E L E P H A N T L A N D E X P A N S I O N A N D M I G R A T I O N R O U T E

Funding Proposal

2025

MARC SHERRATT

SUSTAINABILITY ARCHITECTS

WWW.MARCSHERRATT.COM

&

Rory Hensman

CONSERVATION AND RESEARCH UNIT

2016/046042/08

1. P R O B L E M

South Africa has an overpopulation of the IUCN classified, Endangered, African Savannah Elephant (*Loxodonta Africana*) within its large, fenced conservation areas. This leads to unnatural population control including culling (as seen in Kruger National Park) and contraception (as seen in Addo Elephant National Park) of an endangered species. However, these areas are usually surrounded by smaller reserves that can accommodate temporary elephant movement, if managed correctly. Human-elephant conflict is increasing as the African population grows. This project therefore has significant relevance in developing a system in which people and wild elephants can live in close proximity to each other, with relatively little disturbance. Additionally, African cities are growing at a rapid rate with conservation areas increasing becoming "islands" surrounded by urban development, large-scale wildlife corridors such as these must become more common. These corridors would also function as "escape routes" for areas affected by climate change and therefore provide further resilience to nature conservation efforts.

Being the largest of land mammals, highly intelligent, highly adaptable, and threatened with extinction African Savanna Elephants were seen as an ideal candidate to test if extinct, ancient wildlife migrations can be restored anthropomorphically. That is a return to the large-scale act of seasonal wildlife movement between grazing lands but now along man-made wildlife corridors. Importantly African Elephants are what some call a "hero species" being the most migratory (with migrations up to 500km) of the "Big Five" and highly iconic. This means they could create enough tourism exposure for such a large scaled development to be economically feasible. This project's aim of creating wildlife corridors could ideally link the game reserves of Madikwe and the Pilansberg in the North West with a route across the Magaliesberg Mountains. The route would then link from Johannesburg to the southern part of the Kruger National Park.

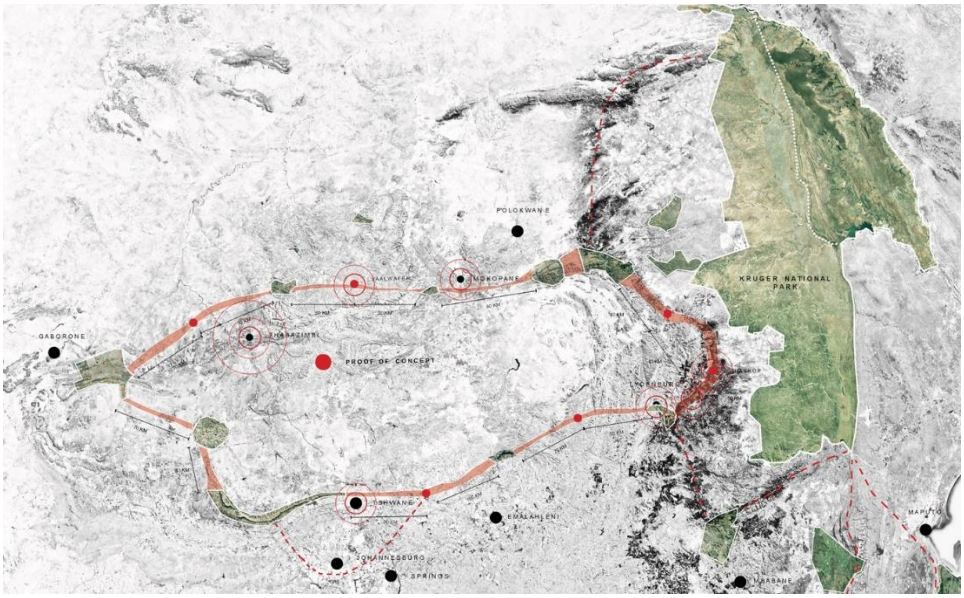

Figure 1. Elephant migration proposed route.

2. RESEARCH QUESTION

How do we manage the access of wild African Savanna elephants to these smaller reserves or semi-natural areas, in the Limpopo Province of South Africa?

3. PROJECT OBJECTIVES & METHOD

The overall goal of this project is to "rebrand" the African Savannah Elephant as a community asset for African people by increasing their food security and providing greater economic resilience to rural people living along this proposed migration route. The project achieves this by harnessing the ecological role of this migratory animal as a seed dispersal agent. Wild elephants will be used to clear land of exotic species, be fed locally indigenous fruiting trees that over time will create a self-sustainable food forests for rural communities. This approach will increase tourism revenue, and increase the carbon sequestration of damaged land due to the additional biodiversity created. This will help mitigate climate change. The technical method used to create this wildlife corridor is to open up smaller reserves / semi-natural areas to wild elephant populations through an automated AI system of sound towers and elephant only gates in order to:

1. Relieve feeding pressure on the host properties and

2. To increase foraging land for wild elephants by allowing them to migrate between private and public properties, which have historically had African Savannah Elephants, without allowing other wildlife to migrate, thus only opening spaces for elephants but keeping other high-value or dangerous game on a landowner's property.

Objective 1 – Domesticated Elephant Training Gate (<u>ACHIEVED</u>)

To create a small training gate with which to train both the equipment and a domesticated herd of elephants to utilize. The whole system will be solar powered and a 4 hectare area will be fenced off using an electric fence so that the only entrance is via an automatic gate. Cameras will be 'trained' using artificial intelligence-based software to identify elephants as opposed to other wildlife so that when an elephant approaches the gate, the gate will trigger and open allowing the elephant through the gate. An infrasonic sounding instrument will be attached to the gate to give the elephants two ecologically sensitive infrasonic signals:

1. That the gate is available to be accessed

2. That the elephants are required to return through the gate. The return call through the gate is to allow landowners to allow elephants on their land for short periods of time i.e. from 6pm to 4am the following day in order to assist with managing the impact on their flora whilst still allowing the elephants to access the property to feed.

Objective 2 – Wild Elephant Automatic Gate Test

Once all the teething issues have been worked out with the Objective 1 Gate the team will set up the elephant gate and fence on a property that increases the foraging range using wild elephants. Therein the process of habituating the elephants to the gate will begin so we can assess how quickly a herd of wild elephants will learn to use these gates as well as understand what the infrasound is telling the elephants to let them know to use the gates and return through the gates.

Objective 3 - Final Elephant Automatic Gate

Once habituation has occurred and the elephants are using the gates frequently a gate will be installed in the fence line between two properties, one being the original (Host) elephant property and the other will be called a "Visitor" property.

The Visitor property must have an adequate fence in order to keep the elephants within their property as well as meet all other obligations in terms of any other elephant facility apart from land size. The elephants will be informed via the infrasound that the gate is available for access. Training of both people and the elephants is required to be able to release elephants between host and visitor properties.

Objective 4 – Provincial scaled implementation

The long-term vision for this project would be to connect both private and public land with wildlife corridors that could allow elephant movement in a fully connected, provincially scaled, adequately protected migration route.

4. P R O J E C T B A C K G R O U N D

The sounding towers will be the primary architectural devices for these wildlife corridors and should include facilities for monitoring the corridor, adequate water and food provisions for wildlife and well as facilities for restoring degraded land. Mapping biodiversity using sound, and sensing pollution in passive elements such as air, water and soil will be an important function of these "towers" as well as monitoring active elements such as weather and climate change. This wildlife corridor must be adequately protected and so this project must develop a strategy that encourages tourism while enabling wildlife to thrive. Elephants are known as "ecosystem engineers" for their incredible power to transform landscapes by their presence, arguably the only more powerful terrestrial species are humans. Elephants therefore can and must be used in a positive way to restore degraded land along which this corridor runs. The project's vision can be viewed in this introduction film, https://www.facebook.com/marcsherrattarchitecture/videos/2761717564057908 .

Figure 2. An envisioned future

These elephant migration routes are envisioned to use an elephant's seed dispersal ability to create indigenous food forests that can help support rural food security. Perennial food trees such as the Marula tree (*Sclerocanya birrea subso. caffra*) have fruit that has a higher vitamin C content than oranges, and its seed is also a rich source of protein. In off-season times, when elephants are not migrating, this land can also be used for productive cattle farming and or wildlife management, which could include hunting or conservation. This brings a diversity of economic prospects to land that can provide secure employment.

One of the primary funding avenues that will be explored is how the migration route can function as a carbon-offsetting scheme. Perennial staple crops, such as the Marula Tree, sequester an average of 1.9 tons of carbon per acre for decades thus helping reverse global warming. Registering it as an official carbon-offsetting scheme, which would attract investment from all over the world, could theoretically fund this route. This project could also link to Provincial and National Government's Climate Action Plans.

5. PROFESSIONAL TEAM

The project was originally conceptualised by Marc Sherratt of Marc Sherratt, Sustainability Architects (MSSA). MSSA is an architectural firm that has specialised in ecological regeneration, using architectural and landscape design to reverse local extinction. The professional team has grown to include:

Name	Role
Marc Sherratt	Sustainability architect & Net Zero Accredited Professional.
Lance Hohip	Project architect & Director of Architecture at MSSA
Franco Schoeman	Musician & sound specialist with experience in elephant infrasonic communication.
Sean Hensman	Elephant expert & Director of Rory Hensman Research and Conservation Unit (RHCRU).
Prof. Adrian Shrader	Professor in wildlife ecology & RHCRU Director.
Chloë Caister	Elephant behaviour and wildlife research specialist for RHCRU.

About MSSA:

MSSA is a research-led, impact-driven architectural practice who design climate resilient responses to the wicked problems found in Africa's built environment. MSSA has supported national governments, corporates and NGOs implement their climate action and ESG plans through a service offering covering all stages of a building's lifespan, from design to improving operations to disassembly. MSSA's business incubator develops architectural technology and products that can be scaled to help reverse climate change and biodiversity loss.

About RHCRU:

RHCRU is a non-profit organization dedicated to research and the sustainable conservation of elephants and wildlife in a rapidly modernizing Africa. RHCRU values a proactive and innovative research-based approach to conservation, working holistically with communities, scientists, and wildlife to create a future where people and animals thrive together. Through partnering with local and international universities, government entities and private organisations RHCRU contributes to meaningful research and conservation impact.

7. PROJECT STATUS

Currently the team have successfully designed, built and installed the automatic gate and testing boma, AI camera and sound system prototype on a farm in Bela-Bela, Limpopo, South Africa. On this farm there is a resident herd of 6 semi-captive African elephants which were used to complete Objective 1, and Step 1 & 2 of the Implementation Plan. The AI camera system has undergone initial research, testing and training through the University of Pretoria under the supervision of Prof. Schrader and is still in the developmental stage. The 6 elephants have successfully been trained to respond to the infrasound signal, designed and developed by Franco. In consecutive successful trials the elephants responded positively to the infrasound signal by stopping foraging and moving towards the testing boma and through the gate. All six elephants responded to the signal immediately and without any prompting, guiding or interference from humans.

Figure 3. Initial setup of automatic gate and sound system.

Figure 4. Elephants approaching automatic gate.

8. C O S T I N G

Project implementation so far has been funded through donation, with all professionals working free of charge. However once proof of concept has been achieved professionals and suppliers must be fairly compensated for their work and equipment, with patents registered for unique project elements. A preliminary costing table for the implementation of a sounding tower and elephant gate has been laid out below, that will be finalised as project costs become more accurate.

Table 1. Preliminary Costing Table of Project Elements.

Item	**Cost (ZAR) ex VAT**
Tower & Gate	
Elephant Gate	ZAR 35,000.00
AI & Camera System	ZAR 30,000.00
PV System & Gate Motor	ZAR 20,000.00
Sound System	ZAR 60,000.00
Aluminium Faraday Cage	ZAR 35,000.00
Concrete Structure	ZAR 70,000.00
Labour	ZAR 35,000.00
Contingency	ZAR 25,000.00
Sub Total	**ZAR 310,000.00**
Professional Fees	
AI Training & Monitoring	ZAR 200,000.00
Structural Engineering	ZAR 10,000.00
Construction Monitoring	ZAR 20,000.00
Professional/Consulting Fees	ZAR 65,000.00
Sub Total	**ZAR 295,000.00**
Project Scaling Costs	
Estimated Maintenance (per tower)	ZAR 50,000.00
Rotavi Electric Fence	ZAR 1,300,000.00
Concrete Mould (500 uses)	ZAR 200,000.00
Contingency Costs	ZAR 45,000.00
Project Total	**ZAR 2,200,000.00**

Number of Gifts	Amount of each Donation
1	ZAR 300,000.00
2	ZAR 200,000.00
4	ZAR 150,000.00
6	ZAR 100,000.00
10	ZAR 30,000.00
23	**ZAR 2,200,000.00**

*These costs exclude travel, transport and a site's unique geological conditions that may cause the design to be adapted.

9. PROJECT SPONSORS

There are many project supporters that have helped the team progress so far, a special thanks goes out to those who have financially contributed to this project.