‘Holistic ethnographies’ of East African customary pastoral commons needed?

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Today, major international policies, agencies and programs consider Indigenous Peoples and Community Conserved Areas (also known as ICCAs – Territories of life) to be key management regimes to maintain and advance human well-being, the conservation of the environment and global sustainability[1]. Within this context, it is important to note that systems of community-based management of natural resources in Africa could probably be counted in the hundreds of thousands. Given that East Africa is one of the most paradigmatic regions in the world for the study of pastoralism, and that pastoralism is one of the most important natural resource uses in the study of the commons, one could assume the strong importance of pastoral customary commons in the East African region, which our extensive fieldwork and literature review confirm.

We believe that *holistic ethnography* of such systems, considered here as the global understanding of the interlinkages among material needs, practices, norms, morals and beliefs that have evolved over time in relation to the constraints of particular landscapes and social histories (see for example Dominguez 2017 [1]), is among the best tools to

[1] https://www.cbd.int/doc/publications/cbd-ts-64-en.pdf, https://www.iucn.org/content/indigenous-and-community-conserved-areas-bold-new-frontier-conservation, https://sgp.undp.org/about-us-157/partnerships/icca-gsi.html, http://www.iccaregistry.org/.

unveil their indigenous conceptualizations of sustainability, the focus of this special issue. Despite its aptitude as a tool, our exhaustive review of the ethnological literature also confirms that fully *holistic ethnographies,* centering on East African customary pastoral commons and explaining them in their completeness, including their symbolic groundings and how these relate to the rest of the socio-ecological system, are rare. As we will see later in the text, only a few studies have truly focused on this subject and approach. At the same time, other texts touching on pastoral customary commons generally only deal with the issue in passing, as ancillary to another subject. Or, they perform a partial analysis by concentrating mainly on the links of commons to materialist ecology (the commons as essential for sustainable land use in dry lands), or to their social basis (group membership, access rights), while pretty much excluding their more intangible cultural aspects [2].

We like to call this the 'East African contradiction': a great abundance of anthropological studies on pastoralism and a substantive presence of customary pastoral commons, but little *holistic ethnography* centrally focused on these communal systems. Given this context, our main objective is to provide the broadest overview possible of the available ethnographic literature touching directly or indirectly upon Kenyan and Tanzanian customary pastoral commons. Our goal is to establish a baseline from which to develop the aforementioned much-needed *holistic ethnographies* focusing on these customary systems, to help overcome the underlined contradiction. Moreover, Bollig and Lesogorol [2], cited above concerning the scarcity of *holistic ethnographies* of these commons, also point out the currently much greater scientific focus on "new pastoral commons" (most often top-down based), or on new arrangements in ongoing reaction to prior policies or laws, rather than on customary ones. In this context, seeking to understand customary pastoral commons is rarer than one could initially expect. However, as we will see more in detail in this bibliographic revision, what becomes most rare are studies that attempt to

explain how are they anchored in shared values and how their subjective moral standards link to the rest of the socio-ecological system.

This lack of nuanced cultural approaches to understanding environmental governance institutions may be linked to two main factors. First, the most detailed ethnographies of the first half of the last century did not, in the main, have the traditional management of natural resources as a specific interest and concern. Questions of sustainability had not arisen with the strength they carry today, so any detailed description of customary pastoral regulatory institutions was presented more as a background to contextualize other aspects of more interest to the anthropology of the time, such as kinship, beliefs, and intergroup relationships. Second, subsequent ethnographic works that addressed pastoralism and natural resources management, from the 1980s onwards, have usually been more focused on material human-ecological balances, on the analysis of the disruptions suffered by those systems, or on the top-down imposed “new commons” very abundant in East Africa. Neither of these approaches or sets of preoccupations are likely to place much importance on the detailed and particular description of the material-symbolic holism of such traditional systems, the focus that could best help explain local cultural notions of sustainability.

Our aim, then is not to compare how many East African pastoral commons are centrally dealt with in the anthropological literature in relation to other parts of the world. Instead, it is to first call attention to the scarcity of holistic ethnographies fully centered on customary commons with stable, consensual and long-tested institutional arrangements, embedded in cultural-historical landscapes, which are based in indigenous communities own moral and ethical beliefs. Second, we seek to establish an anthropological bibliographic bedrock, from which to propel and urge new and more *holistic ethnographic work* on East African pastoral customary commons.

At the same time, and beyond its relevance to customary pastoral commons, studying the East African context is pertinent because the region is currently experiencing particularly important socio-economic and cultural crises around pastoralism, such as tribal and resource conflicts, reduced capacity for adaptation to environmental and political changes, shifts in land tenure systems, and other adverse events that are putting these customary systems increasingly at risk [3], [4], [5], [6], [7], [8]. This endeavor is timely, as it may work in synergy with the emerging new conservation paradigm of Other Effective Area-Based Conservation Measures (OECMs) which are championed through Aichi Biodiversity target 11 [9].

East Africa as a particularly fertile region for the ethnographically holistic study of customary pastoral commons

East Africa is a geographic area with ecological characteristics that are particularly favorable for the extensive activity of pastoralism, as it is dominated by arid and semi-arid savannas with important periodic droughts [5], [10]. For example, over 70% of land in Kenya and over 50% of land in Tanzania is said to be occupied by pastoralist groups [11]. Even as we recognize that there is need for greater accuracy in these calculations [12], we can still accept that it is an activity of great economic and environmental importance for the region, and one with great relevance to its food security, landscape organization, and development potential [13].

In the East African context, numerous studies, old and new, have characterized pastoralism as a form of livelihood which is perilous to environmental sustainability [14], [15] [16]. Nevertheless, in contradiction to this discourse, the region's arid and semi-arid landscapes support an especially high pastoralist presence while also hosting both high levels of biodiversity and a high level of endemism, in many cases even pastorally-

dependent. The region is thus a true biocultural diversity hotspot, which has been resilient for centuries or millennia [17], [18]. In fact, studies indicate that indigenous pastoral communities' socio-cultural and economic systems may have contributed considerably to the shaping and reshaping of East Africa's ecosystems, leading to conservation and resilience of a pastoralist-conditioned biodiversity [17], [19].

Furthermore, interest in the great diversity of indigenous, sustainable forms of environmental governance in the region is growing [20]. This is particularly the case for those areas with increasing pressure on ecosystems, where socio-environmental conflicts are intensifying, and difficulties in finding a balance between biodiversity conservation and economic and social development are increasing in pastoral dry lands [20], [21].

With the emergence during the nineteen-eighties of the perspective of new ecology [22], and the new theory of resources of collective action [23], an ethnographically based critical analysis of the conventional tragedy of the commons theory emerged. It demonstrated that community management conservation outputs could be very similar or even more efficient than private or state management [24]. Realizing the environmental and social failure of applied policies, the dominant discourse against pastoralist and traditional commons management began to change. Emerging discourses began to emphasize the importance of local and indigenous institutions as a strategy to implement sustainable conservation and development policies, adjusted to local populations' needs and ways of life [25], [26].

In this context, recent works have confirmed the historical existence of persistent, sustainable arrangements governing socio-ecological relations in the region. These have drawn attention, as they offer countervailing arguments to discourses of overgrazing, where these are presented as an excuse for devaluing customary systems [27]. At the

same time, other authors [4], working from a complexity perspective, have confirmed the historical resilience of these systems in the diverse context of the Baringo-Bogoria basin.

Within this framework of slow re-evaluation and global recognition of indigenous peoples' and local communities' conceptualizations of sustainability and practices of environmental conservation, one could assume that anthropologists should have given great attention to holistic research, description and analysis of local traditional communal pastoral governance cases in East Africa. These systems certainly fit the model of increasingly valued indigenous ways of sustainability. As noted above, this attention would seem to follow logically from the growing interest in such systems, this region's paradigmatic pastoralism, the centrality of pastoralism in understandings of the commons, and the strong attention that East African pastoralism has received from anthropology.

Scarcity of holistic ethnographies of East African customary pastoral commons

Despite the seemingly logical set of expectations described above, our ethnographic literature review about customary community-based managements of pastoral resources in East Africa has made evident the limited coverage of such systems through fully holistic ethnographies. This discrepancy persists, even as the region has given birth to some of the most relevant ethnographical studies on pastoralism [10], [28], [29], [11], [30], [31], [32]. For example, East Africa is the source of founding concepts in the anthropology of pastoralism, such as the cattle complex [33]. While common governance systems are characteristic of pastoralism broadly [34] and of those in East Africa specifically [35], as we ourselves have been able to attest through ethnographic fieldwork [36], [37], their prevalence alone has simply not closed the literature gap .

In the literature prior to 1960, some ethnographic works already provide descriptions that clearly suggest the existence of pastoral commons among particular Kenyan and Tanzanian groups (e.g. in the Maasai: [38], Sukuma: [39] and Datoga case: [40]). There are also several studies conducted over the last thirty years that, in their descriptions, indicate the persistence in the region of customary pastoral management institutions. They document practices of management where rights and decisions are arbitrated by institutions intertwined at various levels of social organization.

As an example, we would like to draw the readers' attention to studies of the adaptive capacity of the Maasai from Monduli and Longido districts in Northern Tanzania [41]. The authors, Goldman and Riosmena, point out that the rights of access to and movement within common grazing lands on Maasai territory are traditionally delimited by herders' belonging to different tribal fractions. This fact, and the complexity of rights and decision-making systems among the Maasai had also been previously pointed out by Galaty [42]. He observed that different institutional levels of social organization, from status and authority held in the household (*olmerei*), belonging to a section (*olosho*), clan (*olgilata*), age unity (*olporror*) and a particular settlement (*ekang*) are factors that influence rights and decisions on the use of the territory and its resources. For instance, although most direct decisions on livestock management depend on each head of household, such decisions may also be conditioned by clan rules and decisions or even the age group. Although the right of access, circulation, and use of the territory are marked by membership in a section, de facto, the use of a specific territory also depends on the direct decisions taken by the council of elders of that place [42].

At the same time, Mwilawa and colleagues [43] show the persistence of *Olopololi* or *Alalili*. These are protected areas under customary rules which temporarily or totally exclude grazing in certain areas. Potkanski [44], in his work on the Maasai of Ngorongoro

and Salei (northern Tanzania), describes a context in which customary institutions of decision-making, management and sanction have been usurped by modern administrative structures. Nonetheless, with his descriptions he shows that, although they have less power, traditional institutions are still working, and maintain a certain legitimacy for the common management of natural resources.

Potkanski [44] describes, for example, how belonging to the clan or to different age groups continues to be very important in pastoral management. Ownership and access to pastoral land and water is collective, and Maasai in the region still retain the knowledge of traditional territorial divisions managed in the form that Potkansky calls "controlled access collective property". Under this regime, each community has strict rules, agreed upon by consensus among the group of elders. Thus, important pastoral community decisions continue to be taken collectively. Potkanski concludes that the Maasai's customary territorial management system relies primarily on environmental restrictions and on collectively self-imposed access rights to (and access restrictions on) water and grasslands. Moreover, he states, *"This system has proved to be flexible and efficient, and so far has prevented land degradation in this area (p15)*" [44]. Nevertheless, drawing an assessment from the above observation of Maasai customary norms in management of pastoral commons implies an ethnographic gap. We contend that these studies ought to have delved deeper into how these institutions govern pastoral resources such as pasture, water, and biodiversity, as well as coexistence with wildlife, in relation to a full set of values and beliefs that mark the system as a whole. Instead, these appear merely in passing descriptions.

According to McCabe [45], Turkana pastoralists of Northwestern Kenya have institutions led by elders who ensure environmental protection. These institutions persist or simply exist, although in a more diffuse way, in a context where the difficulties and dangers

of the environment, such as aridity, distance to wells or the risk of robberies and diseases limit the use of territory and directly influence pastoral activity. As usual in these societies, kinship serves as the basis for rights to territory and access to resources. Thus, the right of access to wells is directly linked to one's family ties. Section membership provides the main source of rights over a particular area, and entails the obligation to fiercely defend it. McCabe also points out that the constant animosity and warfare between neighboring groups contributes to the preservation of areas of Turkana territory that, despite being rich in pastures, are rarely used due to the high risk of incurring assault.

These institutions, whose deep-rooted cultural relations are not fully disclosed, ensure in any case that livestock populations and the patterns of resources use do not exceed the carrying capacity of their landscape. They thus limit biomass loss and land degradation. In addition, these customary institutions ensure a high mobility of livestock by promoting frequent migration so as to minimize the ecological footprint in one grazing area [46]. Ng'asike [47], Little and Leslie [48] point out in their turn that practices such as herd- and food source-diversification, periodic movement of people and livestock, and robust social relationships that increase family-to-family or village-to-village support among Turkana pastoralists have been key strategies to survive in this arid region with low rainfall and food shortages.

The aforementioned survival strategies of the Turkana communities are similar to those described for the Maasai in northern Tanzania. The Maasai have diversified livelihoods in different climatic patterns and times, and reduce total dependency on livestock when necessary to decrease the pressure on pastoral resources, helping so to conserve wildlife and environment in their territory [49]. However, in our view these three studies in Turkana ought to have made a deep assessment of customary institutions'

continuity and how this links to local conceptions of sustainability by focusing more on cultural aspects. Again, we are far from the goal of a *holistic ethnography*.

In a study of Datoga grazing patterns in Mabulu district (near Lake Eyasi), Sieff [50] [] shows that the Datoga have a complex, sustainable herding cycle based on their traditional environmental knowledge, concrete grazing regimes and the herds' needs according to the season. During the rainy period, the majority of livestock tends to stay near the household. When the dry season starts, they move to the plains. When that season is advanced, the herds are moved to near the shores of Lake Eyasi and to nearby hills where greater humidity is found and pasture has been left to grow. Sieff also shows that, despite the dryness of some moments during the year, the Datoga maintain a daily livestock watering pattern that permits continuity of the system year after year, producing ecologically sustainable outcomes.

According to Birley [51], Sukuma agro-pastoralists have a large number of cooperative traditions. The basis of their organization are age and sex groups, from which collective and reciprocal actions are organized. Kamwenda [52] points out the persistence among the Sukumu of traditional grazing-land exclusion systems (*Ngitili*), creating a reserve for specific moments of the year. Nkonya's [53] work on Sukuma customary institutions involved in water management, often related to pastoralism, shows that the Sukuma own communal lands. Their resource management is governed by the main Sukuma's institution, male-only community assemblies called *Dagashida*. Cooperation between neighbors and between clan members is paramount. In fact, Birley reports, they traditionally form corporate units that share resources and a workforce. Called *Lubili*, decisions and solidarity among members of these units are regulated by a council (*Nzengo*), in which, unlike the *Dagashida*, women can also participate. It is in the *Dagashida,* however, where the major decisions and regulations are made, and on which

the responsibility to enforce the rules and decisions and to penalize offenders falls. Further, although clan members are the owners of private wells, well owners are required to share water with their neighbors and their clan members through *Bakaya,* the traditional name of the clan unit in Kisukuma. Again, however, Birley, Kamwenda and Nkonya mainly focus on exploring the niches occupied by these populations, and the technical administration of those niches.

Coppolillo [54] mentions access to water as fundamental, since it limits grazing areas also among the Sukuma, despite their living in rainier areas than other groups [54]. The case studies of the Datoga and Sukuma have tried to understand sustainability from a social relationship point of view. This is very encouraging, because other studies have not delved into this arena in depth. However, these studies could have focused also on elements inherent to culture that bind these social institutions - such as respect, religion, and generosity - for us to understand their sustainability better. For instance, Coppolillo's study ought to have inquired about the consequences of some herders denying others access to water on a private well. Are they compelled by the community's leadership or coercion of some kind? Or, is the decision to share water with your fellow herders taken out of compassion to a fellow clan/kinsmen, religious considerations, ancestral respect, or respect for shared humanity?

Stiles [55] also notes that Gabra from Marsabit district (Northern Kenya) often convene clan councils (*Korra*) for decision-making related to herd management. These decision councils can be called upon at any social level (clan, age group, settlement neighbors or tribe) depending on the kind of issue to be addressed. Nevertheless, for herd management, the main *Korra* operates at the clan level. All these councils are led by prestigious male elders, and are attended by all married men. Women have no direct

decision-making power in them, though women elders can exert some influence on the final decision.

In addition, there is evidence that high mobility may enhance environmental sustainability and protection across the pastoral landscapes of East Africa. High mobility generally implies the existence of important communal organizations and reduces communities' ecological footprint [56]. However, land-use changes, including protected areas creation, but also social, demographic and political changes in neighboring communities, are contributing to jeopardizing these ecological mitigation strategies, because they often restrict movements of livestock from one grazing area to another [3], [36], [46] [57], [58].

Studies closer to the proposed standards

As pointed out above, something emerging from this literature review is the near absence of works addressing descriptions and analysis of these socio-ecological systems from a deeply holistic perspective that fully merges the material and the symbolic. In almost all cases, to get such a perspective on a particular system requires gathering the pieces from scattered data coming from various authors and, in some cases, from literature addressing the management of other resources. This is the case of Nkonya's theses, focused on traditional Sukuma's water resource management, or even other subjects, as is the case for Bernardi [38] or Rigby [59] From fitting together these pieces, one gets a more complete perspective, but it is still puzzling to encounter such gaps, and hard to grasp the full panorama.

While for such a relevant pastoralist region a literature with more holistic descriptions would be expected, the following works seem closer to providing the sought-after

perspectives. Their joining of material and non-material features permit a better entrée into local notions of sustainability. In that sense, among the literature cited, the contributions of authors as Lane [60], Robinson [61], Bollig and Lesorogol [2] Klima [62], or Mwamidi and colleagues [36] should be noted.

Lane [60] shows that the pastoralist Barabaig of Hanang District (Tanzania) have deep and sophisticated knowledge of their environment. Although he does not provide any detailed description, he insinuates that they have hierarchical institutions of control of access and use of the territory and its resources in a basically tripartite system of decision levels: household, clan, and community. Thus, community issues are discussed in a public assembly (*Getabaraku*), where decisions are made by consensus. They also form committees to decide on sanctions (*Makchamed*). In general, the Barabaig have a complex web of rules and knowledge, which avoid the depletion of pastoral resources. For example, they practice grazing cycles established through strict regulation of access to land, water and other pastoral resources. These regulations are based on deep traditional knowledge of soil types, topography and groundwater in each area of their territory, and the location and condition of the vegetation that these factors imply at every moment of the year. This is accompanied by a cultural belief that territory is not owned, but carries a right of usufruct inherited from ancestors that must be preserved for following generations [60].

According to Robinson and colleagues [63], special councils (*Fula gahs*) guided by an elder with political prestige (*Yuba*) are convened among pasturing neighbors (*Olla*) of the Gabra group. The councils create space for discussion and agreement, by consensus, on issues such as access to common resources like water, collective management of herds, and limiting the group grazing areas [63]. Both Stiles [55] and Robinson [61] point out that the Gabra have several communal institutions for the management of trees, grazing lands and water. They also establish sacred zones and special areas, under

specific norms governing the use of their resources [61]. However, these authors do not describe or specify any of these institutions or the sanctions in case of non-compliance with the communal agreements.

Bollig and colleagues [64] show, further, that the Pokot of Baringo County (Kenya) have neighboring councils (*Kokwo*). These are customary councils for decision-making, including for decisions regarding access to common resources, such as grazing lands. They are located in traditional places, usually under particular large trees, and they are composed of all initiated men living in the area at that moment, under the control of a few prestigious elders. In reference to similar grazing exclusion areas, Mwilawa and colleagues [43] cite the existence of temporary grazing exclusion reserves (*Milaga*) among the Gogo agro-pastoralists of Dodoma region (Tanzania). In the manner of Sukuma *Ngitili* or Maasai *Olopololi* /*Alalili*, these consist of reserved areas from which grazing is excluded during some period of time by common agreement among the community. Madulu [65] similarly points to the existence of sacred ceremonial areas excluded from use among the Irangi of Kondoa district in Dodoma region.

Klima on his side [62] points out mostly at economic-ecological rationales underlying the patterns of movement of herds among the Barabaig, at the same time as the importance of elders' councils in collective decision-making, and of kinship in their mobility across the territory. However, it is interesting to learn in his work that witchcraft accusations play a role in the distribution and mobility of herds across the territory, in ways that affect the environmental impact of grazing. Among the Barabaig, those accusations have important consequences, ranging from expulsion from the settlement to ostracism. For example, a Barabaig who looks at other people's cattle too much may be accused of having cast a spell if one of those animals suddenly becomes ill or dies. Therefore, to

avoid the risk of such accusations, the shepherds tend to disperse, rather than graze their flocks close to the herds of other families.

Mwamidi and Dominguez [66] observed that community elders in Mwanda-Marungu pastoral commons in the Taita Hills (Kenya) have devised several collectively agreed-upon strategies that guarantee the socio-ecological sustainability of their territories. These strategies include for example herding that promotes *in situ* wildlife protection. This is conducted through a customary norm that, in order to avoid transmission of illnesses between wild and domestic animals, all livestock must have vacated the water and salt lick points after 3 pm every day. This promotes ordered human-wildlife co-existence that respects local notions of necessary cohabitation. Mwamidi and colleagues [37] also reports how elders protect indigenous trees that are considered a treasure among Daasanach pastoralist communities. They protect the trees by all possible means, conceiving of both humans and trees as all belonging to one family—the Daasanach community. A curse will fall upon anyone who destroys trees that are used to cure diseases among their people. In their conception, cutting a tree is like killing a person, because the medicine the trees provide saves the lives of the sick. Mwamidi, Renom and Dominguez frequently document metaphors like these in their PhDs, as they constitute cultural representations that feed communities' own notions of how to sustain local ecosystems through a relational ethos.

Conclusion: Paying greater holistic ethnographical attention to Pastoral Indigenous and Community Conserved Areas (PICCAs) in East Africa

All these data point directly or indirectly to the past existence and present persistence of indigenous management systems of pastoral common resources. Many authors

reviewed here invoke them as institutions and practices that may often still be valid and effective in promoting sustainable management, even if subject to strong disruptions (e.g., in Dasanaach or Taita communities). Nonetheless, it is clear after our review of the literature that the study of pastoral commons in East Africa lacks a more holistic ethnographical approach. We find this paucity despite the commons' fulfillment of an immense role in the pastoralist economies at the center of a great proportion of the ethnographic literature on East Africa. It seems strange to see pastoralism so overwhelmingly studied while such a key component of it, its commons, remain so incompletely approached. The set of studies reviewed ratifies the abundance of customary pastoral commons in Kenya and Tanzania, which, as we have said, have great importance for global environmental sustainability. Yet the commons are in most cases treated only partially and their cultural analysis is rather slim in comparison to the more material and structural parts of these systems. It is precisely these cultural analyses, however, that could provide better understandings of the indigenous conceptualizations of sustainability that this special issue addresses. While East Africa is still home to all sorts of pastoral commons [60], [50], [59], only a very few anthropological works are dedicated to explaining their functioning in terms of both materialist and non-materialist factors (e.g. conceptualizations).

As Berkes [67] puts it, the challenge is to build linkages between different kinds of knowledge, and to find synergies to produce better understandings than either could do alone. And to do this, it is a prerequisite to surface and analyze these self-governance systems through holistic, transcultural, in-depth ethnographies that cross the boundaries of anthropology's own internal schools of thought. We know those approaches exist, and have been applied to other pastoral commons around the world [68]. Therefore, while their importance may be recognized and claimed in the broader scholarly literature, it is

impossible to confer upon these extremely human systems an appropriate assessment, support, and value in the absence of more holistic approaches within anthropology.

Papers of special interest

****Papers of outstanding interest***

Bibliography

[1] P. DOMINGUEZ, "Political Ecology of Shifting Cosmologies and Epistemologies among Berber Agro-Sylvo-Pastoralists in a Globalizing World," *Journal for the study of Religion, Nature & Culture,* vol. 11, no. 2, pp. 227-248, 2017.

[2] M. Bollig and C. Lesorogol, "The “new pastoral commons” of Eastern and Southern Africa," *International Journal of the Commons,* vol. 10, no. 2, p. 665–687, 2016**.

[3] K. Mkutu, "Pastoralists, politics and development projects: WORKING PAPER 7," United States International University, Nairobi, 2019.

[4] M. A. David and B. Michael, "The Journal of Eastern African Studies," *Resilience and collapse: histories, ecologies, conflicts and identities in the Baringo-Bogoria basin, Kenya,* vol. 10, no. 1, 2016.

[5] E. K. E. Kaye-Zwiebel, "Kenyan pastoralist societies in transition: Varying perceptions of the value of ecosystem services," *Ecology and Society,* vol. 19, no. 3, 2014.

[6] E. A. ROTH, "Traditional Pastoral Strategies in a Modern World: An Example from Northern Kenya," *Human Organization,* vol. 55, no. 2, pp. 219-224, 1996.

[7] J. G. Galaty, "THE COLLAPSING PLATFORM FOR PASTORALISM: LAND SALES AND LAND LOSS IN KAJIADO COUNTY, KENYA," *Nomadic Peoples,* vol. 17, no. 2, pp. 20-39, 2013.

[8] E. Fratkin, "East African Pastoralism in Transition: Maasai, Boran, and Rendille Cases," *African Studies Review,* vol. 44, no. 3, pp. 1-25, 2001.

[9] J. Harry, "Other Effective Area-Based Conservation Measures (Strategic plan 2011-2020)," IUCN, 2019.

[10] K. Homewood, Ecology of African Pastoralist Societies, Oxford: James Currey Ltd, 2008.

[11] E. Fratkin, K. Galvin and E. Roth, African Pastoral Systems: an Integrated Approach, L. Rienner, Ed., Boulder, CO, 1994*.

[12] N. Burgessa, N. J. K. I. Butynskid, M. Niamir-Fuller, A. Bensada and A. Waters-Bayer, "A case of benign neglect: Knowledge gaps about sustainability in pastoralism and rangelands," United Nations Environment Programme and GRID-Arendal, Nairobi and Arendal, 2019.

[13] FAO., "Pastoralism in Africa's drylands," FAO, Rome, 2018.

[14] D. K. Davis, "Desert 'Wastes' of the Maghreb: Desertification Narratives in French Colonial Environmental History of North Africa," *Cultural Geographies,* vol. 11, no. 4, p. 359–387., 2004.

[15] F. K. Hare, "Making of the Desert: Climate, Ecology and Society," *Economic Geography,* vol. 53, pp. 332-345, 1977.

[16] F. P. Conant, "Thorns paired, sharply recurved: Cultural controls and rangeland quality in East Africa," in *Desertification and Development. Dryland Ecology in Social Perspective*, London, Academic Press,, 1982.

[17] P. Little, "Pastoralism, Biodiversity, and the Shaping of Savanna Landscapes in East Africa," *Africa: Journal of the International African Institute,* vol. 66, no. 1, p. 37–51, 1996.

[18] B. Rene, "The evolution of arid ecosystems in Eastern Africa," *Journal of Arid Environments,* vol. 66, pp. 66564-584, 2006.

[19] D. Johnson, "Nomadism and Desertification in Africa and the Middle East," *GeoJournal,* vol. 31, no. 1, pp. 51-66, 1993.

[20] R. Katebuka, "Effective Biodiversity Conservation Challenges in Africa: A Case of East Africa," *Biology International,* vol. 52, pp. 35-47, 2012.

[21] T. R. Kelemework, "Natural resource degradation and conflict in the East African pastoral drylands," *African Security Review,* vol. 24, no. 3, pp. 270-278, 2015.

[22] I. Scoones, "New ecology and the social sciences: what prospects for a fruitful engagement?," *Annual Review of Anthropology,* vol. 28, pp. 479-507, 1999.

[23] E. Ostrom, Governing the Commons: The Evolution of Institutions for Collective Action, New York: Cambridge University Press, 1990, p. 270.

[24] E. Araral, "Ostrom, Hardin and the Commons: A Critical Appreciation and a Revisionist View," *Environmental Science and Policy,* vol. 13, no. 15, 2013.

[25] L. Glowacki and K. Gönc, "Customary institutions and traditions in pastoralist societies: neglected potential for conflict resolution," 2013**.

[26] McPeak J, "Individual and collective rationality in pastoral production: evidence from northern Kenya," *Human Ecology,* vol. 33, no. 2, pp. 171-197, 2005.

[27] D. H. Johnson and D. M. Anderson, The Ecology Of Survival: Case Studies From Northeast African History, New York: Routledge, 2019, p. 339.

[28] K. Rodgers and W. Homewood, Maasailand Ecology: Pastoralist Development and Wildlife Conservation in Ngorongoro, Tanzania, Cambridge University Press, 2004.

[29] D. Anderson and V. Broch-Due, The Poor Are Not Us: Poverty and Pastoralism in Eastern Africa (Eastern African Studies), Ohio University Press, 2000*.

[30] J. G. Galaty and P. Bonte, Herders, Warriors and Traders. Pastoralism in Africa, Boulder, CO: Westview Press, 1991*.

[31] M. Herskovit, "The Cattle Complex in East Africa," *American Anthropologist,* vol. 28, p. 230–72, 1926.

[32] M. Morit, P. Scholte, I. M. Hamilton and S. Kari, "Open Access, Open Systems: Pastoral Management of Common-Pool Resources in the Chad Basin," *Human Ecology,* vol. 41, no. 3, pp. 351-365, 2013.

[33] M. Herskovitz, "The cattle complex in East Africa," *American Anthropologist,* vol. 28, no. 1, pp. 230-272, 2009.

[34] K. Galvin, "Transitions: Pastoralists Living with Change," *Annu. Rev. Anthropol,* vol. 38:, p. 185–98, 2009.

[35] T. Haller, G. Fokou, G. Mbeyale and P. Meroka, "How fit turns into misfit and back: institutional transformations of pastoral commons in Africa floodplains," *Ecology and Society .,* vol. 18, no. 1, p. 34, 2013.

[36] D. M. Mwamidi, J. G. Renom, A. Fernández-Llamazares, P. Domenguez, D. Burgas and M. Cabeza, "Contemporary Pastoral Commons in East Africa as OECMs: A case study from the Daasanach Community," *International Journal of Protected Areas (PARKS),* vol. 24, pp. 79-88, 2018**.

[37] D. M. Mwamidi, J. Renom and P. Dominguez, "Do Pastoral Commons exists in Contemporary East Africa? The case of Daasanach in Northern Kenya.," *Machakos University Journal of Science and Technology,* vol. 1, no. 1, pp. 8-20, 2018.

[38] B. Bernardi, The Age-System of the Masai, Pontificio Museo Missionario Etnologico: Disponible en Human Relations Area Files (eHRAF), 1955.

[39] R. E. Tanner, "Law enforcement by communal action in Sukumaland, Tanganyika territory," *Journal of African Administration,* vol. 7, pp. 159-165, 1955.

[40] M. G. Wilson, "The Tatoga of Tanganyika," *Tanganyika notes and records,* no. 33, 1952.

[41] M. Goldman and F. Riosmena, "Adaptive capacity in Tanzanian Maasailand: changing strategies to cope with drought in fragmented landscapes," *Global Environmental Change,* no. 23, pp. 588-597, 2013.

[42] J. Galaty, "Land and livestock among Kenyan Maasai," *Journal of Asia and African Studies,* vol. 16, no. 1, pp. 68-88 , 981.

[43] A. Mwilawa, D. Komwihangilo and M. Kusekwa, "Conservation of forage resources for increasing livestock production in traditional forage reserves in Tanzania," *African Journal of Ecology,* vol. 1, no. 46, p. 85–89, 2008.

[44] T. Potkanski, "Property concepts, herding patterns and management of natural resources among the Ngorongoro and Salei Maasai of Tanzania," International Institute for Environment and Development, London, 1994*.

[45] J. T. McCabe, "Turkana pastoralism: A case against the Tragedy of the Commons," *Hum Ecol,* vol. 18, p. 81–103, 1990.

[46] F. Opiyo, O. Wasonga, M. Nyangito, J. Schilling and R. Munang, "Drought Adaptation and Coping Strategies Among the Turkana Pastoralists of Northern Kenya," *International Journal of Disaster Risk*

Science, vol. 6, no. 3, 2015.

[47] J. T. Ng'asike, *Turkana Children's Sociocultural Practices of Pastoralist Lifestyles,* ARIZONA STATE UNIVERSITY, 2010.

[48] M. A. Little and W. P. Leslie, Turkana herders of the dry savanna: Ecology and biobehavioural response of nomads to an uncertain environment, Oxford University Press, 2000, pp. 81-91.

[49] J. T. McCabe, "Sustainability and Livelihood Diversification among the Maasai of Northern Tanzania," *Human Organization,* vol. Vol. 62, no. 2, pp. 100-111, 2003.

[50] D. Sieff, "Herding strategies of the Datoga pastoralists of Tanzania. Is household labor a limiting factor," *Human Ecology,* vol. 25, no. 2, pp. 519-544, 1997*.

[51] M. Birley, "Resource Management in Sukumaland, Tanzania," *Africa,* vol. 52, p. 1–30, 1982*.

[52] G. Kamwenda, "Ngitili agrosilvipastoral systems in the United Republic of Tanzania," *Unasylva,* no. 53, pp. 46-50, 2002.

[53] L. Nkonya, "Drinking from own cistern: customary institutions and their impacts on rural water management in Tanzania," Kansas State University, Manhattan, 2006*.

[54] P. Coppolillo, "The landscape ecology of pastoral herding: spatial analysis of land use and livestock production in East Africa," *Human Ecology,* vol. 28, no. 4, pp. 527-560, 2000.

[55] D. Stiles, "The Gabbra: traditional social factors in aspects of land-use management," *Nomadic Peoples,* no. 30, pp. 41-52, 1992*.

[56] UNDP, "Pastoralism and Mobility in drylands: Global Imperative Challenge Paper," UNDP, 2003. [Online]. Available: https://www.undp.org/content/dam/undp/library/Environment/. [Accessed 21 08 2019].

[57] F. U. Msoffe, S. C. Kifugo, M. Said, M. Neselle, G. Van, R. Reid and J. De Leeuw, "Drivers and impacts of land-use change in the Maasai Steppe of northern Tanzania: an ecological, social and political analysis," *J Land Use Sci,* vol. 6, no. 4, pp. 261-281, 2011.

[58] R. F. Graham, "The 2017 Shooting of Kuki Gallmann and the Politics of Conservation in Northern Kenya," *African Studies Reviews,* vol. 61, no. 2, pp. 210-236, 2018.

[59] P. Rigby, Cattle and Kinship among the Gogo: A semi-pastoral Society of Central Tanzania, Cornell University Press, 1969.

[60] C. Lane, Past practices, present problems, future possibilities: Natural resource management in pastoral areas of Tanzania, Institutional Issues in Natural Resources Management. Occasional Paper ed., vol. 9, H. S. Marcussen, Ed., International Development Studies, Roskilde University, 1993*.

[61] L. Robinson, "A complex-systems approach to pastoral commons," *Human Ecology,* vol. 37, pp. 441-451, 2009**.

[62] G. J. Klima, The Barabaig; East African cattle-herders, (Case studies in cultural anthropology), Holt, Rinehart and Winston, 1970.

[63] L. Robinson, J. Sinclair and H. Spaling, "Traditional pastoralist decision-making processes: lessons for reforms to water resources management in Kenya," *Journal of Environmental Planning and Management,* vol. 53, no. 7, pp. 847-862, 2010.

[64] M. Bollig, C. Greiner and M. Österle, "Inscribing identity and agency on the landscape: of pathways, places, and the transition of the public sphere in East Pokot, Kenya," *African Studies Review,* vol. 57, no. 3, pp. 55-78, 2014*.

[65] N. F. Madulu, "Impacts of population pressure and poverty alleviation strategies on common property resource availability in rural Tanzania," *African Journal of Environmental Assessment and Management,* Vols. 26-49, 2005.

[66] D. M. Mwamidi and P. Dominguez, "Pastoral Commons as Areas of Conservation: The case of Taita hills, South-west Kenya," in *ICTASS2019 Spring Symposium at UAB, Barcelona, Spain on 16th -17th May, 2019*, Barcelona, Spain, 2019.

[67] One Earth, "Learning from Indigenous Populations," Cell Press, 01 09 2019. [Online]. Available: https://www.cell.com/action/showPdf?pii=S2590-3322%2819%2930004-1. [Accessed 02 09 2019].

[68] P. DOMINGUEZ, A. BOURBOUZE, S. DEMAY and G. D. &. K. N., "Diverse Ecological, Economic Socio-Cultural and Political Values of a Traditional Common Natural Resource Management System in the Moroccan High Atlas The Aït Ikiss Tagdalts," *Environmental Values,* vol. 21, pp. 277-296, 2012.

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