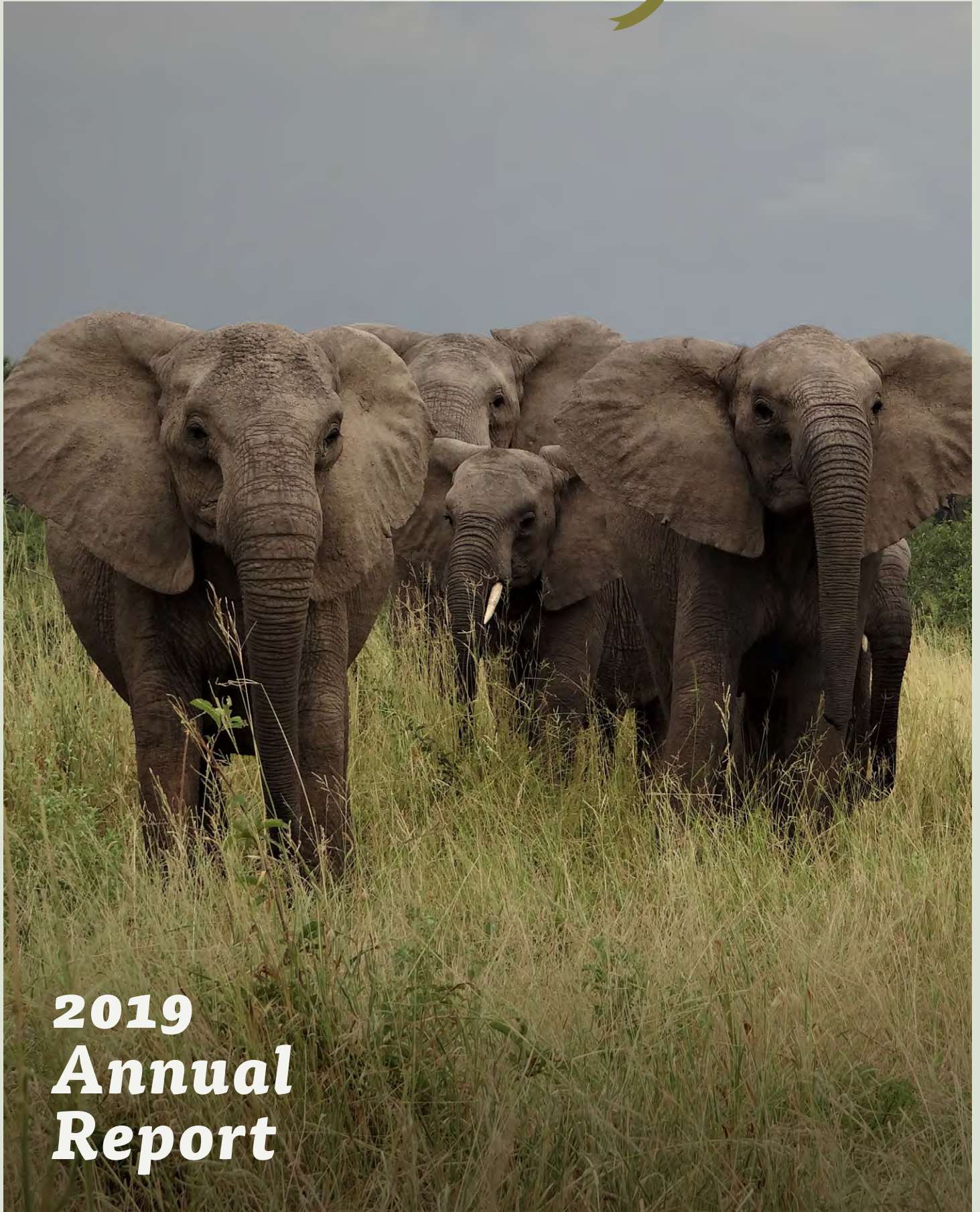


SOUTHERN  
TANZANIA  
ELEPHANT  
PROGRAM

STEP



**2019**  
**Annual**  
**Report**



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# 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 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<sup>2</sup>
- 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 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 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:

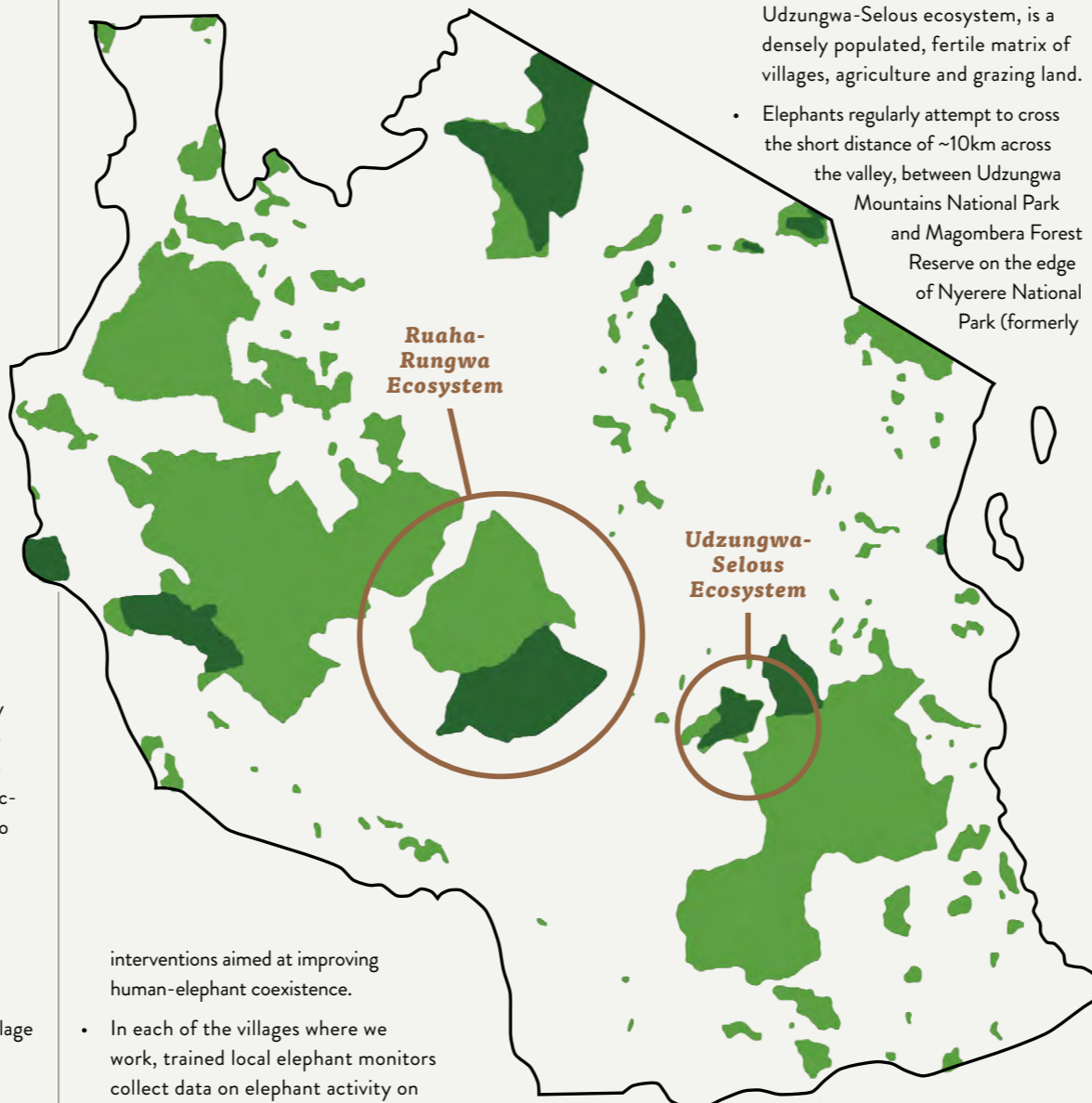
- Provide support for the protection of MBOMIPA WMA by supporting Village Game Scout wages, funding patrols, providing training, and conducting aerial patrols.
- Provide support to Rungwa-Kizigo-Muhesi Game Reserve by funding fuel for regular vehicle patrols, providing training in GPS, GIS and camera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

#### Human-Elephant Coexistence:

- Trial farm-based crop protection techniques such as beehive fences.
- Provide fuel support to rangers to assist communities with crop protection.
- 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.
- 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 local elephant monitors collect data on elephant activity on village land, including crop and food store damage, elephant movements, and elephant behaviour around beehive fences.

## UDZUNGWA-SELOUS

- The Kilombero Valley, in the Udzungwa-Selous 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.
- Collect data on elephant movements and use this to inform education and trials of crop protection methods.
- 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: Paul Tickner, Kusini Safaris

## Dear Friends,

This report lands on your desk at a challenging time for so many people around the world, coping with and adapting to the effects of the COVID-19 pandemic. On behalf of everyone at STEP, we hope that you are all staying safe and well.

I am happy to report that overall, 2019 was another good year for elephants in southern Tanzania, as they continue down the long road to recovery from the poaching crisis that took such a heavy toll from 2007-2016. Poaching is still down, though the risk is always present, and it is vital to keep up our protection efforts. We are proud to be supporting rangers and Village Game Scouts on the ground and from the air, from the miombo woodlands and bush of the Ruaha-Rungwa ecosystem, to the extraordinarily biodiverse forests of the Udzungwa Mountains. As you will see, in all of the sites where we are working, there have been successes in reducing poaching, and some promising signs of wildlife increasing.

Other challenges abound, not least the central conservation issue of human-wildlife coexistence, to which we devote a significant chunk of our resources and effort. In Tanzania, as in so many places, rising human populations and rapid land use changes bring wildlife into ever greater contact with people—but there are solutions that we know, and more to be found. Believing in both strong protected areas and the welfare of people living with wildlife, it is vital that we continue to work with communities to develop and implement plans for long-term coexistence. The approach has to be holistic and include improving livelihoods, empowering people to mitigate crop loss and other negative effects of wildlife, supporting protection from dangerous animals, wise land use planning and restoring community-managed wildlife corridors, and education for children and adults alike.

**2019 was another good year for elephants in southern Tanzania, as they continue down the long road to recovery from the poaching crisis.**

Towards the end of 2019, I was asked by the Government to lead development of Tanzania's first National Human-Wildlife Coexistence Strategy, which is on track to be launched in mid-2020. Once again, Tanzania is showing forward-thinking leadership to protect her natural heritage. I must thank the STEP HEC Team for their support and contributions to the Strategy, and for all their hard work and experience on

the ground developing solutions with communities, without which we would never have been granted the honour of being invited to contribute to this national challenge.

STEP passed its official fifth birthday as an organization in November 2019, and we are proud to have grown from a team of five to twenty-five in that time. The future is currently uncertain for all of us, but as I write this, and despite the anxious times we are living through, Village Game Scouts are patrolling the bush of MBOMIPA WMA, rangers are camping in the montane forest of Uzungwa

Scarp, the HEC team are extending one of our community beehive fences together with the Kanyenja Farmers Group on the edge of Magombera forest, and the STEP corridor team are busy consulting with the Village Governments and all our other partners on how to complete the joint land use planning for the Kilombero Elephant Corridor, to allow elephants safe passage from Udzungwa to Selous and reduce their impact on local farmers.

As ever, we thank you for your enduring support.

Onwards and upwards!

**Dr. Trevor Jones**  
CEO, STEP

# 2019 in Review

## KEY

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



## Protection

<p><b>Aerial Surveillance</b></p> <ul style="list-style-type: none"> <li><b>R</b> 144 hours</li> <li><b>M</b> 1 airplane hangar built</li> </ul>	<p><b>Illegal Activity</b></p> <ul style="list-style-type: none"> <li><b>M U</b> 28 suspects apprehended</li> <li><b>U</b> 229 snares removed</li> <li><b>U</b> 12 timber cutting sites closed</li> <li><b>U</b> 10 poacher's camps closed</li> <li><b>M</b> 0 elephants poached (3 in 2018)</li> </ul>
<p><b>Patrols</b></p> <ul style="list-style-type: none"> <li><b>M</b> 10,016 km of foot patrols</li> <li><b>M</b> 1,758 km of vehicle patrols</li> <li><b>U</b> 373 km of foot patrols over 74 days</li> <li><b>M R</b> 6,638 litres of fuel provided for vehicle patrols &amp; crop protection support</li> </ul>	<p><b>Wildlife Encounters</b></p> <ul style="list-style-type: none"> <li><b>M U</b> An increase in the number of wildlife encounters recorded in 2019 relative to 2018.</li> </ul>



## Human-Elephant Coexistence

<p><b>Beehive Fences</b></p> <ul style="list-style-type: none"> <li><b>K</b> 2 new community beehive fences established</li> <li><b>K</b> 150 litres of honey harvested</li> </ul>	<p><b>STEP VSLAs</b></p> <ul style="list-style-type: none"> <li><b>K</b> 113 loans supporting businesses, agriculture &amp; school fees</li> <li><b>R</b> 19 loans supporting businesses &amp; agriculture</li> </ul>
<p><b>Outreach</b></p> <ul style="list-style-type: none"> <li><b>R</b> 900 fliers &amp; booklets distributed containing STEP-created HEC content</li> <li><b>R</b> 10,000 people reached by 'Tembo Week' at football matches, film nights, community training and school visits</li> </ul>	<p><b>Kilombero Elephant Corridor</b></p> <ul style="list-style-type: none"> <li><b>K</b> 60% of corridor surveyed with communities for Joint Land Use Plan</li> <li><b>K</b> 1 elephant underpass authorized for construction in 2020</li> </ul>
<p><b>Education</b></p> <ul style="list-style-type: none"> <li><b>K</b> &gt;2,000 students received three modules on elephant ecology and behaviour, human-elephant coexistence &amp; wildlife corridors</li> </ul>	



## Research

<p><b>Monitoring</b></p> <ul style="list-style-type: none"> <li><b>K R</b> 8 villages monitored for human-elephant interactions</li> <li><b>R</b> 84 crop damage incidents recorded (a 30% decline relative to 2017)</li> <li><b>K</b> 245 incidents of elephant crop damage</li> </ul>	<p><b>Transects</b></p> <ul style="list-style-type: none"> <li><b>K</b> 56 transects walked by STEP's research officers to count and record the location of elephant dung piles</li> </ul>
<p><b>Publications</b></p> <ul style="list-style-type: none"> <li>7 scientific publications &amp; conference proceedings</li> <li>5 technical reports</li> </ul>	<p><b>Camera Trapping</b></p> <ul style="list-style-type: none"> <li><b>R</b> 17 elephant drinking points monitored by camera traps</li> <li><b>K</b> 18 camera traps monitoring elephant corridor endpoints</li> <li><b>R</b> 80 camera traps deployed for mammal survey</li> </ul>
<p><b>ID Database</b></p> <ul style="list-style-type: none"> <li><b>R</b> &gt;2,000 elephants identified in the Ruaha elephant ID database</li> </ul>	

## 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 26 full time and 7 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 trialing 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.

In 2016, STEP expanded its coexistence work to the western edge of the Rungwa-Kizigo-Muhsi 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 620 hours of aerial support to date. In 2016, we began a program to train rangers in Rungwa-Kizigo-Muhsi, 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 MBOM-IPA 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 >1300 km of foot transects, assessed the age-and sex-structure of crop-using elephants, and monitored elephant use of an important wildlife corridor.



**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.

### 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



Iringa District Council and Natural Resources Advisory Board



Kilombero District Council



Manyoni District Council



Associazione Mazingira



Lyra in Africa



Colorado State University



University of Bangor



University of Stirling

Udzungwa Ecological Monitoring Centre



Reforest 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

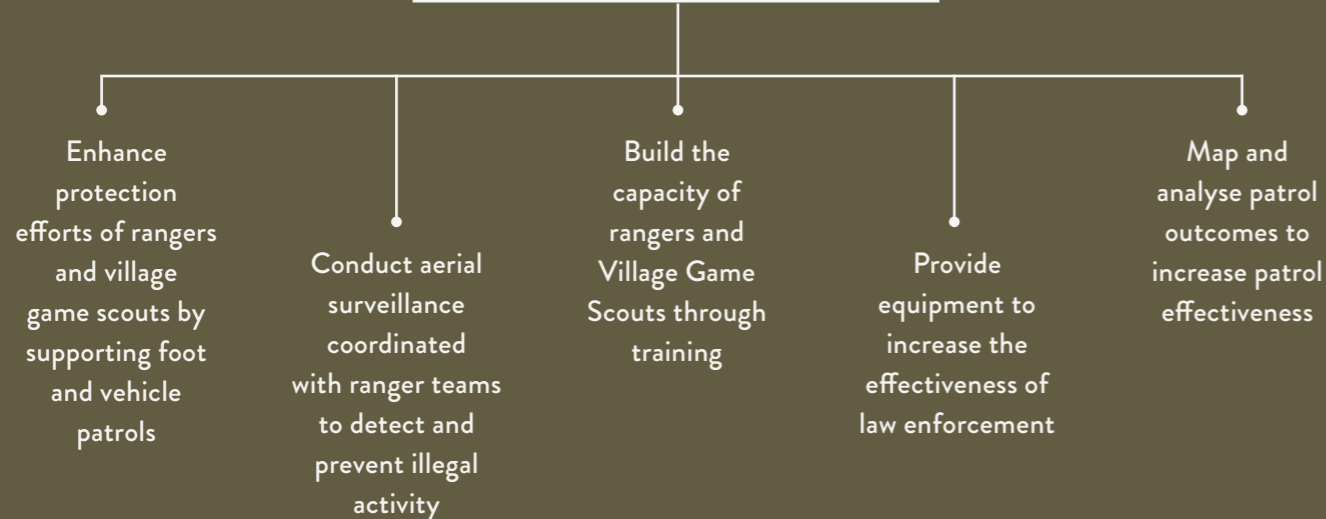
- Helen Pearson
- Nat Comber
- Nick McWilliam

# Protection



Rangers on patrol in Rungwa Game Reserve

## MAIN GOALS & FUNCTIONS



## Where We Work

### MBOMIPA WMA

- 777 km<sup>2</sup>
- 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<sup>2</sup>
- 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 2019, STEP continued to support three teams of Village Game Scouts (VGS) to conduct at least 21 days of foot patrols each per month by paying Scout wages and providing fuel and food supplies. VGS conducted an impressive 10,016 km of foot patrols and 1,758 km of vehicle patrols in Lunda zone of the WMA in 2019. 100% of patrols were logged using GPS units, with patrol coverage and outcomes mapped every month and analyzed by STEP to enhance patrol effectiveness. Patrols resulted in 13 suspects apprehended in 2019. This work has greatly increased the security of the WMA. We have seen an increase in the number of wildlife encounters recorded by VGS on patrol in 2019 relative to 2018—evidence that the area is now safer for wildlife. An excellent result of this work is that no elephants were poached in the Lunda Zone of the WMA in 2019 compared with three in 2018.

### Uzungwa Scarp Nature Forest Reserve

In 2019, STEP supported 74 days of foot patrols by rangers from Tanzania Forestry Services and Iringa Anti-Poaching Unit together with Village Game Scouts in Uzungwa Scarp Nature Forest Reserve. These were equivalent to 15 mobile camping patrol missions each lasting for 5 days. All patrols were strategically planned and executed, with mapping, analysis and reporting of findings subsequent to each patrol. Patrol teams covered 373 km of the steep slopes of the Scarp, a 60% increase in patrol coverage relative to 2018. Patrols resulted in 15 suspects apprehended, removal of 229 snares, and closure of 12 timber cutting sites and 10 poacher's camps. 145 wildlife observations were made on patrol, a 40% increase in the number of wildlife encounters per kilometer of patrol relative to 2018.





The STEP plane taking off at Makwasa, Rungwa Game Reserve; Village Games Scouts in MBOMIPA WMA; Elephants in Lunda Zone

### Capacity Building

A key component of STEP's Protection work is to increase the capacity of rangers to do their work effectively and safely. To this end we provided training in First Aid, forest mammal identification, rules and regulations under Tanzania's Wildlife Conservation Act for 20 rangers from Uzungwa Scarp Nature Forest Reserve, Kilombero Nature Reserve, Tanzania Forestry Service Iringa and several STEP staff. We also provided refresher training in use of GPS units on patrol for 7 VGS in MBOMIPA WMA. In addition, STEP's GIS team provided support in mapping and analysis of patrol outcomes. This helps to plan subsequent patrols, monitor the results of patrolling, and identify spatial and temporal trends in illegal activities.

### Aerial Patrol Support

2019 was the sixth year of STEP's aerial program, which has now provided over 630 hours of aerial support to the Ruaha-Rungwa ecosystem. This year, STEP's aerial team flew a total of 144 hours across six protected areas. Over the dry season, pilot team Charles Nagy and Anne Yeoman were based in MBOMIPA WMA for 3 months, conducting near-daily flights to monitor elephants and detect illegal activities for follow-up on the ground by village scouts. STEP's Protection team also completed construction of a hangar for the aircraft in MBOMIPA. We conducted 28 hours of wet-season aerial patrols in Rungwa-Kizigo-Muhesi Game Reserves, in close coordination with ranger teams, braving the challenges of the rainy season to keep these important areas secure. Aerial surveillance resulted in detection of 188 illegal activities in 2019 and helped ranger and VGS teams follow up on timber cutting, the illegal presence of cattle and corrals inside protected areas.

### RUNGWA-KIZIGO-MUHESI GAME RESERVES

- 15,000 km<sup>2</sup>
- Supports ~7000 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 6,638 litres of fuel in 2019.

- Rungwa-Kizigo-Muhesi Game Reserves received 2,000 litres of fuel for patrols which enabled rangers to cover 6,220 km of vehicle patrols, resulting in 19 arrests.
- MBOMIPA WMA received 3,610 litres of fuel to conduct vehicle patrols and VGS rotations. The support enabled VGS to apprehend 13 suspects and cover 17,658 km of vehicle patrols.
- 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 1,028 litres of fuel to conduct patrols and crop protection in MBOMIPA WMA, Lunda-Nkwambi Game Controlled Area and adjacent villages.

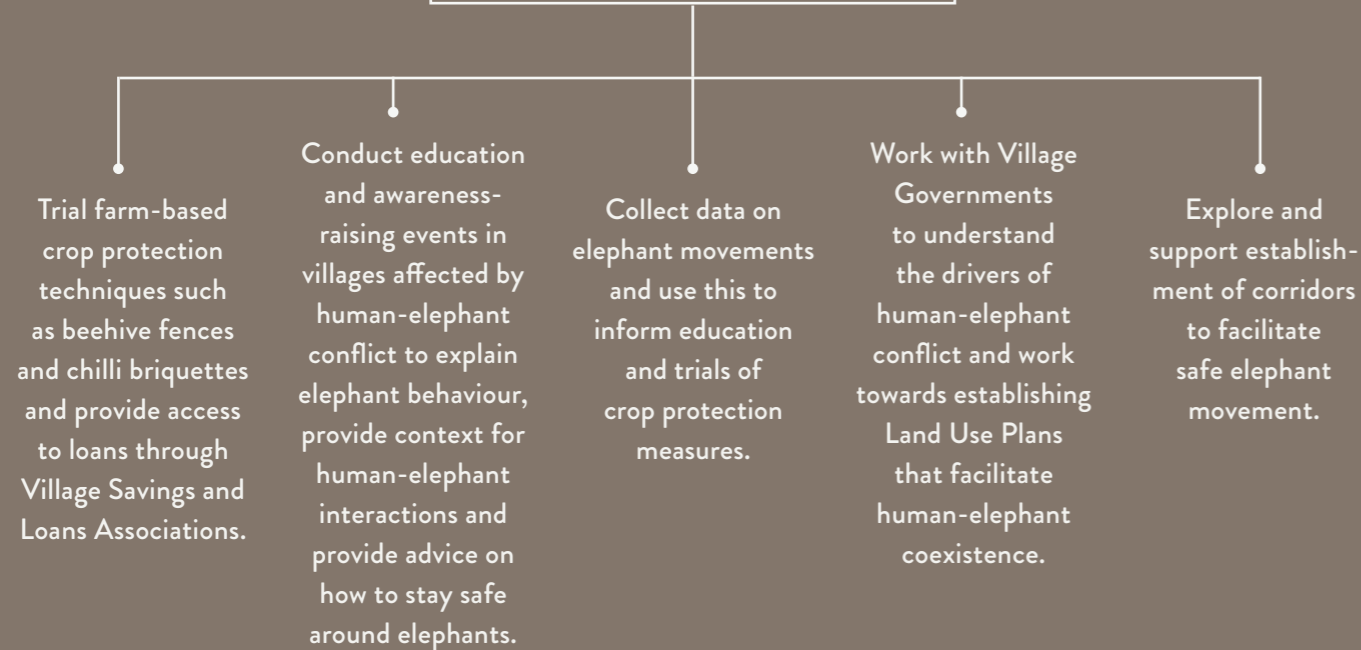


# Human-Elephant Coexistence



Katurukila Farmers' Group at their beehive fence together with the Kilombero Human-Elephant Coexistence Team

## MAIN GOALS & FUNCTIONS



## 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, and
- 2) facilitating safe elephant movement through a designated wildlife corridor, and
- 3) improving farmer livelihoods.

STEP has established six beehive fences 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. Building economic resilience is an important factor in building human-elephant coexistence, as the economic impact of crop losses 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.



Farmers working on the Katurukila Fence

## IN 2019

- **Beehive Fences:** STEP established two new beehive fences in Magombera and Kanyenja Villages, both along the boundary of Magombera Forest Nature Reserve. Magombera's fence is the longest in STEP history at 2.6 kms.
- **Beehive Fence Education:** STEP worked to transform the first fence it supported, Njokomoni Fence (near the main gate to Udzungwa Mountains National Park), into an educational fence. STEP hosted 43 tourists, donors and members of other conservation organizations at the fence to share best practices about using beehives to reduce human-elephant conflict.
- **Beekeeping Training:** As part of beehive fence establishment, STEP runs beekeeping training to equip farmers with beekeeping best practices. In 2019 over 80 farmers received beekeeping training.
- **Honey Collection:** STEP continued to operate its Udzungwa Honey Collection Center, established in 2018, by helping to process 150 litres of honey. All STEP beekeeping groups are members.
- **VSLAs:** STEP established one new Village Savings and Loans Association in 2019 and continued to support four existing VSLAs. 105 farmers participated in VSLAs and accessed 113 loans with a value of 8,765,000 TZS (~\$3930) to build small businesses, improve their farming practices and pay school fees.
- **Education:** STEP supported education and awareness-raising events at three schools in the Kilombero Valley. These were events planned and organized by the schools to showcase student performances and artwork about elephants and the importance of conserving their environments. STEP provided food and materials for the events and offered short trainings on elephant behaviour, ecology and how to stay safe around elephants. In total, these events involved over 1500 students.



### KILOMBERO ELEPHANT CORRIDOR

Restoration and protection of wildlife corridors of enhancing human-wildlife coexistence and improving livelihoods over the long term. This fenced, community-managed corridor will funnel elephants between Magombera Forest Nature Reserve 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 generate associated income-generating projects. Together with the National Land Use Planning Commission, the Morogoro Regional Administration, Kilombero District Authority, the Ministry of Natural Resources and Tourism and the local communities, STEP has conducted consultations, focus group discussions, and educational activities across the area with a focus on three key villages, Kanyenja, Sole and Mang'ula A, through which the corridor passes.

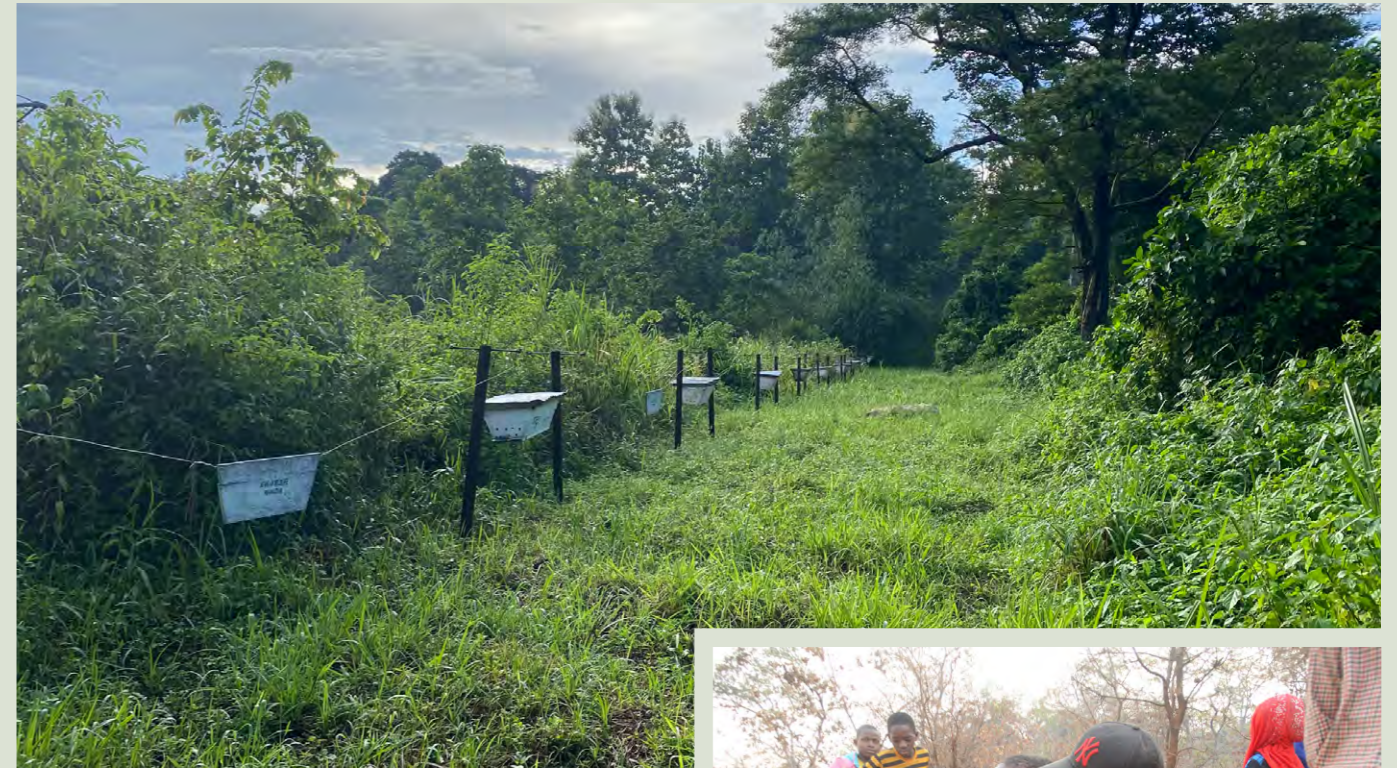
The next phase of work will focus on participatory land use planning to secure the corridor, involving valuation and compensation of all small farms in the corridor. In addition, we have secured authorization and funding for construction of Tanzania's first elephant underpass on the Mikumi-Ifakara highway.

#### IN 2019

- **Communication:** Over the whole year, the STEP team, who are embedded in the corridor village communities, continued discussions and sensitisation on the corridor and how it can address some of the challenges facing these communities.
- **Surveying:** Together with the National Land Use Planning Commission and the District Participatory Land Use Planning Team, STEP completed the surveying of land in Kanyenja village, covering 60% of the length of the corridor.
- **Support:** STEP continued to gather support for the project at every level of Government and with a wide range of local stakeholders.
- **Monitoring:** Camera-trapping and transect monitoring confirmed the crossings of several elephant groups along the corridor, as well as tracking the serious current extent of crop losses in the area.
- **Education:** STEP delivered three educational modules on Elephant Ecology and Behaviour, Human-Elephant Coexistence and Wildlife Corridors to over 2,000 students in 18 primary and secondary schools in the area. Prior to the education program, most students had no knowledge on approaches to managing human-elephant interactions.



Students at Mang'ula A Primary School



Njokomoni Fence; young supporters watching Tembo Cup matches and reviewing STEP's human-elephant coexistence booklet; STEP staff sharing a training after a Tembo Cup football match

**RUNGWA**

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. We supported the establishment of two farmers groups, both of which operate beehive fences and VSLA. Through our monitoring and ground surveys across the landscape, we have learned that large farm sizes, shifting land tenure systems and an extensive protected area-farmland interface pose challenges to farm-based interventions. In 2019, due to limited efficacy of beehive fences in this landscape, we revised our approach to include a greater focus on education and outreach and income diversification. In the future, we also plan to use our elephant data to catalyze land use planning as a tool for addressing the driver of human-elephant interactions.

IN 2019

- **Current Model:** In 2019, STEP made a concerted effort to support farmers groups to increase beehive occupancy. Despite regular follow-up and use of bee attractants, occupancy remained low and inconsistent, necessitating review of our coexistence model. In response, we are modifying the beehive fence design by increasing the use of dummy hives on the communal fence, and allowing individuals farmers to place beehives in more productive areas to increase their income from beekeeping. We also continued to support VSLAs, which provided 19 farmers with access to loans for business establishment and agricultural activities.
- **Outreach:** STEP facilitated a workshop for village leaders in which key human-elephant coexistence concepts were discussed. Village Leaders were provided knowledge about drivers of human-elephant interactions, mitigation methods to reduce crop damage and ways for community members to stay safe. The workshop was conducted in June 2019 and included Village Executive Officers, Village Chairpersons, Ward Executive Officers and staff from Rungwa Game Reserve. Groups discussions from this workshop informed content for other community events, particularly the educational content we developed for the Tembo Cup.



Leaders from communities around the Rungwa-Kizigo-Muhesi Game Reserve at STEP's Community Leader Workshop

IN 2019

- **Booklet:** STEP developed human-elephant coexistence content specific to the Rungwa context. Drawing on data from household baseline surveys and key informant interviews done to understand current levels of experience and knowledge with human-elephant interaction in the region, STEP created an outline and began conducting research and writing content. We worked with Tanzanian illustrators and graphic designers, critical collaborators as illiteracy rates in Rungwa are high. The illustrations communicate key concepts in the



booklet and also provide step by step instructions for implementing crop protection strategies.

Prototypes of the translated booklet were brought on field visits and reviewed with secondary students and members of STEP's farmers' groups. 400 copies of the booklet and 500 copies of a flier made from streamlined booklet content were distributed in and around Rungwa as part of the Tembo Cup week of outreach and education activities.

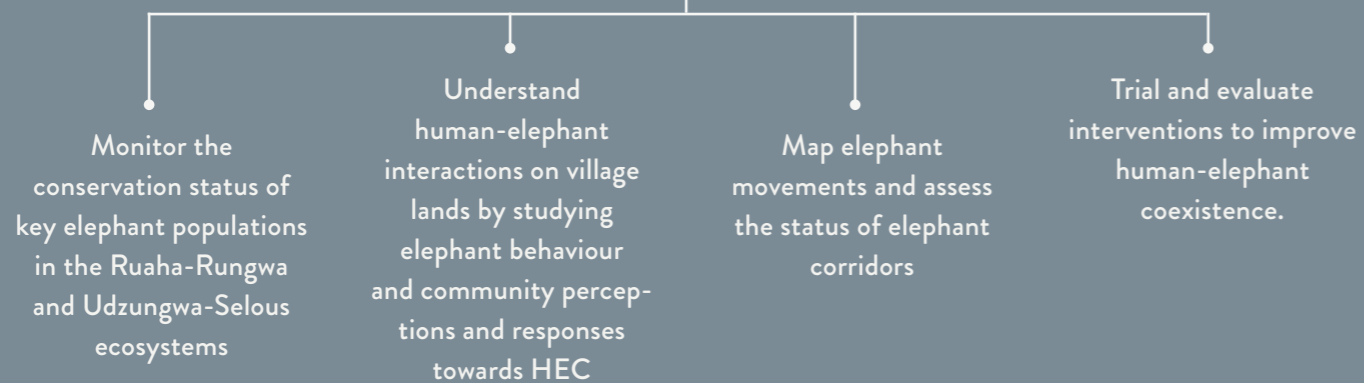


- **Tembo Cup:** In July 2019, STEP ran a large scale education and awareness raising campaign centered around a football tournament, called The Tembo Cup. A week of knock-out football matches were played in villages in which human-elephant conflict is high. The idea was to create a more positive association with elephants through an engaging community activity. In addition to football matches, film nights, community trainings and trainings at schools were conducted.
  - Over 5000 people came to football matches.
  - Over 3000 students were trained at 9 primary schools and 1 secondary school.
  - Over 2000 people attended film nights at which Swahili language wildlife films were shown.
  - Over 900 people assembled for community training held before or immediately following football matches.



PHOTO: Natasja Corfixen

## MAIN GOALS & FUNCTIONS



### 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 continued to conduct monthly monitoring of elephants in the Park to add to this dataset and our database of known elephants for Ruaha, which includes >2,000 elephants.

### Camera Trapping Elephant Visits to Water Sources

Water is a key resource for elephants and therefore an important determinant of elephant ranging behaviour. In 2019, we continued a camera trap study investigating how elephants use water sources in the Ruaha-Rungwa ecosystem. We placed 13 cameras along elephant trails leading to the Great Ruaha River and 5 cameras at water sources on village land adjacent to Ruaha National Park.

We found that elephants show greater night-time use of water sources that pose a greater risk, such as on village land. One of our village camera traps detected 36 bull elephants drinking at a village water source in a single night! STEP will use the results of this study to provide recommendations for managing shared access to these water sources for people and elephants.

### Camera Trap Surveys in Ruaha-Rungwa

In collaboration with Charlotte Searle and Paolo Strampelli (WildCru, University of Oxford & Ruaha Carnivore Project), STEP is using camera trap surveys as a long-term monitoring tool for the Ruaha-Rungwa ecosystem. Camera trap surveys help us collect data on mammals in understudied parts of the ecosystem and to study elephant activity patterns, grouping behaviour, and habitat use, especially in areas where elephants are difficult to observe. In the dry season of 2019, we placed a large grid (>400 km<sup>2</sup>), comprising 80 camera traps, in the miombo woodlands

of Rungwa Game Reserve for three months. The cameras detected 43 mammal species, including cheetah and endangered wild dog. The camera traps detected elephants on 372 occasions, with 80% of detections occurring between 19:00 and 06:00. We suspect this greater nocturnal and crepuscular activity by elephants is a continued response to risk and disturbance experienced during the poaching crisis.

### Monitoring Elephants in Udzungwa and Magombera Forests

To help us monitor elephant use of Udzungwa and Magombera forests, STEP's research officers walk five foot transects every month (a total of 312 km over the year!) to count and record the location of elephant dung piles. As it is very difficult to see elephants in forest, elephants cannot be monitored from the air. Instead, we record how many elephant dung piles we encounter between seasons and across years. Our monitoring suggests that elephant use of Mwanihana forest in Udzungwa has increased over the past four years, which is very positive news!

In addition to foot transects, we are using camera traps to monitor elephant use of forest edge in Udzungwa and Magombera and to study elephant movements



#### ID Database Example

**Name:** Kimilamatonge  
**Age:** > 40 years  
**Sex:** Female  
**Known Since:** December 2013  
**Group Size:** 6 individuals

between these forests along the Kilombero Elephant Corridor. The camera traps are revealing a lot of elephant activity (over 200 detections in 6 months!) in Magombera forest, particularly for bulls, who make up 90% of elephant detections. In a very exciting result, our cameras provided the first photographic evidence of elephants moving between the two forests, as an elephant bull named Earl, who we first identified in Udzungwa in 2011, was photographed by camera traps in Magombera forest in 2019. Apart from elephants, the cameras in Magombera have detected buffalo, hippo, and African wild dog (a first record for this forest and newly gazetted Nature Reserve!)

**Studying Human-Elephant Interactions**

In 2019, eight elephant monitors helped us to record over 300 incidents of crop damage. Local elephant monitor data from the Kilombero Valley data helped us to identify Kanyenja and Magombera villages as hotspots of elephant crop damage, and, as a result, these villages were selected as the location for our newest beehive fence projects.

Using data from our long-term study site in Udzungwa, STEP collaborated with MSc students Kirsten Henderson and Rebecca Symington (University of Stirling) to investigate elephant crop use and identify characteristics of farms that are vulnerable to crop losses. Elephants damaged 79 different types of crops and trees over a seven-year period. The five most frequently damaged crops were pumpkin leaves, amaranth, okra, Chinese lettuce, and orange trees. Larger farms were more likely to experience crop damage incidents, while farms closer to the Park boundary experienced a higher intensity of crop damage than farms further away.

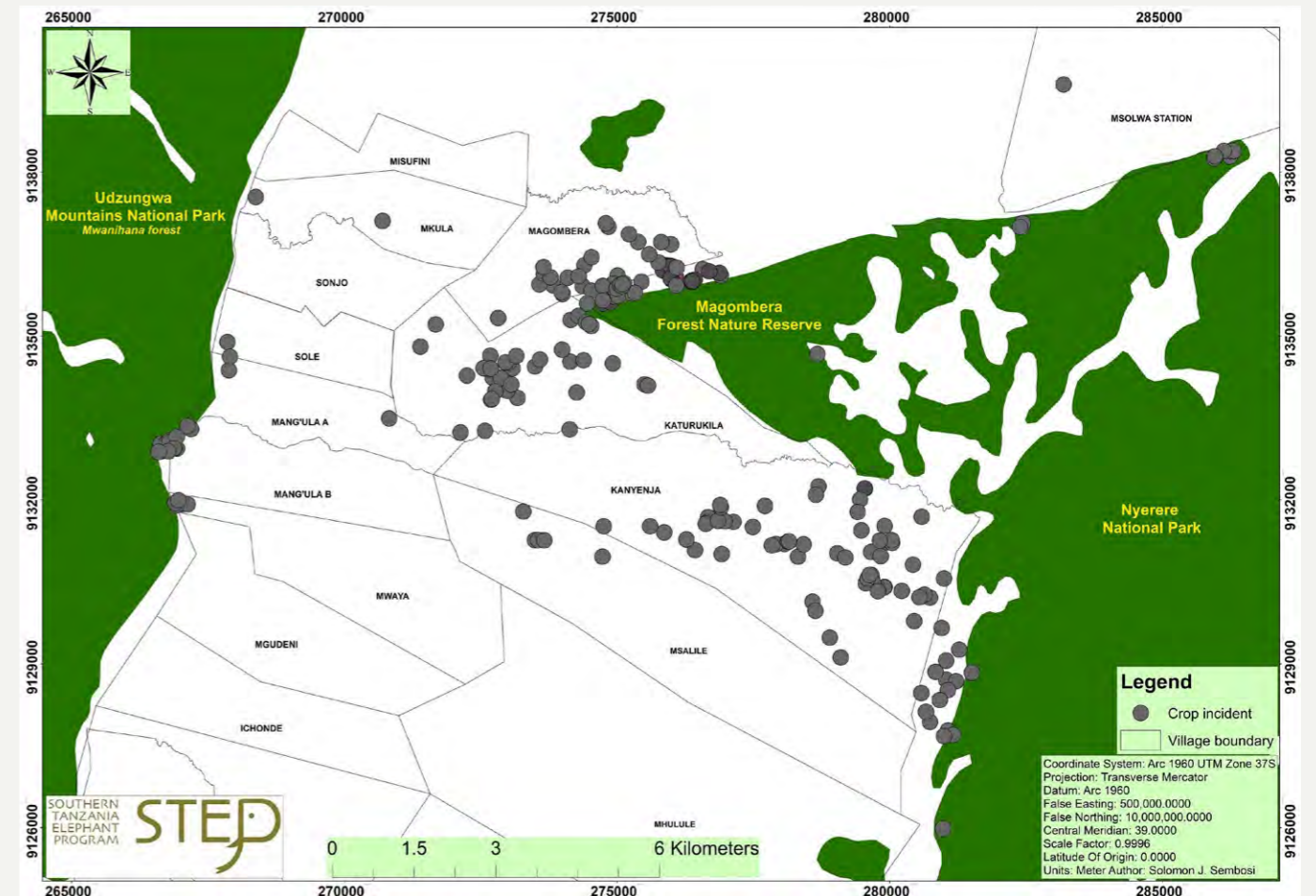
**Trialling HEC Interventions**

STEP has been trialling linear beehive fences placed along the boundaries of protected areas and adjacent farmland in southern

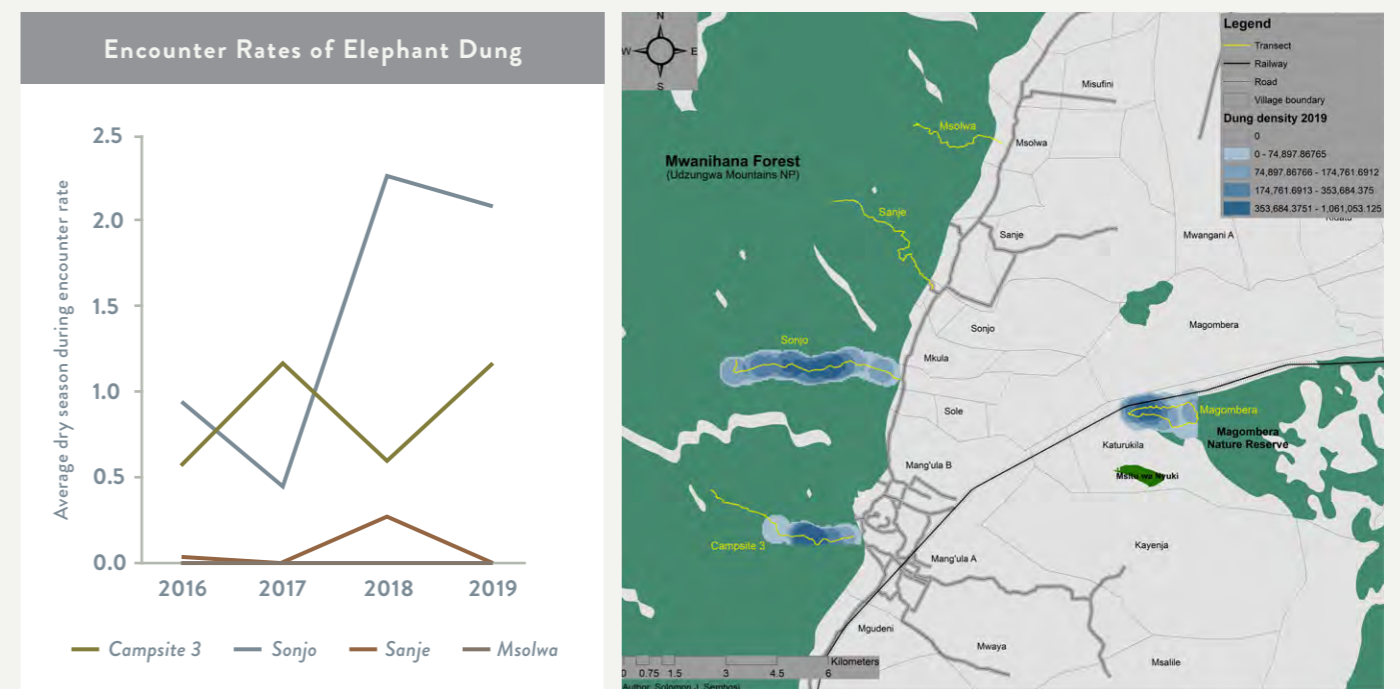
Tanzania since 2011. In our longest-term study site adjacent to Udzungwa Mountains National Park, elephant visits to farmland continued to be much lower in 2019 than in the years 2011 to 2014, before a 1.2 km beehive fence was installed, suggesting the beehive fence continues to be effective after 5 years. In Rungwa, where beehive occupancy has proved a challenge due to strong seasonal fluctuation in bee populations, we are studying the effectiveness of a modified beehive fence design made up primarily of ‘dummy’ hives, with real hives hung in trees nearby to increase beehive occupancy. So far, this modified beehive fence appears to have some deterrent effect, as on multiple occasions, elephants have approached the fence without crossing through it.



Tuskless male (individual M13, named Earl) caught on camera trap in Mwanihana forest in Udzungwa from 2011-14, and in Magombera forest in 2019. Note the significant changes to his left ear through wear and tear over the last five years; his identity is however confirmed by the hole in his left ear and wrinkle patterns on his trunk and face.



TOP: Location of crop loss incidents in 2019.



LEFT: Average dry season (June to November) encounter rates of elephant dung (number of piles per km) along four transects in Udzungwa for the years 2016 to 2019. RIGHT: Dung densities along five forest transects in Mwanihana and Magombera in 2019.

# Key Priorities for 2020



## Protection

### Uzungwa Scarp

- Provide Patrol/Field equipment (tents, tarps, sleeping pads, VGS t-shirts and gumboots).
- Conduct training for new TFS staff (GPS, GIS, patrol techniques and report writing).
- Monitor ongoing court cases of suspects apprehended.
- Conduct 22 Joint forest patrol operations at USNFR with Village Scouts, rangers from Tanzania Forestry Services and Iringa Anti-Poaching Unit, a 32% increase relative to 2019.

### MBOMIPA WMA

- Support VGS Wages and Provisions for 2020.
- Increase coverage of foot, aerial and vehicle patrols to under-patrolled areas in 2019.
- Introduction of SMART technology for Patrol Data Collection.
- Launching of Aircraft Hangar and Operation Control Room.
- Facilitate advanced trainings for VGS.

### RUNGWA GR

- 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.
- Develop markets for the Udzungwa Honey Collection Center and work towards expanding membership to other beekeeping groups in the area.
- Trial two new mitigation methods: solar lights and 'smelly repellent' made from chilli and elephant dung.

### Kilombero Elephant Corridor:

- Complete the participatory mapping and Joint Land Use Planning for the corridor.
- Initiate the process of valuation and compensation, led by official Land Valuers from the Ministry of Lands and the Kilombero District Authority.
- Recruit, train and equip 12 Village Game Scouts to protect and monitor the wildlife corridor.
- Rehabilitation of the Kidatu-Ifakara highway will now include Tanzania's First Elephant Underpass to facilitate movement of elephants and other wildlife from the Udzungwa Mountains National Park into the corridor. Construction due to be completed in 2020.

### Rungwa-Doroto

- Expand the Tembo Cup to at least twice as many villages in 2020. Expand the tournament to include netball in an effort to attract young women and girls.
- Broaden the role of Local Elephant Monitors, moving them beyond collecting data solely on elephant movements and using them to learn more about drivers for tolerance, perceptions of elephants and to disseminate information.
- Expand work beyond Rungwa to Doroto village, another elephant activity hotspot on the Rungwa-Kizigo-Muhesi boundary. There, STEP will launch VSLAs, conduct a second Tembo Cup Tournament and employ Local Elephant Monitors who will expand outreach and education activities.
- Replace existing beehive fences with a new trial structure: dummy hives only. This will allow groups to move beehives into more suitable locations for colonization by bees and will hopefully still prevent elephant incursion into fields.



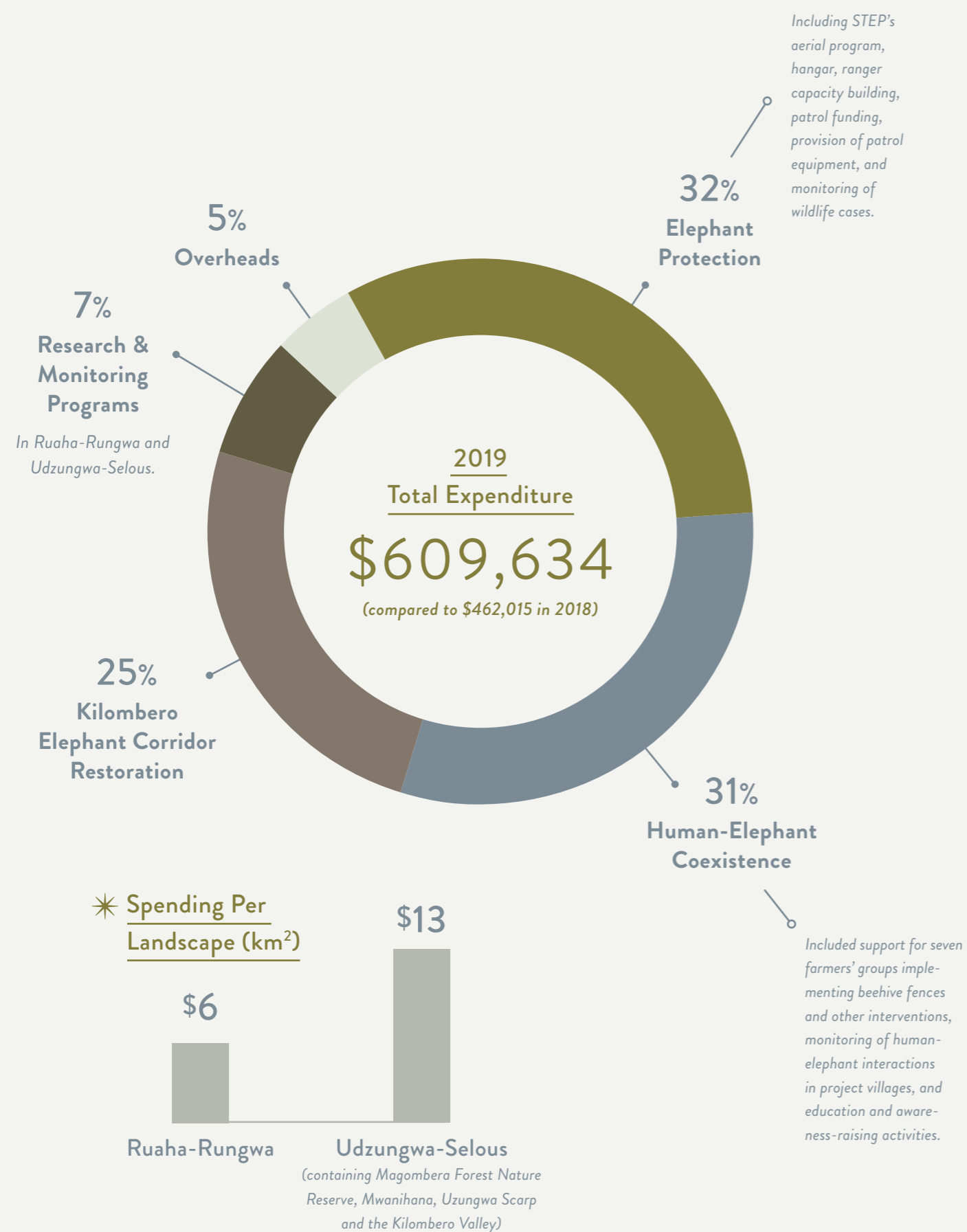
## Research

- Contribute STEP data and expertise to the development of Tanzania's Elephant Management Plan (2020-2029) and first-ever National Human-Wildlife Coexistence Strategy (2020-2024).
- Continue monitoring of the Ruaha-Rungwa and Udzungwa-Selous elephant populations through transects, ground surveys, and camera trapping.
- Continue research collaboration with the Conservation and Human Behaviour Group from the University of Bangor.
- Collaborate with an MSc student from the University of Kent to understand key factors that shape community tolerance for elephants in the Kilombero Valley.
- Collaborate with an MSc student from the University of Newcastle to investigate spatial predictors of elephant crop damage in the Kilombero Valley.
- Collaborate with a PhD student from Colorado State University to study land use and farming decisions in conflict hotspots and evaluate corridor restoration as a solution to human elephant conflict.



*Elephants at Lunda, taken from STEP aircraft*





**Articles & Publications**

**Reports, Articles and Publications**

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Smit J. Studying elephant behavioural responses to human-elephant interactions. Presentation to the Stirling Human Animal Interaction Research group (SHAIR), University of Stirling. 5 October 2018.

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