# THE DIFFERENCE

PEOPLE > PLACES > OUTCOMES

VOLUME 5 AUGUST 2022

MILTON

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**ON THE COVER**
Digital Mapping,
Impact Observatory
Read more on page 6.

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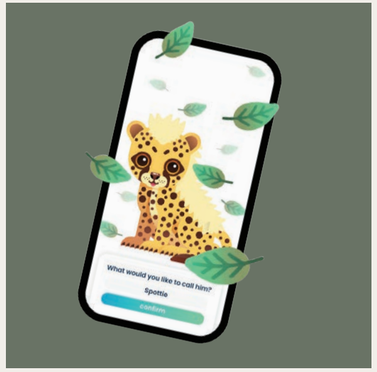


100 *WHAT'S NEW?*
**What's New?**




*"Innovative methodologies using science-based data, to determine the economic value of our natural world in order to protect it and creating a market for this natural capital, is the future"*

○ Paul Milton

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# *Founder's Note*

Welcome to The Difference Volume 5, this edition focuses on **Innovation** within the burgeoning sustainable development industry and the circular economy.

**Innovation**, in this context, continues to push boundaries, pioneering concepts that prove out baseline data points for authenticity and accuracy of information to aid critical decision making.

In this edition, we showcase global thought leaders in mapping, data gathering, valuation methodologies, science-based research, stewardship and protection, education, and awareness.

These partnerships and associations are allowing us to galvanize defendable information in joined up ways that were not available a mere decade ago. Data remains key in developing baseline metrics and measuring outcomes.

Population growth, climate change, human-wildlife conflict and the need for food security are significant reasons as to why understanding the complete picture of the landscapes in which we work is vital. I have no doubt that global, national, and regional policies associated with land use, environmental management, sustainable development, and local community participation, when using the data available today, if applied and presented in concise and clear ways, will positively guide all stakeholders in their future decision-making.

The sustainable development industry investment community can no longer rely solely on anecdotal evidence to support their investment programs. We expect new and available technologies and data capture techniques to provide the required credible baseline data.

Consolidating and combining data, using these emerging technologies to integrate results, coordinating outcomes, future-proofing, all continue to challenge both the public and private sectors. Predictive planning and the use of A.I. technologies will be the future.

Geospatial technologies and analytics continue to develop and are critical to mapping the risk impacts of climate change.

Land is a diminishing asset class and managing both urban and rural landscapes needs consolidated thinking, shared standards, and well-aligned policies for the future. Marine environments at risk of both climate change and overfishing, fueled by the need for food security, are often overlooked. It is not easy to understand what is not always visible, technologies continue to help scientists understand the risks these habitats are facing with species monitoring and assessing human impacts, in order to shape future conservation policies.

Human-wildlife conflict in both terrestrial and marine environments continues, driven by population growth and demand for food security. Data-based mapping for enhanced agriculture yields, limiting land demand, innovative technologies combined with the development of alternate economies, are all factors that we discuss in this edition to help mitigate these impacts.

Figuring out how to value our natural world, to encourage future protection, and the development of alternative economies are discussed with Ralph Chami on page 34 - demonstrating innovative and science-based valuation techniques that are creating new market economies.

In closing, thank you to all our partners and collaborators for their contributions to this edition of The Difference. Launching The Difference was an experiment to gauge the reaction of our network and the broader market. The response to previous issues V1-V4 was overwhelmingly positive and so we have elected to move to a biannual publication, broader in content and hopefully a more enjoyable and informative read. We look forward to the continued integration and use of innovative programs within our industry, supporting and guiding all stakeholders and interested parties in their ability to make a difference.

○ Paul Milton, Founder

• TECHNOLOGY •

Impact Observatory

# Monitoring the World at Unprecedented Speed and Scale

***Much of the future sustainability of at-risk conservation areas will rely on community lands surrounding protected areas. Milton Group and Impact Observatory share in this viewpoint and are working together to set new innovative standards of land use planning for these future buffer zones.***

*Impact Observatory is an innovative technology company that develops AI-powered, on-demand, geospatial data, mapping changing land use and land cover at unprecedented scale and speed. The team's mission is to bring this data to sustainability and environmental risk analysis for governments, industries, and markets – providing these decision-makers with the timely, actionable, science-based geospatial insights they need to succeed.*

# Steve Brumby, Co-Founder, and Mark Hannel, Machine Learning Scientist, share with us below how they are creating positive impact through technological innovation and improved access to data.

World leaders planning a path to a greener, more inclusive, and sustainable future all too often have to make critical decisions about development and conservation using outdated and incomplete data. For hundreds of years, a key tool to understanding the state of the world and planning a course of action is the map. Making maps has always been a highly technical endeavor, requiring teams of experts working for years to produce updates for specific regions, resulting in static maps that may be years out of date at the moment of publication. What is needed is a new type of map, a living map of the world, that is made automatically and updated continuously, that can inform decisions about what and where we protect, restore, and manage, and lets us observe the impact of our actions. Fortunately, recent advances in a set of interrelated advanced technologies - Earth observation from space, artificial intelligence algorithms, and fast and affordable cloud computing - are revolutionizing our ability to monitor nearly any place on earth in near real time.

At Impact Observatory, together with our partners at Esri and Microsoft, we aim to democratize and leverage these cutting-edge technologies to support conservation efforts, combat climate change, and support efforts like Karingani's OnePlanet framework with better data to help guide decision making and monitor impact. Impact Observatory has developed deep-learning algorithms that use imagery produced by the European Union's Copernicus Programme to create dynamic, global-scale maps of land cover designed to inform decision making and monitor impacts from conservation efforts. These maps provide over 100 times the spatial resolution of previous freely available global datasets from the European Union, NASA, and other institutions. Equally as important as the higher resolution is the ability of Impact Observatory to rapidly produce updated maps to identify changes. Traditional map products are only updated after multi-year delays, but these new automated approaches can be run on imagery obtained by satellites as recently as one week prior.

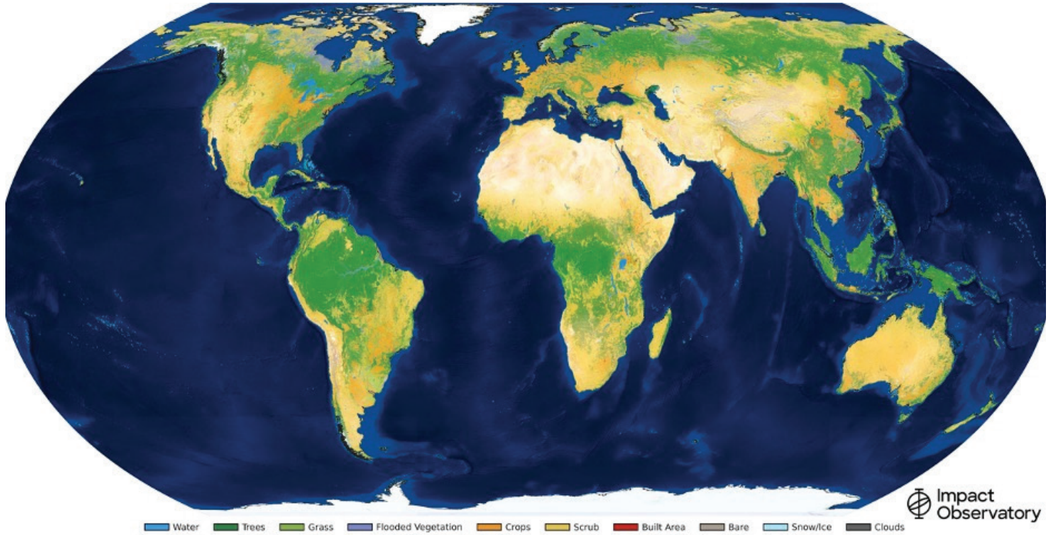


Figure 1 - The Esri 2020 Land Cover map, created in partnership with Impact Observatory and Microsoft.





## Changing landscapes

Many of the most useful applications of land cover maps require the ability to measure changes in land use and land cover over time. With a time-series of maps, monitoring of deforestation, urban expansion, agricultural land conversion, and surface water scarcity all become possible.

Transitions from trees or rangeland to built area can reveal new construction due to industrialization and population growth. Reductions in built area can signify urban decline and human migration that can be triggered by climate change, natural disasters, resource depletion, and human conflict. Losses in tree cover can now be understood by tracking what the forest turns into: tree-covered regions turning bare may be the result of deforestation or forest fire while tree-covered regions turning to agriculture may be the result of slash-and-burn agriculture. Changes in surface water and wetlands can inform drought assessments, floodplain management, hydropower monitoring, and the accessibility of outlying areas to vehicle passage. A few specific examples of these changes are explored below.

## Catastrophic fires and droughts

Below, you can see our map outside Oroville, California overlaid on Sentinel-2 satellite imagery of the scene in 2020 and 2021. The extent of a 2020 catastrophic forest fire dominates the scene in 2021 as a large portion of land shifts from trees to rangeland. Additionally, the drier conditions of 2021 appear as lower water lines in the surrounding lakes and are highlighted by the transition of water to rangeland.

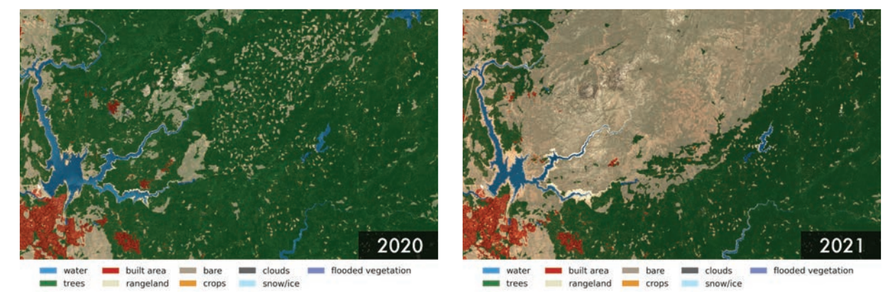


Figure 2 - Forest fires in 2020 ravaged Butte County, California, resulting in significant tree loss in the 2021 land-cover.

*"Technology can't solve our global problems alone, but we are hopeful that by improving the quality and timeliness of information we can support bigger, faster impact where it's needed most."*


Lake Oroville

## Rapid growth of cities in the developing world

The population of Bujumbura, Burundi is rapidly growing. In fact, the World Bank projects that Bujumbura will be one of the ten fastest growing cities in the world through 2025 growing at an annual rate of 5.75%. Our LULC map below highlights urban expansion between 2017 and 2021, showing the expanding perimeter of the African city.

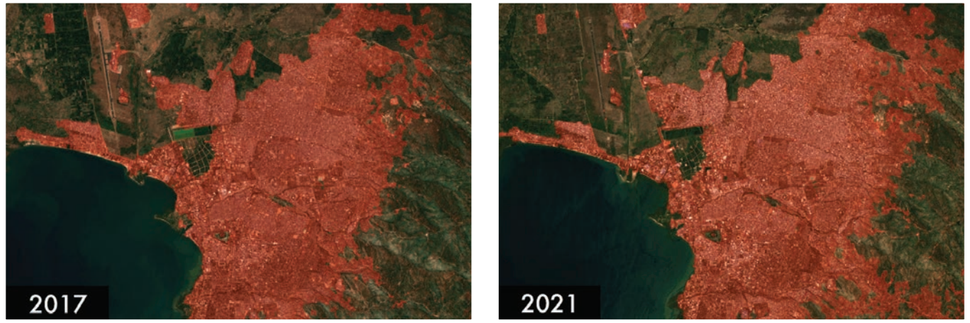


Figure 3 - Eastward urban expansion between 2017 and 2021 in Bujumbura, Burundi. Built area classifications are highlighted in red.

## Human modification of the landscape

The Aswan High Dam was built to control annual flooding of the Nile. During periods of excess flooding, several lakes known as the Toshka Lakes appear northwest of the artificially-created Lake Nasser. The Toshka lakes periodically swell and evaporate subject to the climate and the dam's high levels. Below our LULC maps in 2017 and 2021 readily demonstrate the differences in average water levels during the two calendar years.

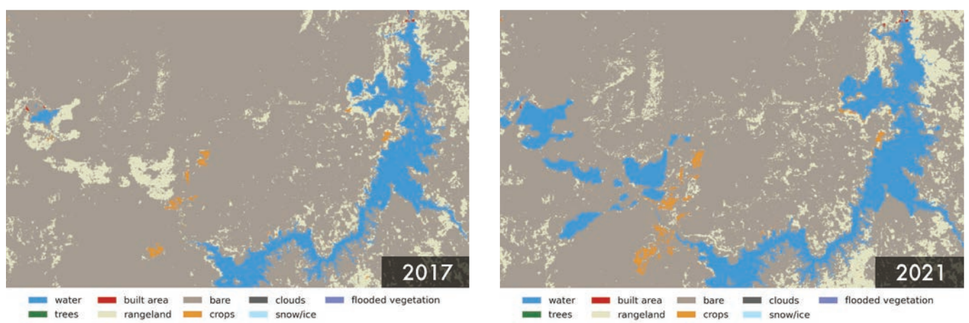


Figure 4 - The lower average water levels of 2017 are juxtaposed against the higher average water levels of 2021.





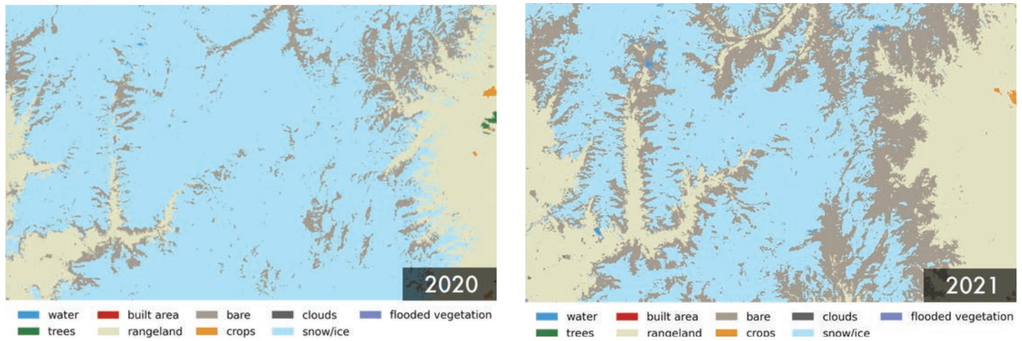


Figure 5 - Winter 2020 to Winter 2021 comparison of the Andes Mountain snow extent.

## Delving deeper — Landscape changes within each year

Our annual maps utilize a year's worth of Sentinel-2 satellite images. In addition to these publicly available maps, Impact Observatory is now offering sub-annual time periods, which reveal a trove of information on cyclical changes in landscapes and how these cycles change from year to year.

Melting mountain snow is a critical source of irrigation for surrounding regions. However, changing precipitation patterns along with higher average temperatures have limited the amount of snow cover stored on snowcapped mountains. Because snow cover varies greatly throughout the calendar year, the average snow cover shown in our annual maps is sometimes significantly less than the total amount of snow cover in the winter season. By limiting our LULC analysis to the winter months in the Andes, we are able to see the changing snow cover between the winter of 2020 and the winter of 2021.

With the public release of our 2017–2021 land use time-series, governments, environmental organizations, and researchers alike will have access to an unprecedented series of annual, global land use and land cover maps. With our ability to make maps on-demand from the latest available imagery, decision makers will have access to the data they need to monitor changes in land use, whether from human impact or climate change. We have already begun partnering with the UN Development Program, conservation organizations, and local governments to help deploy the best possible data as they work to best manage resources for people and nature, and will continue to develop these "living maps" to support these efforts globally. Technology can't solve our global problems alone, but we are hopeful that by improving the quality and timeliness of information we can support bigger, faster impact where it's needed most.

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• A DISCUSSION •

# The Circle of Giving

***We were delighted to speak with David Casselman, CEO of Ecoflix, on the vision and purpose behind the first not-for-profit global streaming platform saving animals and the planet.***

*Our Founder, Paul Milton, met David last year and recognised the value in this media-based platform using digital technology and innovative partnership programs to drive purpose. Paul is now a nominated trustee of Ecoflix Europe – a subscription-based service with 100% of Ecoflix's membership fees, donations, and profits go towards wildlife and conservation efforts.*

*An innovative approach to global media, Ecoflix's goal is to inform audiences with factual and up-to-date content to empower people globally to make a difference. We wanted to showcase their work below and give you an insight into the positive impact Ecoflix continues to deliver.*

ecoflix CHANNEL

## Streaming Now: Original Content – and So Much More


Going Wild | **Series**

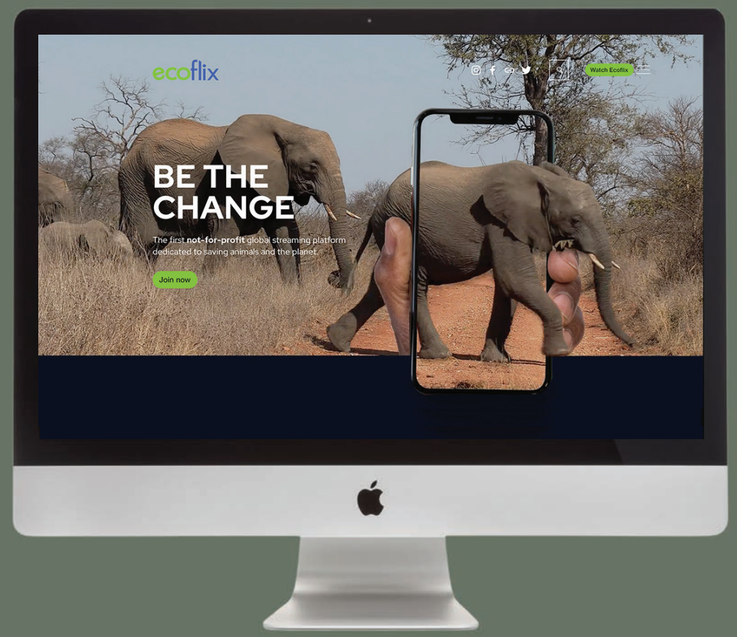

The Pulse | **Original Weekly News Series**


ChangeMakers | **Original Series**


Eco Trailblazers | **Original Series**


Borneo Ocean Diaries | **Series**


On Safari With Nala | **Ecokids Series**




**What was your key vision behind the creation of Ecoflix?**

Our hope was to use the power of film to educate, inspire and change hearts and minds. Our single-minded purpose was and is to help save animals and our planet.

**In a space with many buzzwords, trending topics, and at times false information, how are you establishing your reputation as a 'go-to' media source for facts, science, and inspiration on climate change?**

It is a challenge. We believe that trust and recognition will come with time. We will never misrepresent the facts, always doing our very best to promote ourselves through the medium of beautiful films: inspiring images help people to appreciate the wonders of the world. Nature needs us now. Protecting her is our dream.

**Education plays a large part in understanding the importance of protecting wildlife and our planet. Who is the target audience for Ecoflix and how do you aim to educate the younger generation?**

Demographics suggest that Gen Z should be our target audience, and we certainly hope to draw their attention. But there is a need for all of us to change our view of the future...which must include how we relate to animals and other people, as part of a new commitment to protect the planet that sustains us. Humanity has lost touch with the planet in the last fifty years, causing nearly irreversible damage. No one group that can make all the difference. We hope most to inspire young children with the beauty and wonder of nature. But change will be required at all ages.

We see a world where all animals, which includes all people, worldwide, will embrace the necessity of living together in harmony, among ourselves, other animals, and with our planet. We must come together, because whether we realize it or not, we all need each other. The world is an interconnected ecosystem. We each play a part in a life-or-death drama. As evolution has taught those who are paying attention: only species which live in harmony with nature will survive. We hope to highlight the changes we need to make as a species, enlisting aid of the youngest among us. They are the future. The hopes of humanity rest with them...as always. Only now, we must depend upon them to reverse the damage we have done.



**Can you explain the premise behind the features on your platform, Ecoflix Earth and Ecoflix Education, and what you are aiming to achieve with these?**

Ecoflix Earth is our attempt to demonstrate that we all share this planet, and that we are more alike than we are different. Such a simple concept seems to have evaded the leaders of governments around the world for generations. Through shared imagery from around the world, posted on Ecoflix Earth, we hope to inspire greater appreciation for our similarities and dispel long held notions that we are different from any other people anywhere on the world.

We all love animals, our families, our friends, and the earth that sustains us. It is past time to join forces and act together as a species to save our planet. We have damaged it. We can save it. But we have created this dilemma as a species, worldwide. None of us can heal the damage alone.

It is now more urgent than ever to teach our children to take control and be the change we need to survive. We have failed as adults. We must inspire our children, who will outlive us, to do better than we did. Toward that end, we are giving Ecoflix for free to schools around the world. We hope to create a springboard effect, bringing families together around the unifying goal of saving animals and our planet. Together, we can make a difference. Little by little, day by day.

**The key innovative premise to Ecoflix, your 'Circle of Giving', you state to be the 'heartbeat' of your not-for-profit business, can you explain how this works and how your members are having a positive effect on the planet through their subscription?**

Ecoflix was founded on the notion that helping those who are helping animals and the planet would be the most impactful way to make a difference. So, we donate 100% of our subscription proceeds to support animals and the planet, which directly benefits many of our NGO partners. We also promote their amazing work on Ecoflix, worldwide. We do that by helping the world to see the good they are doing every day. That includes showcasing their work, both by highlighting their films, and often by creating beautiful, original

• A DISCUSSION •

*"We see a world where all animals, which includes all people, worldwide, will embrace the necessity of living together in harmony, among ourselves, other animals, and with our planet."*

programming about what they do.
In this way, our members can subscribe to Ecoflix, and at the same time learn about new NGOs and support their favorite organizations.

**What do viewers receive for their monthly subscription to your platform and how often do you add new content to keep it fresh and up to date?**

We offer our viewers hours and hours of amazing video focused on animals and our planet. To keep things fresh, we do our best to add content all the time, both from the creation of Ecoflix original productions, airing films created by our NGO partners, and sometimes by acquiring films produced by others.

Our goal is to be different than other channels, offering easy to watch, beautiful and educational films. We will not air any films which include violence or gruesome scenes. And we love to cover the globe, both on land and under water, bringing unique and inspiring videos, which always provide new and exciting information. Providing beautiful films about animals and the planet are central to our mission.

**Who are your key collaborators in the NGO space and how did these relationships come about?**

We have many people and organizations to thank. First among them are the Born Free Foundation, Elephant Nature Park, IFAW (International Fund for Animal Welfare), The Whale Sanctuary Project, The Wolf Connection, Chimp Haven, Wildlife SOS, Gentle Giants, the Libearty Sanctuary, Mercy for Animals, and so many more. Most of our NGO partners are organizations with whom the Ecoflix management team has known or worked for many years. Others are remarkable non-profits we learned about along our journey and invited to join us. These relationships, in every case, are a product of our mutual commitment to saving animals and the planet. We are so thrilled to be able to help them get their powerful message out to the world.

**What do you believe your subscribers can do to help make a difference to save animals and restore the planet in their own lives?**

Our subscribers are people, just like us. We all need to do more, do better, every single day. We hope Ecoflix will help them learn new ways that we can all improve our relationship with the earth and become ambassadors to help inspire others to join our cause. We cannot fix everything overnight. We must be mindful and diligent, making small improvements/changes all the time. The Starfish Story is my daily mantra (it is described and animated on Ecoflix). Just like throwing back starfish on a crowded beach at low tide, we must be patient and remember that we cannot save the world all at once. We can only do it one day, one starfish at a time.

**Looking forward, what is next in store for Ecoflix?**

We continue to make friends, partnerships, create films, acquire films, all for one purpose: to inspire change to save our precious animals and our one and only planet. We have many projects in the works. It is a very exciting time. Stay tuned. We look forward to producing and releasing many more beautiful films as well as some remarkable world news, all in the coming days, weeks, and months.

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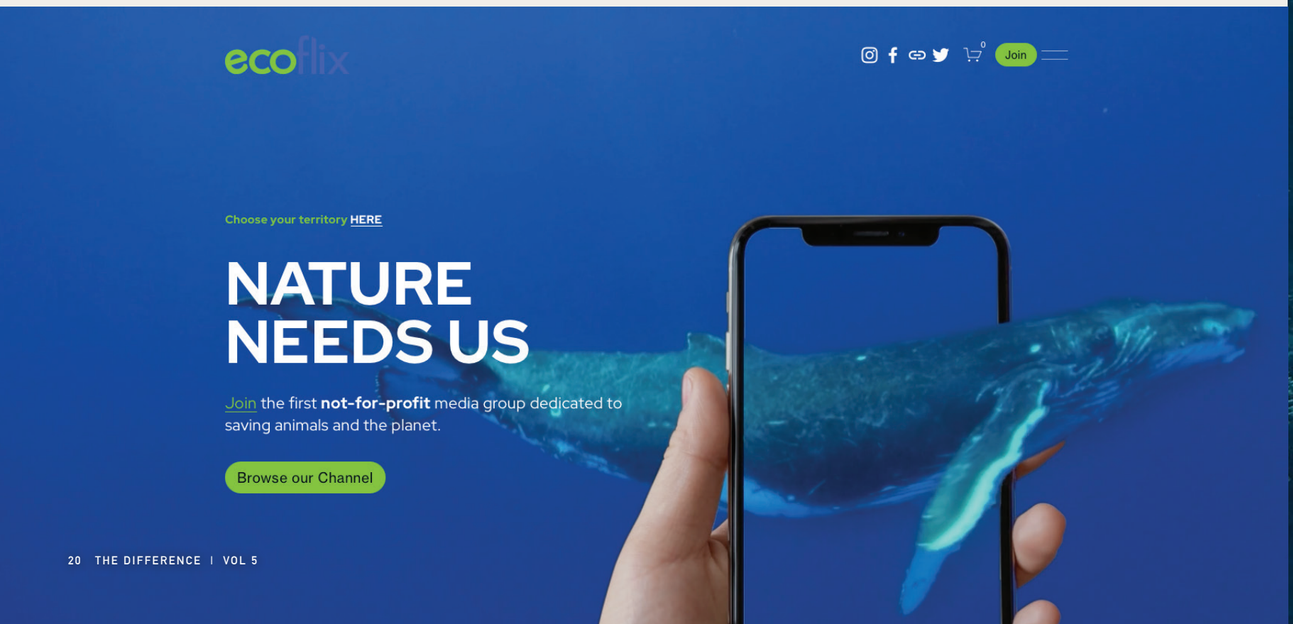


• THOUGHT LEADERSHIP •

Royal Botanic Gardens Kew

*Chimanimani mountains, Mozambique © Toral Shah/RBG Kew*

# Marvellous Mozambique:

## *Creating a Conservation Bedrock*

*Milton Group are working on a variety of large-scale landscapes in Mozambique and so are The Royal Botanic Gardens, Kew. With aligned interests in the country, we invited Dr. Iain Darbyshire from Kew to discuss their work in Mozambique through their Tropical Important Plant Areas (TIPAs) programme aiming to protect the biodiversity and natural capital whilst providing skills training to continue this innovative work for generations.*

Building on over 263 years of botanical expertise, and with a thriving cross-disciplinary network spanning more than 100 countries, the Royal Botanic Gardens, Kew is a world-leading plant and fungal institution. Our 300+ scientists collaborate worldwide with an urgent purpose: to help stop biodiversity loss and develop nature-based solutions to some of humanity's biggest global challenges.

RBG Kew's work mapping Important Plant Areas (IPAs) in Mozambique, in partnership with the Mozambique Agricultural Research Institute (IIAM) and Eduardo Mondlane University, is a powerful case study that demonstrates some of the practical and replicable ways we combine RBG Kew and in-country expertise to help ensure thorough, high-quality botanical research feeds directly into effective conservation delivery. Long-term thinking, the strategic use of historic collections and collective knowledge, and investments in education are all ways in which we continue to build on strong foundations to innovate.

*Lebombo Mountains, Mozambique © Jo Osborne/RBG Kew*





*"With a global network of partners, the Royal Botanic Gardens, Kew is helping to halt biodiversity loss in the planet's most threatened habitats."*

*Burning forest trees, being cleared to make way for agriculture © Iain Darbyshire/RBG Kew*

• THOUGHT LEADERSHIP •

*Cycads (Encephalartos turneri) growing on the granite outcrops in Mozambique © Iain Darbyshire/RBG Kew*

## Beautiful, weird and wonderful

With its diverse geography, geology and climate, Mozambique is home to a wealth of plant and habitat diversity. From a stately palm (*Raphia australis*) to a leopard print succulent (*Orbea halipedicola*), many of its species are notably beautiful, weird and wonderful, with the RBG Kew Mozambique team finding the country home to 271 strictly endemic plants (plants that grow only within the nation's borders) and a further 387 near-endemics (rare and highly localised plants that are distributed in Mozambique and a neighbouring country).

These endemics and near-endemics entail a particularly high conservation responsibility. Together with the wild habitats that support them, they have high natural capital, providing important resources – such as timber, food, and medicine – and essential ecosystem services, such as helping protect Mozambique's soils and watersheds. However, an increasing demand for agricultural land and natural resources has resulted in large areas of forest and other natural habitat being cleared, putting the country's biodiversity at significant risk.

**271** strictly endemic plants

**387** near-endemic plants

## Prioritisation is key

When it comes to tackling those risks, especially in biodiversity hotspots such as this, and/or where resource is limited, prioritisation is key. So too is making sure that flora as well as fauna are considered with equal urgency; plants and fungi are often highly under-represented in conservation planning schemes worldwide because information on their diversity is not available in formats readily accessible to policymakers and conservationists.

As Dr. Iain Darbyshire, RBG Kew Mozambique Research Leader, says: 'The wellbeing of the world is dependent on plants, yet as many as two in five species face extinction. It is vital, therefore, that we effectively prioritise conservation efforts to allow plant diversity to recover and thrive, with all the societal benefits that can bring.'

That's the drive behind RBG Kew's flagship Tropical Important Plant Areas (TIPAs) programme, which, headed by Iain and at the close of its initial, seven-year phase, is focused on Mozambique and seven other tropical countries and territories. 'A major contribution to this global effort', adds Iain, 'The programme is transforming our understanding of some of the globe's most precious and threatened biodiversity hotspots.'

• THOUGHT LEADERSHIP •

*'The wellbeing of the world is dependent on plants, yet as many as two in five species face extinction. It is vital, therefore, that we effectively prioritise conservation efforts to allow plant diversity to recover and thrive, with all the societal benefits that can bring.'*

Dr. Iain Darbyshire, RBG Kew
Mozambique Research Leader

*Kew's partners from the Instituto de Investigação Agrária de Moçambique collecting plant specimens © Jo Osborne/RBG Kew*

## Through the thicket

The RBG Kew Mozambique team have been listing and mapping the country's endemic and near-endemic species so that the conservation community at all levels has an accurate understanding of the country's Important Plant Areas (IPAs). IPAs, an initiative coordinated globally by conservation charity Plantlife International, were, until 2020, aligned to Target 5 of the UN Convention on Biological Diversity's (CBD's) 'Global Strategy for Plant Conservation' (GSPC) and are more than likely to feature in several of those GSPC targets going forwards (the next set are yet to be announced).

This makes them an important step towards fulfilling national CBD targets.

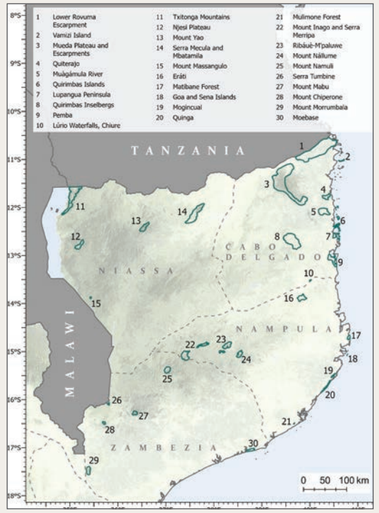
The initial phase of listing and mapping is critical. As Jo Osborne, RBG Kew botanist and former TIPAs Project Manager notes: 'Building a record of which plants grow where' is 'no small task, involving lengthy reviews of literature and herbarium research'. After the intensive planning stage, the multiple expeditions to poorly studied sites commence. Iain adds: 'Easy access to satellite imagery has revolutionised the way we now plan and conduct expeditions.

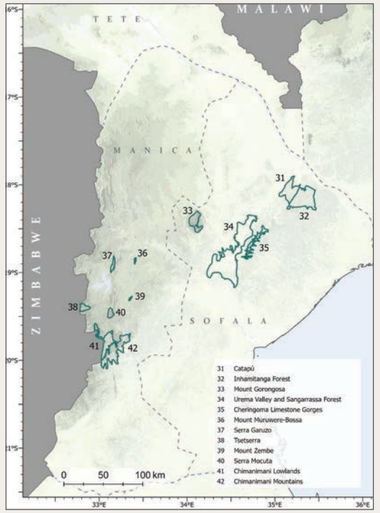
Of course, this doesn't always go to plan – what looks like a gentle stroll on Google Earth can prove to be a vertical climb or many hours spent thrashing through dense thicket!' Once through the thicket, what did the team discover?

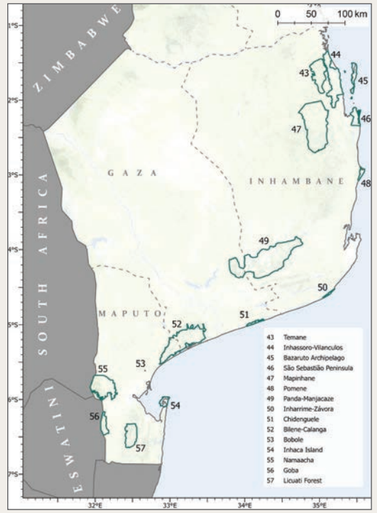
*Kew botanist Jo Osborne documenting the plants of the granite slopes including Euphorbia mlanjeana and Plectranthus cucullatus © Iain Darbyshire/RBG Kew*








## The results

We now know that the network of Mozambique's IPAs comprises 57 sites, distributed widely across the country. Altogether, that's 22,950 square kilometres of Important Plant Area (IPA). This constitutes fewer than 3% of Mozambique's total land area, but, critically, it encompasses important populations of 82% of the threatened plant taxa of Mozambique, and nearly three quarters of those all-important endemic, near-endemic and range-restricted species.

These results are a good example of how important thorough early groundwork is, showing just how targeted conservation efforts can be once conservationists are in possession of the facts: effectively managing what is a relatively small land area will have enormous benefits for the preservation of the country's rare and endemic flora and important habitats. With formal protection having been granted to fewer than 50% of the sites to date, and with none considered to be free from threats to their biodiversity, the necessity for focused intervention is clear.

Similarly, the comprehensive survey phase allows experts to simultaneously update the International Union for the Conservation of Nature (IUCN) Red List of Mozambique's threatened species, and to run Red List assessment training for in-country partners. The IUCN Red List of Threatened Species is **the world's most comprehensive information source on the global extinction risk status of animal, fungi and plant species,** relied upon by government agencies, wildlife departments, NGOs and many more.

*Ribaue Massif, Mozambique © Iain Darbyshire/RBG Kew*

## Sharing our data – and lessons learnt

Once the territory is mapped, it's essential to make good-quality data widely and easily available. That's why, in 2020, RBG Kew launched a new, freely accessible online data portal, the Tropical Important Plant Areas (TIPAs) Explorer. Hosting the findings from our work in Mozambique, it allows stakeholders worldwide to search and download the vital detailed information they need to help effect change.

And more traditional means still have a vital role. Iain and his team regularly publish new species and survey data in journal articles, and a book, *The Important Plant Areas of Mozambique*, due to be published in both English and Portuguese, sets out the lessons learnt from the Mozambique project and shares tried-and-tested methodologies.

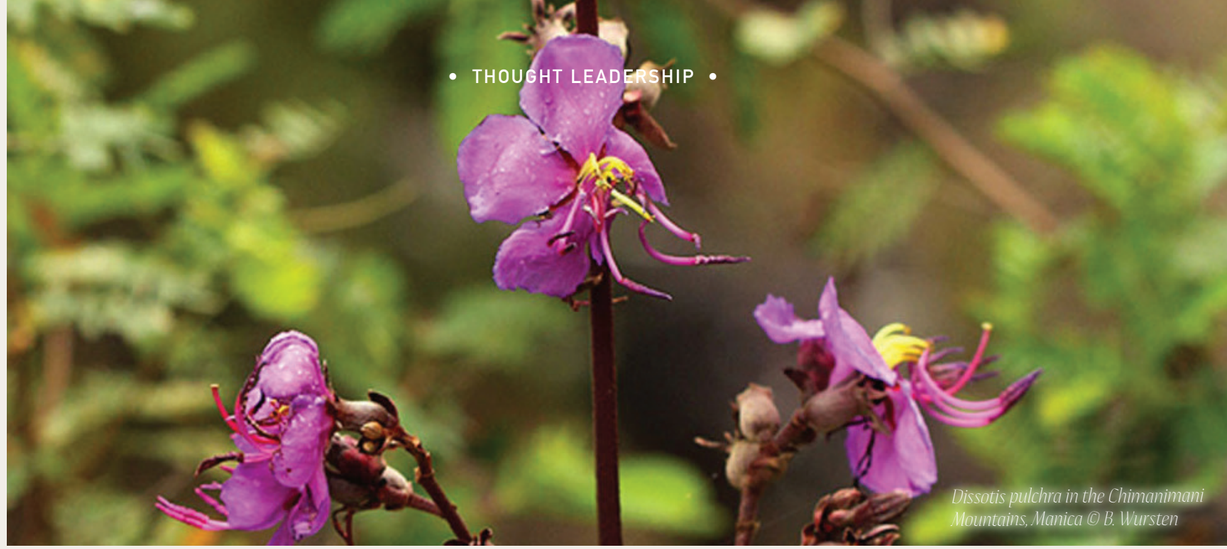
**tipas.kew.org**

*Forest clearance as a result of timber extraction in the Panda district © Jo Osborne/RBG Kew*

*The fieldwork campsite on the margins of the Ribaue forests © Iain Darbyshire/RBG Kew*







*Dissotis pulchra in the Chimanimani Mountains, Manica © B. Wursten*

## Employment and training: equipping a new generation

Sharing knowledge and developing and embedding skills are both critical to RBG Kew's work. The Mozambique programme team ran field skills training, including plot-based survey methods and plant identification, throughout the project, and supported the employment and training of several early career botanists, including a Mozambique-based MSc student and a PhD student whose work is focused on conservation prioritisation tools. 'It's great that our work is helping to launch a new generation of biological scientists in Mozambique,' says Iain, and members of the Mozambique partnership are now helping guide other African countries in the IPA process, including in Cameroon and Uganda.

RBG Kew's Sophie Richards, Mozambique Project Officer from 2020, adds: 'Supporting colleagues in Mozambique to develop skills in conservation assessment has been a fantastic opportunity to learn about the challenges of plant conservation on the ground, especially during the pandemic, when I couldn't get there myself. I'm now applying and developing what I've learnt in my current role in the Uganda TIPAs team.'

## Local, national, and international

The RBG Kew Mozambique IPAs programme has struck an important balance between building capacity locally and beginning to implement change both nationally and globally, with project partners now working with NGOs, industry, government, and the wider global IPA and IUCN networks.

Conservation efforts necessarily evolve with technologies, priorities and what we know, yet this case study shows powerfully that thorough, collaborative groundwork continues to be an essential first step. There may still be a long way to go to protect Mozambique's biodiversity – and the futures of communities whose livelihoods rely on these precious natural resources – but once resources and expertise are shared and embedded, the scene is set for innovative, long-lasting change.

*The Board of Trustees of the Royal Botanic Gardens, Kew thank Steve Lansdown CBE and Maggie Lansdown, and Oppenheimer Generations Foundation for their generous support of the TIPAs Mozambique project.*

*Further word by Anna Glendenning.*

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*Taratibu Reserve, Mozambique © Aaron Davis/RBG Kew*

# In Conversation with Ralph Chami

*Our Founder hosted Ralph Chami, Co-Founder of Blue Green World and Assistant Director in the Institute for Capacity Development at the International Monetary Fund, in London to speak to Ralph about his truly innovative concept to focus on wildlife-centred carbon services as a means of solving the climate crisis and for the future of financing conservation projects.*

*Ralph Chami, Session 8 TED2022, Vancouver*





## How much is one forest elephant worth?

**The carbon value of a single forest elephant is**

**$1.75 million**

**Elephant Biomass Carbon**

The amount of carbon on each elephant is equivalent to **2.64 metric tons** of $CO_2$

MAJOR THREATS

**Deforestation**

Deforestation in Africa is happening **4X** faster than the global rate, resulting in an average loss roughly of **40,000** square kilometers per year

MAJOR THREATS

**Poaching**

Centuries are required for forest elephants to recover their historic population level of **1 million** from their current population of **100,000**

**Elephant Forestry Increase**

Each forest elephant can stimulate a net increase in carbon capture in central African rainforests of **9,500** metric tons of $CO_2$ per $KM^2$

**You are the co-founder of Blue Green World, a group of professionals that values the services of living natural assets to develop nature-based markets that fund the regeneration and stewardship of the natural world. Could you tell us about your career background and how this led to your interest in nature-based solutions as a means to reverse biodiversity loss and tackle the climate crisis?**

As a teenager I was a big fan of Sir David Attenborough, Jack Cousteau, and Dr Sylvia Earl. I wanted to be an oceanographer, but that was not to be. I had to wait 40 years to finally come face to face with 120-foot Blue Whale feeding peacefully next to our 25-foot boat. I believe everything I did before and until I met that gorgeous creature led me to this work. My first degree was in sciences, followed by finance, statistics, and finally economics, prepared me well for understanding the science that underlies this work. My work experience in the market, teaching, research, and as a professional macroeconomist with 25 years in policy work—all came into play here.

**You have written extensively on the topic of wildlife carbon services alongside a number of scholars, what is your personal goal with publishing this research?**

While everyone is focused on the role of trees, forests, and, more generally, flora, in carbon sequestration, they are missing the role of fauna in helping flora sequester carbon or in providing other ecosystem services. I chose to focus on wild animals as they are not typically viewed as helping in the climate change fight. My aim is to show that they are great allies in this regard, and that a forest without its animals is not a forest; an ocean without its whales, sharks, turtles, etc., is a dead ocean.


*Ralph Chami, UN World Oceans Day 2022*

• A DISCUSSION •

*Wildebeest*

Publishing this work in peer-reviewed journals has the added benefit of credibly speaking to researchers and academics helping to bring them into this work. We need the best minds as well as new talents to be attracted to work on unravelling the secrets of this wonderous nature, and publishing in academic journals helps in this regard.

Another benefit from publishing the research helps to attract private sector funding into this space by providing another layer of certification for this work.

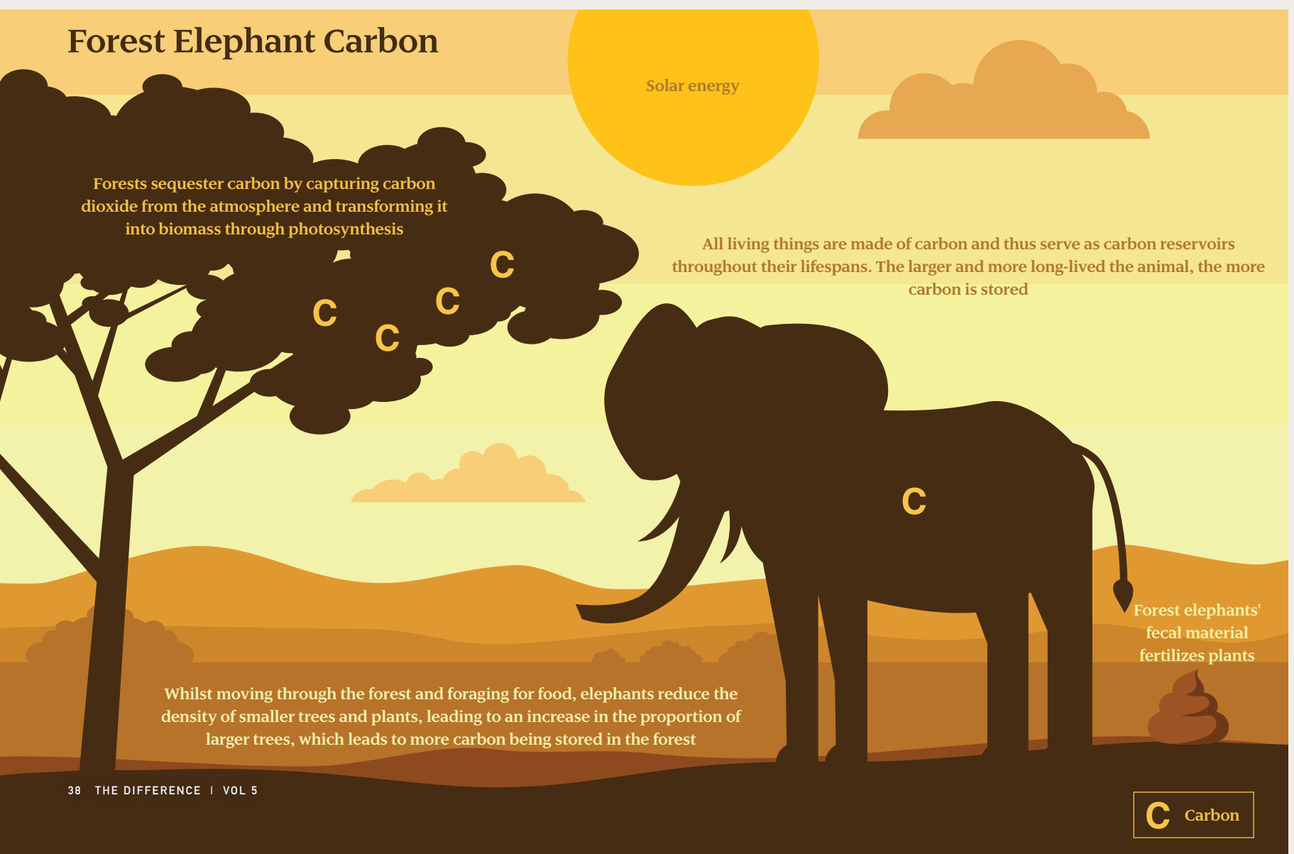
**Volume 5 of The Difference focuses on Innovation - the thinking and methodology behind your article 'Financing Conservation by valuing carbon services produced by wild animals' is certainly ground-breaking. How significant do you believe wildlife carbon services will be to solving the climate crisis?**

I believe wildlife plays a "crucial" role in the climate fight. As I stated earlier, the focus on flora, be it blue or green, misses the important fact that nature's functions and resilience are based on its biodiversity, and that includes all the creatures that exist in nature and their interaction with each other and with flora. Planting trees does not make a forest, nor does it guarantee that carbon will be captured or let alone be sequestered. Forests that have lost their elephants, for example, are lost. An ocean without its whales is a dead ocean.

Protecting and restoring, where possible, animal populations to their previous "steady state" size would help restore nature itself and its ecosystem services, and one of these services is certainly carbon sequestration.

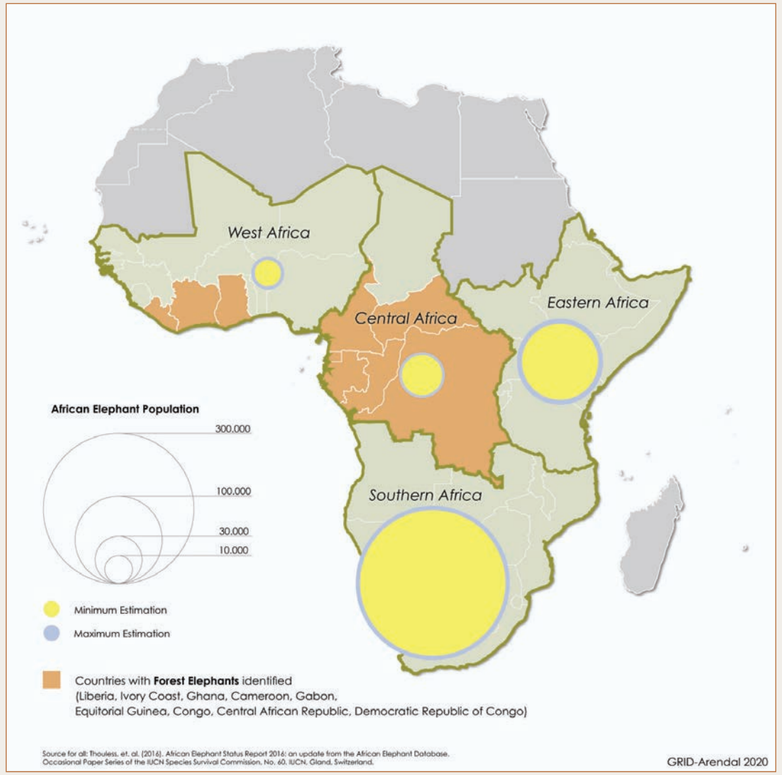
**For your case study, you focused on African forest elephants and their carbon capture services – could you share with us the scale of impact that protecting these elephants would have and how much their carbon services would be worth?**

Let me take you through the case. There are currently 100,902 elephants in the 79 protected areas. Under "no poaching" models, the population would grow to 201,000 elephants in 30 years, and 389,000 in one hundred years. We compared that "fully protected" scenario to how the elephant population levels would grow under "medium" poaching and "high" poaching scenarios. With medium poaching the population would grow to 151,000 in 30 years, and only to 125,000 in medium-high poaching. We estimate that by putting stronger protection in place and significantly reducing poaching, the carbon in forests due to elephants would deliver 109 million metric tons of carbon which translates into 400 million tons of $CO_2$ in carbon credits. At the average price of carbon credits during 2021, i.e, $63.47, this protection would be worth $25.4 Billion.








**Could you share with our readers a few other examples of animals that play a significant role in the carbon cycle?**

Scientific understanding of the role of wild animals in the carbon cycling process, and as integral parts of a healthy functioning ecosystem, is growing. For example, in the recent publication "Animating the Carbon Cycle: Supercharging ecosystem carbon sinks to meet the 1.5° C climate target" (from the Global Rewilding Alliance), examples are given of well-known cases, such as the restoration of the wildebeest population on the plains of the Serengeti, and wolf populations across the North American boreal region. They go on to describe newer discoveries as well. In the marine environment, they highlight the importance of recovering whale populations and the need to restore globally degraded fish stocks not only for carbon cycling but also for food security reasons. Other case studies include beavers, invertebrates, musk oxen in the arctic regions, sea otters' role as guardians of the kelp forests, sharks impacting blue carbon levels through predator-prey relationships, and a range of other high-potential species.

We see significant potential for valuing the services of these species, as the science becomes available, and creating market products to fund their preservation. As written in our recent paper *Financing conservation by valuing carbon services produced by wild animals* in the Proceedings of the National Academy of Science:

"Researchers are establishing that many other animals, including marine and terrestrial vertebrates (9, 10) and invertebrates (9), play important roles in carbon cycling. More research is needed to establish the correlation between carbon cycling and wild animals. However, the decline of many wild populations has likely compromised the functioning of ecosystems, including their carbon storage potential; this suggests that rewilding could enhance carbon storage across a wide range of ecosystems (18, 19). The total market value of carbon services may be measured in the trillions of dollars—smaller than global equity markets but as large as the markets for important types of bonds, such as commercial paper. More broadly, the techniques used in

• A DISCUSSION •

*Sea Otter*

this paper can be applied to any animal service that can be measured and to which market prices may be assigned. Animal services, therefore, represent an entire asset class whose market potential may rival that of existing financial instruments."

**The global biodiversity financing gap is a critical issue which requires innovative approaches to attract investors and deliver solutions to tackle biodiversity loss globally. What do you foresee the impact of valuing carbon services produced by wild animals will have on the future of financing conservation projects?**

Highlighting the carbon-services of wild animals provides a more complete picture of dynamics involved in the forests' (or nature's) ability to provide this service along with other ecosystem services. Understanding the role that animals play in this regard helps in designing more comprehensive and tailored conservation projects, thus ensuring their chances of success.

From an investment angle, our approach uses market valuation which speaks directly to markets, investors, and policymakers who are adept at cost-benefit analysis. This shifts conservation from being a pure cost proposition to being a source of capital for sustainable and shared prosperity. This incentive-compatible approach brings in investors who are not necessarily driven by philanthropic or altruistic motives.

**Do you envisage carbon credit investors financing services such as veterinary practices and anti-poaching teams to aid their investments which could in turn provide alternative economic opportunities and uplift local communities?**

The ability of wild animals to generate services, now and into the future, for their owners or for those willing to pay for these services very much depends on their health and wellbeing. Thus, flows from the sale of these services must ensure that the animals are looked after in perpetuity, by design. This involves all activities that would guarantee their safety and wellbeing and that includes veterinary services and anti-poaching activities. In this regard, all stakeholders are aligned to look after the wild animals.

**Could you explain the benefits of investing in wildlife carbon services in comparison to habitat-centred programs?**

Carbon-sequestration services are one of many services that wildlife produces as it lives its life free from human interference. Currently, there's an active market for carbon with countries, companies, investors, and households—all demanding sequestration services and willing to pay for them. With the focus shifting to additional services, which come under the rubric of "biodiversity," markets will arise for such services with positive prices. At present, however, biodiversity, though valuable, is not yet priced in the market, which makes it more difficult to attract private sector financing beyond the typical philanthropic channel which has its own limits.

**At Milton Group, we adopt natural and social capital valuation methodologies across our projects to holistically encompass their value for our investors. Therefore, we support your innovative approach to encourage investment into conservation projects. How soon do you think wildlife carbon services and credit schemes could be formalised and implemented?**

There are four steps involved in being able to build markets around the carbon or biodiversity services of wildlife. 1) The science that links wildlife to their carbon sequestration service. We have enough evidence here in the case of some species, but more funding is needed for other species. 2) The market valuation approach is here and now vetted and published. 3) The legal framing is also here (in terms of who can speak on behalf of the wildlife—be it the government or local and indigenous populations). 4) Regulated exchange has already been developed and is ready. This transforms natural assets to natural capital and to financial capital. Markets and investors are now keen to come into this space as they can not only offset their carbon footprint but also meet their ESG and SDG social obligations.

Thus, solely focusing on habitat-centred programs to the exclusion of the role of wildlife in providing these services misses the latter's role and would not result in the ultimate result of a healthy and thriving nature.

Beyond valuing the services of wild animals, we need to be able to take those services to the market. The third step involves resolving issues related to the legal framing of nature and its creatures. For example, ascertaining the ownership rights to manage and speak on behalf of the wild animals is important if we are to bring markets into this space. Once that is done, such services (not the animals or nature) can be traded either using OTC or regulated exchange approach.

www.bgf.world

*Bruno Oberle, Director General of the International Union for Conservation of Nature (IUCN), and Ralph Chami, United Nations Headquarters, July 2022*



• A DISCUSSION •

*Beaver*

• TECHNOLOGY •

# Marine Conservation Technology

*A researcher laser measuring a satellite tagged whale shark (©Simon Pierce)*

MARINE MEGAFAUNA FOUNDATION

*Our expert conservation partner in Mozambique, Dr. Andrea Marshall, is the Founder and principal scientist of the Marine Megafauna Foundation. She was the first person in the world to complete a PhD on manta rays. After her thesis, she stayed in Mozambique to spearhead the conservation of manta rays in the region and around the world. She is the lead author of the IUCN's Red List assessments for both species of manta rays and a member of the IUCN Shark Specialist Group.*

*We are delighted to have Andrea, an expert thought leader, discuss the impact and advances technological innovation is having in the marine conservation space.*

Dr. Andrea Marshall

It has been two decades since we began researching threatened marine megafauna off the coast of Eastern Africa. The Marine Megafauna Foundation has now grown into a global organization, headquartered out of the USA with projects around the world. Broadly speaking, our goal is to 'Save Our Ocean Giants from Extinction' but we tackle this mission in different ways, using different approaches. Across the board we have had to embrace innovation over the last two decades to accomplish our ambitious goals. From research to education, rapidly advancing technology is shaping the way we do business. Given how difficult our line of work is, we feel fortunate to have specialized equipment at our disposal today, that conservationists did not have access to in the past. Complex new tools, cutting edge techniques, and more sophisticated analyses afford us the ability to pose and answer questions that would have seemed indeterminable to scientists even only a few of decades ago. As educators, we are able to engage the public and stakeholders with media and digital resources far better than at any other point in human history. So, while the battle to protect our resources and natural heritage rages on, and mounting threats seem insurmountable, the cutting-edge technologies, which are emerging at a record pace, give us an unprecedented advantage that may just help us rise to the occasion.

Scientists rely on data and data alone to interpret what is happening around us. As conservation biologists, we are burdened with the enormous task of using data to figure out how to safeguard the natural world around us. This means that our field researchers are responsible for building ecological knowledge about species of interest, as quickly as possible, to develop effective management strategies. The pressure is on because these focal species are typically rare and endangered and, in our case, are underwater. Collecting data on these often-elusive creatures can take a tremendous amount of time. The work is typically expensive and logistically challenging, even dangerous. While dedication and persistence are essential, these days field biologists rely more and more on technology to help collect data more efficiently.





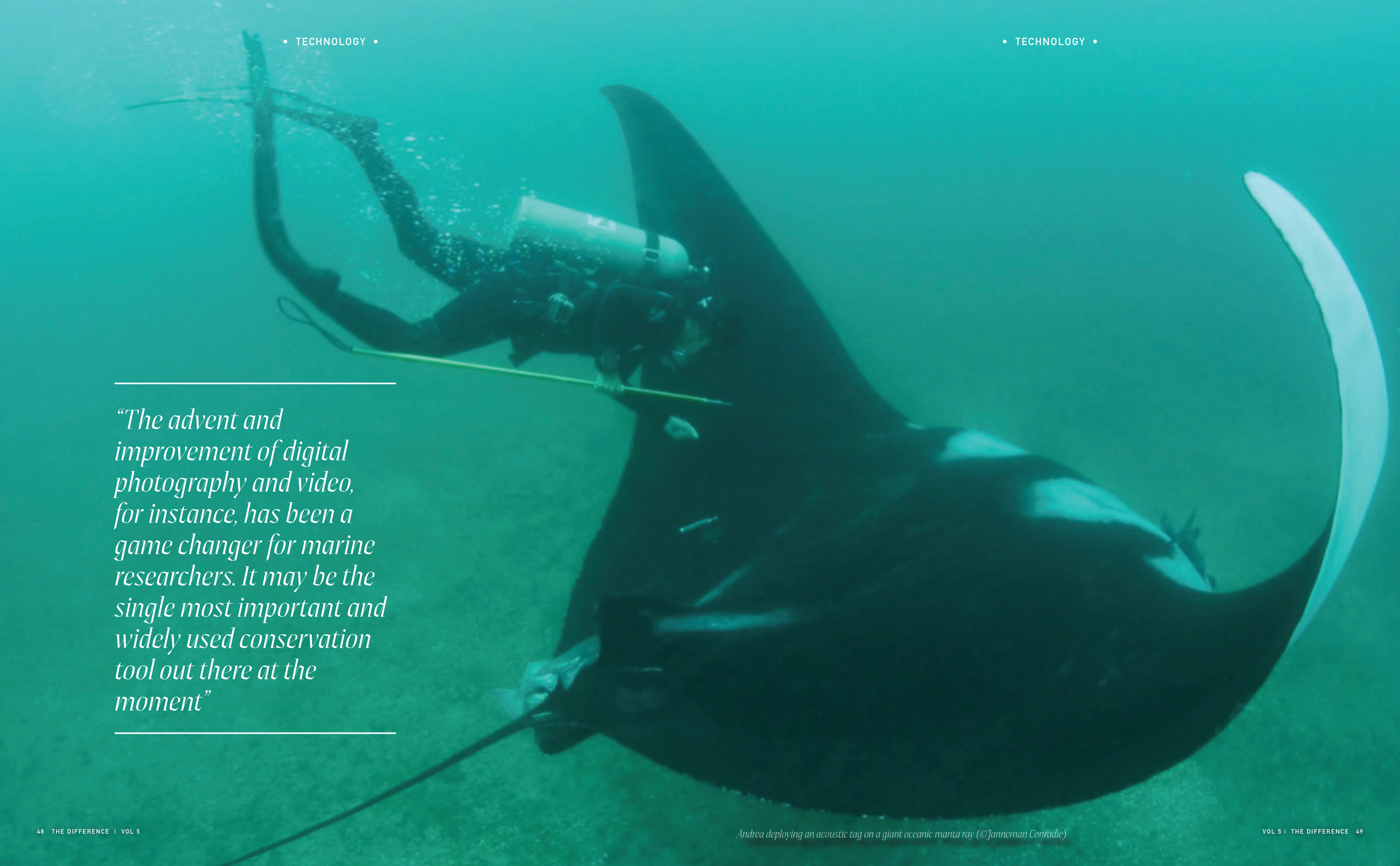
In the past, countless limitations existed for marine researchers. Even the most basic methods of data collection and documentation have gone through incredible advancements in the last couple of decades.

The advent and improvement of digital photography and video, for instance, has been a game changer for marine researchers. It may be the single most important and widely used conservation tool out there at the moment. When I started my career, I could take a maximum of 36 images on a dive, and I never really knew what I was capturing until I developed that roll of film. The digital photography age is allowing for more in-depth studies on wild animal populations than ever before. For many, it has transformed the way we do marine research all together. The foundation of my entire global research program on manta rays, for instance, is based on non-intrusive photographic monitoring. It has allowed us to build up an un-biased, visual database of information that can support a wide variety of analyses for years to come. The concept is simple, once we discovered that manta rays have unique, unchanging spot patterns on their bodies that can be used to identify individuals, we realized we could track them over time and use these photographic databases to estimate population sizes, determine how long they live and learn more about their reproductive ecology. It is simple and effective and we now study most of our focal marine species like this.

Of course, we didn't stop there, we wanted to automate things, scale up, think big. So, we helped to develop algorithms, some based off of NASA constellation matching algorithms, to record, store and match the unique spot patterns on our focal species- the wildlife equivalent of the FBI fingerprint database. Once we had these different algorithms up and running, it was not hard to automate the process and create global online databases. The one for manta rays, developed in collaboration with the WildMe Foundation, is affectionately known as "Manta Matcher' and it stands to revolutionize manta ray research by both centralizing data and tapping into a much broader base of contributors, namely the SCUBA diving community around the world. The uptick in citizen science will drive submissions and increase data input by orders of magnitude. As if this was not enough, artificial intelligence and machine learning have now been integrated onto the platform as well to help source and process data floating around on the worldwide web. Ultimately global databases like these will help biologists acquire, organize, utilize, and store data more efficiently. They will also facilitate much needed international collaborations between researchers allowing us to track global trends, increase ecological knowledge and gain a broader perspective of species' immediate conservation needs.

*Andrea photographing one of the resident dugong in the Bazaruto Archipelago National Park (©Anna Flam)*

• TECHNOLOGY •



*"The advent and improvement of digital photography and video, for instance, has been a game changer for marine researchers. It may be the single most important and widely used conservation tool out there at the moment"*

*Andrea deploying an acoustic tag on a giant oceanic manta ray (©Janneman Conradie)*

*Andrea presenting MMF's latest immersive underwater experience to the Mozambican government (@MMF)*

> *"Across the board we have had to embrace innovation over the last two decades to accomplish our ambitious goals. From research to education, rapidly advancing technology is shaping the way we do business."*

Innovations in marine camera technology and their applications continue to emerge at record speed. In recent years, sophisticated camera traps now allow us to 'spy" on animals without the influence of our presence, allowing us to monitor critical habitats and see what the animals are doing for up to 8 hours a day. These 'spy cameras', which can be baited or un-baited, allow us to capture never before seen behaviors and film species that are likely too shy to approach reefs when bubble blowing divers are around. Even animal borne cameras are now being used to provide a direct perspective of what individual animals get up to, even if it is only for several hours or sometime days. To be able to have a direct window in to the behaviour of animals, even over these short periods of time, is remarkable and is changing what we know about these fast swimming, wide ranging, and highly elusive animals. We are learning more about how they interact with one another, with their prey and even how they approach and use different environments.

Of course, we need more detailed information than this to really get a handle on an animal's conservation needs, but every bit helps. Imagine trying to study an animal that lives underwater, that is hard to find, that never stops swimming, and that migrates long distances into the open ocean. Tracking animals with radio collars on land is one thing, but the advent of underwater telemetry- tags which can be used to track the movements of animals underwater- was a game changing technological innovation for marine research. The process typically involves fitting small tags onto or into animals that can be detected by acoustic hydrophones in the ocean or by satellite networks in space.

While acoustic technology is less expensive than satellite technology, incoming data collection is dependent on acoustic stations receiving the signal from tags. Tags can only be picked up around a 300m radius from the station, therefore researchers need to place and maintain large arrays of these hydrophones along coastlines to have a chance of logging valuable presence/absence data. Tags can function for extended time periods (up to 5 years) and provide blanket coverage of areas of interest 24-hours a day, 365 days a year, allowing researchers to ask very important questions about how animals are using habitats over time.

Satellite tags are more expensive. They typically collect data for shorter periods of time but capture more detailed information. These tags sample the water around the animal approximately every 10 seconds, archiving detailed data on water temperature, depth, light levels (through sunrise and sunset times), swimming speed etc. Once they pop-off, they transmit data directly through the Argos satellite network back to the researcher's computer. This specific technology is useful at providing detailed information on broad scale movements, migration patterns, diving behaviour, seasonal visits to critical habitats, as well as important information on rate and frequency of movement, home range and habitat preferences. By adding other satellite-derived data sets, e.g. chlorophyll-a concentration and surface sea temperatures, researchers are able to further infer drivers of the animal's movements. Overlaying data on industrial fishing or artisanal fisheries along a coastline can help us pinpoint areas of





*Andrea genetically sampling a stingray (©Janneman Conradie)*

potential conflict. The applications are endless.

But there are still questions that cannot be directly answered by these types of technological gadgets, which is where innovations in research methodologies become important. For example, collecting genetic information has always been an essential part of conservation research. In particular, it is useful for species identification, to estimate effective population size and to assess the degree of connectivity amongst global populations. Muscle, skin tissue or mucus are collected from individual animals and researchers are able to extract DNA from these samples and read information in the target area in the genome. DNA sequencing technologies are rapidly advancing year after year. The advent of Next-Generation Sequencing (NGS) is now opening up exciting possibilities, enabling unprecedented amounts of genetic information to be read and used to inform about genetic diversity, structure and abundance. In some cases, we can now investigate individual relatedness of regularly sighted animals, and more specifically, individuals who are sighted regularly within the same social groupings. Assessments of individual relatedness and connectivity of populations will further our knowledge of social structure and determine whether resident populations are made up of breeding adults and their offspring or are organized in other ways. They will also allow us to gain insight into genetic mixing and movement patterns within our focal regions, offering more insight into the development of sound management plans.

However, the tedious collection of genetic material from the field has long hampered progress in the research of marine species. If samples can be acquired from fisheries, then adequate sample sizes may be obtained more easily, but for rare or hard to access species, such as the ones that we study, it may take years to build up sufficient sample numbers. Thus, perhaps the most exciting recent advancement in this field is the ability to collect DNA material from seawater itself. Environmental DNA (eDNA), which originates from the waste products, skin cells or mucus of organisms as they swim through the water, is now able to be effectively captured from simple water samples taken in and around a study site. The analysis of eDNA for biodiversity assessments is an emerging, yet promising, technique that effectively enables the detection of species without direct observation. eDNA techniques can thus confirm the presence of a range of different species, even at low population densities, is easy to conduct at large spatial scales. Our researchers are one of the first to be using eDNA analysis techniques to investigate the presence, distribution, and movement of marine megafauna species along the coast of eastern Africa.

When we are able to obtain small tissue samples directly from animals, we can also use them to study the feeding ecology of species, i.e. characterizing its diet to determine its role within an ecosystem. In the past, the conventional approach for determining a marine animal's diet typically involved intrusive or lethal sampling to extract stomach contents. New non-lethal and minimally invasive biochemical methods are revolutionizing the way we study the diets of our focal species. Relying on the principal

• TECHNOLOGY •

*A researcher ultra-sounding suspected pregnant whale shark in the Galapagos (©Simon Pierce)*

of 'you are what you eat', we can use stable isotope analysis to provide insight into what an animal eats by determining the isotopic value of the consumer and comparing it to the values of prey items. Fatty acid analysis works in a similar way, in that the fatty acid stored in the adipose tissue of a consumer is highly influenced by the FA profile of their various prey resources. These types of biochemical analyses are now helping to provide new insights into what some of the most rare and elusive marine animals are eating and what drives their movements through our oceans.

Other mysteries in our field that have remained unanswered until now include questions surrounding the pregnancies and births of some of the world most rare and endangered species like manta rays and whale sharks. In another world-first, MMF researchers and our collaborators have begun to use newly designed underwater ultrasounds to examine the bellies of large mature female whale sharks in remote offshore islands, where we suspected females may be giving birth. The idea of ultra-sounding a 14-meter free swimming shark in the wild would have been laughable a decade ago, but as we adapt technology for underwater use, we can begin to undertake the same type of physical evaluations as land-based researchers. To tackle the feat, we additionally needed to equip researchers with tank-borne underwater scooters (think underwater jetpacks) to allow them to keep up with the sharks while swimming inverted underneath the sharks. Having tackled this maneuver on the world's largest fish, we can certainly think about adapting it for other marine species going forward.

Innovations in technology have not only helped to advance field research and our ability to conduct complex analyses but they are helping us document and archive footage to support the work we are doing. At this stage, our in-house cameramen are filming our work in 8K, a superior resolution that allows us to share our work digitally on both social media and with broadcasting giants around the world and safely store it for years to come. We utilize specialized drones which can travel away from the operator for up to 7 km. Equipped with a 28X digital zoom, these drones allow us to penetrate into environments that were previously inaccessible to us and collect detailed information on conservation threats without compromising our staff or monitor and film the behaviour of animals without disturbing them. These tools are also actively helping us to better communicate the results of our science to the public -an equally important part of conservation.



The re-emergence of virtual reality (VR) has been particularly important to our education campaigns and has changed everything about how we communicate and disseminate information to the masses and inspire people to care about conservation issues. Better camera technology and VR-headset hardware have allowed filmmakers and developers to create impressive virtual realities. One can now SCUBA dive with sharks or freedive with an Orca from the safety of a school classroom. Early on, MMF recognized that for the first time in human history, it is possible to bring the ocean to the people, especially those who do not have the privilege to explore it in real life. As an organization we decided that we wanted to democratize these experiences and let the communities in the developing countries we work experience their oceans and their endangered marine species with their very own eyes- allowing them to develop empathy and a socio-emotional connection to them. VR will allow stakeholders to see the consequences that various activities have on marine species and ecosystems. It helps us to inform and educate government through immersive experiences. It helps us ignite a conversation about conservation like never before.

Even as I detail all of these advancements, it is important to remember that as useful as technology can be, and believe me it is a tremendous asset, the most powerful tool in our arsenal is the human mind. We are incredibly insightful and can evaluate situations, detect subtle nuances, and process information in ways that computers are still not capable. From our capacity to contextualize information, to our ability to deliver emotional stories derived from a lifetime of experience, conservation may advance with innovative technology, but it is ultimately rooted in the human experience. Investing in innovation is essential, and technology should be used to our advantage when needed, but it can't and should not replace dedicated human observation and interpretation nor should it be used to wholly substitute human experience or interaction. A multifaceted approach to conservation will likely yield the most powerful and comprehensive results and help us achieve our ambitious goals of safeguarding our oceans and our natural marine heritage.

**www.marinemegafauna.org**

**@marinemegafauna**

**@marinemegafauna**

*Filming with 360 cameras to create a virtual reality experience (© Andrea Marshall)*

• OUTCOMES •

# Staying one Step Ahead with the Grumeti Fund

**Milton Group has had the privilege of working at Grumeti Reserves in Tanzania for over a decade. Grumeti Reserves, a 346,000-acre reserve in the western corridor of the Serengeti National Park, is an area that is at high risk of human-wildlife conflict.**

*In 2011, we were invited to help attract investment for long-term conservation management and in 2012 we helped create annual funding programs to help support the work of the non-profit Grumeti Fund, which continues to deliver important philanthropic wildlife and community work.*

*The Grumeti Fund's anti-poaching team is considered best-in-class. Wesley Gold, Anti-Poaching Manager at the Grumeti Fund, shares with us below the innovation of anti-poaching methods in the field and how to stay 'one step ahead' to tackle the poaching crisis.*

*Mobile Patrol Unit, Motorbike team on patrol*

# GRUMETI FUND

It is well recorded that the world's dwindling natural spaces are being destroyed at an alarming rate, coupled with the fact that the burgeoning global population is set to explode - exponentially so - in areas that surround these natural spaces. Essentially there is a growing increase in demand for a rapidly diminishing and irreplaceable resource. Never has it been so important to preserve these remaining spaces - and any form of success will completely depend on innovative methods derived from "out-the-box" thinking.

## The "Paramilitary" twist

The word "paramilitary" is increasingly used in anti-poaching (AP) circles. There is a debate as to whether a paramilitary structure is a good fit for an AP operation. In a traditional sense, the word "military" is associated with war, violence, etc. – a big hammer to be used to solve a serious and clearly defined problem swiftly and precisely, hardly the type of methods or language one wants to be using in a modern conservation setting! The detractors argue that this emboldens a fortress approach whereby the protected area becomes segregated from the communities that surround it, a sure recipe for disaster! However, after reading the introduction above, the supporters of the debate could be forgiven for agreeing that the situation warrants such an extreme intervention. In an innovative twist some AP operations have adopted a halfway house whereby the strategy is paramilitary but highly focused on methods used in counterinsurgency warfare. There are a number of similarities to an AP operation, namely:

### Getting the surrounding communities on side

When referring to counterinsurgency warfare, Field Marshall Sir Gerald Templar said, "The shooting side of the business is only 25% and the other 75% lies in getting the people of the country behind us". It suggests, in a conservation context, that the lion's share of the protected area effort should be spent in the communities, winning over the "hearts and minds". While on paper, many protected areas have very worthy community outreach programs, these are seldom aligned with the AP effort and they often only account for 25% or less of the overall effort, (read budget), whereby AP accounts for the 75% or more. Often, some of the most serious AP challenges such as illegal grazing will only be made worse by confrontational AP methods. The only way to sustainably prevent these challenges is to get buy-in from the communities and this involves strategies to incentivise them to do so.

### The need for intelligence

Having an acute understanding of how, where & when the poachers operate so their weakness can be exploited at a time and place of the anti-poacher's choosing. If there is success with meaningful community engagement, then this becomes easier. Good intelligence helps to deploy AP units more precisely and improves the element of success in terms of arrests and confiscations. It will also contribute significantly to being a significant deterrent in the long term. Intelligence in an AP context is mainly generated by analysing information that has been received from informers. However, in an ever-evolving world, technology can play a key part in generating effective intelligence.

### The Manoeuvrist Approach

The ability to adapt and respond to an ever-changing environment. Understanding that the poachers will change their way of operating to give them the best chance of success. The AP teams should be very well trained and equipped, and any action should be decisive, deliberate, and multi-faceted in its approach to avoid becoming predictable.

### Genuine and meaningful Government partnerships

This is especially important in private sector conservation projects. All the above points can be very well enhanced by having good relationships with the various Government authorities. Technology can be more efficiently and freely used to generate intelligence when done in partnership with the appropriate Government authority. The private sector comes with valuable resource and access to expertise, two important things that are seriously lacking in many of the countries that protected area management takes place. By carefully establishing partnerships with Government agencies such as prosecution






*Grumeti Fund Handler with K-9 DT*

• OUTCOMES •


*GF Technology Conservationist, Alina Daati, demonstrating GF's spatial awareness platform Earth Ranger, the backbone of their ability to coordinate AP operations*

*MPU Motorbike team on patrol*

authorities, resource and expertise can be brought to greatly improve the capacity to prosecute and convict poachers, possibly the ultimate deterrent, but in doing so help to improve prosecution of other serious crimes such as rape and murder, thereby having a hugely positive effect on the overall security of the area.

Having a para-military AP operation that ideally focusses on communities and the building of relationships can appear to be an oxymoron but that is the innovative twist. By way of an example, setting up a world class agricultural operation that can produce high quality food for the tourism operation, while concurrently employing and upskilling community members, with a view to eventually becoming the sole responsibility of the communities not only offers great impact investment opportunities but creates a sustainable and circular way of sourcing food locally, while encouraging modern agricultural practices and genuinely empowering communities. It really must be world class and something that the country and community can be very proud of. The win for AP is that community relations become very positive; meaningful and actionable intelligence is easier to generate; illegal grazing could be minimised; and communities are disincentivised to poach. Similar projects could be achieved simultaneously with uniform manufacture and similar industries. The greatly reduced yet highly trained and effective AP operation will be more focused on external syndicates and organised poaching, which it carries out in a meaningful partnership with the various Government entities.





*Special Operations Group Scouts conducting daily fitness using CrossFit. Grumeti Fund has the first and only dedicated anti-poaching CrossFit affiliation*

• OUTCOMES •

## Circles Within Circles

To achieve the multi-faceted approach that is mentioned above, a well-known method is the circles method, where the security strategy is composed using a layered approach. This tried and trusted method, innovative in itself, forms the base from which creative methods can be implemented in a complementary fashion, starting with the method closest to the secured object, or in the case of protected areas, in it, and working outwards in a concentric fashion. This diagram demonstrates possible elements that form a basic example of the circles approach.

### Layer 4 - Mobile Teams

These teams are less visible, and their primary focus is on the vulnerabilities that may be identified in layers 1-4, but also monitor and exploit any changes in poachers' methods and tactics. These teams represent the necessity to be adaptive and responsive. Some of these teams could be mounted on motorbikes to extend their range and mobility, but the necessity to do this should be dictated by the situation on the ground.

### Layer 5 - Light Aircraft

Use of light aircraft to provide targeted surveillance and support to teams on the ground. Also, a very effective tool for monitoring endangered species. Having the third dimension that comes with the use of an aircraft is very helpful to identify things like access points into the protected area and footpaths. These paths can be followed quickly using aircraft and this information can be relayed to the teams on the ground to exploit.

### Layer 6 - Elite Scouts

Elite scouts whose sole role it is to react to intelligence. These teams are highly trained and better equipped with things like night vision, which enables them to move freely at night without being seen by the poachers. Their operations should be well planned and conducted with precision and in collaboration with Government agencies as they will be operating frequently outside the protected area.

### Layer 3 - Access Control

Maintaining control over the main access routes into or in many cases, through the protected area. Use of technology to monitor vehicle speeding to reduce the risk of roadkill. Be able to shut down access in case of poaching incidents or other necessity.

### Layer 7 - Intelligence Generation

A private sector organisation involved in intelligence gathering can be problematic. It is therefore important that this is done in partnership with the relevant Government agencies. This will expand the reach beyond the boundaries of the protected area and inform the other layers, which in turn will enable the efficient operation and use of valuable resources.

### Layer 2 - Observation Posts

Observation Posts on high ground. This would complement Layer 1 by providing overwatch and reporting anything suspicious. It is also possible to do this in collaboration with neighbouring communities.

### Layer 1 - High Visibility Routine

This could be high visibility and routine patrolling to create a presence in the Protected area. It could be an opportunity to do this in collaboration with a surrounding community to give them ownership of a given area.

### Layer 8 - Control Room

This is possibly the most important layer in terms of the circles framework. Having a multi-faceted approach is certainly an innovative one but only if all the activities in each circle are coordinated and supported centrally. Failure to do this will result in each layer working independently of the other and the operation consequently becoming counterproductive. The best way to achieve this is to have an operations room that is manned 24/7, using spatial awareness technology such as Earth Ranger (see **www.earthranger.com**). All AP activity is coordinated centrally, which means that the various parts will function in a synergistic way.

Each circle is assessed as to why it is an important addition to the overall strategy, and where the vulnerabilities lie. The next circle should be designed to complement the previous one and perhaps cover vulnerabilities that have been identified in the previous circle. Many protected areas are equipped with the first three circles, and they may possibly not be working in a complementary fashion, and this creates grounds that will be exploited by poachers. Provided that they are well coordinated and not complicated, the more circles that are added will increase the chances of the AP effort intervening before an animal has been poached or even before the poacher has entered the protected area.

• OUTCOMES •


*Grumeti Fund game scouts and K-9 handlers on a training exercise together*

## Force Multipliers

Force multipliers are factors that greatly enhance the AP effort by helping it to achieve greater feats than without it. Generally, these should only really be considered once the basic security strategy is in place and working well. Adding a force multiplier too early can be counterproductive, as the focus becomes the force multiplier and less on the still developing security strategy. Some innovative examples of force multipliers are as follows:

### Canine Detection and Tracking

The use of canine can greatly enhance the AP operation. An example of this is how much more efficiently a dog can find something. Whereas it takes a human approximately 6-8 hours to properly search a car, a dog can have it done in under five minutes! This can mean that many more cars can be searched at an access control point without causing an inconvenience to motorists who are passing through.

### Technology

**- Spatial Awareness Technology**
Technology such as the Allen Institute for Artificial Intelligence Earth Ranger (ER) platform has transformed how information from the field in often remote areas can translate into informed management decisions in near real time through use of other technologies such as digital radio systems, and remote cameras. In the past this information took a week or more to reach management and decisions were made based on often obsolete information. This has been a revolutionary force multiplier. Accessing information in real time has empowered AP operations to be able to effectively coordinate a more complex, multi-faceted strategy, which would have been difficult in the past.

**- Night Vision Equipment**
Although in some case prohibitively expensive, night vision has helped the AP teams to "own the night". Poachers most frequently operate at night and rangers would risk encountering poachers in complete darkness, which would add huge risk to their safety. Alternatively, torches would be used, which would give the ranger's position away. Night vision has meant that the ranger can operate freely and stealthily at night and enabled them to have the advantage over the poacher.

**- Covert Camera Traps**
These are set up at known incursion points and through use of AI, automatically identify a human, take a picture, and transmit it through ER to the Operations room. Scouts can then be immediately deployed, to the point with tracker dogs and a quick and efficient follow-up made.

However, very often force multipliers are very appealing or "sexy", especially to the fund-raising initiatives. Serious questions should be asked as to what problems the prospective force multiplier will solve. If the answer is "none" then justification for acquiring, it does not warrant the often-hefty investment.

## Conclusion

As natural habitats and the wildlife that inhabit them diminish, the products such as ivory, timber and bushmeat are becoming more valuable. With this increase in value comes a more technical and efficient poaching and trafficking effort. It is more necessary than ever to find innovative ways to combat this, to stay "one step ahead" of the poachers. This article, written by an anti-poaching manager, has hopefully highlighted that private sector involvement is critical, not only from an investment point of view but for accessing expertise. Focus must be drawn away from exclusively operating within the protected area as this is often only a symptomatic treatment of the problem and not addressing the route cause. Serious effort should be made to engage and partner with Government agencies to have a far-reaching effect, which will better protect the investment. Perhaps the most innovative consideration is to engage more meaningfully with the communities that surround these protected areas and incentivise them by creating unprecedented world class circular community initiatives that are aligned with a much more nimble yet decisive anti-poaching strategy.

**Wesley Gold**
Anti-poaching Manager at Grumeti Fund

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*K-9 Supervisor, Mugoye Rugatiri, with K-9 Tony*

• THOUGHT LEADERSHIP •

# Innovating Valuation Methodologies

*At Milton Group, our mission is to remain at the forefront of innovation across all our impact investment projects and create value in the positive outcomes.*

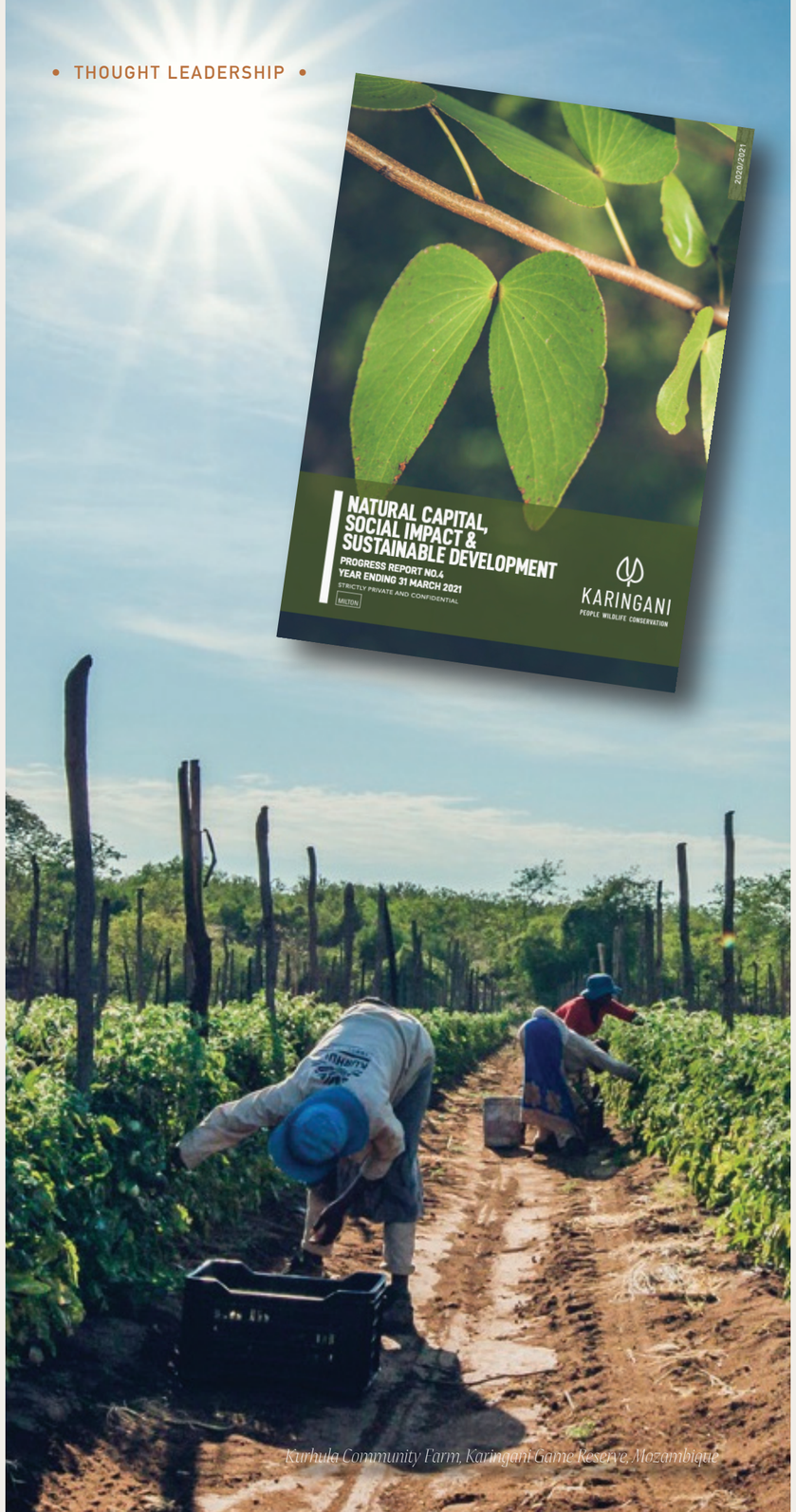
*Elephants at Karingani Game Reserve, Mozambique*

Our purpose at Milton Group is to remain at the forefront of innovation across our impact investments creating value and generating positive outcomes. An integral part of ensuring the long-term resilience of our projects has been delivered through the adoption of natural and social capital valuation methodologies. This approach allows us to measure asset value, and demonstrably achieve sustainable outcomes. Natural and social capital valuation methodologies is an approach which we support and continues to emerge, gaining momentum and recognition.

Historically, traditional accounting methods have focused on financial metrics and haven't considered the many positive impacts organisations have on both the natural world and human society. This approach is becoming increasingly limiting and does not reflect the true value many organisations are creating or take into account the results and outcomes they are generating, whether positive or negative – an approach wholly not in alignment with post-Covid-19 society who's changing attitudes have seen a significant rise in dialogue surrounding ESG, outcomes-based thinking and sustainable investment.

Naturally, a more holistic approach to identifying and quantifying value is required to reflect and drive this change in perception. Natural and social capital accounting offers a solution to this as it considers not only the impacts organisations are having but this approach defines risks and opportunities in order to drive decision-making and unlock future value.

At Milton Group, we utilise Natural Capital, Social Impact and Sustainable Development Progress Reporting to form the basis of demonstrating our progress in achieving the investment and project restoration, sustainability, and built form development goals. We report and compare results using a number of fit-for-purpose KPIs (Key Performance Indicators) including but not limited to climate, biodiversity, energy, waste, school enrolment levels, employment gender equality, and health and happiness.




*Kurhula Community Farm, Karingani Game Reserve, Mozambique*





## A Case Study: Positive Impact at Karingani Game Reserve

Karingani Game Reserve is a 371,000-acre protected wilderness zone in southwestern Mozambique at the junction of the Kruger National Park in South Africa and the Limpopo National Park in Mozambique, and forms part of the Greater Limpopo Transfrontier Conservation Area (GLTFCA). Milton Group has an integrated and enduring vision for Karingani to become a world-leader in sustainable conservation and a model for investment into the circular economy. Karingani's goal is to restore, enhance and maintain the natural ecological processes and biodiversity of the reserve through an effective and sustainable partnership between the Mozambican Government, private investors, and participating communities, with a focus on the circular economy, job creation and providing long-term and resilient economic sustainability.

The aim remains to be the gold standard of reporting, data collection and analysis at Karingani, focused on measuring and quantifying the outcomes of our efforts with consistent valuation benchmarking for self-improvement through our progression from analogue-based annual reporting to digital-based reporting to demonstrate impact. The reporting approach adopts two internationally recognised standards of measuring sustainability and monitoring the restoration progress at the reserve. The first standard is 'One Planet', a set of principles that measure commitment to sustainability, available at www.OnePlanet.com. The second standard is SER (2019), the International Standards for the Practice of Ecological Restoration, available at www.SER.org. Using these two internationally recognised standards as a guide, a series of bespoke attributes and key performance indicators (KPIs) have been created to monitor, indicate, and measure change for the purpose of sustainability and positive impact - this approach then underpins all land and project valuations.

At the foundation of our outcomes-based valuations are our Karingani Natural Capital, Social Impact and Sustainable Development Progress Reports that measure progress using science-based KPIs across a wide spectrum of metrics annually. Through these, we are able to accurately measure the positive economic, natural, and social impacts of the entire investment against Karingani's purpose and management plan, becoming a vital instrument for decision-making for an asset of this scale and diversity. This holistic approach to valuing the opportunity and ecosystem helps underpin the message to attract the market and forms the basis for an investment platform capable of creating balance sheet value and making a difference.

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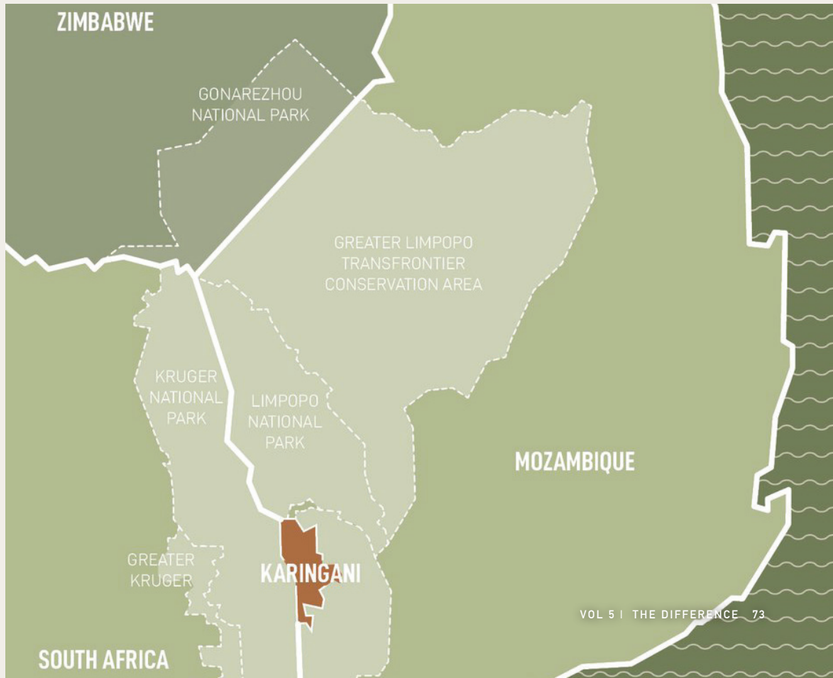
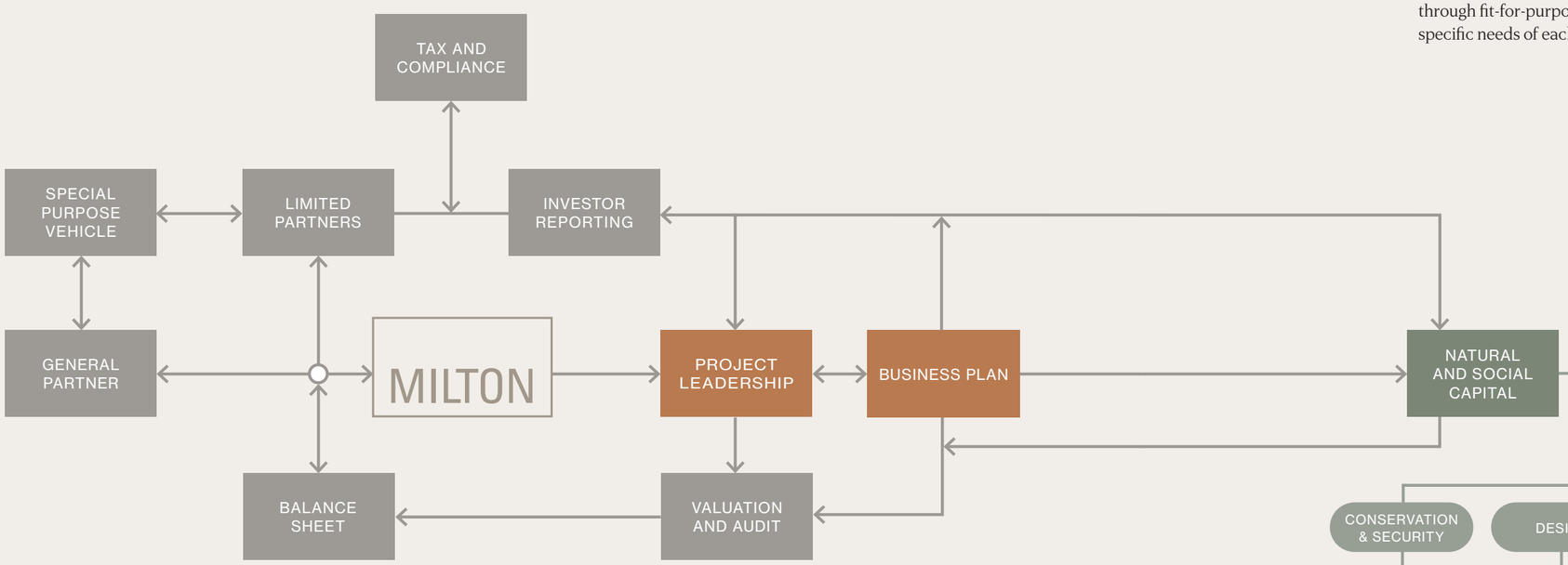


## Investor Management

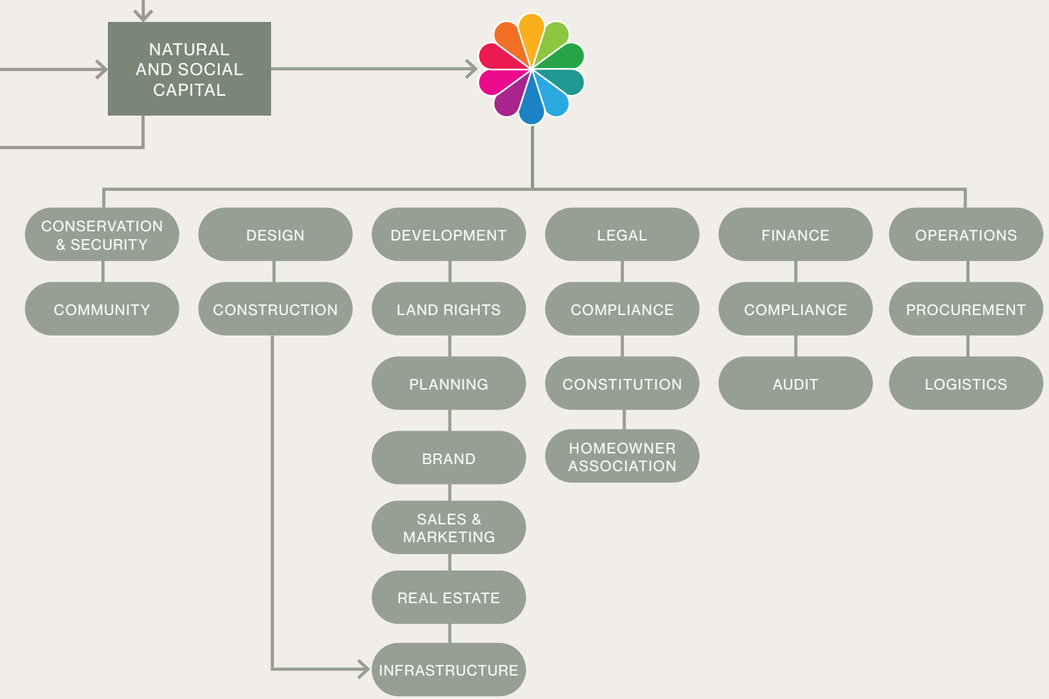





## Rethinking Representation and Responsibilities

Our organizational chart illustrates the role Milton Group fulfills as the appointed representative of owners, fully responsible for team management and investment delivery.

All projects comply with our self-imposed measurement standards, which are delivered through fit-for-purpose Key Performance Indicators (KPIs) that align precisely with the specific needs of each investment or project.



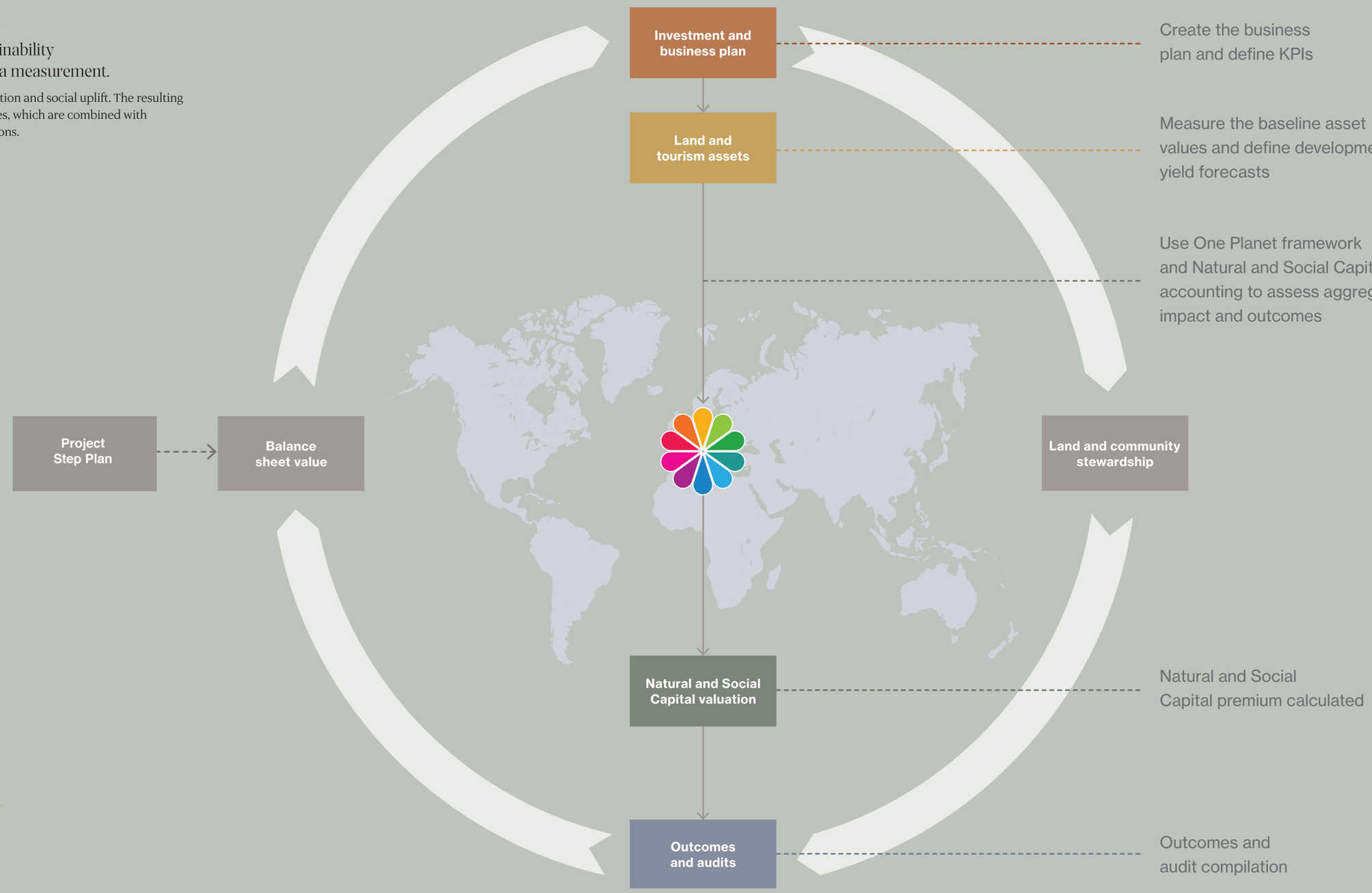

*Is the recognized icon of the One Planet Living framework. This icon represents 10 principles derived from the UN Sustainable Development Goals on social, environmental and economic sustainability*

• THOUGHT LEADERSHIP •

## Natural and Social Capital

### Aligning with the 10 One Planet sustainability principles for transparent project data measurement.

We qualify positive contributions to land restoration and social uplift. The resulting data measures predefined performance outcomes, which are combined with conventional techniques to drive project valuations.



• THOUGHT LEADERSHIP •

*Kurhula Community Farm, Karingani Game Reserve, Mozambique*

*Singita Kwitonda Lodge, Volcanoes National Park, Rwanda*





## A Case Study: Sustainable Results at Singita Kwitonda Lodge and Kataza House

Singita Kwitonda Lodge and Kataza House are located in the 800km buffer zone of the Volcanoes National Park in the northwest of Rwanda. Milton Group were the developers and owners' representative for Singita Kwitonda Lodge and Kataza House with the vision to achieve and sustain a number of positive social and environmental outcomes. This vision entailed the construction of the hospitality operations and a large-scale ongoing rehabilitation and reforestation program of the surrounding landscape.

This rehabilitation and reforestation program holds the ultimate goal of extending the total area of the park as this is a key location for the expansion of conservation efforts in aid of the critically endangered mountain gorilla. A key part of this initiative is Akarabo Plant Nursery which is creating value through providing propagated plants for the restoration of the buffer zone. During phase one of the landscape restoration, 250,000 trees and shrubs were planted. A farm-to-table concept delivers freshly grown herbs and vegetables to Singita's kitchens on property.

We measured the construction of Kwitonda Lodge and Kataza House against our sustainable development goals and KPIs using the One Planet principles during the 36-month long land rehabilitation, landscaping, and construction period to develop the lodge with the goal of ensuring positive social impacts and community uplift being a key focus of the program. The development of the lodge alone provided over 700 local construction jobs with women representing 30% of the workforce, part of our target for increased gender equality. We partnered with local suppliers for the construction process who provided locally sourced materials, including 850,000 handmade bricks, and materials such as sand, aggregate, stone, clay bricks, bamboo weaves and plant stock.

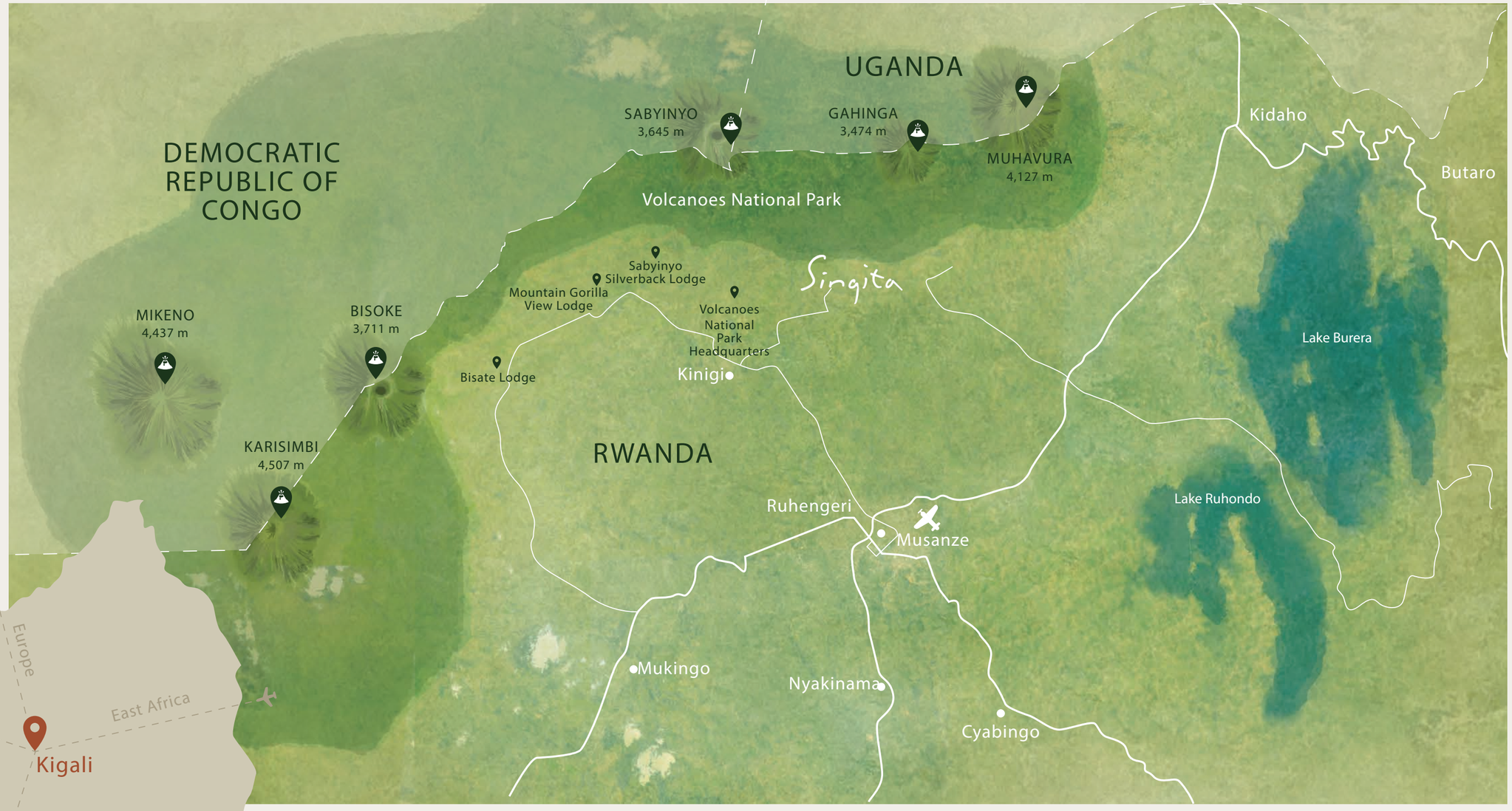
The long-term benefits of the development are evident with an estimated 95% of all the construction workforce remaining in an ongoing position with the general contractor. Through our partnership with OnePlanet, sustainability training was provided and integrated into the development for the 700 construction workers, transferring knowledge within the local communities. Such initiatives are vital in ensuring our projects provide meaningful outcomes and positive social and economic long-term impact for the local area.

At COP26, Singita Kwitonda Lodge was recognised for its innovative and sustainable operations by being selected alongside 16 other sustainable development projects to be featured in the Build Better Now virtual exhibition, curated by the UK Green Building Council, which showcases the most sustainable building projects from around the globe.

All these positive impacts contribute to the holistic value of the project with job creation, female employment, a permanent plant nursery, extensive reforestation, and restoration of land consistently adding asset value. Without considering these impacts, measuring our progress, combining the data, and the adoption of natural and social capital methodologies, the value of this project would not be able to demonstrate and measure the true benefits the operations and programs are having on wildlife, communities, and the landscape.

We have seen a significant growth of awareness in the institutional investment sector that recognises the importance of measuring the impacts businesses are having on the natural world and human society with an increase in financial models and expertise that reflects this. Impact investing is now recognised as both an emerging asset class and a value creator for any project with a growing focus on the development of blended financing models, sustainable outcomes, and the importance of biodiversity. It is of critical importance now more than ever that we as thought leaders engage private capital to set baseline criteria for natural and social capital methods of valuation and prove out this approach – ultimately demonstrating the importance of impact investing, both as a value creator and as a sustainable approach to adopt for the benefit of future generations and the natural world.

• THOUGHT LEADERSHIP •




## Global Statistics

>700 construction workers received One Planet and Sustainability training

Close to $2 million spent in local community on wages, materials and logistics

70% of building material weight locally sourced

43.56% estimated energy saving through sustainable design

250,000 trees and shrubs planted in Phase 1 of reforestation process






*Singita Kwitonda Lodge, Volcanoes National Park, Rwanda*

# Zero Carbon

## Making buildings energy efficient

### Energy

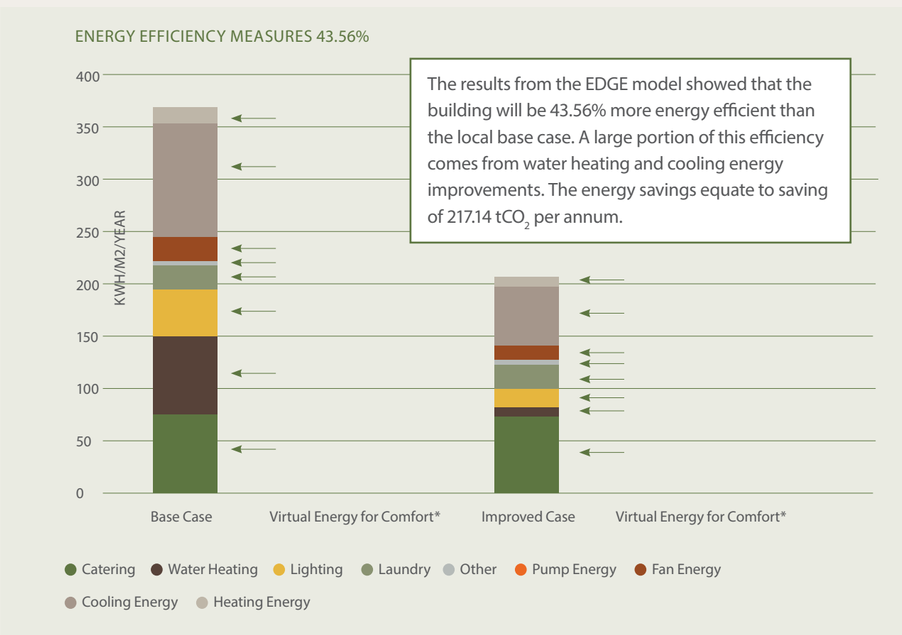
The project's regional grid supply is made up of 100% hydro generated power:

- Ntaruka Hydro Dam in the Northern Province supplies 9MW.
- Mukungwa Hydro Dam also in the Northern Province supplies 12 MW.

As such, the power strategy was not to be off-grid, but to reduce consumption through a high performing building shell combined with efficient equipment, fixtures and fittings.

Peak occupancy daily power demand by development zone and consumption types were calculated.

| PEAK OCCUPANCY POWER DEMANDS | |
|---|---|
| Guest Lodge | |
| Total daily estimate load | 1409 kW |
| Approximate instantaneous peak load | 92.84 kW |
| Main Lodge | |
| Total daily estimate load | 818 kW |
| Approximate instantaneous peak load | 111.41 kW |
| Staff Accommodation | |
| Total daily estimate load | 689 kW |
| Approximate instantaneous peak load | 92.75 kW |
| Ancillary Buildings | |
| Total daily estimate load | 100 kW |
| Approximate instantaneous peak load | 29.82 kW |
| Site and Common Landscape | |
| Total daily estimate load | 476 kW |
| Approximate instantaneous peak load | 20.33 kW |




### Space Heating

The thermal modelling exercise resulted in the recommendation of a hybrid solar thermal and assisted air source heat pump system.

The system was designed to distribute heating demands to:

- underfloor heating.
- domestic hot water.
- pool heating with a dedicated heat pump.

Underfloor heating systems in guest areas have 60 W/m2 heating loads. This type of system uses a combination of radiant (floor surface temperature) and convective heating to improve thermal comfort. A backup electrical element in a storage tank ensures redundancy.

Following a period of operations, it was identified that radiant floor heating should always be combined with user-controlled point heating for greater flexibility and responsiveness.

### Pool Heating

Desired pool temperature of 35-degrees is met via
- a dedicated air source heat pump.
- clean burning LPG fireplaces have been installed to all internal areas to reduce consumption of wood fuel.

### Cooling

As a result of the thermal modelling process, an assisted natural ventilation and cooling system was designed that included:

- ducted / forced air ventilation system that draws in cool fresh air to ventilate and cool spaces while eliminating the need for air conditioners. The system allows easy retrofitting of air conditioning units for heating or cooling if identified as necessary after operations have stabilised.
- split ductable units that can provide both cooling and ventilation were installed to the villa massage room, media room and gym as well as the Main Lodge wine cellar and pastry kitchen. Only the ventilation function was turned on at commissioning phase, with the cooling option only activated if required.
- ceiling fans throughout the spaces aid internal air movement.



*"As a result of a building thermal modelling process, a mechanically assisted natural ventilation and cooling system was installed in lieu of traditional air conditioning"*

## Zero Waste

Reducing waste, reusing where possible, and ultimately sending zero waste to landfill

**POSITIVE OUTCOMES**

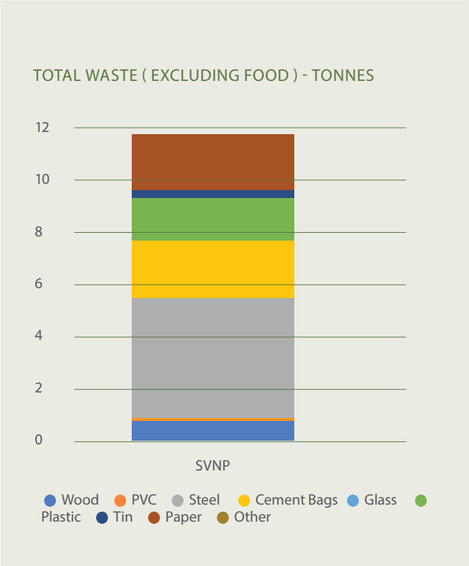
- Natural hydrological functions rehabilitated.
- EDGE 81.80% water saving.
- 90% of wastewater is treated for reuse in nursery.
- Approximately 92% of the development parcel is permeable.
- 1:100 storm event design capacity.

**OPPORTUNITIES**

- Increase design capacity of rainwater harvesting.

## Design Strategies

- a prefabricated steel framing system was used to reduce on-site waste generation.
- permanent shuttering was used for the majority of concrete slabs to reduce the depth of the slabs and the requirement for excessive shuttering during construction.






## Delivery and Construction Management

### Energy Reduction & Onsite Reuse

- the site was divided into 5 zones, to be kept clean, with 5 people appointed as permanent waste collectors.
- clean building rubble and stone offcuts were used to backfill landscape terraces and under landscape mounding.
- steel bending and cutting schedules were used project-wide, with off cuts used for temporary works and reinforcement framing.
- timber for formwork was recycled and reused onsite where possible.
- all formwork nails were straightened and reused.
- at completion, formwork was cleaned and retained by contractor to be reused on future projects.

### Plastic Reduction

- single use plastic bottles were discouraged throughout the construction process.
- 2 water dispensers were located in the meeting room and staff room to supply the management and consultant team.
- the food supplier delivered water in bulk with each lunch deliver to supply worker teams.

### Off-site Waste Recycling

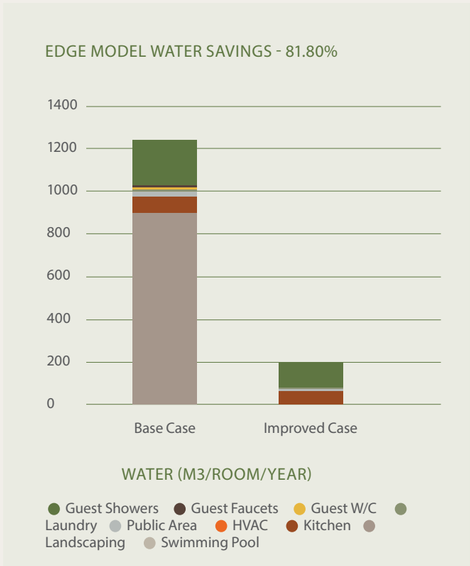
All waste was sorted by type throughout construction process; glass, plastics, metals, timber and food. However, during the construction process it was identified there was limited local infrastructure in place for waste management.

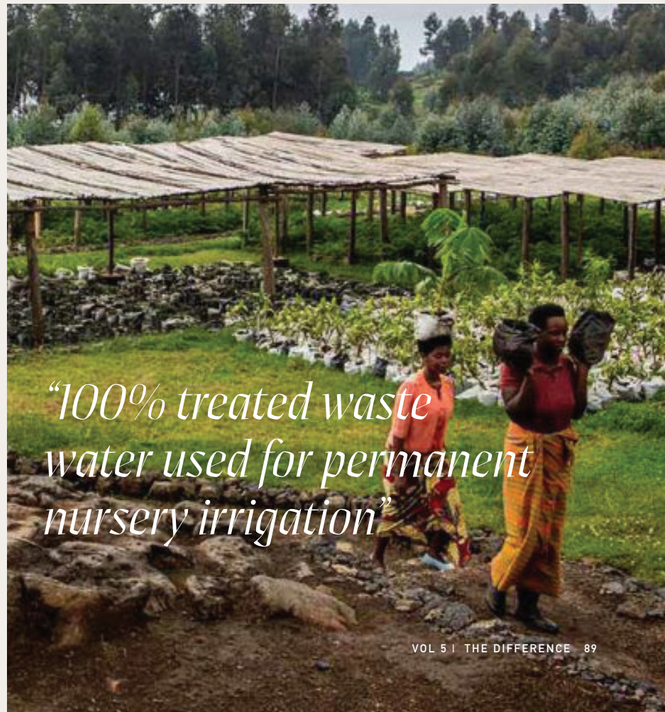
Informal practices were put in place to minimise the amount of waste directed to landfill, including:

- off-cuts of timber and plywood were used in the kiln process for the production of local clay bricks.
- any formwork off-cuts were collected and given to the surrounding villagers for firewood and/or for use in small domestic construction and repair projects.
- steel waste was sold to a local company for reuse.
- cement bags were reused as carry bags by local retail stores.
- paint cans were reused within the local community to carry water or produce.
- food waste was collected and distributed to local piggeries.

## Sustainable Water

Using water efficiency inbuilding, farming and manufacturing. Designing to avoid local issues such as flooding, drought and water course pollution.



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## Site Hydrology & Surface Water Management

The project site had been denuded by historic agriculture activity which included the heavy manipulation of surface water movement through agricultural furrows. As part of the commitment to rehabilitate this piece of land, understanding and restoring the hydrological functions was critical.

The first stage of this process was a hydrological survey and digital storm event modelling exercise to understand the site's geology, subsequent water movements and impact of the proposed development. The team used this information to reshape the land, removing agriculture furrows and reinforcing the primary and secondary watercourses.

Once this baseline structure was established, further design interventions were used to reduce the impact of the built structures and encourage the natural establishment of riparian habitats, including:

- raising all built structures off the ground on an elevated concrete and steel pier system.
- raising all road and pathway circulation networks to avoid inundation.
- strategic positioning of culverts and fjords as identified by the digital storm event model.
- elevating 40% of the guest boardwalk to allow seasonal flood events to continue below.
- a network of detention basins to slow water moving through the site and create habitat for riparian and aquatic species.
- vegetated roofs were installed to approximately 70% of the roof area, slowing the movement of water from roof surfaces back into the landscape.
- a detailed swale system was designed to divert water away from built structures and into watercourses.
- permeable surfaces in the landscape design where promoted where possible to slow runoff. Approximately 92% of the landscape is permeable.

*"Restoring the site's natural hydrological functions was a core objective of the project."*

*Singita Kwitonda Lodge, Volcanoes National Park, Rwanda*

• THOUGHT LEADERSHIP •

*Singita Kwitonda Lodge, Volcanoes National Park, Rwanda*

• A DISCUSSION •

# Wildchain: The Digital Conservationists

*We caught up with Wildchain to hear about their mobile gaming app that lets you digitally adopt wildlife and plant trees to cut your carbon footprint and support real-world conservation efforts. Actions in the game trigger real-world impact and players can raise funds for conservation.*

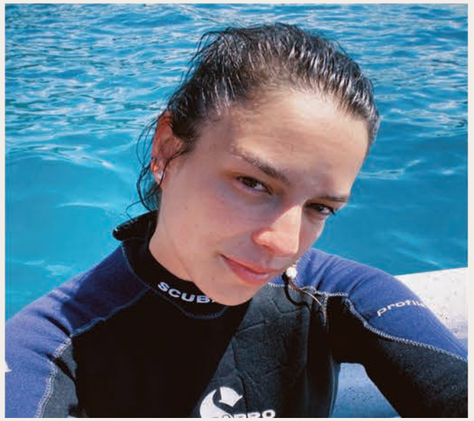
*In Wildchain, gamers become digital conservationists and can digitally adopt endangered animals and raise them from baby to adult, creating their very own wildlife sanctuary, blending the real and the digital worlds. We spoke to the Co-Founder, Florian Rehm, to learn more about this innovative concept below.*

### Who is behind Wildchain?

Our team is united by our joint love for animals and nature. We're a small, independent international team based in Thailand, India, Nigeria, Portugal, and France and we've followed our passion for wildlife and technology to create Wildchain. We use technology and gamification to tackle the biggest challenges for conservationists - lack of public engagement and lack of funding - and we have developed a solution for them that can be scaled across the world.



Wildchain



**Tell us about the inspiration behind Wildchain and can you explain the premise of the app to our readers?**

There was a defining moment, about 4 years ago, when the last male northern white rhino called Sudan died out. There is this famous photo by Ami Vitale that shows the last moments of Sudan, together with a ranger, and that photo had a huge effect on me and motivated me to try to support wildlife conservation somehow.

**We're at the beginning of a mass animal extinction. We've lost almost 70% of the world's wildlife since 1970. Today, over 37,000 species are threatened with extinction. In the next decade, 1 million species could be threatened. To avoid this mass extinction event, scientists estimate that we need to protect 30% of our planet by 2030. That requires us to double the conservation of land and waters and for that, we need an additional $45 billion per year.**

The big question is... how do we scale conservation funding? Governmental spending and philanthropy are not going to be enough. To mobilize funding at scale we need to create completely new fundraising structures.

So, we strategically looked for markets to tap into and quickly realized that the gaming market is massive. **There are over 2.2 billion active mobile gamers, and the global games market has a revenue of $180 billion.** Our idea was to tap into this huge market and create 'games for good'.

**As this issue is focused on Innovation, we are particularly interested in the pioneering concept and technology behind Wildchain, blending the real and virtual world. Could you tell us a bit more about the technology involved in this platform?**

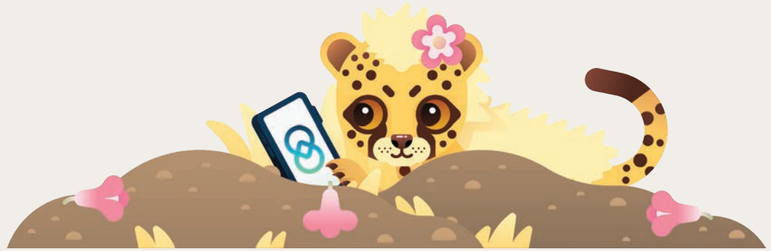
We're building a Play-to-Impact Web3 game. Wildchain utilizes real-world wildlife data from the IUCN Redlist and environmental data from OECD and UN Environment. We take the data and use blockchain technology to create scarce digital assets, called non-fungible tokens (NFTs). All the Wildchain NFTs are minted on a carbon-negative blockchain.

Each token is a digital representation of an animal living in the real world, one to one. For example, if there are 10 Vaquitas, the most endangered marine mammal, left in the world, there will also be 10 Vaquitas on the blockchain and in our game. Each animal in the game is a unique, digital counterpart of an animal living in the wild. Just by playing the game and virtually adopting these critically endangered animals, you can create donations to real-world conservation projects and help protect the natural habitat of wildlife species, plant real trees, or back a wildlife ranger.

100% of our profits go towards wildlife conservation initiatives. But the way we allocated those profits is new. We want donation transparency to be end-to-end, from donors' pockets to last-mile conservationists, scientists & rangers. Users will be able to actively allocate where their donations go on a transparent Kickstarter-





like platform which will give visibility into the impact they have created.

In Web2 Games, what happens in the game, stays in the game. Value is extracted from the player instead of being shared with them. Now with the Web3 innovations, such as NFTs, it allows game items to be traded for cryptocurrency, which can subsequently be transferred to fiat money.

Wildchain harnesses cryptocurrency to reward players with something that has real-world – as well as virtual-world – value. Rewards given in Wildchain are NFTs and our 'WILD' token. The NFTs represent an in-game asset - in our case endangered animals as part of the game. Once players have earned them, these NFTs can be traded for other assets within the game or given up for adoption for cryptocurrency on our carbon negative NFT marketplace.

Many people are still skeptical about play-to-earn games and can't believe that someone can make a living by playing games. But already today in rural Philippines, Play-to-Earn games are putting food on the table, as explored in the documentary 'Play-to-Earn: NFT Gaming in the Philippines'. It's the next

evolution in games after free-to-play and mobile games.

**To ensure positive impact, you have an impact framework in place. Can you tell us how you formed this framework and how this drives your business?**

Our goal is that fund utilization can be viewed and verified in a transparent manner and projects can share exactly how their contributions are used and tie donations directly to the impact of their project. This aims to give grassroots projects more exposure and access to a stable stream of funds from a global community, empowering conservation, and research like never before. The donation experience itself will be gamified with unlockables, challenges, leaderboards, awards, and competitions to empower and mobilize our community of digital conservationists.

We're doing that by creating a Decentralised Autonomous Organisation (DAO). Our profits are added to the DAO each month and distributed based on voting by the players and player in-game actions. We've developed an Impact-Output-Rubric with an impact scorecard, that our experts (conservation curators) use to screen the conservation projects that apply for grants. Our community can then vote to allocate the funds of our DAO to support approved conservation initiatives. The initiatives report the created impact back via an impact measurement framework. If the charities do a good job at impact reporting, it is more likely that players will award them with another grant in the future.

By turning our game revenues into funding for projects selected by players that perform actions in the game, our incentive systems align the interests of the project. With a potential of up to 2.2 billion mobile gamers, we can channel funds from entertainment into environmental impact.

**How would you describe the positive impacts to date achieved by Wildchain in protecting wildlife, their habitats, and the communities that surround them?**

We're still testing a lot of features of the game, and it is not publicly available yet. However, Wildchain has already:

- Planted 18,300 mangroves in Maputo Bay in Mozambique.
- 163,602 KG of $CO_2$ offset per year for the next 25 years.
- 183 Workdays for people in poverty in Mozambique created.

**Education plays a big part in understanding the importance of wildlife and our interconnected relationship with it from a young age. How do you raise awareness around the threats facing our wildlife and the natural world?**

Since 2017, there has been a growing body of literature highlighting the part games can play in educating users on societal and environmental issues. Despite Wildchain not specifically being marketed as an educational tool, everything it encompasses has the potential to be just that - for kids and adults. In Wildchain, we educate players of all ages and nurture a love for the natural world. Flora and Fauna information in Wildchain is scientific information, which will train players to become more knowledgeable in the natural world, including how we impact the world and the threats to endangered animals.

By providing a tool for anyone to make a positive change in the world, we're building communities of people who want to make a positive impact. We think public participation is the key to creating a better future for our planet, and Wildchain aims to reinforce the message that everyone can, and must, "play" their part.

Players are supporting conservation initiatives through creating awareness and funding. Players play a leading role in selecting projects that will receive funds. As a result, players will also learn about various initiatives, problems they address, the theory of change, and the impact they hope to achieve.

Wildchain doesn't buy into our instant culture - players must work and wait to make a difference, further ingraining life lessons of mindfulness and patience.

**What's next for Wildchain?**

At the moment, we're implementing some key features, while we are currently testing the alpha version of the game with our initial Kickstart backers and are planning on releasing the next update in August.

We're then looking to raise more funds to target a launch of our NFT Marketplace and an invite-only beta version of the game in October 2022.

www.wildchain.io

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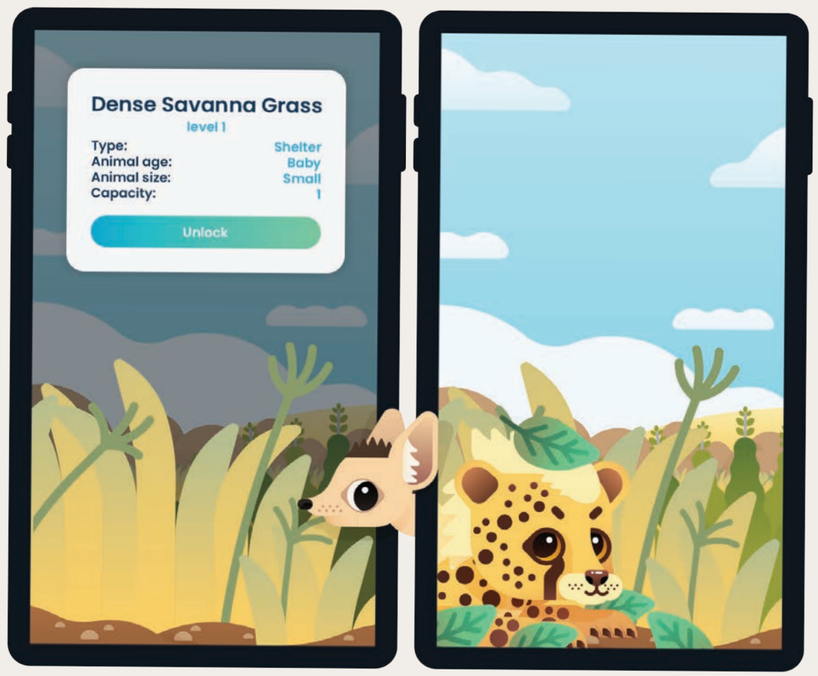
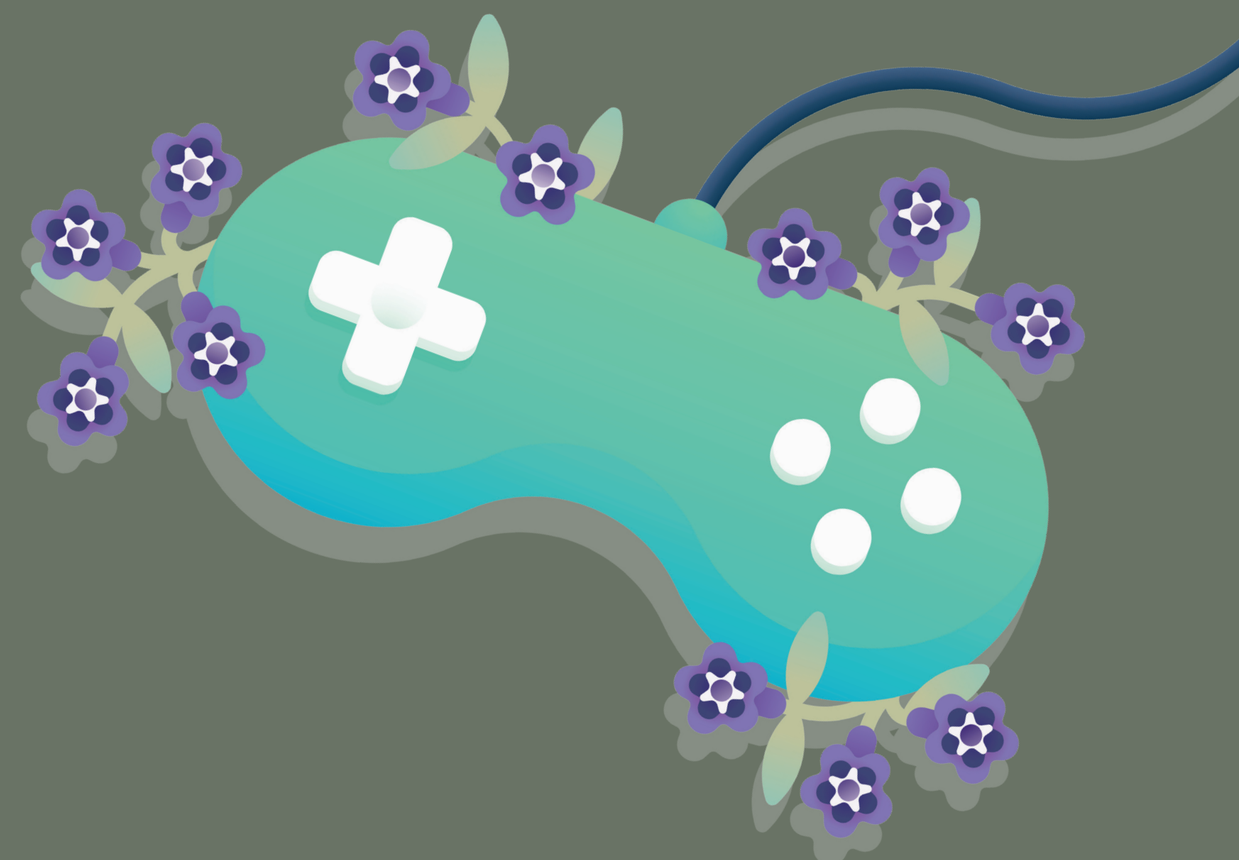







# "Game for Good"



# 'Sirkon' the Lion

Our founder Paul Milton, has welcomed 'Sirkon' home - one of the incredible pieces that made up the Tusk Lion Trail in 2021. The global art trail featured an impressive array of lion sculptures, celebrating the iconic predators and those who dedicate their lives to protecting them.

This majestic sculpture, created by Paul Onditi, reflects the growing impact and challenge of the human-wildlife conflict faced by communities living alongside national parks. Kenyan artist, Paul Onditi is part of a generation of young African artists working on the continent whose engagement with contemporary art is rapidly gaining international attention.

'Sirkon' was auctioned at Bonhams London in November 2021, where funds raised across the auctions were donated to African Community Conservation Foundation and Tusk, to support their critical work in protecting endangered species and empowering communities across Africa.





# Mission Blue Hope Spot

We are delighted to announce that the Inhambane Seascape of Mozambique - a Globally Outstanding marine conservation area as rated by the IUCN and a potential UNESCO World Heritage Site - was declared by Dr. Sylvia Earle and Mission Blue as the first Hope Spot of 2022, as part of a network of Marine Protected Areas (MPAs) developed to protect these significant areas for biodiversity.

In June 2018, Farquhar LLC, represented by Milton Group, entered into a Public-Private Partnership (PPP) with the National Administration for Conservation Areas (ANAC), holding the collective aim to protect 1.2 million acres of land and marine habitat at the southernmost tip of the globally important Bazaruto Archipelago, a critical part of the Inhambane Seascape. It is home to an exceptional diversity of marine species including iconic marine megafauna such as whale sharks, manta rays, migratory humpback whales, five of the world's seven species of sea turtle and one of the largest remaining populations of dugongs in the West Indian Ocean. Our expert conservation partner in Mozambique closely assisting us with this aim, Dr. Andrea Marshall and her team at Marine Megafauna Foundation, have been recognised by Mission Blue for their continued dedication to saving threatened marine life using pioneering research, education, and sustainable conservation solutions and for striving to assist the Mozambican government in meeting the UN Convention on Biological Diversity to formally protect 30% of its marine resources by 2030.

# The Ellen DeGeneres Campus

We would like to extend our congratulations to the Dian Fossey Gorilla Fund for their new permanent headquarters, the Ellen DeGeneres Campus, Rwanda, which opened in February of this year, continuing Dian's vital work towards saving the critically endangered mountain gorillas.

The Campus is situated upon 12+ acres adjacent to the Volcanoes National Park in the northwest of Rwanda, an area globally recognized for its growing population of mountain gorilla. ACCF and Milton Group kindly arranged for world-renowned photographer David Yarrow to donate five of his framed limited edition large format prints to the foundation. These photographs were taken of the mountain gorillas in the park and are now on display at the Campus.

The facility is comprised of multiple buildings focusing on conservation, education, and scientific research - including the Rob and Melani Walton Education Center and Sand and Harold Price Research Center, which focus on educating future conservationists and advancing the science needed to safeguard the future of the mountain gorillas that reside within the slopes of this mountainous habitat.

The Campus also supports our partner, the Rwanda Development Board, in their mission to address conservation threats through sustainable tourism development by providing tours of the campus and environmental education to visitors of the park.

To read more about the Campus click the link below.

**www.gorillafund.org/ellencampus/**

*1 Like Father Like Son*
*2 The Pilgrim, Conservation Gallery entrance*
*3 The Governor*
*4 King Kong, Education Center library*





*The Thinker, Karisoke Research Center*

KARINGANI
PEOPLE WILDLIFE CONSERVATION

# Hyena Relocation

Earlier this month, a clan of hyenas from Karingani Game Reserve were captured and moved to the Karingani temporary predator holding facility to be donated to Gorongosa National Park, with a view to returning this species back into the landscape. Hyenas are a critical component to the ecosystem, so this reintroduction will continue to help build upon the biodiversity and conservation of the park.

Not only are hyenas scavengers, but they are also proficient predators and help maintain healthy herbivore populations by predating on the sick, elderly and weak herbivores. Due to their powerful jaws and unique digestive system, they are able to consume bones – which means their excrements are extremely high in calcium and phosphorous. These calcium deposits recycle key nutrients back into the environment. Many reptile species, such as tortoises, consume the excrement as an added source of calcium to their diet.

Gorongosa National Park in central Mozambique is dedicated to the protection and enrichment of their biodiversity-rich landscape. After the civil war, spotted hyenas were extirpated from the area, and now Gorongosa is ready to bring these important carnivores back into the system. Karingani, dedicated to restoring landscapes, was proud to support and collaborate with a similar initiative by donating a clan of spotted hyenas.

On 13th July, through a collaborative conservation initiative with Administração Nacional das Áreas de Conservação, Gorongosa National Park, Karingani and the Mozambique Wildlife Alliance, the hyenas were transported by aircraft to their new home in Gorongosa National Park. The clan will be given an adjustment period to acclimatise to their new surroundings in a holding facility at Gorongosa and then will be released into the park. This historic move showcases Mozambique's dedication to conservation through collaborations to restore and protect biodiversity.

*"I invite all to join the goal of mapping 80 per cent of the seabed by 2030. And I encourage the private sector to join partnerships that support ocean research and sustainable management."*

UN Secretary-General António Guterres,
United Nations Ocean Conference 2022.


We'd like to thank our contributors & partners for their valued input on The Difference Volume 5.

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