Making Space for Nature: Elephant Conservation in Mali as a Case Study in Sustainability

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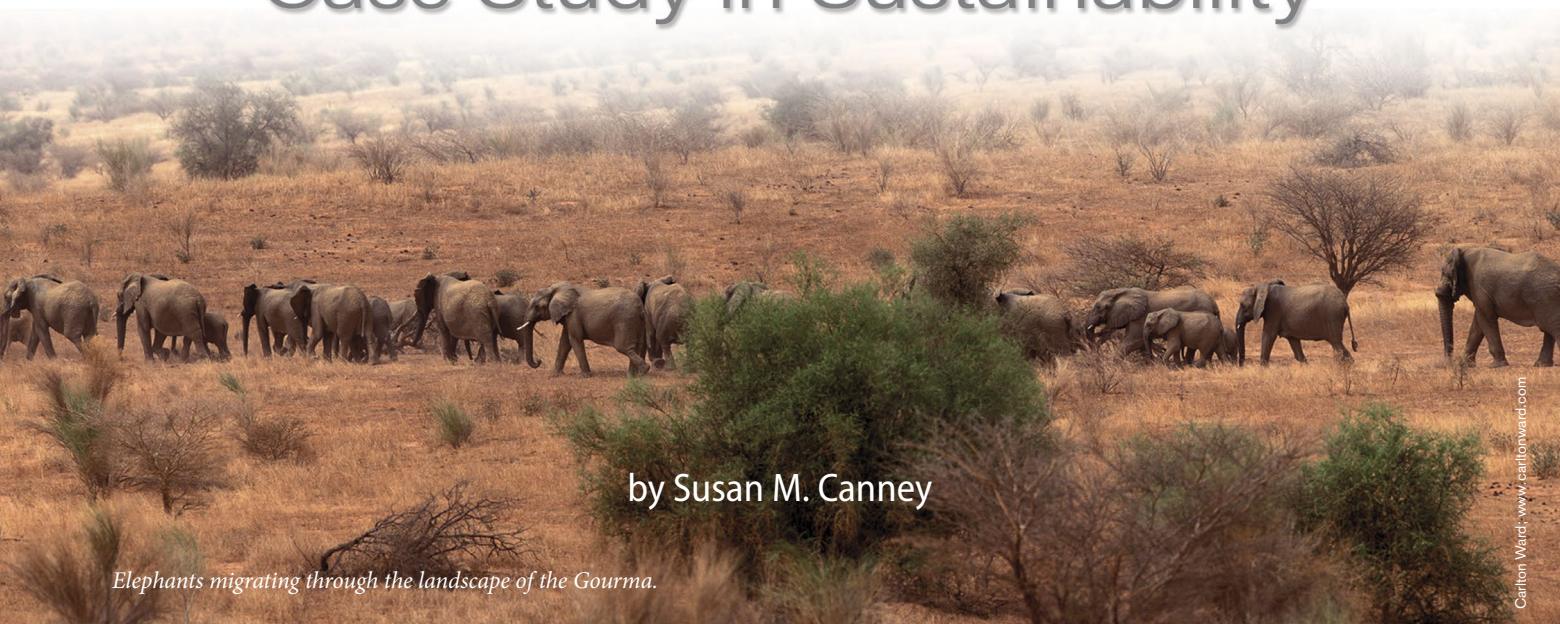View related articles ↗

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by Susan M. Canney

Elephants migrating through the landscape of the Gourma.

Carlton Ward, www.carltonward.com

As environmental threats multiply on a global scale, the uneasy coexistence of humans and wildlife is a growing challenge to policymakers who see conservation as a threat to endless economic growth.[1] Biodiversity conservation historically has been about saving species and protecting areas of land and water from the impacts of human activity. Protected areas are the cornerstone of biodiversity conservation, with studies showing that well-managed reserves are generally more effective in safeguarding biodiversity.[2] They are also more effective at delivering ecosystem services.[3]

In an increasingly crowded world, protected areas are progressively isolated and degraded by habitat loss and overexploitation, posing a particular problem for wide-ranging species that need to roam outside protected areas.[4] Biologically rich places outside of protected areas are filled with humans, where governments are often overwhelmed by crime, coupled with inadequate support to conserve biodiversity in the face of competing demands from a range of exploitation interests.[5]

Conservation professionals have increasingly recognized that the human dimensions of biodiversity are components vital to the field's overall success.[6] At the same time, the perception of indigenous peoples' and local communities' roles in conservation has transformed the understanding of conservation outcomes.[7] These trends have highlighted the need for approaches that seek to render conservation attractive to local people as part of locally relevant values and practices, while safeguarding human rights and social safeguards.[5]

Most conservationists are aware of the increasing complexity of their task and are looking for ways to address this complexity.[8] The shift in focus has occurred over a relatively short period, with the scientific tools and techniques not always keeping pace.[9] In recent years, scholars have built up a body of knowledge concerning change in social–ecological systems, but entry points for mainstreaming such thinking into conservation practice remain unclear.[10]

Obstacles include demands from funders and agencies that—under pressure themselves to deliver speedy impact and realize value for money—require detailed planning and targets according to specific templates that are designed for simpler systems. Hence much conservation management is distorted by oversimplification and standardization.[11] Another drawback is the persistent (though slowly changing)

organization of academia into disciplines (reinforced by research evaluation metrics). Researchers tend to analyze aspects of complex social–ecological phenomena using frameworks specific to their discipline. Understanding of the processes that lead to environmental improvement or deterioration is limited, because without a common framework to organize findings, knowledge remains fragmented.[12]

Dealing with complex, interconnected issues using approaches that are more adapted to smaller, simpler, more controllable problems doesn't work in the long run and generally results in creating problems elsewhere in the system.[13] A classic example is the European Union (EU) biofuels policy that aims to reduce its carbon emissions but that is accelerating the decimation of forests around the world (and failing to reduce carbon emissions as intended).[14]

Rather than breaking the problem into parts and assuming these can be understood through predictable cause-and-effect relationships that can be controlled, the complexity viewpoint explicitly recognizes the uncertainty arising from the relationships of different interacting components that simultaneously affect, and are shaped by, the wider system. It also offers approaches that could help conservation be more effective.[10]

Informing judgments through embracing a complexity worldview does not mean abandoning analysis, planning, regulation, and strategy. Being clear about the goals and persisting in their achievement are of central importance. Neither does it mean a set of new tools that fit within the familiar mechanistic approach. It means taking a wider view and planning for a greater degree of flexibility in responding to the unexpected, seizing opportunities, and adapting to changing circumstances.[15]

Understanding the Elephant Migration

This case study concerns a small, iconic, "desert-adapted" elephant population in the Gourma region of Mali south of Timbuktu, broadly within the bend of the Niger River in Mali southward to the border region with Burkina Faso (Figure 1).

These elephants undertake an annual migration circuit (the longest of all elephants) to cope with the widely dispersed and variable nature of the Gourma's natural resources.[16]

Initial studies launched in 2003 used data from Global Positioning System (GPS) collars, combined with satellite imagery and georeferenced environmental and human data, to piece together an understanding of the migration, understand how this population had survived when others around it, and at comparable latitude, had disappeared, and identify a plan for their continued survival. The elephants moved over an area of 32,000 square kilometers but they spent the majority of their time in thicket-forest areas around water-holes where they found water, forage, shade and refuge. Although broadly shaped by the distribution of water and food throughout the year, as well as the need to avoid human activity, the results showed that elephant movements were intimately linked to contexts connecting both the natural and human environments. Considering the migration as a whole revealed how developments in one area ramified through the system to create impacts elsewhere, features that were not always obvious from a more reductionist analysis.[17]

Incremental encroachment of human activities was threatening to choke off the migration route and elephant access to key resources, as well as to destroy, fragment,

Elephants in their preferred habitat of thicket-forest where they find water, food, shade, and refuge.

Figure 1. Map showing the elephant migration route in grey (as identified by Save the Elephants GPS collars) on a Google Earth satellite image. The inner delta of the Niger River can be seen to the left of the image, as well as its course as it bends east and then south.
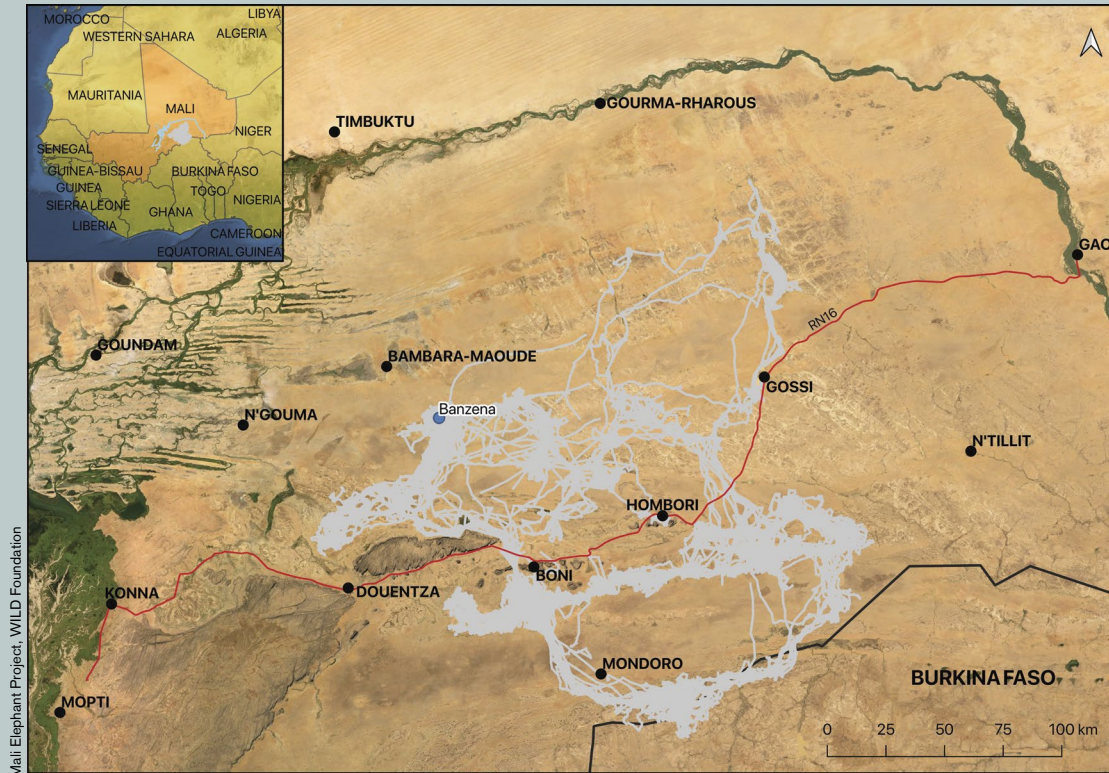
and degrade important habitat, making elephant survival more and more difficult. Small, incremental increases in stress are difficult to detect but reduce the ability of the elephant population to recover from a more acute pressure, such as a succession of drought years or the obstruction of a key elephant corridor. If left to continue, this would have resulted in an escalation in human–elephant conflict and increasing stress and mortality in the elephant population until it either dwindled to unviable numbers and/or fell victim to a severe drought or poaching.[17]

It Was Difficult to See What Could Be Done

This population of approximately 500 elephants was roaming over a vast, open area that was inhabited by people, making familiar top-down conservation approaches unviable, even if the political will and financial resources had been available.

Using the principles of complexity theory, the aim of this work was to understand the threat to elephants as the result of a system of relationships between people and their living and nonliving environments (the social–ecological system defined by the elephants), and then to devise interventions that could shift the pattern of relationships to reduce the threat to elephants. This involved seeking to understand the key features of interconnected behavior, the patterns and quality of relationships and the information flow between them, so as to provide some insight into how management intervention might promote sustainable change. The idea was to identify "assets," aspects of the system that were supportive of elephant persistence, and to create synergies through linking these assets to further reinforce aspects of the situation

that were favorable to elephant persistence, while at the same time diminishing aspects that increased threat. Assets could be features of the environment, people, relationships, organizations and institutions, policies and laws, and attitudes or aspects of culture and tradition. The aim was to identify "leverage points" where a relatively small action could produce a disproportionately large impact and "tip" the system to a more conducive state for elephant persistence.[18]

Engaging the Social World

The Mali Elephant Project held workshops to deepen understanding of the social context and engage local actors. These included community leaders (both traditional and elected), government administration and technical services, and the representatives of donor projects

Lake Banzena in Mali is the only source of water accessible to elephants during the late dry season, but in 2009 the influx of huge cattle herds threatened to dry the lake up before the rains came.

and programs. We spoke of the international and national value of these elephants by showing the results of our analyses, asking the participants whether they thought these were correct, whether they had anything to add, what they thought the problems were, and to suggest potential solutions. This provided a basis for a deliberation on human–elephant coexistence, thus combining scientific and local knowledge in cocreating "new knowledge."

The first key finding was that a large majority of the local people did not want elephants to disappear for a variety of reasons (see Box 1)—but perhaps most strikingly "because if elephants disappear it means that the environment is no longer good for us." For the local people the disappearance of elephants was an indicator of the environmental degradation that diminished their subsistence livelihoods, and they clearly understood the need for humans to operate within the physical limits of the natural resource base.

This was supported by an attitude survey of public opinion, conducted orally by trained surveyors (belonging to a national conservation nongovernmental organization) across the elephant range on market days, which showed that only 18% of those surveyed would not mind if elephants disappeared.[19]

This sparked the idea of trying to build a shared vision in Mali that the elephants must be conserved. Groups of stakeholders (the government, other projects and programs, the tourism industry, the general public) were invited to workshops and the results were used to design outreach materials and initiatives. Examples included colorful information leaflets/posters for the literate public; a schools program on how to live with elephants that was incorporated into school curricula; the creation and adoption of a Tourist Code of Conduct; working with a development program to re-site its plan to clear an important elephant forest; working with the government planning department to

incorporate the elephant migration route in local structure plans; and preventing the siting of a cement quarry in key elephant habitat.

Local attitudes provided a promising start, and building a shared vision within Mali was a good base on which to build future interventions. Yet all this was not enough to bring about a sustained change in human behavior, but at this point we could not see how that might come about.

The Development of a Model for Intervention

Shortly after, in 2009, a crisis developed at Lake Banzena—the only source of water accessible to elephants during the late dry season—where the influx of huge cattle herds meant the lake was likely to dry before the rains came. It was difficult to know what could be done. We knew that human occupation of the lake had been increasing and

Box 1. Local Values Placed on Elephants Before Project Intervention

Elephant presence is an indicator of a healthy ecosystem on which human livelihoods depend. *"If the elephants disappear it means the environment is no longer good for us."*

They have ecological roles as seed dispersers, in forest regeneration, and are associated with water and forests.

While feeding, elephants knock down from high branches otherwise inaccessible fruits and seeds, which are gathered by the women for food and sale, while seed pods and leaves are eaten by livestock.

Their dung is valued to help conjunctivitis, a widespread problem in these environments.

Local pride in their natural heritage: *"If the elephants disappear, our area will no longer be special."*

Awe in witnessing elephants' social interactions and expression of a range of emotions—joy when groups reunite, care for each other and their young, mourning their dead—and their problem-solving abilities.

Every species has a right to exist and it contributes something unique to the ecosystem, described as *baraka* or blessing. Each species has its own *baraka*, and if a species is lost, the ecosystem is irretrievably diminished, and poorer in its ability to sustain life.

Before conflict, elephant tourism provided employment for local youth as guides.

Local people value the quality of elephant social interactions.

assumed that this was linked to the increasing cattle using the lake (given the lack of correlation between rainfall and cattle numbers, we suspected that rainfall was not a factor). We needed to understand the situation better and so conducted a socioeconomic survey of the households living around the lake, the migratory herders, government technical services, and representatives of local projects. To perform such a task required recruiting a local team, led by someone skilled in social survey and facilitation, who was from the area, had a good understanding of its people and environment, and was able to interpret the responses and associated nuance.

The community workshops had led to the discovery of a social anthropologist who was born and had grown up in the elephant range and had extensive experience working in development projects. As well as being able to conduct the socioeconomic studies, he proved to be a skilled facilitator and understood the people and their issues, recognizing the need for inclusivity and multiple perspectives. Being the son of a respected local chief from a minority ethnicity endowed him with additional "convening ability" to build local relationships.

Commercial firewood collection being transported for sale in distant urban centers.

We held a series of preliminary meetings to collect perspectives from the full range of stakeholders, to help frame the issues and guide the design of the survey questionnaire. We conducted surveys of all stakeholders in a variety of formats: collectively in small groups (e.g., local authorities, traditional chiefs, elected representatives, heads of clans, heads of households, women, youth, and experts), and individually. Responses were continually triangulated to identify areas where further clarification was required, while those who either spoke too much or were silent during group meetings were also interviewed individually to better understand their viewpoints. From this point the project had a continuous presence on the ground.

Three key results of the survey were surprises but proved fundamental to designing a strategy. The first was that, contrary to our assumptions, 96% of the cattle using the lake didn't belong to local people but to wealthy individuals from distant urban centers. The survey also revealed high levels of resource exploitation and degradation caused by urban commercial interests seeking resources such as firewood, charcoal, game, forage, and wild foods. The second surprise was the high incidence of water-borne disease, with more than 50% of the population chronically afflicted—particularly women and children—and that the population would be happy to relocate if an area of good pasture and clean borehole water was found outside the elephant range. The third was the discovery of three social groupings among the clans, meaning that instead of one borehole, three would be required to minimize social conflict.[20]

The survey found that the underlying cause of much of the environmental degradation afflicting the Gourma could be attributed to the lack of sustainable resource management. The various ethnic groups had systems of resource management but were reluctant to respect each other's systems, so there was no enforcement. It was a classic "tragedy of the commons" in which a shared resource is depleted by users acting independently in their own self-interest, contrary to the common good.[21]

The project brought all stakeholders together in public to discuss the survey results in the context of their daily lives, the problems they faced, and their relation to the elephants. Developing a shared understanding of the situation and their role in it created a sense of unity, which was the vital first step. They also understood that to work, any resource management arrangements needed to be transparent and equitable to be respected by all. Their solution was based on traditional governance systems in which a committee of elders was elected with representation from all social groups. This committee established the rules of resource use (in this case including the protection of elephant habitat and the migration route), and elected teams of young "ecoguards" patrolled to ensure compliance, supported by government foresters when required. The community

The impact of abusive cutting on thicket forest.

A small community meeting.

first identified the qualities required to be an ecoguard and then selected individuals with those qualities.

In complex systems terminology, these systems provided the missing feedback relationship required to regulate resource use and protect elephant habitat. The ecoguards also conducted resource protection and regeneration activities such as building firebreaks and planting trees, trained by government foresters or other local specialists where necessary. Key to this was the enabling environment provided by Malian decentralization legislation, which has transferred land and natural resource management responsibilities from central government to local governments and communities. This demonstrates how a broad legal framework (decentralization) can be drafted so as to encourage adaptation to local

Community ecoguards dragging thorn branches behind camels (or motorbikes) to mark the fire-break guideline before teams of workers clear the vegetation from the fire-break itself.

conditions and local self-reliance. The largely illiterate rural communities did, however, need help, and the Mali Elephant Project provided support by facilitating the process and drafting the required "conventions."

The result was a model that delivered results as more pasture and forest products were available and close by, particularly during the dry season. During the first year the Banzena communities had protected more than 90,000 hectares of pasture from fire and were able to sell hay and access rights, charging large commercial herds for access to water and pasture. Revenues were shared equally among the management committee, the ecoguards, and the women. Their livestock proved to be healthier, were worth more at market, and produced more milk and young. Subsequently, the project facilitated the establishment of women's associations to develop small income-generating schemes that prospered from the increasingly abundant natural products but were designed to respect the limits of the ecosystem. These reinforced the incentives for innovation and wise resource management.

Aware that people resist the *imposition* of change, that their behavior can be shaped by context (people will change their behavior if it is perceived to improve their lives), and that they generally make reasonable decisions based on the information available to them, the project continually sought to find ways to align the goal of elephant conservation with individual aspirations, and then to strengthen these with locally owned institutions that included government at all levels.

Overall, these practices supported many of the attributes cited by local communities as being signs of wealth. The most common of these are animals, food, equipment (usually agricultural), money, work/trade, having a social support network, and being socially engaged.[22] Communities across the area requested help to establish similar systems.

Although these systems meant that people received livelihood benefits, possibly the greatest perceived gain was that they felt empowered to do something to improve their lives and were eager to prevent habitat destruction and degradation

by outsiders.[23] At the same time, these arrangements provided an occupation for unemployed youth and improved social cohesion because the different parts of the community had to work together to achieve collective benefits. The process was replicated at commune level, and then communes were brought together to harmonize their systems. The new resource management rules were incorporated into the commune's economic and social plans, thereby providing an additional supporting context for local initiatives.

A New Crisis and New Solutions

One could envisage this continuing up the administrative hierarchy, but just as these governance systems looked set to spread across the elephant range, a much bigger crisis developed. In 2012 the combination of a separatist rebellion, an extremist insurgency and a coup d'état meant that the elephant range became lawless, flooded with firearms, and the new phenomenon of elephant poaching emerged.

It was very difficult to know what could be done. The project convened a four-day community meeting to enable the sharing of experience. Once again the process involved engaging all key interested parties in discussions of their wider concerns and their relationship to elephants, facilitating a sense of unity through developing a shared understanding of the situation and their role in it. Major community concerns were the inability to access staple grain (as all vehicles and supply vehicles were hijacked) and the recruitment of the youth by the armed groups. The project agreed to arrange the piecemeal distribution of grain by donkey cart to avoid hijack, while community elders issued edicts establishing the social norm that poachers were thieves—a status of great shame—who stole that which belonged to the community. The project also created a network of young ecoguards who received token "recognition payments" to report on elephant locations, detect poaching, and identify the perpetrators, as well as protect natural resources. None of these joined

the armed groups despite the much larger rewards of doing so, because being an ecoguard carried significant local status and was a less risky occupation.[24]

This worked for three years until the conflict worsened, trafficking networks proliferated, poaching escalated, and armed enforcement was requested by the ecoguards. The project worked with the government to create a 35-strong mixed ranger–military antipoaching unit. Key to its operation was the nature of training it would receive. The project sought trainers who worked with a similar "whole-system" approach that focused on gathering information to understand the context better, avoid danger, and target action, while respecting and supporting the local population. The nonprofit Chengeta Wildlife fitted the bill, with an approach that is founded on promoting harmony between humans and nature through a philosophy founded on respect. Once the unit was fully operational, poaching dropped dramatically to very low levels.[25] Key to its success was the support of the local community for elephant conservation.

Throughout this period the project realized that additional legislation was required both to ensure that important areas for biodiversity safeguard were protected and to strengthen the implementation and enforcement of the community resource management conventions. Government foresters already helped train communities to build firebreaks and to control illegal exploitation of protected tree species, but needed a legal mandate that would allow them to help local communities enforce their natural resource conventions. The project worked progressively with government to revise the rules of an existing protected area that covered a part of the elephant range, but where no human activity was forbidden or regulated apart from hunting elephants. The idea was to enlarge the reserve boundary to cover 42,635 square kilometers, thereby encompassing the whole of the elephant range, using a biosphere reserve model that provides for strictly protected core areas surrounded by buffer and transition zones of regulated resource use. The latter zones would be managed through the community natural resource
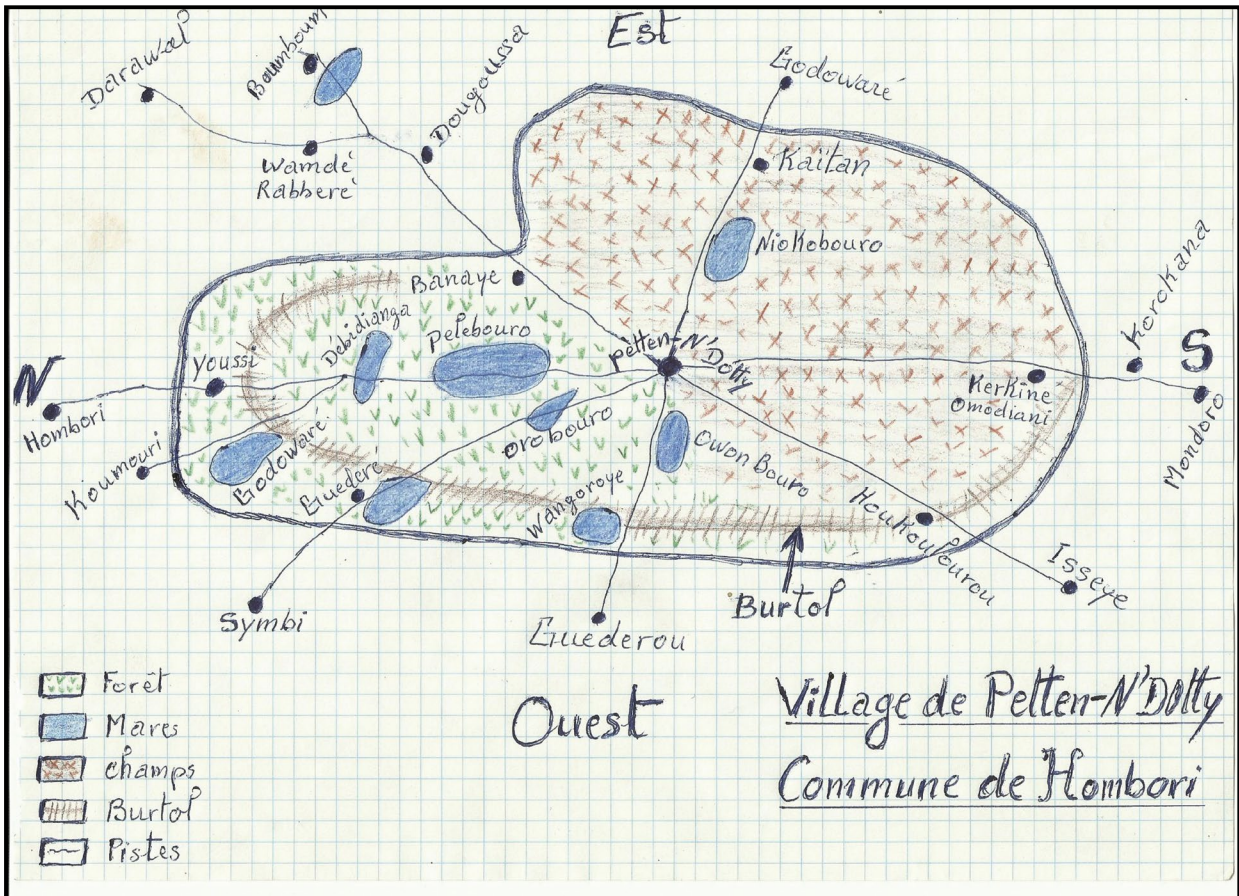
Example of a map produced by an agricultural community as a basis for discussing natural resource management.

management conventions, while the respect of the core protected areas would be negotiated with local communities using approaches similar to those introduced at Lake Banzena. Collaborating with the environmental network of parliamentary representatives resulted in the championing of legislation that is now in the process of being adopted by government.

Continual Learning

This "broad-brush" portrayal of the project masks the continual learning and adaptation that found the best ways for these connected management processes to work, and to cope with continual change and disruption. One example is the use of firebreaks to protect pasture and water in Lake Banzena from an influx of livestock during a year of low water levels. This influx was avoided by using firebreaks to protect pasture close to the

Niger River, from where most of the herds originated, thereby removing the need to find pasture in the elephant range.

Other examples include changes in how to spread the approach. The original idea had been to proceed piecemeal across the elephant range, but with the sudden onset of lawlessness and poaching, the project changed strategy to engage ecoguards across the elephant range (and provide an occupation for at-risk youth). As a consequence, the ecoguards acted as advocates for the benefits of collective resource management, engaged other youth, and helped spread the adoption of the model, albeit in a more haphazard way. As the conflict intensified further, the risk of travel meant that the project adapted by reducing the number of journeys made by the team. It did this by engaging the mayor's office of each commune in the delivery of the process, closely guided, monitored, and supported by the project team. The beneficial result was that this promoted ownership of the process by the elected

representatives and reinforced the importance of the local community plans and agreements in the commune's socioeconomic development plan.

The vision is that the whole elephant range will become an integrated landscape where the most critical areas for elephant persistence (as well as for other wildlife) are strictly protected. Land and resource use in the rest of the elephant range will be regulated by community arrangements of resource management, supported by government foresters and development plans that protect key elephant habitat and migration routes. The habitat restoration that is a part of this process, together with the regulation of hunting, would ultimately allow the reintroduction of lost species.

It had always been assumed that this would be a long-term process, and that the project would have to support communities until they experienced the tangible benefits, became used to these new practices, and customarily

integrated the practices into their day-to-day decision making. It was found, however, that communities with high social cohesion often required no ongoing support. Once they had established these management systems, the systems became self-sustaining. Revenues were shared among the community and, together with the other benefits, provided sufficient incentive to sustain the introduced practices. Successful communities demonstrated what was possible, and others emulated them spontaneously. The new reserve legislation incentivizes the uptake of these governance systems across the landscape containing the elephant range.

Challenges

There has not been sufficient time to assess the degree to which these arrangements are viable in the long term or have provided sufficient incentive for communities with poor social cohesion. Before conflict, the hypothesis had been that peer pressure, tangible benefits, and ongoing project support, plus the rule of law, would lead at least some to adopt these practices. But the social stress, division, and lawlessness associated with the conflict have made it very difficult to engage these communities since 2012.

Other challenges relate to the impact of the wider context and the social–ecological systems that are linked to those of the Gourma. One is the risk of displacing the environmental impact to other areas. Anecdotal evidence from an evaluation of the impact of the Banzena process suggested that the restrictions in harvesting of wood and making charcoal at Lake Banzena had been associated with an increased price of charcoal in Timbuktu, hence renewing interest in wood lots. However, this does not preclude the risk that environmental impacts might be displaced elsewhere.

Before conflict, the project strategy had aimed to address this by "extending out" from its experience in the elephant range by seeking further alliances and ways to strengthen the enabling environment fostering grass-roots efforts, particularly in enforcement against the destabilizing pressures from urban centers.

This applies particularly to the problem of the large commercial herds. The project began by engaging the Ministry of Livestock Husbandry as part of a cross-ministerial meeting to discuss the problem. There was ready agreement that Mali's environment could not sustain current levels of commercial livestock, and that there was a need to engage the owners of the large herds and to seek ways to reduce the pressure on local ecosystems. Experience had showed that at least some were willing to pay for access to grazing and water, and a survey was planned to understand better the spectrum of actors and attitudes; however, shortly after this, the conflict struck and all efforts had to be focused on elephant protection.

Finally, there was the enormous challenge presented by the advent of lawlessness, banditry, and insurgency in 2012. The expectation was that the project outcomes would collapse, and elephant poaching would spread unchecked in the absence of enforcement capacity. Bouba Ndjida National Park in Cameroon had just lost hundreds of elephants in only a few months. The surprise has been that the project has continued to operate and that the collective arrangements have survived and indeed continue to be implemented despite an absence of government since 2012. This suggests a certain resilience.

Insecurity makes project operations much more difficult and time-consuming. Progress is slower and more resources are required to achieve the same ends. There are areas that are off limits, while the movements of people have disrupted existing community arrangements. Although we might not be covering all of the ground that we would have liked, we are continuing to operate where we can, and some of these areas change over time. One might conclude (under the old management mental model) that actions in these areas are wasted effort, because it is not working to plan and it is more difficult to collect short-term impact statistics. Another way

of viewing this is that the actions initiate activities that can be picked up later when that area becomes accessible, and the learning processes will be quicker. Anecdotal evidence suggests that at least some of these communities have continued with the practices despite the project not being able to access them. The project has garnered significant local respect and trust because it is perceived to have been there with the people throughout (the only organization of any kind to have done so).

Discussion/Overview

This conservation initiative did not start out to be a community-based conservation program. This emerged as a result of adopting a living systems perspective to guide the selection and use of approaches and tools, rather than a sole emphasis on imposing a predetermined, expert-conceived solution with precise plans and predetermined targets and indicators.

It was, however, funded by organizations requiring such precision. Shifting between mindsets to deliver the accountability required by donors, while nurturing a complexity approach in such an unpredictable environment, was enormously challenging.

Despite the challenges, the most striking feature of this experience is that applying a complexity perspective to a problem of elephant conservation resulted in outcomes that contributed to ameliorating several "wicked" problems simultaneously.

Seeing elephants as an integral part of a wider complex adaptive system, and analyzing the problem of elephant persistence as an emergent phenomenon provided more scope for discovering solutions and exploring more potential pathways where compromise and negotiation might occur. Not only did this approach find a way for elephants and humans to live together peacefully, but it prevented elephant poaching in a lawless zone. Furthermore, it improved local livelihoods through easier access to more abundant natural resources of pasture, forests, water, and game. The collective nature of the solutions improved social cohesion and

Nomba Ganame; Copyright WILD Foundation

Members of a community women's association collecting medicinal plants to sell.

countered youth unemployment by providing socially respected occupations for unemployed youth in the restoration of ecosystems and biodiversity.

The resilience of the project in the face of insecurity seems to have been achieved because it was locally rooted through locally adapted inclusive governance systems that focused on solving local problems. The underlying causes of the crisis included the lack of meaningful occupations for the youth, a degraded environment, compromised livelihoods, and state-delivered abuses resulting from poor governance and untrustworthy state institutions.

Like the problem of elephant survival, violent extremism in the central Sahel (Mali, Niger, and Burkina Faso) is also a complex phenomenon that results from local responses to a wide range of circumstances. While contributing factors, such as the rise of global jihad and the unforeseen consequences of the bombing of Libya, play a role, studies suggest that the situation is largely the result of widespread poor governance and a lack of trust in the state.[26]

Overall, it seems that improving key relationships in the system from the perspective of elephant conservation also improves key relationships relating to other notoriously intractable problems. This approach also proved to be extremely cost-effective, as well as revealing a potentially sustainable path into the future.

Relevance for the Post-2020 Global Biodiversity Framework and the Sustainable Development Goals

The approach has relevance for the delivery of the Post-2020 Global Biodiversity Framework (GBF) to be agreed at the next Conference of the Parties to the Convention on Biological Diversity, in 2021. The GBF will replace the 2010 "Aichi targets" and set the level of ambition for action to address concerns about biodiversity and ecosystem services until at least 2030. The zero-draft announced in January 2020 proposed new targets, extending protections to at least 30% of the planet by 2030.[27] There are, however, other groups that cite research suggesting that 50% is a more appropriate target.[28]

The GBF aims to bring about a transformation in society's relationship with biodiversity to ensure that by 2050 the shared vision of "living in harmony with nature" is fulfilled. It also seeks to place biodiversity and ecosystem services in the context of global agendas relating to development, climate change, land degradation, and disaster risk reduction and to support the achievement of the Sustainable Development Goals.[27]

The true transformative potential of the 2030 agenda can be realized only through a systemic approach, as none of these problems can be understood in isolation: All are interdependent and mutually reinforcing.[29]

Moving development into a positive curve toward sustainability will require

the guidance of a mindset that recognizes the fundamental interconnectedness of the entire biosphere and its biophysical limits as an interconnected system. Humans and their societies and economies are seen as an indivisible part of, and wholly dependent on, the natural world.[30] Under this "ecological worldview," sustainability is about aligning human development with the flows and processes of nature to restore and regenerate strong social–ecological systems at all scales, from local to planetary. Societal goals are achieved through sustainability, not in conflict with it.[31]

Interdependent relationships are fundamental to this worldview, so values concern building and maintaining mutually supportive and beneficial relationships between the self, other humans, nonhumans, and the planet as a whole.[31]

Navigating the complexities of this change requires the insights and principles of transdisciplines such as complexity thinking. It means attending to the whole with humility while paying attention to what is important: acknowledging that only some things can be known and asking the right questions to identify gaps in knowledge.[18] It means engaging constructively with the values of stakeholders and learning through evaluative, systemic enquiry. It can point to new possibilities but requires exercising wisdom in judgment and action.[32] It means "changing the role we imagine for ourselves, from architects of a system we can control and manage, to gardeners in a living shifting ecosystem."[33]

This argument is not new, and there is a large body of work on complexity thinking. But it is sometimes difficult to conceptualize how the theoretical constructs might be applied to real-world problems. This case study has tried to bring life to the principles by describing the process applied to the problem of human–wildlife coexistence. The Mali case study suggests that using this approach to tackle one sustainability problem also improved other sustainability problems, and offers the possibility that the networked product of many actions at all scales might mutually reinforce and accelerate the transition to sustainability.

Susan M. Canney is the Director of the Mali Elephant Project, an initiative of WILD Foundation and the International Conservation Fund of Canada. She is also a Research Associate of the Department of Zoology at the University of Oxford, Oxford, United Kingdom.

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