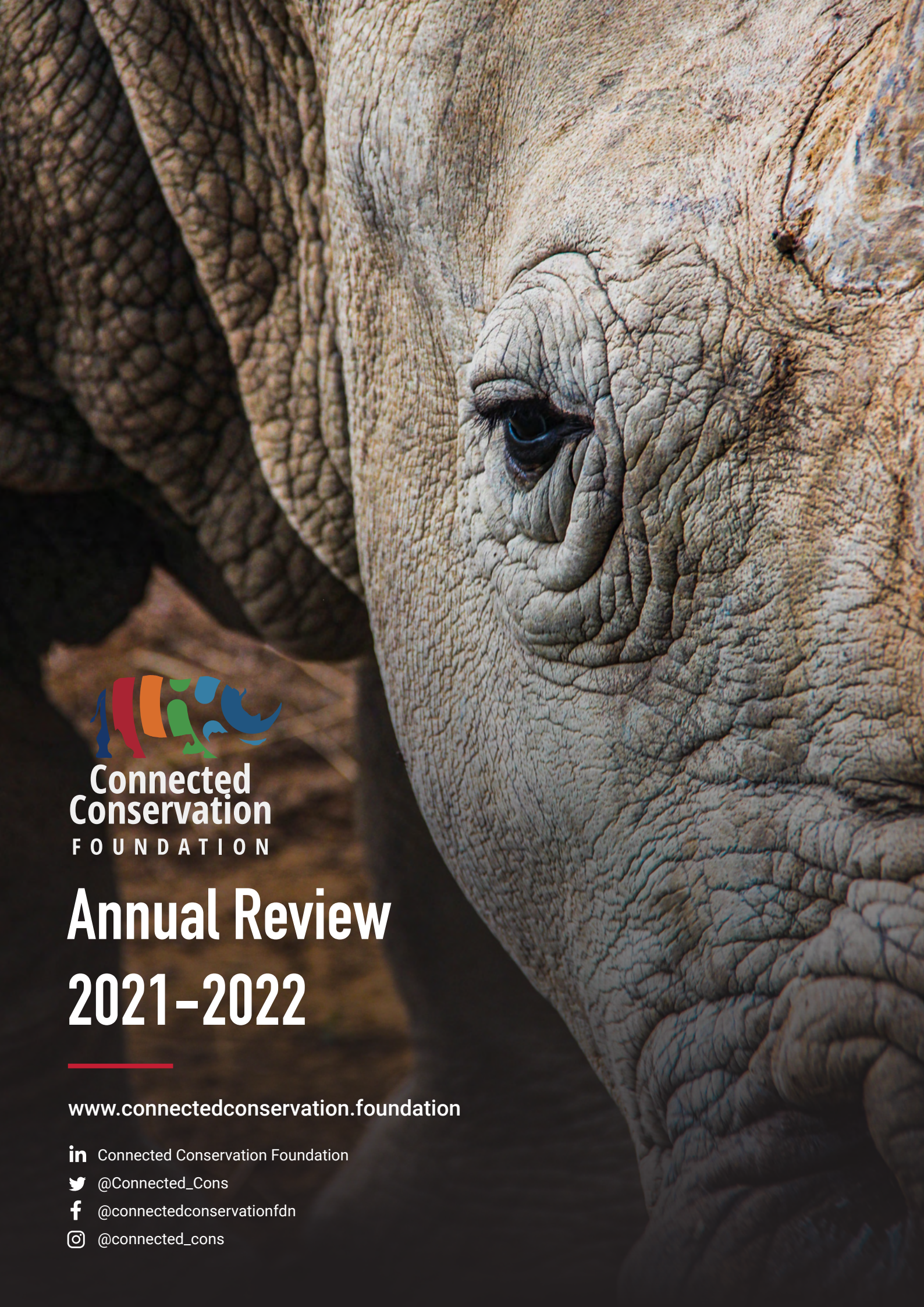

Connected Conservation FOUNDATION

Annual Review 2021–2022

www.connectedconservation.foundation

Connected Conservation Foundation
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OUR MISSION IS TO PROTECT AND RESTORE WILDLIFE AND NATURAL ECOSYSTEMS, PROVIDE LOCAL EDUCATION AND SUPPORT COMMUNITIES THROUGH TECHNOLOGY.

A Warm Welcome

from our Chairman Bruce 'Doc' Watson

A huge thank you to all our partners, supporters, volunteers and team over the last year. Together, we've achieved so much.

2021/22 was a challenging year. From terrible drought in East Africa, to global record temperatures, to the **escalating poaching crisis in South Africa**, our beloved wildlife is in serious trouble.

But, the strides our legendary local partners have taken for wildlife and communities has been remarkable. This year, we are extremely proud to **equip teams in five new protected areas in Kenya** with crucial technologies that are scaling the effectiveness of conservation interventions.

Thanks to our combined efforts, digital infrastructure has been deployed across these vast, interconnected landscapes, **helping dramatically improve the conservation management and protection of these irreplaceable ecosystems.**

We're also **ecstatic to hear that Kenya's population of critically endangered Black Rhinos has increased by around 10%.** With partner's reporting that training and technology improvements to intelligence-led wildlife protection has made a tremendous contribution.

We hope you'll feel inspired by the stories in the ways CCF is working **— to equip those on the front lines and behind the scenes — to ensure wildlife and ecosystems thrive in Africa.**

It is an exciting time to be at CCF. We're delighted that our network of collaborators is evolving in new ways to protect wildlife and foster local African conservation leadership. Heartened by this united strength, we embrace the coming year with passion, gratitude, and hope. We invite you to join us on the journey.

"**From everyone at Connected Conservation Foundation,** it has been an absolute pleasure working with you. **We're excited to do more in 2023 and beyond**"

Our Focus

The end of 2022 gave us cause for cautious optimism. Governments from 196 countries around the world united at COP15 in Montreal and agreed a historical set of Global Biodiversity targets to stop the sixth mass extinction of life on Earth and to protect 30% of the planet for nature.

Sophie Maxwell, Executive Director

We can achieve this ambition, but there are huge challenges ahead. Firstly, we need to protect the nature that is still intact. Yet, in a recent survey conducted by African Parks, of all 8,000 registered protected areas in Africa, most are only "paper parks" without adequate enforcement.[1] More effective management is needed to ensure large functioning landscapes can secure threatened species, provide ecosystems services and benefit local people.

Technology has a critical role in helping strengthen and improve the effectiveness of protected areas and achieve and measure against targets.

At Connected Conservation Foundation, we're uniting partners in the donation of technologies, capabilities and resources, to **equip teams at the forefront of environmental protection** with transformative tools.

Together, we're deploying landscape-wide technology solutions including connectivity and communications infrastructure, high-res satellite data and remote sensing devices, alongside training opportunities to enable conservation teams to **multiply their capacity to protect and manage unique environments and over 30 threatened species,** across Kenya, South Africa and Zambia.

Our 2030 Goal:

> **"Assisting effective Protective Area Management for 10,000,000 ha, protecting 50+ threatened species and improving the lives of local people."**

This year, we're proud to upscale our support to five new protected areas, connecting an additional 3,000,000 hectares. We've been blown away by the wider adoption of sensors for conservation challenges, including; wildlife protection and research, security, land-use management, livestock grazing, sustainable tourism and managing natural resources for both wildlife and local people.

Looking ahead, we're excited to see the continued acceleration of connectivity and environmental intelligence platforms that harness big data, AI, IoT and Satellite Earth Observation to scale the monitoring and protection of nature.

Through enabling digital infrastructure, we're committed to aiding protected areas effectively manage and protect their threatened species, harness new Natural Capital finance, and **empower community-led conservation for a thriving, wilder future.**

[1]. African Parks , African Parks' 161 Strategy: Securing the Foundation of Africa's Protected Area Network

Our Impact to Date
Achievements and Activities

We saw many successes in the last fiscal year, channelling large-scale digital infrastructure equipment and technology resources to a total of nine protected areas across Kenya, Zambia and South Africa.

Thanks to the generous donations from our sponsors, alongside unwavering support from dedicated engineers and their teams, we're **helping our field partners harness technologies to protect and restore crucial conservation areas** of Sabi Sand Nature Reserve, Northern Rangelands Trust, Lewa Wildlife Conservancy, Ol Jogi, Loisaba, Sera Wildlife Sanctuary, Kafue and Madikwe Game Reserve.

SUPPORTING EFFECTIVE CONSERVATION OF 30+ THREATENED SPECIES AND THEIR HABITATS

TO DATE, WE'VE ENABLED

9 protected areas
Benefiting from technologies for security, ecology research and operations

5,000,000 ha
Connected and better managed, with real-time data for informed decisions

6 operations rooms
Developed and enhanced

150+ rangers
Equipped and empowered, keeping patrols safe

OUR NEW 2021/22 ACHIEVEMENTS

EQUIPPED
5 new conservancies with conservation technology infrastructure

CONNECTED
3 million new hectares of network expansion, securing unique wilderness

ENHANCED
3 operating centers enhanced with infrastructure as hubs for real-time data

MONITORED
300,000 ha in Madikwe and NRT, now better managed using Airbus high-res satellite imagery

OUR NEW 2021/22 ACHIEVEMENTS

ENABLED
3 new PTZ long-range thermal camera installed in Madikwe, to spot and stop poaching incursions

ENABLED
5 new PTZ live-stream video cameras in Sera, monitoring wildlife health from 200 km away

ENABLED
3 PTZ long-range thermal cameras in Sabi, thwarting poaching incursions

ENABLED
High spec laptops for GIS team to use high resolution satellite mapping data

SUPPORTED
Ongoing technology support and training for in-field teams and GIS experts

DEVELOPED
4 new innovative technologies trialed and evaluated against conservation outcomes

HOSTED
3 knowledge transfer workshops on latest conservation tools and practices

Collaborative Conservation Impacts:

Our partner NRT reports[2] that training and technology efforts to improve intelligence-led wildlife protection have successfully reduced ivory poaching and human-wildlife conflict rates.
The provision of real-time data, digital radio communications and cross-conservancy network collaboration, has helped them accomplish:

Reduction in detection and response times for resolving issues, peacebuilding and security threats (tourist attacks, road banditry, tribal clashes, poaching, human-wildlife conflict) including:

Kenya reported zero poaching in 2020.

Increase in black rhino populations by 10% in Kenya.

96% reduction in elephants killed for ivory in NRT member conservancies since 2012.

Decline in human-elephant conflict, and stopping retaliation killings.

(C) Leslie Polizoti

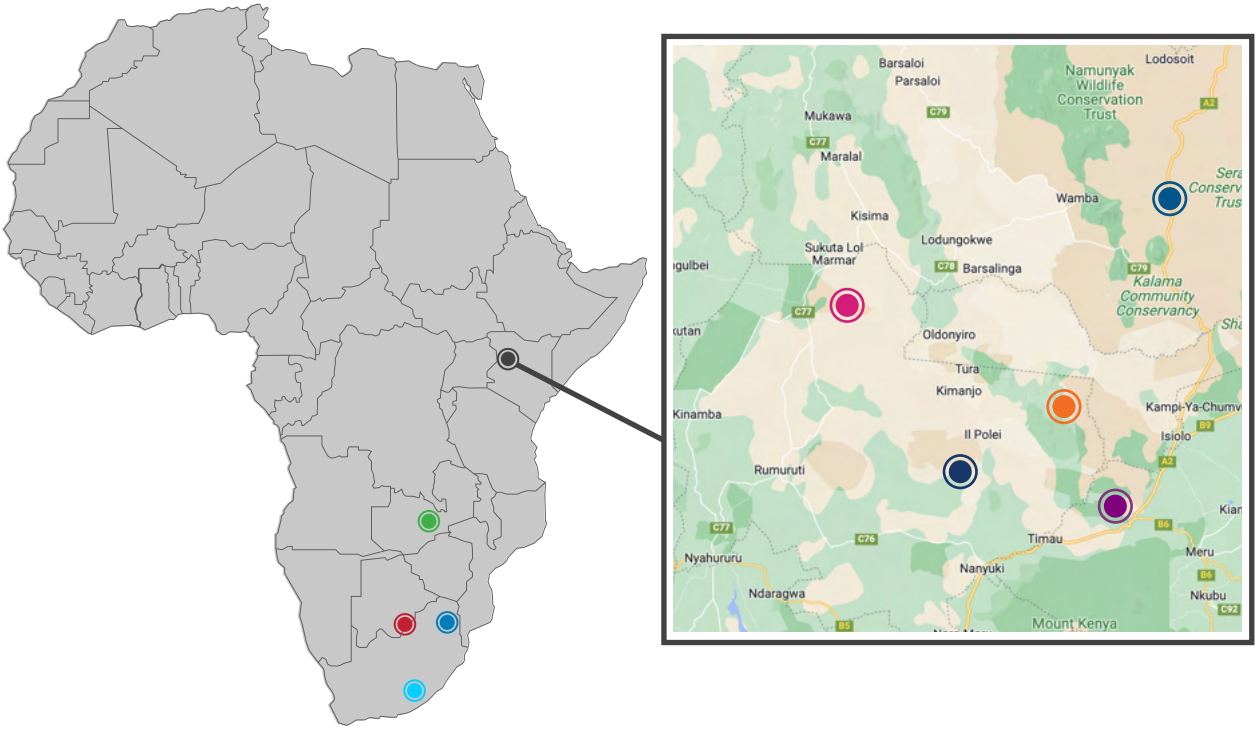
Monitoring the **reintroduction of critically endangered Grévy's zebra** to a new landscape, Sera Wildlife Sanctuary.

Measuring landscape changes and managing ecosystem dynamics, from the rapid detection of environmental threats to locating endangered species.

Pleiades © Airbus DS 2022

[2] Nothern Rangelands Trust, Bi-Annual Report Jan to Jun 2022

Collaborative Projects



Madikwe, South Africa (750km²)

Focus: Anti-poaching, effective ecosystem management for rewilding and species reintroductions.
Area: 75,000 ha
Tech: Long-range thermal cameras and high-resolution satellite imagery.

Kafue National Park, Zambia

Focus: Creating a virtual fence line to stop poaching and illegal fishing and poaching.
Area: 200,000 ha
Tech: FLIR Thermal cameras with AI detection, radio masts, high bandwidth connectivity and LoRaWAN network.

Sabi Sands Nature Reserve, South Africa

Focus: Halting rhino poaching and improving effective protected area operations.
Area: 62,000 ha
Tech: Backbone point-to-multipoint radio area network, LoRaWAN IoT network, gate biometrics, CCTV cameras, control room server and sensor integration platform, vehicle registration cameras, long-range thermal cameras, vehicle and fence sensors, AI-enabled detection, drones.

Northern Rangelands Trust, Kenya

Focus: Supporting peace and security, wildlife protection and community-led conservation.
Area: 3,000,000 ha
Tech: High bandwidth backbone network, communications, LoRaWAN and IoT network, sensor integration platform integrating: wildlife and livestock tracking, solar power gages, water tank level detectors, weather station, fence detectors, diesel tank probes and soil gages

Sera Wildlife Sanctuary, Kenya

Focus: Remote wildlife monitoring, informing life-saving conservation interventions.
Area: 10,000 ha
Tech: Live-stream video from PTZ Cameras across five watering holes, transferred via a high bandwidth network across 200km.

Lewa Wildlife Conservancy, Kenya

Focus: Peace and security, preventing poaching, assisting conservation management.
Area: 61,000 ha
Tech: Digital radio communications, LoRaWAN network, sensor integration platform for sensors, ranger trackers solar power gages, water tank level detectors, weather station, fence detectors, diesel tank probes.

Ol Jogi, Kenya

Focus: Land use management of sustainable grazing for wildlife and local people.
Area: 23,500 ha
Tech: LoRaWAN network, sensor integration platform for livestock tracking and rotational grazing.

Loisaba, Kenya

Focus: protected area effectiveness, improving patrol operations.
Area: 23,500 hectares
Tech: LoRaWAN network, sensor integration for ranger tracking, patrol management and efficient use of resources.

Great Fish River

Focus: Communications and security
Tech: Backbone high bandwidth network and thermal long-range cameras.

Projects and Partners

Partnerships are crucial in creating lasting impacts through technology.

We humbly appreciate the collaboration and incredible talent of all our field partners. Only through their tireless dedication during COVID, extreme drought and life-threatening anti-poaching efforts, can we protect some of Africa's most threatened species.

Northern Rangelands Trust, Kenya (5 new sites)

Focus: Supporting peace and security, wildlife protection and community-led conservation

Recovering:

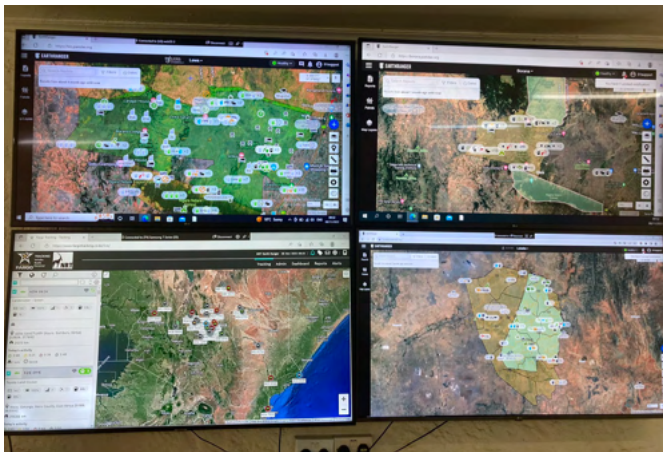
Critically endangered black rhino, white rhino, elephant, lion, pangolin, cheetah, giraffe, wild dog, oryx, grevy's zebra, hirola, gerenuk and many more.

3,000,000 HA WILDERNESS ACROSS CONSERVANCIES BETTER MANAGED AND PROTECTED

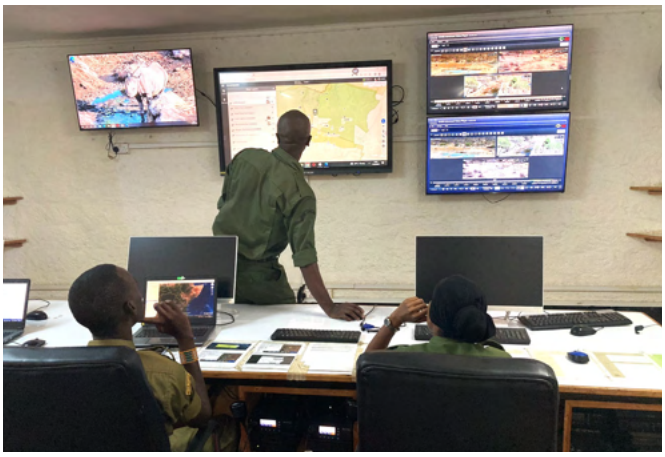
Northern Rangelands Trust (NRT) is a membership conservation organisation serving 43 community conservancies spread across 6,300,000 hectares of Northern Kenya. Our long-standing collaboration has helped NRT employ technology to **enhance its conservation management operations across headquarters and field-based teams.**

Together, we're creating **Africa's largest landscape-wide IoT Conservation Network** (20 gateways), regional technology hubs, and a high-bandwidth communication backbone. This new digital infrastructure has joined five huge reserves - including NRT Centre, Lewa Wildlife Conservancy, Ol Jogi, Loisaba, and Sera Wildlife Sanctuary.

This shared knowledge, data transparency and accountability is empowering private and community-led conservancies in inclusive and equitable decision-making.



Real time data display for four conservancies



NRT Centre joint operations room

Nothern Kenya is leading the way in applying LoRa-enabled IOT sensors, high-res satellite imagery, and control room infrastructure. These technologies have improved security, ecology research, land-use management, sustainable tourism and community-led conservation, whilst supporting the prevention of human-wildlife conflict and wildlife poaching.

With Cisco and Dimension Data, Connected Conservation's large-scale network and IoT sensor integration platform, helped 51 Degrees assist conservation teams to **onboard 120 new sensors quickly with a low-code approach.**

These provide **crucial and diverse data across huge distances, and are visualised in Earth Ranger** for easy digestion and management. A further 150 sensors will be onboarded.

This new array of data shared across NRT conservancies is **building trust and removing borders.** Wildlife can now be tracked, allowing them to migrate freely between protected areas and increase the size of rangelands for growing populations.

Shared information on species' movement patterns and poaching hotspots is also **strengthening conservation management strategies** and the re-deployment of security measures.

NRT REPORTED **ZERO POACHING** IN 2020.
KENYA HAS SEEN A **10% INCREASE** IN BLACK RHINO NUMBERS.

Salome Lemalasia, Loijipu's guardian with Loijipu, the black rhino in Sera Rhino Sanctuary, Sera Community Conservancy (C) Vivian Jebet

NRT's New Era of IoT Conservation Sensors:

SECURITY MANAGEMENT SENSORS

Ranger tracking

Promoting safe and effective patrols and tracking rangers in times of crisis

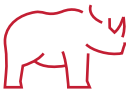
Vehicle tracking

Balancing sustainable tourism and providing alerts of suspicious behavior or safety concerns

Fence alarms

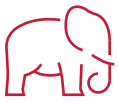
Detecting fence weak spots & tampering caused by poachers and wildlife

ANIMAL MONITORING SENSORS



Rhino trackers

Giving early warning of sick or vulnerable animals



Elephant, lion, cheetah and leopard tracking

Providing early warnings to prevent human-wildlife conflict

Livestock tracking

Helping manage sustainable grazing strategies

OPERATIONAL MANAGEMENT SENSORS

Environmental

Helping manage and respond to resource shortages and migitate conflict

Resource tracking

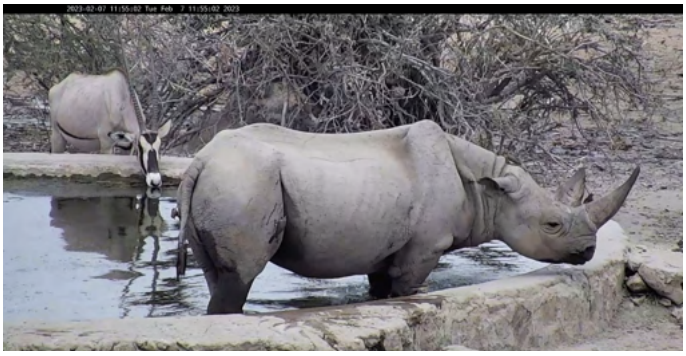
Providing data from remote areas, saving time, cost and traveling to manage resources

Reporting and verification

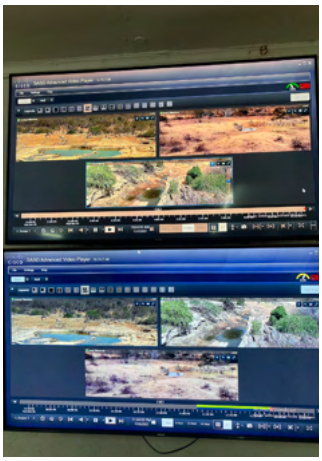
Validating protected area effectiveness and unlocking new revenue streams

Remote Wildlife Monitoring, Sera Wildlife Sanctuary

We are proud to support NRT with **transformative methods for wildlife monitoring** in the remote Sera Wildlife Sanctuary. Waterholes are the beating hearts of Kenyan ecosystems. Sadly, Sera has been hit by a prolonged two-year drought, making these waterholes vital for animals to visit.



New cameras are remotely monitoring reintroduced rhinos to Sera



Dimension Data engineers were engaged to connect live streams of high-res PTZ RGB and thermal cameras (from National Geographic and Sythetica) to monitor wildlife across five key waterholes.

For the first time, **exciting and detailed camera footage is being sent via a new high bandwidth network, travelling over 200km** (a six hour drive) across Kenya's arid and hostile bushland to the central control room.

Teams are now remotely monitoring the health of Sera's wildlife 24/7, providing a detailed view of animal body conditions without needing to fly an hour to reach the project site. Teams constantly monitor the camera feeds and post updates via WhatsApp, where daily images inform life-saving interventions.

It's fantastic to see so many Grevy zebras in a new landscape, Sera Wildlife Sanctuary.

PTZ cameras have already enabled the team to rapidly respond to starving juvenile elephants.

Sabi Sand Nature Reserve (Phase 3)

Countering rhino poaching and improving effective protected area operations

Sabi Sands Nature Reserve (SSNR) is a beacon for best-practice ecotourism and conservation in Africa, bordering the world-renowned Kruger National Park, where wildlife migrates freely between protected areas. Our long-running collaboration with SSNR has been developing, testing and implementing conservation technology solutions to protect species since 2015.

Safeguarding:

Black and white rhino, leopard, elephant, lion, wild dog, pangolin, cheetah, giraffe

Alongside Kruger, Sabi Sand is currently at the epi-center of relentless rhino poaching. With our technology partners, we continue to help tackle this problem with new technologies and support existing solutions for SSNR's security and management teams. Phase 3 technology deployments are **expanding protection to new, previously unsecured, poaching hotspots along the shared border with Kruger.**

IN 2021, 451 RHINOS WERE KILLED IN SOUTH AFRICA – THE FIRST TIME IN SIX YEARS THE COUNTRY RECORDED AN INCREASE IN RHINO POACHING INCIDENTS

We've secured new equipment to **extend Sabi's LoRaWAN IoT network and deploy vehicle trackers and fence alarm sensors to provide early warning of threats.** Together, we've worked to realise a new mobile mast connectivity solution, server infrastructure, new thermal cameras, trial AI-powered analytics on long-range thermal cameras and real-time thermal video streams from drones to equip security teams to respond to poaching incursions.

Maintaining reduction in ranger response times from 30 to 7 minutes

12 poaching incidents thwarted

Keeping all anti-poaching unit rangers safe during follow-up operations

Sustaining solutions:

Between 2016 to March 2022, Dimension Data engineers have helped with the ongoing maintenance and management of deployed technology solutions including:

- Helping build local technical capacity.
- Monthly and fortnightly meetings with each site, providing mentorship, technical support and direction.
- Guiding reserves through decision-making, servicing and planning and ensuring all systems are in frequent use, reliable and operating to their full capabilities.
- Quarterly servicing field partners' air conditioning units, generators and uninterrupted power supplies (UPS).
- Remotely monitors crucial network elements including servers, switches, routers, firewalls and point-to-point radios.
- Our engineer partners also provide assistance and replacement of damaged kits caused by lightning strikes. On average, three storms a year damage equipment.

Madikwe Game Reserve (Phase 1)

Tackling rhino poaching threatening one of the biggest rewilding projects in South Africa

NGO Madikwe Futures Company works to manage and secure Madikwe Game Reserve, which has undergone an incredible transformation. Fragmented farmland has been united and fences have been removed, whilst invasive sickle bush cut back to create rich grasslands. These recovering landscapes are supporting species reintroductions, whilst 30 lodges have established tourism infrastructure, supporting over 1,000 jobs and a wealth of community benefits. Madikwe's achievements are under threat from a dramatic rise in rhino poaching.

Recovering:

Black and white rhino, elephant, lion, leopard, buffalo, wild dog, cheetah, brown hyhena and over 300 birds

To help, **we've equipped Madikwe field teams with new PTZ three long-range, PTZ thermal cameras,** and installation of their poles, solar power, batteries and antennas.

These cameras are deployed along the perimeter to monitor known poaching entry and exit routes. They send live video feeds over a radio network to the central operations room 24/7, 365 days a year. This is helping rangers instantly detect incursions and counteract escalating rhino poaching.

"OUR CAMERAS ALLOW US TO SEE AND RECORD THINGS THAT PEOPLE CAN'T, INCLUDING SEEING ACTIVITY AT NIGHT AND UNDERSTANDING THE DIRECTION THAT INTRUDERS HAVE COME FROM AND WHERE THEY'RE HEADING TO NEXT"

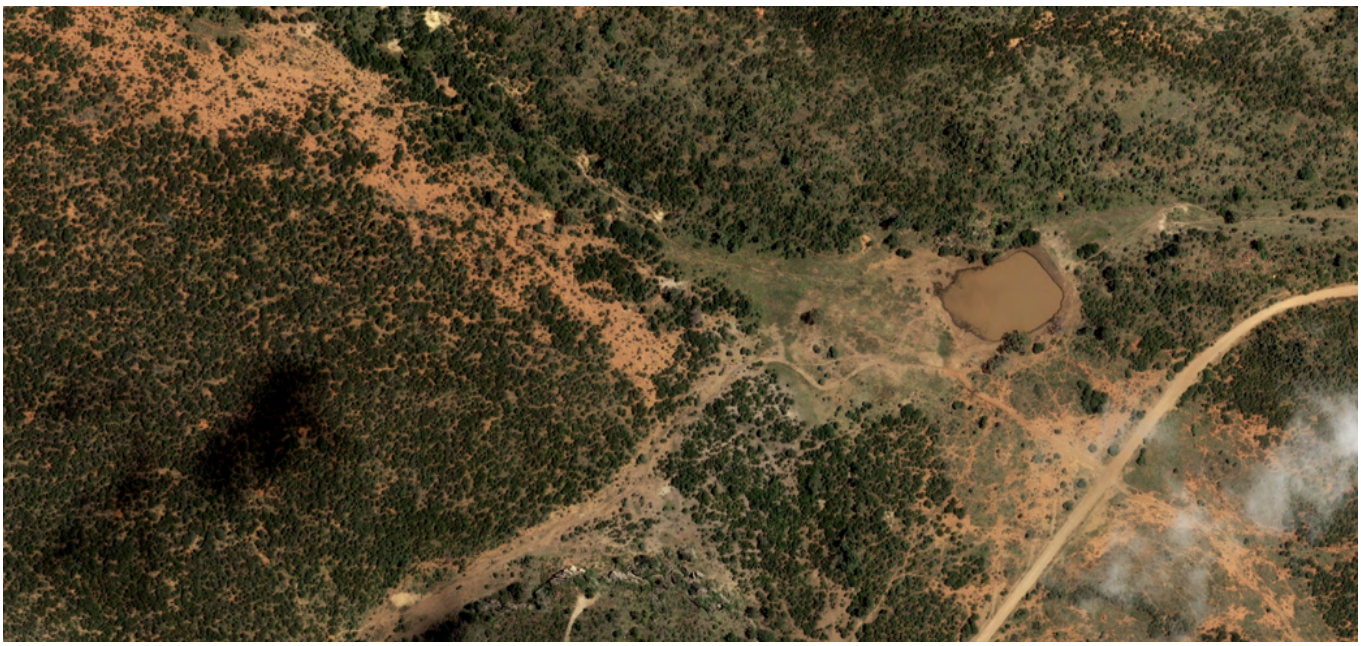
— *Koos Potgieter, Madikwe Futures Company*

ZERO POACHERS WENT UNDETECTED WHEN PASSING MADIKWE'S NEWLY INSTALLED LONG-RANGE THERMAL CAMERAS. EACH INCLUSION HAS BEEN IMMEDIATELY SPOTTED AND STOPPED.

This year, we've gathered technology requirements for the upcoming connection of other areas of the park with a LoRaWAN network.

Securing funding for installation and equipment for early warning sensors including fence alarms, and vehicle and ranger tracking devices, alongside satellite Push to Talk Radios to help tackle rising poaching threats.

Monitoring from space:



(C) CNES (2022), DISTRIBUTION AIRBUS DS

Excitingly, **we are leveraging the use of donated 50cm/30cm satellite imagery from the Airbus Foundation to safeguard species in Madikwe** and give vital insights into the extent and health of this ecosystem. Thanks to this imagery:

Sadly, three deceased rhinos were detected from space, alerting and assisting criminal investigations into this tragic poaching incident.

750km^2 of wilderness in Madikwe is being monitored from space, helping to balance conservation with sustainable tourism.

Kafue National Park, Zambia

Creating a virtual fence line to stop poaching and illegal fishing

Game Rangers International (GRI) works to empower rangers and local communities in Kafue National Park, Zambia. Here, ivory poaching and illegal, unreported and unregulated fishing on Lake Itezhi-Tezhi, is putting fish stocks, wildlife and local livelihoods at risk.

Safeguarding:

Black and white rhino, leopard, elephant, lion, wild dog, pangolin, cheetah, giraffe

In 2018, GRI worked with engineers and donated Cisco equipment to **deploy a high-bandwidth network to create a 19km long "virtual" fence line** across the lake.

FLIR Thermal cameras were deployed to send live video streams of movement across the lake back to a central control room. Since the project started, GRI has been working to build on the network technology and operational capabilities.

GRI has now increased the impact of the technologies by working with FLIR and Zambia's Department of National Parks and Wildlife (DNPW) to develop Artificial Intelligence detection algorithms. These **algorithms scan all real-time videos to record every boat crossing in and out of the lake, day and night.**

The system automatically **generates alerts of suspicious activity or boats and integrates with EarthRanger,** to give an early warning to ranger teams. Boats fishing illegally on Lake Itezhi-Tezhi and those crossing the lake into the reserve to poach elephants and take bushmeat are now being detected and stopped.

GRI, with VukaNow, has supported extensive training for community scouts helping them coordinate law-enforcement responses and use the technologies effectively.

Supporting Rangers and Community-led Conservation

ONLY 43% OF RANGERS HAVE ACCESS TO A COMMUNICATIONS DEVICE [3]

Wildlife rangers are brave professionals and the backbone of protecting life on earth. Every day, they put themselves in danger to defend our natural world. They need support and the most effective resources to help protect ecosystems and disappearing wildlife.

We're uniting partners to equip rangers with immediate and reliable ways to communicate with their central control room 24/7. **Connectivity and communication devices are now empowering over 150 rangers,** keeping them safe whilst they protect threatened species and deliver peace and security to local communities.

"EQUIPPING THE RANGER TEAM WITH CONNECTIVITY WAS A BIG MOMENT FOR US. AT ANYTIME, WE CAN INSTANTLY ACCESS EACH OTHER AND THE CONTROL ROOM, MAKING IT EASIER AND FASTER TO CATCH POACHERS"

— *Josh, APU Ranger, Madikwe Game Reserve*

Empowering community-led conservation

Deployed digital infrastructure is now securing and sharing conservation data across NRT's community-led conservancies, including NRT Centre, Sera Wildlife Sanctuary and Marsabit.

This new transparency fosters good governance and community-driven decision-making, leading to resilient community ownership, equitable benefit distribution and accountable conservancy boards and administration.

The technology is also **empowering communities to monitor and manage their ecosystems effectively** and sustain natural resources for wildlife and people, securing local wildlife custodians across park borders.

We're proud to equip those working on the ground to bring this change.

[3] Belecky, M. et al. 2021. Employment conditions of public sector rangers: A major under addressed problem. Parks Stewardship Forum Vol 37(1). DOI:10.5070/P537151749

Developing Conservation Technology Leaders

We believe knowledge exchange and sharing best practice between sites is essential to achieving conservation goals. We're proud to support local specialist training to help strengthen the skills of our local partners and build their organizations.

Developing new skills for monitoring changing landscapes

We've been delighted to support Northern Rangelands Trust's GIS and Wildlife department in undertaking third-party training to help our local partners build technical capacity.

Topics included remote sensing fundamentals, ArcGIS Pro, image classification, image analysis and its applications in change detection and environmental modelling, story maps, dashboards, web maps and Geoportal.

The development of these new skills and software will **enable NRT's team to help deal with their changing landscapes** and sustainably manage natural resources.

Knowledge sharing and development

In December 2021, we co-hosted an education and demonstrator event to share lessons learned on applying conservation technologies.

The Environmental Minister of Uganda attended alongside Dimension Data, Sabi Sand Nature Reserve, Smart Parks and NRT's conservation leaders, researchers and ranger teams. The event was a testament to the power of knowledge sharing. Valuable insights were discussed on what's working, what's not and future areas of vital technical development.

Developing a technology impact measurement framework – two day workshop

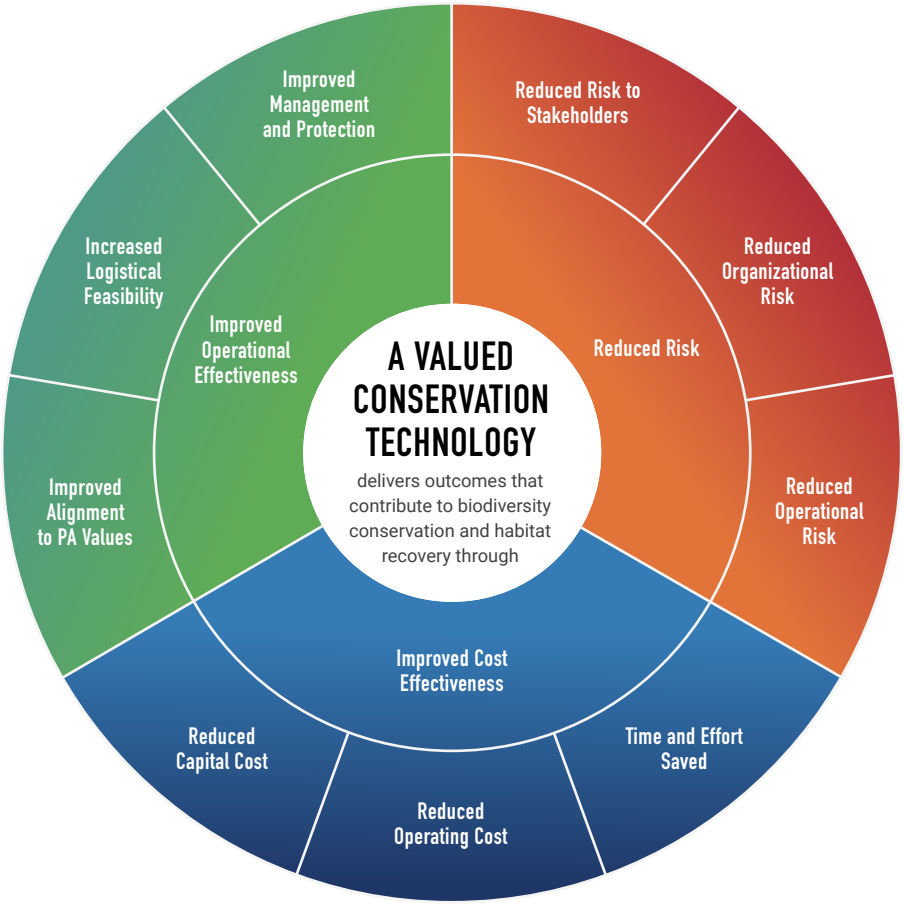
Connected Conservation Foundation has recognized the need for a robust monitoring and evaluation framework for conservation technologies.

To kick start the process, we held a virtual workshop to gather experts to tackle the statistical and practical challenges of measuring impact in this space. We explored ideas and identified issues, aiming to create an effective framework that would transform the use of conservation tech.

Knowledge Sharing and Development

A shared challenge between conservation organisations is ensuring that any technology deployed is fit-for-purpose, effective and sustained long-term

Working with Conservation Alpha, **we aim to develop an easy-to-use impact measurement framework for conservation technologies** to offer protected area managers repeatable metrics and indicators that allow us to measure the effectiveness of technology interventions.



We focused on **reducing the reporting burden on field teams,** how best to use technology to collect evaluation data and what was 'enough' to meet reporting goals to prevent over-analysis.

We strived for the framework to be flexible enough to adapt to different geographies, challenges and strategies ranging from security and protection of wildlife and rangers to risk management, reducing human-wildlife conflict and knowledge sharing and collaboration across conservancies.

Taxonomy development

With each park having different operational values and technology needs, together we developed a taxonomy that aimed to help protected areas measure a broad range of technologies for multiple uses. For each outcome, a list of example indicators and associated metrics are suggested but remain adaptable to the specific concept in which the technology is being deployed.

Next steps

We aim to test and refine an initial draft of the Impact Framework for Conservation Technology against use cases and technologies already deployed by our partners, Sabi Sand Nature Reserve and Northern Rangelands Trust.

Acknowledgements

We're thankful for the inputs of protected area managers, technology companies, scientists and security experts including: Conservation Alpha, African Parks, Sabi Sand Nature Reserve, SANParks, Kruger Park, Northern Rangelands Trust, 51 Degrees, Dimension Data, Terra-Nautics, Conserve Global and Bhejane 360.

Bringing Innovation to the Ground

We're uniting partners to trial new technologies and pioneering innovative solutions. Our bold thinking and field-based insights are helping shape the next generation of wildlife conservation technologies.

Field-based test lab

Sabi Sand Nature Reserve (SSNR) has been our test partner for new technologies since 2015. Together, **we've helped establish a leading control room and upgraded solutions, enabling Sabi to lead the way in testing and improving game-changing conservation tools.** We're also evaluating conservation use cases of mobile connectivity, artificial intelligence and aerial monitoring.

IN THE LAST DECADE, 9,885 AFRICAN RHINOS HAVE BEEN LOST TO POACHING

Poaching is a relentless crisis that is devastating South Africa's white and black rhino populations. To stay ahead of this evolving threat, we're working with SSNR, Cisco and Dimension Data to develop a cost-effective, mobile surveillance solution - the Nomadic Mast. This trailer-mounted outpost can be deployed in previously unpatrolled, unconnected remote areas, providing real-time visual capabilities, Wi-Fi, and LoRa connectivity and surveillance for up to a 15km radius.

Following refinements, **the nomad is now in the field supporting Sabi's dedicated anti-poaching team with counter operations and can be re-deployed anywhere within the reserve in just under three hours** - bolstering Sabi's network of static surveillance technology.

"IT FEELS GREAT SEEING OUR IDEA BEING TESTED AND FURTHER ENHANCED. ONCE FULLY OPERATIONAL, MORE UNITS WILL BE DEPLOYED ACROSS SABI. THE FINAL PRODUCT WILL BE SHARED WITH OTHER PROTECTED AREAS TO HELP THEM TACKLE POACHING AND KEEP RANGERS SAFE"

— *Endri Steyn, Head of Special Projects at Sabi Sand Nature Reserve*

Testing Artificial Intelligence (AI) detection on video feeds from thermal cameras

To support anti-poaching efforts, we've worked alongside SSNR and Dimension Data to trial the application and integration of different off-the-shelf AI-powered surveillance systems into the Connected Conservation solution.

Over six months, we tested donated AI solutions from Centr to monitor video feeds from thermal cameras and generate automated alerts when animals or humans are detected. The pilot **helped field teams understand where AI can save time and resources and increase reliability.**

Testing drones with thermal heat sensing cameras

SSNR has also integrated game-changing drones into night-time anti-poaching operations. When an alert is raised, a drone fitted with thermal heat-sensing cameras is deployed.

Dimension Data engineers have helped SSNR connect live video feeds from these drones to deliver real-time footage into the control room using the Connected Conservation network.This is enabling rangers to track poachers as they move quickly through the park and provide all units with an up-to-date understanding of the poachers' rapidly changing position in the night.

The drone cameras keep the rangers safe, giving early warnings of forthcoming predators or obstacles so they can avoid potentially life threatening-encounters.

Artificial Intelligence and High-Resolution Satellite Data

There's a growing appetite for harnessing high-resolution satellite images and AI to monitor large animals (over 1m in size) across vast and hard-to-reach areas.

PLEIADES NEO © AIRBUS DS 2022

CCF brought together new donated 30cm satellite imagery from Airbus Foundation, with on-the-ground technologies, data scientists and field partners, to explore breakthrough questions, including:

Can satellite imagery and artificial intelligence modernise wildlife surveys in Africa?

Wildlife surveys in savannah environments are typically conducted using aerial counts from small aircraft. A collaborative cross-sector team explored the practicalities and feasibility of these new methods to reduce the time and cost of wildlife surveys.

Three approaches for the detection and identification of animals on satellite images were trialed:

01. The human eye using field-based expertise and insight.
02. Computer vision and open-source (pretrained) neural network models.
03. Bespoke convolutional neural network model, trained on a set of synthetic animal images.

This novel approach aimed to test all three against on-the-ground wildlife sightings reported by field teams around the time of satellite pass-over.

Although some results showed promise, significant challenges remain.

READ THE FULL RESULTS IN OUR WHITE PAPER AT
https://bit.ly/sat-whitepaper

Partners and Donors

Our work is made possible by the generosity, expertise and technology capabilities from our forward-thinking partners.

Founding Partners:

We're grateful and proud of the conservation impact achieved together.

Our Supporters:

AIRBUS FOUNDATION

In July 2021, **Airbus Foundation joined a partnership with CCF to offer high-resolution satellite imagery and unmanned aerial vehicles to protect endangered species and natural ecosystems.**

Together, our five-year roadmap aims to equip park managers across CCF's partners and beyond with pioneering 30 cm high-resolution satellite imagery.

Microsoft

CCF channeled resources from Microsoft for two projects:

01. Providing funding and computational resources through the AI for Earth programme for our satellite and AI projects.

02. Co-financing to enhance the core Connected Conservation Solution. To modernise the IoT sensor integration platform, so field partners can now onboard new sensors quickly and easily, with a low-code approach, for rapid data visualisation and analysis in Earth Ranger. Now a new device type can be on-boarded in under an hour. When a conservancy integrates a new sensor, the device option becomes available to all other partner reserves.

Birdies4Rhinos

We're strengthening the alliance between sport and nature by deepening our relationship with Birdies4Rhinos. This group of twenty-one international golfers are fundraising for CCF projects, donating for every birdie they score.

European Tour players, Justin Walters and Dean Burmester are inviting more players to join them, including most recently, the Olympic Champion and US Open champion, Justin Rose.

Increasingly, well-followed players are using their social media platforms and agents to **raise awareness of rhino poaching and support fundraising efforts.**

AT LEAST ONE RHINO IS KILLED EVERY DAY IN AFRICA BY POACHERS

> "WHEN YOU SEE THE THREATS TO RHINOS WITH YOUR OWN EYES, IT MAKES IT ALL REAL. YOU REALISE JUST HOW BAD AND CRUEL THE SITUATION IS. SEEING THE TECHNOLOGY AND PEOPLE WORKING TOGETHER REAFFIRMED MY PASSION FOR WILDLIFE CONSERVATION. SOLUTIONS ARE REAL."
>
> — *Chris Paisley, English professional golfer*

Our collaborators

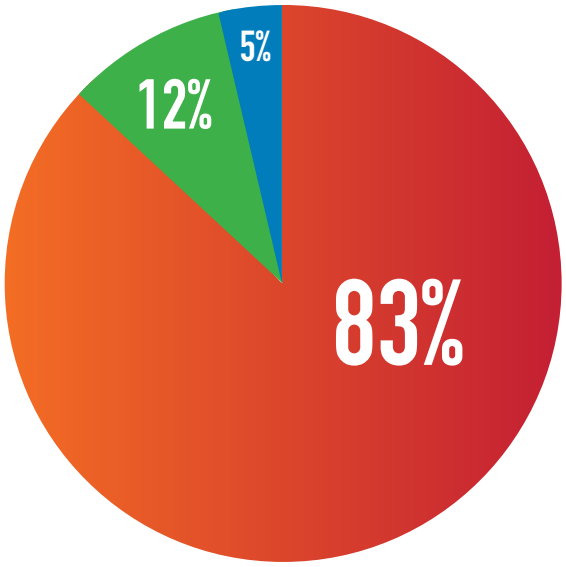
EARTHRANGER

51° DEGREES

Mishcon de Reya

Financial Summary

Income and expenditure for year ending March 2022



Income

Corporate donations:
$275,430

Facilitating

Data products and cloud services:
$125,000

Associated equipment, licensing, and in-kind local engineering, around:
$2,000,000

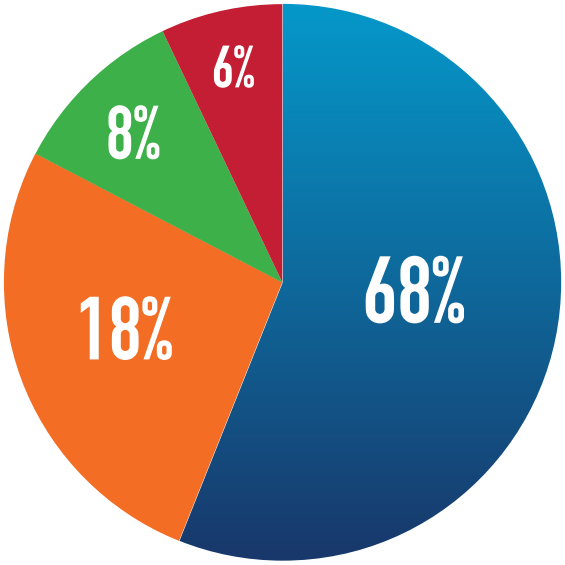
Expenditure

Project costs and Grants:
$153,942

Salaries:
$40,365

New website and marketing:
$18,970

Operations costs:
$14,675



Fundraisers: Birdies4Rhinos

A special thank you to the Birdies4Rhinos team, who has been proactive in hosting fundraising events including a Pro-Am in Johannesburg. The group has delivered terrific results, boosting awareness of the rise of rhino poaching in South Africa, alongside raising funds to help CCF protect some of Africa's rarest animals. We look forward to supporting upcoming events.

Behind the Scenes

Special thanks go to those going above and beyond

Connected Conservation Foundation
Emma Oldham

Communications and Fundraising Manager

Dimension Data, South Africa
Riaan Smit

Principle Solutions Architect and Conservation Technology Legend

Dimension Data, South Africa

Baveena Nathoo

Dimension Data, Kenya

Edwin Ngaruiya

Cisco donations and logistics

Chris Panzeca
Ian Robertson
Christiane Dimas
Patrick Verret
Rebecka Turner

Recognition:

In October 21, we were thrilled our work was selected as one of the top 100 positive practices, during Part 1 of the COP15 Biodiversity Conference in Kunming.

Upcoming Projects, 22-23

1) Equipping crucial connectivity to Park HQs across African Parks' 19 sites

A stable internet connection is at the heart of modern-day conservation operations and is essential to African Parks for wildlife management, protection and community coexistence. Tribal struggles in African Park's remote regions mean ensuring zero downtime connectivity is now a safety requirement for staff and local people. We're grateful to Cisco for 24 enterprise-level Meraki router devices to help African Parks manage reliable connectivity for all their sites remotely from one central location, ensuring bandwidth and data are 100% dedicated to vital conservation work.

2) Using satellite data to define a new Protected Area in Northern Kenya

The Airbus Foundation will donate 2000 square km of 50cm resolution images from the Pleiades satellite to CCF. This imagery will help monitor and plan conservation activities by Northern Rangelands Trust for the Lorian Ecosystem - underpinning new proposals for designation of a new protected area.

> "THIS PROJECT WILL RESTORE ECOLOGICAL CONNECTIVITY BETWEEN NORTH AND CENTRAL KENYA BY MAINTAINING THE BIODIVERSITY OF THE TERRITORIES BETWEEN MARSABIT AND MERU AND THE RESILIENCE OF THE PEOPLE LIVING THERE"
>
> — *Anthony Wandera, Snr. Research & Monitoring Officer*

Images will inform wildlife corridor planning and map vegetation types, including the status of the invasive prosopis juliflora tree. The data will also provide a baseline to measure NRT and partners' conservation projects over the next ten years.

3) Monitoring new species and habitats using very high-resolution satellite data

Our new global grant award, 'Satellites for Biodiversity' will be launched in partnership with Airbus Foundation, to accelerate the use of 30cm and 50cm satellite imagery from the Pleiades and Pleiades Neo for biodiversity conservation. The grant will support global projects looking to monitor and manage threatened species and their habitats. Winners will receive access to the most advanced optical satellite imagery at 30cm spatial resolution from Airbus Pléiades Neo and 50cm from Pléiades, $5,000 USD of financial funding, access to Airbus' Archive Library on request and free ESRI software and support.

4) Africa's extension, to create the world's largest IoT conservation network

A Samburu woman milking a goat in Westgate Community Conservancy. (C) Ami Vitale

CCF and partners will deploy Phase 3 of the NRT network, extending coverage to a formidable total of three million hectares – an area the size of Luxembourg. Bringing coverage to 22 of NRT's community-led conservancies, and one new private reserve: Borana Wildlife Conservancy.The project will evolve wildlife and natural resource conservation by leveraging long-range, low-power IoT sensors and networks to collect, monitor, and analyse real-time environmental data on a captivating scale. This data will help safeguard wildlife populations, promote peace, prevent conflict and empower community-led conservation.

5) Reducing poaching in Madikwe Game Reserve, with new LoRa Network and sensors. South Africa

To help Madikwe tackle the dramatic rise in rhino poaching, we're deploying a LoRaWAN network into Madikwe Game Reserve located next to the Botswana border. This new connectivity will allow the implementation of network sensors, including fence alarms and vehicle trackers, to raise early warnings on incursions to help eradicate rhino poaching.

"FROM EVERYONE AT CONNECTED CONSERVATION FOUNDATION, IT HAS BEEN AN ABSOLUTE PLEASURE WORKING WITH YOU. WE'RE EXCITED TO DO MORE IN 2023 AND BEYOND"

— *Chairman Bruce 'Doc' Watson*

CONNECTING PEOPLE AND TECHNOLOGY TO SCALE PROTECTION AND RESTORATION OF OUR NATURAL WORLD

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