

Balancing the social and ecological concerns on the outskirts of Ethiopia's capital

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### Abstract:

*In the highlands of Ethiopia on the outskirts of the capital city there is a widespread presence of the Australian and thus invasive Eucalyptus globulus. The species offers a livelihood for many, but is damaging to the native species, overall biodiversity and soil quality in the area. Research was done through studying the area, which was gradually restored through removal and replanting methods lead by a local non-governmental organization with the support of volunteers both local and international. Soil quality, biodiversity, and other social and ecological factors were observed and researched through a comparison of quadrants at differing stages of restoration efforts. The results concluded that the area which was restored had much more biodiversity and less frequency of soil runoff, which limited soil erosion, thus improving soil quality. The challenges are creating a positive ecological change while addressing the social needs of the people. Choosing to plant species, which could offer an alternative fuel source as well as planting crops to feed a hungry nation are recommended, as well as methods to increase the speed at which restoration efforts can be completed.*

### Introduction:

The highlands of Ethiopia are now largely devoid of forest vegetation. Large areas show severe land degradation and erosion, and the region is notoriously prone to drought and famine (Darbyshire, 2002). Ameliorating these conditions, while simultaneously addressing the social concerns and challenges is at the core of the Entoto Park project. The central organization associated with this project is the Ethiopian Heritage Trust (EHT), which was established in 1992. Its main mission is to conserve and restore the natural heritage of Ethiopia which encompasses indigenous and endemic plants and animals.

The EHT was granted rights to the land for the sake of their project, which is to create a national resort/park area. In the last two years they have restored, using their methodology, 27 hectares of land. EHT is a citizen based non-profit organization, a legal body of communal membership. They operate under a governing council and an executive board. Their work is funded through private memberships of anywhere from 5.00 birr (50 US cents) to 20,000 birr (200 US dollars). They for see requiring 1 million birr for the next five years for the park project to progress significantly. The specific goal for the area is to create an area for local citizens and tourists to visit and use recreationally. The developments would include an area for running, as it is a national sport, a camping area, and walking tracks (see Appendix

1.1). The goal would be to one day charge fees for use of the area, and have a restaurant and resort related services.

In a study done on *Eucalyptus globulus* in Ethiopia it was found that its growth was largely dependent on topsoil water content, giving it the potential to cause substantial dry-season groundwater depletion. Severe water depletion was also found at a depth of 9m at its taproots (Fritzsche, 2006).

Another study found Ethiopian soil deficient in nitrogen and potassium and other micronutrients. Further, it found that many farmers relied on merely a few species of trees for products and services, which increases sensitivity to pests and diseases (with low biodiversity), as well as decreasing the overall sustainability of the farming system (Kindu, 2005).

A Dutch study looked at how adjacent crops react to the presence of *Eucalyptus globulus* in the Ginchi watershed in the central highlands of Ethiopia to the southwest of Addis Ababa. The crop reduction for tef (which is used to make Anjera, a traditional bread. See figure 1.1 below) and wheat was anywhere from 10 to 90% (Kidanu, 2005). These studies are all relevant concerns with the *Eucalyptus globulus* presence on Mount Entoto.



Figure 1.1 Tef *Eragrostis tef* Grain

A study was done through Addis Ababa University discussing the correlation between farmers' decisions to conserve soil and water and their knowledge of conservation and ecological issues. The study site was in the highlands (>1500 m asl), which was described as having the highest agricultural

potential in the country, which is crucial, as food production is threatened and contributes 45% of the annual GDP. It was found that farmers are aware of erosion problem, but comprehension is limited to mostly visible evidence. It also found that farmers have negative attitudes towards the suggestions of outsiders. Thus, farmers ideas and traditional methods (terraces, drainage ditches etc) must be considered when implementing measures (Amsalu, 2004). The EHT is a local organization with mostly local membership and holds to these types of traditional methodology, which will help with overall local co operation.

Location:

Ethiopia is a land locked country in the central eastern side of Africa. Ethiopia’s capital of Addis Ababa has a population of 2 million people and is located at 9.03333 [latitude in decimal degrees] and 38.7 [longitude in decimal degrees] and has an average altitude of 2400 meters above sea level (masl). Mount Entoto is to the north of the capital, and the project site is located on the south eastern slope of the mountain in the Ethiopian plateau, these highlands have an elevation elevation of 2600 – 3100 meters above sea level. The project site spans 1300 hectares and contains Afromontane forest-woodland vegetation being in the ecological zone of the Afromontane belt, in the agroclimatic zone Moist Dega. The average rainfall is 1400 mm and the area experiences an average temperature of 14 degrees Celsius. The northern rim of the project site serves as a watershed between the Blue Nile to thenorth, and Awash River to the south. (EHT information)



[www.wordtravels.com](http://www.wordtravels.com) Figure 1.2 Map of Ethiopia

### Environmental Issues:

Being on the edge of the capital city of Addis Ababa with over 2 million inhabitants within the surrounding area of Mount Entoto there are many challenging environmental issues. The population pressures from a high level of rural to urban migration, as well as high birth rates creates a need for continuous construction within the city causing higher population density and an increased pressure on agricultural lands. Industry is being developed (extractive industry) on the outskirts of town. This contaminates land, which can no longer be used for agricultural practices. The project area is frequented quite intensely by the people of Addis as it is a fuel resource (expanded on below). There are limited areas in the city to acquire fuel thus it experiences high visitation from the city. Most poorer Ethiopians operate on basic fuel sources such as leaves as stick of any plant available, as well as animal dung. Since *Eucalyptus globulus* is widespread and fast growing people come to the project site to collect this type of fuel. This is a challenge for the project at hand as restoration work is difficult when the site is first planted and is sensitive to damage more so than when it has had the opportunity and time to become established. The more people the more vulnerable the area is to these type of population pressures.

Furthermore, waste is found within the project area and there is no garbage collection on the mountain. Another environmental challenge associated with creating a park within the project area is that the area isn't easily accessible by vehicle or otherwise. Taxis can go up the mountain to a certain point, but 4WD vehicles are needed to access most areas. These are not vehicles commonly found in the city and most people who enter the project area walk, but in terms of the area being a tourist destination, tourists will be unlikely to walk up to the park despite its beauty. Thus, roads would need to be constructed within the project area to create accessibility. This type of disturbance could create drainage issues and flooding challenges.

### Social Issues:

Many people from the city of Addis rely on the Eucalyptus found on Mount Entoto in order to survive. Fuel collectors as they are called, are mostly women and they spend many hours walking up and down the mountain and on the project site they collect sticks, twigs and leaves, which they then carry on their back and sell at the bottom of the mountain, or some collect for personal use. Men also collect sticks to sell, but they are seen using donkeys as transport (See figure 1.3). A social issue tied to the existence of fuel collecting how it happens now is that often women are forced to give men at the bottom of the mountain their days work and are left to start over.

That competition reflects the much broader issue of the lack of jobs for the citizen of the capital city and Mount Entoto. The plan of the trust is to remove all *Eucalyptus globulus* leaving nothing for fuel collectors, as the restored areas are not allowed to be used for fuel source gathering. This need for fuel will not go anywhere. It is more likely to increase. Having an alternative is a social necessity in the future. The EHT however already uses the park project as a way of creating alternative jobs for the people of the area. In order to prevent the 'poaching' of trees that had been planted by the Trust 60+ guards are working within the project area monitoring it.



Figure 1.3 Donkeys carrying fuel

The EHT also provides employment opportunities for those living on the mountain, as they can receive payment of 10 birr a day (approximately \$1 US). It is in the project plan however to relocate the farmers on Mt Entoto, which is legal because they have only users rights to the land, but negative because of the lack of productive land available to subsist off of. Especially once out of the highlands and heading to the drier low lands.

Another social challenge is how to commence charging locals to access the area they enter now for free. EHT's goal is to create a green-space for the people of Addis, but for many even a small entry charge will be beyond their means. For those who cannot afford entry they are left with little to no options for an escape from the city. Currently within Addis parks are partitioned by hedges and those wanting to spend time there must pay a rental fee. They are often used for weddings and other formal occasions, or for the more affluent dates or picnics.

#### Local/International Involvement:

Locally the citizens of Addis have little to no say over the future of the project site. Students from The University of Addis participate in field trips there, help with labour work as well as research, but generally citizens have no part in decision making. EHT has been granting control by the government, which offers them a great opportunity for positive environmental change, but relinquishes the government from the financial burden leaving it up to private donors to cover the costs. Financial limitations are a challenge in all aspects of the restoration. Also, international participation includes Dutch support and international students, which are great supporters of the project, but do not necessarily understand the plight of the common man living off of the current project area.

### History:

When Menelik was sworn in as emperor of Ethiopia in the late 1800s he established the capital city in the slopes of Mount Entoto where the current project site is. The forest was under extreme pressure due to population growth and the people quickly ran out of resources by the time Menelik II took over the throne. In order to supply the people of Addis Ababa (Addis) with a source of fuel Menelik II reforested with *Eucalyptus globulus*, which is indigenous to Australia and nearly became the forest's monoculture. In 1974 the land changed from private ownership and became state owned. Dwellers on the mountain (60+ households) now only have 'users rights', which allows the government to allocate control, but to maintain overall possession of the land.

### Conditions:

*Eucalyptus* plantations are extensively managed for wood production in the central highlands of Ethiopia (Zewdie, 2009). The (native) forest cover of Ethiopia used to be 35-40% of its total land area. The result of deforestation for various purposes is a natural forest cover of only 2.7% in 1989 (Kindu, 2005). Currently there are approximately 100 hectares of *Eucalyptus globulus* forest within the restoration project site (See figure 1.4) When *Eucalyptus globulus* was initially planted it thrived and grew faster than native species limiting the areas biodiversity. Since the initial plantation of the species there have been continuous re-plantings of *Eucalyptus globulus* after harvesting the wood for much needed fuel. The issues that have arisen include a high level of soil erosion since there is no ground cover in between the Eucalyptus trees and thus nothing to hold the soil aside from the roots of *Eucalyptus globulus*, which have a low soil holding capacity. Another large factor in the issue of erosion is the severity of the rainy season, which from June to September and flooding occurs.

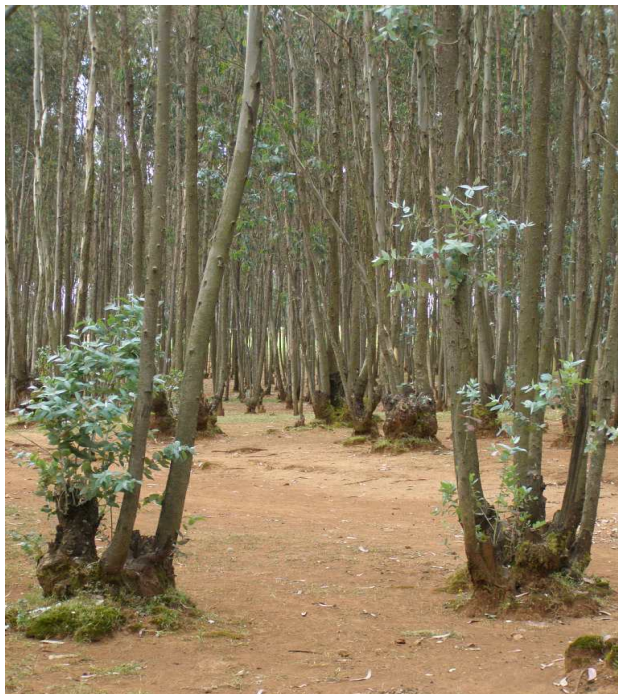


Figure 1.4 *Eucalyptus globulus* plantation

Acknowledgements:

I would like to thank Tesfaye Hailu with the Ethiopian Heritage Trust for the background on the social political and environmental information on this project.

Methods:

The central focus of my fieldwork in the Ethiopian highlands was a comparative study of the area which EHT had spent time restoring and the area which remains a Eucalyptus plantation. Due to technological limitations and a general absence of any type of advanced equipment the assessments were done using basic tools and materials (tape measure, flagging tape, shovels, and qualitative observation). My research took place early in the morning from September to November, which is just after the rainy season terminates.

I first assessed the un-restored areas by arriving at 8 am when it is more likely to see birds and other species. I proceeded by measuring out a quadrant and running line transects across the quadrant, which methodology I learned through field studies with The University of Victoria. I did this on three different quadrants which each measured 100 square meters. I observed and noted wildlife and soil conditions, as well as slope and foliage coverage on the site. In order to determine the soil I assessed texture, shine and cast (Day, 1983). I observed the slope with EHT's project manager at each site and found that it averaged at a 30%+ slope.

Species	Percentage Cover
Moss/Mixed Grasses	6.30%
Eucalyptus globulus	9.00%

Percentage Cover Unrestored Site 1

Species	Percentage Cover
Moss/Mixed Grasses	19.20%
Eucalyptus globulus	5.30%

Percentage Cover Unrestored Site 2

Species	Percentage Cover
Moss/Mixed Grasses	23.90%
Eucalyptus globulus	15.50%

Percentage Cover Unrestored Site 3

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Site 1	10%
Site 2	16%
Site 3	28%
Average	18%

Canopy Cover on Unrestored Sites 1,2, 3

Species	Percentage Cover
Clover/Mixed Grasses	84%
Acacia abyssinica	7.30%
Yadey abeba	8.70%

Percentage Cover Restored Site 1

Species	Percentage Cover
Hagenia abyssinica	15.60%
Yadey abeba	8.00%
Mixed Grasses	61.80%
Acacia abyssinica	10.40%
Juniperus procera	4.00%

Percentage Cover Restored Site 2

Species	Percentage Cover
Clover/Mixed Grasses	74.10%
Yadey abeba	8.00%
Juniperus procera	3.00%

Percentage Cover Restored Site 3

Canopy Cover	
Site 1	0%
Site 2	0%
Site 3	0%
Average	0%

Canopy Cover Restored Sites

I stood at three different locations within the quadrant each an equal distance apart and measured the canopy cover. In noting species diversity there was one *Juniper procera* located in site 2. No other species of shrub or tree was present. No wild animals/insects were observed. Groups of cattle (donkeys and goats) were seen grazing on site 3. At the restored sites I observed a variety of butterflies and birds.

I collected soil samples to look at its qualities on the un-restored areas as well as the soil on the restored sites. In order to restore the site area Eucalyptus needed to be harvested and then once only the stumps remained they were de-barked (see figure 1. 5). The bark was physically cut back to keep the species from propagating.



Figure 1.5 *Eucalyptus globulus* stump

The status quo within the project's history was to simply cut it back and give the land time for the toxins to leave the soil. Stumps were cut back in the fall when I was there and then the land was left until just prior to the rainy season. After that period of time a mixture of 2 parts local soil: 2 parts compost and 1 part sand were combined to create a more alkaline soil improving soil conditions. Then this soil was planted with 60,000 seedlings. The seedlings prior to planting are raised in a nursery, which is on site, and has raised approximately 500,000 seedlings of indigenous species since the beginning of EHT's control of the area (See figure 1.6)

These species include *Juniperus procera*, which is presumed to be the natural vegetation of the region (Darbyshire, 2002). It is a valuable timber and can survive dry conditions once established, but does better in high rainfall areas. Other species include *Acacia abyssinica*, which is appropriate for the areas agroclimatic zone and has the uses of firewood, charcoal, soil conservation and nitrogen fixation. *Hagenia abyssinica* is appropriate for high altitudes (2,300 – 3,300 masl), to be used as a fuel source and is ornamental. The *Olea europaea* responds well to being planted in good soil, but like the Juniper can be drought resistant once established. It is however slow growing and difficult to raise and has a low rate of germination (Bekele-Tesemma, 1993). The species were determined through the knowledge of EHT representatives as well as plant identification books. Most of these aforementioned plant species fruit and bloom supporting the local endemic bird, and mammal species. This is unlike the *Eucalyptus globulus*, which doesn't offer this.



Figure 1.6 Nursery

Rock terraces to prevent soil runoff were constructed approximately 8 feet apart, in between plantings it varied depending on slope. Ditches were also dug alongside road to prevent flooding in the area (See figure 1.7).



Figure 1.7 Restored Project Area

### Results/Interpretation:

The species diversity on the un-restored sites was essentially non-existent and was almost a monoculture of *Eucalyptus globulus*. There was little to no ground cover on the non-restored sites. The soil was barren and dry despite it being early in the dry season, which shows how much water the Eucalyptus requires, and the low water retention abilities of the soil, which using the described method I assessed as a heavy clay soil, vertisol. The canopy cover wasn't too minimal, but nothing would grow as the Eucalyptus requires much water and excretes toxins that will not support other species which could cover the soil to prevent soil and nutrient run off from taking place during the rainy season. The soil also is in a poor condition to sustain new plantings (see figure 1.8)



Figure 1.8 Un-restored site soil

The replanted area was much more bio-diverse with greater water retention in the soil. Small springs were seen on site, which before *Eucalyptus globulus* was removed would not have been present on site. Based on observation of the site after the dry season, and local expert opinion the plantings have a 70% success rate. In comparing the two sites it was noted that the un-restored site had rocky, highly eroded soil. Soil erosion diminishes soil quality and thereby reduces the productivity of natural, agricultural, and forest ecosystems (Pimentel, 2006). The severity of the erosion has been noted by past research and evident as the rain runs down the mountain into the city during the rainy season (Englund, 1994). It is also noted that the un-restored sites have no organic matter left on the soil to decompose and provide the soil with nutrients, as fuel collectors are permitted to come and collect all the sticks and leaves that fall to the ground. There was only one incident of a species other than the *Eucalyptus globulus* being present on any of the un-restored sites.

On the replanted area much more species diversity was observed. The run off management through terraces and check dams kept soil erosion to a minimum, thus allowing the newly laid down soil to remain intact and for the newly planted species to remain and hold the soil in place. Mole Rat *Heterocephalus glaber* tunnels were seen on site, as were Spotted Hyena *Crocuta crocuta* dens. Hooded Vultures *Necrosyrtes monachus* were seen flying overhead while going from one site to the next.

This lack of biodiversity is evidence of poor soil quality needed to give even hardy species, which can handle drought, time to become established and withstand the dry season. This is also, and perhaps more importantly, evidence that its nature is to suppress the growth of other species in an area to which it is not endemic. This suppression is partly due to the reason the *Eucalyptus globulus* was there to begin with, to be a fast growing fuel sources. It also supports the previously studied chemical component in the leaves and roots, which prevents the growth of trees and herbs (Englund, 1994).

The highlands would typically be the most productive lands in Ethiopia, and the conditions under *Eucalyptus globulus* are unique compared to areas of similar conditions with indigenous species intact. Through the comparison of both the restored and un-restored sites it is obvious that *Eucalyptus globulus* needs to be removed for the health of the ecosystem. In looking at other studies my research confirmed the high quantity of water required by the species, and with the rocky barren soil, the high incident of soil loss.

#### Discussion:

The results of my research within the project area showed clearly that the removal of *Eucalyptus globulus* is crucial to limiting soil erosion, and eradicating the toxins which are present in the soil, which originate in the presence of *Eucalyptus globulus* on site.

Cutting back the *Eucalyptus* was an effective approach to keeping it from propagating and it offered the soil and opportunity to detoxify. It is also more cost efficient than tree stump removal, which is beyond the budget of the project. Furthermore, adding a more alkaline combination of soil to the previous shallow soil that was low in nutrients allowed other species to be planted, and have a relatively high success rate over the dry season. The terraces and ditches, which were constructed to control runoff were effective based on the soil quality observed after the rainy season, plant species survival and health of the restored sites after the termination of the rainy season. A couple of trees on site were even waterlogged, which never would have happened during the dry season pre *eucalyptus* removal. There were also many more birds and insects on the restored area as the new plant species enable them to forage.

The need for a fast growing fuel source to support a growing population hasn't disappeared. It is still very a central issue in Ethiopian's daily lives, to an even larger extent with continuous population growth (See figure 1.8).

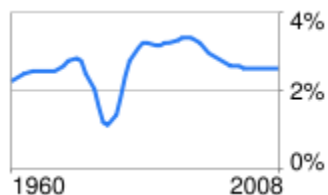


Figure 1.8 World Bank, World Development Indicators, 2009

Limitations within my research included but were not constricted to a lack of advanced tools. My experimentation was limited to the above research as, due to political complication, I was only granted half of the amount of time I intended to use on research on the project area. A month into my research with the EHT I was denied my visa renewal for three months and ended up staying another 5 weeks, but due to political restriction on my work the EHT would no longer support my visits to the project site through accompaniment or transport. I was fortunate to have outside support and continued my research with the help of friends and a 4WD vehicle, but was limited in technical advice and local knowledge.

#### Recommendations:

The need to increase wood production significantly in the near future is critical from an ecological perspective, the methodology and approach to the restoration of Mount Entoto are positive, and from the perspective of social conditions there are many challenges. I saw the extreme poverty that people were trying to alleviate using Eucalyptus as their means. The ecological positives are vital for all inhabitants of the area, as well as the endemic species, but strong social steps need to be addressed, as this project borders a very large urban center.

A lack of food for Ethiopia's people and a strong reliance on food aid is a disadvantage to the social circumstances of the country. The economy relies heavily on agriculture as 85% of exports are agricultural products. Despite this they import a third of their food. Also, 80% of people's jobs are in the agriculture sector (Amsalu, 2006). This project ought to support the Ethiopian people's ability to feed themselves, and domestic food transport from the more productive highlands to the struggling lowlands which experience frequent drought, and starvation ought to be considered. Agroforestry would be an effective approach to enable a combination of a leisure area and food production.

The past emphasis on eucalypt plantations underscores the importance of introducing multiple-product tree species into agroforestry system in the Ethiopian highlands, where trees can be combined with the production of annual crops. Also planting *Eucalyptus globulus* along field boundaries produces a harvestable tree crop within 4 or 5 years. These tree are also un-palatable to goats and sheep. (Kidanu,2004). There is a possibility that keeping some Eucalyptus in the area could be ecologically sound with proper monitoring. Keeping the species controlled using the currently used cut back method as well as soil quality monitoring would be effective. Also, planting, or perhaps leaving them intact on a low gradient slope would prevent runoff during the rainy season. Terraces on a Eucalyptus site could be similarly effective as they are in the restored site encouraging less soil damage.

In terms of continuous monitoring of the site, frequent visits must continue, as well as monitoring cattle grazing on the restored vulnerable area. This need is especially high just after planting, but, as cattle find the indigenous planting to be desirable as do the local people with fuel and financial needs this monitoring will be continuous. Measuring top soil loss during or nearing the end of the rainy season would be an effective way of ensuring the terraces are set up correctly and that they are sufficiently preventing soil loss. Monitoring species sighting and overall biodiversity must be done regularly to ensure that the animal populations are appropriate.

In order for the EHT's ecological objectives to be achieved work on Mt Entoto needs to continue, which financially is challenging for them. It requires a lot of time and money. EHT needs to continue to solicit help from the surrounding community and promote the positive ecological reasoning behind their actions. In order to speed up the restoration's progress EHT should look at new methods of how to increase the efficiency of detoxifying the contaminated soil (such as Arbuscular mycorrhiza fungi). My independent observations and suggestion is that once soil quality has vastly improved designate an area of the project site to be used for agricultural purposes. Allow the people who currently have land use rights in the area to plant crops using a rotation that keeps soil nutrient rich and allows them to have a livelihood outside of *eucalyptus globulus* fuel collection, or aid with restoration work, which is positive, but temporary and does not support the need for higher food production in Ethiopia's highlands, as these areas are superior for growing crops compared to the very dry low lands.

Allowing farming in the park, perhaps creating a community garden, not simply a botanical garden, which is now in place would be a great addition to the park plan, and could help ameliorate the soil quality. Cereal (such as the culturally important tef *Eragrostis tef* Grain)/legume crop rotation has the potential to improve the productivity in nutrient deficient soils. The legume is nitrogen fixing, which the soil is low in. This reduces the need for inorganic fertilizers, which most farmers are unable to afford. Looking at the microbial community, which is integral part of soil and crop productivity. Mycorrhizal fungi have been described as soil micro-floras that are involved in nutrient transfer from soil to plants in natural ecosystems. Arbuscular mycorrhiza fungi contributes to crop growth and development. Many research works have emphasized the importance of this symbiosis in phosphorus uptake, root growth, and resistance to drought (Emmanuel,2010).

The goal of the area cannot be solely a pay to enter green-space for affluent citizens of Addis, nor simply for tourists. At the current pace, with all the challenges at hand, it will take many years to develop and restore the area to the point of having a finished vacation area, which will, once developed offer employment opportunities, but in the meantime people need jobs, food and fuel. Using the country's most productive agricultural lands purely for scenic beauty is not ideal for the social conditions of the nation at large.

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## Appendix:



1.1 Map of Proposed Entoto Park Project.

### Bird Species List:

Moorland Francolin(*Francolinus psilolaemus*)

Erckel's Francolin(*Francolinus erckelii*)

Wattled Ibis(*Bostrychia carunculata*)

White-collared Pigeon(*Columba albitorques*)

Dusky Turtle-dove(*Streptopelia lugens*)

Black-winged Lovebird(*Agapornis taranta*)

White-cheeked Turaco(*Tauraco leucotis*)

Montane Nightjar(*Caprimulgus poliocephalus*)  
Nyanza Swift(*Apus niansae*)  
Banded Barbet(*Lybius undatus*)  
Abyssinian Woodpecker(*Dendropicos abyssinicus*)  
Dark-headed Oriole(*Oriolus monacha*)  
Thick-billed Raven(*Corvus crassirostris*)  
White-backed Tit(*Parus leuconotus*)  
Brown Woodland-warbler(*Phylloscopus umbrovirens*)  
Brown Warbler(*Sylvia lugens*)  
Abyssinian Catbird(*Parophasma galinieri*)  
Montane White-eye(*Zosterops poliogastrus*)  
Sharpe's Starling(*Cinnyricinclus sharpii*)  
Slender-billed Starling(*Onychognathus tenuirostris*)  
White-billed Starling(*Onychognathus albirostris*)  
Abyssinian Ground-thrush(*Zoothera piaggiae*)  
Rueppell's Robin-chat(*Cossypha semirufa*)  
Moorland Chat(*Cercomela sordida*)  
White-winged Cliff-chat(*Myrmecocichla semirufa*)  
Abyssinian Slaty Flycatcher(*Dioptornis chocolatinus*)  
Tacazze Sunbird(*Nectarinia tacazze*)  
Swainson's Sparrow(*Passer swainsonii*)  
Baglafecht Weaver(*Ploceus baglafecht*)  
Abyssinian Crimson-wing(*Cryptospiza salvadorii*)  
Abyssinian Citril(*Serinus citrinelloides*)  
Brown-rumped Seedeater(*Serinus tristriatus*)

Hooded Vultures *Necrosyrtes monachus*

Streaky Seedeater(*Serinus striolatus*)

Mammal Species List:

Spotted Hyena *Crocuta crocuta*

Mole Rat *Heterocephalus glaber*

Ethiopian wolf *Canis simensis*

Leopard *Panthera pardus*

Antelope *Tragelaphus buxtoni*

Gelada *Theropithecus gelada*

Crested porcupine *Hystrix cristata*

Civets *Civettictis Civetta*

Anteater *Myrmecophaga tridactyla*

