

RESEARCH

Resisting Legibility: State and Conservation Boundaries, Pastoralism, and the Risk of Dispossession through Geospatial Surveys in Tanzania

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This article illustrates how the introduction of modern geospatial surveying technology in Tanzania has failed to resolve a boundary conflict between the state and nature conservation authorities on one side and a rural community of pastoralists on the other. Far from fixing a contested geography by resurveying its boundaries and facilitating stakeholder participation for conflict resolution, digital cartography has made visible and reanimated the buried history of mismatched and conflicting logics between state-led territorial administration and conservation, and pastoral land use practices. The article shows how state and conservation officials have relied on the insights from fact-finding exercises to dismiss rural land use practices that are not represented in official maps. Pastoralists resist these state- and conservation-centred cartographic practices of fixed boundaries to maintain a historical, vital geography of seasonal access to pastures and water. By way of conclusion, this article highlights the pitfalls of geospatial land surveys and fact-finding exercises that unearth and lay bare a boundary conflict previously hidden from the state's view. Through enhanced legibility, rural communities may become visible to the state, risking dispossession and evictions.

Keywords: boundary conflict; land survey; mapping; conservation; pastoralism; legibility; Tarangire National Park

1. Introduction

The introduction of geospatial land surveying technologies has offered new avenues for government administration, land titling and marketization, land and boundary conflict mitigation and resolution, and land use planning (Anthias, 2019; Cassells, 2001; Chapin, Lamb and Threlkeld, 2005; Dawwas, 2014; Ellis and Waterton, 2005; Radcliffe, 2010; Rose-Redwood, 2012; Soyong and Perera, 2014; Zhang, Li and Fung, 2012). Modern cartography promises unambiguous land use planning and mapping, and greater citizen participation in these processes in contexts that are often ridden with ambiguous spatial records, and uncertainties over land tenure and property rights (Boone, 2019; Huggins, 2018).

Yet, the challenge to any cartography is its own history. Cartography is not employed on a blank slate (Bluwstein and Lund, 2018; Roth, 2008). Instead of laying the groundwork for conflict resolution through boundary revision and change, land surveys are often used to confirm pre-existing administrative and protected area boundaries. The hope is that clearly demarcated and mapped boundaries will create or raise awareness of the

'true' boundaries and property rights, thereby enabling the mitigation and resolution of persistent land conflicts.

The apolitical framing of boundary conflict resolution as 'awareness raising' exercises prevents a political settlement of conflicts that often have political root causes. Land use planning and surveying exercises are not politically neutral processes that can ensure legitimate, uncontested boundaries and maps through reliance on cartographic technology (Boone, 2019; Fogelman and Bassett, 2016; Fox, 2002; Harwell, 2011; Robbins, 2003; Walker and Peters, 2001; Walwa, 2017). Rather, resonating with critical appraisals of cartographic practices (Crampton, 2009; Harley, 1988; Kosek, 1998; Orlove, 1991), analysts see them as the newest tools in the hands of the state and non-state actors. In such hands, these actors can harness cartography to advance their interests and priorities, and their visions of property and land tenure (Bluwstein and Lund, 2018; Huggins, 2018; Orozco-Quintero and King, 2018; Radcliffe, 2011; Rose-Redwood, 2012; Sjögren, 2015).

These critical insights suggest that the promise of modern cartography to settle land and boundary conflicts through surveying, mapping and demarcating ambiguous territories is often unfounded (Fox, 2002; Harwell, 2011; Walker and Peters, 2001). Drawing on these insights and a case of a protracted land and boundary conflict in Tanzania, this article adds another dimension to these

debates by arguing that – rather than settling existent land disputes – cartography-based land use planning, land tenure clarification and property demarcation exercises can reanimate and amplify dormant conflicts whose foundation was laid in the past. More concretely, this article shows that far from fixing a contested geography by resurveying it, modern cartography makes visible the buried history of mismatched and conflicting logics of top-down state-led boundary-making for administration and nature conservation on one side, and local land use practices on the other.

2. Boundary conflicts, state-making, and pastoral livelihoods in Tanzania

The promise and perils of clear boundaries

Land and boundary conflicts in rural areas of the Global South often derive from unclear, poorly documented, competing claims over property, land and territory. In response to land conflicts, conflict resolution processes are launched, experts are assigned, fact-finding missions are deployed, affected parties are invited to participate, and maps and reports are produced. Often, such missions acknowledge that some of the affected conflict parties were not properly consulted when their land use practices became constrained by new land tenure categorizations and demarcations. At times, some of the claimants may be accused of using someone else's land unlawfully, intentionally or not.

To settle a land and boundary conflict, experts usually propose to survey the disputed land through modern geospatial technology in order to clearly and unambiguously communicate the geographical positions to all parties involved. Conservation and development practitioners, NGOs, scholars, and even government authorities call for the participation of rural people in land use planning and boundary clarification exercises to clarify unclear property relations, to resolve land and boundary conflicts, and to harmonize different and at times competing land uses (Boone, 2019; Huggins, 2018; ILC, 2013; Kaswamila and Songorwa, 2009; Massay, 2017).

The Tanzanian state has enthusiastically embraced digital land surveying technology to address the numerous conflicts between conservation authorities and rural people, between farmers and pastoralists, between agribusiness investors and smallholders, and between urban developers and property owners. With the introduction of modern geospatial technology by international donors such as the World Bank and KfW¹, and by conservation NGOs such as WWF and FZS,² land surveys have become common features of conflict resolution procedures across the country (Boone, 2019).

For instance, the Ministry of Lands, Housing and Human Settlement Development, has received a multimillion USD grant by international development organizations to survey village boundaries and individual land plots across the country in the context of the Land Tenure Support Programme (LTSP). LTSP was launched in 2016 and is expected to employ modern geospatial land surveying technology, including drones (Reuters, 2016), to strengthen land tenure security, to settle ongoing and

prevent future land disputes, and to 'ensure effective land administration' (DailyNews, 2017). Furthermore, the Tanzanian central government has recently set aside 1.5 billion TZS to survey the boundaries of 100 villages surrounding national forest reserves. Through this large-scale project, the Tanzanian Forest Service under the Ministry of Natural Resources and Tourism and the National Land Use Planning Commission expect to reduce land conflicts between villages and protected areas, with the goal to 'fight continued forest invasion' (Mbago, 2019). The same Ministry has also announced a countrywide 'remapping and demarcation' of its national parks, game and forest reserves to 'avert human-wildlife clashes' (Makoye, 2017). In these endeavours, ministry officials emphasize the reliance on GPS-based boundary surveys to raise local awareness of official boundaries. They see the main challenge towards conflict resolution in 'a low understanding among the residents on demarcation issues' (DailyNews, 2016).

The example of a land conflict between Tanzania's Saadani National Park and the surrounding villages is a case in point. Here, the Tanzanian Prime Minister has pointed out that 'land officers will use the Global Positioning System (GPS) device to identify the right boundaries that were set by the government' (Rweyemamu, 2017). This example illustrates how government authorities and donor-supported programs rely on top-down land surveys to raise people's awareness and acceptance of legally recognized land tenure regimes and boundaries that have been put in place by the state in the past.

However, the reliance on modern technology and participation of all relevant stakeholders obscures the fact that boundary clarification and conflict resolution are inherently power-laden and socially messy. Participation can serve as window-dressing for top-down expert-led processes (Lund, 2015; Perreault, 2015). Rural voices can become marginalized when pitted against conservation and tourism interests (Bluwstein, 2017; Huggins, 2018; Orozco-Quintero and King, 2018). Formalization of land tenure and property ownership through clear boundaries and land use plans bears the risks of dispossession when state and non-state actors with an interest in land digitize, demarcate, title, and thereby make land claims visible (Bluwstein et al., 2018a; Boone, 2019; Chung, 2019; German, Unks and King, 2016; Maganga et al., 2016; Walwa, 2017). Formalization of land rights can also undermine access to land and resources across larger scales, suggesting that there is a trade-off between bounded territories with clear property rights and environmental resilience through access to spatially and temporally shifting resources (UCRT, 2010; Walker and Peters, 2001). Furthermore, boundaries are not simply technical objects that can be readily surveyed and clarified. Rather, the 'social life of boundaries' makes them 'inherently resistant to uncomplicated clarification' (Harwell, 2011: 181; also see Walker and Peters, 2001).

In addition, the reliance on technology and participation can distract from a critical examination of underlying causes of land and boundary conflicts. Such conflicts have often little to do with a lack of participation or a

lack of boundaries per se. Rather, what is often at stake are incongruent and incompatible logics of state-centrist administrative government (whose *modus operandi* is based on simplification and legibility) at odds with varied local needs and rural livelihoods (Fox, 2002; Ndagala, 1990). A state-centrist view relies on administrative boundaries and units (such as villages, districts, and regions) as technologies to govern people and spaces within state territory (Mitchell, 2002; Scott, 1998). This view holds that a boundary encloses rights to all resources in the territory. Contra a state-centrist view that relies on abstraction and simplification of complex socio-ecological arrangements, rural livelihoods may rely on customary land tenure and land use practices that are entangled with spatially variable, non-territorialized environmental conditions. These practices often have deep historical roots and are not always dependent on fixed territorial rights over a bounded piece of land (Harwell, 2011; Walker and Peters, 2001). Ultimately, invisibility (or illegibility) vis-à-vis the state can even be a *precondition* for the maintenance of rural land use practices and land tenure regimes that are at odds with a state-centrist administrative logic (Wainwright and Bryan, 2009).

Tanzania's history of state-making projects of land and resource control

In present-day Tanzania, the tension between a state-centrist administration and rural livelihoods has emerged with the launch of colonial state-making projects. A central goal of colonial administrations was to make legible the poorly visible and fluid rural landscapes. Or in the words of James Scott, 'to make a society legible, to arrange the population in ways that simplified the classic state functions of taxation, conscription, and prevention of rebellion' (Scott, 1998: 2). The problem of legibility, a 'central problem of statecraft' (Scott, 1998: 2), was addressed by drawing maps and demarcating boundaries on the ground.

By mapping boundaries and demarcating different territories, colonial administrators tried to govern colonial subjects by containing different groups in clearly delineated, visible, and controllable areas. Administrative powers were attached to boundaries that gave birth to provinces and districts, and later regions (Justin and De Vries, 2017). On top of a colonial grid of administrative boundaries, authorities tried to separate territories of state-control (e.g. a forest or a game reserve) from customary territories (e.g. a native reserve). Post-colonial land tenure regimes are products of these state-building projects of the past (Boone, 2015), but also of the resistance to these projects or the failure of these projects to confine and fix populations in space (Harwell, 2011; Moore, 1998).

In present-day Tanzania, three kinds of state-making projects have played a particularly significant role in redrawing the administrative, ecological and social map: ethnicized state administration, nature conservation, and villagization. Ethnicization was a strategy of early colonial rule to reorganize and reorder African societies along ethnic lines and institutions, so that colonial subjects could be governed through indirect rule. Ethnicization

was underpinned by racialized images of Africans, whose fluid and overlapping identities were made more rigid and fixed – and thereby legible and controllable – by colonial territorialization (Hodgson, 2001; Justin and De Vries, 2017). Although post-colonial nation building has successfully undone much of this policy through detribalization in Tanzania (Boone and Nyeme, 2015; Greco, 2016), present-day administrative divisions continue to be based on a colonial cartography (Justin and De Vries, 2017).

Tanzania's protected areas (such as national parks or game and forest reserves) have been colonial and post-colonial state-making projects *par excellence* (Neumann, 2004). The spatial logic of colonially inspired and still-practiced nature conservation requires a Cartesian separation between nature and culture. This separation has been historically achieved through the creation of territorial boundaries (Bluwstein and Lund, 2018; Hazen and Harris, 2007) and often through the eviction of humans (Agrawal and Redford, 2009; Brockington and Igoe, 2006). Particularly relevant for this article are the limits of 'mappability' in conservation (Hazen and Harris, 2007). For lack of technological capabilities or poor physical access to localities that were to be mapped, early protected area cartography was often based on estimation and approximation. Geographical and ecological data and knowledge about the human and nonhuman geography of these spaces were limited. At times, this lack of knowledge led to a conservation cartography that undermined the ecological and social fluidity of these spaces by fragmenting them into bounded, discrete land use and tenure categories. Usually, both humans and animals (domestic and wild) had to ignore these boundaries in order to survive.

In the 1970s, Tanzania embarked on a 'high-modernist' resettlement scheme across the entire country (Scott, 1998). Through villagization, rural communities were expected to become 'modern', nucleated villages. This forced formalization of rural spaces – of which pastoralist commons were particularly illegible to the state – followed a socialist vision of state-making and nation-building. Although villagization failed on many accounts (Greco, 2016), it nevertheless left behind a legacy of thousands of officially recognized and registered villages, some of them with mapped village boundaries. These boundaries made it onto maps that most villagers have not seen, nor did they know their detailed extent. By and large, coercive villagization has not improved rural livelihoods (Schneider, 2004), but it shaped rural perceptions about a state that cannot be trusted and – at times – needs to be resisted, such as when land formalization schemes are introduced to rural people (Briggs, 2011).

State-making, boundarization and pastoral livelihoods

In particular, pastoral livelihoods have been undermined by such state-making projects of legibility that sought to confine mobile peoples and their livestock into bounded areas, often with little access to permanent water sources (Ndagala, 1994). Pastoralism in Tanzania is a risk-spreading livelihood strategy to safeguard the survival of

livestock herds in an environment characterized by a lack of permanent water sources and seasonal, at times erratic, changes between rain and drought. Pastoral livelihoods tend to be particularly at risk of becoming marginalised by the state because mobile livestock herders often do not establish durable infrastructures to stake their claims to the land (Ndagala, 1990; Odgaard, 2002). Given this invisibility of pastoral livelihoods vis-à-vis the state, the juridical inferiority of customary land rights to statutory law throughout the 20th century,³ and a set of enduring prejudices against pastoralists (who are often framed as being backward and primitive), pastoral groups have been displaced, moved around, and resettled throughout colonial and post-colonial rule in Tanzania in the name of administrative government, environmental conservation, and agricultural 'productivity' (Hodgson, 2001).

A pastoral rangeland geography does not only leave few visible structures, it is also at odds with state-imposed land use plans, administrative boundaries and protected area demarcations. Consequently, pastoralists have widely ignored and resisted state- and conservation-led demarcations if these boundaries cut off access to vital resources (Homewood, 1995, Hodgson and Schroeder, 2002). At times, violent clashes with the authorities became inevitable, but for the most part, evasion of boundaries allowed the maintenance of a boundless territory for pastoral land use in line with seasonally variable environmental conditions.

As of late, the introduction of modern land surveying and mapping technologies has enabled state authorities and conservation managers to reorder the poorly legible rural landscape, laying bare the tension between a pastoral semi-arid geography and the administrative logic of the territorial state. Drawing on an empirical case from Tanzania, the rest of the article illustrates how this tension cannot be simply overcome with stakeholder participation and the reliance on modern land surveying technology as long as conflict resolution is underpinned by deeply uneven power relations between public authorities and its subjects. Rather, a boundary resurvey may erase the history of local land use and further entrench these power relations by enabling the state and conservation authorities to reassert its control over unruly communities.

3. Research methodology

This article draws on around six months of fieldwork in Tanzania between 2015 and 2017. I conducted around 150 interviews with ordinary villagers and village leaders (including focus groups, oral histories, and participatory mapping), TANAPA, MNRT, and TAWIRI staff, district and regional government officials (land surveyors, game and natural resource officers)⁴ and civil society representatives. I have reviewed, georeferenced, and overlaid numerous historical and contemporary maps with GIS⁵ shapefiles obtained from different sources⁶ and with my own GPS measurements in the field. Through this method I could trace the history of administrative and protected area boundary making in the study area. I shared the images, maps, and insights drawn from GIS analysis with my interlocutors in the field to receive feedback and to

further my understanding of different and competing perceptions about the local history of boundary making.

4. The case: A protracted land and boundary conflict between Kimotorok village and two protected areas

The Tanzanian village⁷ Kimotorok became embroiled in a protracted land conflict after conservation authorities resurveyed the boundaries of Tarangire National Park and Mkungunero Game Reserve in the mid-2000s. In the wake of the resurveys, conservation authorities have challenged Kimotorok residents' land rights and territorial claims, leaving people vulnerable to periodic threats of eviction and displacement. To settle the boundary conflict, conservation and government authorities have revisited historical maps and government decrees that stipulate administrative and protected area boundaries (these decrees are called Government Notices, GNs). However, the various maps and GNs that have been produced since colonial rule until now do not always match. More importantly, maps and GNs omit local knowledge of past and present land and resource use practices, thereby erasing pastoral land use in the area that has predated official conservation initiatives and administrative divisions.

As **Figure 1** illustrates, Tanzania National Parks Authority (TANAPA) and the Wildlife Division of the Ministry of Natural Resources and Tourism claim the land of two officially recognized subvillages of Kimotorok, in part (in the case of Arkasupai subvillage) or entirely (in the case of Kisondoko subvillage). By claiming parts of Arkasupai subvillage, TANAPA suggests that Kimotorok's dispensary, the doctor's and nurse's house, the primary school, and all central shops and businesses – the entire public infrastructure of the village – are within meters away from the boundary of Tarangire National Park, some structures being inside the park, others outside. In addition, TANAPA claims that several Arkasupai homesteads, farms, and important wet-season livestock grazing areas are inside the park. Mkungunero Game Reserve officials, too, deny access to an important wet season grazing area by claiming that Kisondoko subvillage is an illegal settlement situated entirely inside Mkungunero.

As the schematic drawing in **Figure 2** illustrates, there should be no overlaps between the various administrative and protected area boundaries. A village must not be cut in half by administrative boundaries of a district, a region, or a national protected area. Yet **Figure 2** also illustrates the historical proliferation of administrative divisions in Northern Tanzania. Each subdivision, redrawing and renaming of administrative territories sets in motion the state's bureaucratic machine to adjust existent territorial entities and land tenure regimes to the new administrative reality, on paper and on the ground. This requires time, financial and human resources, coordination, technical knowledge, and expertise. While time seems to be an unlimited source as many protracted conflicts in Tanzania suggest, resources, coordination, knowledge, and expertise (what is often referred to as 'capacity' in development language) are limited (Huggins, 2018; Orozco-Quintero and King, 2018).

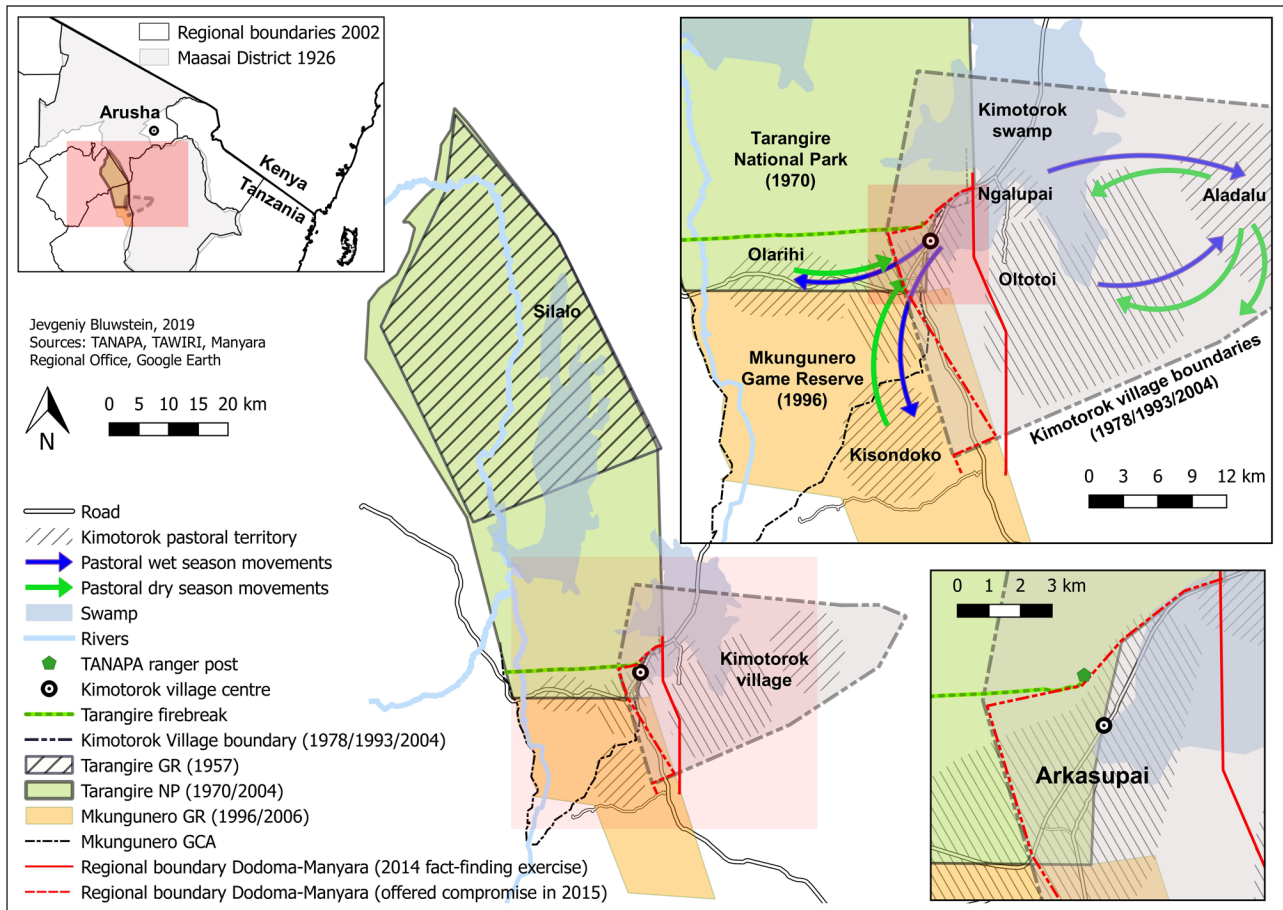


Figure 1: Pastoral land use and boundary overlaps with protected and administrative areas in the study area.

It is therefore not a surprise that authorities identified several overlaps between different administrative divisions and protected areas, when the boundary conflict between the village Kimotorok and the protected areas Tarangire and Mkungunero flared up:

- The regional boundary (in thick red, **Figure 3**) ought to separate Dodoma region (west) from Manyara region (east). The district Kondoa ought to be in Dodoma region, the districts Simanjiro and Kiteto ought to be in Manyara region (**Figures 2 and 3**). Regional and district boundaries (in thick red, **Figure 3**) should not cut through a village that is always under administrative control of one District and one Region.
- Kimotorok village is officially within Simanjiro District (Manyara Region, **Figure 2**); however, its boundaries (in blue and purple, **Figure 3**) do not align with district and regional boundaries in **Figure 3**.
- Mkungunero Game Reserve should be contained within Kondoa district (Dodoma region) and neither cross the red line into Manyara region, nor the blue and purple lines into the villages Kimotorok and Irkiushiobor (**Figure 3**).
- Tarangire National Park (which follows the horizontal northern boundary of Mkungunero Game Reserve – in green – and turns north at the beacon EAX 405 – in black, **Figure 3**) should not cut through Kimotorok village (blue). Rather the park boundary should align with the western boundary of Kimotorok.

To settle the boundary conflict, a fact-finding exercise was conducted in 2014 in the disputed territory between Tarangire and Kimotorok (**Figure 4**). The exercise brought together representatives from a parliamentary committee dispatched by the office of the prime minister of Tanzania, representatives of Mkungunero and Tarangire, and seven Kimotorok village leaders: former and (at the time) current village chairmen, a subvillage chairman, three traditional leaders, and the women's representative in the village council. By all accounts, it was a participatory exercise. The seven village leaders are respected members of their community and are trusted with representing the interests of village residents. With the help of Kimotorok leaders, government experts identified, geolocated and mapped various locations of relevance (**Figure 4**). Homesteads in the disputed area were also geolocated and mapped. However, according to one of the participating Kimotorok leaders, government experts were not transparent about how they would use the extracted information.⁸

Authorities mapped their findings based on the spatial information they collected on the ground (**Figure 4**). Drawing on this map, TANAPA officials considered to revise Tarangire's park boundaries (**Figure 5**). The boundary revision would include moving the old regional boundary (in red) westwards (in dotted red, **Figure 1**; in blue, **Figure 5**), so that official Kimotorok village boundaries would be at least partially recognized and the village centre would not be outside of its 'home' region and district

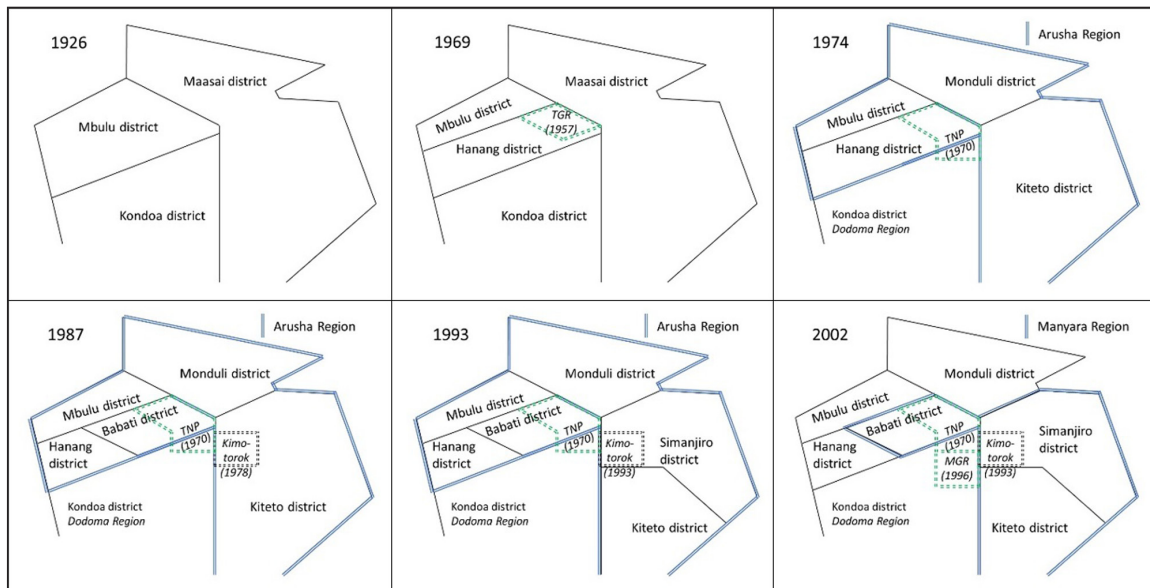


Figure 2: Schematic illustration of past and present administrative and protected area boundaries in the study area, as they ought to be. TGR – Tarangire Game Reserve; MGR – Mkungunero Game Reserve; blue – regional boundaries; black – district boundaries; green – protected area boundaries.

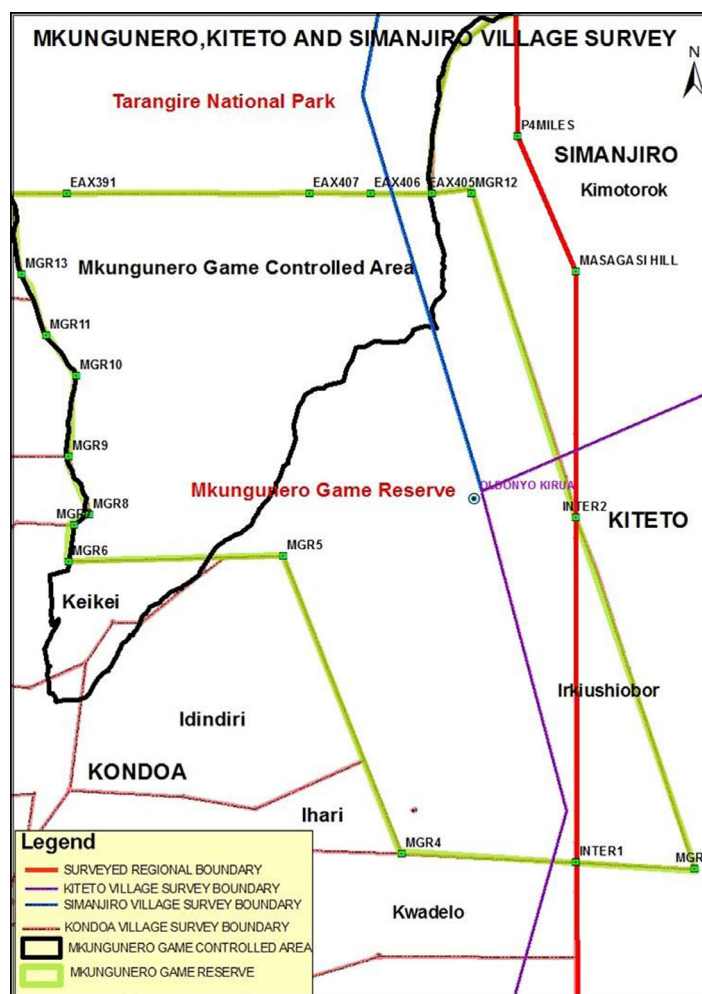


Figure 3: Overlapping territories in the study area. Source: PowerPoint presentation ‘Mkakati wa Kuhakiki Mpaka wa vijiji vya Irkiushibor, Kimotorok, Katikati, Kwadelo na Kilele cha Ngo’mbe’ (Strategy for verification of boundary of villages Irkiushibor, Kimotorok, ...), prepared by the Ministry of Land, Housing and Human Settlements, the Prime Minister’s Office Regional Administration and Local Government, and the Ministry of Finance-National Bureau of Statistics, date unknown.

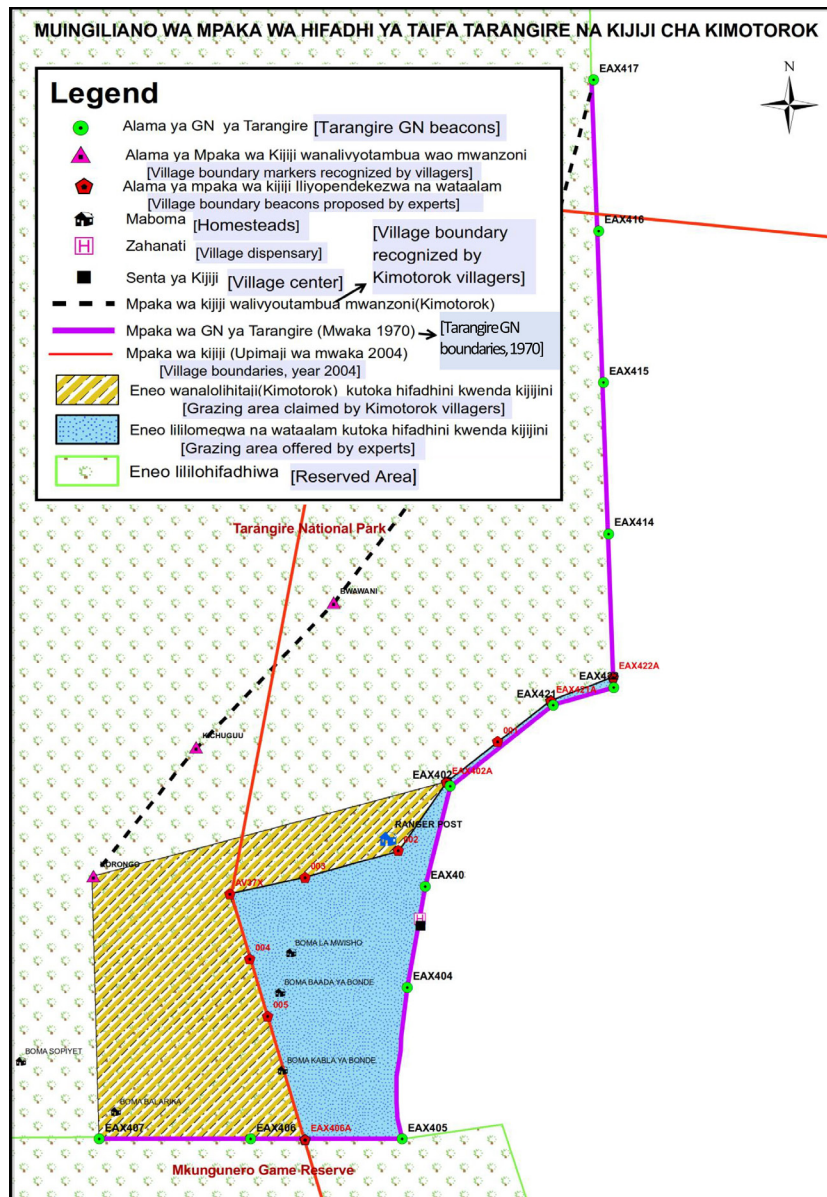


Figure 4: ‘Expert’-led mapping of Kimotorok village claims compared to government authorities’ understanding of the boundaries. This map was produced by authorities based on the fact-finding exercise in October 2014. I enlarged and amended the legend with English translations. Map title: Boundary overlap between Tarangire National Park and Kimotorok village (Muingiliano wa mpaKa wa hifadhi ya taifa Tarangire na kijiji cha Kimotorok).

(Manyara and Simanjiro) any longer. Kimotorok would gain an area of 14 km² (see ‘Grazing area offered by experts’, **Figure 4**). This would formalize a key part of Arkasupai subvillage that hosts Kimotorok’s village centre and the public infrastructure of the village. On the other hand, this boundary revision would cut off access to seasonal pastures that Kimotorok residents depend on during the wet season. Much of this pastoral territory would be lost to southern Tarangire and Mkungunero (**Figure 1**). In addition, TANAPA would keep its ranger post in close proximity to the village centre (**Figures 1 and 4**).

Kimotorok village leaders rejected TANAPA’s compromise on two grounds: the close presence of a ranger post that subjects Kimotorok residents to permanent surveillance, and, more important, the loss of access to seasonal pastures and water sources in Tarangire and Mkungunero. Yet even if Kimotorok leaders would have agreed to the

compromise, high-level TANAPA officials expressed a clear preference against the compromise and for evictions.⁹

Seasonal land and resource use practices in Kimotorok

A look at local land and resource use practices illustrates how high the stakes are for Kimotorok residents. Kimotorok village is home to a majority Maasai community of around 3,000 people, 60,000 heads of cattle, and 67,000 goats and sheep, according to a 2012 census. Pastoralist settlements and land and water use practices around Kimotorok swamp resonate with seasonal patterns of rain and drought in the region (**Figure 1 and Table 1**) and predate the establishment of protected areas.¹⁰ A rural livelihood in the semi-arid and drought-prone environment of the study area can thrive based on pastoralism, but only if seasonal mobility of livestock herds to access pastures and water is not constrained.

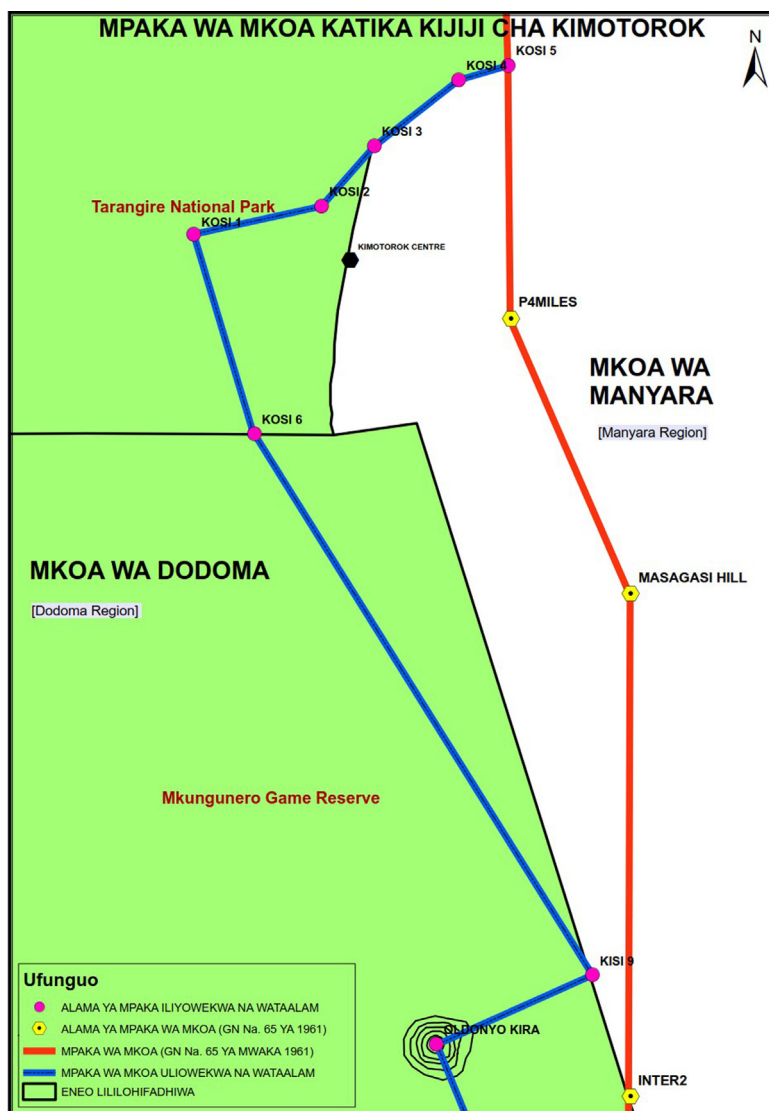


Figure 5: Suggested revision of regional boundaries Dodoma-Manyara after the fact-finding exercise. Red line – surveyed regional boundary; blue line – proposed changes to the regional boundary. Map title: Regional border at the village of Kimotorok (Mpaka wa mkoa katika Kijiji cha Kimotorok). Source: Manyara Regional Land Office, 2015.

Table 1: Seasonal settlement and livestock grazing calendar in Kimotorok. Light grey months indicate transition periods from rain to drought and from permanent to temporary homesteads.

| Month | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------------------------------|---|---|----|----|----|---|---|---|---|---|---|---|
| Rain (bimodal) | | | | | | | | | | | | |
| Swamp is flooded | | | | | | | | | | | | |
| Permanent homesteads (dry season) | | | | | | | | | | | | |
| Temporary homesteads (wet season) | | | | | | | | | | | | |

The rains begin around September–November and last until March–May. During the wet season, Kimotorok swamp is flooded with water, enabling fishing, but becoming inaccessible to livestock grazing. Thus, around February, Kimotorok pastoralists move their livestock to temporary homesteads away from the Kimotorok swamp to find water and grasses east of the swamp in Aladalu subvillage, and west of the swamp in Kisondoko

and Olarihi (Table 1 and Figure 1). After the rains stop, Kimotorok swamp stores rainwater for months, acting as a grass and water bank, a drought reserve to carry livestock herds through the dry season until the rains return. Hence, around August, livestock is taken back to permanent homesteads located close to Kimotorok swamp, which is by now a green oasis amidst a dry environment.

Since the mid-2000s, this historical geography of agropastoral land use is contested. A 2015 survey of a quarter of Kimotorok's households revealed that the residents perceive the most pressing challenges in the village to be the conflict with Mkungunero (mentioned by 76% of the respondents), the lack of access to water (51%), and the conflict with Tarangire (46%) (Bluwstein et al., 2018b). Consequently, spatial representations (maps, beacons, topological landscape features) have become key stakes in struggles over territory. Village leaders are keen to see maps and to understand the meaning inscribed in them in the hope of finding a map that matches their land use practices and recognizes village boundaries as they ought to be. Kimotorok leaders reject maps that appear to challenge and criminalize local practices, denying the maps' authenticity, technical accuracy, and political legitimacy.

5. History of boundary making in the study area

In this section, the article will dive into the history of top-down boundary-making initiatives to illustrate the roots of the ongoing boundary conflict. This history can be periodized into 1) colonial rule through ethnicized administration, 2) protected area creation, 3) protected area expansion and village formalization, and 4) the recent introduction of digital survey technologies to fix boundary uncertainties and conflicts.

Drawing ethnicized boundaries during the colonial beginnings

In 1905, the German colonial administration declared a 'Reserve' for Maasai in northern Tanganyika. Maa-speaking people were expected to live south of the Arusha-Moshi road, and east of the Great North road running from Arusha to Babati (Iliffe, 1969: 59). In 1922, the British colonial administration reaffirmed this territorialization by also declaring the 'Maasai Reserve' in the area (Hodgson, 2001). The British envisioned a pastoral territory to contain and to isolate the Maasai in an 'ethnological and economic sanctuary, rigidly closed to outside influence and to trade' (Provincial Commissioner Mitchell, 16 March 1927, cited in Hodgson, 2001). Through the stroke of a pen, people deemed to be Maasai were alienated from their ancestral lands, being forced to live in the semi-arid 'Maasai Reserve'. Many permanent water sources and fertile lands were excised to be used for colonial settlers (Ndagala, 1990).

However, Maa-speaking people lived across a much larger territory, and the assumed ethnic differences that the British saw to be very pronounced were much less fixed but rather ambiguous, fluid, and ever changing. Pastoralists who were already at that time also cultivating had to abandon agriculture to become 'pure pastoralists' in line with the essentialized colonial image of the Maasai (Hodgson, 2001). In 1926 the districts 'Maasai' and 'Kondoa' were gazetted to reflect this colonial division of pastoral Maasai and agricultural Rangi people (Figures 1 and 2).

Yet, as an exception to the general rule of ethnicized government, Maasai living in Kondoa district were not coerced into resettling to the Maasai district (Richter

1994: 270). This lack of complete enforcement allowed the affected pastoralists – some of them were the ancestors of present day Kimotorok Maasai – to maintain their transhumant land use practices.

Drawing protected area boundaries during late colonial rule

Nature conservation appeared on the colonial agenda in the 1940s in the study area, when colonial administrators began debating the possibility of establishing a protected area in present-day Tarangire National Park, at the edge of Maasai District. Believing that the area around Tarangire River was not populated and hardly used, a game warden suggested in 1949 that '[i]t is most desirable to have a National Park in an area where the interests of man and game do not clash' (ACC 69 275/1 Vol. 1, cited in Arlin, 2011). Tarangire Game Reserve was eventually gazetted in 1957 (Figure 1).

With Tarangire's establishment, Maasai access to Tarangire's perennial swamp, Silalo (Figure 1) was not entirely cut off (Igoe, 2002). Moreover, the District Commissioner Townsend insisted that the colonial authorities needed to be 'absolutely sure' that native authorities had no competing claims to the reserve before its establishment (Arlin, 2011: 185). The colonial administrators were keen to consult its native counterparts, at least as far as they recognized their customary authority. According to archival material that Arlin (2011) reviewed, the Gorowa and Mbugwe native authorities residing west and south of the envisioned game reserve confirmed to not having claims to the enclosed area. The Maasai living north and east of the reserve (hence some of the ancestors of present-day Kimotorok residents) claimed three areas for settlement and livestock grazing. Their inputs were only partially addressed and the proposed reserve boundaries amended. Other ethnic groups such as Barabaig and Rangi (whose descendants reside south-west of Tarangire today) were not consulted given their marginal political role and representation in the area at the time (Arlin, 2011).

However, consultations around the establishment of Tarangire Game Reserve were based on an outdated demography of the 1920s that poorly reflected the realities of land use of the 1950s (Arlin, 2011). As Arlin put it, the creation of Tarangire was based on 'very poor geographical knowledge' and 'a hasty cartography' (Arlin, 2011: 183). Important landscape features such as rivers, mountains or even villages were mapped erroneously and confused with one another. For practical reasons, boundary-making followed topographic features. Game wardens' advocacy for a game reserve reflected a limited understanding of the environment they wanted to control. Wildlife ecology was also poorly understood. The creation of the reserve was expected to secure pastoralists and farmers against wildlife that was to be contained and isolated within the reserve. However, the archives show how wildlife frustrated game wardens soon after the reserve establishment, unwilling to be contained within the reserve boundaries during the wet season (Arlin, 2011, citing a game warden, 1958).

Expanding conservation, formalizing villages

In 1970, Tarangire Game Reserve was upgraded to a National Park and significantly expanded southwards into Kondo district (Dodoma region), thereby swallowing some of the adjacent Mkungunero Game Controlled Area (an area without a land protection status, **Figure 2**), and Kimotorok's customary lands (**Figure 1**). Kimotorok residents suffered substantial territorial losses by the southern expansion of Tarangire and its reconstitution as a National Park, a protected area category that denied any shared land and resource use with rural people (Igoe, 2002).¹¹ To the later Prime Minister Edward M. Sokoine, this upgrade meant 'the loss of homes, grazing pastures and water points that [the Maasai] urgently needed for themselves and their cattle' (Hagen, 1979: 7, my translation from German). People and livestock were driven out by force, and settlement structures were burned down

(Sachedina and Trench, 2009; Interview, 2016). Kimotorok elders remember well the day when TANAPA pushed them and their livestock out from Silalo.

Yet, TANAPA's lack of knowledge of its new south-eastern park boundary signalled to Kimotorok residents what land was under state protection and what remained communal territory. Through fire breaks, Tarangire's rangers enforced and thereby formalized new lines of separation between the national park on the one side, and pastoral settlements, grazing grounds, and small-scale agriculture *within* present-day park boundaries on the other (mapped in **Figure 1** as 'Tarangire firebreak', and mapped in **Figure 6** as 'Fire_breaks_2005' and 'FIRE 2005').

In 1978, present-day Kimotorok village was recognized as a subvillage of Loiborsiret village. Both were officially registered and mapped in the context of the national villagization program. Given a lack of knowledge of

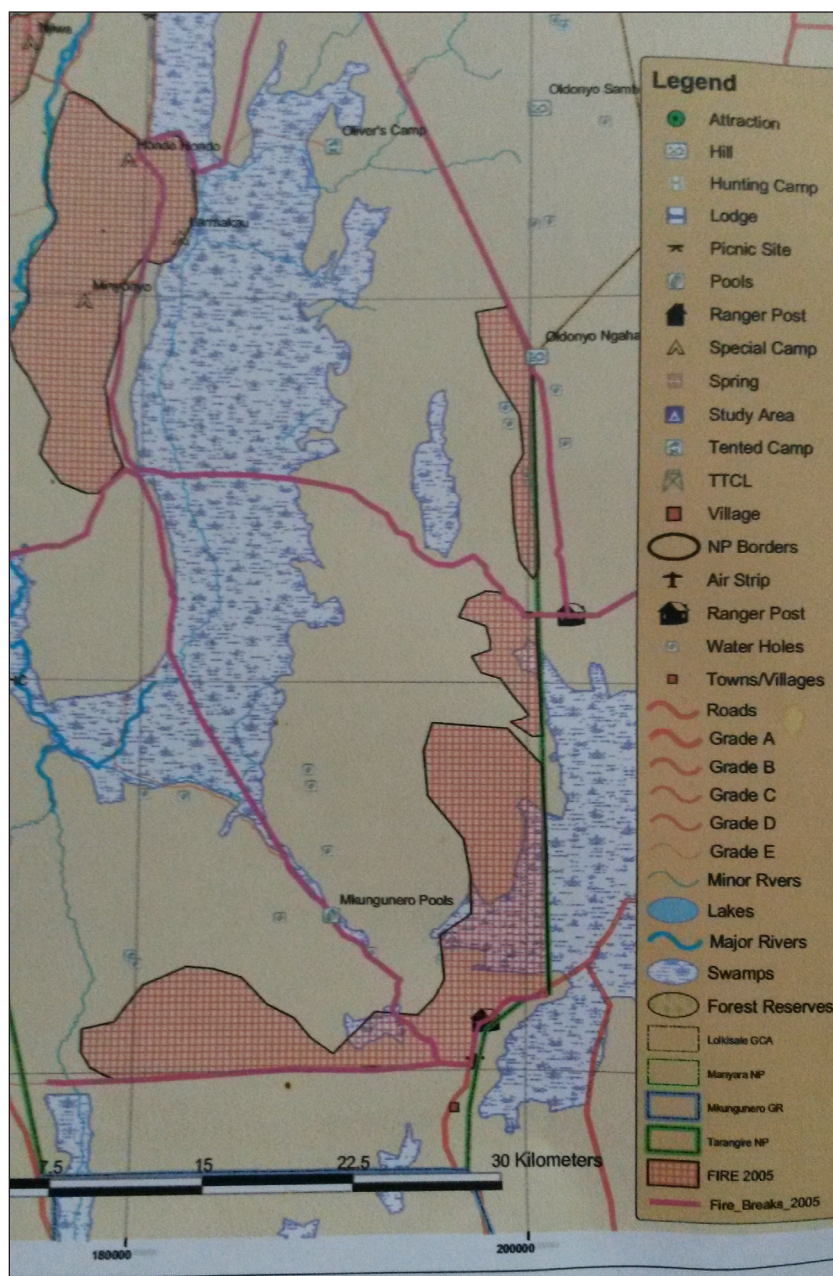


Figure 6: Fire management in Tarangire National Park, map by TANAPA 2005.

Tarangire's south-eastern park boundaries, it appears that nobody realized that Kimotorok's and Loiborsiret's officially formalized boundaries overlapped with Tarangire National Park and were also at odds with district and regional boundaries (see **Figure 3**, also note that Kimotorok's 'village boundaries 2004' in **Figure 4** are based on this formalization in 1978).

In any case, pastoral land use practices were not constrained by these newly created boundaries, whose exact position remained unknown to state authorities. Rather, people felt the coercive aspect of villagization when government authorities tried to force residents into nucleated settlements (Homewood, 1995). According to several village elders, shortly after Kimotorok was recognized as a subvillage of Loiborsiret, government forces burned down several Kimotorok homesteads, forcing people to move 30 km northward to Loiborsiret. Yet, as elsewhere across the country, many forced displacements in the name of villagization were soon rescinded, and already a year later people were allowed to return and establish temporary structures in Kimotorok for livestock grazing.

In 1983 Kondoia district officials decided to upgrade Mkungunero Game Controlled Area to a game reserve. Kimotorok residents were not informed nor consulted because they should not have been affected by Kondoia district decisions according to the administrative logic of district boundaries (see **Figure 2**). However, the decision to make Mkungunero into a state protected area was not implemented until 1996. In these 13 years between decision making and implementation, much has changed on the ground in Mkungunero. Rangi farmers continued expanding their agricultural activities and settlements in Mkungunero, while Maasai continued to use their customary territory for wet season livestock grazing and permanent and temporary settlements. In these 13 years, Kimotorok even acquired official village status in 1993 under the administrative authority of Simanjiro district (**Figure 2**). With the recognition as a village, Kimotorok's wet season area called Kisondoko – located deep inside Mkungunero (**Figure 1**) – received its first subvillage chairman.¹² The formalization of Kisondoko as part of a village further reinforced Maasai claims to wet season grazing inside Kondoia district.

Three years after Kimotorok was recognized as an official village, Mkungunero was gazetted as a game reserve in 1996. However, it was not simply established based on already existent GCA boundaries, which in itself would have created territorial overlaps and disputes with several villages. Instead, the reserve received entirely new boundaries on its eastern side (see **Figures 1, 2 and 3**). These new reserve boundaries were not only at odds with many villages, including Kimotorok, but also crossed into Arusha Region (renamed in Manyara Region in 2002), although the game reserve was meant to be contained within Dodoma Region. This was likely another mapping mistake that led to much confusion between two regions, three districts, and several villages. Yet again, for lack of resources and due to other priorities, Mkungunero remained a paper reserve for another 10 years after its

official gazettement as a protected area, amidst expanding human settlements and farms and an actively used pastoral territory.

Introducing digital survey technologies to fix boundary uncertainties

In 2006, Mkungunero authorities for the first time surveyed the reserve's 1996 boundaries and began to enforce them.¹³ They claimed that two Kimotorok subvillages – Kisondoko and Arkasupai¹⁴ – were illegal settlements located fully or partially inside Mkungunero (**Figure 1**). Parallel to Mkungunero's efforts to forcefully consolidate a protected area, TANAPA launched its own efforts to resurvey Tarangire park boundaries with GPS technology. The survey took place in 2004 and yielded an increase of Tarangire's area from a so far assumed 2,600 km² to 2,850 km². TANAPA conducted the survey based on Tarangire's official Government Notice – GN 160, issued 19 June 1970 (**Figure 7**). As common practice of the day, this original GN does not include actual geographic coordinates, but relies on approximate topographic descriptions. What is more, TANAPA was not in possession of a single map of Tarangire that would be based on this GN 160 of 1970. Thus, a set of maps from the British Directorate of Overseas Surveys (D.O.S 422, series Y742) was used in combination with the 1970 GN text (**Figure 7**) to resurvey Tarangire National Park, and thereby to 'interpret' the original GN, as TANAPA officials put it. The D.O.S maps are from the 1960s, and are of undeniably high quality, yet they do not claim 'authority on the delimitation of boundaries'. Moreover, given the time of production (1960s), Tarangire is depicted in its original game reserve boundaries of 1957. In other words, Tarangire's expansion southwards towards Kimotorok's customary territory was not included in 1960s maps that TANAPA relied on in 2004 to ascertain its 1970 boundaries vis-à-vis neighbouring villages.

This is not an unusual situation. The Tanzanian state's capacity to appropriately record, catalogue, and digitize boundaries and maps, land use and development plans, title deeds, and a cadastral system is limited (Huggins, 2018; Chung, 2019; Orozco-Quintero and King, 2018). Kimotorok was one of many villages that was suddenly believed to overlap with protected areas.¹⁵ Following the 2004 resurvey, TANAPA abandoned its firebreak that served as a de facto park boundary vis-à-vis Kimotorok (**Figure 6**). In the coming years, TANAPA proceeded placing beacons into the ground to stake their claims to a 'heavily populated area with considerable human activity' (Masara, 2005: 12), cutting directly through Kimotorok's village centre, only meters away from the primary school that TANAPA helped build in 2003 as part of its public relations and community outreach program Ujirani Mwema ('good neighbourliness'). Most beacons in the disputed territory were pulled out by Kimotorok residents as a sign of resistance to what was perceived as an illegitimate land claim. To date, Kimotorok residents do not understand why TANAPA would officially recognize Kimotorok's village infrastructure and with it, Kimotorok's village territory, only to challenge it a year later. To further the confusion, TANAPA also supported the construction

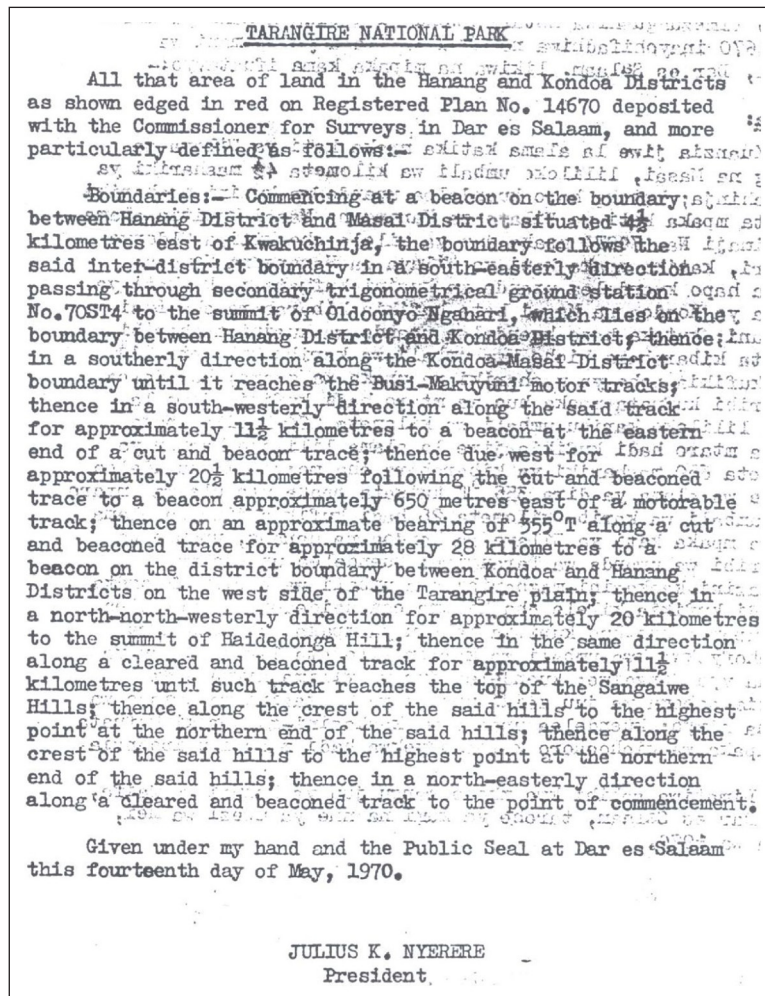


Figure 7: GN 160, published June 19, 1970, declaring the establishment of Tarangire National Park, signed by the President in May 14, 1970.

of the village dispensary in 2007 only meters away from where it claimed the Tarangire boundary to be.

Parallel to the conflict with Tarangire, Kimotorok residents had also to navigate growing tensions with Mkungunero after the game reserve authorities surveyed its boundaries in 2006. Since then, Mkungunero wardens arrested, fined, robbed, and beat numerous people in the disputed territory. The conflict culminated into a prolonged period of violence against Kimotorok residents, peaking in Mkungunero's assault on Kimotorok residents in September 2013 in the context of a country-wide Operation *Tokomeza Ujangili* ('Eradicate Poaching').¹⁶ The Regional Police Commander summarized the actions committed against Kimotorok residents in September 2013: 8 arrested residents, 11 burned homesteads including numerous houses, stolen or burned cash and livestock, poisoned food stock, and a raped woman.¹⁷ In a personal visit, a team dispatched by the Manyara regional government found six burned homesteads with 250 people left homeless. Assuming that Kimotorok is within the jurisdiction of Simanjiro district/Manyara region (**Figure 2**), the Manyara Regional Police Commander expressed to his superior – Manyara's Regional Commissioner – his astonishment over the 'criminal associations such as raping and grabbing of citizens properties'. Echoing the territorial dispute over

administrative boundaries, he further asked 'how come the operation is carried out by rangers from Kondoa district without any consultation with Manyara Region and even, Simanjiro district?'¹⁸

A parliamentary task force with participation of Ministerial and Regional authorities conducted an official inquiry into the land conflict in early February 2015. The task force concluded that 'technical errors' were made during the establishment of Mkungunero Game Reserve. Villages and district authorities were 'poorly involved' in the establishment of Mkungunero's boundaries, and the boundaries were mapped based on a poor 'interpretation' of several GNs. Delays in demarcating and enforcing the boundaries further contributed to the conflict.¹⁹

Such self-critical realization of governments' shortcomings in boundary making for administration and conservation is not uncommon in Tanzania (Orozco-Quintero and King, 2018). Despite these findings, in late March 2015, government authorities returned to install beacons through Kimotorok's village centre in an attempt to demarcate the administrative boundaries of the districts Simanjiro and Kondoa. The idea was to confirm the claims of Tarangire and Mkungunero conservation authorities in their entirety by affirming that large parts of Kimotorok are outside Simanjiro district and are therefore

illegal. Residents quickly pulled out several beacons while hundreds of women spearheaded a week-long occupation of the village centre. As explained by the village chairman, the entire village opposed the beacon placements, 'because it was us who were supposed to show where are the boundaries and the hills, because we are the natives of this village'.²⁰

6. Whose history matters?

As the previous section illustrates, the roots of the conflict lie in the history of top-down state-led projects of boundary making. The introduction of digital technology to survey land and territory to settle ambiguous land tenure has only reawakened competing territorial claims instead of resolving them. Put differently, the introduction of modern geospatial survey technology has reinserted environmental history back into negotiations over whose claims matter, and by extension, whose history matters.

In a series of letters sent to high-level government officials, Kimotorok village leaders laid out their historically rooted claims to their ancestral lands. In these letters, they suggest that territorial claims by Tarangire and Mkungunero would interrupt 'proper land use', erase three 'legal subvillages' and their 'economies', and undermine 'sustainable development' of the disputed area. The leaders reject maps that were produced without 'participation of the community'. Rather, Kimotorok leaders suggest that 'it is better for the village to show their boundaries according to their use'. While they refuse to recognize the existence of Mkungunero, they suggest that Tarangire should be protected in its initial form, instead of extending park boundaries 'illegally'. The government is expected 'to seek the truth by involving the community members and stop relying on maps which have been forged so as to create the current situation [...] which doesn't consider human life and sustainable conservation.' In short, Kimotorok leaders insist that 'legal authority' will be derived from the 'right land use history'.²¹

But what is the 'right history' to government and conservation officials? And can it be made visible and settled with a boundary survey? In several conversations, high-level conservation authorities actually acknowledge that their own lack of knowledge of protected area boundaries and lack of boundary enforcement throughout the years have strengthened people's claims to the contested territories. However, the same officials insist that protected area boundaries must never be violated, no matter how illegitimate the process of boundary making may have been in the past. This apparent contradiction is resolved through the believe in a state-centrist narrative of development that erases local environmental histories.

In an interview, a TANAPA warden referred to a common narrative of free/unused land by suggesting that 'when Tarangire was established, Kimotorok was empty, there were no people here'. To the director of Mkungunero, Mkungunero predates people's claims, because the game reserve was declared as a Game Controlled Area in 1954, prior to villagization.²² 'Villagization came in 1974. Before 1974 villages were not defined'.²³ Mkungunero's director

and a Kondoa District official both claimed in separate conversations that before El Niño in 1997/8 hardly anyone lived in Kimotorok.²⁴ 'There was no village, just some grazing'.²⁵ A high-level official at the Ministry of Natural Resources and Tourism offered the most radical interpretation of the law of the land by pointing out that elephants were present in the area before the first humans set foot there.²⁶

Such revisionist environmental histories have also made it into official park brochures and management plans. Tarangire's Management Plan states that 'prior to 1950, the area which is now Tarangire National Park had little human settlement and was not used for livestock grazing due to the high concentration of tsetse flies' (TANAPA, 1994: 6). What the Management Plan fails to mention is that the geography of the tsetse fly is not a timeless phenomenon. Rather, its historical waxing and waning across much of Northern Tanzania – including Tarangire – coincided with the onset of colonial rule and the rise of diseases and epidemics that wiped out pastoralists' herds and depopulated human-settled areas in late 19th century (Arlin, 2011; Ford, 1971; Giblin, 1990; Iliffe, 1979; Kjekshus, 1996). When protected areas – such as Tarangire – were established throughout the 20th century, they consolidated a new tsetse geography in previously human-controlled areas.

It is in this revisionist context that modern cartography is introduced with an inherently flawed ambition to fix once and for all uncertain and ambiguous boundaries. Such revisionist histories follow a long tradition of erasure or dismissal of human contributions to landscapes that conservationists want to protect from human interference (Brockington, 2002; Neumann, 1998). In these official environmental histories, human presence is not acknowledged and political communities are not recognized if no official formalization of people's land use practices has been granted by the state. In other words, official environmental history of rural spaces – a *legible* history that matters in the eyes of the state and conservation authorities – only began in the 1970s with state-led policy of villagization.

7. Conclusion

As the article has shown, dynamics of rain and drought, pastoral settlement and grazing patterns, and conservation authorities' claims to land jointly produced a vital but contested geography of agro-pastoral land and resource use practices around a large wetland area. Kimotorok residents resist the state and conservation authorities to maintain this geography of seasonal access to pastures and water outside of fixed village boundaries. In their resistance against the administrative logic of fixed boundaries and maps, the villagers challenge the state's cartographic gaze that erases people's historical existence and their material ties to the land and the environment.

These struggles over mobility and visibility will persist as long as claims by a village do not hold the same weight as claims by more influential entities, as a former head of Mkungunero Game Reserve – a state bureaucrat at the Ministry of Natural Resources and Tourism – explained:²⁷

In case of Mkungunero Game Reserve I needed to draw the original boundaries first, and then we can negotiate over what to do with human activities inside. In the case of the Game Controlled Area in Arusha we couldn't challenge the [international] airport or in case of Loliondo Game Controlled Area we couldn't challenge the district town in the middle of the GCA. Those were not negotiable. But with the villages you can negotiate.

The promise of conflict resolution through land use planning and surveying is at odds with these power relations that privilege the state and its logic of fixed administrative boundaries (Boone, 2019). When digital surveys and fact-finding exercises unearth and lay bare a boundary conflict previously hidden from the state's view, poorly legible, mobile rural communities may become visible to the state, which further entrenches these power relations and heightens the risk of dispossession.

Notes

- ¹ Kreditanstalt für Wiederaufbau (German Development Bank).
- ² World Wildlife Fund, Frankfurt Zoological Society.
- ³ The legal marginalization of customary land rights vis-à-vis the state led a Tanzanian judge to describe rural people as 'squatters on their own land' (Judge Nyalali in 1994 Civil Appeal No. 31, Court of Appeal of Tanzania, cited in Alden Wily 2012: 767). Only the implementation of the 1999 Land Acts in the 2000s facilitated the recognition of customary land rights by granting village councils administrative rights over village lands, albeit upholding the state as the ultimate land owner (Alden Wily, 2012). However, recognizing customary land rights to pastoral commons that tend to stretch across village boundaries has proven more challenging than recognizing customary land rights to cultivated farm land within the village.
- ⁴ Ministry of Natural Resources and Tourism (MNRT) is in charge of wildlife management policy and the protection of game reserves through the Wildlife Division. Tanzania National Parks Authority (TANAPA) manages national parks, Tanzania Wildlife Research Institute (TAWIRI) is in charge of wildlife research in protected areas.
- ⁵ Geographic Information System. I used Google Earth and QGIS.
- ⁶ TANAPA, TAWIRI, WWF, and the publicly available WDPA dataset.
- ⁷ In Tanzania, village land is a legal category to designate land under administrative control by elected village councils.
- ⁸ Interview, 2015.
- ⁹ Interviews, 2016.
- ¹⁰ In 2015, I conducted several focus-group interviews with Kimotorok elders who were between 65–80 years old at the time. The elders claimed that their fathers were already born in the area, which would date human land use and settlements in the area to around 1910. The elders can still remember how pastoral homesteads were arranged around the Kimotorok swamp during their childhood, in areas that today constitute official Kimotorok subvillages Arkasupai, Oltotoi and Ngalupai (**Figure 1**). The elders also pointed out that the subvillage Arkasupai was named after a tree that was a regular meeting point inside present-day Tarangire National Park. Tarangire enclosed this place after it expanded in 1970.
- ¹¹ Whereas the status of a game reserve provided some space for tolerating local land and resource use until then.
- ¹² It is unclear if Kisondoko was mentioned in the government gazette in 1993. It is, however, mentioned in 2000 as a subvillage according to GN 226, 9 June 2000.
- ¹³ Although Sachedina (2008) reports that some Rangi farmers were already evicted in 1983, my interviews with conservation authorities, Kimotorok Maasai, and Indindiri villagers suggest that until 2006 reserve boundaries were not enforced by Mkungunero authorities.
- ¹⁴ The others were Aladulu, Oltotoi, and Mbugani (Ngalupai).
- ¹⁵ Three other villages west of Tarangire were also affected by the boundary resurvey: Gidejabung, Ayamango, and Gidemar. TANAPA demanded a total of 65 km² from these villages, although each village had officially recognized and mapped boundaries. TANAPA itself recognized them in late 1980s/early 1990s as official correspondence between the villages and the district government shows (author is in possession of these documents). Since 2006, TANAPA has imposed a pending eviction order. Hundreds of households were forced to give up cultivation and housing in officially recognized, settled, and farmed village land, without adequate monetary or in-kind compensation (Boerstra, 2017).
- ¹⁶ The operation was launched across the country in response to the elephant poaching crisis in southern and western Tanzania of the late 2000s/early 2010s.
- ¹⁷ In the period between December 2012 and September 2013, Kimotorok Village Chairman recorded 55 burned houses within 24 homesteads.
- ¹⁸ MNR/C.5/4/4/Vol.4/134, 4.10.2013.
- ¹⁹ Powerpoint presentation 'Mkakati wa Kuhakiki Mpaka wa vijiji vya Irkiushibor, Kimotorok, Katikati, Kwadelo na Kilele cha Ngo'mbe', prepared by the Ministry of Land, Housing and Human Settlements, the Prime Minister's Office Regional Administration and Local Government, and the Ministry of Finance-National Bureau of Statistics, date unknown.
- ²⁰ Interview, 2015.
- ²¹ Letters by Kimotorok Village Council to different officials, 23.9.2011; 2.9.2012; 2013. Translated from Kiswahili by a research assistant.
- ²² This is misleading. Until the introduction of the Wildlife Conservation Act of 2009, Game Controlled Areas have not imbued land with a protected area category. A GCA simply designates an area where wildlife hunting is 'controlled'. Most villages in Northern Tanzania are located in Game Controlled Areas.
- ²³ Interview, 2015.
- ²⁴ Interviews, 2015.

²⁵ Interview, 2015.

²⁶ Interview, 2015.

²⁷ Interview, 2015.

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Competing Interests

The author has no competing interests to declare.

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