

Figure 9: Education profile of Project's Green-preneurs

The introduction of the Green-preneur model into these communities was catalysed through the introduction of the Wildlands "Trees for Life" Initiative in 2010. Since then the local Tree-preneurs have propagated and bartered 349 348 trees to a total value of R 2 102 971 (Figure 10):

- 61 781 trees during the 2010/2011 financial year;
- 67 379 trees during the 2011/2012 financial year;
- 91 314 trees during the 2012/2013 financial year;
- 128 874 trees during the 2013/2014 financial year.

Over the past financial year, the Green-preneur model was enhanced through the formal introduction of the Wildlands "Recycling for Life" Initiative into the Mkhuze Floodplain CEBA Project. A total of 9 975 Kg of recyclable waste was collected, worth R 3 990 to the relevant Waste-preneurs.

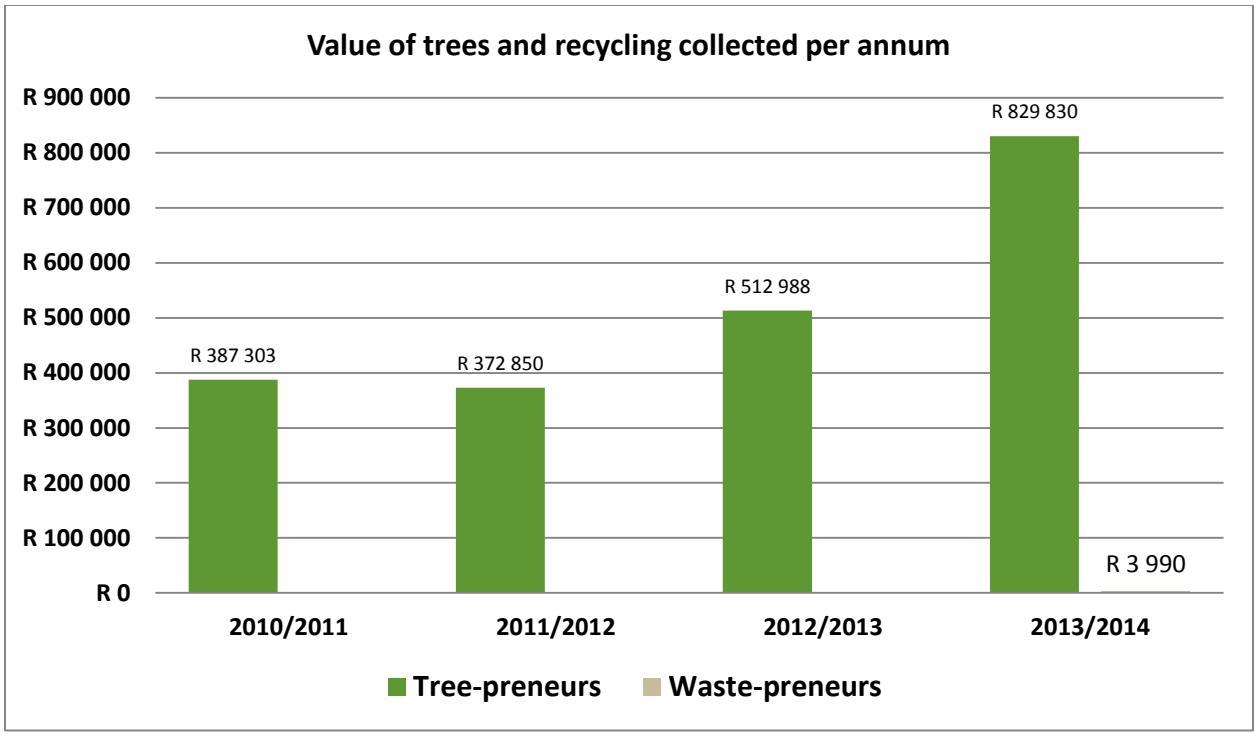

Figure 10: Annual value of trees and recyclable waste (2013/2014)

Over the 4 years the trees have been bartered for a wide range of goods, including groceries, household goods, educational support, Jojo Tanks and Qhubeka Bicycles. Figure 11 demonstrates the livelihood impact of the tree and recycling barter over the past financial year. Trees were bartered for groceries, bicycles, Klevr desks, carpets whilst the recyclable waste was bartered primarily for groceries (Figure 11). The barter process is directly dependent on and influenced by the funding available to Wildlands, and demonstrates the diverse positive livelihood impact of the tree barter model.

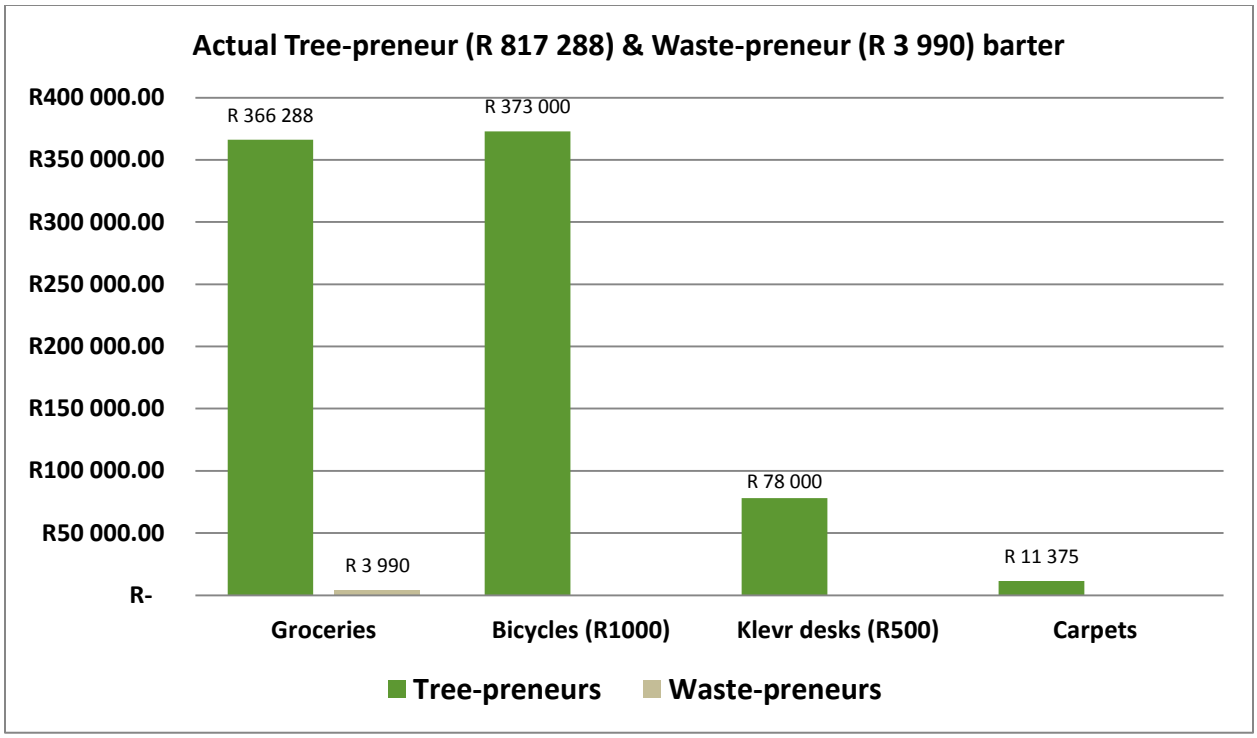

Figure 11: Actual barter profile (2013/2014)

In addition to enabling livelihood improvement through the barter of trees and recycling, the Wildlands team are also progressively developing and implementing green-preneur focused capacity building programs. The initial intervention (July 2009 to June 2013) was an Environmental Rewards Project. Through this Project Green-preneurs who met specific tree barter targets were rewarded with one day, overnight or multiday experiences (Table 4).

Table 4: KwaJobe Environmental Reward experiences (2009 – 2013).

	One Day		Overnight		Multi-night		TOTALS	
Year	**Pax**	**Days**	**Pax**	**Days**	**Pax**	**Days**	**Pax**	**Days**
2009/2010	0	45	0	20	0	0	**0**	**65**
2010/2011	0	117	0	68	0	0	**0**	**185**
2011/2012	0	81	0	77	0	9	**0**	**167**
2012/2013	0	0	0	6	0	18	**0**	**24**
TOTALS	**0**	**243**	**0**	**171**	**0**	**27**	**0**	**441**

Over the past year the team have focused on developing and piloting a new project supported by Rand Merchant Bank Fund, aimed at nurturing Project Team and Green-preneur Leadership, Ambassadorship and Citizenship. Mrs Zoe Gumede and Mr Thulani Mafuleka, are local Wildlands team members selected to be part of the pilot project. Over the next financial year he will lead the process of nurturing Leadership, Ambassadorship and Citizenship across his extended Team and Green-preneur networks, and their extended families.

The team also focused on developing and piloting a new "Emerging Entrepreneur" Project, supported through Enterprise Development grant funding from the South African Sugar Association and Enterprise Development facilitation funding from Mondi Zimele. Whilst no Mkhuze Floodplain CEBA Tree-preneurs were selected for the pilot phase, it is likely that a local group will be included this coming year.

5.2 Objective 2: Enable ecosystem restoration and conservation

5.2.1 Context

The Mkhuze Floodplain restoration work is incredibly important for a number of reasons, including:

- Deforestation has exposed the floodplain soils, resulting in them drying out and decreasing their fertility.
- Historic deforestation has left the community farms extremely vulnerable to high speed scouring during flood events.
- Lake St Lucia lies downstream of the floodplain, and sediment carried down the river is deposited in the Lake, leading to it silting up.

Restoring forest cover will help slow evaporation and the pace of flood waters, thereby allowing the farmed areas to be replenished with nutritional silt and debris, rather than scoured out.

Wildlands has been experimenting with reforestation models in the KwaJobe community since 2007, when it piloted a Carbon Farmer model. Over a 5 year period 203 community members planted over 35 000 trees. Unfortunately, this process was not particularly successful, due to high mortality. As a result the planting model has been migrated to a team based clearing, planting and aftercare model.

The vegetation of the study area falls in 2 biomes – savannah & forest. The dominant savannah biome is comprised of both Western Maputaland clay bushveld (Conservation status – Vulnerable) and Makhatini clay thicket (Conservation status – Least Threatened), while the forest biome fringes the Mkhuze River & is classed as Lowveld riverine forest (Conservation status – Critically Endangered). In this area Lowveld riverine forest is only found along the lower-lying reaches of the Mkhuze River where it exits the Lubombo mountain range. The width of the forest band varies considerably along the 104km project area, ranging from 1 – 50 metres. See Appendix 1 for a Lowveld riverine forest tree checklist.

The entire length of the project site, excepting the area around Cezwana Pan, has been designated as Critical Biodiversity Area 1 (KZN Terrestrial Systematic Conservation Plan, 2011). This means the area is "irreplaceable" in that there is little choice in terms of alternate areas available to meet KZN provincial conservation targets. If CBA 1 areas are not maintained in a natural state, then provincial and/or national biodiversity targets cannot be achieved. The elements of concern, or rather those elements that result in the area being designated as a CBA 1, are the Lowveld riverine forest, White-backed vulture, Western Maputaland clay bushveld & a mollusc.

The Mkhuze River is one of only twenty-five rivers (over 100km in length) that flow unimpeded from source to sea, and as such is an important hydrological system to maintain in top ecological condition (Atlas of Freshwater Ecosystem Priority areas in South Africa, WRC Report No. TT 500/11, 2011). This river is also one of the key freshwater inputs into the St Lucia estuary, a World Heritage Site, & as such the river & the surrounding land need to be managed in order to maintain ecological integrity of downstream systems.

5.2.2 Current threats

The most pressing threat in this CEBA, as in much of South Africa, is the spread of invasive alien plants (IAP's). There are a number of negative effects accompanying the invasion of alien plants into an area, of which the following are but a few examples: reduced biodiversity, increased fire risk, reduced area of arable land, reduced grazing lands, health concerns and reduced water flow. The most prevalent alien species in this CEBA are Triffid weed (*Chromolaena odorata*), Lantana (*Lantana camara*), Syringa (*Melia azedarach*) and Famine weed (*Parthenium hysterophorus*). Although not an IAP, the indigenous River-climbing Acacia (*Acacia schweinfurthii*) has become invasive along the river.

Of primary concern among the above-listed IAP's is the Famine weed *(Parthenium hysterophorus*). This invader has been present in South Africa since at least 1980, but has only recently been brought into the limelight by a significantly noticeable increase in its density & distribution. The fact that it can go from seeding to flowering in only 4 weeks, makes this a very serious threat that is only going to escalate without quick, decisive & effective control. The negative effects associated with this plant are cause for concern:

- Animals that walk through stands of Famine weed shows signs of inflammation & ulceration on their legs, bellies & mouths.
- Black rhino have been seen with such symptoms in Phongolo Nature Reserve. It also
- It causes severe allergic reactions in people, including dermatitis, hay fever and asthma
- It reduces agricultural productivity. The plant has allelopathic qualities i.e. it produces a toxic chemical that inhibits or impedes recruitment of other plants
- The plant quickly dominates areas, reducing biodiversity, as it is able to produce 100 000 seeds per plant

A further threat, and also one which is occurring across the country, is the poaching of wildlife in general and Rhino in particular. Prior to the recent escalation in Rhino poaching, much of the poaching that was discovered in the Mkhuze Game Reserve was snares set for antelope. This is primarily by community

members who cannot afford to buy meat, however the collateral damage is often predators and other non-target animals.

5.2.3 What is Wildlands doing to restore ecosystem functioning?

Wildlands has engaged with the DEA through their Natural Resource Management Landusers Incentive programme (NRM - LUI) to both assist in the control of IAP's and to plant trees back into degraded areas. We have a team of 41 people working to restore the ecological integrity of this area through the removal of IAPs in the winter months and the planting of indigenous species in summer.

5.2.3.1 Invasive Alien Plant (IAP) control

The IAP work that Wildlands is doing along the 104km length of the Mkuze River included in this CEBA Project is critical to the restoration of this river. The initial clearing of IAP's is a time consuming process as it is all done by hand, given that Wildlands prefers a conservative, non-chemical approach. The use of a mechanical approach minimizes the negative impact that herbicides will have on the sensitive systems associated with the River. The Wildlands IAP work is done in close association with EKZNW who are working inside Mkhuze Game Reserve and enable access to some of the more remote areas on their reserve boundary.

After the initial clearing activities it is necessary that that same site be revisited on regular occasions in order to do follow-up IAP control. Follow-up activities are planned every 3 – 4 months after any IAP control work i.e. Initial clear – 1st follow-up – 2nd follow-up – 3rd follow-up etc.

As per Working for Water's standard operating procedures, all clearing operations near river systems remove felled IAP's 30m from the river edge. Furthermore, these IAP's are not burned as such dense piles of fuel means the fires burn very hot on a concentrated area rendering that area sterile. The material is chopped up and placed in dongas or erosion gullies, where it acts as a sediment and seed trap. Material that propagates vegetatively is removed and burnt off site.

To date Wildlands has not undertaken any Famine weed clearing as the health implications are considerable. Wildlands is working closely with KZN Department of Agriculture and Environmental Affairs' Invasive Alien Species Programme in an effort to come up with a suitable plan for Wildlands' project areas.

Over the past year a total of 52.2ha was cleared of IAP's (Figure 12). This is the first year of intensive clearing and the area will be maintained and additional area cleared this coming year. The teams are working at 3 different sites, linked to where they reside (Figure 2). Emphasis is on keeping the riverine fringe and buffer to Mkhuze Game Reserve clear.

5.2.3.2 Tree planting

In addition to IAP eradication and control, the Mkhuze Floodplain team are also planting indigenous trees sourced from local tree-preneurs. These trees are being planted with a view to:

- Improve biodiversity and restore riverine forest structure and function,
- Reduce soil erosion by stabilizing the river bank,

- Reduce evaporation and suppress IAPs by establishing closed canopy.
- Sequester CO_2.

For the cleared forest and bushveld sites, the Wildlands team will select the tree species most suitable to plant in that particular site. See Appendix 1 & 2 for Lowveld riverine forest and savannah tree checklists respectively.

Planting density is dictated by the density of the trees in nearby areas of comparable vegetation. In forest (Lowveld riverine forest) the density of trees is fairly high, in the order of 1 tree every 1.5m – 2m. In the savannah areas, which are fairly well wooded, the tree density is somewhat lower at 1 tree every ± 3m. In this particular CEBA the tree density has not been severely compromised by human harvesting or alien plant invasions, & the existing vegetation requires only supplemental planting rather than a complete re-plant. Thus the planting density for forest is 1 tree every 3m, or 1 100 trees per hectare; for savannah it is 1 tree every 5m, or 400 trees per hectare.

Over the past year, the team planted 154 007 trees across the area cleared of IAPs (52.2 ha's). The survival of these trees will be monitored and additional trees planted where necessary. The primary reason for tree planting has been to stabilize the river bank of the Mkuze River and to provide a suppressing canopy for IAP's. Sites where trees have been planted are shown in Figure 12.

In addition to the above restoration activities, Wildlands supports 34 community farmers by paying them quarterly to maintain patches of restored vegetation – these we term Carbon Farmers. Initially Wildlands supplied the Carbon Farmers with trees for their plots, minimum size of 1ha, and entered into an agreement where they keep the trees alive in return for a quarterly stipend. This programme was initiated prior to any external financial contributions in the uMkhanyakude area, and understanding the key strategic position that these communities hold in terms of conservation, Wildlands wanted to provide some level of financial support as well as striving for a positive conservation outcome. The Carbon Farmer programme has run for five years, the end of which was reached in June 2014.

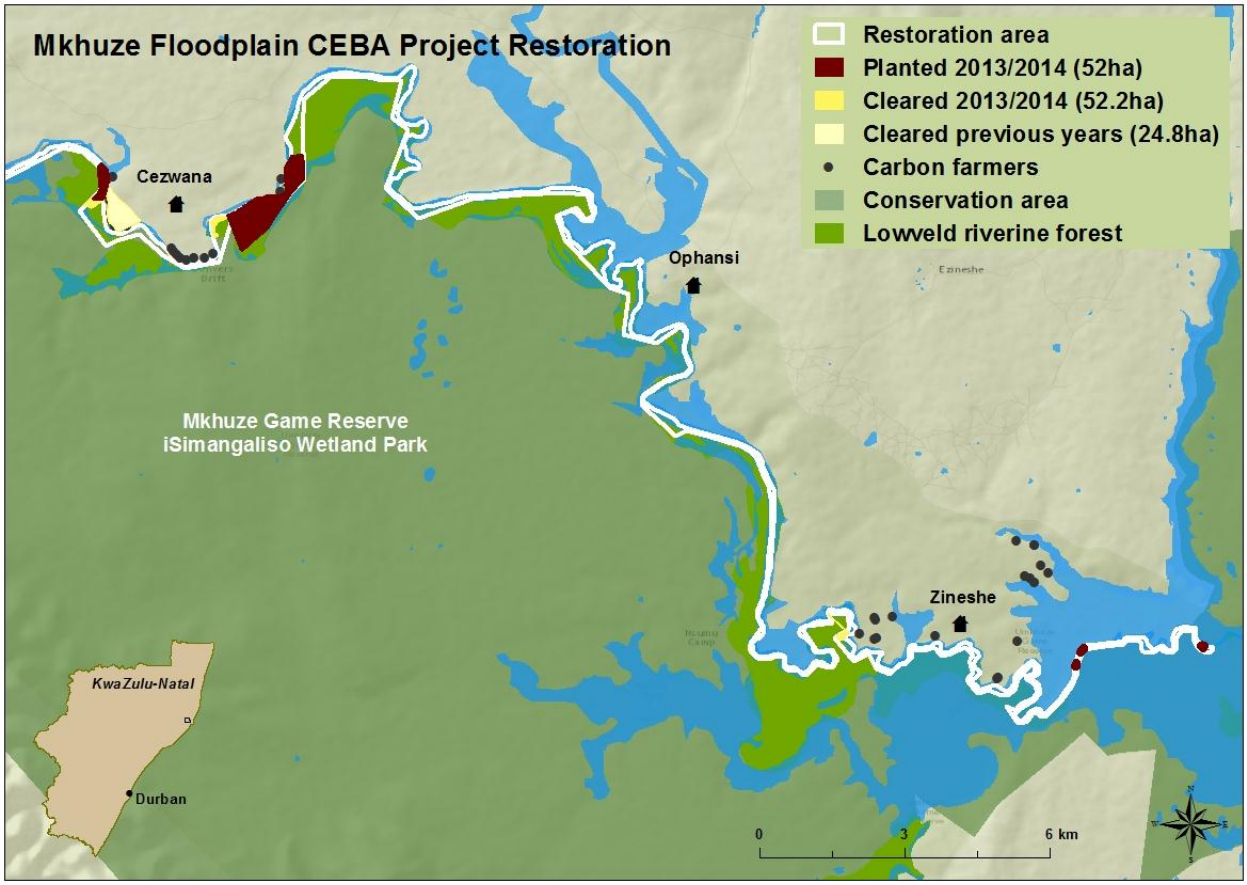

Figure 12: Mkhuze Floodplain CEBA Project restoration work (2013/2014)

5.2.4 Future activities

The Wildlands team will continue to provide follow-up support for the areas cleared and planted to-date, whilst progressively expanding these foot-prints. In addition, Wildlands is engaging with the Provincial and National Departments of Environmental Affairs to begin developing and implementing plans to control Famine weed in this and other project areas.

The local restoration team's work is supported by an on-going monitoring and evaluation process, aimed at progressively improving the restoration process. This will include an assessment of:

- Invasive alien plant control success.
- Indigenous tree survival.
- Improvement in species diversity.
- Overall ecosystem health.

This will be supported by:

a. A carbon baseline assessment which will be used to inform a 5 yearly assessment of sequestered carbon dioxide (CO_2).

b. A socio-economic assessment which will be used to inform a 3 yearly assessment of the associated socio-economic impact of the restoration process.

6. Data sources

- Cooperative Governance and Traditional Affairs (COGTA) www.kzncogta.gov.za/Portals/0/.../Provincial_Backlogs_201306_3.pdf
- Futureworks (2005). uMhlathuze Environmental Services Management Plan.
- Population Census (2001). Statistics South Africa- http://www.statssa.gov.za/census01/html/default.asp
- Statistics South Africa (2008). Community Survey 2007. http://www.statssa.gov.za/publications/populationstats.asp
- TEEB – The Economics of Ecosystems and Biodiversity (2011). TEEB Manual for Cities: Ecosystem Services in Urban Management. www.teebweb.org
- Water Research Commission (2011). Implementation Manual for Freshwater Ecosystem Priority Areas.

7.0 Appendices

7.1 Appendix 1 Tree species occurring in the Mkhuze Floodplain CEBA

Scientific name	Common name	Veg type - planting site
Acacia robusta	Robust thorn	Riparian / Savannah
Acacia xanthophloea	Fever tree	Riparian / Savannah
Albizia anthelmintica	Worm cure albiza	Savannah
Balanites maughamii	Green thorn	Savannah
Bauhinia galpinii	Pride of de kaap	Savannah
Berchemia zeyheri	Red ivory	Savannah
Blighia unijugata	Triangle-tops	Riparian Forest
Breonadia salicina	Matumi	Riparian / Savannah
Capparis brassii	Narrow-leaf caper-bush	Savannah
Capparis tomentosa	Woolly caperbush	Savannah
Carissa tetramera	Sand Num-num	Savannah
Celtis gomphophylla (durandii)	False white stinkwood	Savannah
Croton steenkampianus	Maputaland Croton	Savannah
Dovyalis longispina	Coast kei-apple	Savannah

Ekebergia capensis	Cape ash	Savannah
Euclea divinorum	Magic guarri	Savannah
Ficus caprefolia	Sandpaper fig	Riparian / Savannah
Ficus sur	Broom cluster fig	Riparian Forest
Ficus sycomorus	Sycamore fig	Riparian / Savannah
Grewia bicolor	White raisin	Savannah
Kigelia africana	Sausage tree	Riparian / Savannah
Kraussia floribunda	Rhino coffee	Riparian / Savannah
Monodora junodii	Green apple	Savannah
Nuxia oppositifolia	Water nuxia	Riparian / Savannah
Ozoroa engleri	Weeping Resin-tree	Savannah
Pappea capensis	Jacket-plum	Savannah
Phoenix reclinata	Wild date palm	Riparian / Savannah
Phyllanthus reticulatis	Potato bush	Savannah
Rauvolfia caffra	Quinine-tree	Riparian / Savannah
Salvadora australis	Narrowly mustard tree	Savannah
Schotia brachypetala	Weeping boer-bean	Riparian / Savannah
Sclerocarya birrea	Marula	Savannah
Spirostachys africana	Tamboti	Riparian / Savannah
Strychnos henningsii	Red bitter berry/ Natal Teak	Savannah
Strychnos madagascariensis	Black monkey orange	Savannah
Strychnos spinosa	Green monkey orange	Savannah
Syzigium cordatum	Waterberry	Riparian / Savannah
Tabernaemontana elegans	Toad tree	Riparian / Savannah
Terminalia sericea	Silver clusterleaf	Savannah
Tricalysia lanceolata	Jackal-coffee	Savannah
Trichilia emetica	Natal mahogany	Riparian / Savannah
Vernonia colorata	Lowveld bitter tea	Savannah
Voacanga thouarsii	Wild frangipani	Riparian Forest