SOUTHERN
TANZANIA
ELEPHANT
PROGRAM

STEP

2022 Annual Report

STEP's new Savannah S microlight aircraft landing after an aerial mission in MBOMIPA WMA. Thanks to funding from Future for Elephants and Vrienden van de Olifant, STEP was able to purchase a new aircraft to provide critical aerial support to the Ruaha-Rungwa ecosystem.

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"The conservation education program at my school started in 2019. It is different from the rest of our other subjects because first of all, we learn entirely about wildlife, their importance and how we can live with them. It is also very different as we get a chance to go to national parks and see for ourselves what we learnt in class, which we do not do in our other subjects."

— *student from Bokela Secondary School, Mang'ula*

COVER IMAGE: *Kilombero HEC Coordinator Kim Lim with students from Udzungwa, Darajani, Mwaya, Mtukula and Msolwa Primary Schools on a park visit to Mikumi National Park.*

To ensure that communities see tangible benefits from conserving corridors, STEP initiated conservation agreements with the villages participating in the Kilombero Elephant Corridor. Stewardship of the corridor generates benefits based on attainment of certain conservation targets set through a participatory process. Villages decide how these benefits are allocated toward initiatives to improve healthcare, education, empowerment of women and girls, and the environment. In this photo, community members of Sole village receive their first corridor conservation payment from STEP staff.

Overview of Our Work

Southern Tanzania remains a globally important region for elephants, home to 35% of East Africa's elephants, and 7% of the continent's population. The key strongholds are the Ruaha-Rungwa and Udzungwa-Kilombero-Nyerere

ecosystems, connected by corridors, forming a meta-population of around 30,000 individuals. In 2009, numbers were more than double before devastating declines from poaching for the ivory trade.

STEP works to conserve this important population through a landscape level approach.

We provide prioritized and targeted support to communities, protected areas and government to

ensure these ecosystems can continue to support these vital elephant populations while also meeting the needs of neighbouring human communities.

RUAHA-RUNGWA

- Over 45,000 km² the ecosystem contains seven protected areas: Rungwa, Kizigo and Muhesi Game Reserves, Ruaha National Park, MBOMIPA Wildlife Management Area (WMA), Lunda-Nkwambi Game Controlled Area and Waga WMA.
- Population of 15,600 elephants remained stable in the 2021 TAWIRI census. Ongoing demographic monitoring continues to assess the extent of recovery from poaching.
- The elephants of Ruaha National Park make use of the entire Ruaha-Rungwa landscape, moving into Rungwa-Kizigo-Muhesi Game Reserves in the north and into MBOMIPA WMA and village land in the south—this means the entire ecosystem must be protected.

Key Challenges
- Limited resources to effectively patrol a huge area: inadequate road networks and heavy rains limit efforts, especially in the Game Reserves.
- Limited resources for MBOMIPA WMA on the south-eastern border of the park, a critical wildlife area and buffer to Ruaha National Park.
- Threats include poaching for ivory and bushmeat, illegal logging, charcoaling, mining, and encroachment. Elephant poaching caused a >50% population decline between 2009-2015.
- Human settlement along protected boundaries, in conjunction with a lack of land use planning, has led to more frequent human-elephant interactions, due in part to blockage of elephant corridors.

**Our Approach:**
Protection:
- Provide support for the protection of MBOMIPA WMA by supporting Village Game Scout wages, funding patrols, providing training, enhancing governance and conducting aerial patrols.
- Provide support to Rungwa-Kizigo-Muhesi Game Reserves by funding fuel for regular vehicle patrols, providing training in GPS, GIS and camera trapping and conducting aerial patrols in conjunction with ground teams.

Human-Elephant Coexistence:
- Conduct education and awareness-raising activities in villages affected by human-elephant conflict to explain elephant behaviour, provide context for human-elephant interactions and teach communities how to stay safe around elephants, via both large-scale events and one-on-one training by Local Elephant Monitors.
- Operate 24 Village Savings and Loan Associations that provide access to credit during critical periods as well as a way to save money throughout the year. Members receive a share out at the end of a savings cycle from interest paid on loans.
- Understand the drivers of human-elephant conflict and work towards land use planning, facilitating human-elephant coexistence.
- Provide fuel support to ranger teams to assist communities with crop protection.

Research:
- Monitor the status of key elephant populations, study human-elephant interactions on village land, and evaluate interventions aimed at improving human-elephant coexistence.

Ruaha-Rungwa Ecosystem

Udzungwa-Kilombero-Nyerere Ecosystem
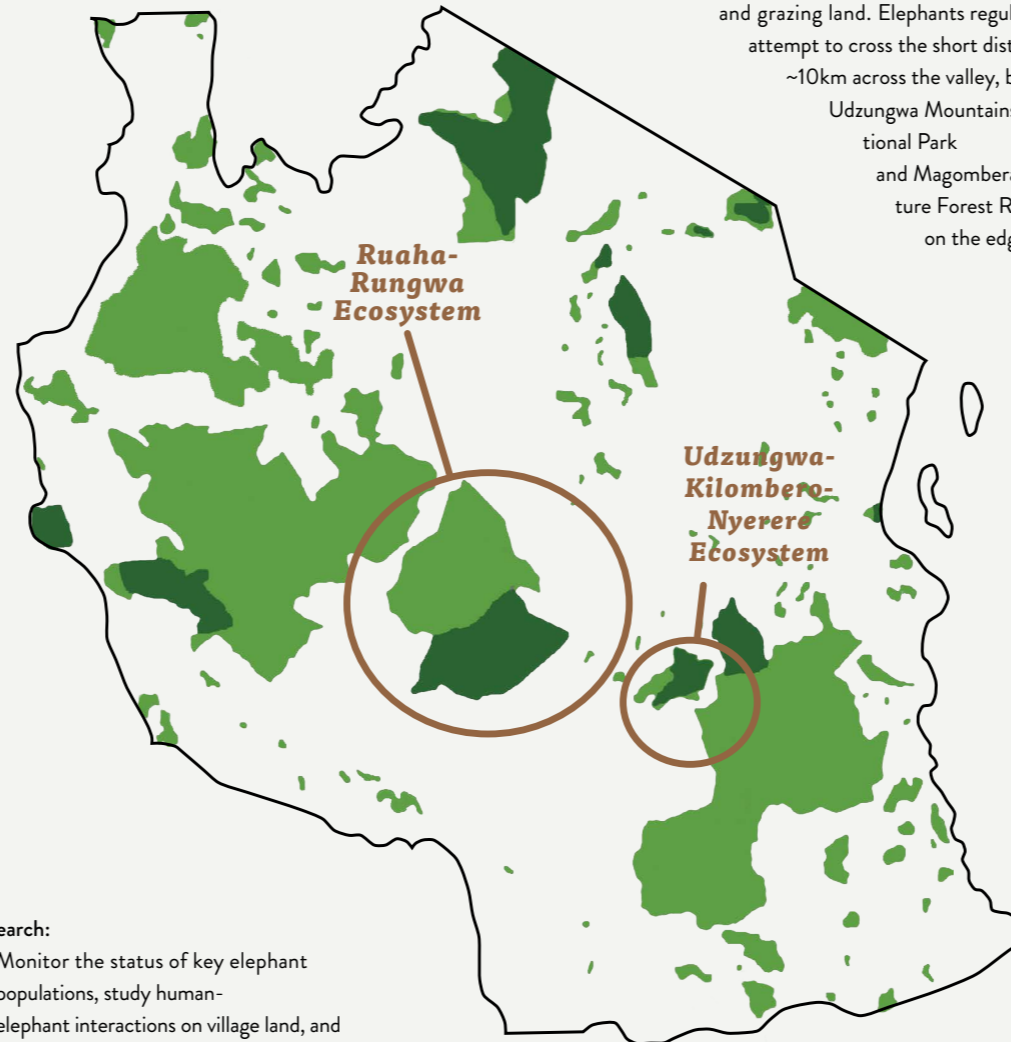
UDZUNGWA-KILOMBERO-NYERERE

- The Kilombero Valley, in the Udzungwa-Kilombero-Nyerere ecosystem, is a densely populated, fertile matrix of villages, agriculture and grazing land. Elephants regularly attempt to cross the short distance of ~10km across the valley, between Udzungwa Mountains National Park and Magombera Nature Forest Reserve on the edge of Nyerere National Park (formerly part of Selous Game Reserve). Less than 50 years ago, there was continuous forest across the valley: today, the forest has been fragmented by rapid land conversion due to agriculture. The route is a critical connection between the western and southern elephant metapopulations of Tanzania and the only link that can be maintained and restored. This area includes:
  - Udzungwa Mountains National Park
  - Magombera Nature Forest Reserve
  - Nyerere National Park and Selous Game Reserve
  - Uzungwa Scarp Nature Forest Reserve
  - Kilombero Nature Forest Reserve
- Population of 15,500 elephants estimated for Selous-Mikumi in the 2018 TAWIRI census.

Key Challenges:
- The area contains important elephant corridors which link Udzungwa Mountains National Park and Nyerere National Park resulting in frequent elephant presence and movement.
- Intensive agriculture in the valley has created a hard edge between forest and farm land, making farms vulnerable to elephant crop damage.
- Udzungwa's forests are threatened by logging, bushmeat poaching and snaring, and encroachment.

Our Approach
Protection:
- Support protection of Uzungwa Scarp, Magombera and Kilombero Nature Forest Reserves by funding patrols, providing equipment, and facilitating training on GPS and GIS, camera-trapping, human rights participatory forest management, patrol techniques, reporting, and first aid for rangers and Village Game Scouts.

Human-Elephant Coexistence:
- Restore connectivity between Udzungwa and Nyerere through establishment of the Kilombero Elephant Corridor, working with communities and local government on compensation for farmers.
- Improve farmer livelihoods through beehive fence projects to reduce crop loss to elephants and generate income through honey sales. Provide access to loans through Village Savings and Loan Associations.
- Conduct education and awareness-raising events in villages affected by human-elephant conflict to explain elephant behaviour, provide context for human-elephant interactions and advise communities on how to stay safe around elephants.
- Trial new crop damage mitigation methods for diverse conditions within the valley. Continue to bolster beehive fence effectiveness.

Research:
- STEP's research teams monitor the status of elephant populations, study human-elephant interactions on village land, and evaluate interventions aimed at improving human-elephant coexistence. This work is critical to understanding the status and conservation needs of elephant populations and for planning and evaluating conservation interventions.

2022 *in Review*

M MBOMIPA WMA

R Ruaha-Rungwa-Kizigo Muhesi

K Kilombero Valley

U Udzungwa Mountains National Park, Uzungwa Scarp and Kilombero Nature Forest Reserve

Protection

Aerial Patrols

M R **56** *flight hours*

Illegal Activity

M **61** *poachers' camps closed*

U **412** *snares removed*

U **17** *timber cutting sites closed*

U **80** *poachers' camps closed*

M U **31** *suspects apprehended*

Patrols

M **10,638** *km of foot patrols*

M **10,893** *km of vehicle patrols*

U **1,579** *km of foot patrols in all forest protection programs*

R **104,189** *km of vehicle patrols*

Capacity Building

M **36** *VGS trained in mobile data collection, report writing, radio communication and vulture poison response*

M **49** *MBOMIPA WMA Board and Authorised Association members trained in good governance practices*

Human-Elephant Coexistence

Reducing Negative Human-Elephant Interaction

K **3** *meetings held with TANAPA to develop HEC response framework*

K **1** *TANAPA vehicle rehabilitated for HEC patrols*

Building a Foundation for Tolerance and Coexistence Through Outreach and Education

R **>1,053** *farmers reached in one-on-one training by LEM+ Team*

R **>19,000** *people reached by 'Tembo Weeks' at football matches, film nights, community training and school visits*

K **>2,900** *people reached by film nights on elephant ecology, behaviour & human-elephant coexistence*

R **>10,164** *students reached through lessons taught by Local Elephant Monitors*

Supporting Livelihoods

R **339** *loans provided across 24 VSLAs*

R **16** *new VSLAs established for a total of 24, providing 144 loans to 170 farmers*

K **11** *total VSLAs operational, 4 of which are made up of farmers compensated by the corridor establishment process*

K R **1,050** *litres of honey harvested*

Kilombero Elephant Corridor

K **1** *Special Zone Plan developed*

K **274** *landowners compensated and received financial training*

K **75** *corridor farmers supported to form VSLAs*

K **4** *meetings of the Kilombero Elephant Corridor Management Committee held*

Research

Monitoring

R **>435** *elephant observations for ecological and demographic monitoring*

R **201** *incidents of elephant crop damage recorded*

K **394** *incidents of elephant crop damage recorded*

U K **36** *walking transects conducted to count and record dung piles for population monitoring*

Capacity Building

3 *Tanzanian MSc students supported*

13 *Scientific publications & conference proceedings to date*

Camera Trapping

R **10** *camera traps monitoring elephant use of water sources on village land*

K **12** *camera traps monitoring elephant corridor endpoints*

K **20** *camera traps monitoring elephant responses to mitigation fences*

Trials

K **1.5** *km of metal strips fencing*

K **3.5** *km of solar lights fencing strip fencing*

K **2** *beehive-fence reinforcement trials, combing beehive fences with metal strips or solar lights*

K **8** *improved food stores constructed*

VSLA Meeting, Ipunguli, Doroto

The STEP Story

VISION: *Creating a long and peaceful future for elephants in southern Tanzania and for the ecosystems and communities on which they inter-depend.*

MISSION: *To secure a future for elephants in southern Tanzania by supporting elephant protection, enhancing human-elephant coexistence, conducting research and awareness-raising.*

🛡 Protection   🐾 Human Elephant Coexistence   📊 Research

2014
- 🔍 STEP founded with five members
- 🛡 Aerial support program for Ruaha-Rungwa launched
- 🐾 Expansion of first beehive fence project in Kilombero

2015
- 🐾 Start of ongoing capacity building training program for rangers in GPS and GIS
- 📊 Elephant monitoring program in Ruaha National Park begins
- 📊 Elephant monitoring transects in Udzungwa Mountains National Park begin

2016
- 🐾 Human-elephant coexistence work expanded to Rungwa
- 🐾 First Village Savings and Loans Associations (VSLAs) established in Kilombero
- 🐾 Expansion of beehive fences to two additional villages in Kilombero
- 🐾 First Local Elephant Monitors engaged

2017
- 🛡 Launch of the ongoing Uzungwa Scarp Protection Project
- 🛡 Number of rangers and protection personnel trained in use of GPS units and GIS exceeds 100
- 🐾 First fuel support for HEC response provided to partners

2018
- 🛡 Launch of the ongoing MBOMIPA WMA Protection Project
- 🛡 Efforts to restore the Kilombero Elephant Corridor begin
- 🛡 Aerial support program passes 500 hours
- 📊 Beehive fence and elephant demography studies published

2019
- 🐾 Publication of human-elephant coexistence booklet
- 🐾 First Tembo Cup football tournament
- 🐾 Number of beehive fences in Kilombero reaches five
- 🐾 Protection work in MBOMIPA leads to arrest of elephant poaching network

2020
- 🐾 Human-elephant coexistence work expanded to Doroto village
- 🐾 Construction of Tanzania's first elephant underpass begins
- 🐾 Total of 13 Local Elephant Monitors engaged
- 🐾 STEP's CEO leads development of Tanzania's first national human-wildlife conflict management strategy
- 🛡 Ongoing recovery of wildlife populations in MBOMIPA WMA

2021
- 🐾 Expand efforts to strengthen HWC response by rangers through training
- 🛡 Kilombero Nature Reserve Protection Project begins
- 🐾 Number of VSLAs established in Rungwa-Doroto reaches 8
- 📊 Trials of novel elephant deterrents (smelly repellent, strobe lights) expanded

2022
- 🔍 STEP Team grows to 50 members
- 🛡 STEP's new anti-poaching aircraft arrives and begins operations
- 🐾 Trial of constructing improved food stores begins
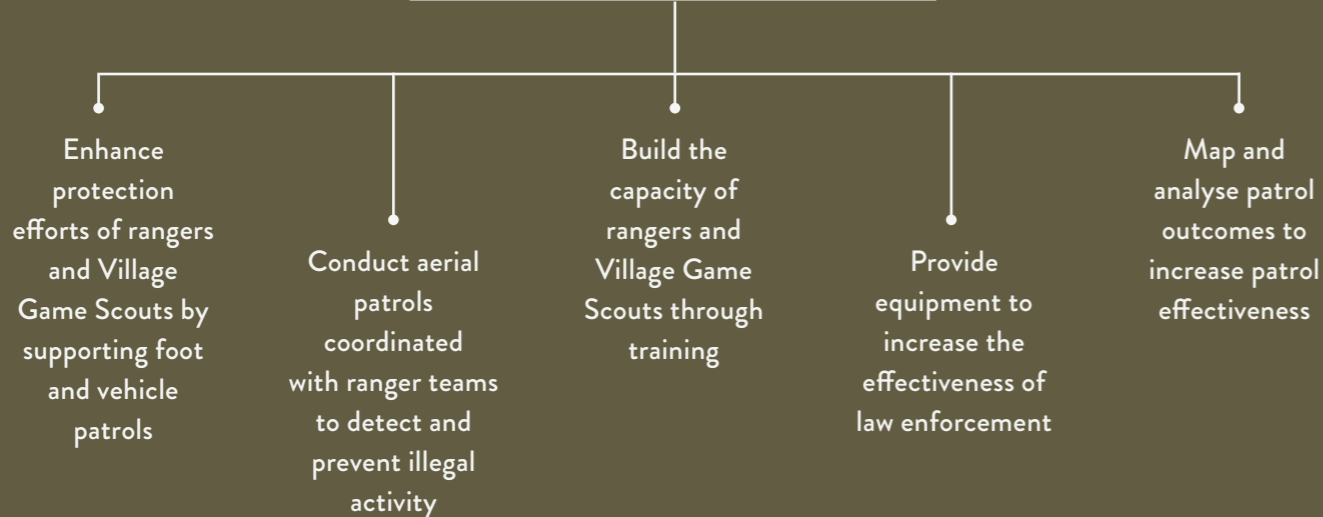- 🐾 STEP begins conservation agreements for farmers in villages adjacent to the Kilombero Elephant Corridor

Protection

A group of elephants in MBOMIPA WMA as seen from STEP's new Savannah S aircraft.

MAIN GOALS & FUNCTIONS

- Enhance protection efforts of rangers and Village Game Scouts by supporting foot and vehicle patrols

- Conduct aerial patrols coordinated with ranger teams to detect and prevent illegal activity

- Build the capacity of rangers and Village Game Scouts through training

- Provide equipment to increase the effectiveness of law enforcement

- Map and analyse patrol outcomes to increase patrol effectiveness

Where We Work

MBOMIPA WMA

- 777 km^2

- Comprises land from 21 villages in Iringa Rural District

- The WMA forms a critical buffer zone to the south-east of Ruaha National Park, and is used by one of the largest concentrations of elephants in the ecosystem

Female members of the MBOMIPA VGS TEAM.

MBOMIPA PROTECTION PROJECT

2022 marks the fifth year of the fruitful collaboration between STEP and MBOMIPA WMA. This year, STEP began work with the newly elected MBOMIPA WMA Authorised Association (AA), WMA Management and the MBOMIPA Board to improve governance and strengthen leadership capacity. Together with Honeyguide Foundation, STEP supported a study tour to successful WMAs in northern Tanzania, provided governance training to 42 MBOMIPA WMA AA and seven Board Members as well as providing training for 101 village leaders on separation of powers (roles and responsibilities) in the management of MBOMIPA WMA—an area identified during leadership meetings. To improve and build their capacity, 36 VGS attended training on mobile data collection, report writing, poisoning response (focused on vultures) and deepened their knowledge on radio communication. 10 VGS were trained on methods for reducing human-wildlife conflict, a new service that the MBOMIPA VGS will begin providing to neighbouring communities.

To increase the involvement of women in community protection of MBOMIPA WMA, four female VGS were recruited. We work to ensure safe working conditions for women VGS, including separate accommodation at VGS posts, and flexibility in work schedules to accommodate childcare responsibilities. Women are also represented in VGS leadership; among the three VGS commanders every month, one is a woman. Women VGS are effective post commanders who have earned the respect and trust of their fellow VGS.

MBOMIPA CUP

Learning from the Rungwa-Doroto HEC Team, STEP supported a football tournament to promote awareness and positivity around the WMA with Lion Landscapes, a collaborator in the landscape. More than 13,000 people attended 23 game were held between the WMA village members. In addition to football matches, film nights and school outreach events were conducted, reaching an additional 6,800 individuals.

A film night at the MBOMIPA Cup.

Plans for 2023
- Continue working with the AA and the Board to improve communications between the WMA and the surrounding communities.
- Continue training the VGS on effective human-elephant conflict response, including provision of a vehicle that will be used for elephant deterrence from farmland.

UZUNGWA SCARP NATURE FOREST RESERVE

- 327.63 km^2
- The second largest mountain block of the Udzungwa Mountains, part of the Eastern Arc Mountains
- Home to many globally threatened species, especially primates, small to medium-sized antelopes, reptiles and amphibians. In the 1970s, elephants were known to be locally present

KILOMBERO NATURE FOREST RESERVE

- 1345 km^2
- Pristine rainforest
- Provides habitat for threatened species such as kipunji monkeys, Abbott's duiker and elephants

Challenges/Risks:

- Habitat destruction (logging, charcoaling, forest fires) and encroachment from farming and illegal hunting

RUNGWA-KIZIGO-MUHESI GAME RESERVES

- 15,000 km^2
- Supports critically-important elephant range
- Varied landscapes: hilly with patches of riverine forest, open grassland plains, rocky outcrops and extensive miombo woodland
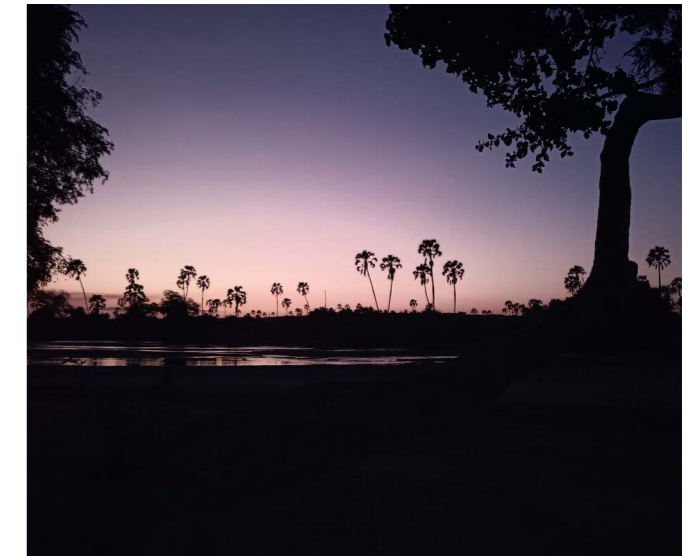
FOREST PROTECTION PROJECT

In 2022, we continued our strong collaboration with Tanzania Forestry Services (TFS) to support joint foot patrol operations by TFS rangers, adjacent communities and the southern highlands Anti-Poaching Unit in Uzungwa Scarp Nature Forest Reserve. These patrol teams covered 845 km of the Scarp's steep slopes by foot patrols in 2022. As a result, 331 snares were removed, 10 poachers' camps and 15 logging sites were closed downs and one arrest was made. Patrol teams were supported to develop strategic patrol plans, maintain patrol databases, and report patrol findings. Patrol teams were also supported with the application of conservation technologies including Survey 123 Mobile Data, camera trapping, and GIS for patrol data analysis.

STEP facilitated meetings in 19 villages adjacent to the Uzungwa Scarp Nature Reserve to bring together Village Natural Resources Committees (local institutions entitled to manage access to benefits and jointly manage the Reserve), Village Leaders, Chita JKT representatives, and foresters. In these meetings, participants received training on Participatory Nature Forest Reserve Management and fire management, shared lessons learned, and discussed the way forward on management of the Reserve. One Community Benefit Assessment was conducted around USNFR.

STEP facilitated meetings with TFS USNFR to discuss feedback and findings on a community benefits assessment and to discuss the way forward. Additional patrol gear (solar lamps, power banks, and a camera) were provided to USNFR and we facilitated major maintenance of the patrol vehicle.

We also continued our strong ongoing collaboration to support joint foot patrol operations involving rangers from TFS and Udzungwa Mountains National Park (UMNP). These operations also included the active participation of adjacent local communities from Kilombero Nature Forest Reserve (KNFR) and UMNP. Patrol teams covered 721 km of foot patrols of the steep slopes of both protected areas. On these patrols, rangers removed 81 snares, closed down 70 poachers' camps and 23 farms and apprehended 16 suspects.

In 2023

- Continue supporting patrols to further increase illegal activity detection and prevention
- Work with TFS on interpreting the findings of the 'benefit audit' to improve community perceptions of and benefits from USNFR
- Expand community engagement work
- Seek more resources to increase forest patrol days under the successful joint TFS-TANAPA patrols model
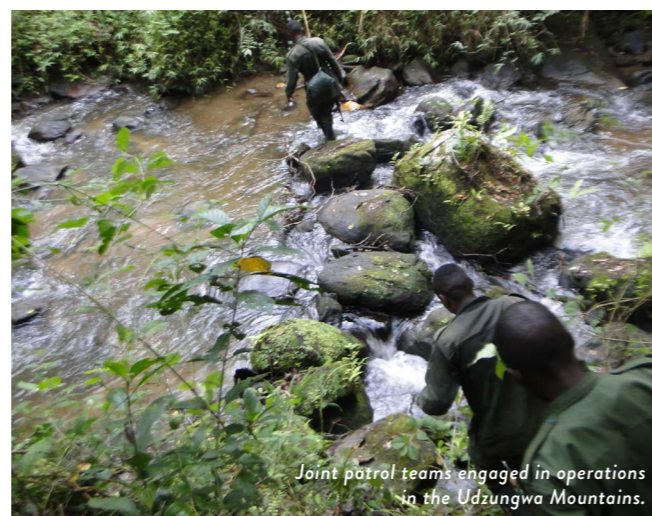
Joint patrol teams engaged in operations in the Udzungwa Mountains.

ENHANCING THE PROTECTION OF RUNGWA-KIZIGO-MUHESI GAME RESERVES

Fuel Support

To support ground patrols, human-wildlife conflict response and increase the mobility of rangers across the Ruaha-Rungwa ecosystem, STEP supported protected area authorities with a total of 11,084 litres of fuel in 2022. This enabled 104,189 km of patrols with a focus on detection of tree-cutting, illegal mining, other anti-poaching activities and human-elephant conflict response.

Aerial Patrol Support

2022 was an important year for rebuilding STEP's aerial program, after our previous aircraft was retired in 2021. With financial support from Future for Elephants and Vrienden van de Olifant, STEP purchased a new Savannah S aircraft, which was delivered to Tanzania in late 2022. We resumed aerial support for the Ruaha-Rungwa ecosystem in the wet season of 2022-2023, conducting 56 flight hours in MBOMIPA WMA, Lunda-Nkwambi Game Controlled Area, and Rungwa and Kizigo Game Reserves during this period. Aerial patrols are always done in collaboration with rangers and village game scouts, who are ready to respond to sightings of illegal activity made from the air. On patrols, several bushmeat and illegal logging camps were spotted that were subsequently closed down by rangers, and several suspects were apprehended. We look forward to having the plane operational throughout the 2023 dry season and thereby provide critical support to rangers.

In 2023

- Increase aerial support in Rungwa, Kizigo and Muhesi Game Reserves to enhance protection of these important areas
- Extend regular aerial support to Lunda-Nkwambi
- Train additional rangers as aerial observers in Rungwa, Kizigo, and Muhesi Game Reserves to accompany the STEP pilot on flights
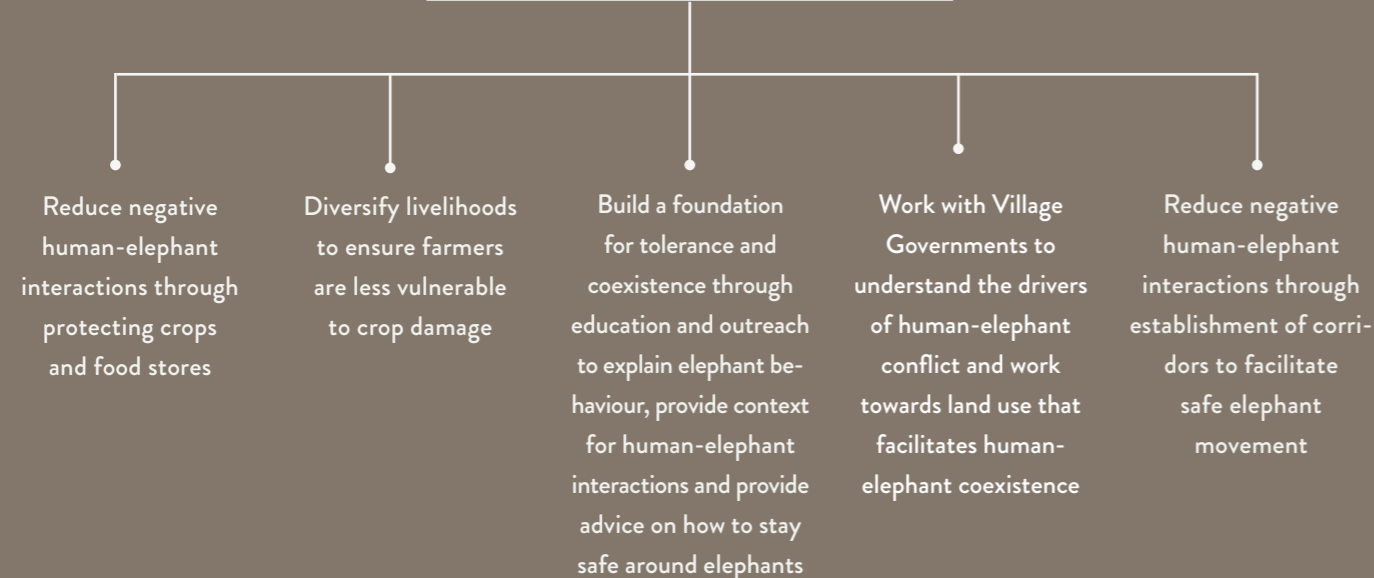

STEP's new Savannah S aircraft.

Human-Elephant Coexistence

Photo: Michał Dzikowski, courtesy of the Embassy of Poland in Dar es Salaam.

Farmers at work behind the double-stranded metal strips fence in Magombera village.

MAIN GOALS & FUNCTIONS

Reduce negative human-elephant interactions through protecting crops and food stores

Diversify livelihoods to ensure farmers are less vulnerable to crop damage

Build a foundation for tolerance and coexistence through education and outreach to explain elephant behaviour, provide context for human-elephant interactions and provide advice on how to stay safe around elephants

Work with Village Governments to understand the drivers of human-elephant conflict and work towards land use that facilitates human-elephant coexistence

Reduce negative human-elephant interactions through establishment of corridors to facilitate safe elephant movement

KILOMBERO VALLEY: HEC RESPONSE FRAMEWORK DEVELOPMENT WITH TANAPA

In 2022, after more than five years of informal data sharing, STEP and TANAPA established an official HEC response framework—a Standard Operating Procedure for reporting HEC incidents , consistently collected metrics and a commitment to capacity sharing. The Framework will facilitate more effective and rapid response by rangers when elephants are on village land, an important complement to STEP's approach: while increasing community capacity for safe methods to protect crops is key to our strategy, there will always be situations that are too dangerous for community members to manage on their own. It is therefore essential that well-trained and well-equipped ranger teams from the relevant protected area authorities in the Kilombero Valley are in place to provide this essential backup support.

The HEC Response Framework was finalized in May 2022 and became operational shortly thereafter. Three meetings were held in 2022 during which the framework was discussed and data was shared. As part of the Framework, STEP supported rehabilitation of a vehicle to enable more rapid HEC response, co-designed data collection forms with TANAPA ecologists and provided elephant deterrent tool kits (air horns, high-powered torches and fireworks).

Close collaboration with Udzungwa Mountains National Park and Nyerere National Park staff will continue into 2023.

Udzungwa Mountains National Park and Nyerere National Park leadership with STEP staff at the first Framework Development Meeting, 2022.

2022 AND ONWARDS TO 2023

- **Beehive Interventions:** STEP continues to support 6.8 km of beehive fences. More than 406.8 L of honey was harvested in 2022 by the 152 farmers engaged in beekeeping (55% women and youth).

- **VSLAs:** STEP started two new VSLAs in 2022, reaching a total of 12. 250 members accessed 318 loans with a value of TZS31,925,500 ($13,584) to start small businesses, improve their farming practices and pay school fees. 85% of these groups are using CHOMOKA, an app designed to increase transparency and efficiency in record keeping.

- **Expanded Mitigation Methods Trials:** We continued monitoring elephant responses to a 1 km solar-powered strobe lights fence, and found that elephants largely avoid the fence when crossing into farmland. We established two new trials to test if we can enhance the efficacy of beehive fences as an elephant deterrent by combining beehive fences with another method. In one village, we established a beehive fence—strobe lights combination trial, and in a second village, we established a beehive fence—metal strips combination trial. We completed three one-year trials of smelly repellent fencing and disseminated the findings of the smelly repellent fences trials through meetings with village leaders, and discussed next steps for mitigation options with leaders.

- **Education and Outreach:** STEP engaged an experienced educator to improve our human-elephant coexistence curriculum which was used to teach students in 19 schools across Kilombero Valley. 2,900 people came to elephant-themed film nights in village centers in 2022. We continued our park visit program, bringing 177 students to Mikumi National Park and 90 students to Udzungwa Mountains National Park. Students learned about elephant research and monitoring and got to experience Tanzania's rich natural heritage, many for the first time up-close. STEP also supported nine student-led awareness-raising events

- **Tembo Seco Cup and Plans for Kilombero Cup:** STEP hosted a small elephant-themed football tournament between four secondary schools in May 2022. This provided valuable experience that will be used to run the first-ever Kilombero Cup in 2023, planned to reach 12 villages.

KILOMBERO ELEPHANT CORRIDOR

2022 was another productive year towards our long-term vision of restoring the Kilombero Elephant Corridor between the Udzungwa Mountains and Nyerere National Parks, via the Magombera Nature Forest Reserve. The goal is to peacefully manage the regular movements that elephants make across the Kilombero Valley, even though their once forested routes have been turned into farmland over the last 50 years. This corridor facilitates connectivity between Tanzania's southern and western elephant populations, a vitally important stronghold for East Africa's population.

STEP has been facilitating this multi-stakeholder restoration project since 2018, involving communities, civil society, Government and the private sector to restore this ecological connectivity, and enhance food and personal security for the local farming population. At the heart of the project are the communities of the three villages of Sole, Mang'ula A and Kanyenja, who have agreed to setting aside ~7% of village land to enable the corridor.

In 2022, valuation for 279 landowners was completed by Government Valuers, with compensation amounts calculated and agreed to according to government standards. Thanks to the support of World Land Trust, Aage V. Jensen Charity Foundation, Elephant Crisis Fund and Quick Response Fund for Nature and several other donors, the compensation payments were paid in full to all households, amounting to over $800,000 (with a second round of remaining plots evaluated and compensated in early 2023). Financial training was provided to 424 people (all landowners and their families) to maximize the benefits of compensation payments. STEP supported 75 compensated landowners to start four VSLAs and more VSLA groups are in the pipeline.

The Kilombero Elephant Corridor Management Committee, comprising village leaders, District Government, TANAPA and TFS met four times and made key decisions that are driving the project forward. A Special Zone Plan for the KEC has been developed, physical demarcation of the corridor boundaries was implemented, construction of boundary fencing is ongoing and STEP, together with USAID Tuhifadhi Maliasili have been mandated to facilitate and support recruitment, training and equipping of 20 Village Game Scouts who will monitor and patrol the KEC on behalf of member villages. A plan for tree planting to restore habitat throughout the corridor has also been completed and implementation is expected to begin in 2023.

Also in 2022, we began consultations on a new program of **Conservation Agreements** between STEP and the three corridor villages, which will enable us to pay funds into each village annually -to be spent transparently on village projects decided on communally at the village assembly -in return for the village's positive protection of the corridor and other conservation actions.

ONWARDS TO 2023

- Supporting revision of local Land Use Plans to incorporate the Kilombero Elephant Corridor

- Construction of fencing and other corridor infrastructure

- Begin implementing a corridor habitat restoration plan, and
  continue with community tree nurseries

- Continue wildlife corridor education for 3,000 students in 20 local primary and secondary schools

- Expand camera trap monitoring of wildlife movements

along the corridor

- Soliciting investment for local enterprises and continue forming Village Savings and Loan Associations for compensated farmers and others in villages around the corridor

- Recruitment, hiring and equipping Corridor Village Game Scouts to monitor and patrol the corridor

- Expansion of Conservation Agreements between STEP and the corridor communities

The Regional Commissioner of Morogoro, Hon. Fatuma Mwassa (in red scarf) planted a tree within the KEC, marking a significant milestone in the corridor restoration while promoting a national tree planting campaign.

Discussing a Conservation Agreement at the Village Assembly in Sole.

RUNGWA KIZIGO MUHESI LOCAL ELEPHANT MONITOR TEAM

The landscape around the Rungwa Kizigo Muhesi Game Reserve ecosystem is dynamic and complex. Communities are large and dispersed with many remote settlements disconnected from village centers. Enter our Local Elephant Monitors (LEMs), our core team in the landscape and the backbone of our HEC work. In 2022, STEP expanded our LEM Team to 14, reaching the villages around Kizigo Game Reserve for the first time.

Our LEMs are involved with every aspect of STEP's work in the landscape—they are our representatives at the village level and often are one of the first people called when there is human-wildlife conflict. LEMs collect elephant movement data to help us build our understanding of elephant space use. When they arrive at a farm or home that has sustained damage, they have a unique opportunity to offer customized education about human-elephant interaction: why do elephants come into farmland, what does their behaviour mean and, most importantly, how to stay safe if they come again. Many families in the landscape have recently immigrated and don't have traditional knowledge about migratory routes—this sometimes means that a farm will be repeatedly visited by elephants from year to year or even within seasons. The knowledge our LEM's provide is therefore critically important for keeping families safe.

In addition to this one-on-one education, our LEM Team leverages their relationships in their communities to talk about human-elephant interaction in schools, public meeting places and during our Tembo Cup tournament. Our Team is multilingual, helping to deliver our content in local languages that make it easy to understand.

This year, our Team began a trial of showing elephant-themed educational videos on tablets. Even though we hold our Tembo Cup events throughout the landscape, there are some households that are too remote to attend. Our LEMs make sure these individuals are reached by bringing out reach to them.

LEMs attend and supervise Village Savings and Loan Meetings, collecting key performance indicators and ensuring groups stay true to guidelines.

They are also our main distribution networks for any equipment or trials, this year they are playing a critical role in our poultry vaccine distribution trial, allowing farmers to access important medicine for common and devastating poultry disease that are often out of reach for these remote communities by price, logistics and quantity. **We couldn't do the work that we do without this team!**

The Rungwa village Local Elephant Monitor Team: Hamisi, Abneri, Jonas and Shabani.

LEM Gunda teaching at the Tembo Cup.

- **VSLAs:** STEP started 16 new VSLAs in the villages and sub-villages around Rungwa-Kizigo-Muhesi Game Reserves. These are also highly mobile and dynamic communities of agro-pastoralists. Across 24 groups, 589 members had access to 267 loans with a value of TZS47,321,500 (~$20,136).

- **TEMBO CUP** in July-August 2022, STEP conducted the fourth annual Tembo Cup in three zones! A mix of education and outreach events together with football matches and film nights, tournaments were held across three zones in more than 24 villages, reaching 20,000+ people.

- **PROTECTED AREA SUPPORT:** STEP strengthened human-elephant conflict response in Muhesi Game Reserve through donation of a Land Cruiser and through repairs of an existing Land Cruiser for Kizigo Game Reserve. STEP also donated 10,000 liters of fuel, enabling critically important HEC response.

- **PROTECTED AREA CAPACITY BUILDING:** We have continued our training collaboration with Kichaka Expeditions Environmental Program through hosting 28 TAWA rangers for a 6 day training where they learned foundations of elephant behaviour and how elephants utilise their habitats. Separately, we trained rangers from all three game reserves on a human-elephant conflict mitigation tool kit, developed by Honeyguide Foundation. Teams considered their operating environments, the types of situations in which they encounter human-elephant conflict and new ways to deter elephants, integrating their knowledge on animal behaviour. Finally, 40 rangers were trained in the basics of elephant calf rescue, learning the key factors to consider when infant elephants are separated from their mothers in the wild. This often happens in areas of close human-

A VSLA meeting in Darabetaa.

elephant interaction, namely where there are deep man-made wells. When an infant falls into one of these wells, it is often abandoned by the herd. Training focused on critical care for these creatures and best practices for reuniting them with their families. These multifaceted trainings are a key focus for STEP in 2023 and help to address central aspects of Tanzania's Human-Wildlife Conflict Strategy.

- **BEEKEEPING:** In 2022, farmers who were given modern beehives by STEP harvested 644 litres of honey and 25kg of wax. In 2023, we are planning to distribute another 460 hives to beekeepers around the Ruaha-Rungwa landscape.

- **POULTRY VACCINATION TRIAL:** Many households in the landscape keep chickens but are unable to access medicine for common diseases. We began a pilot vaccination program with our Local Elephant Monitors to distribute medicine through 11 of our VSLAs with the goal of improving economic resilience of the communities around the Rungwa-Kizigo-Muhesi Game Reserves.

- **FOOD STORE TRIALS:** Despite low maize harvests in the landscape, eight initial pilot sites have been positively received by participants, many of whom have expressed a willingness for cost-sharing for future construction.

- **HEC FILM DEVELOPMENT:** In early 2023, we worked with renowned Tanzanian filmmaker Roshni Lodhia to develop a script and concept for a 30+ minute film based on our educational content and experiences in the landscape. The film will be completed mid-2023 and will be used during the Tembo Cup and during our small film screenings with LEMs at farmer households. We hope to showcase the film throughout Tanzania, possibly showing it on cross-country bus routes and disseminating content via social media.
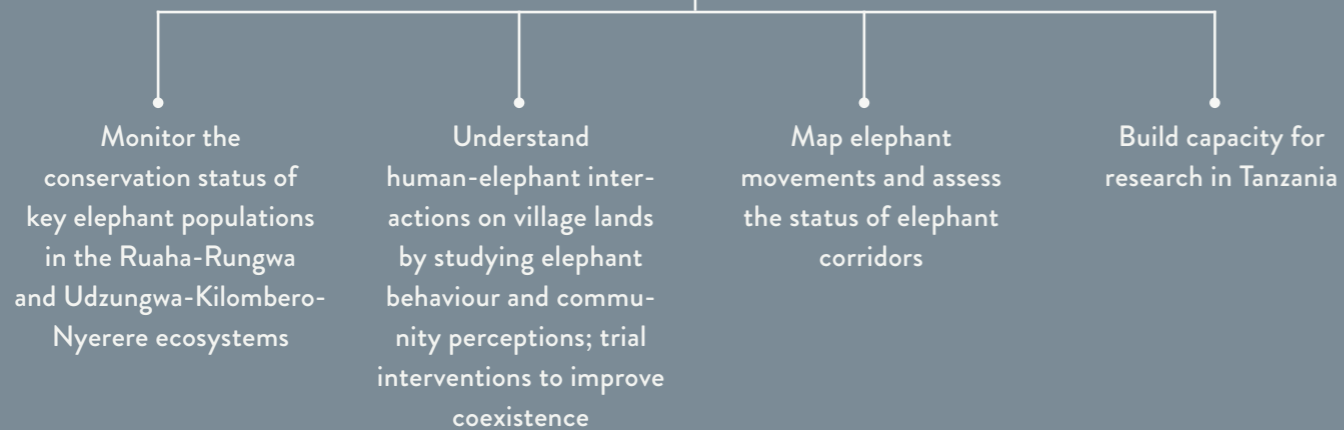
Research

Photo: Matt Luizzo/USFWS

MAIN GOALS & FUNCTIONS

- Monitor the conservation status of key elephant populations in the Ruaha-Rungwa and Udzungwa-Kilombero-Nyerere ecosystems
- Understand human-elephant interactions on village lands by studying elephant behaviour and community perceptions; trial interventions to improve coexistence
- Map elephant movements and assess the status of elephant corridors
- Build capacity for research in Tanzania

Training and mentoring MSc students

To build capacity for research in Tanzania and to facilitate scientific studies that inform elephant conservation work, STEP initiated a program to support Tanzanian Master's students in 2021. Through this program, students receive mentoring and skills training throughout their research journey, from study design to data collection, analysis, and results dissemination. Our first two students under this program (Irene Laizer and Lowassa Moitiko) completed their data collection in 2022 and were supported to analyse their data and begin to write up their findings.

Through Irene's research, we learned more about human-elephant interactions around water sources on village land. Camera trapping showed that elephants visited village water sources primarily at night, while household surveys indicated that people primarily accessed water sources during the day. While some people feared meeting elephants at water sources, the most common concerns were that elephants damaged water sources (such as by causing soil to fall into wells) and that elephant urine and dung made the water less safe for domestic use. One recommendation from respondents was to provide alternative safe water sources, such as communal taps, for people.

Through Lowassa's research, we learned more about the elephants using the edges of Magombera Nature Forest

Reserve and Mwanihana forest (which form the endpoints of the Kilombero Elephant Corridor). Through camera trapping, we learned that both males and family groups use these areas. Using features of the ears and tusks, we identified 70 different individual elephants using the forest edge over a period of just six months! Once the Kilombero Elephant Corridor is restored, we will continue to use camera traps to estimate the number of elephants using the corridor.

We also welcomed a new student to the program in 2022: Ms. Grace Mchome from the Sokoine University of Agriculture. Grace's research project will assess the efficacy of various mitigation fences by investigating elephant responses to mitigation fences, including by observing elephant behaviour at fences using camera traps, and by conducting interviews with farmers to learn more about their views on these mitigation methods.

STUDENT COLLABORATORS

Irene Laizer
Lowassa Moitiko
Grace Mchome

Young male elephant photographed by one of our camera traps at the solar lights mitigation fence in Kanyenja village.

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Grace Mchome checks a camera trap in the Kilombero Valley.

Monitoring elephants in the Ruaha-Rungwa ecosystem

The Ruaha-Rungwa elephant population declined by over 50% between 2009 and 2015 due to poaching for the ivory trade, and our long-term research and monitoring aims to understand the consequences of poaching for elephants in the ecosystem. In a study published in the African Journal of Ecology, we showed that in areas of the ecosystem that had experienced higher levels of poaching, elephants were more nocturnal than in areas where elephants had been relatively safe from poaching. We also found that poaching risk influenced elephant use of roads and water sources as well as grouping patterns, indicating that poaching has important consequences for how elephants use their environment and their associations with other elephants.

Trialling a range of farm-based elephant deterrents

Finding affordable and effective ways to protect farms from elephant crop damage is one way that we hope to enhance coexistence between people and elephants. The development and trialling of elephant deterrents with farmers continued to be an important area of innovation and learning for us in 2022. Following consultations with village leaders and residents, we supported farmers in Kanyenja village to register as a community-based organization and to build and manage a 3.5 km linear solar-powered strobe lights fence along village farms. In Magombera village, we entered an agreement with the village leadership to support them to build and manage a 1.5 km double-stranded metal strips fence along village farms. Furthermore, with farmers groups managing beehives fences in Kanyenja and Katurukila villages, we began trialling whether beehive fences can be more effective at preventing elephant incursions into farmland if we combine these fences with solar-powered strobe lights or metal strips. We will monitor elephant responses to all these mitigation methods and assess their efficacy.

Trialling safe food stores

In villages around Rungwa-Kizigo-Muhesi, elephants are known to damage food stores. In 2022 we began trialling an alternative food store design (first developed in Zambia) to determine whether it is more effective at protecting crops from elephants. We constructed eight food stores with households participating in the trial and, to date, none of these stores have been damaged by elephants. In 2023, we will continue to monitor whether these stores keep crops safe from elephants, as well as interview households to understand their views on these food stores and to gauge whether people in the community are willing to contribute to financially to alternative food stores.

One of STEP's improved food stores in Doroto.

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A cow-calf group returning from drinking at a water source that humans and elephants share in Doroto village.

2023 PRIORITIES

- Continue monitoring of key elephant populations and human-elephant interactions

- Support Tanzanian Master's students

- Continue to trial mitigation methods with farmers

- Expand camera trapping of the Kilombero Elephant Corridor

Publications

Smit, J. B., Searle, C. E., Buchanan-Smith, H. M., Strampelli, P., Mkuburo, L., Kakengi, V. A., Kohi, E. M., Dickman, A. J., & Lee, P. C. (2023). Anthropogenic risk increases night-time activities and associations in African elephants (Loxodonta africana) in the Ruaha-Rungwa ecosystem, Tanzania. African Journal of Ecology, 61(1), 64–76.

Pfeifer, M., Sallu, S. M., Marshall, A. R., Rushton, S., Moore, E., Shirima, D. D., Smit, J.B, ... & Guerreiro-Milheiras, S. (2023). A systems approach framework for evaluating tree restoration interventions for social and ecological outcomes in rural tropical landscapes. Philosophical Transactions of the Royal Society B, 378(1867), 20210111.

Laizer, I.J., Smit, J. B., Kicheleri, R. P, Majige, L., & Byamungu, R.M Insights into human-elephant interactions around shared water sources on village land adjacent to Rungwa-Kizigo-Muhesi Game Reserves, Tanzania. *In review*

Barnes, L, Rushton, S., Smit, J.B, Moore, E., Lala, Margherita, Sallu, S., Milherias, S. & Pfeifer, M. Spatial risk models map hotspots for Human-Elephant Conflict in the northern Kilombero Valley, Tanzania. *In review*

4%

Research & Monitoring Programs and Collaborations

In Ruaha-Rungwa and Udzungwa-Kilombero-Nyerere

9%

Overheads

10%

Kilombero Elephant Corridor Restoration

Including extensive community consultations, participatory land valuation exercises with farmers and supporting the Corridor Management Committee.

44%

Kilombero Elephant Corridor Compensation Payments

One-off payment for 274 landowners

2022
Total Expenditure

$1,651,842

(compared to $811,164 in 2021)

13%

Human-Elephant Coexistence

Included support for livelihood interventions, beekeeping projects, monitoring of human-elephant interactions in project villages, and education and awareness-raising activities.

19%

Elephant Protection

Including STEP's aerial program, ranger capacity building, patrol funding, provision of patrol equipment, and supporting MBOMIPA WMA.

Spending Per Landscape (km²)

$35

$9

Ruaha-Rungwa

Udzungwa-Kilombero-Nyerere

(does not include corridor compensation payments made to farmers)

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Saving Wildlife Together

INFINITY FOUNDATION

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Dearly Departed VGS

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