The science behind protected area networks for elephants

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25th Anniversary of the SADC TFCA Conference and Heads of States Summit

Harare, Zimbabwe

19-23 May 2025

UNIVERSITEIT VAN PRETORIA
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Faculty of Natural and Agricultural Sciences
Fakulteit Natuur- en Landbouwetenskappe
Lefapha la Disaense tša Tlhago le Temo

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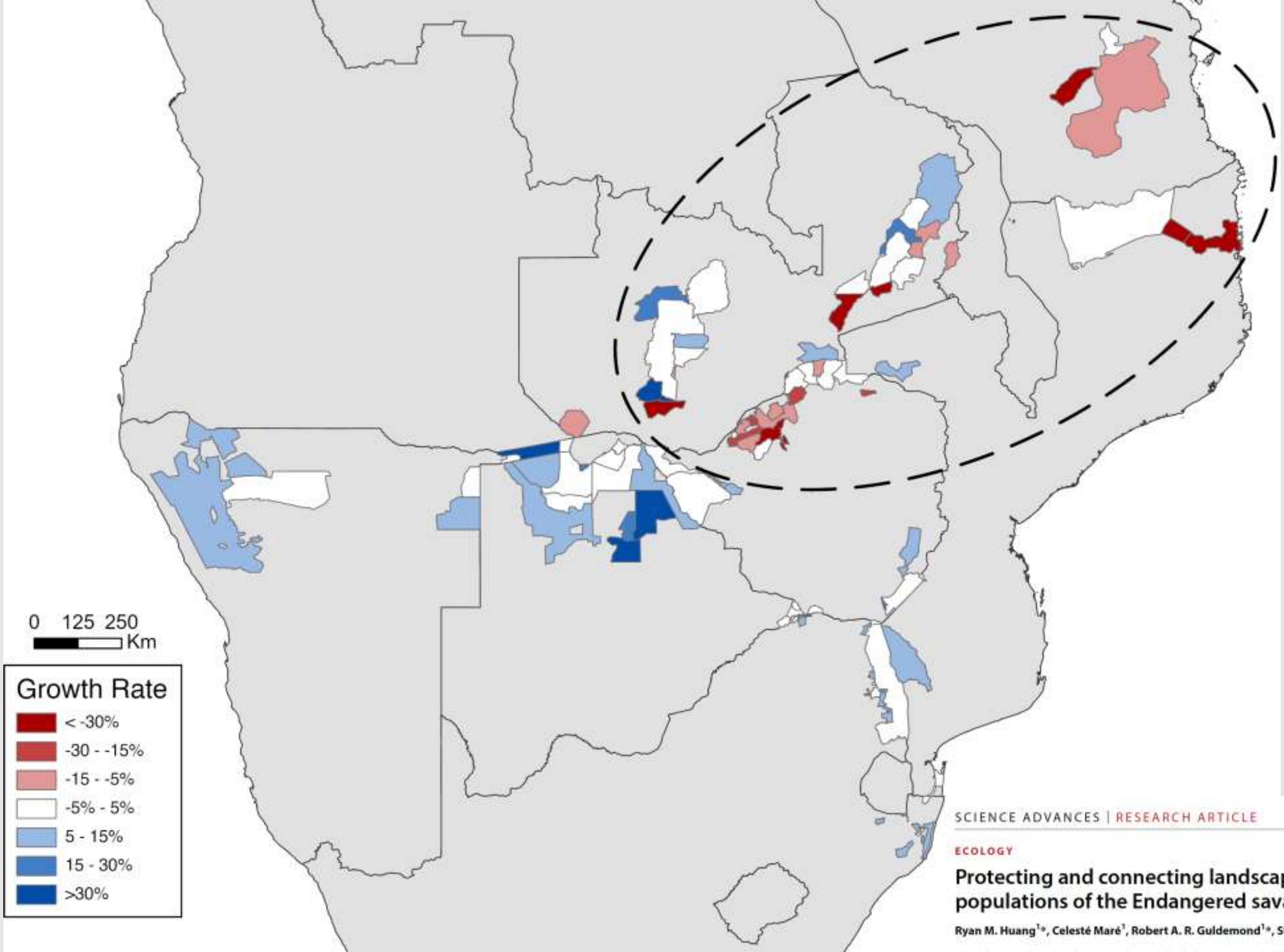
Room to Roam

Celebrating transfrontier conservation incentives

- Identify conservation success stories
  - to know what works, what doesn't work, and why it works
- Identify future challenges for protected areas
  - and the land between – connectivity conservation
- Dark cloud of projected climate change



SCIENCE ADVANCES | RESEARCH ARTICLE

ECOLOGY

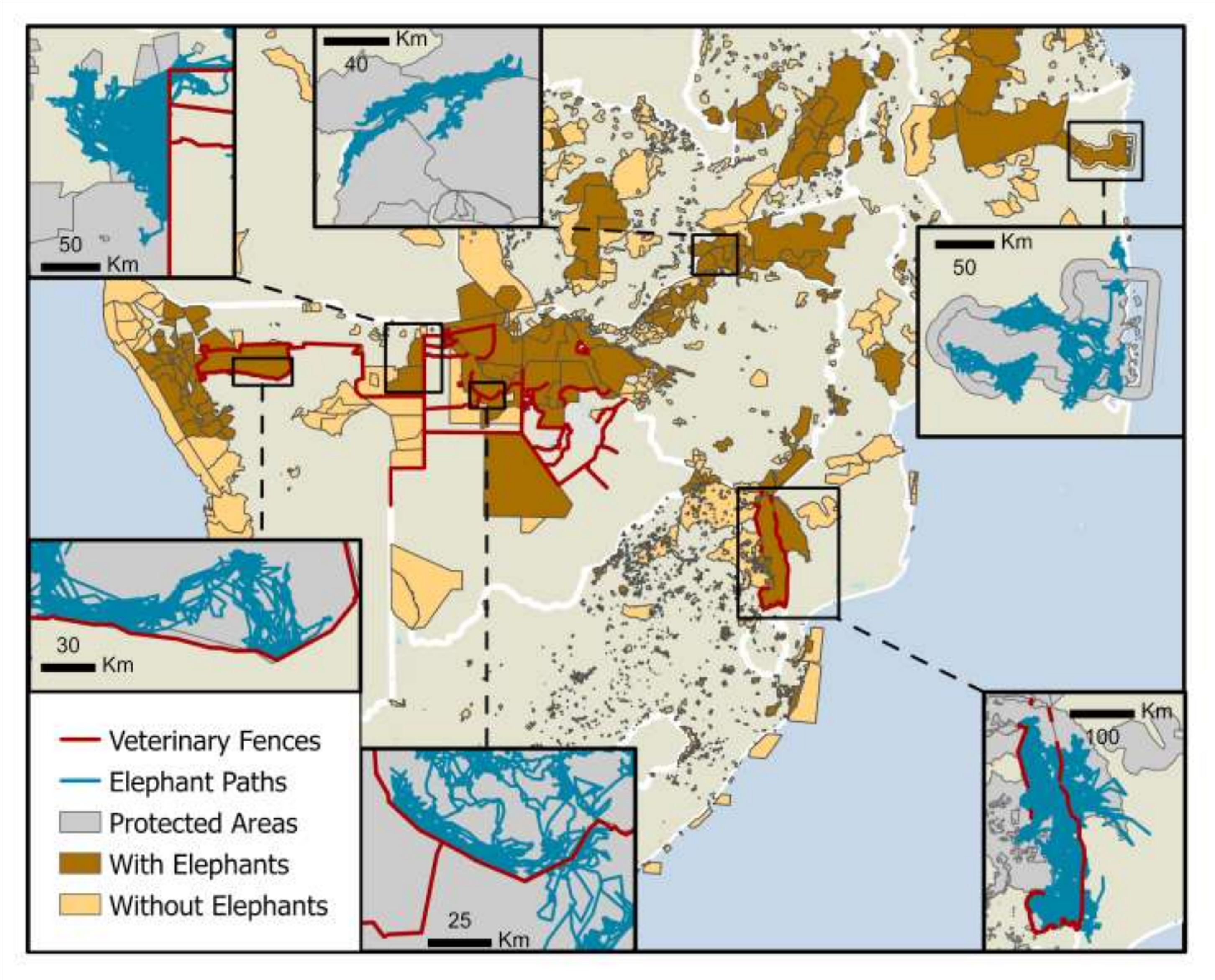
Protecting and connecting landscapes stabilizes populations of the Endangered savannah elephant

Ryan M. Huang[1]*, Celesté Maré[1], Robert A. R. Guldemond[1]*, Stuart L. Pimm[1,2], Rudi J. van Aarde[1]

Population dynamics - conclusions

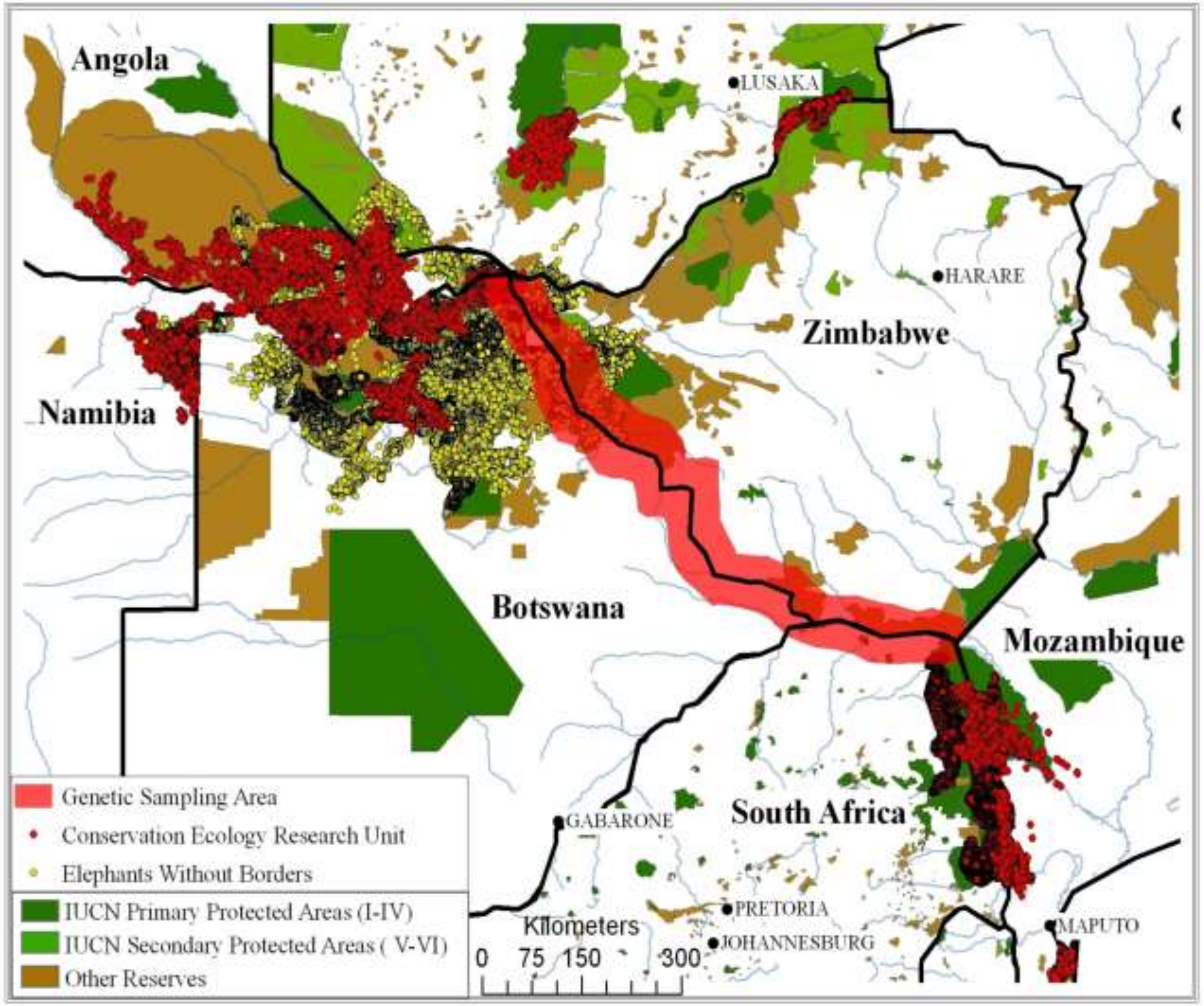
- protect and connect sufficiently-sized conservation areas;
- ‘fortress’ model is not sustainable

Mapping potential connections among populations



Huang *et al*. (2022) PLoS ONE 17(10):e0275791

Opportunities & barriers for linking protected area networks



- Kasane to Crooke's Corner;
- linking the Kavango-Zambezi with the Great Limpopo TFCAs

Conserv Genet (2018) 19:155–167
DOI 10.1007/s10592-017-1005-z

CrossMark

RESEARCH ARTICLE

Origin and phylogeography of African savannah elephants (*Loxodonta africana*) in Kruger and nearby parks in southern Africa

Alida de Flamingh[1,2] · Alfred L. Roca[2,3,4] · Rudi J. van Aarde[1]

Space use – delineating barriers for dispersal

elephants do not have passports!


Confidential

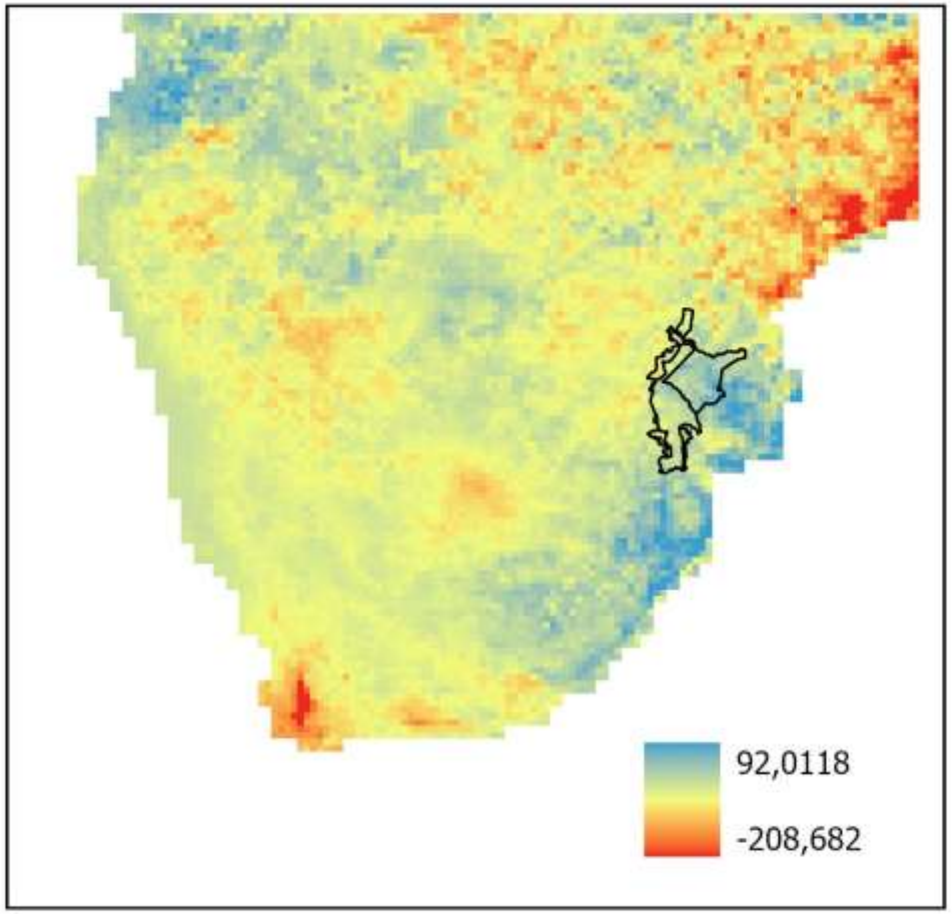
Research proposal

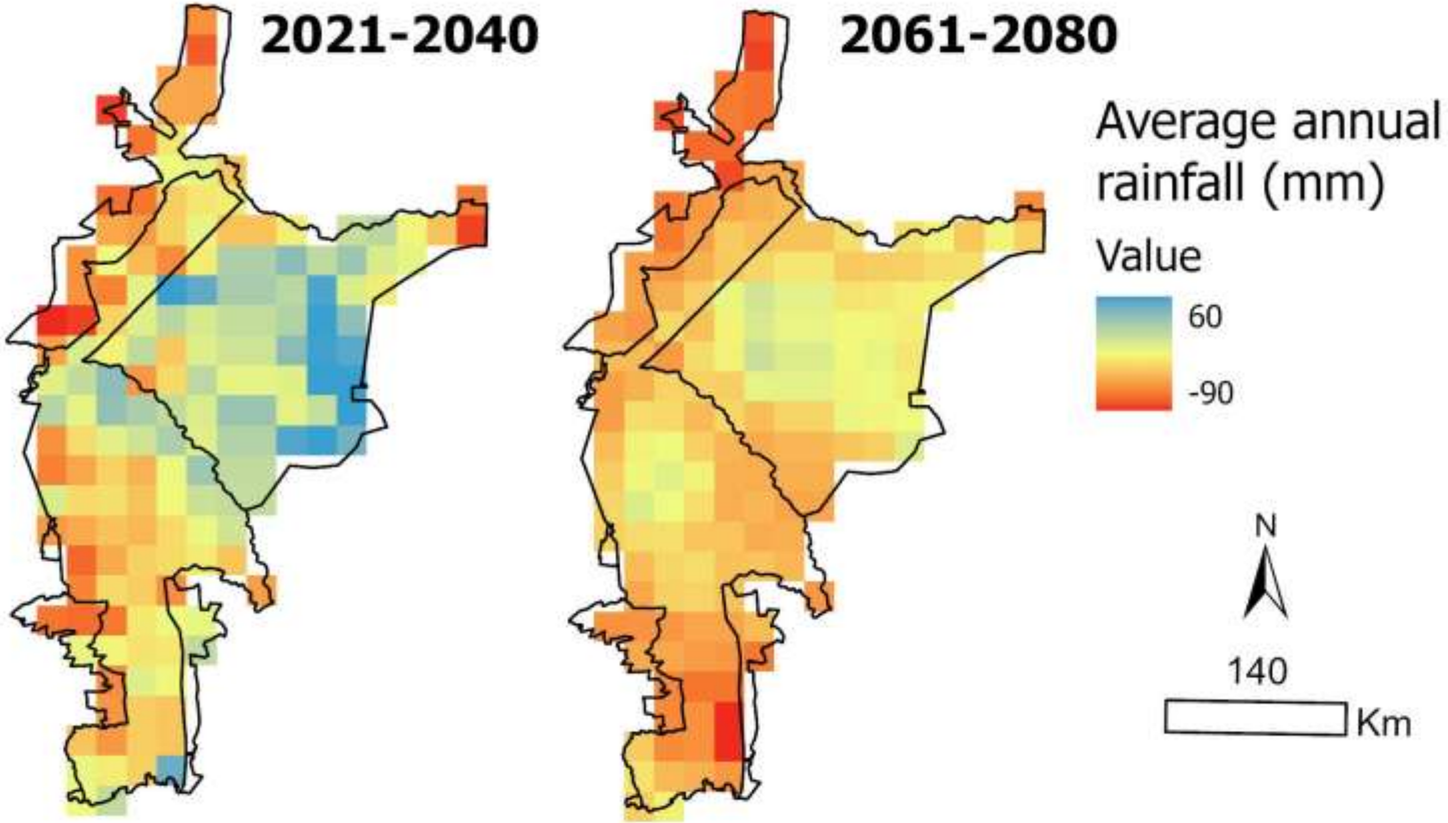
Maintaining healthy elephant population dynamics exposed to a changing climate and landscape in the Greater Mapungubwe, Greater Limpopo and Lubombo Transfrontier Conservation Areas

@ Theresa & Ines Götz

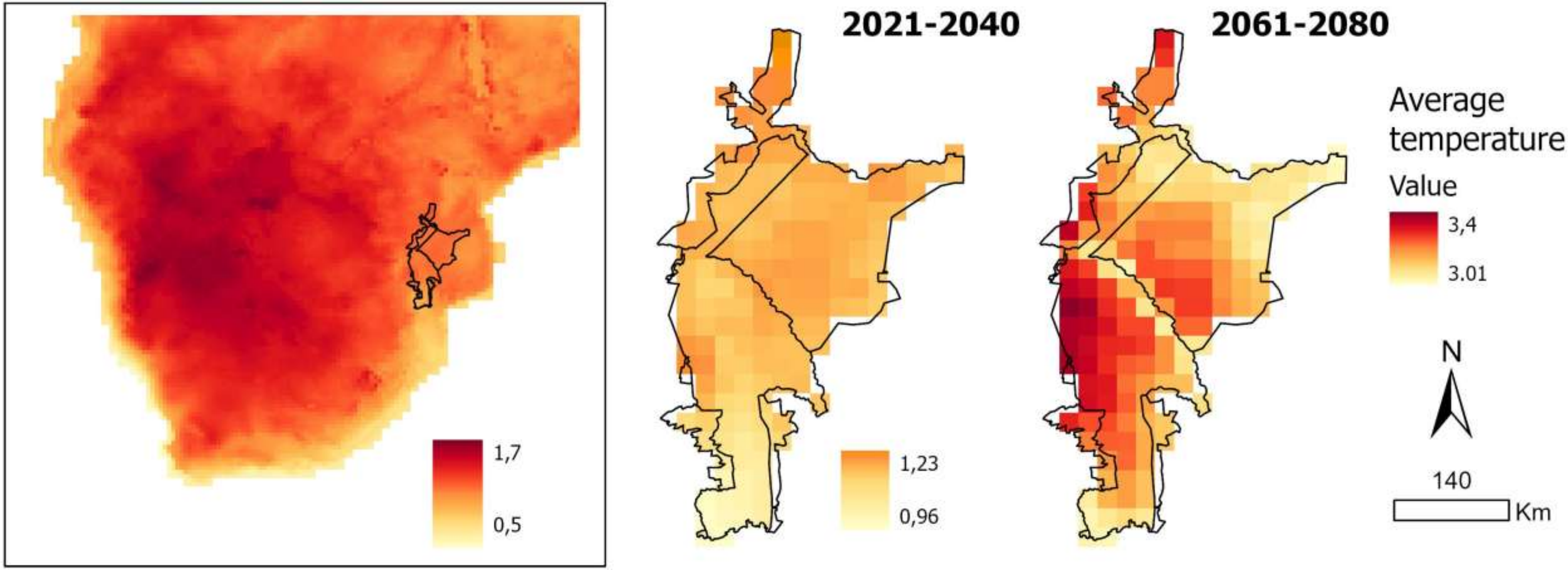
Prepared by Dr Robert Guldemond (Principal Investigator)

Predicted change in average annual rainfall relative to 1981-2000





Predicted change in average temperature relative to 1981-2000



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Thank you for attending

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Room to Roam

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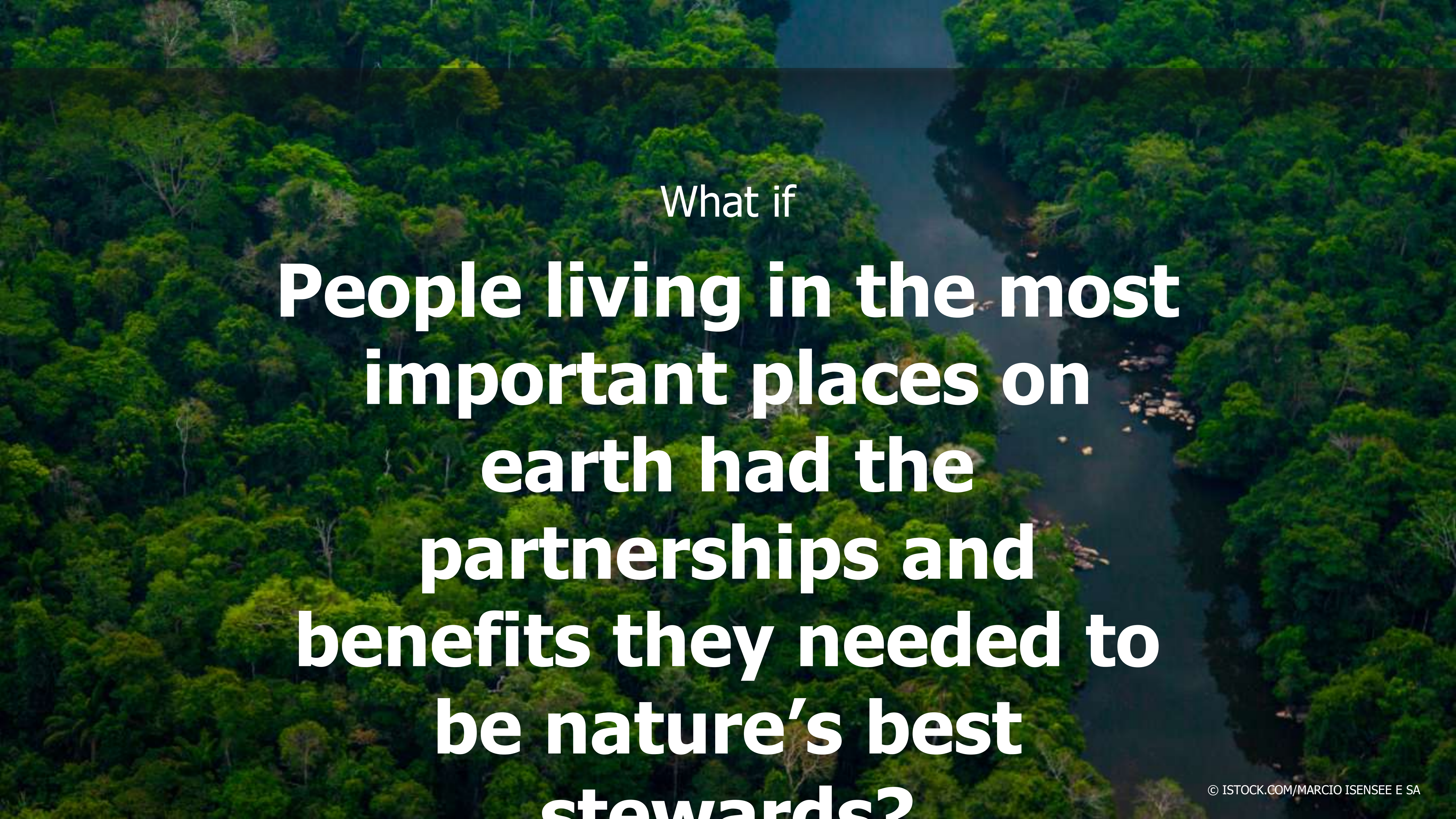
Lefapha la Disaense tša Tlhago le Temo

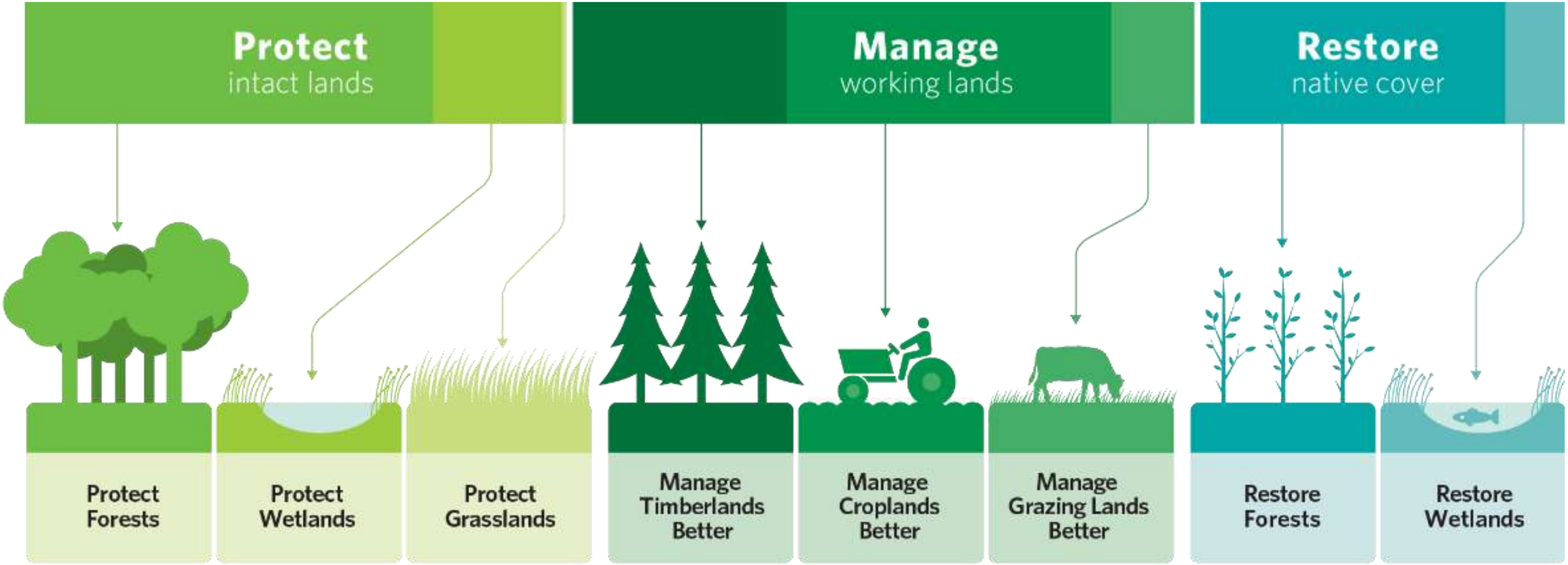
FREE TO ROAM: LANDSCAPE APPROACHES

12

Julia Levin | Vice President, Southern Africa,
Conservation International jlevin@conservation.org


What if
People living in the most important places on earth had the partnerships and benefits they needed to be nature’s best stewards?
© ISTOCK.COM/MARCIO ISENSEE E SA

AFRICAN RANGELANDS SUPPORT ECONOMIES, BIODIVERSITY & NATURAL CLIMATE SOLUTIONS




Ecosystem recovery
Livelihood activities
Drivers of degradation
Restoration & Management Science
Market Opportunity
Climate Finance
Integrated Approach

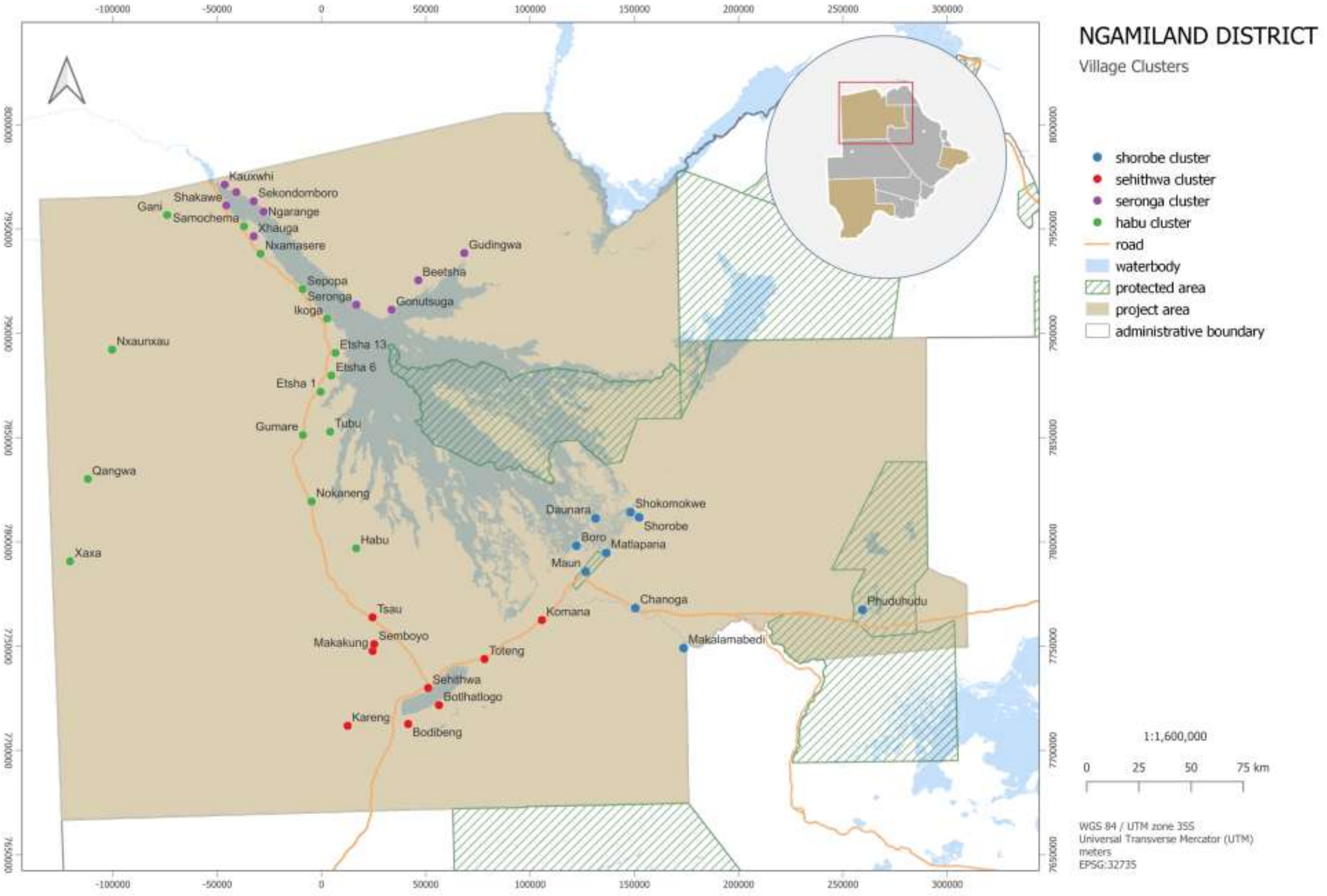

PROTECT
2.7
million+
hectares
104
Red list
species
© Nico Smit


INBC FORTE


CONNECT
People and places
Parks and landscapes
© Trond Larsen


Project Finance for


MANAGE & RESTORE
82% household own livestock
1 million + hectares under market driven restoration
© M&M Pictures


NGAMILAND DISTRICT
Village Clusters
shorobe cluster
sehithwa cluster
seronga cluster
habu cluster
road
waterbody
protected area
project area
administrative boundary
1:1,600,000
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WGS 84 / UTM zone 35S
Universal Transverse Mercator (UTM)
meters
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Kauxwhi
Shakawe
Sekondomboro
Gani
Samochema
Ngarange
Xhauga
Nxamasere
Gudingwa
Beetsha
Sepopa
Seronga
Gonutsuga
Ikoga
Nxaunxau
Etsha 13
Etsha 6
Etsha 1
Gumare
Tubu
Qangwa
Nokaneng
Daunara
Shokomokwe
Shorobe
Boro
Matlapana
Maun
Habu
Xaxa
Chanoga
Phuduhudu
Tsau
Komana
Makalamabedi
Makakung
Semboyo
Toteng
Sehithwa
Botlhatlogo
Kareng
Bodibeng

AFRICAN RANGELANDS SUPPORT NATURE POSITIVE ECONOMIES

Natural rangelands support wildlife-based economies and tourism and travel related economies

Managed rangelands support livestock-based economies and associated commodities (meat, leather, wool, dairy and associated products)

Converted rangelands support dryland agriculture, renewable energy and a diverse range of economies


THANK YOU
CONSERVATION
INTERNATIONAL

Placing Local Communities at the Heart of the SADC TFCA Agenda for Coexistence and Prosperity

Why it's important and Possible Policy Responses to Make it Work

Rationale: Why Local Communities Matter in SADC TFCAs

- **Poverty and social imperatives:** Extreme Poverty (40%) and dependency on natural resources (90%) remains high in the SADC region and access in TFCAs is critical
- **Custodians of biodiversity:** Have conserved land and biodiversity for millennia (80% of Earth's remaining biodiversity is found in Indigenous territories (World Bank, 2021).
- **Traditional ecological knowledge:** They hold context based traditional ecological knowledge and governance systems that should be integrated into conservation practice
- **Key biodiversity areas:** KBAs overlap with IP&LC managed landscapes (WWF & IUCN, 2023 found that 36% of KBAs – up to 50% for Southern Africa –only logical to engage them
- **Treaty imperatives**: The UNDRIP and CBD specifically call for recognition and respect of IP&LC rights, traditional knowledge, and their contribution
- **Equity and rights based conservation:** The CBD/KM-GBF emphasizes equitable sharing of benefits, and human rights; TFCAs should embrace people and not undermine IP&LC rights
- **Community interests:** They need a seat at the policy table to defend their rights against policy and legislation excesses – draconian laws that destroy whole families/ generations

TFCA Policy Responses to Deliver Coexistence and Prosperity

- **Conservation narrative:** Need for a paradigm shift to reclaim natural resource sovereignty, take charge of policy making, and put people at the centre of conservation
- **Legal recognition of IP&LC territories:** Secure land and resource rights through laws that recognize IP&LC lands and territories, and devolve ownership rights
- **TFCA wildlife corridors:** Who decides; people, PA agencies? Definition and delineation of wildlife corridors must be a consultative process with local communities to avoid HWC
- **Inclusive decision making:** Policies must ensure that local communities have a meaningful voice and are represented by their legitimate organisations in TFCA governance structures (e.g. management boards)
- **Investing in human wellbeing:** As a smart conservation strategy for protected areas and TFCAs bounded by high density human settlements (Kasungu-Lukusuzi)
- **Human-wildlife conflict:** Human-wildlife coexistence must be underpinned by policies that mandate compensation for HWC, robust grievance redress mechanisms, and multisectoral and multistakeholder approaches that address root causes
- **Capacity building:** Strengthen governance, and technical capacity capacity of IP&LC organisations including promotion of networks/coalitions for economies of scale

Conclusion

- For the SADC TFCA agenda to succeed
  - Communities must be active partners—not passive beneficiaries
  - Conservation policies must be pro-people to secure land rights, ensure fair benefits, and reduce human-wildlife conflict
  - Need to invest in human wellbeing to build local capacity and foster sustainable livelihoods

Only then can true coexistence and shared prosperity be achieved

Thank you.

SADC Transfrontier Conservation Areas International Conference & Summit

Planning for Connectivity: A Case Study of the MAZALA Landscape in Zambia and Malawi

Harare International Conference Centre, Zimbabwe
21 May 2025

Presented by: Dr Pieter Olivier
M.A.P Scientific Services
www.mapss.co.za

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Why is connectivity important?

- Larger, connected areas have more species than smaller, isolated areas.
- When habitats are lost and fragmented species disappear.
- Ecological connectivity can therefore maintain species richness and ecological processes.
- Long-term conservation success depends on large connected habitats.

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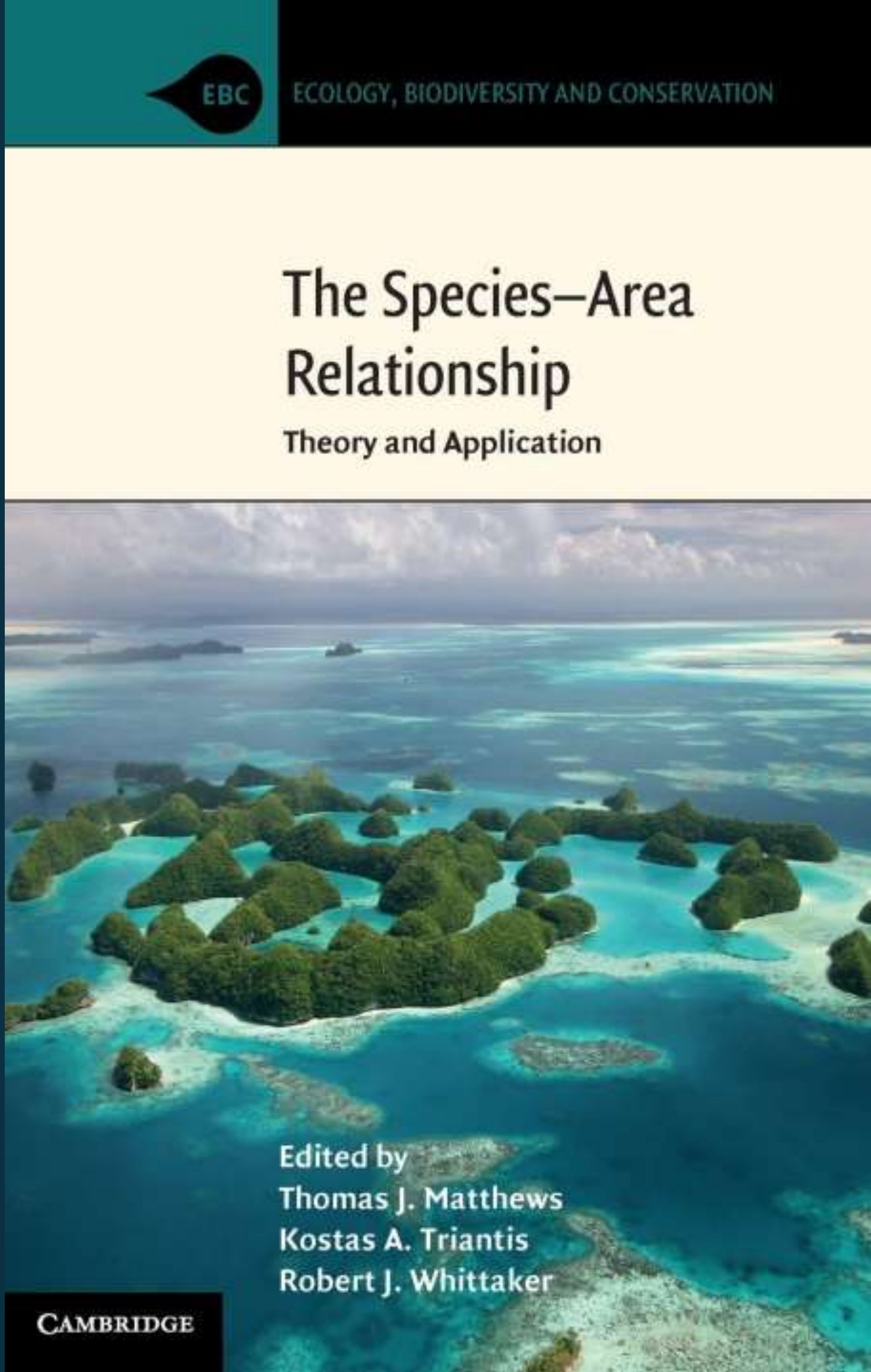

SADC Protected Areas

- Protected areas function as islands surrounded by an ocean of human land-use types.

  - Often small and isolated
  - Disruption of key ecological processes
  - Increased edge effects
  - Human-wildlife conflict
  - Localised environmental degradation
  - Vulnerable to climate change

- Solution? - Planning for connectivity by integrating conservation into broader land-use strategies.

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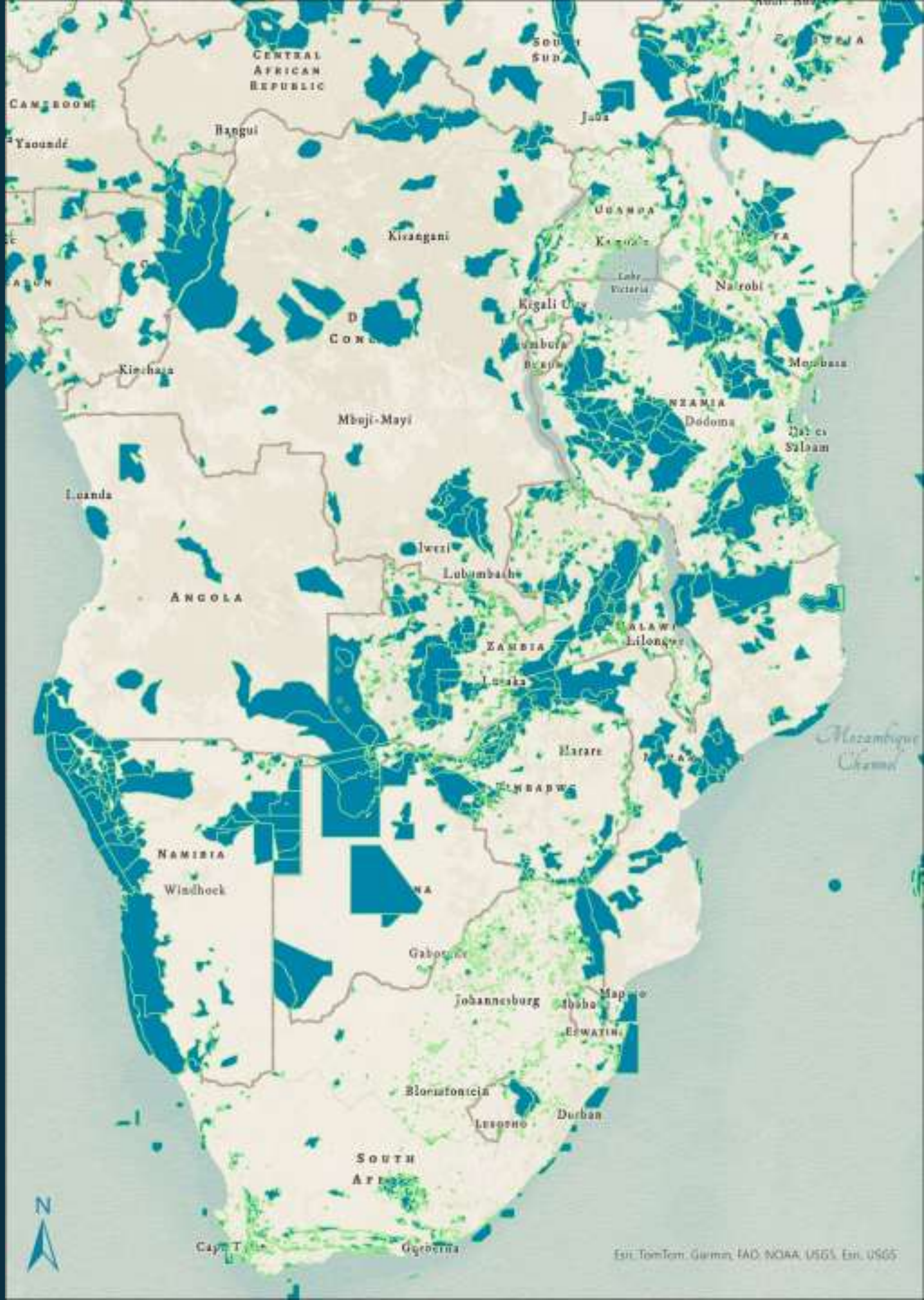

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  - Human-wildlife conflict
  - Localised environmental degradation
  - Vulnerable to climate change

- How do we do this?

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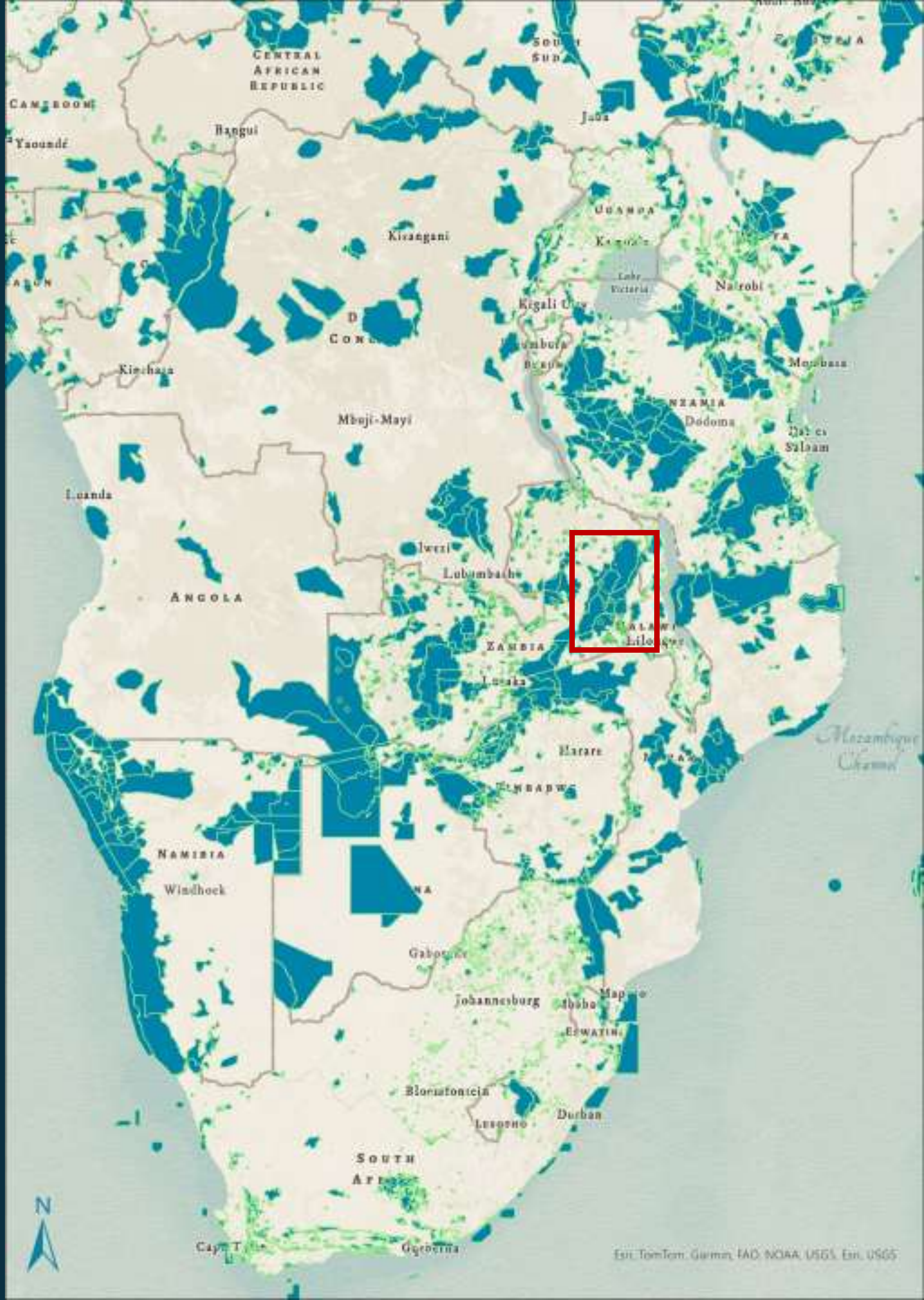
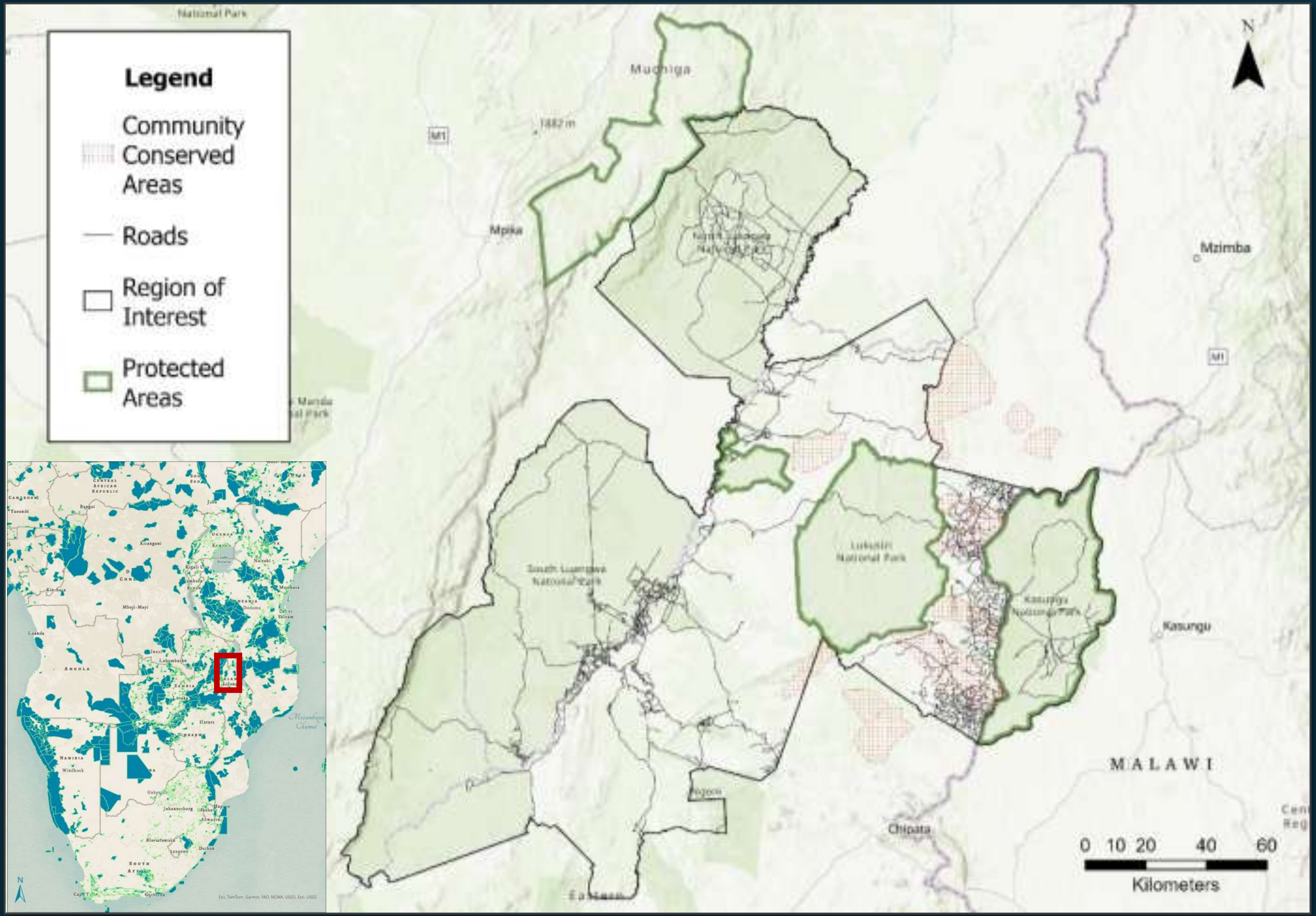


The MAZALA Landscape

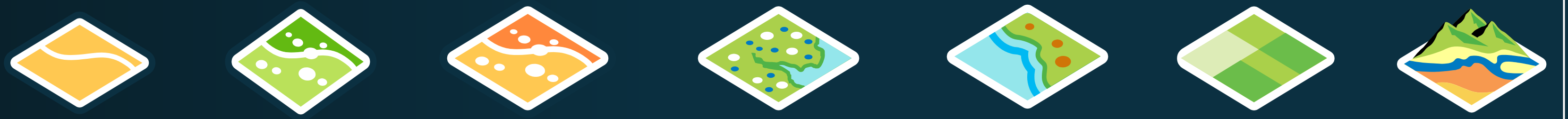
- One of four focal landscapes for IFAW's Room to Roam initiative - transboundary and hosts important biodiversity strongholds.
- However, changes in land-use threaten connectivity, landscape stability, and resilience.
- This has implications for threatened species, particularly elephants, and the provision of ecosystem services.
- The challenge is to secure viable habitats by **developing corridors and linkages** that enable elephants to persist without detracting from the livelihoods of local communities.



Finding Corridors

Step 1

Baseline layers



Finding Corridors

Step 2

Land-cover and predicted changes in land-cover by 2030

Baseline layers + Models + Field validation

Step 1

Baseline layers

Finding Corridors

Step 3

Elephant Habitat Suitability and predicted changes by 2030

Baseline layers + Land Cover + Models

Step 2

Land-cover and predicted changes in land-cover by 2030

Baseline layers + Models + Field validation

Step 1

Baseline layers

Finding Corridors

Step 4 — Connectivity – Identify Corridors
Baseline layers + Land-Cover + Habitat Suitability + Models

Step 3 — Elephant Habitat Suitability and predicted changes by 2030
Baseline layers + Land-Cover + Models

Step 2 — Land-cover and predicted changes in land-cover by 2030
Baseline layers + Models + Field validation

Step 1 — Baseline layers

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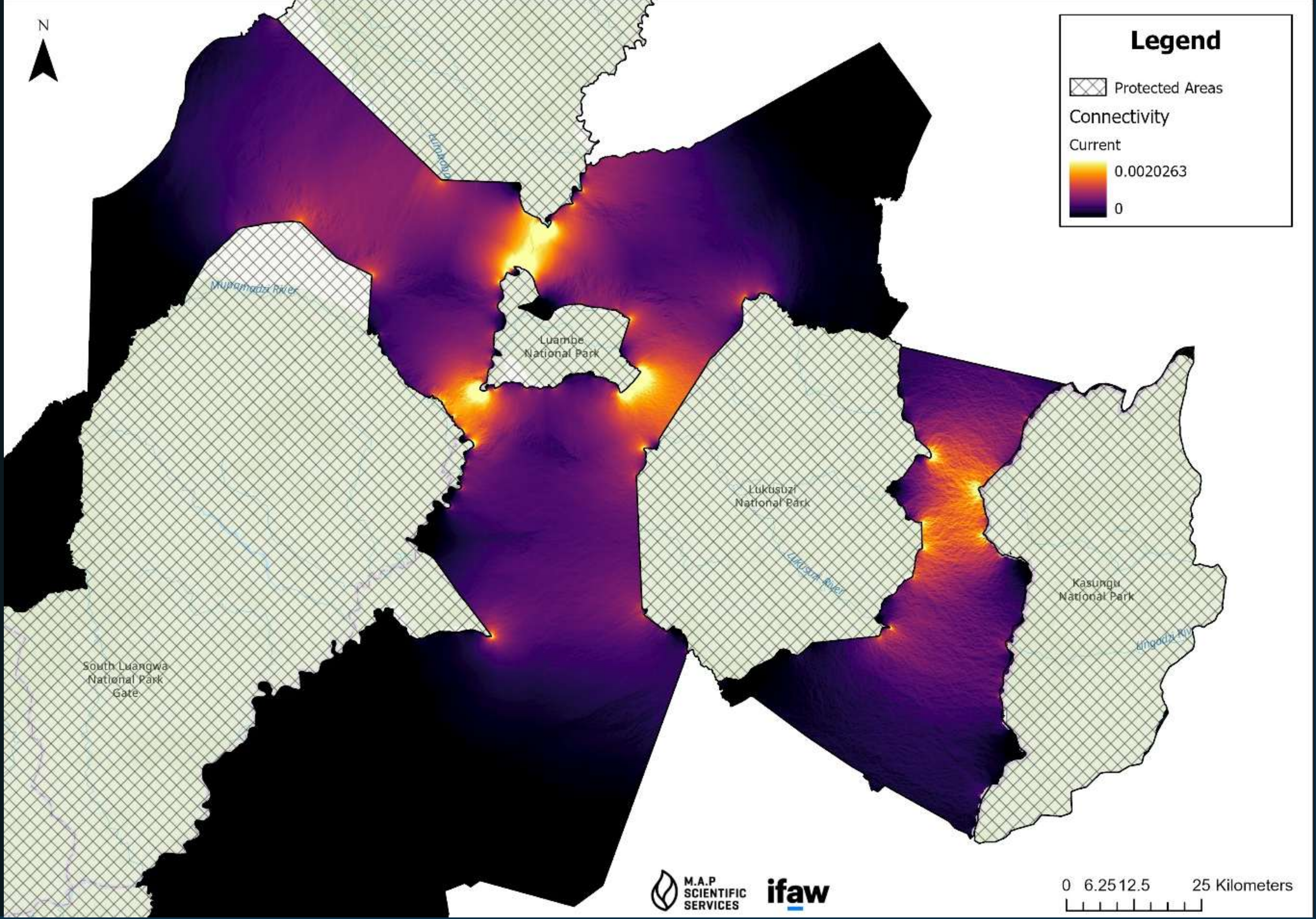
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Protected Areas
Connectivity
Current
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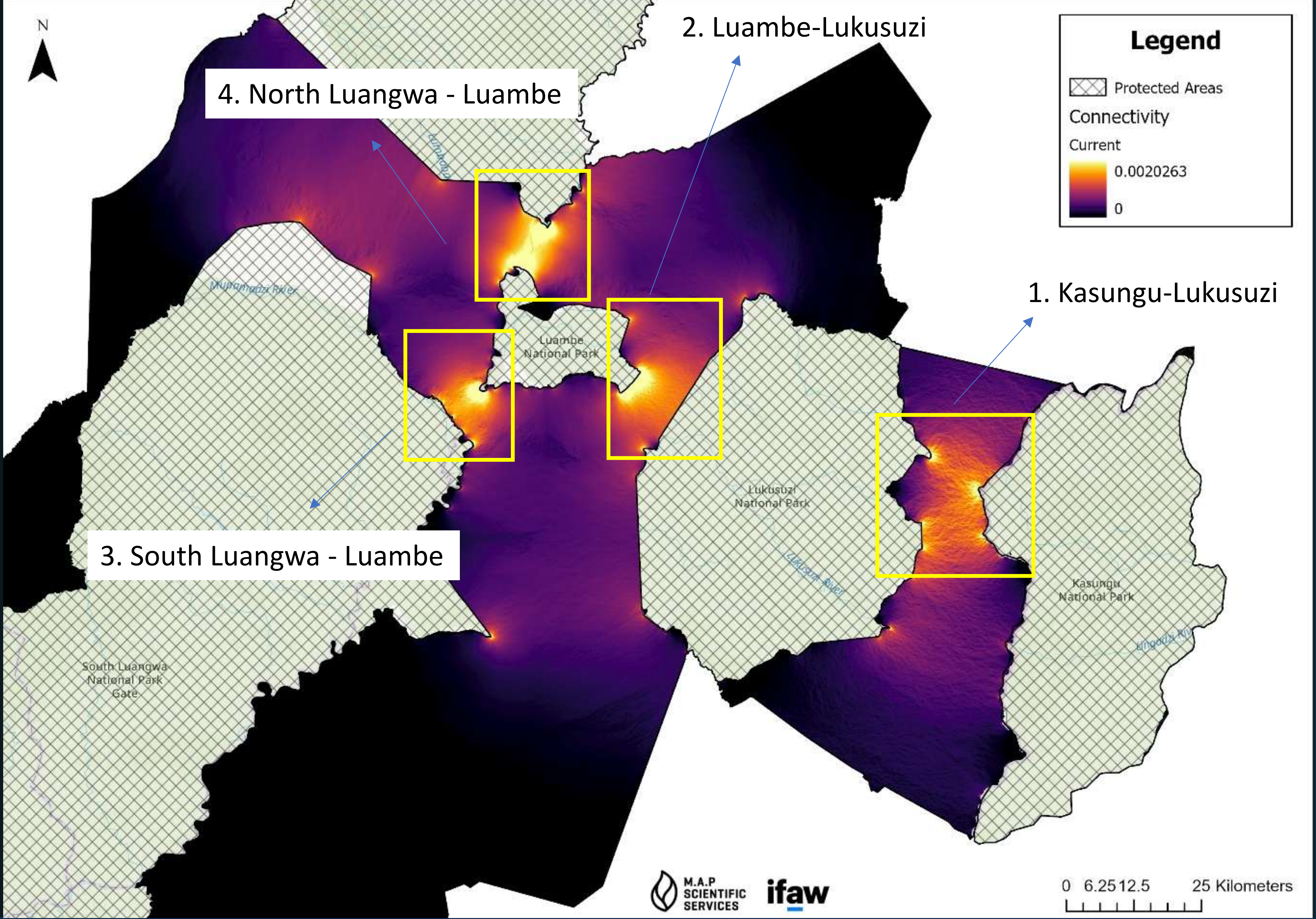
Mupamadzi River
Luambe
National Park
Lukusuzi
National Park
Lukusuzi River
Kasungu
National Park
South Luangwa
National Park
Gate
0 6.25 12.5 25 Kilometers


2. Luambe-Lukusuzi
4. North Luangwa - Luambe
1. Kasungu-Lukusuzi
3. South Luangwa - Luambe
Legend
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Luambe National Park
Lukusuzi National Park
Kasungu National Park
South Luangwa National Park Gate
Mupamadzi River
Lukusuzi River
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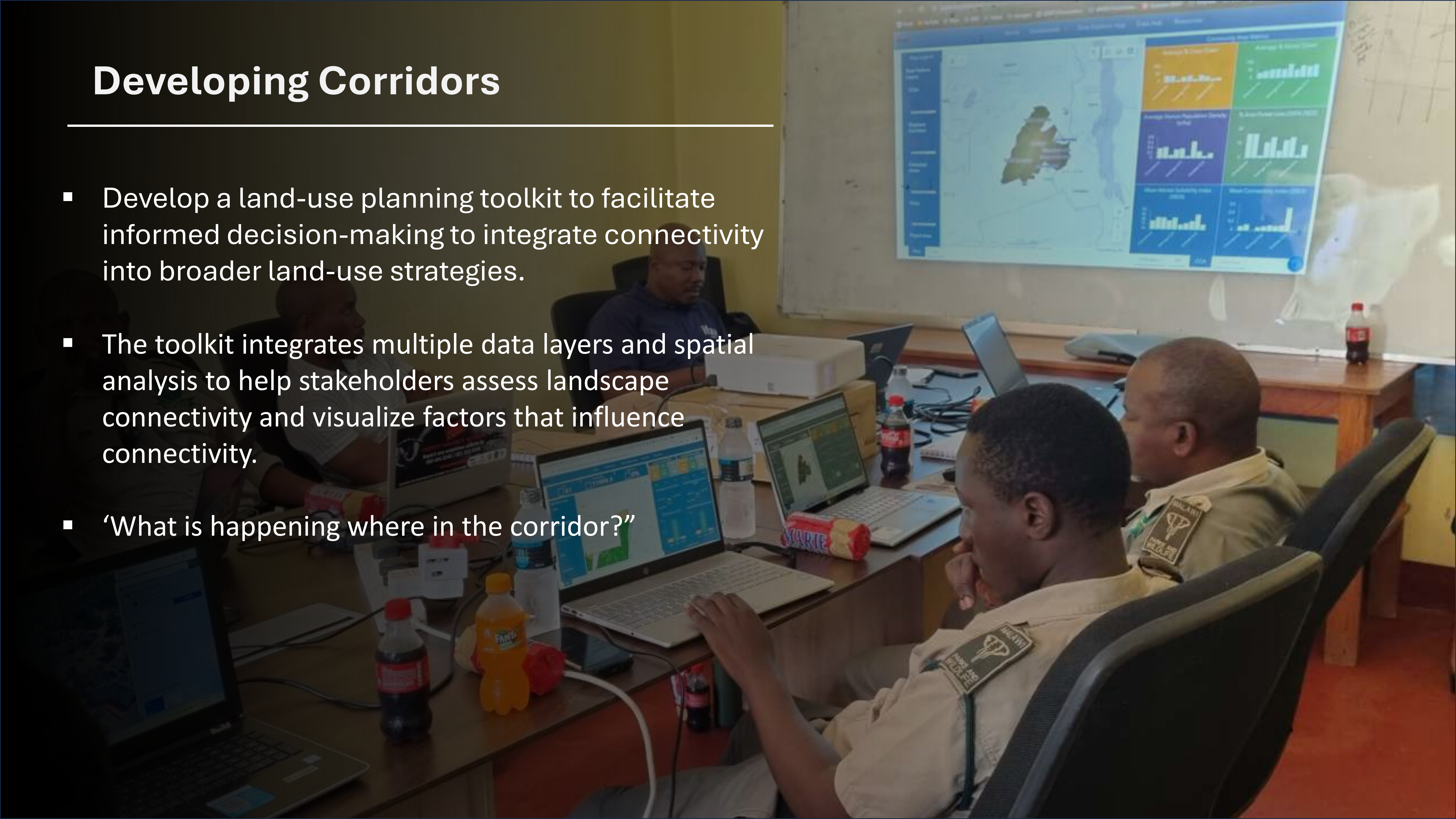
0 6.25 12.5 25 Kilometers

Developing Corridors

- Develop a land-use planning toolkit to facilitate informed decision-making to integrate connectivity into broader land-use strategies.

- The toolkit integrates multiple data layers and spatial analysis to help stakeholders assess landscape connectivity and visualize factors that influence connectivity.

- ‘What is happening where in the corridor?”



Home Gallery Map Scene Notebook Groups Content Organization

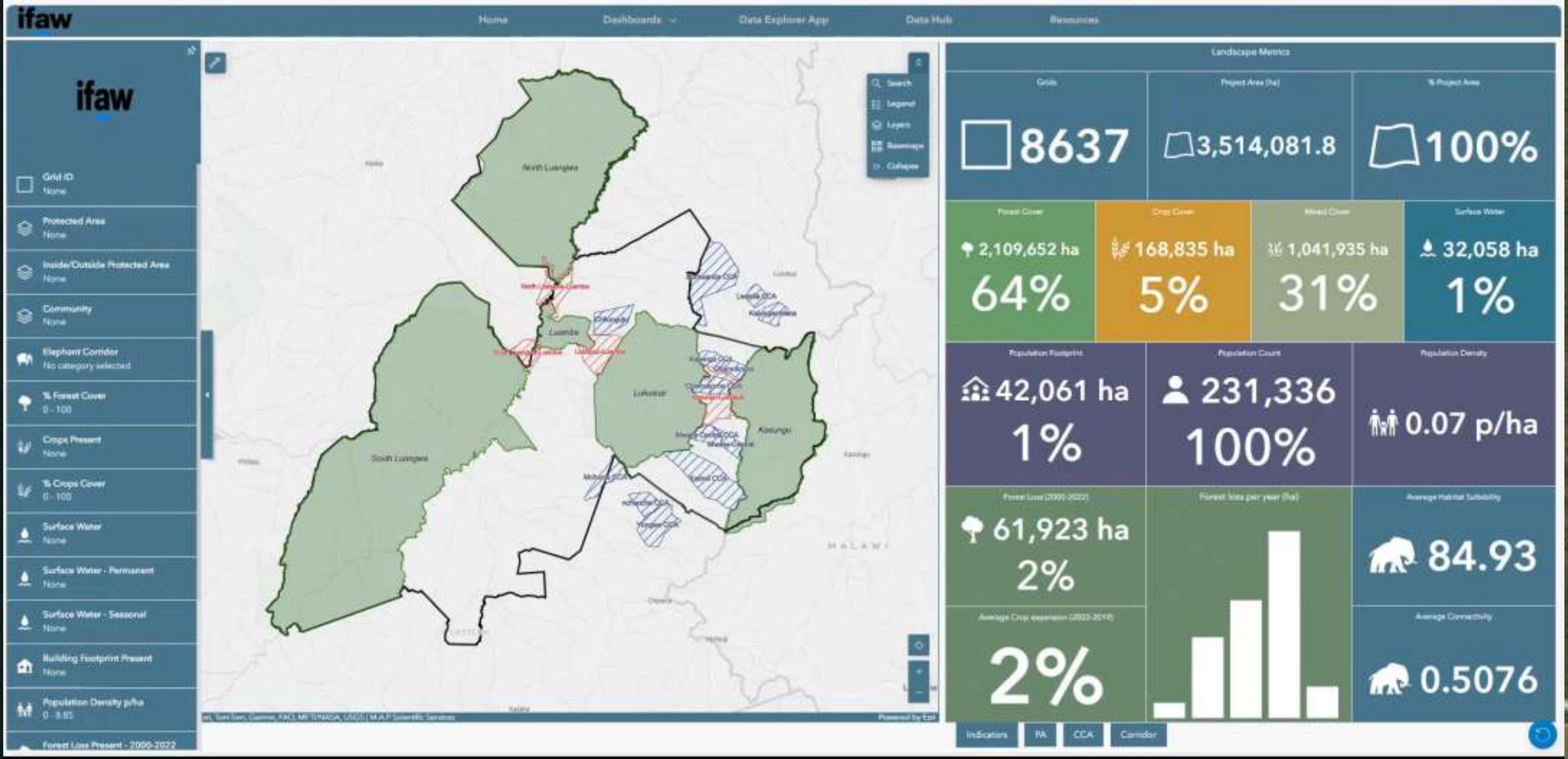
Administrator IFAW
admin_ifaw

Malawi - Zambia Landscape (MAZALA)

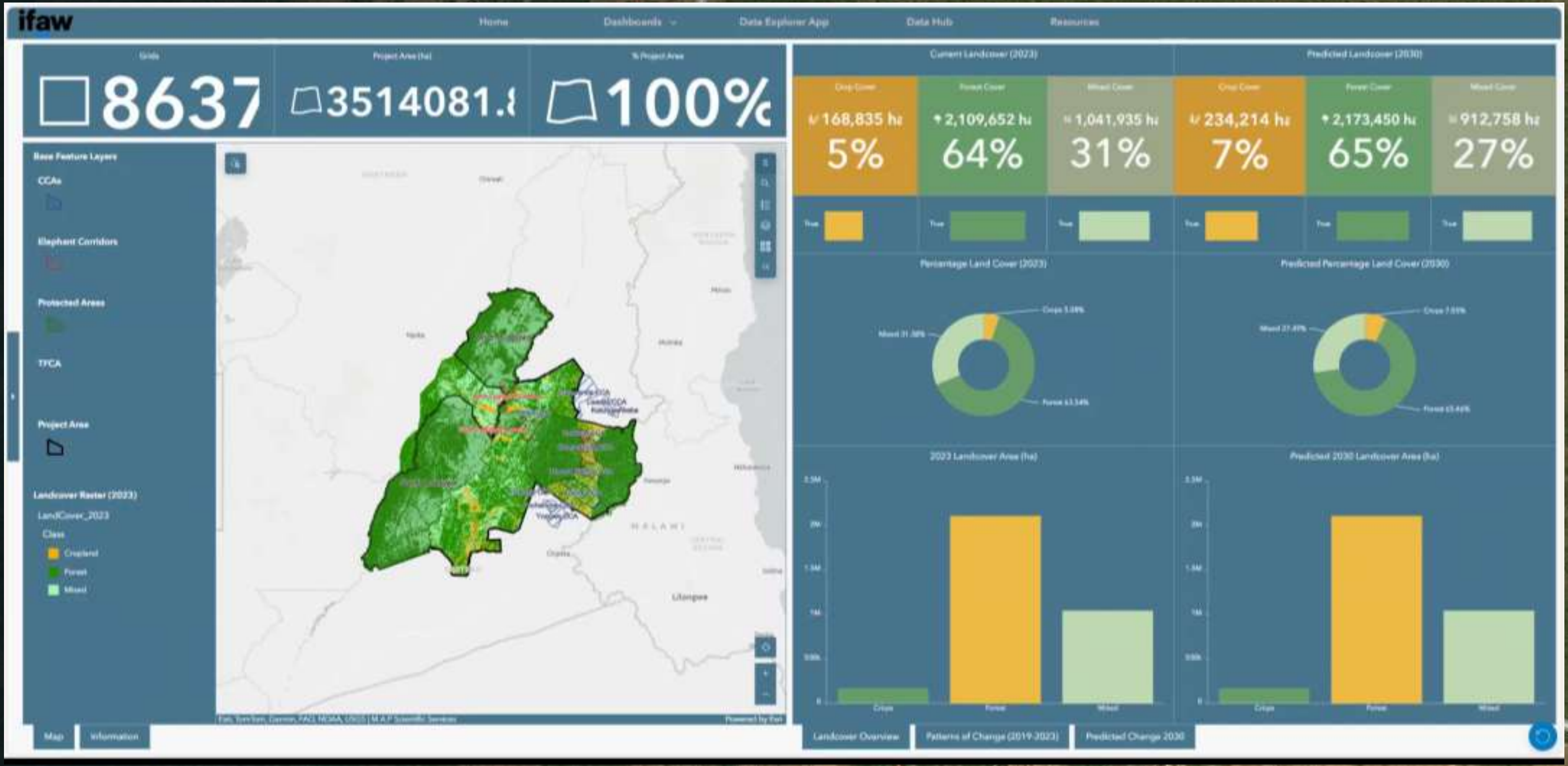
Planning for Landscape Connectivity, Stability, and Resilience

Edit home page

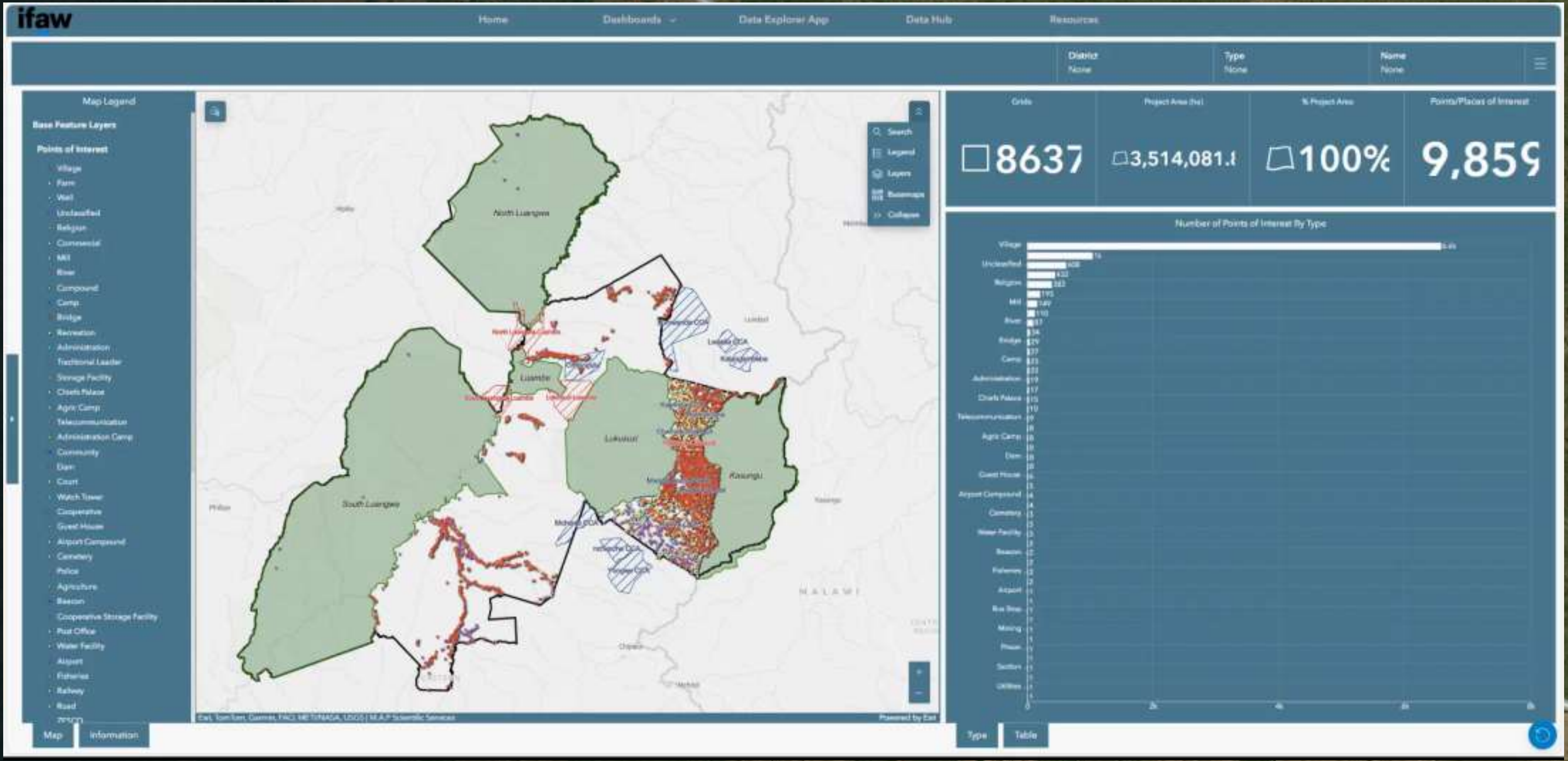
What is the current status of the corridor?



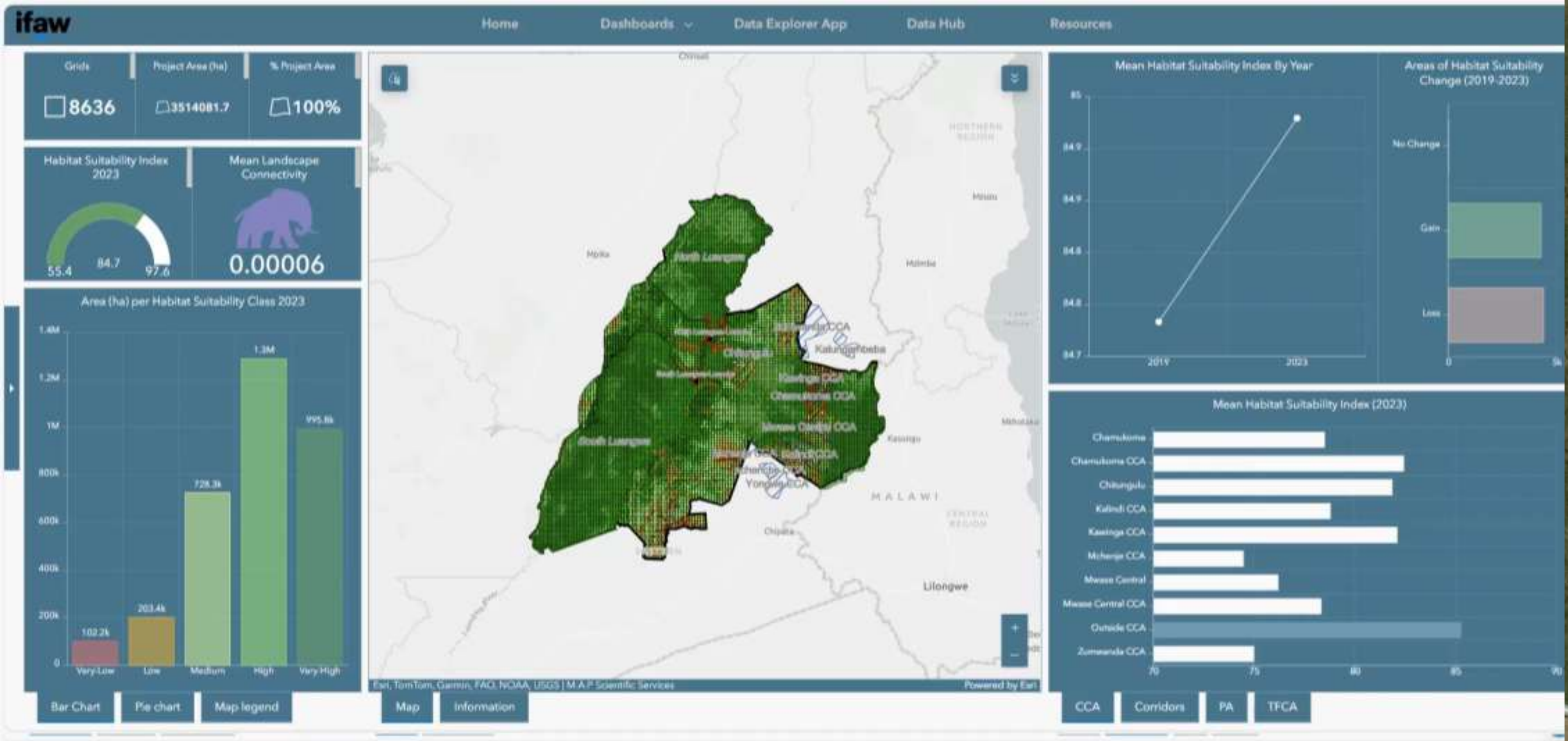
How are land-use change affecting the corridor?



Who will be affected in the corridor?



What do elephants think of the corridor?



Are elephants using the corridor?

Where to from here?

- The corridors identified are the areas that elephants are most likely to use.
- This translates into the areas that are also the most likely to experience human elephant conflict.
- The next steps – ensuring the corridors are effective i.e. facilitate movements but do not detract from the needs of people.
- Connectivity can align with areas important for **carbon storage**, offering **co-benefits for conservation and climate goals**.

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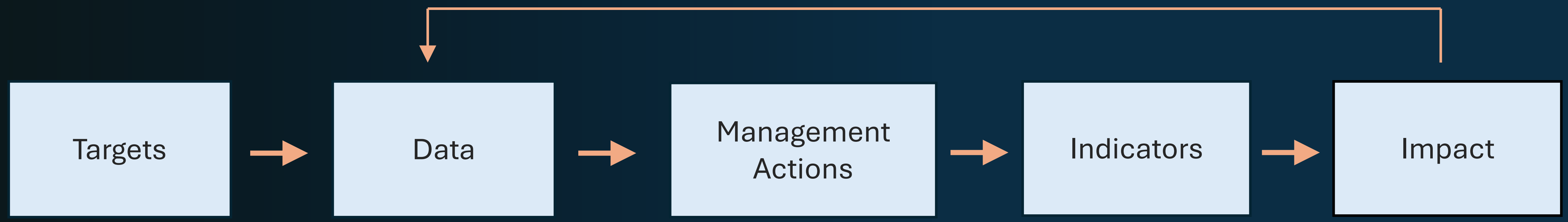
Planning → Operations → Impact



Targets
- Maintain and enhance connectivity

Data
- Land-cover
- GPS collar data

Management Actions
- Secure and restore key portions of the corridor (e.g., reforestation, prevention of agricultural expansion).

Indicators
- Extent of forest restored/protected
- Number of human elephant conflict events reported.
- Number of elephants using the corridor
- Connectivity Index

Impact
- Increased elephant movement.
- Lower incidence of human elephant impact
- Increased forested area
- Improved gene flow

Thank you.

Dr Pieter Olivier

M.A.P Scientific Services

pieter@mapss.co.za

SADC Protected Areas

- Protected areas function as islands surrounded by an ocean of human land-use types.

- Small and isolated
- Disruption of ecological process
- Edge effects
- Human-wildlife conflict
- Localised impacts
- Vulnerable to climate change

- Solution? - Planning for connectivity by integrating conservation into broader land-use strategies.

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SADC Protected Areas

•**Ecological connectivity** is essential for maintaining biodiversity and ecological processes.
•It refers to how well different habitat patches are linked, allowing for wildlife movement and ecosystem function.
•Despite its importance, connectivity is **often missing from land-use planning** frameworks.
•The **Kasungu–Lukusuzi habitat matrix** is under increasing threat from agriculture and infrastructure expansion.
•Many areas have already been degraded—**identifying and protecting remaining intact zones is critical**.
•This matrix is a **key corridor for elephant movement** between Malawi's Kasungu NP and Zambia's Luangwa NPs.
•Enhancing connectivity can benefit **elephants and broader ecological resilience**.
•Connectivity can align with areas important for **carbon storage**, offering **co-benefits for conservation and climate goals**.

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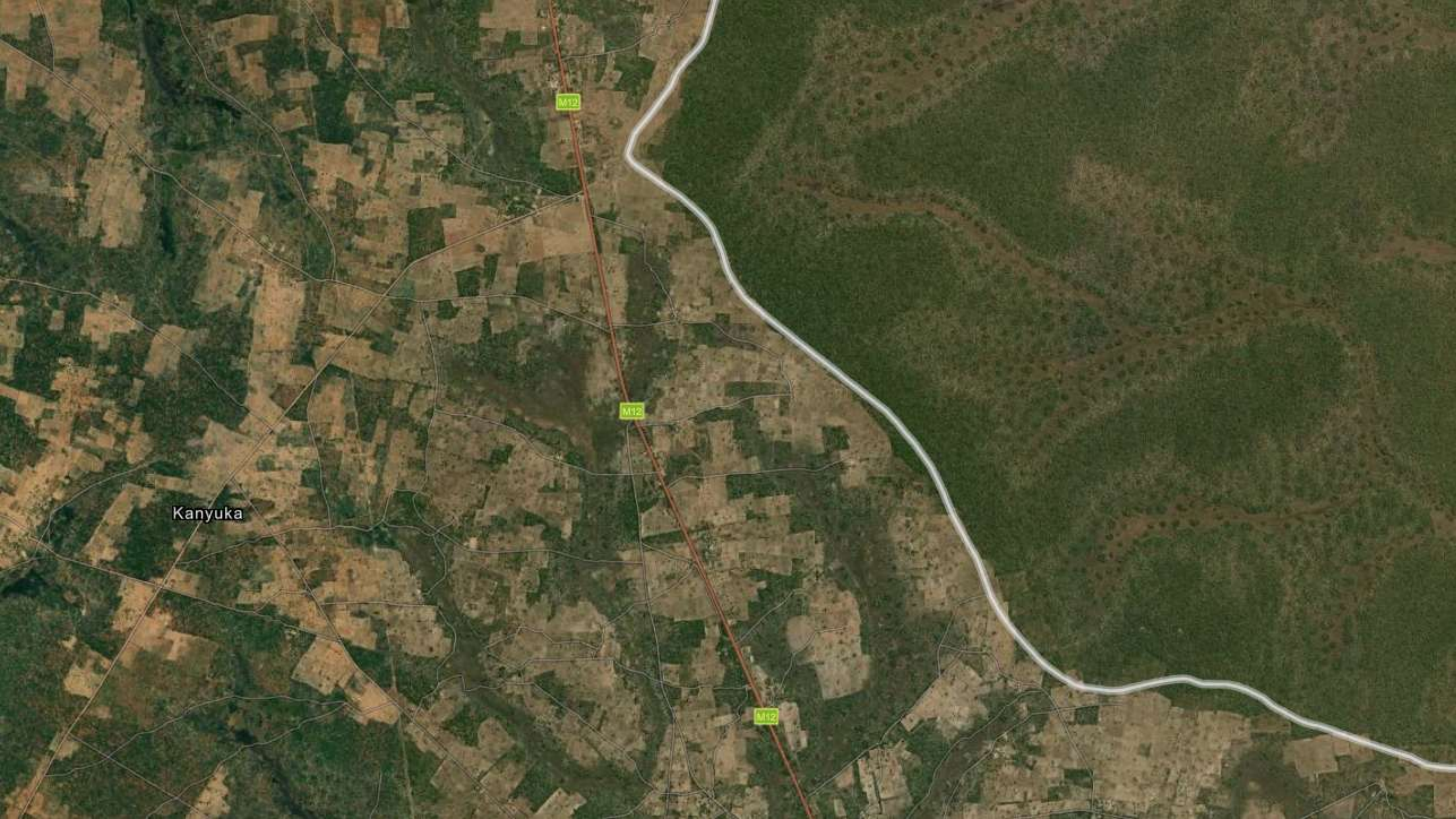
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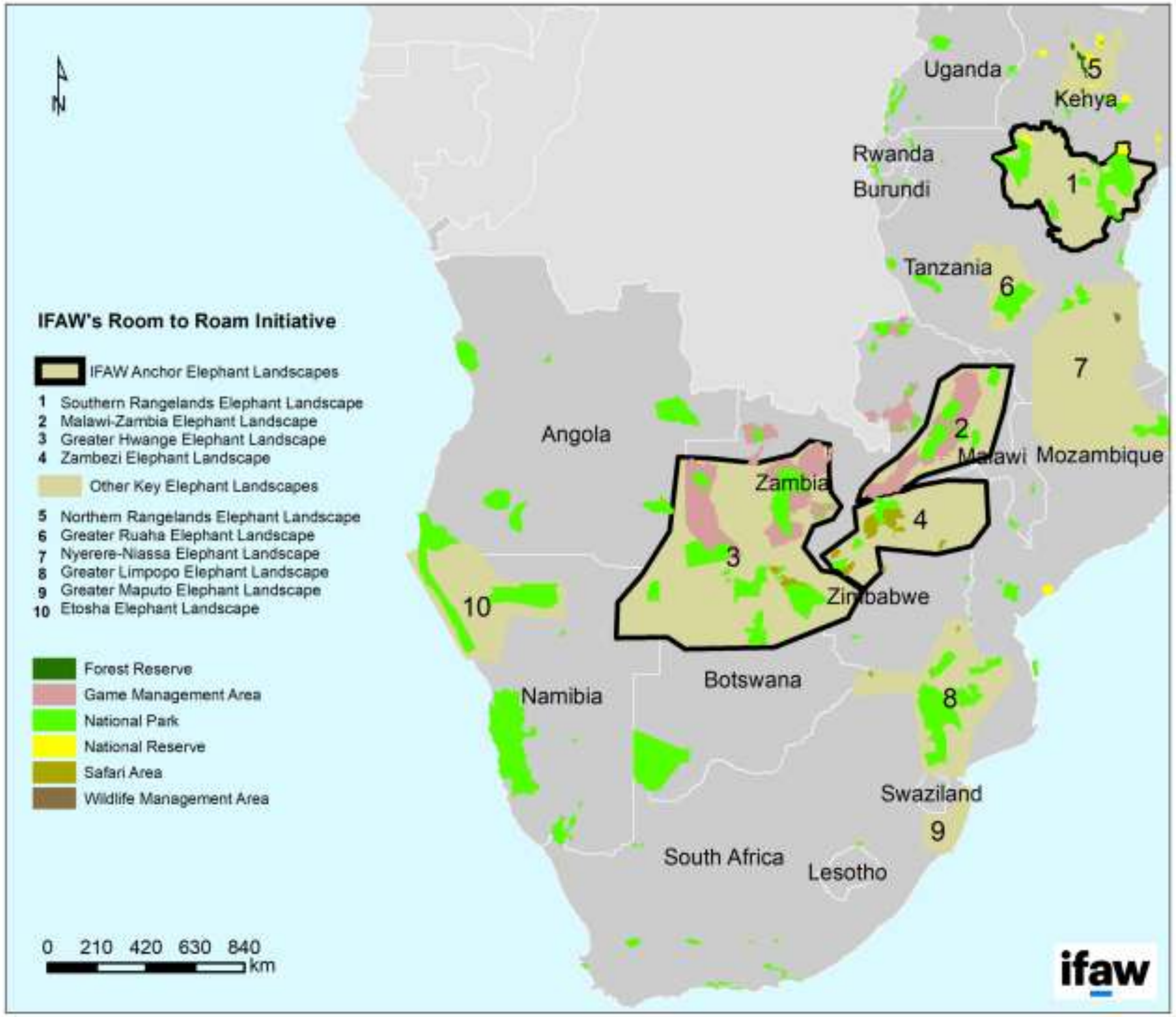
Room to Roam: Enhancing Transboundary Connectivity for Healthy Ecosystems

Henry Ndaimani (PhD)

SADC TFCA International Conference & Summit Rainbow

Towers (17 – 23 May 2025)

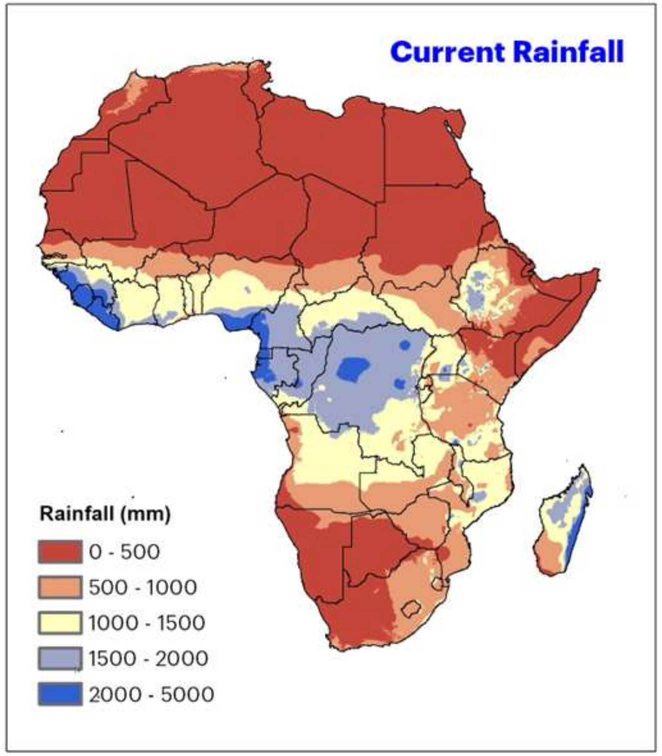
Room to Roam

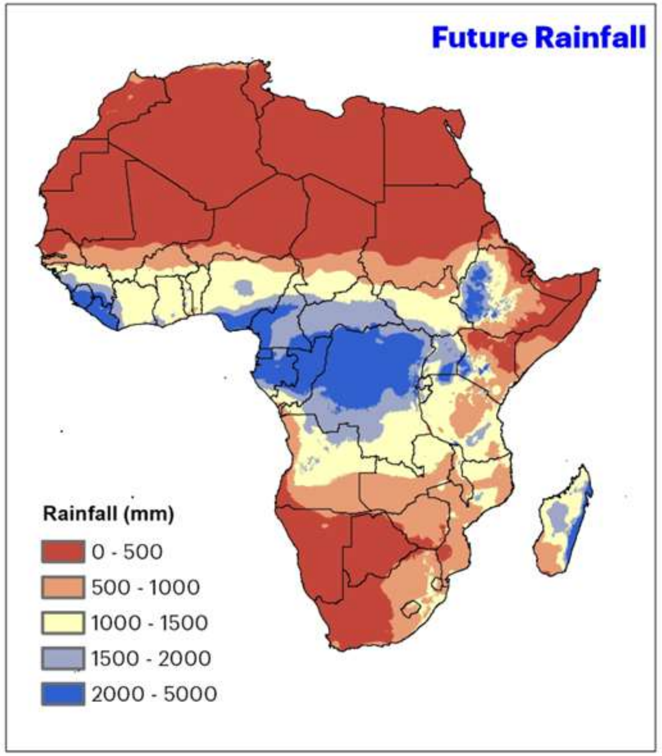


Backed by 20 years of science and engagement with local communities, Room to Roam is securing and connecting habitats, creating safe passages for wildlife to travel freely through their home ranges in East and southern Africa

Selected Conservation Issues?

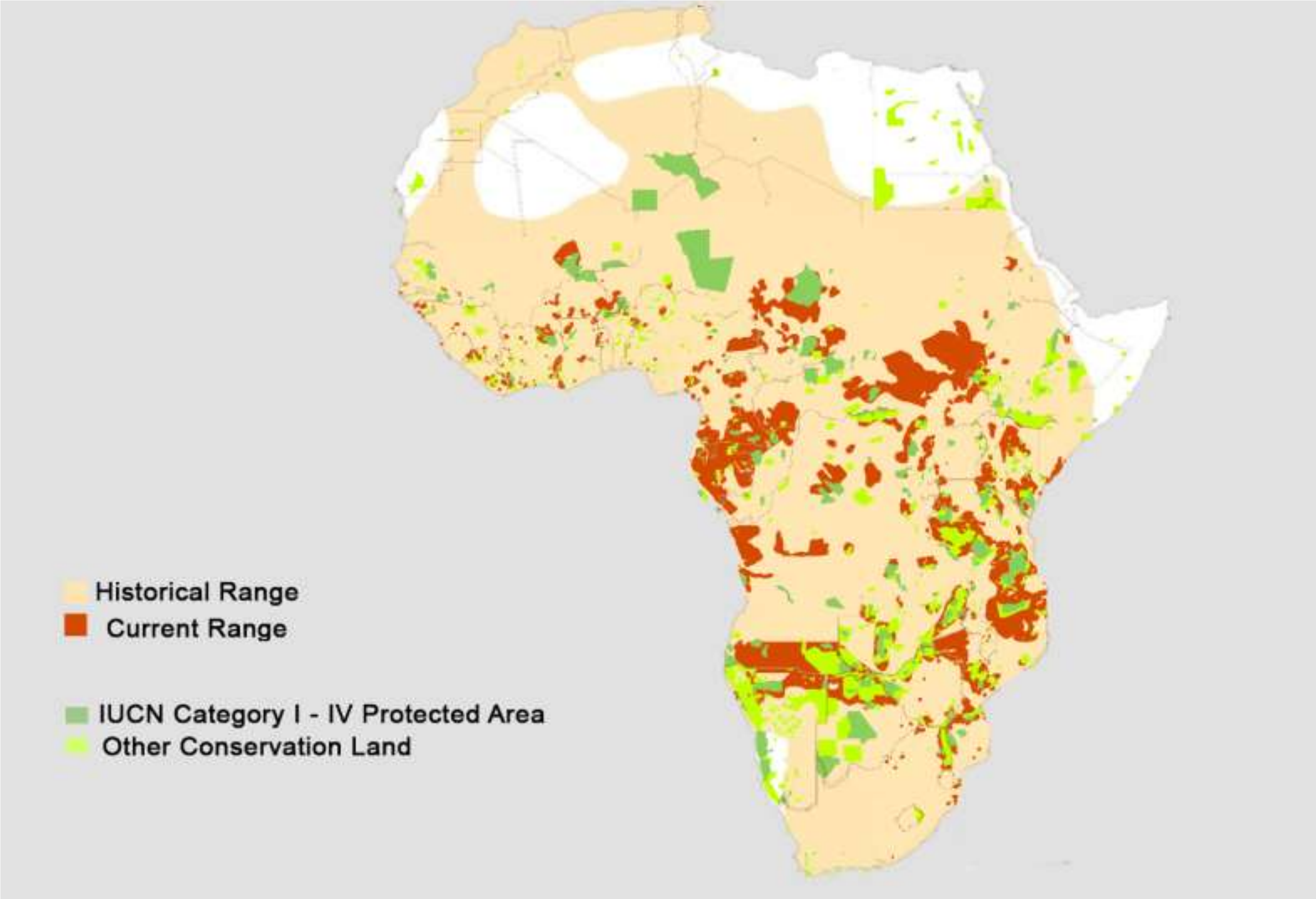
Climate Change



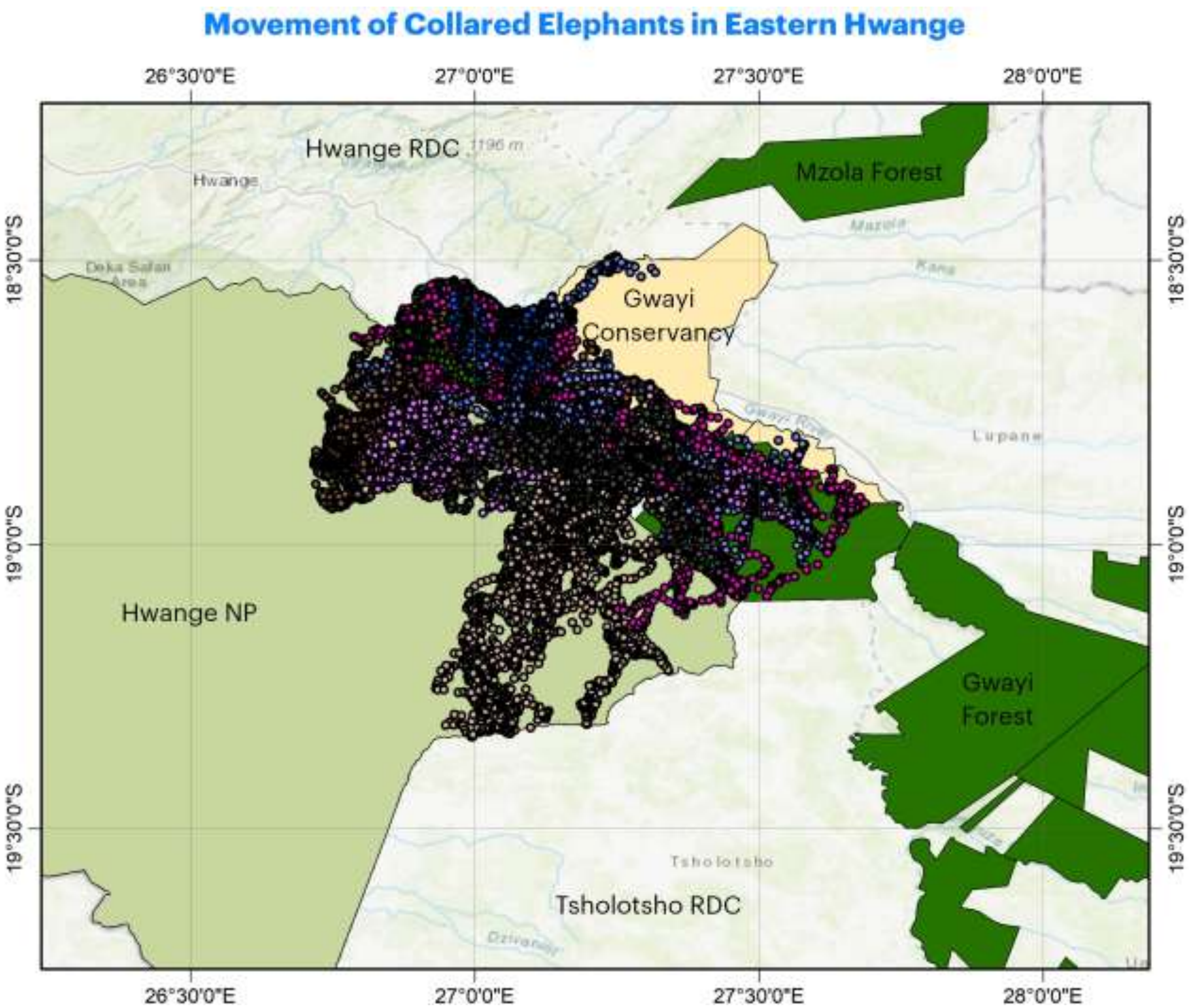


- Is climate change driving patterns in the use of ecological corridors and dispersal areas?
- Is the distribution of water and forage driving patterns of HWC
- What potential do the protected areas possess as sinks for carbon

Habitat Fragmentation, Forest Loss

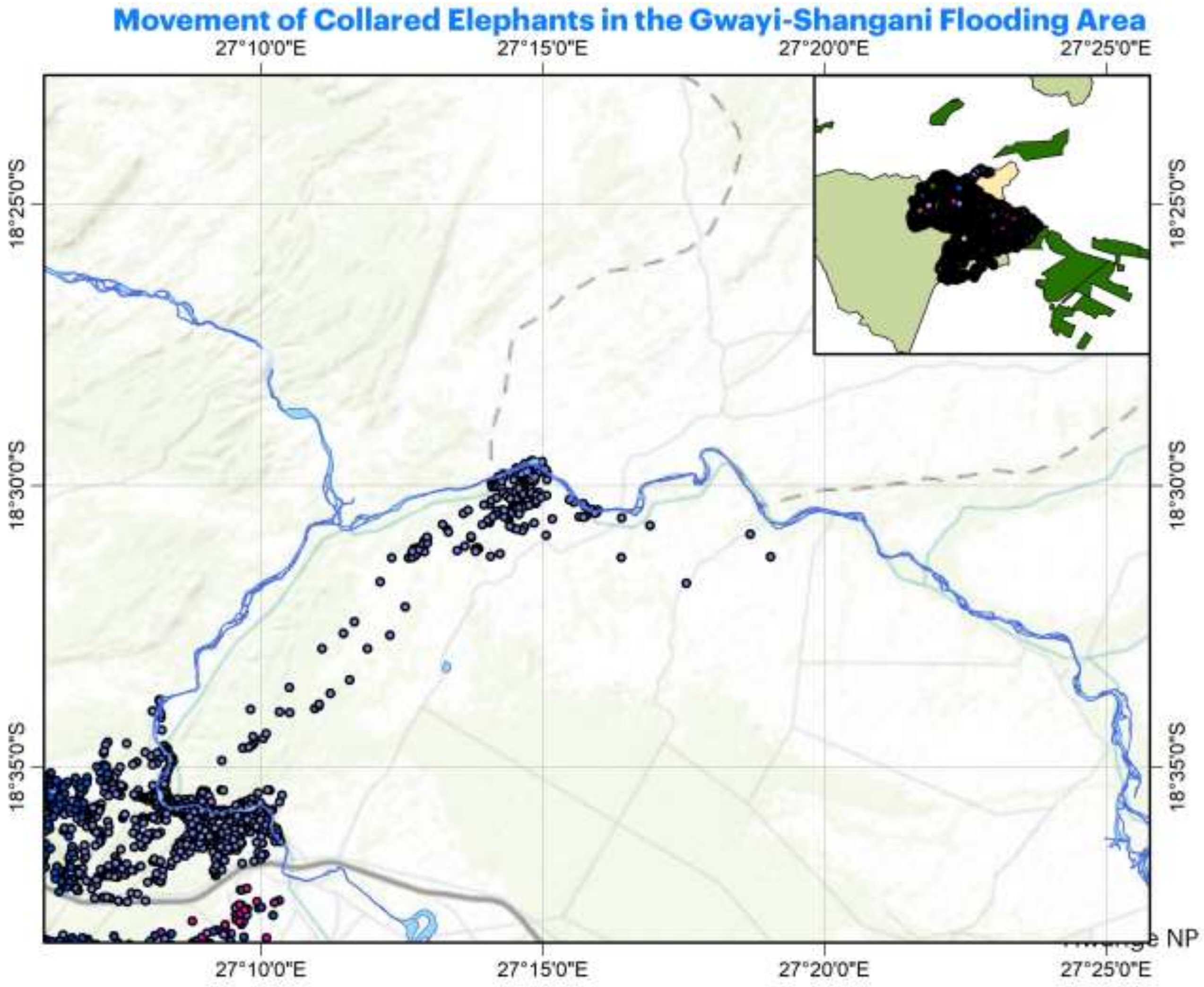


Artificial Water? Driving Elephant Densities



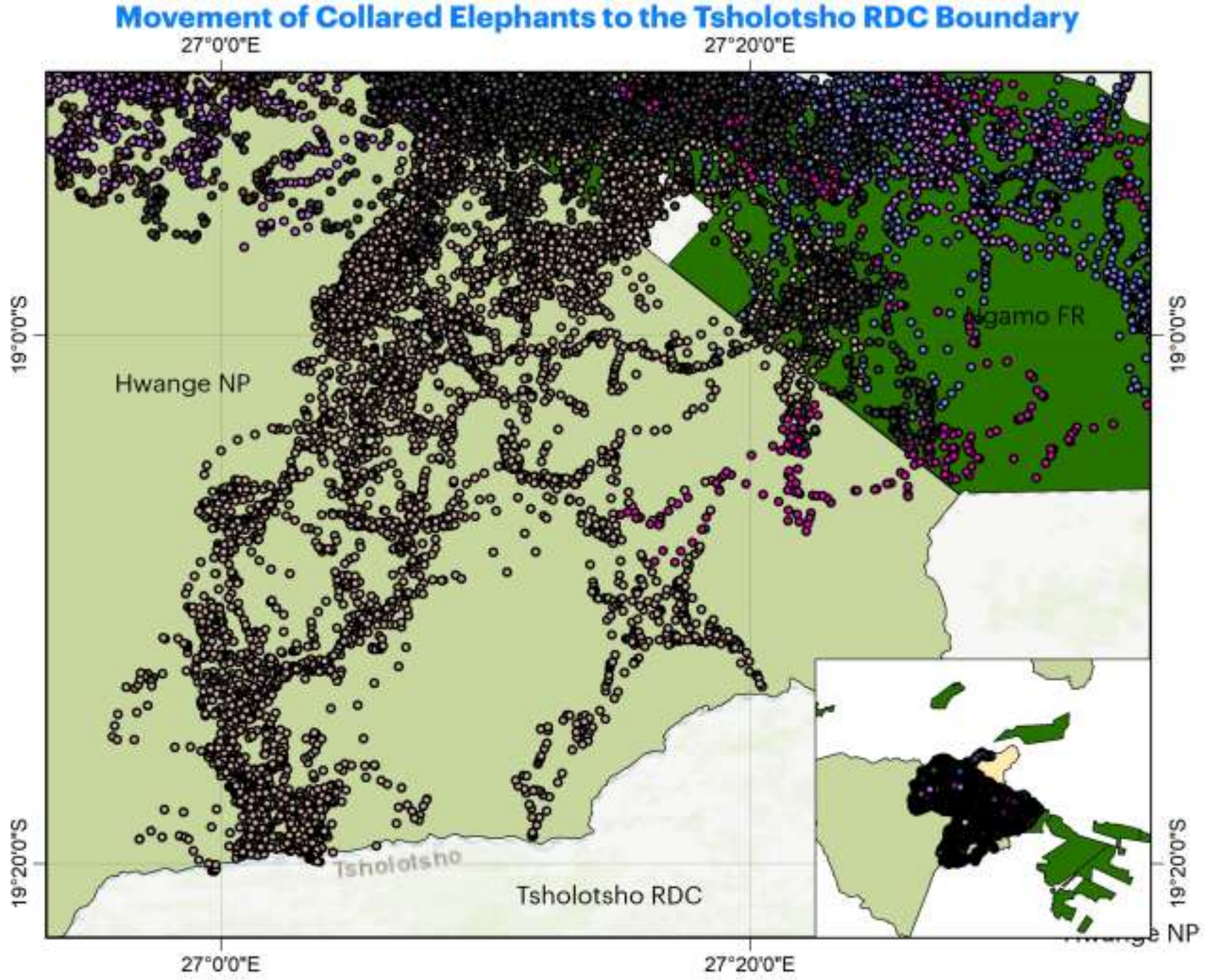
- The distribution of surface water has an impact on how elephants use the landscape
- Decisions on which water points to keep open will therefore have an impact on impact

Permanent water



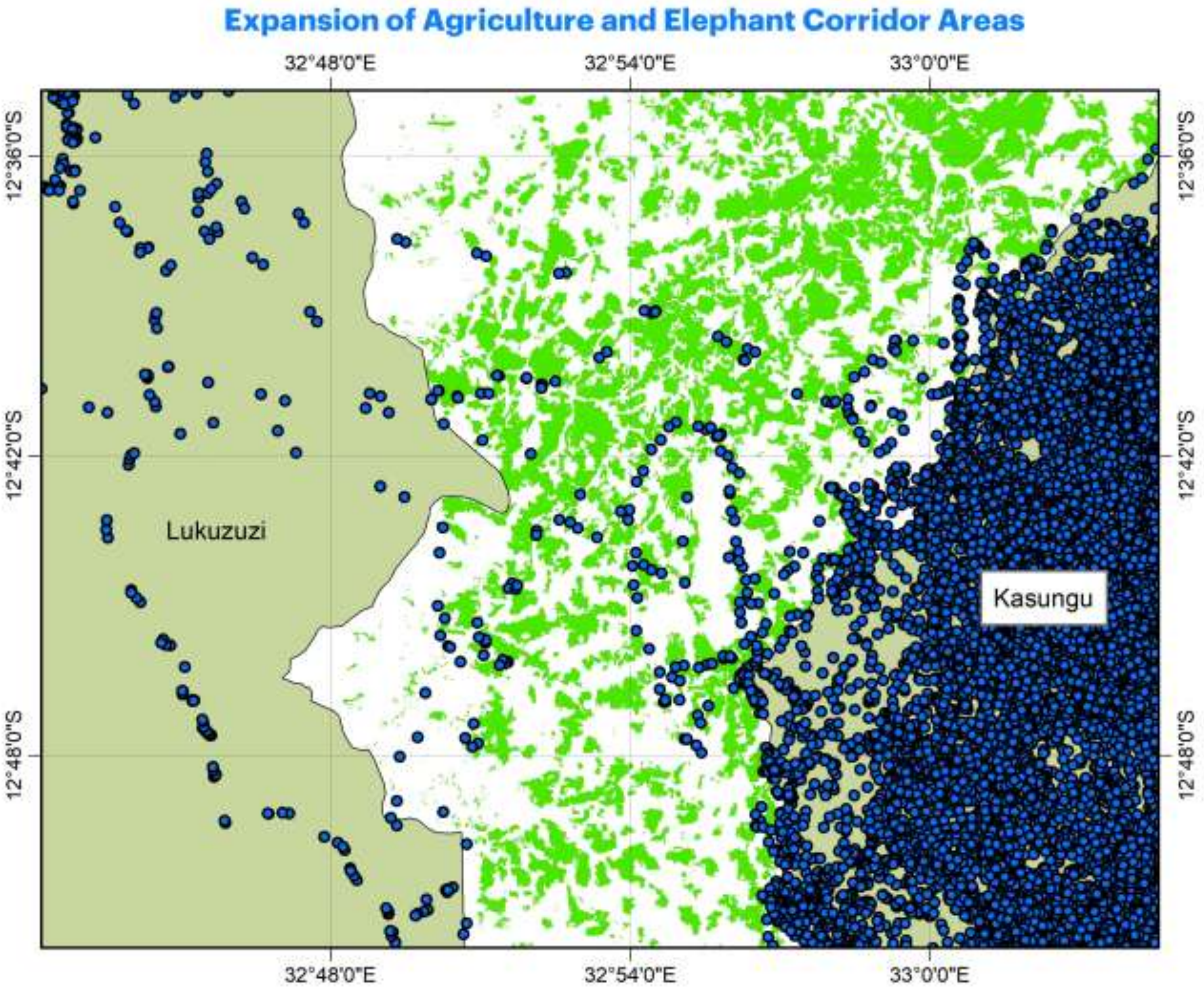
- Evidence of elephants using both the Gwayi and Shangani Rivers
- What impact will a permanent water body have on landuse and general use of the area by elephants

Hard Edges



- There seems to be a hard edge on the Tsholotsho boundary
- Could there be other factors that restrict elephants from venturing further into the communal land?

Expansion of cropland



- High human population growth is driving the expansion of settlement and agriculture
- Historical ecological corridors and dispersal areas have been impacted
- Could this be driving trends in conflict cases?
- What solutions are available

The Human Face to Conservation

Response teams

- 39 and 20 villagers trained and equiped as primary response teams (PRTs) in Zambia and Zimbabwe respectively
- PRTs serve as the first line of defence from and response to conflicts – promote coexistence
- Amongst key roles is to collect HWC data on mobile devices using the ER mobile application
- PRTs equipped with relevant tools including a HEC toolkit that uses sequential order of methods to prevent crop destruction
- Strengthening capacity of wildlife and local government authorities response teams is ongoing - 18 motorbikes, 4 vehicles, fuels, uniforms and monthly dry rations

Education and awareness

To nurture and foster humans' tolerance on problem wildlife species,

- coexistence radio shows are regularly conducted, averagely reaching-out to 500k people/show in 6 districts of Eastern Province, Zambia
- 35 HEC informational signages installed at strategic sites across 7 chiefdoms in Zambia
- Community wide and targeted behaviour change centred awareness – village meetings and sports tournaments
- Environmental stewardship program (ESP) targeting students promoted in Hwange and MAZA

Water is life initiative

To enhance access to water for people,

- 13 boreholes drilled & solarized through people the Water is life initiative
- **To diversify income streams and improve nutritional and food security,**
- 5 * 1 ha gardens established under the horticulture-based village business units initiative

Predator proof bomas

To reduce livestock predation when kraaled at night,

- 100 predator-proof bomas installed in Hwange, safeguarding approx. 1,000 cattle, under the predator-proof bomas initiative

Elephant proof granaries

To prevent elephants from accessing stored maize,

- 36 household and 4 communal levels concrete and cement stores constructed in Zambia and Malawi respectively

Solar-electric poliwire fencing

To reduce elephant crop raiding in 8 hotspot HEC hotspot areas in Kasungu – Lukusuzi- Luambe TFCA,

- 80 km long poliwire materials supported across 7 chiefdoms in 2023 – 25 farming seasons

Climate smart agriculture

To enhance food security, promote conservation compatible and climate smart farming,

- key inputs and extension services for best practices and agroforestry are supported,
- linkages to markets and value addition on produce

Alternative livelihoods

To inspire new opportunities to earn and put food on the table,

- Cooperatives are supported on alternative livelihood sources – conservation enterprises such as tailoring and beekeeping

Future Directions

- ❑ Data and Science-driven interventions
- ❑ Cutting-edge technologies (AI)
- ❑ Community participation at all levels
- ❑ Climate resilience, Climate Finance