

Complex Coexistence:

Understanding Human Wildlife Coexistence in Southern Kenya, its Challenges, and What's Being  
Done to Ensure its Continuation

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***Abstract***

Conservation in East Africa has for decades pitted humans against wildlife in ways that encourage trade-offs which displace communities. This ideology flies in the face of a reality in which pastoralists have coexisted with wildlife in East Africa for millennium, and disregards the nuanced ways in which traditional herders and wildlife interact. This coexistence is proven by the fact that 60% of Kenya's current wildlife lives outside of exclusionary protected areas in regions where pastoralists make their living (Western et al., 2009). Despite this, the ability for Kenyan pastoralists to practice wildlife-compatible livelihoods today is under threat. The danger to these systems are many, ranging from the above mentioned exclusionary conservation ideology, to the sale of land to outsiders, to shifting land use. It is with this in mind that this paper seeks to expand on pastoral methods of coexistence, its obstacles, and solutions to those obstacles. To narrow the scope of this task, this paper will look at Maasai living in the southern parts of Kenya. Much of the content of this paper is informed by a three-month internship undertaken with the South Rift Association of Landowners in the Ol'Kiramatian and Oldonyo-Nyokie regions of Kenya, as part of the Institutional Canopy of Conservation initiative.

***Strategies for Coexistence***

The first section of the paper will demonstrate the strategies pastoralists use to craft livelihoods which both supply for their needs and leave space for, or in some cases encourage, abundant wildlife populations. Of crucial importance to these strategies is the traditional ecological knowledge that facilitates complex interactions between pastoralists and wildlife. This knowledge allows pastoralists to prevent rangeland degradation, avoid wildlife conflict, and implement grazing patterns that produce heterogeneous environments in which a diversity

of organisms can thrive. For example, in the nearby Mara ecosystem, researchers found pastoralists observing novel ecological indicators which aided them in deciding where to graze livestock, thereby preventing overgrazing and long-term degradation (Jandreau & Berkes, 2016). One such indicator was the sound cattle made while they grazed. Preferring to use their tongues to grasp softer, greener grasses, cattle would eat silently when grazing healthy grasses. When left in one place too long however, they would be forced to use their teeth to pick at the stubs of grass, and would breathe loudly through their noses. By listening carefully for this sound, herders would know when to move their cattle to prevent them from overgrazing any one pasture and degrading its ability to produce grass. Similarly, those same researchers found herders highly observant of the coloration of the paths their livestock tread regularly for water. When the path became too brown and dusty it meant the area was being travelled too frequently by livestock, and herders recognized it was time to move to new pastures to avoid overgrazing. As these indicators show, traditional ecological knowledge is a key pillar which facilitates coexistence by allowing pastoralists to raise livestock without impairing the landscape's ability to produce vegetation.

A point that strongly supports the coexistence argument is the function of Maasai homesteads in savanna ecosystems. These homesteads, called *bomas*, are seasonal settlements that house extended families as they move their livestock to take advantage of geographically dispersed resources. They are comprised of outer barriers made of thorny acacia branches, mud and thatch residences, and inner enclosures used to house livestock. Because livestock spend so many nights in the same confined area, large amounts of feces build up in the centre of the *boma*, effectively centralizing nutrients. Once abandoned, this abundance of nutrients

promotes the growth of a specialized species of highly nutritious grass, which the Maasai call *manyatta* grass (Reid, 2012). Research has shown this grass to be a draw for wild herbivores, turning abandoned homesteads into biodiversity hotspots (Augustine, 2003). Eventually, the grass is eclipsed as trees draw on the nutrient buildup to create oases in the surrounding grass landscape. These concentrations of trees go on to support birds, small herbivores, and many other organisms. Abandoned *boma* hotspots are so green that they can be identified from space (Reid, 2012). This serves as one of many examples of how human habitation of rangelands can serve to enrich savanna landscapes and benefit its wild inhabitants.

Coexistence requires more than the action of a single party, and often relies on interactions between humans and wildlife. Few human-wildlife relationships have been as well documented as the one between Maasai and lions, which serves as an unconventional example of coexistence. The reason this paper categorizes this example as unconventional is the popular perception of the relationship between Maasai and lions as one of pure conflict. This is true to the extent that the two frequently come into direct conflict; lions frequently prey upon Maasai cattle, in response to which Maasai spear and kill lions (Hazzah et al. 2009; Zimmermann et al., 2010). This relationship is deeply significant in cultural terms, with the killing of lions being an important step in the ritual by which Maasai transition from warriors, called *Moran* (Fosbrooke, 1956). Despite this, the relationship between Maasai and lions, when managed properly, can be beneficial to both parties. For one thing, Maasai's killing of lions helps to keep them wary of humans, leading them to avoid pastoralists (Schuette, 2012). This avoidance creates lion-free areas that wild herbivores then tend to favour for their lack of predators (Tyrrell et al., 2017). This results in higher populations of species such as Zebra, Impala, and Wildebeest. Thus, the

moderate hunting of lions by pastoralists contributes to the creation of a heterogeneous landscape that benefits livestock and wildlife, which will be discussed further later in this paper. To quote one Maasai pastoralist; “When I was young, an *ilmurran*, I liked lions because when they attacked our livestock, we could kill them and celebrate and be proud.” (Goldman et al., 2013: 339).

Another instance in which seemingly contradictory actions in fact support coexistence is the relationship between pastoralists and wildlife during periods of severe drought. When pastures become unavailable and Maasai can no longer depend on their livestock for reliable sustenance, many turn to hunting wildlife to stave off starvation (Reid, 2012). It is partially due to this that Maasai refer to wildlife as their “second cattle”, as they provide an insurance against starvation during drought (Western, 1982:202). However, this is not a one-sided exchange. During these same times of drought and dependency, when wild grazers numbers are diminished or have migrated elsewhere, lions hunt cattle to avoid starvation. It is because of this that some refer to cattle as lions’ second wildebeest (Western, 1982).

There are many examples of ill-conceived actions that are undertaken by outsiders and perpetuated through received wisdom, which do not reflect the nuanced ways in which humans interact with ecosystems (Leach & Mearns, 2003). Even fire, often considered symbolic of destruction itself, is a way in which humans contribute to savanna ecosystems and promote coexistence. Studies have found fire to be a common feature of East African savannas since at least 400,000 years ago (Bird & Calio, 1998). The lighting of small, controlled fires promotes pasture health by removing dead, low nutrient grasses and allowing new, nutrient-rich grasses to grow (Fuhlendorf & Engle, 2001). Furthermore, fire can be a useful tool in clearing bushland

and expanding savannas, contributing to a healthy mosaic of local environments. Fire also reduces the prevalence of disease in savannas by reducing populations of ticks and tsetse flies, which can spread infection.

The final argument this paper makes for the presence of coexistence concerns the way pastoralists contribute to a spatially and temporally heterogeneous environment in which a multitude of organisms are able to find niches. This phenomenon is closely linked to pastoral adaptations to bimodal rainfall, which leads them to divide grazing into wet season and dry season pastures. During the rainy season, when grass is quick to regrow and does so in nutritious abundance, pastoralists concentrate in areas most favourable to this type of growth, often in areas without permanent water sources but where seasonal ponds occur. As the rains subside and the savanna dries, pastoralists gradually move their herds into dry season grazing areas known as grass banks, which they preserve untouched during the wet season (Tyrrell et al., 2017). Here they find taller, less nutritious grasses that enable them to maintain their herds through to the next rainy season. The avoidance of dry season grazing areas during portions of the year is of crucial importance to wildlife. Spatially, this provides an area in which lions can exist with minimal human interaction for most of the year (Schuette, 2012). Furthermore, it produces areas used by pastoralists with minimal lion presence, which many herbivores rely on to avoid predators (Tyrrell et al., 2017). Thus, the preservation of dry season grazing areas in which livestock are absent for large portions of the year creates spatial niches for various wildlife to fill, while also maintaining crucial grass banks that herders and wildlife depend on during the dry season.

When observed over the course of months, spatial and temporal landscape diversity became highly entwined, as seasonal movements create regional differences in the environment (Tyrrell et al., 2017). However, when one looks at the use of space within a timeline of hours and days, a trend emerges of rotating use of land by livestock and wildlife. Because of the ability of livestock to digest taller, less nutritious grasses, they stimulate the growth of short to medium grasses called 'grazing lawns', which are more nutritious and provide less cover for predators (Reid, 2012). Research has shown that these grazing lawns draw wildlife such as wildebeest, gazelle, zebras and topis towards settlements, where they graze during the night-time when people and livestock are inside their bomas (Ogutu et al. 2010). Thus the diurnal activities of pastoralists create a temporally heterogeneous landscape by promoting nocturnal use of livestock-created grazing lawns.

### **Current Challenges to Coexistence**

Despite the time-honed strategies for coexistence described above, there exists today a plethora of pressures that diminish or inhibit coexistence between Maasai pastoralists and wildlife in Kenya. Before delving into these issues, this paper seeks to make a quick clarification on their interconnectedness. Though this paper presents them as independent categories, it needs to be understood that the factors that both support and degrade coexistence are incredibly interconnected, and make up a complex system of interdependent forces. As such, though they will be presented in categories, it must be understood that each phenomenon exists in a context dependent upon other similar phenomenon to function, and is by no means an isolated observance.

An underlying theme of many of the current pressures on coexistence strategies has to do with an idea popularized in Hardin's now canonical *Tragedy of the Commons* (1968). Hardin essentially argued that where resource use is governed by commons institutions they inevitably become degraded as users over-extract for personal gain at the cost of society. Accordingly, Hardin argued, the only reasonable response was to replace common resource management with privatization and state regulation. Heralded for decades, his idea has recently been the subject of sharp critique from both the conservation and social studies communities. Hardin made the critical error of neglecting the ability of common resource users to in fact *talk to one another*. What he ended up describing instead was a situation of open-access (Feeny et al., 1990). By doing this, Hardin not only disputed the possibility of communities to self-organize to manage their resource bases sustainably, but further ignored communities who were already doing just that. As Ostrom demonstrated in her Nobel Prize winning research, there are a variety of contexts in which institutional arrangements can be organized to allow for sustainable common resource use (Ostrom, 1990). Many of the examples in the Strategies for Coexistence section of this paper demonstrate just that, with examples such as organized grazing patterns and coordinated mobility demonstrating a marked ability of pastoralists to successfully manage pastures as a commons (Tyrrell et al., 2017).

The application of Hardin's principles has proven a huge barrier to coexistence in East Africa. One of the main ways in which it has done this is by promoting the expansion of national parks (i.e. 'state tenure'), which exclude pastoralists from using vast areas of land and the grazing resources therein. Seeking to promote biodiversity, these parks often encompass the most fertile grazing lands, which pastoralists rely on for dry season grazing and as insurance



against severe drought (Tyrrell et al., 2017). By excluding pastoralists, these parks also deprive ecosystems of key functions, such as the previously described *boma* hotspots and grazing lawns. A clear example of this is Nairobi National Park. The removal of pastoralists and their livestock from the ecosystem allowed zebra and wildebeest populations to skyrocket, as they no longer had to compete with cattle for grazing (Gichohi, 1990). Though seemingly beneficial, this led to a proliferation of predators who found the new wildlife populations easier prey than previous livestock. This in turn led to increased predation on predator -susceptible species that had not competed with livestock and thus had not increased in population with their removal, such as topi and gazelle. This led to these species being nearly extirpated from areas in which livestock was removed (Georgiadis et al., 2007).

Another major conflict with the spread of parks is the manner in which they create conflict between communities and wildlife. Whereas before the two groups were able to utilize the same land at different times of the day and year, parks enforce strict boundaries and exclude communities from their traditional resources. This has been shown to generate a great deal of resentment in affected communities (Reid, 2012). In my own research, I have heard this echoed by pastoralists who claim the government is more concerned with the wellbeing of lions than they are with that of humans (Ragan et al., *unpublished*). “If a lion is killed, KWS will be here in one day and take me away. If a lion kills a livestock they are nowhere to be seen.” (Ragan et al., *unpublished*). Nowhere is this more readily observable than in Kajiado county, where the governor recently threatened to kill wildlife in the region if pastoralists weren’t allowed to graze in the surrounding national parks (Maroma, 2017). This was in response to pressing drought, and concern that many of the pastoralists’ cattle would die if not given access

to grazing in the parks. This example clearly shows how the implementation of exclusionary conservation models in Kenya has created conflict between herders and wildlife in ways that did not exist prior.

Many of the threats to Maasai coexistence strategies come in the form of imposed restrictions on pastoral livelihoods, as demonstrated above with the example of national parks. These restrictions take many forms and can extend well beyond the boundaries of state-run parks. As discussed earlier, moderate hunting of lions by Maasai results in a number of benefits for both pastoralists and wildlife (Schuette, 2012; Tyrrell et al., 2017). Despite this, the Kenyan government banned the hunting of lions in 1977 in response to fears over shrinking lion populations. In doing this, they failed to distinguish between Maasai pastoralists who predominantly kill lions in response to attacks on livestock, and trophy hunters who kill lions for sport. These restrictions hinder coexistence between Maasai and lions. In interviews with pastoralists in areas where lions have not been hunted for decades, Maasai claimed that lions had been emboldened by the lack of retaliation against livestock raids, and had increased the frequency of attacks (Goldman et al., 2013). This is a case in which external threats to ecosystems, in this case foreign hunting of lions resulted in penalties against pastoralists that ultimately hinder their ability to coexist sustainably.

The restriction of mobility is another prominent hurdle to the ability of Maasai and wildlife to coexist. While parks serve as a clear example of the exclusion of pastoralists, they are by no means the only force to do so. In the Athi-Kaputiei plains directly south of Nairobi, increased subdivision of communal lands and subsequent privatization has led to land sales to outsiders (Reid, 2012, Nkedianye et al., 2009). These outsiders practice livelihood strategies

that are not compatible with abundant wildlife, such as agriculture, industrial manufacturing, and mining. Moreover, they often erect fences around their property (Nkedianye et al., 2009). These fences are devastating for rangeland mobility, as they hinder the migration of wildlife, restrict livestock grazing, and bar access to critical resources such as water and grazing lawns. The high cost of land relative to household income is the main driving force behind this process of land sale to outsiders, and poses a serious threat to the long-term sustainability of the region (Nkedianye et al., 2009). This process of subdivision and sale of communally held lands is a phenomenon which threatens the sustainability of many regions of Kenya, including Ol’Kiramatian and Oldonyo-Nyokie. While Ol’Kiramatian has managed to implement a diversified land zoning strategy which secures land against appropriation by outsiders, Oldonyo-Nyokie is currently planning on undergoing subdivision (Ragan et al., *unpublished*). Only time will tell how this will turn out for the residents of the area.

Boundaries to mobility take the form of more than simple wood and wire fences. With the onset of colonialism in East Africa at the turn of the 19<sup>th</sup> century, Europeans imposed international borders onto previously indistinguishable tracts of rangeland. European powers drew these boundaries with complete disregard for ethnic boundaries, ecosystems, and wildlife migration systems. For Ol’Kiramatian and Oldonyo-Nyokie, the most pertinent of these borders is the Kenyan-Tanzanian border to the south, which runs roughshod through the center of Maasai territory. In the past, this has had little effect on pastoralists, who describe freely crossing a vague and unguarded border between the two countries. In interviews in Oldonyo-Nyokie, pastoralists expressed disregard for the border, claiming it had almost no relevance on their herding strategies (Ragan et al., *unpublished*). This is reflected in the tendency of

pastoralists to cross into Tanzania during times of extreme drought, and vice-versa (Hobbs & Huenneke, 1992). Recently however, this border has begun solidifying into an un-traversable barrier to mobility which threatens pastoralists' ability to mitigate the effects of regional drought. Nowhere is this more evident than in the recent seizure by the Tanzanian government of 1,300 cattle crossing into Tanzania from Kenya. Reinforcing this, Tanzanian president John Magufuli has stated that "Tanzania is not a feeding farm for animals from other countries" (TEA, 2017). If mobility between the two countries is prohibited it could significantly reduce the area of pasture available to Maasai on both sides of the border, and thereby decrease their ability to cope with regional droughts.

During my own research in the Oldonyo-Nyokie region, one challenge that emerged in interviews was the spread of the *prosopis juliflora* plant throughout rangelands, known to the Maasai as *mathenge* (Ragan et al., *unpublished*). Introduced as part of a joint effort between the United Nations Food and Agriculture Organization and the Kenyan Government in the 1980's to halt the spread of deserts, *mathenge* has had a huge impact on savannas. Spreading quickly, the shrub like plant has outcompeted native species. It is aided by the fact that its leaves poison other plants when they fall and carpet the nearby ground (Maundu et al., 2011). This results in decreasing pasture availability as *mathenge* overcrowds grasses, adding strain to pastoralists and wildlife. Furthermore, while native brush can be eaten by browsers, *mathenge* seeds are poisonous, sticking to browsers mouths and causing their teeth to fall out. This significantly limits the number of livestock a rangeland can support (Maundu et al., 2011). Muusya Mwinzi, Director General of the National Environmental Management Authority, has stated that "not even an elephant can penetrate through a field of *prosopis juliflora*. It is

threatening our range lands especially those near water sources” (Mawathe, 2006). If not checked, the spread of *mathenge* may significantly limit the productive capabilities of rangelands.

The final challenge to coexistence this paper looks at is that of climate change. Overarching and all-encompassing in its impacts, climate change is the most critical threat to the livelihoods of pastoralists and survival of ecosystems in East Africa. While Africa is predicted to see the highest temperature rise of any continent, the distribution of this varies widely (Reid, 2012). While some areas have already risen beyond the expected continental average of 3.5°C, others appear to be cooling (Christensen et al., 2007). Scientists are unsure how this varying temperature change will interact with rainfall patterns in East Africa. Whether it causes an increase or decrease in rainfall, it will have colossal impacts on ecological systems which have come into being over of millions of years, and will generate unpredictability which will threaten local livelihood strategies (Doherty et al., 2010).

Beyond temperature and rainfall, climate change has the potential to change the carbon makeup of the atmosphere, and by extension the biochemical balance of vegetation. For example, the increase of CO<sub>2</sub> will result in grasses becoming harder to digest as they absorb less nitrogen and produce more structural carbohydrates (Ehleringer et al., 2002). This will lower the number of livestock and wildlife a rangeland can support, increasing competition and heightening the need for land. Furthermore, as carbon’s PPM rises, trees and shrubs will begin to outcompete grasses, resulting in shrinking savannas. While this will undoubtedly benefit some actors, such as browsing giraffe and buffalo, it will decrease the available resources of

already resource-strained grazers. This lessens the diversity and heterogeneity of savanna landscapes and makes them more susceptible to drought (Tyrrell et al., 2017).

A final impact of climate change is in its potential to increase the disease burden of people, livestock and wildlife. Researchers predict that given increased rainfall, tick populations in grasslands will increase (Fyumagwa et al., 2007). As previously discussed, ticks are capable of spreading diseases amongst, and at times between, wildlife and livestock. An increase in disease bearing parasites then will increase this disease burden and put grazers at increasing risk of sickness. It's not just animals that face potential for greater sickness, but also humans. As temperatures increase, malaria has begun to spread into new regions previously immune due to climatic conditions (Hay et al., 2002). Leading to almost half a million deaths in 2016 alone, the spread of malaria could prove devastating to pastoral communities (WHO, 2017).

## **Responses**

As the previous section shows, pastoralists and wildlife face ever-expanding challenges to their ability to coexist. These come mainly in the forms of imposed restrictions, limited mobility, and climate change. While the list of challenges is great, the variety of responses has been equally substantial. Drawing primarily from my work in the Ol'Kiramatian and Oldonyo-Nyokie areas of Southern Kenya, this paper will expand on a number of these solutions, outlining their underlying motivation, approach, and results to-date.

Climate change models predict rainfall in Southern Kenya to increase, but caution that extra rainfall will evaporate with higher temperatures and not cause more grass and vegetation (Jones and Thornton, 2003). This extra rainfall hasn't yet materialized in the areas I've worked, with droughts becoming increasingly prolific in the Ol'Kiramatian region. As climate change

leads to an increasing inability to predict seasonal rainfall patterns, Maasai in Ol'Kiramatian resort more than ever to mobility strategies. For example, during the recent 2007 drought, pastoralists took their cattle as far abroad as Nairobi and Tanzania in search of pasture (Ragan et al., *unpublished*). To do this, pastoralists rely on kinship networks embedded in the Maasai clan system, which they use to gain safe passage and access to geographically disparate grazing resources (Reid, 2012). Pastoralists who take their cattle abroad during regional droughts are able to maintain their herds through times of drought and sustain their livelihood. Similarly, wildlife frequently migrate in search of pasture as a response to drought (Reid, 2012). This demonstrates the crucial importance of mobility to wildlife and livestock to mitigate the effects of drought. As climate change makes rainfall increasingly unpredictable, the need for mobility will only increase. In many ways a continuation rather than a new approach, mobility is a strategy particularly well suited to the ongoing and increasing stresses of climate change, and one which may enable Maasai pastoralists to persist amid climate insecurities.

Another strategy being employed, this time in the Oldonyo-Nyokie region, is the attempt to centralize and retain water to buffer against increasing droughts. Here we see two primary developments, targeted at human and livestock water needs, respectively. The first are rain catchments, for which communities pave small hillsides with smooth plaster, making a downward facing cone-shaped structure. When the rainy season comes, rainfall, unable to be absorbed into the plaster, flows down the catchment and into a holding tank. According to residents, this has the double benefit of providing a source of water for human consumption during the dry season, as well as allowing children to stay in one place most of the year to attend school by giving them year round access to centralized water (Ragan et al., *unpublished*).

In this way, it simultaneously provides water security to herders and enables their children to obtain an education. The ecological effects of these structures, as well as their potential to focus grazing in otherwise waterless areas, have not yet been studied, and so this paper cannot comment on them. That being said, their size and distribution is highly limited so far, and any potential drawbacks are likely outweighed by the human benefit they provide.

While the rock catchments provide for human water needs in drier environments, they do nothing to quench the thirst of Maasai's herds, nor do they provide any benefit to wildlife. For this, Maasai in Oldonyo-Nyokie turn to dams. In most cases, communities select dam management committees and pool funds to dig a large ditch in the ground. During the rainy season, this ditch fills with water and creates a standing pool that persists for months into the dry season (Ragan et al., *unpublished*). This water sustains pastoralists' herds and allows them to venture farther into some of the drier regions of Oldonyo-Nyokie, which would otherwise be unusable due to lack of standing water. It is particularly helpful in allowing sick and young livestock to remain close to *bomas*, rather than having to travel long distances to find water. As for wildlife, the dams create a bit of a complex scenario. Pastoralists actively discourage wildlife from drinking from the watering hole by building thorny enclosures similar to the ones they construct around their homes. This is because wildlife decrease the amount of time before the water dries up, as well as potentially defecating in it and causing it to spoil. Despite their attempts, wildlife do manage to get into the water at night when there are no herders around to repel them. Locals claim to find higher densities of wildlife around the dams than they do elsewhere, indicating they serve an important function in the maintenance of wildlife populations in the drier areas of Oldonyo-Nyokie. Again, no scientific data exists examining the



relationship of dams to ecosystem wellbeing. Ultimately, the dams have provided a solution to climate-driven water insecurity. Being recent developments however, their long-term efficacy and ecological impacts are yet to be seen.

In the Ol’Kiramatian region, pastoralists are using a very different strategy to respond to growing climate insecurities. Drinking water in Ol’Kiramatian is less of an issue, with a number of rivers funneling down off the bordering Rift Valley escarpment. While satisfying thirst, this channeled water does little to promote the growth of grass in the area. Because of this, pasture availability is the main variable with regards to rainfall inconsistency in Ol’Kiramatian. To mitigate this, the Maasai of

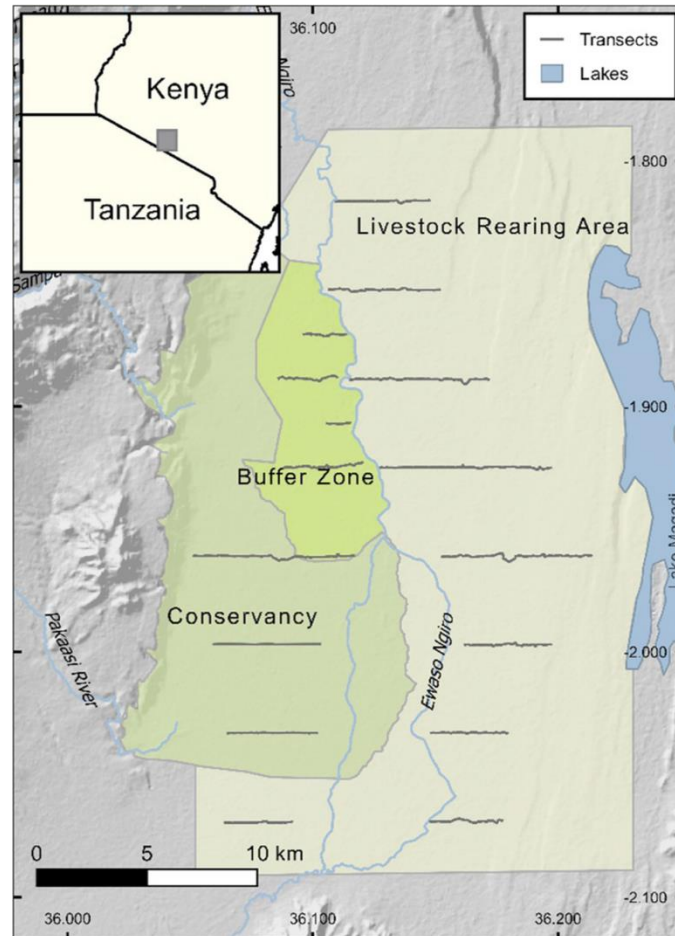


Figure 1. Map of Ol’Kiramatian region and its conservancy land zoning. Taken from Tyrrell et al., 2017.

Ol’Kiramatian have established a conservancy in the Western region of the district (See Figure 1). In doing this, they have combined traditional grazing pattern strategies with contemporary state institutions to preserve an emergency grass bank which they can fall back on during times of severe drought. As discussed earlier, East African pastoralists rely on seasonal migration to access nutritious, fast growing grasses during the rainy season, shifting to drier, less nutritious

areas during the ensuing dry season (Tyrrell et al., 2017). Viewed through this lens, the creation of a conservancy is the legal formalization of this system, setting aside an area of land to be avoided by livestock except in times of drought and grass shortage. This contributes to creating a temporally diverse landscape, with livestock cycling through the buffer zone of the conservancy according to the season, and entering the conservancy rarely. This landscape diversity further contributes to the promotion of biodiversity in the region (Schuette, 2012). As such, the creation of a conservancy has served to create a grass bank that benefits livestock and wildlife alike, helping to decrease grazing insecurity in the face of climate change.

Another one of the key benefits of the conservancy to the Ol'Kiramatian conservancy is its securing of tenure over the land within the community. As discussed earlier in the Athi-Kaputiei context, the alienation of land harms the ability of pastoralists to practice successful herding livelihoods, and decreases the biodiversity of ecosystems (Nkedianye et al., 2009). Galaty refers to this as a process of 'legal theft', whereby outsiders come to control vast portions of pastoralists' land through a hemorrhaging process of incremental land sales (Galaty, 2016). Kenya's South Rift region, of which Ol'Kiramatian and Oldonyo-Nyokie are a part, is no stranger to this process, though have so-far fared better than most in retaining ownership of their lands. In Ol'Kiramatian, the community has been battling in court for ownership over a portion of their land for decades. Though this has proven a substantial drain on resources, their ability to contest outsiders' questionable claims to their land stands out as a source of hope for the future of coexistence.

Another community benefit of the conservancy is its potential to generate income through tourist activities. Much has been written about the need for communities to receive

the benefits of conservation efforts rather than solely incurring its costs (Berkes, 2004; Adams and Hutton, 2007). In Ol'Kiramatian, this is done by charging tourists a daily fee of around 10 USD. These funds, collected by community representatives, are then distributed amongst registered households as income. Another way in which the community benefits financially from having a conservancy is through the researchers it helps to draw in. In Ol'Kiramatian, this led to the building of the Lale'enok Research Center by the Reto Women's Group who lease it to researchers as a base from which to work in the area. Through this, the women are able to charge a daily fee to users, generating funds which they use to develop livelihood opportunities such as beadwork and honey production, as well as fund bursaries that allow local girls to attend school. Ultimately, the conservancy allows the community to reap financial benefits from their biodiversity resources through its attraction of tourists and researchers alike.

The benefits the community derives from researchers extend beyond the rent they pay to the Reto Women's Group. The Lale'enok Research Center serves as the functioning headquarters for the South Rift Association of Landowners (SORALO), of which Ol'Kiramatian and Oldonyo-Nyokie are members. SORALO assists communities by researching issues related to land tenure and sustainability, empowering community members by including them in the creation of that research, and disseminating findings amongst community members to help them make land use decisions that work to their benefit. By doing this, the organization works to strengthen traditional livelihood practices while simultaneously safeguarding resources for future generations under the umbrella of community based conservation. Having observed many of these research programs firsthand, I can confirm that they benefit communities most by including them in the process of data collection.

While academic research outputs may benefit communities in the long term by helping to guide policy and funding at the national and international level, it has little relevance to the current day-to-day lives of Maasai. For example, SORALO's Rebuilding the Pride program does regular surveys of Ol'Kiramatian in order to track lion numbers and their movements throughout the ranch. This generates data which helps researchers and policy makers understand human-wildlife interactions, but has little relevance to the daily lives of Maasai pastoralists (Schuette, 2012). However, because the Rebuilding the Pride team consists of members of the local community, referred to as community resource assessors, a parallel form of colloquial data is created in tandem with the academic oriented data. Community resource assessors, by going out regularly to observe where lions are, quickly disseminate that knowledge via cellphone to other community members. From there this information is disseminated to the relevant parties, namely pastoralists, who use it to inform their herding decisions to avoid conflict with lions. A similar project occurs on a smaller scale with SORALO's baboon project, in which one community resource assessor collects daily data on baboon movements and uses their observations help herders avoid conflict with them.

SORALO's employment of community members creates colloquial knowledge which helps guide more than just the avoidance of wildlife conflict. Through their Rangeland Monitoring program, community resource assessors record vegetation levels throughout Ol'Kiramatian across many seasons. This produces long-term data on the relation of vegetation to rainfall patterns that helps illuminate rangeland drought resistance and recovery. Again, this information is useful for crafting effective policy and using international funds effectively, but its on-the-ground value lies in the ability of community resource assessors to disseminate their

findings and experiences into the community. This occurs when community resource assessors, having moved all around Ol’Kiramatian and observed the quality of pastures there, are able to provide herders with the information required for them to make the best grazing decisions. This allows herders to graze their livestock more efficiently and effectively. As the above examples show, the inclusion of local Maasai in the processes of researchers provides real, on the ground benefits to the community in the form of employment and knowledge. As communities receive the benefits of conservation efforts, it helps them to justify the costs inherent in conservation, and generates community support.

A more direct approach to engaging communities and promoting support for conservation efforts is to directly employ locals in its execution. This idea has spread across Kenya in the form of Community Rangers. Spearheaded by the Kenyan Wildlife Services (KWS), the program trains and employs community members to ensure sustainable practices across Kenya’s protected areas and wildlife hubs. SORALO has partnered with the KWS in this venture to train Community Rangers to patrol its various member group ranches. The hope is that by employing locals, communities will receive the benefits of wildlife abundance that offset the costs, such as crop raiding and livestock predation. The program has met with widespread success, with the KWS announcing just this month the addition of 78 new Community Rangers (Muingi, 2017). Another sign that the program has been successful was that, during interviews in Oldonyo-Nyokie, residents stated interest in establishing a conservancy with the explicit desire that it would lead to scouting jobs for the community (Ragan et al., *unpublished*).

## Conclusion

By explaining the ways in which East African Maasai communities have coexisted with wildlife for generations, this paper has sought to show that the improvement of pastoral livelihoods and the conservation of wildlife are mutually compatible goals. That being the case, there are still many forces putting stress on this relationship and causing it to break down in places. Whether it be the eviction of Maasai to create wildlife-only parks, misinformed initiatives, which import invasive species that outcompete native resources, or the broadly encompassing effects of climate change, the future of traditional coexistence strategies are under threat. Luckily, Maasai communities have shown an impressive ability to adapt and persevere through these challenges. By adapting traditional ecological knowledge and developing new, novel solutions to problems, they create hope for the continuation of the relationships between pastoralists and wildlife.

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