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CASE STORIES

Community-led Conservation & Acoustic Monitoring in Action

A pilot study with Wild Survivors in Tanzania's Rukwa-Katavi ecosystem

Key insights

- Monitoring species presence and habitat use can help communities make better land-use decisions, reduce elephant conflict, and strengthen stewardship. Biodiversity data becomes a tool for coexistence, not just science.
- Acoustic monitoring is a cost-effective, scalable, and non-intrusive way to track species presence and activity. It also captures soundscapes that provide insights into ecosystems.
- Even a small-scale deployment of five recorders and cameras over four months produced valuable insights. This shows how pilots can lay the groundwork for long-term monitoring programs.
- Birds are reliable indicators of ecosystem health and biodiversity. Monitoring them offers early warnings of ecological change, supports community engagement, and even helps track elephant impacts on habitats.
- Suggested next steps include expanding recorder coverage, monitoring year-round, improving AI species detection, engaging communities with results, and building long-term acoustic biodiversity archives.

Fostering Coexistence & Biodiversity Protection in Tanzania's Rukwa-Katavi Ecosystem is a comprehensive, community-driven initiative that aims to safeguard elephants and village forest reserves by promoting sustainable livelihoods based on beekeeping and regenerative agriculture. Launched in 2024 by **Wild Survivors** in collaboration with villages bordering Katavi National Park, Luafi Game Reserve, and Mpwimbwe Wildlife Management Area (WMA), the multi-layered initiative is supported by **Save the Elephants**' Elephant Crisis Fund - a joint program with the **Wildlife Conservation Network**.

The initiative includes a biodiversity monitoring pilot in partnership with **biometrio.earth**. The pilot explores the use of nature tech with biometrio.earth's **IN-SITU STARTER solution** in selected sites in the Mpwimbwe WMA. Pairs of wildlife cameras and acoustic recorders were positioned in five buffer zone likely used by the elephants as they transit through the broader Rukwa-Katavi landscape.

In addition to deploying wildlife cameras and processing global geospatial datasets, the pilot integrated an innovative use of acoustic monitoring. By deploying compact, weatherproof **Wildlife Acoustics Song Meter Micro 2 recorders**, we captured nearly 37,000 sound files across 150 days, providing a new lens through which to understand biodiversity and habitat health.

This case study summarizes the acoustic monitoring approach and results, and reflects on their value for community-based conservation in one of East Africa's most critical wildlife landscapes.

The context: coexistence in the Rukwa-Katavi ecosystem

The Greater Rukwa-Katavi ecosystem spans over 92,000 square kilometers and remains one of East Africa's largest, most ecologically intact wildlife landscapes. It supports a wide range of habitats, including Miombo woodlands, wetlands, and river systems, and is home to East Africa's largest elephant population. The Mpimbwe WMA, at the edge of Katavi National Park and Luafi Game Reserve, is a community-managed area that serves as both buffer and corridor for elephants moving between protected areas and surrounding farmland.

Despite its ecological richness, the landscape faces growing pressures. Expanding agro-pastoral settlements, shifting land use, and encroachment into forest reserves have intensified competition between people and wildlife. Crop-raiding by elephants in particular causes significant economic losses for farmers, leading to conflict and undermining conservation goals.

Wild Survivors, a locally led organization, has been working with communities in Tanzania to address these challenges. Their approach combines practical tools to reduce conflict, such as beehive and chili fences, with efforts to restore degraded forests, promote alternative livelihoods, and safeguard elephant movement routes. In Mpimbwe, coexistence toolkits such as beekeeping initiatives provide farmers with income while reducing crop losses by elephants and conserving biodiversity.

The biodiversity monitoring pilot was designed as a complementary layer to these initiatives. By generating data on species presence and habitat use, monitoring can help communities and conservation partners make better-informed decisions about land use, resource management, and elephant conflict mitigation.

Why acoustic monitoring?

Conventional biodiversity surveys can be costly, time-consuming, and limited in coverage. Acoustic monitoring offers a powerful complement:

- **Non-intrusive and continuous** – digital microphones can operate day and night for months at a time, capturing wildlife vocalizations without disturbing the environment.
- **Scalable and cost-effective** – once deployed, recorders can collect large volumes of data across multiple sites simultaneously.
- **Broad applicability** – birds, frogs, mammals, and even insects produce vocalizations that can be identified and analyzed.
- **Soundscape insights** – beyond individual species, ecoacoustic methods reveal patterns in the overall sound environment, which reflect ecological processes and habitat health.

The pilot deployed five Wildlife Acoustics Song Meter Micro 2 recorders, chosen for their compact design, affordability, and durability.

Setting up Song Meter Micro 2 recorders, chosen for their compact design, affordability, and durability.
Credit: Wild Survivors.

With weatherproof housings, flexible recording schedules, and up to 280 hours of capacity per deployment, these devices are well suited to remote field sites like Mpimbwe.

Alongside five **Solaris** camera traps, the recorders were positioned in the northern part of the WMA, where elephant movement was expected to be most frequent according to the essential connectivity locations. This area, designated by villages as a buffer zone, is a critical interface between community lands and national park boundaries.

Data collection and scope

Over the course of 150 monitoring days, the recorders generated nearly 37,000 audio files. These were analyzed using automated tools and machine learning models, focusing on two complementary approaches:

- **Ecoacoustics** – examining the full soundscape to identify differences in acoustic activity between habitat types.
- **Bioacoustics** – detecting and identifying individual species, particularly birds, from their calls.

While the sampling effort was modest - just five monitoring nodes over a four-month period - the dataset provides a valuable starting point. It demonstrates how even small-scale deployments can yield actionable insights, and how acoustic monitoring could be expanded into a more comprehensive, long-term program.

Ecoacoustic results: listening to habitats

The soundscapes recorded in Mpimbwe revealed clear differences between habitats. Each habitat - grassland, shrubland, and forest - demonstrated its own distinct acoustic communities, characterized by unique groups of vocalizing species.

- Grasslands and forests showed higher levels of species activity, with vocalizations spanning a wider range of frequencies.
- Shrublands were less acoustically diverse, suggesting lower species richness or different community structures.

These findings provide early evidence that habitat types within the WMA support distinct ecological communities. This knowledge can help guide conservation planning, for example by identifying habitats that are particularly rich in biodiversity or especially sensitive to disturbance.

Bioacoustic results: voices of the birds

Birds are a major focus of bioacoustics as they are both highly vocal and function as valuable ecological indicators. Even with the limited sampling, the pilot detected approximately one-third of the bird species ever reported in the broader region – an impressive result given the small area and short time frame.

Elephant herd in Mpwimbwe WMA captured by Solaris trail cameras.

Notable detections included:

- Grey Plover (Pluvialis squatarola) – a vulnerable species that is rarely found inland, more commonly associated with coastal areas.
- Gray-olive Greenbul (Phyllastrephus cerviniventris) – a species with a relatively restricted range and highly distinctive calls.
- Crowned Hornbill, Purple-crested Turaco, and Crested Barbet – visually striking species that also play important ecological roles, such as seed dispersal.

Hornbills, for example, are keystone species in forest ecosystems. By dispersing seeds over long distances, they sustain plant regeneration and forest structure, thereby supporting a wide range of other species. Their presence in Mpimbwe is a positive sign for ecosystem health.

Why bird detection matters

Birds are among the most widely used indicators of biodiversity and ecosystem condition. They meet many of the criteria for effective ecological indicators: they are widespread, well studied, relatively easy to detect, and highly responsive to environmental change.

- **Birds provide early warning systems.** Changes in bird populations often reflect broader ecological shifts, such as habitat degradation or climate impacts.
- **Birds function as proxies for ecosystem health.** Bird diversity is often correlated with diversity in other groups, making birds a useful barometer for overall biodiversity.
- **Birds for community engagement.** Birds are highly visible and charismatic, making them powerful tools for raising awareness and building local stewardship.

In elephant landscapes, birds can also provide indirect insights into elephant impacts. Some forest-dependent species may decline if elephants reduce tree cover, while other species may benefit from the more open undergrowth that elephants create. Monitoring bird communities can therefore help track the cascading ecological effects of elephant populations.

Challenges and limitations

As with any pilot, there were limitations. The restricted number of sites and relatively short monitoring period meant that rare or shy species may have gone undetected. In addition, global machine learning models used for species identification are still limited by a lack of training data for many African birds, particularly rare or threatened ones. **Expert validation of detected species**, an important step in biodiversity monitoring included in **biometrio.earth's COMPLETE** solution, was also beyond the scope of this pilot.

Nevertheless, the results highlight important insights that can be useful for current community conservation management but also for designing a more comprehensive biodiversity monitoring plan.

Building on the pilot

The Mpimbwe pilot demonstrates that acoustic monitoring can generate meaningful biodiversity data while being cost-effective and scalable. The next steps could include:

- **Expanding coverage** – deploying more recorders across additional habitats and villages to build a comprehensive picture of biodiversity in the WMA.
- **Year-round monitoring** – capturing seasonal variations in species presence and activity.
- **Improving AI models** – incorporating recordings of rare and endemic species to refine detection algorithms.
- **Community engagement** – using recordings and visualizations to share results with local stakeholders, strengthening awareness and support for conservation.
- **Long-term biodiversity archives** – creating acoustic libraries for understudied tropical regions, providing a resource for future research and conservation planning.

By listening to the landscapes of Mpimbwe, the pilot has revealed patterns of biodiversity that were previously undocumented. These insights are not just scientific data points, they are tools for coexistence. By understanding how species use habitats, where elephants travel, and how ecosystems change, communities can better plan land use, reduce conflict, and strengthen stewardship of their landscapes.