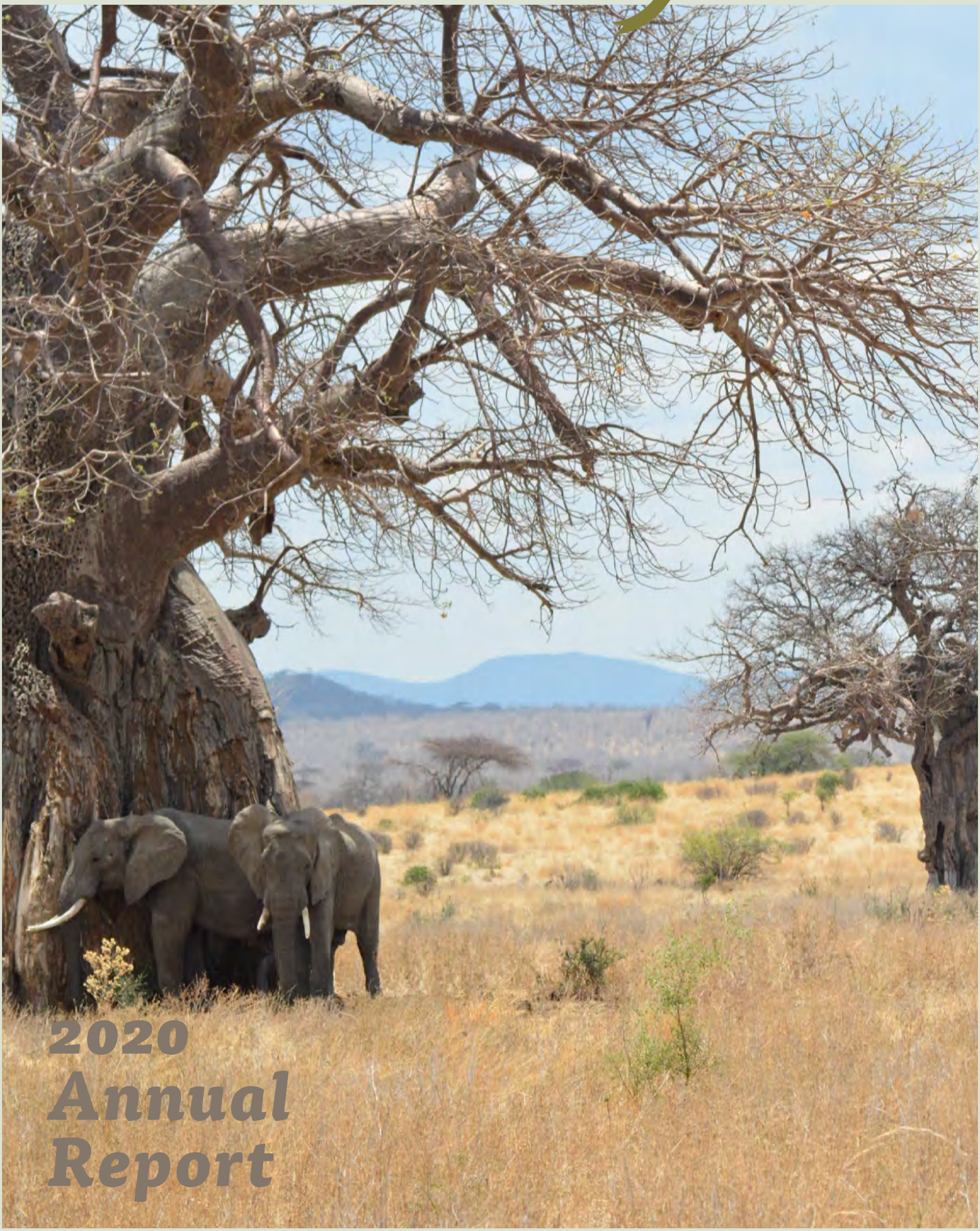
SOUTHERN
TANZANIA
ELEPHANT
PROGRAM

STEP



2020 Annual Report

Advanced bush training with the MBOMPIA VGS and the K.E.E.P. Team.

Table of Contents

Students at Doroto Primary School learn about elephants as part of the 2020 Tembo Cup.

Overview of Our Work

Southern Tanzania is a globally important region for elephants, with populations numbering around 30,000 individuals in 2018. In 2009, numbers were more than double, approximately 70,000, before devastating declines from poaching for the ivory trade. The region holds 35% of East Africa's elephants, and 7% of Africa's elephants. The key elephant strongholds in the region are the Ruaha-Rungwa and Udzungwa-Selous-Nyerere ecosystems, which are themselves connected by corridors, thus forming a meta-population.
STEP works to conserve the elephant meta-population of southern Tanzania 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 vitally important elephant populations.***

RUAHA-RUNGWA

- 45,000 km^2
- Contains seven protected areas: Rungwa, Kizigo and Muhesi Game Reserves, Ruaha National Park, MBOMIPA Wildlife Management Area, Lunda-Nkwambi Game Controlled Area and Waga WMA.
- Population of 15,500 elephants estimated in the 2018 TAWIRI census.
- Initial signs of recovery from poaching over the last ten years including an increase in the number of calves observed.
- Ruaha National Park elephants 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.
- Insufficient resources for MPOMIPA 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 decimated the population by > 50% over the last ten years.
- Human settlement along protected boundaries, in conjunction with a lack of land use planning, has led to more frequent human-elephant interactions.
- Blockage of corridors due to land use change.

Our Approach:

Protection:

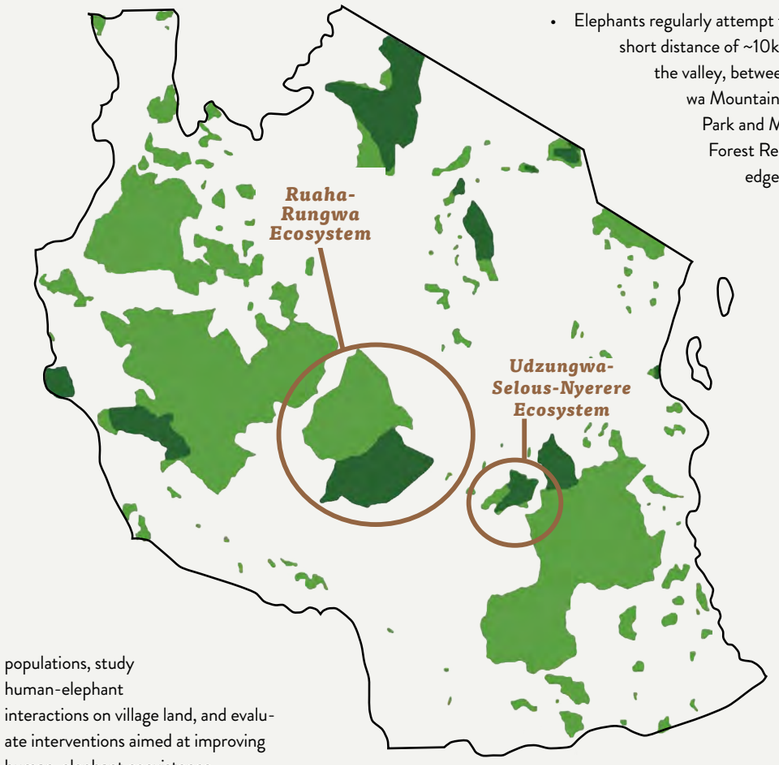
- Provide support for the protection of MBOMIPA WMA by supporting Village Game Scout wages, funding patrols, providing training, and conducting aerial patrols.
- Provide support to Rungwa-Kizigo-Muhesi Game Reserve by funding fuel for regular vehicle patrols, providing training in GPS, GIS and camera trapping and conducting aerial surveillance in conjunction with ground trams.

Human-Elephant Coexistence:

- Conduct education and awareness-raising events in villages affected by human-elephant conflict (HEC) to explain elephant behaviour, provide context for human-elephant interactions and teach communities how to stay safe around elephants through both large-scale events and one-on-one training by Local Elephant Monitor +, a new position.
- Provide fuel support to rangers to assist communities with crop protection.
- Understand the drivers of HEC and work towards establishing Land Use Plans that facilitate human-elephant coexistence.
- Provide access to loans through Village Savings and Loan Associations.

Research:

- Monitor the status of key elephant populations, study human-elephant interactions on village land, and evaluate interventions aimed at improving human-elephant coexistence.
- In each of the villages where we work, trained LEM+ collect data on elephant activity including crop and food store damage, elephant movements, and elephant behaviour around dummy-hive fences.



UDZUNGWA-SELOUS-NYERERE

- The Kilombero Valley, in the Udzungwa-Selous-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 Forest Reserve on the edge of Nyerere National Park (formerly 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 (over 30,000 individuals) and the only link that can be maintained and restored. This area includes:
  - Udzungwa Mountains National Park
  - Magombera Forest Nature Reserve
  - Nyerere National Park and Selous Game Reserve
  - Uzungwa Scarp 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 (formerly Selous Game Reserve), 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 Forest Nature Reserve and Magombera Forest Reserve by funding patrols, providing equipment, and facilitating training GPS and GIS, patrol techniques, reporting, and first aid for rangers and village game scouts.

Human-Elephant Coexistence:

- Improve farmer livelihoods through beehive fence projects to reduce crop loss to elephants and generate income through honey sales.
- 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 mitigation methods for diverse conditions within the valley and to bolster beehive fence effectiveness.
- Provide access to loans through Village Savings and Loan Associations.
- Work with Village Governments and communities on understanding the drivers of HEC and work towards establishing Land Use Plans that facilitate human-elephant coexistence including restoration of a key wildlife corridor to facilitate elephant movement.

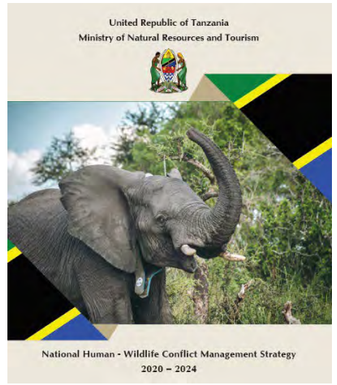
Research:

- STEP's research teams monitor the status of key elephant populations, study human-elephant interactions on village land, and evaluate interventions aimed at improving human-elephant coexistence.
- Scientific monitoring is crucial for understanding the status and conservation needs of elephant populations and for planning and evaluating conservation interventions.

PHOTO: Penny Banham

Dear Friends,

In 2020, while adapting to life in a pandemic, we continued to focus on the two primary issues that are vital to conserving elephants for the long-term: protection of elephants and their habitats, and working with communities to enhance human-elephant coexistence. Through partnerships and grassroots work, we hope to contribute to the recovery of Tanzania's elephant population from the last poaching crisis, and to build a culture and capacity for coexistence with elephants. Southern Tanzania is among the most important areas worldwide for elephants, and here, we still have a chance of conserving elephants in wild ecosystems that are large enough to regulate themselves. STEP provided vital support to protected area partners in the form of fuel and funding for patrols, equipment, and training during a time when budgets and resources are severely affected by the COVID-19 pandemic. A highlight of the year was working with partners to deliver training to 32 Village Game Scouts of MBOMIPA WMA in advanced bush walking and patrolling skills, helping the scouts to do their jobs more safely and effectively.



We also continued to support protection of highly biodiverse Eastern Arc forests through the Uzungwa Scarp Protection Project, and we are thrilled to be expanding this support in 2021 to Kilombero Nature Reserve – home to the critically endangered kipunji monkey as well as elephants.

As unsustainably rising human populations and rapid land use changes bring wildlife into ever greater contact with people, the work of our Human-Elephant Coexistence team has never been more important. In Kilombero, we launched our seventh beekeeping group, extended existing beehive fences, and began trials of novel elephant deterrents to help expand the farmers' crop protection toolkit. We also continued progress with communities towards restoring the pioneering Kilombero Elephant Corridor. In Rungwa-Doroto, we continue to deepen our understanding of the complex drivers of conflict and to adapt our approach, and our local monitoring and education team were recognized with a Disney Conservation Hero award. We hosted the second iteration of the elephant-themed Tembo Cup football tournament and expanded the tournament to five villages adjacent to Muhesi Game Reserve. Through Village Savings and Loans Associations, we have seen farmers in many places gain access to safe credit for the first time.

A special highlight of 2020 was the opportunity to lead the development of Tanzania's first National Human-Wildlife Conflict Management Strategy, at the invitation of the Director of Wildlife. It was an honour to be part of this work and I am grateful to the STEP team and wide range of stakeholders who contributed to the strategy, which was officially launched by the Government in October 2020. We are committed to supporting its implementation and as a first step, we were proud to train a team of rangers from Northern Tanzania in beehive fences as a crop protection tool.

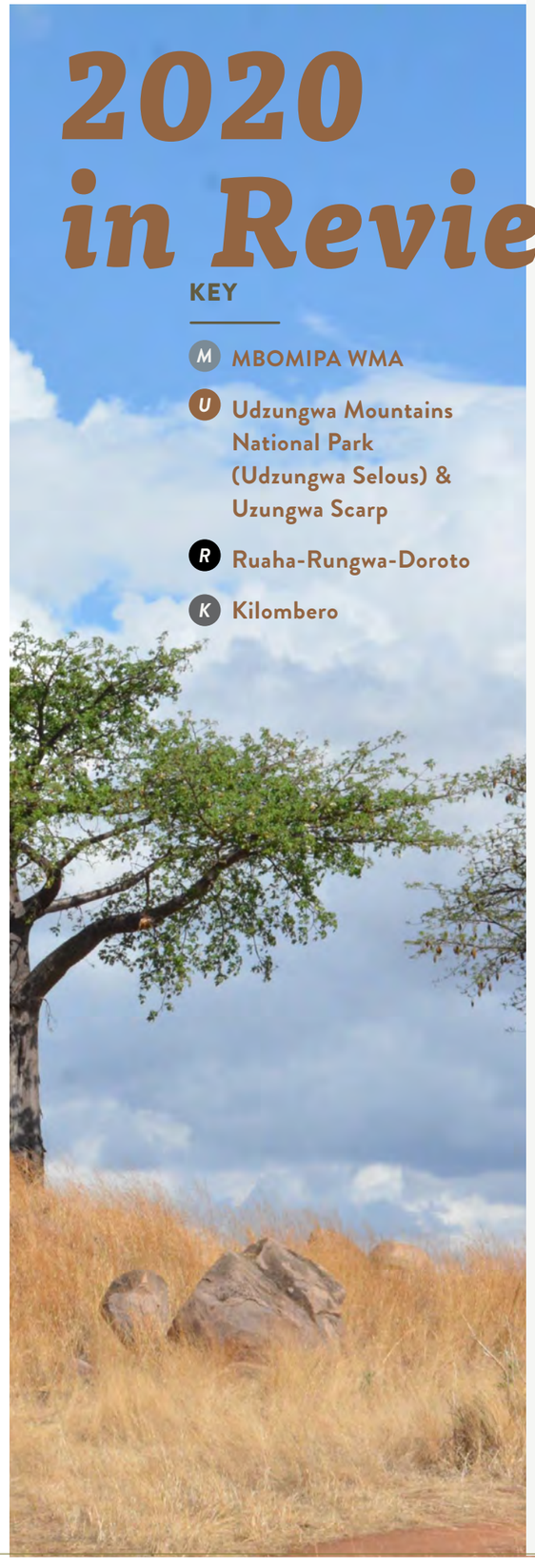
As the world emerges out of the COVID-19 pandemic, and begins to address the even greater climate and ecological crisis, we will continue our efforts in service of elephants and the ecosystems and communities on which they interdepend.

As ever, we thank you for your enduring support.
Onwards and upwards!

Dr. Trevor Jones

CEO, STEP

2020 in Review



KEY

- M — MBOMIPA WMA
- U — Udzungwa Mountains National Park (Udzungwa Selous) & Uzungwa Scarp
- R — Ruaha-Rungwa-Doroto
- K — Kilombero

Protection

Aerial Surveillance

M R **54.4** *hours covering 6,812km of linear distance*

Patrols

M **8,186** *km of foot patrols*

M **4,756** *km of vehicle patrols*

U **329** *km of foot patrols*

R **10,823** *litres of fuel provided for vehicle patrols & crop protection support*

Illegal Activity

M U **22** *suspects apprehended*

U **127** *snares removed*

U **12** *timber cutting sites closed*

U **14** *poachers' camps closed*

M **0** *elephants poached*

Capacity Building

M **24 VGS trained** *in advanced bush skills and weapons management*

M **8 VGS trained** *in tactical anti-poaching*

Human-Elephant Coexistence

Beehive Fences

K **494** *beehives across 7 groups*

K **6.8** *km of beehive fences across 7 groups*

K **149** *litres of honey harvested*

Outreach

R **800** *farmers reached in one-on-one HEC training by LEM+ Team*

R **>14,000** *people reached by 'Tembo Weeks'* *at football matches, film nights, community training and school visits*

Education

K **>2,295 people** *reached by film nights on elephant ecology, behaviour & human-elephant coexistence*

R **>1,000 students** *reached through lessons taught by Local Elephant Monitors*

STEP VSLAs

K **93** *loans with new Sole group gaining access to safe credit for the first time.*

R **74** *loans improving houses, adding livestock and paying school fees for 3 students, 1 in university*

Kilombero Elephant Corridor

K **>90%** *of corridor surveyed with communities for Joint Land Use Plan and compensation of farmers*

K **1** ***elephant underpass*** *completed in 2020 pending completion of highway rehabilitation*

K **1** ***Kilombero Elephant Management Committee*** *formed comprising multiple stakeholders*

Research

Monitoring

K R **8** *villages monitored for human-elephant interactions*

R **49** *crop damage incidents recorded* *(a 42% decline relative to 2019)*

K **389** *incidents of elephant crop damage*

Publications

9 *scientific publications & conference proceedings*

5 *technical reports*

Transects

K **59** *transects walked by STEP's research officers* *to count and record the location of elephant dung piles*

Camera Trapping

R **10** *elephant drinking points monitored by camera traps*

K **18** *camera traps monitoring elephant corridor*

K **10** *camera traps deployed to monitor elephant responses to smelly repellent and strobe light fences*

Trials

K **2 mitigation methods trialed**: *1.5 km 'smelly repellent' fence and 200m solar-powered strobe light fence*

STEP is a non governmental organization registered in Tanzania.

Believing in the importance of strong protected areas and the welfare of people living around their boundaries, we work with a range of partners towards long-term security for elephants, a critical keystone and umbrella species of the ecosystems of Ruaha-Rungwa, Udzungwa and Selous. STEP's work falls under four cross-pollinating categories: ***elephant protection, community projects to enhance human-elephant coexistence, research and monitoring, and awareness-raising and education.*** We have 25 full time and 14 part-time staff in two offices: our headquarters in Iringa and our field office in Mang'ula, Kilombero.

STEP's work began with efforts to increase human-elephant coexistence in the Kilombero Valley, through monitoring of elephant crop use and trialling of crop protection methods to improve livelihoods. Our monitoring confirmed elephant movement along the historical Selous to Udzungwa corridor as one driver of crop damage, and has informed our approach to building human-elephant coexistence in the Kilombero Valley through 1) limiting elephant movement into farmland and settlement through farm-based interventions, 2) facilitating safe elephant movement by restoring a wildlife corridor and 3) increasing farmer's capacity and resilience for living with elephants through community loan programs (Village Savings and Loan Associations). Our work and experiences in this area helped us develop the foundational model that we continue to use in Kilombero to date.

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.

In 2016, STEP expanded its coexistence work to the western edge of the Rungwa-Kizigo-Muhesi Game Reserve complex. Over the last two years, STEP has learned a great deal about the circumstances in which crop protection methods are viable or not. Rungwa is increasingly a place of innovation and reinvention for STEP as we explore new methods for enhancing human-wildlife coexistence, including a greater focus on education , awareness-raising and land-use planning.

STEP's Protection program was born of the need to increase capacity and resources for law enforcement during a time of heavy elephant poaching. STEP's aerial program for Ruaha-Rungwa commenced in 2014, and has provided over 670 hours of aerial support to date. In 2016, we began a program to train rangers in Rungwa-Kizigo-Muhesi, Kilombero Nature Reserve, and Uzungwa Scarp Nature Reserve to use GPS and GIS for patrols, and to support regular foot and vehicle patrols. In February 2018, STEP, was invited to initiate the MBOMIPA Protection Project to restore security for MBOMIPA WMA by supporting patrols and providing technical support and resources to village scouts.

In order to monitor the status of key elephant populations in southern Tanzania, STEP began its elephant research monitoring programs in Ruaha National Park and Udzungwa Mountains National Park in 2014. Since then, STEP has completed a demographic re-assessment of elephants in Ruaha National Park, identified over 2000 elephants for an ongoing elephant monitoring program and carried out several large camera-trapping surveys. In Udzungwa, we have carried out >1600 km of foot transects, assessed the age-and sex-structure of crop-using elephants, and monitored elephant use of an important wildlife corridor.

Key Partners

Tanzania Wildlife Management Authority

Tanzania National Parks Authority

Tanzania Wildlife Research Institute

Tanzania Forestry Services Agency

MBOMIPA Wildlife Management Area

National Land Use Planning Commission

Morogoro Regional Administration

Udzungwa Ecological Monitoring Centre

Iringa District Council and Natural Resources Advisory Board

Kilombero District Council

Manyoni District Council

Associazione Mazingira

Reforest Africa

Colorado State University

University of Bangor

Agrisys Tanzania

University of Stirling

Kichaka Expeditions Environmental Program

Lyra in Africa

Ruaha Carnivore Project

Board of Southern Tanzania Elephant, Tanzania:

Arafat Mtui
Trevor Jones
Josephine Smit
Athumani Mndeme
Richard Phillips

Trustees of Southern Tanzania Elephant Trust, UK

Helen Pearson
Nat Comber
Nick McWilliam

Protection

Village Game Scouts show the Iringa District Commissioner the new hangar for the STEP airplane.

MAIN GOALS & FUNCTIONS

- Enhance protection efforts of rangers and village game scouts by supporting foot and vehicle patrols
- Conduct aerial surveillance 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.
- Tanzania's largest community wildlife management area.
- 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.
- The area boasts a high diversity of mammal and bird species, similar to those in the adjacent Ruaha National Park.

Challenges/Risks:

- Poaching of elephants and other wildlife.
- Cattle grazing, charcoal production and mining
- Rising demands of human populations (many in poverty) leading to encroachment of farm and grazing land in some zones of the WMA.

UZUNGWA SCARP NATURE FOREST RESERVE

- 327.63 km^2
- The second largest mountain block of the Udzungwa Mountains, part of the Eastern Arc Mountains chain.
- USNFR consists of tall luxurious sub-montane forests and deciduous to semi-deciduous highland forests.
- 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.

Challenges/Risks:

- Wildlife populations have declined in the Nature Reserve, attributed to hunting and trapping for bushmeat as well as due to habitat degradation.
- Hardwood logging and agricultural encroachment negatively impact the forest's capacity for carbon storage and watershed protection.

MBOMIPA Protection Project

In 2020, STEP signed a new three- year MOU to further our commitment to the ecosystem. We continued to enable three teams of Village Game Scouts (VGS) to conduct at least 21 days of foot patrols monthly by supporting Scout allowances and providing fuel and food supplies. VGS conducted 6,483 km of foot patrols and 4,756 km of vehicle patrols (3x more than in 2019) in Lunda zone of the WMA. Patrols resulted in the apprehension of 19 suspects.

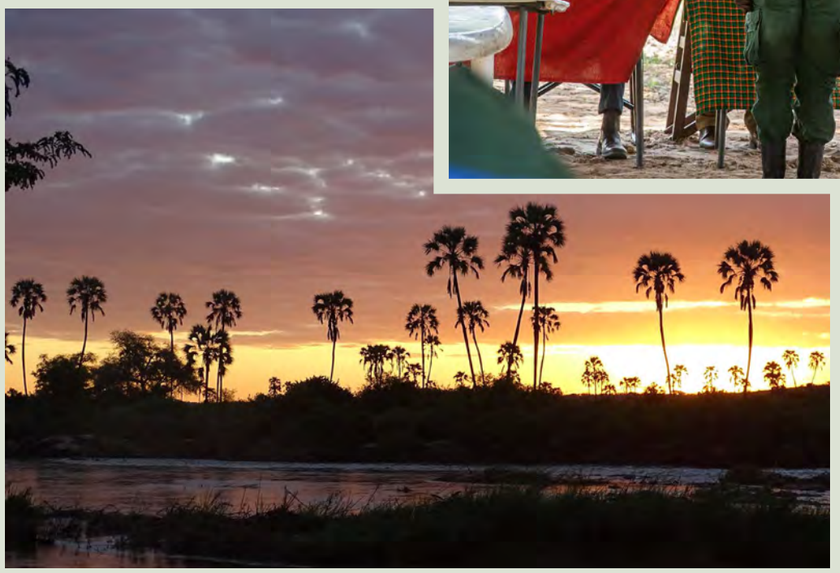
In November, eight new VGS were recruited in order to increase female membership and to make sure all villages have representation within the scouts.

Wildlife encounter rates have stayed steady since 2019, continued evidence of increased security. For another year, no elephants were poached in the Lunda Zone of the WMA.

Uzungwa Scarp Nature Forest Reserve

In 2020, STEP supported ten mobile camping patrols by rangers from Tanzania Forestry Services and Iringa Anti-Poaching Unit together with Village Game Scouts in Uzungwa Scarp Nature Forest Reserve. All patrols were strategically planned and executed, with mapping, analysis and reporting of findings subsequent to each patrol. Patrol teams covered 329 km of the steep slopes of the Scarp. Patrols resulted in 3 suspects apprehended, removal of 127 snares, and closure of 10 timber cutting sites and 7 poachers' camps. 77 wildlife observations were made on patrol of 16 different species.

Over the last three years, we have seen a 96% decrease in our encounter rate of illegal farms and a 77% decrease in our encounter rate of tree logging.



Clockwise: submontane forest of the Udzungwa Mountains; MBOMIPA VGS training graduation with Iringa District Commissioner, Hon. Kasesela; Lunda sunset, MBOMIPA WMA; TFS-VGS patrol in Uzungwa Scarp Nature Reserve.

Capacity Building

In 2020, STEP worked with Kichaka Expeditions Environmental Program (KEEP) to train 24 VGS on bushwalking, weapons handling, firearms and marksmanship. The course provided detailed theoretical and practical information on preventing poaching, bushcraft and survival skills, dangerous animal behaviour, weapons knowledge and practice and orientation in the bush. Scouts were also trained on the Spatial Monitoring and Reporting Tool (SMART).

In November, the eight new VGS attended a 30-day basic tactical anti-poaching training, run by PAMs, conducted according to International Ranger Federation standards.

Aerial Patrol Support

2020 was the seventh year of STEP's aerial program, which has now provided over 670 hours of aerial support to the Ruaha-Rungwa ecosystem. This year, STEP's aerial team flew a total of 54 hours across six protected areas. This was one area in which we felt the impact of COVID-19, international border closures limited the ability of our pilot and engineer teams to come in and conduct critically important aerial surveillance.

We conducted 17 hours in Ruaha National Park and MBOMIPA WMA and 37 hours of wet-season aerial patrols in Rungwa-Kizigo-Muhesi Game Reserves. After a once-in-a-generation rainy season in 2019-2020, targeted aerial support became even more vital as flooding and muddy conditions severely limit ground patrol capabilities. Aerial patrols resulted in the detection of 84 illegal activities across the ecosystem. Regardless of challenging conditions, rangers and scouts tried their best to follow up on poaching camps, illegal timber harvesting and illegal grazing activities.

RUNGWA-KIZIGO-MUHESI GAME RESERVES

- 15,000 km^2
- Supports ~7,000 elephants (the population was reduced by 50% from 2009–2015).
- Varied landscapes: hilly with patches of riverine forest, open grassland plains, rocky outcrops and extensive miombo woodland.

Challenges/Risks:

- Encroachment from livestock and other human activity, unmanaged fire (and use of fire for honey hunting), timber poaching, unregulated grazing, illegal hunting and small-scale mining.

Fuel Support

To support ground patrols and increase the mobility of rangers across the Ruaha- Rungwa ecosystem, STEP donated a total of 10,823 litres of fuel in 2020, a nearly 40% increase from 2019.

- Rungwa-Kizigo-Muhesi Game Reserves received 5,133 liters of fuel (double 2019's supply), enabling rangers to cover 8,478 km of vehicle patrols, resulting in 21 arrests and more than 150 pieces of confiscated timber.
- The Game Reserves also received 1,711 liters of diesel specifically for support for human-wildlife conflict related patrols.
- MBOMIPA WMA received 4,230 litres of fuel to conduct vehicle patrols and VGS rotations.
- STEP works closely with the Iringa Anti-Poaching (KDU) Unit and provides support when needed for crop protection by rangers during peak conflict times, as well as for patrols. STEP supported KDU with 1,460 litres of fuel to conduct patrols and crop protection in MBOMIPA WMA, Lunda-Nkwambi Game Controlled Area and in adjacent villages.

Human-Elephant Coexistence

Residents of Milesa subvillage in Kanyenja enjoy a film about elephants at STEP's Film Nights hosted by the HEC Team in Kilombero.

MAIN GOALS & FUNCTIONS

- Trial farm-based crop protection techniques such as beehive fences, smelly repellent and solar lights and provide access to loans through Village Savings and Loans Associations.
- Conduct education and awareness-raising events to explain elephant behaviour, provide context for human-elephant interactions and provide advice on how to stay safe around elephants.
- Collect data on elephant movements and use this to inform education and trials of crop protection measures.
- Work with Village Governments to understand the drivers of human-elephant conflict and work towards establishing Land Use Plans that facilitate human-elephant coexistence.
- Explore and support establishment of corridors to facilitate safe elephant movement.

KILOMBERO VALLEY

The multi-faceted land use challenges of the Valley have informed STEP's approach to building human-elephant coexistence in the Kilombero Valley through:

1) limiting elephant movement into farmland and settlement through farm-based interventions
2) facilitating safe elephant movement through a designated wildlife corridor
3) improving farmer livelihoods.

STEP has established seven beehive fences and six beehive huts in the Kilombero Valley since 2011. In addition to reducing elephant movement into farmland and settlement, beehive fences generate revenue for farmers' groups through the sale of honey. Beehive huts help to boost occupancy on the beehive fences and contribute to honey production revenue. Economic resilience is an important factor in building human-elephant coexistence, as the economic impact of crop losses and poverty can erode tolerance for elephants. STEP also works with farmers' groups to establish Village Savings and Loan Associations, community-based financial systems in which members have access to credit and financial assistance through weekly contributions. Members can take loans from VSLAs and access emergency financial relief. By increasing community and household resilience to human-wildlife conflict, VSLAs can contribute to increasing coexistence.

A new hive on the Njokomoni Fence, established in 2011.

IN 2020

- **Beehive Fences:** To date, STEP has built 6.8 km of beehive fences. STEP established a new farmers' group in Sole village, adjacent to Udzungwa Mountains National Park. When construction of the Mikumi-Ifakara highway is completed, this fence will be built to help funnel elephants into the Kilombero Elephant Corridor.
- **Beehive Fence Education:** STEP hosted nine members of a Rapid Response Task Force formed by TAWA and trained them on beehive fences. This unit will be called to support communities as they respond to human-wildlife conflict.
- **Mitigation Method Trials:** STEP is trialing two new mitigation methods: smelly repellent, a fermented chili mixture that is hung on a wire fence to deter elephants and solar-powered strobe lights, also placed along a wire fence (see the Research section to learn more!).
- **Honey Collection:** STEP continued to operate its Udzungwa Honey Collection Center, established in 2018. Beekeeping groups harvested 149 litres of honey.
- **VSLAs:** STEP established one new Village Savings and Loans Association in 2020 and continued to support five existing VSLAs. 108 farmers participated in VSLAs and accessed 108 loans with a value of 15,540,849 TZS (~$6,968) to improve their farming practices and pay school fees. Farmers in two VSLAs did not have access to safe and reliable credit before STEP initiated VSLAs in their communities.
- **Education:** STEP conducted film nights and supplementary education in eight villages, reaching 2,295 adults and youth. STEP also supported two student-led awareness events where young learners presented poems, posters and dramatic performances about the importance of elephants.

KILOMBERO ELEPHANT CORRIDOR

Restoration and protection of wildlife corridors is key to enhancing human-wildlife coexistence and improving livelihoods over the long term. This fenced, community-managed corridor will funnel elephants between Magombera Forest Nature Reserve (on the edge of Nyerere National Park) and Udzungwa Mountains National Park, reducing the impacts of elephants moving past houses, through schools and through farmland. It will reduce economic losses for the community, create employment and stimulate associated income-generating projects. Working with the National Land Use Planning Commission, the Morogoro Regional Administration, Kilombero District Authority, the Ministry of Natural Resources and Tourism and the wider local communities, STEP has built consensus for the corridor with the owners of all the farm plots within the corridor. Tanzania's first ever elephant underpass has also been built on the Mikumi-Ifakara highway, and will be opened once the corridor is demarcated.

The next phase of work will focus on participatory land use planning to secure the corridor for the long term, involving completion of valuation and compensation of all small farms in the corridor.

IN 2020

- **Consultation:** Since late 2018, STEP's Corridor Team has held over 300 stakeholder meetings on the corridor with community members, Government officials and private sector stakeholders, including focus group discussions with elders, women and youth in the three corridor villages.
- **Monitoring:** Ongoing tracking of elephant movements across the corridor and identification of elephants moving into farms at either end using camera-traps.
- **Joint Land Use Planning and Land Valuation:** Land Valuation was completed for Kanyenja village using a Land Use Planning map made with STEP support.
- **Creation of Corridor Committee:** STEP facilitated the formation of a provisional Corridor Management Committee with representatives from the three villages through which the corridor passes, the Kilombero District Commissioner, the Director of the Ifakara Town Council, the Director of Wildlife and the Director General of the National Land Use planning Commission.
- **Elephant Underpass:** Main construction completed with graded entry and exit paths to be landscaped in 2021 following completion of the current highway rehabilitation.

Tanzania's first elephant underpass

Clockwise from upper image: Making smelly repellent with gloves on in Kanyenja; the STEP Team hanging solar lights; smelly repellent on a linear fence on the edge of Magombera Forest Nature Reserve

RUNGWA-DOROTO

The Rungwa-Kizigo-Muhesi Game Reserve complex forms the northern half of the Ruaha-Rungwa ecosystem. Here, human-elephant conflict is a growing challenge, driven by increased and unplanned agriculture and settlement directly adjacent to the Game Reserves and in unprotected elephant habitats and corridors; the result of human population growth and ongoing in-migration of people in search of farmland.

Since 2016, STEP has been working on mitigating human-elephant conflict in and around Rungwa village on the western edge of Rungwa Game Reserve and, in 2020, we expanded our work to Doroto village on the northern edge of the Reserve, another conflict hotspot. We have shifted our approach to focus on VSLAs and a multi-faceted approach to education and awareness raising to work towards human-elephant coexistence in this complex and dynamic landscape. Through our Local Elephant Monitors Plus (LEM+), we can reach farmers through 1:1 trainings at home as well as expand our teaching in both formal and informal school environments. As we learn more, we plan to use our elephant data to catalyze land use planning as a tool for addressing the driver of human-elephant interactions.

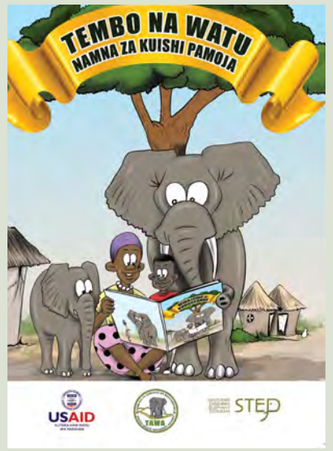
IN 2020

- **Current Model:** In 2020 STEP continued to modify our beekeeping interventions, replacing all beehive fences with 'dummy hives.' We continue to monitor the effectiveness of these fences for deterring elephants with our Local Elephant Monitor Team. We worked with 45 individual beekeepers via a modern hive beekeeping trial and distributed modern beehives to our existing farmers' groups in an effort to boost honey production. We formed two new Village Savings and Loan Associations in Doroto, extending access to safe credit to 102 community members. Loans were used to buy food, clothes and to respond to medical emergencies. They were also used to make household improvements and for investment in agriculture and small business. Before STEP VSLA's, the only access to credit was through high interest loans issued by individuals and often repaid by sale of crops for 2x less than market value.
- **Community Leader Engagement:** STEP facilitated a second workshop for village leaders building on key concepts introduced in 2019. It brought together Village Executive Officers, Village Chairpersons, Ward Executive Officers, staff from Rungwa Game Reserve and Itigi District Council. The focus was to understand the factors that determine land selection for settlement, grazing and agriculture. Groups discussions from this workshop informed content for our outreach work including 1:1 training, community events and education in schools.

The Outreach Officer from Rungwa Kizigo Muhesi Game Reserve speaks to two teams in the Tembo Cup semi-final.

IN 2020

- **Outreach at Many Levels: One on One Education:** With our focus on increasing safety around elephants in the ecosystem, we have equipped our LEM+s with information that helps them visit farmers at home for customized training based on their experience with elephants and their household activities. In 2020, they visited over 800 farmers.
- **Education in Formal and Informal Schools:** Due to the dispersed nature of settlement in the Rungwa-Doroto ecosystem, there are several informal primary schools that provide eduction in peripheral areas. The LEM+ Team, in consultation with school leadership, provided education to over 1,400 students in 7 of these schools.



- **Beekeeping Research**
  - Continued to trial 2.4 km long dummy hive fence for blocking elephant movement into farms.
  - Worked with 45 beekeepers to trial modern beehives as a way to increase honey production.
- **Tembo Cup 2.0. :** In November 2020, STEP conducted our second Tembo Cup. A mix of education and awareness raising events together with football matches and film nights, the Tembo Cup was held in nine villages in Rungwa-Doroto. The focus was to continue creating a more positive association between people and elephants. In total, >14,000 people were reached by Tembo Cup Messaging:
  - Over 8,000 people came to football matches.
  - Over 3,000 students were trained at special school events or at matches.
  - Over 3,400 people attended film nights at which Swahili language wildlife films were shown.
  - Over 2,400 of STEPs Human-Elephant Coexistence Booklets were distributed and 1,500 fliers presenting summarized information.

Above: STEP's HEC Booklet; a film night in Itagata; spectators at the Tembo Cup final match in Doroto.

Research

PHOTO: Penny Banham

MAIN GOALS & FUNCTIONS

- Monitor the conservation status of key elephant populations in the Ruaha-Rungwa and Udzungwa-Selous ecosystems
- Understand human-elephant interactions on village lands by studying elephant behaviour and community perceptions and responses towards HEC
- Map elephant movements and assess the status of elephant corridors
- Trial and evaluate interventions to improve human-elephant coexistence.

Monitoring Elephants in the Ruaha-Rungwa Ecosystem

STEP's elephant monitoring program in Ruaha National Park aims to collect long-term data on elephant population structure, tusklessness, distribution and behaviour. Our research teams conducted regular monitoring of elephants in the Park to add to this dataset and our database of known elephants for Ruaha, which includes >2,000 elephants. We also continued ongoing work using camera traps to study elephant activity patterns and access to water sources across the Ruaha-Rungwa ecosystem.

Monitoring Elephants in Udzungwa and Magombera Forests

To help us monitor elephant use of Udzungwa and Magombera forests, we conduct the same set of foot transects every month to count and record the location of elephant dung piles. This enables us to compare how many dung piles we encounter between seasons and across years. Our monitoring suggests that elephant use of Mwanihana forest in Udzungwa continued to increase in 2020 and that Magombera forest is now home to elephants all-year round, whereas this forest was previously considered a dry season dispersal area.

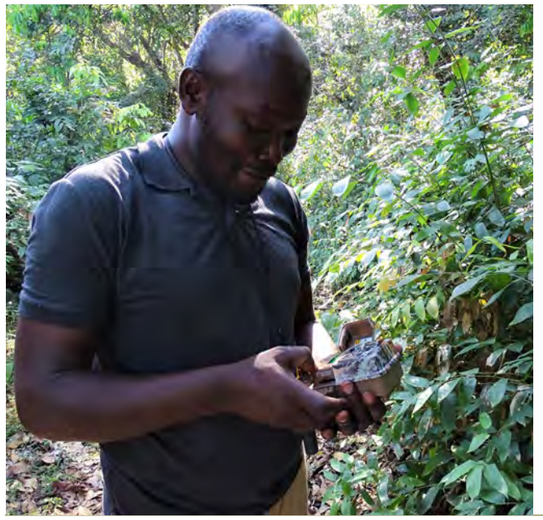
In addition to foot transects, we continued to use camera traps to monitor elephant use of the forest edge in Udzungwa and Magombera and to study elephant activity patterns and movements between these forests along the Kilombero Elephant Corridor. We have found that most elephant activity is crepuscular and nocturnal, with almost 80% of camera trap detections of elephants occurring between 18:00 and 05:59. Elephants showed a distinct peak of movement out of forest and into farmland between 18:00 and 19:59, when half of all movement out of the forest occurred.

To help inform ongoing efforts to restore the Kilombero Elephant Corridor, we ground-truth any attempts by elephants to move between Magombera and Mwanihana forests. Our monitoring shows that only a third of attempted elephant crossings are successful, demonstrating the need for a designated and well-managed corridor for elephants to follow.

A large bull captured on our Magombera Forest Nature Reserve camera traps.

Studying Human-Elephant Interactions

In 2020, local elephant monitors recorded over 400 incidents of crop damage. This monitoring helps us understand the spatial and temporal dynamics of elephant activity on village land and informs our human-elephant coexistence interventions. For example, continued high levels of crop damage in the Kilombero Valley highlight the need to restore the Kilombero Elephant Corridor and extend mitigation methods so that elephant movement can be managed as much as possible. We also partnered with the AgriSys project (University of Newcastle) to identify predictors of crop damage hotspots, which may in turn help to inform land use planning processes that reduce the risk of crop damage, and to evaluate corridor restoration as a solution to human-elephant conflict.



Top: Local Elephant Monitors in Kilombero receive training in mobile data collection; bottom: STEP Research Assistants set camera traps for studying elephant movements

A male elephant cautiously approaches a smelly repellent fence at night

Trialling HEC Interventions

STEP's primary crop protection method to date has been beehive fences. However, beehive fences are not always affordable nor are they suitable in all contexts. In our long-term study site in the Kilombero Valley, we have begun to test two novel elephant deterrents, smelly repellent and solar-powered strobe lights, to expand our toolkit of crop protection methods.

Smelly repellent is a foul-smelling fermented mixture of chilli, ginger, garlic, neem leaves, eggs and cow dung which can be bottled and hung on a simple fence. In collaboration with 17 farmers, we constructed a 1.5 km linear smelly repellent fence along the forest-farm interface in Kanyenja village. Our monitoring so far has shown that elephants approaching the fence while heading to farmland turned around and headed back to the National Park in almost two-thirds of cases.

Solar-powered strobe light fencing consists of lights mounted on bamboo poles at elephant-eye level on prominent elephant trials. Each light is a self-contained unit with solar panel which flashes at a regular frequency. We are trialing the lights in the context of a 200m linear fence protecting a cluster of farms with major elephant trails into farmland. Our monitoring has shown that elephants now largely avoid this area, even though it was previously a major route of elephant entry into farms.

Given promising initial results, we plan to expand these trials in 2021 to further examine their efficacy as an elephant deterrent and their feasibility for farmers.

Key Priorities for 2021

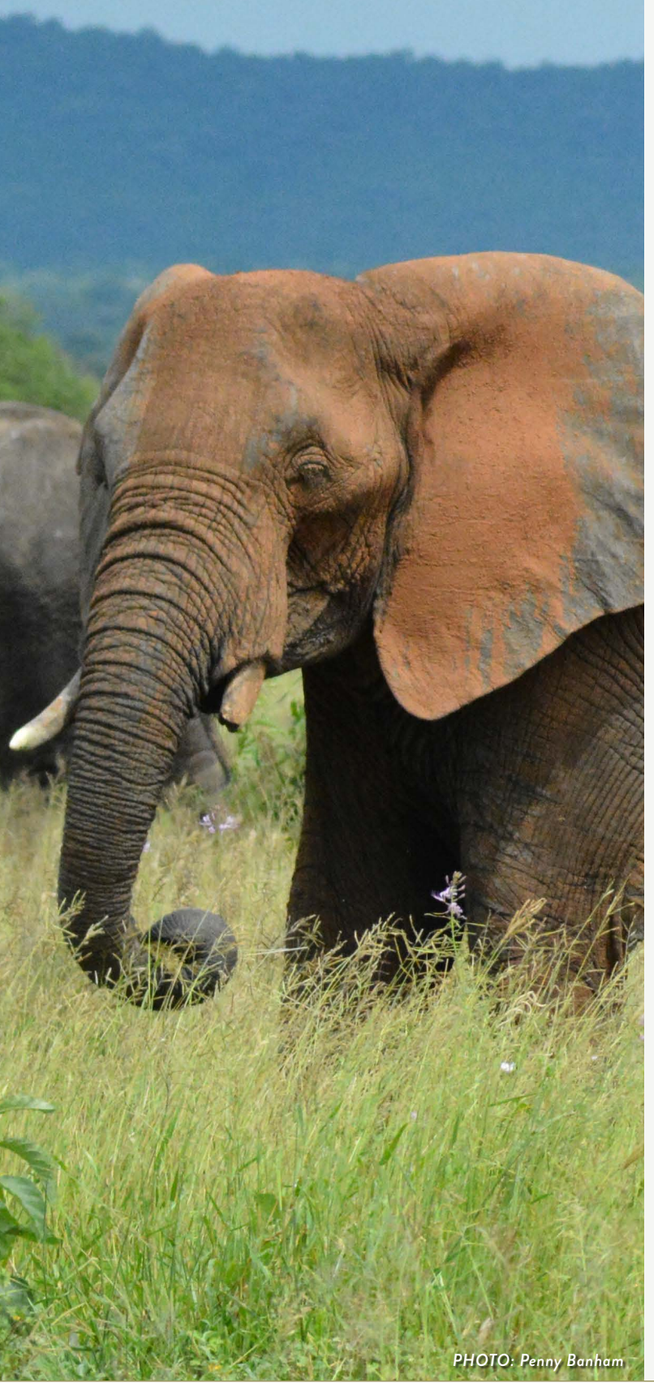


PHOTO: Penny Banham

Protection

Uzungwa Scarp

- Increase number of patrols to twice per month.
- Training for all VGS from all 19 forest adjacent villages on patrol conduct, human rights and use of GPS.
- Provide patrol/field equipment (tents, tarps, sleeping bags, t-shirts and gumboots).
- Continue trialing new conservation technologies (Protected Area Management System [PAMS] and camera trapping).

Kilombero Forest Protection Project

- Resume protection support with monthly joint patrols by TFS, UMNP and local VGS.
- Training for TFS staff on Protected Area Management System (PAMS).
- Training for VGS in Udekwa Zone on patrol conduct, human rights and use of GPS.

MBOMIPA WMA

- Support, coordinate and manage VGS throughout 2021.
- Equip VGS with new patrol tools: GPS and uniforms.
- Increase coverage of foot, aerial and vehicle patrols to under-patrolled areas.
- Expand VGS Coverage to Kinyangesi Zone with introduction of PAMS technology for Patrol Control Room and advanced training for VGS.
- Support Iringa KDU with fuel for patrols in Lunda Mkwambi GCA and MBOMIPA WMA.
- Aerial support for patrols in Lunda Mkwambi GCA.

Rungwa-Kizigo-Muhesi Game Reserve

- Increase coverage and number of aerial missions to one mission every month.
- Support fuel for ground patrols.

Human-Elephant Coexistence

Kilombero:

- Continue to support existing farmer groups and beehive fences and extend to one new village. Extend existing fences to increase coverage around Magombera Forest Nature Reserve.
- Continue to optimize honey production, harvest, and storage by working with Tanzanian experts.
- Continue to evaluate solar lights and 'smelly repellent' for both efficacy and farmer perceptions.
- Conduct education and awareness raising in primary and secondary schools that focuses on foundational aspects of tolerance.

Kilombero Elephant Corridor:

- Continue to support Joint Land Use Planning for the corridor.
- Support government partners with the process of compensation.
- Support physical demarcation of the corridor.
- Recruit, train and equip 12 Village Game Scouts to protect and monitor the wildlife corridor.

Rungwa-Doroto

- Continue to expand the reach of the Tembo Cup to villages most in need of large scale education and awareness-raising. Work to bring content to women and girls in innovative ways.
- Continue to broaden the role of Local Elephant Monitors, integrating their data collected on elephant movements with newer data that will help us learn more about drivers for tolerance and perceptions of elephants.
- Continue to expand and improve Village Savings and Loan Associations to address the financial challenges of agropastoral communities.
- Start initial trials of on-farm crop protection methods and look for ways to fortify crop storage.
- Continue support for Rungwa-Kizigo-Muhesi Game Reserve to protect and benefit the communities living around protected areas.

Research

- Contribute STEP data and expertise to the development of Tanzania's Elephant Management Plan (2021–2030) and the National Wildlife Corridor Assessment, Prioritization and Action Plan.
- Continue monitoring of the Ruaha-Rungwa and Udzungwa-Selous-Nyerere elephant populations through transects, ground surveys, and camera trapping.
- Expand trials of smelly repellent and solar-powered strobe lights fencing.
- Support the fieldwork and training of two Tanzanian Master's students studying human-elephant interactions.
- Continue research collaborations to investigate key factors that shape community tolerance for elephants, identify spatial predictors of hotspots of elephant crop damage, study land use and farming decisions in conflict hotspots and evaluate corridor restoration as a solution to human-elephant conflict.

Doroto Primary School students look at STEP's educational booklet

2020 Financial Summary

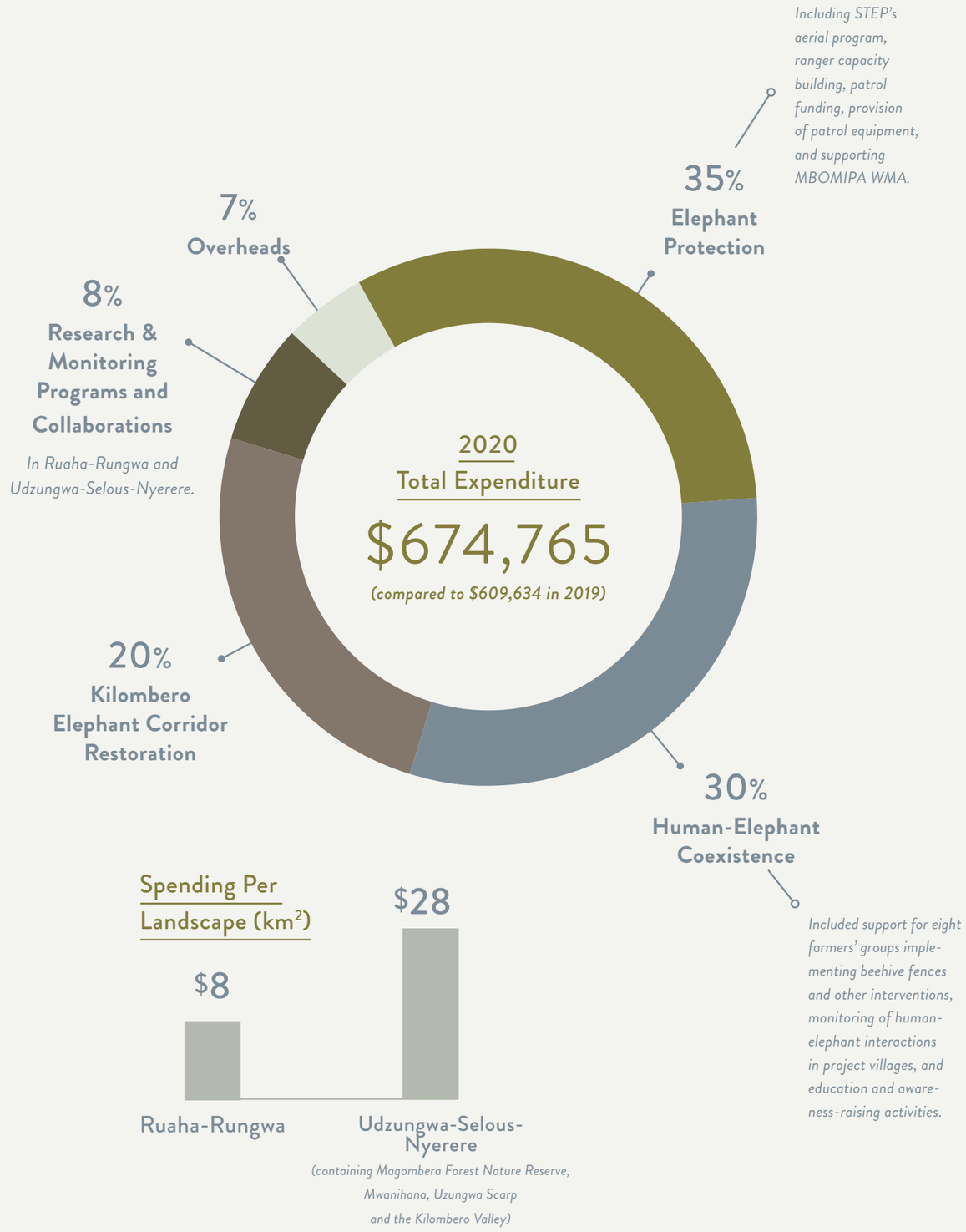



PHOTO: Penny Banham

Articles & Publications

Reports, Articles and Publications

Hardouin, M., Searle, C. E., Strampelli, P., Smit, J., Dickman, A., Lobora, A. L., & Rowcliffe, J. M. (2021). Density responses of lesser-studied carnivores to habitat and management strategies in southern Tanzania's Ruaha-Rungwa landscape. PloS one, 16(3), e0242293.

Mkuburo, L., Nahonyo, C., Smit, J., Jones, T., & Kohi, E. (2020). Investigation of the effect of poaching on African elephant (Loxodonta africana) group size and composition in Ruaha National Park, Tanzania. Scientific African, 9, e00490.

MNRT (2020), National Human-Wildlife Conflict Management Strategy 2020-2024. Ministry of Natural Resources and Tourism, United Republic of Tanzania (editors: Msuha, M., Jones, T., Mrisha, C., Noronha, J., Smit, J., Kapalata, F., Kagaruki, K., France, S., Munuo, W., Masalu, F.)

MNRT (2020), Supplement to the National Human-Wildlife Conflict Management Strategy 2020-2024. Ministry of Natural Resources and Tourism, United Republic of Tanzania. (editors: Msuha, M., Jones, T., Mrisha, C., Noronha, J., Smit, J., Kapalata, F., Kagaruki, K., France, S., Munuo, W., Masalu, F.)

Searle, C. E., Smit, J., Strampelli, P., Mkuburo, L., Ikanda, D., Macdonald, D. W., ... & Dickman, A. J. (2021). Leopard population density varies across habitats and management strategies in a mixed-use Tanzanian landscape. Biological Conservation, 257, 109120.

Strampelli, P., Searle, C., Smit, J., Grau, A., Henschel, P., Lobora, A., ... & Dickman, A. (2020). Insights into the status and distribution of cheetah (Acinonyx jubatus) in an understudied potential stronghold in southern Tanzania. African Journal of Ecology.

Popular Articles

Coexisting with new preventative measures. September 2020. A global challenge: Conservation & the coronavirus Joint IWT Challenge Fund and Darwin Initiative newsletter

Football for people and elephants: Engaging future protectors. September 2020. A global challenge: Conservation & the coronavirus Joint IWT Challenge Fund and Darwin Initiative newsletter

We are deeply grateful for the generous support of the following organisations and individuals who supported our work in 2020.

Donors

Albert J. Impink III
Andrew Sowerby
Allan Thornton
Belia Klaassen
Belia van Hilst
Carrie Cafaro
Carole Fenwick
Claire Smith
Dave Currey
Gary Hodges
Gillian Knowles
Henry Powell
Katarzyna Nowak
Larry Laverty
Liz de Leyser
Matt and Susan Powell
Hraaf Oppenen
Phyllis Lee
Skip Schulting
Robert and Leanne Lianz
Preserve the Rare Foundation
Stiftelsen Infinity Foundation

Technical, Field and In-Kind Support

Dr. Maurus Msuha
Hon. Richard Kasesela
Dr. Stephen Nindi
Abel Mtui
Dr. Edward Kohi
Dr. Victor Kakengi
Joseph Olila
Exper Pius
Patrick Kutondolana
Peter Erro
Mabula Misungwi
Patrick Simango
Wilbright Munuo
David Kanyatta
Oscar Nkonomagaka
Ilzumbe Msindai
Dr. Halima Kiwango
Christopher Mademla
Fatuma Juma
D. Katarzyna Nowak
Dr. Andy Bowkett
Dr. Francesco Rovero
Allan Carlson
Professor Phyllis Lee
Professor Hannah Buchanan-Smith
Charlotte Searle & Paolo Strampelli
Richard & Victoria Phillips
Anthony Jarrett & Kathryn Edwards
Nik & Jo Harris
Kichaka Expeditions
Ethan Kinsey
Ikuka Safari Camp
Paulo Urio
Belia Klaassen & Ype Smit
Natasja Corfixen
Rose Mawenya
Vumilia Mgimwa
Michal Smielak
House of Youse
Tom Hilton
Jon Salerno
Hassan Kisamo
Rob Beechey
PAMS Foundation
Dr. Silvia Ceppi
Coexistence Alliance Tanzania

Village Game Scouts of MBOMIPA WMA

Casian Kilawa
Haji Maryo Mtwanga
Hamis Xavery Kingalate
Patricia Mhulilo
Renatus Kikoti
Sara Semele
Shuhuli Sprian Degere
Timotheo Kilaguzi
Tito Ndoga
Vedasto Mwiringe
Abeid Daudi Mfaume
Adam Balosi Mgogo
Ernest Constantino Fusi
Felix Matei Wisa
Renald Mwendishule Kiwonike
Ismaili Mkandara
John Samwel Sofi
Abdalah Masaka
Roida Markus Kayera
Shiraz Hussein Mpululu
Basta Mbilinyi
Benedict Nyalusi
Blastus Hali
Castory Lyang'ula
Fikiri Idd Mgoiganga
Greyson Abraham Kalolo
Isiaka Lyamti
Jeremia Maliva
Mlama Kingalata
Mundulya Sajilo
Musa Mbungu
Paskali Kihulo

Our Team:

Arafat Mtui, *Honorary Chair*
Dr. Trevor Jones, *Chief Executive Officer*
Emma Impink, *Programs Manager*
Josephine Smit, *Associate Researcher*
Frank Lihwa, *Protection Manager*
Solomon Sembosi, *Protection and Technology Officer*
Godfrey Nyangaresi, *Forest Protection Coordinator*
Kimberly Lim, *Human-Elephant Coexistence Coordinator, Kilombero*
Shafii Msuya, *Human-Elephant Coexistence Coordinator, Rungwa-Doroto*
Kephania Mwaviko, *Human-Elephant Coexistence/Research Officer*
Joseph Mwalugelo, *Corridor Restoration Manager*
Athumani Mndeme, *Corridor Restoration Assistant*
Geofrey Lubengo, *Finance and Grants Officer*
Nelson David, *Finance and Administration Officer*
Felister Kidunu, *Finance and Administration Assistant*
Nasibu Kaluse, *Human-Elephant Coexistence Officer*
Joseph Kidibule, *Research Officer*
Abneri Nombo, *Community Liaison, Rungwa*
Peter Mtyana, *Vehicles Coordinator*
Kelvin Madege, *Driver and Mechanic*
Saidi Mahinya, *Driver*
Edward Lupondo, *Driver*
Ferdinand Koekemoer, *Pilot Team*
Ahmed Dahal, *Pilot Team*
Richard Nicholson, *Pilot Team*
Anne Yeoman, *Pilot Team*
Charles Nagy, *Pilot Team*
Prisca Mgeni, *Office Assistant*
Bakari Libawa, *Office Guard*
Abasi Lipongola, *Office Guard*
Amina Mndeme, *Office Assistant*

Local Elephant Monitors:

Rungwa-Doroto
Shabani Ramadhan
Jonas Jackson
Hamisi Nasoro
Gunda Sayi
Yosia Mohamed Mnyawi
Nkuva Mshampimbi

Kilombero:
Salum Mamba
Juma Kihulu
Jumanne Msondiwa
Francis Nyangwa
Shabani Juma Msolo
Shukuru Abdallah

stzelephants.or.tz

@southerntanzaniaelephant

@SouthernTanzaniaElephantProgram

@STzElephants

Support Us: givey.com/southerntanzaniaelephanttrust