Pachyderm

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Designing conservation education as a living system: lessons from Borana Conservancy

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Introduction

Borana Conservancy forms part of a wider network of interconnected conservation efforts on Kenya's Laikipia Plateau, supporting growing populations of both black and white rhinoceros, alongside other wildlife, including migratory elephant populations. Since introducing black rhinos in 2014, Borana has seen steady population growth and has recorded no rhino poaching incidents for over a decade.

These achievements are part of a broader landscape-scale approach to conservation, in which the management of neighbouring protected areas is coordinated through linked wildlife corridors, shared monitoring systems, joint planning and engagement with surrounding communities to support both wildlife and people.

Just as conservation knowledge and experience are shared across this landscape, Borana's community education initiatives have generated lessons that may be useful beyond the conservancy itself. This article draws on the implementation of Borana's conservation education programme to share practical insights for practitioners, educators, and organisations seeking to strengthen environmental learning and conservation engagement in their own contexts.

In 2022, Borana Conservancy established *Mazingira Yetu* ("our environment" in Swahili), a structured conservation education programme for local school children and adult community groups living around the conservancy in Laikipia. The programme was designed to increase meaningful access to the conservancy landscape, while catalysing locally grounded environmental action. Facilitating such access was seen as essential for strengthening connections to local ecological and cultural heritage and demonstrating conservation practices with direct relevance to everyday life—especially regarding sustainable food production, land stewardship, and cattle grazing.

We published an article in 2022 (Hennery et al. 2022) outlining our approach: a context-driven form of conservation education, which we understood at the time as learning that was relevant, practical, and rooted in the participants' own experiences. Building on this understanding, we continued to refine our programme.

Our experience now demonstrates that education programmes designed for sustained local action must extend beyond relevance alone to actively cultivate

networks of peer relationships that catalyse learning, collaboration and local ownership. Such networks require clear roles, feedback loops and ongoing engagement across schools and communities. This systems approach lies at the heart of our argument for effective conservation education.

For those working in conservation, this has clear implications for the design of education programmes. Healthy ecosystems function most effectively through connected relationships that allow them to adapt and endure over time. When education is designed similarly, it can move beyond one-off encounters and support learning that lasts.

Looking more deliberately to nature for guidance, we began to shape *Mazingira Yetu* as a living system, not a fixed intervention—one able to adapt, diversify, and respond to feedback over time. This approach informed an iterative programme design and prompted the development of a clearer Theory of Change, aimed at embedding environmental understanding in light of new challenges Kenyans in semi-arid areas are facing, and supporting a broader cultural shift in response to these local environmental concerns.

When design met reality

Mazingira Yetu was designed around the "Head, Heart, and Hands" framework (Sipos et al. 2008), bringing together cognitive understanding, emotional connection, and practical engagement with conservation.

The programme brought primary school students (grades 5 and 6 in the Kenyan education system, typically aged 10–12) from 10 local schools into the conservancy through guided field trips. It also worked with adult community groups and hosted community events to support shared learning and conservation discussions.

Over time, we saw that our approach supported learning but did not consistently translate into sustained conservation action. The programme had initially assumed that exposure through field visits would translate into practical conservation projects at the school level, but this did not occur consistently across all partner schools. Knowledge and attitudes improved, yet ongoing conservation practices, especially at the school level, remained limited.

Nurse plants

A few partner schools created new solutions to challenges such as waste management or deforestation; most did not, even though they faced the same environmental pressures. This was not due to lack of motivation or knowledge. Instead, uneven conditions across schools mattered: teacher experience, knowledge transfer, access to resources, and the presence or absence of existing school-based projects to build on.

A critical insight was that contextual education must strengthen the systems that support action, rather than simply deliver content. In practice, this meant recognizing that many teachers lacked the confidence, time, and practical pathways needed to initiate and sustain projects, and that one-off field trips did not provide sufficient follow-up to support action. In nature, nurse plants create the conditions that help other species take root and grow. We understood the need for similar support structures within our education network to help build and share capacity across schools.

Teacher workshops and peer exchanges were introduced to address these gaps and became an important 'nurse' system within the programme. Educators could share challenges, pragmatic solutions, and local innovations, with the support of more experienced teachers and programme staff. This form of experiential learning facilitated knowledge transfer while building confidence and skills across schools, strengthening the programme beyond a few isolated successes.

One teacher from the school closest to Borana became an important anchor within the network. His creativity and passion led to strong ecological projects. We used his school as a demonstration site during teacher workshops. Other educators observed projects in a familiar setting. They also exchanged ideas with programme staff and local teachers. These exchanges let teachers see real projects, discuss local challenges, and find ideas for their own schools.

Over time, this approach contributed to increased teacher understanding, confidence and more intentional project development at schools where such initiatives had previously been absent, with educators more willing to seek support and collaborate across the network.

Lesson 1: Build 'nurse' systems into programme design

Be intentional and clearly incorporate mechanisms for peer learning and information sharing as core components of your programme. Deliberately establish 'nurse' systems that recognize and leverage local expertise to build capacity throughout the network, ensuring the programme supports sustained action.

Ecological succession

Mazingira Yetu initially relied on the 'Head, Heart, and Hands' framework as a stand-in for a Theory of Change (ToC), on the assumption that increased knowledge and shifting attitudes would lead directly to conservation action. However, over time, this proved insufficient. Ecological succession offers a useful way of thinking about change. Ecosystems grow through stages over time, with each stage laying the groundwork for the next. Progress depends on the conditions being right, and when later-stage outcomes are forced too early, they rarely last.

Our ToC needed to pay closer attention to the conditions that enable action. We found that without the skills, knowledge transfer, resources, and supportive environments needed to act, behaviour rarely changed, even when learning and motivation were present. Thus, learning leads to change only when it is embedded within the social, ecological, and institutional contexts that shape people's ability to act.

In its simplest form, our new ToC shows learning moving through four interconnected stages, with competence filling a critical gap between motivation and sustained participation:

We further recognized that competence deepens over time through repeated cycles of exposure, practice, and reflection (Vitello et al. 2021). A single day trip to Borana Conservancy, however impressionable, was not sufficient on its own. Instead, the programme needed to be embedded within ongoing cycles of learning, support, and follow-up in local schools, creating the conditions for participation to emerge and last.

We needed practical pathways for teachers, structured follow-up for learners, and ongoing support at school level. Via a two-year learning cycle, Grade 5 was more intentionally framed as the foundational year, with a focus on building ecological understanding and connection to the landscape. Grade 6 then became the key leverage point for translating knowledge into action through school- and community-based outreach work, mentoring, and practical project implementation. This intentional scaffolding of learning was supported by teacher-to-teacher mentoring and the introduction of structured tools such as a school site review process to help learners and teachers identify context-specific challenges and design relevant projects.

We made use of Waitabit—a local permaculture site that supplies fresh produce to Borana's tourism operations and staff—as a living classroom where students and community members can engage directly with regenerative agriculture in practice. This helped bridge the gap between knowledge and applied competence. In parallel, the *Mazingira Yetu* Express (Fig. 1), a modified overland vehicle, extends place-based learning into the wider conservancy, enabling in situ engagement with wildlife, landscape processes, and land stewardship.

This shift in our ToC helped reframe the programme from a sequence of learning activities to a more intentional, staged process in which competence is developed over time through structured support, creating a stronger foundation for participation to emerge.

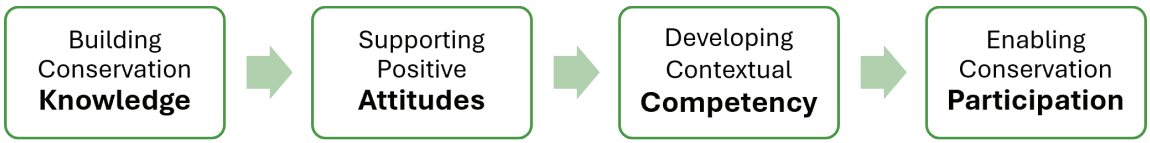

Figure 1. Mazingira Yetu Express.

Lesson 2: Do not assume succession. Design it

Just as ecosystem succession develops through stages of growth and consolidation, education programmes must intentionally build the conditions that allow learning to progress into action, rather than assuming later outcomes will emerge on their own.

Feedback loops and growth

Mazingira Yetu initially envisioned large community events, hosted annually at each partner school as a way to amplify messages, share the results of school projects, and raise conservation awareness. These events were framed as moments of visibility and outreach, with the expectation that many events would take place across the network each year to maximize reach.

In 2024, during initial planning meetings, feedback from local teachers made it clear that large annual events could place pressure on schools without necessarily deepening learning or community ownership. Teachers emphasized the need for preparation time and strong learner involvement. In response, from 2025, we moved towards a co-designed process, using regular school visits to plan community event themes, prepare learners as messengers, and shape events around local priorities.

As we adopted a more participatory approach and co-designed events with local teachers, the purpose of the community events began to shift. Rather than prioritizing breadth alone, teachers emphasized how the community events should focus on a deeper connection, experiential, shared learning, and collective reflection. We learned that the value of community events lies not in scale, but in intentional design. This led to a shift from planning many events to hosting just two community events per year, held at rotating schools and attended by clusters of nearby schools.

When structured as moments of consolidation and celebration rather than information-heavy and wide-reaching campaigns, the events proved most effective.

Lesson 3: Design for depth, not volume

Sustained impact is built through depth. Like healthy ecosystems, nascent programmes benefit from growing slowly, doing fewer things well, learning from feedback to shape how and where growth should occur, and what can be discarde as not useful. Scale should follow insight, not precede it.

We had learned that fewer, well-designed annual community events held in rotating locations could create more lasting impact than frequent, 'one-size-fits-all' engagements across multiple schools. Depth and intentionality (i.e. quality of interaction) mattered more than frequency.

This insight became an important feedback signal for the wider programme, and lessons were acknowledged. The principle that depth was more effective than volume, first observed in community events, was subsequently applied to other core activities informing how the grade 5 and 6 field trips and school-based support were sequenced across the programme. In living systems, feedback rarely operates in isolation; signals often emerge in one part of the system and prompt change elsewhere.

We therefore reassessed how scale was being pursued in the conservancy field trips. An early emphasis on volume, measured by the number of learners visiting Borana each year, had begun to strain programme staff capacity, and if left unchecked, could risk undermining programme quality. We reduced the number of field trips per school per year, shifting our focus from reach to depth. Slowing down created space for better preparation, reflection, and more sustained support. Growth took a different form: not only upward, but also outward and going deeper. This reflects how, in many cases, less proved to be more.

Reducing the number of field trips created space for more focused monitoring and evaluation. This enabled the programme to strengthen its feedback processes by more deliberately using thematic analysis, including the development of a shared codebook to standardize reflection and allow findings to be compared across schools and over multiple years. Moving beyond participation numbers gave us deeper insight into how attitudes towards wildlife, land use, and conservation stewardship were shifting over time, allowing these signals to more meaningfully inform future programme design.

Resiliency through roles

Initially, we had planned for activities to take place primarily at the Borana Education Centre. However, when we observed local teachers independently leading successful environmental projects, we recognized these as important 'nurse systems' with significant potential for growth. Through working more closely with schools and teachers, we gained insights into succession, competence building and why some initiatives failed to translate into sustained action. We also learned from large community events that, in some cases, less is more: depth of engagement and consistent follow-through can be more effective than scale. Together, these lessons led us to view the school site, rather than the education centre, as the most important setting for sustained learning and action. At the same time, we recognized that meaningful continuity could not depend on already overburdened

Lesson 4: Design for evolving roles

Learning from feedback only matters if roles/understanding can change. Conservation depends on people being placed where they can support follow-through, experiential learning, and adaptation in response to wider environmental concerns. Embedding roles in local contexts allows them to evolve and be reorganized when gaps appear.

Lesson 5: Adaptive design requires stable foundations

Stay anchored to your purpose and hold core design elements steady long enough to mature. In living systems, change is balanced by continuity, and stability creates the conditions for meaningful feedback. Adapt what surrounds the work, not its roots, because adaptive systems reveal what is truly working only when their foundations are strong.

teachers taking on additional responsibilities without support. To strengthen relationships between schools and Borana's conservation education team and provide more consistent engagement, we restructured key programme roles, including the introduction of an outreach officer, to better align with community needs.

Mazingira Yetu moved from an educator-and-assistant model to one incorporating distinct centre officer and outreach officer roles, creating dedicated responsibility for school follow-up, teacher mentoring, and community engagement. This enabled more regular school visits, stronger support for teacher-led environmental projects, and deeper engagement with adult community groups working on conservation projects, allowing learning to extend beyond the conservancy into everyday school and village life.

Through these refined roles, the programme continued to shift energy away from volume of field trips and towards sustained school-based engagement. This created stronger conditions for skills development, follow-up, and accountability, reinforcing the competence stage of our theory of change. The outreach officer role allowed school project progress to be monitored and support to be adjusted in real time, while also building the practical resources and relationships needed for schools to lead initiatives more independently over time.

In addition, during learner field trips to Borana, engagement with other conservancy departments exposed young people to the diverse careers and functions that sustain the landscape, broadening their understanding of conservation beyond wildlife. In this way, conservation awareness and education became embedded across the conservancy's broader work rather than resting with a single team. We had many volunteers from the workshop staff, security personnel and wildlife monitoring teams come and talk to the students during field trips, expanding the educator role and diversifying the knowledge provided.

The programme had always engaged a small number of adult groups during the school holidays, bringing them into the conservancy for daytrips. With the creation of the outreach officer role, adult groups were more intentionally targeted, and outreach activities supported the formation of specific groups of adults with defined needs, such as composting or rangeland management. Tailored sessions were then designed and delivered at the education centre located at Borana HQ, or at the demonstration farm, with follow-up visits to support groups in applying what they learned.

Stability in an adaptive system

While *Mazingira Yetu* remained open to adaptation, we also learned the importance of stability. Not all elements benefit from constant adjustment. In practice, there was a risk that frequent changes to programme structure would prevent learning processes from fully taking root, making it difficult to understand what was working and why. In living systems, growth depends on a balance between change and continuity.

School-level delivery of conservation education has remained focused on students in grades 5 and 6 through a two-year rolling curriculum, which includes two conservancy visits. While grade 5 focuses on building foundational understanding, grade 6 seeks to apply this learning in school settings and initiate conservation projects. Altering this structure in mid-cycle would disrupt conservation learning before its effects could be observed. Holding the design steady allowed its full benefits to surface.

The education centre located at Borana HQ continued to function as a consistent hub of learning, where conservationists, educators, and learners meet, exchange ideas, and deepen practice. In parallel, engagement with adult community groups has been

sustained through targeted trainings, including in permaculture and land-use practices. These parallel learning pathways reinforced the idea that conservation education unfolds across generations, rather than in isolated cohorts.

Within this stable learning framework, the programme continued to deepen its teaching tools through interactive approaches such as rhino-tracking role play, biofact boxes featuring skulls, feathers, and dung samples, and camera trap footage, which revealed the hidden life of the conservancy. These consistent learning tools helped anchor curiosity and ecological understanding across programme cycles.

Therefore, what changed was the depth and structure of support surrounding the programme, not its direction. Rather than uprooting what was already growing, we focused on strengthening the conditions around core elements, allowing learning, competence, and participation to mature over time. This included more intentional follow-up in schools, clearer progression between learning stages, and improved alignment among programme activities. The balance between stability and adaptation proved essential to system-based design, ensuring that change was informed, deliberate, and grounded rather than reactive.

This commitment to stability also extended beyond programme delivery into how the team maintained its purpose over time. Early in the development stage, we convened management and implementation staff in a facilitated session to co-create a shared purpose statement. Core Borana stakeholders worked together to articulate the programme's deeper vision and direction, grounding it in a shared understanding of the landscapes, communities, and futures we hoped to support. This written statement has since served as an important anchor for decision making, allowing new initiatives and adaptations to be tested against a clearly held purpose. In this way, stability was not about resisting change, but about ensuring that change remained aligned, transparent, and rooted in a shared vision.

Conclusion

Treating *Mazingira Yetu* as a living system has reshaped how we understand both problems and solutions in conservation education. By looking to the landscapes we seek to protect, we found guidance in the ways natural systems organize, adapt, and sustain themselves over time. People are central to these landscapes, and meaningful conservation therefore depends on shared stewardship, supported

Figure 2. Teabreak during classroom discussions.

by education that enables participation rather than assuming it.

Over the years of implementing *Mazingira Yetu*, we realized that learning cannot be confined to the conservancy alone. Sustained action required differentiated roles, deliberate follow-up, opportunities for practice, and spaces for peer learning within communities. Education needed to be deeply contextual to move with people, roles, and relationships, across schools and villages, rather than remain concentrated in a single site. It should be designed as a system of interconnected activities, with built-in mechanisms for reflection, feedback, and adaptation. Not a finished product, but an evolving practice.

These lessons extend beyond Borana. For those working in conservation education elsewhere, we offer this invitation: learn from practice, listen closely to your landscapes, and be willing to adapt. Like living systems, education programmes thrive when they remain able to learn, responsive, and grounded in the realities of the people and places they serve.

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