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**SUSTAINABLE PASTORALISM AND
RANGELANDS IN AFRICA**

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Sustainable Pastoralism and Rangelands In Africa

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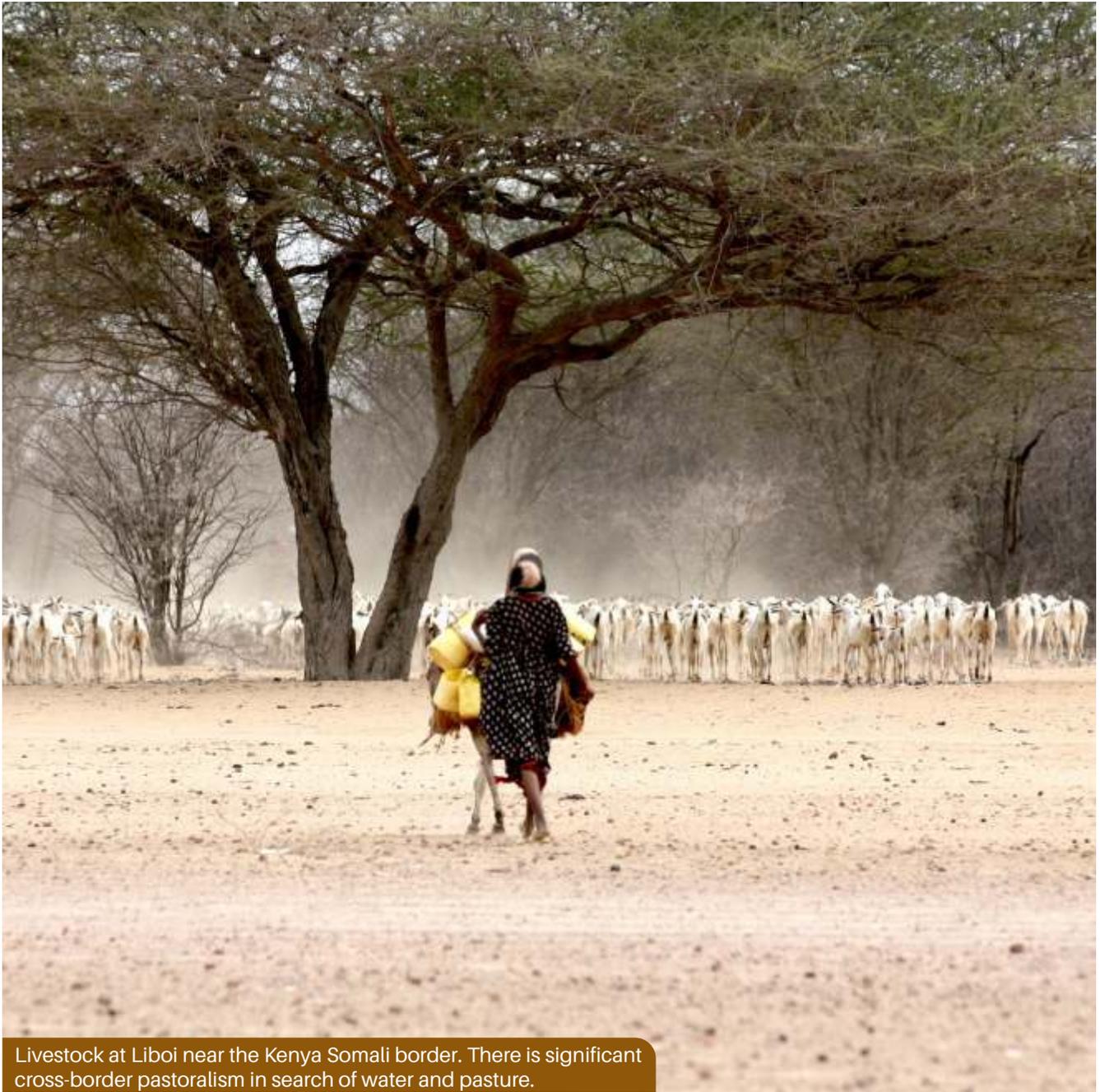
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Livestock at Liboi near the Kenya Somali border. There is significant cross-border pastoralism in search of water and pasture.

MESSAGE TO READERS

Bukar Tijani¹



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As expressed so beautifully in the editorial, pastoralism forms the backbone of the agricultural activities in many African countries and even the main economic activity in most. Pastoralism is practiced in three main forms, namely (i) true nomadic pastoralism, where herdsmen move around randomly with their herds in search of pasture for grazing and/or water, (ii) semi-nomadic pastoralism, better known as transhumance or transhumant pastoralism, where herdsmen migrate seasonally forward and backwards with their herds between two specific areas and (iii) sedentary pastoralism, where animals are enclosed within an area. The latter include domestic livestock ranches, game farms, game lodges and reserves and game parks. This edition of the journal carries clear messages on the problems facing pastoralism generally but particularly transhumance and their underlying challenges and efforts to overcome conflicts. It shows that in fact the ambition of governments is to have managed pastoralism without “free movement” of people and animals. For this reason, leaders have unfortunately tended to apply bureaucratic controls, the weaknesses of which this edition have brought to fore.

The sixteen articles in this edition cover diverse aspects of pastoralism and rangeland management in Africa. They bring a fresh sense of pastoralism and rangeland management. These include a review of issues, challenges and practices; youth perspectives on pastoralism highlighting opportunities and threats faced by young pastoralists; land tenure system in pastoralist societies, including findings of a study tour to Peru; effect of traditional rangeland management practices on vegetation structure and aboveground biomass. The changing roles of women in pastoral areas of Somaliland presents a glimpse of gender issues. A capstone findings and provisional recommendations regarding environmental impacts of land management in pastoralist and wildlife eco-tourism co-existence in Serengeti Park in Tanzania, offers an insight on off-road-drive phenomenon.

The Opinion Piece provides a briefing on the state, contributions, challenges and management arrangements and efforts for pastoralism in the Maghreb countries (Algeria, Libya, Mauritania, Morocco and Tunisia). There is also a keynote paper presented as a Special Feature dealing with changing the landscape of measuring livestock vaccine potency in developing countries and challenges involved considering the phenomenon of the “Antimicrobial

Resistance” (AMR) being championed by FAO, OIE and other partners. It asserts that vaccines developed and produced elsewhere are often not appropriate or effective in Africa or other developing countries. It discusses factors that inhibit development and production of vaccines locally. The Department of Nuclear Sciences and Applications of the International Atomic Energy Agency (IAEA) in Vienna, Austria, contributed this article with the objective of establishing contacts with the livestock vaccine development community in Africa and other under-resourced laboratories.

Overall, the key messages converging in this issue of the journal are about the inability of countries to adequately support pastoralism. It is evident from most of the articles received that development ambitions in many African countries favour settled agriculture, given that population pressure makes traditional transhumance almost impractical nowadays. Most of the papers support the perpetuation of pastoralism but none makes the compelling case of what pastoralism provides that cannot be provided just as well by alternative approaches integrated into settled agriculture. If this is not done, the pressure to make pastoralist interests a second category concern will continue.

It is noteworthy that most of the articles point to the conflicts in the pastoralism sector. This edition seeks to contribute to the pool of required knowledge and contribute to clearer understanding of the realities confronting pastoralism. Without the necessary knowledge and understanding no sensible solutions can be formulated. A personal testimony on experience in Karamoja, Uganda is a piece from the heart. Africa needs to come up with clear recommendations of workable solutions.

The awakening of all stakeholders to the prevailing issues will illuminate a wide array of best possible ways that African society ascends in organizing and sustainably managing pastoralism and rangelands in Africa. Welcome, and brace yourself for an interesting read!

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Transhumance pastoralism in Africa: thoughts from the field

Kwaku Agyemang¹



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Pastoralism can be defined as a system of production in which humans and domestic livestock live in a symbiotic relationship, making use of natural pastures on an extensive basis. The human population gains most of its livelihoods from the animals kept, both directly from milk, meat and hides and indirectly through exchange of livestock products for other goods (Toulmin, 1983). Pastoral nomadism refers to way of life of peoples who do not live continually in the same place but move cyclically or periodically with their livestock herded in order to find fresh pastures on which to graze (Blench, 2001). Strictly speaking, true nomads follow an irregular pattern of movement. Nomadism does not imply unrestricted and undirected wandering; rather, it is based on temporary centres whose stability depends on the availability of food supply and the technology for exploiting it. On the other hand, Transhumance is the movement of livestock in search of water and food. It differs from nomadism in that generally only the herds travel, with a certain number of people necessary to tend them, while the main population or family stays at the base (Blench, 2001). In contrast, Agro-pastoralism is defined as a way of life or a form of social organization based on the growing of crops and the

raising of livestock as the primary means of economic activity. All these forms operate in Africa. In general, nearly all forms of pastoralism have often times come under criticism because of ownership pattern and behaviour that refuses to bring the stock into the economy or the assumption that pastoralism contributes to the overuse and degradation of natural resources and degrade the environment. These negative conclusions have often been reached based on well-known assertions, including the twin notions or theories of the so-called "cattle complex" (Herskovits, 1926) and "tragedy of the commons" (Hardin, 1968).

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Nonetheless, pastoralism remains a world-wide practice. It is estimated that pastoralists globally number between 100-200 million (World Bank, 2014). If the millions practising extensive agro-pastoralism were to be included, the number will rise sharply. Some recent analyses and reports have sought to bring out the positive aspects of pastoralism, for example, as providing a highly efficient way of managing the sparse vegetation and relatively low productivity of dryland areas (Rota and Sperandini, 2009). These proponents further argue that mobile pastoralism is the most viable form of production and land use in most of the world's fragile drylands, and that pastoral systems support the livelihoods of millions of people living in harsh environments where alternative land use systems are highly risky or simply not possible. As the areas where farmers cannot grow crops, because of lack of water, increases in size with climate change, the importance of pastoralism in Africa in particular, will become bigger as only that practice can extract sparse vegetation resources in the extended arid lands and convert them to products that benefit people and communities. Similarly, the assertions about the low productivity and insignificant contribution of pastoralism towards socio-economic development have been deflated as it has been shown recently that pastoralism is the only effective way to support human existence in harsh environments and often represents the only sustainable approach to land use in such areas (Wilson, 1992). Furthermore, the superior productivity of pastoral systems was demonstrated when the much taunted superior performance of fenced ranches over pastoral systems with mobility was not shown to be the case (Bekure, 1982). Again, the assertion of environmental degradation caused by the practice of pastoralism was not confirmed in a comparative analysis in Central Namibia, and no evidence of "the tragedy of the commons" in the communal systems was found (Ward et al, 1998). Rather, a recent assessment of the response to the 2008–2009 drought in Kenya suggests that herding makes better economic sense than crop agriculture in many of the arid and semi-arid lands.

Pastoralism in Africa: Scope and growing importance

Pastoralism is often listed as one of the major livestock production systems in Africa (Dixon et al., 2001). Although there seems to be some confusion on the scale of pastoralism in Africa, there is a general agreement that for the about 55% of the Africa land surface described as arid and semi-arid lands (ASALs), 47% is arid and is largely suitable for pastoralism only. Although Dixon et al. (2001) state that the pastoral systems in Sub-Saharan Africa occupy 346 million ha (14% of the land area of Sub-Saharan Africa, excluding North Africa), the Africa Union (2010) indicated pastoral areas occupy about 40 percent of the entire Africa's land mass. Similarly, the number of pastoralists in Africa has been variously quoted to be as low as 20 million and as high as 268 million, the variances are largely due to differences in

definitions. For example, the high value of 268 million pastoralists (over 25% of Africa's population), said to live and move on 43 per cent of Africa's land mass, and attributed to the African Union (AU, 2010) most likely includes agro-pastoralists, whereas the lower value of 20 million only take nomadic pastoralists into account and not agricultural pastoralists (Buckens, 2017). The contributions of pastoralism to national economies and food security, although not readily acknowledged by some governments, are however not in doubt. In East Africa, 90% of the meat consumed, comes from pastoral herds and, in Kenya alone the sector is estimated to be worth US\$800 million. In general, pastoralism contributes 10 to 44 percent of the GDP of African countries (AU, 2010). These findings from the analyses referred to above and other similar studies have made a strong case for pastoralism and have contributed to somehow a rather positive image for the practice.

Development and trends in Transhumance: The Case of West Africa

As noted above, Transhumance, a sub-type of pastoral system, is characterized by regular seasonal movement of herds between two specific areas in order to exploit seasonal availability of pastures. In West Africa, the gradient in agro-ecological zones, from the very dry arid zone bordering the Sahara desert to the north, followed in more or less north-south bands, by semi-arid, sub-humid, and humid zones towards the coast, with scattered savannah areas in the forest zone and some coastal savannah regions, allow the development of various forms of pastoral mobility and settlement in the region. The gradient in agro-ecological zones in the region as it affects pastoral mobility for pastures and water is made more complex by the existence of a "tsetsefly/trypanosomes belt" found mostly in the sub-humid and humid forest zones, which prevents mobility of pastoral herds into certain areas.

Thus, pastoral transhumance takes at least two forms:

1. In the first form, pastoralists from neighbouring countries are granted temporary stay in settlements in tsetse-free areas in the sub-humid and humid forest areas in another country (for example, Fulani herdsmen from Niger or Northern Benin settling seasonally in Central Ghana) make short distance transhumant movements into farming areas, usually within the host country.
2. In the second form, transhumant movements originate from far away parts of the country (usually northern sectors) or from another country and make incursions into farm and rangelands in more feed-endowed and water-available areas (for example, Fulani herdsmen from Northern Nigeria or Niger making incursions into provinces in south eastern or western Nigeria).

In the latter case, the transhumance movements often do not linger long in one particular area along the route, but rather cover extensive distances in a short period. They then stay for the bigger part of a season in the alternative (host) area. The herders with their livestock return home only when pasture conditions improve at the home base.

The latter group is often loosely referred to as “nomads” in the receiving communities in the south. In their quest for pastures and water for their animals, transhumant groups encounter conflicts with farming communities over resource use, but also over inaccessibility to resources traditionally reserved for grazing. The ensuing misunderstanding between the parties often lead to escalation of hostilities that affect the wider communities.

Environment of tensions, conflicts and violent clashes in West Africa



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The available information shows that from an age-old economic viable practice, a pattern of production, management and mobility has emerged in West Africa that presently easily degenerates into tensions and confrontations between herders and host country farmers due to changing political, socio-economic and environmental conditions, posing environmental and security threats. It is well known that the practice of transhumance has been around for centuries, with relatively peaceful interactions with crop farmers along transhumance grazing routes and those in the temporary host areas, through exchanges of animal products and foods (Seddon and Sumberg, 1997). However, in recent times the practice has resulted in severe conflicts in most parts of West Africa wherever migrating herdsmen and their herds pass through or attempt to settle temporarily. Conflicts have been reported to be usually centered on the destruction of crops, pollution of rivers and ponds serving as source of drinking water for communities, and sometimes on alleged improper behavior of herders, including rape of local women in the host areas, disregard for local traditional authorities, harassment of nomads by host communities' youths, indiscriminate bush burning by herders, and cattle theft (Ofuoku and Isife, 2010; Baidoo, 2014). These are among known triggers of herder-farmer conflicts. Among the socio-economic effects of the conflicts between herders and farmers are a) reduction in outputs and incomes of crop farmers, b) displacement of farmers, c) erosion (land degradation) as a result of over-grazing, d) loss of lives through killings by nomads and reprisal killings of nomads (Ofuoku and Isife, 2010).

In addition to damage to farm crops, afforestation programmes have failed in some countries linked with destruction of young trees by browsing animals and chopping of tree branches by herders to feed migratory animals. Almost all coastal countries in West Africa (Cote D'Ivoire, Ghana, Togo, Benin, Nigeria), with borders with landlocked dry countries with large pastoral herds, have experienced conflicts between host communities and cattle herders from the northern countries (mainly Chad, Niger, Mali, Burkina Faso, northern Cameroun). In some cases transhumant herds cross more than one country border in search of for feed and water. Violent clashes between herders and local residents which sometimes require local law enforcement agency interventions to restore peace have led to loss of human lives and cattle. Violent clashes involving tens of human deaths have been recorded in Agogo in the Central Ghana (Baidoo, 2014) and in Kaduna State in Central Nigeria (Modern Ghana, 2017).



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The underlying causes for increased tensions and clashes can be traced to a few factors and trends. Among them, expanded migratory herds and longer stay periods at the areas of migration is believed to relate to deteriorating feed and water supply in the counties or regions of origin of the herds; human population growth and climate variability and climate change are said to be contributing to the reduction of feed and water resources in the areas where the animals originate. Herders with their animals therefore undertake transhumance into more feed and water-endowed countries in the south, where similar human population growth pressures and climate change variability are being experienced. Further south in the sub-humid and forest zone, more intensive agricultural farming and growing of tree crops have reduced areas available for grazing. Transhumant livestock therefore encroach on planted farms. Furthermore, the excessive cutting of trees for farming and other commercial purposes has also reduced tsetse fly habitats and tsetse flies, and thereby allow trypano-susceptible ruminants to live in these areas for longer periods without a threat of infections with trypanosomiasis (Agyemang, 2005).

Based on the above mentioned trends, opponents of transhumance argue that herders should not be allowed to settle seasonally in arable areas, and should bear the cost of damage done to crops when it occurs. For the proponents of pastoralism and by implication including transhumance pastoralism, a counter argument is that many social pressures have been put on pastoral systems, including encroachment on rangelands in low-medium potential rainfall areas by crop farmers, and blocking of traditional routes previously used by migratory herds.

It is the position of the latter proponents that perhaps the recent findings on the viability of pastoralism, and its positive influence on dryland ecosystems, are not

communicated effectively to policy and decision makers. They, however, acknowledge that alternative policy options need to be formulated, and that key policy gaps include regulation of transhumance pastoralism, production investment, mobile service delivery, conflict resolution, decentralization and democracy adapted to mobile populations, alternative and complementary income generation opportunities, etc. The underlying assumption and logic for the need of policy options towards pastoralism as a system of production is that pastoral areas are not isolated from national and international political and socio-economic aspects and in the planning of development programmes. The interactions between the pastoral and broader sectors must be taken into account to achieve a holistic approach (Johnson, 1992).

The role of Regional Economic Communities: the example of ECOWAS initiative

From the discourse above it can be argued that the positive trends that have been observed in pastoralism elsewhere in Africa is somehow overshadowed by reported conflicts between farmers and herders, especially those practicing transhumance pastoralism. These conflicts have existed for a while in all regions of Africa but have assumed serious dimensions lately. In West Africa the regional integrating and economic community block, the Economic Community of West African States, (ECOWAS), in anticipation of possible increases in tension and conflicts, has attempted to address such region-wide problems within its agenda for free movement of people and goods in the region and across country borders. In furtherance of this, a Transhumance Protocol was developed by ECOWAS and presented to stakeholders for discussions. In 1998 it was adopted by Heads of State under Decision A/DEC.5/10/98 regulating transhumance between ECOWAS member States.

The relevant Article (3) on the legality of cross-border transhumance states that “The crossing of land borders for the transhumance of cattle, sheep, goats, camels and donkeys according to conditions defined by this Decision is authorized between all the countries of the Community” (ECOWAS, 1998). An International Transhumance Certificate (ITC) was also subsequently adopted. Provisions which establish the key specifications common to bi-lateral agreements for cross-border mobility include: specified essential documents required to cross the borders – e.g. passport, vaccination and animal health certificates; specified time periods for mobility – e.g. between November and April, and not exceeding a period of 30 days. Entry and exit points and livestock corridors along which animals must travel are specified as well as conflict resolution conditions.

The coming into existence of the ECOWAS Transhumance Protocol and the International Transhumance Certificate (ITC) has inspired other regional integrating blocks to adopt similar approaches. The Southern Africa Development Community (SADC) developed such an approach as part of the Regional Agricultural Policy Framework in 2011. The Inter-governmental Authority on Development (IGAD) of Eastern Africa in 2017 started the process of developing a Transhumance Protocol with a provision of an ITC. These continent-wide developments would seem to suggest a tacit acceptance of the fact that transhumance, and the broader nomadism cannot be eliminated readily in most parts of Africa, and that better management of the mobility of herders and their animals should become a priority in the various regions of the continent. However, in spite of the existence of the ECOWAS Transhumance Protocol and the operation of the ITC, cattle migration is, each year hindered by administrative red tape, which compels herders to act on their own, often leading to failure to comply with national and regional regulations. For example, up to date Nigeria is said to have little or no pastoral infrastructure, and that in some areas there are no officially demarcated camp sites, watering points and transhumance corridors. Frustrated herders then turn to acting on their own, hijacking whatever they can get, often resulting in clashes with farming communities (Sahel Standard, 2016).

Practical solutions for eliminating or reducing conflicts between transhumant herders and crop farmers and communities through innovations and innovative approaches of tackling pastoral and farming issues.

Innovation technologies:

Possible innovations and technologies include those that increase the quantities and quality of resources (crop-residues, pastures from rangelands, water sources) and/or those that improve the distribution of the resources at the receiving communities or communities along transhumance routes. For example, quality crop residues (legumes, quality stalks) in farmers' fields in exchange for manure and urine from herders' animals, under mutual agreements, can benefit both parties and build confidence among them. Improving fertility of rangelands and farming lands through spreading of improved leguminous seeds from the dung voided by the grazing/browsing livestock could be achieved through arrangements between herders and receiving communities.

Innovative approaches to doing things in the areas of:

a) enforcement of the use of designated routes by transhumant herders and livestock transporters that involve local authorities and traditional rulers in the receiving communities, b) instituting Early Warning Systems based on human intelligence gathering to alert early indications of conflicts, c) instituting state of the art conflict management, resolution and arbitration mechanisms at district and local Levels, and d) creating temporary camps in receiving communities for transhumant herders and herds originating from afar, to promote and regulate short distance transhumance.



Education and awareness creation among herders and farmers and their communities in the areas of:

a) Understanding among farming communities in the workings of the pastoral economy and the ecological interdependency of various systems of production, and of various regions, b) awareness of agreements between countries under RECs on the free movement of goods and services in the region to bring new perspectives to farming communities in the way they interact and negotiate with herders, c) education on mutual respect among people of different cultures d) education on the need to respect local norms on gender issues, especially interactions with women and children, be provided for both settled and visiting herders, e) education and awareness programmes on the ecological implications of the overuse of resources, such as overgrazing; misuse of natural resources such as burning of grasslands in the dry season, f) education of both herders and farmers on what climate change means for the availability and quality of natural resources, and the creation of awareness of impacts of climate change.

Recommendations to Governments and Regional bodies (Regional Economic Communities)

From the discourse above, it is becoming clearer that pastoralism in Africa is currently contributing considerably to national and regional economies, in terms of GDP and food and nutrition security. Quantified information are emerging that show that pastoral livestock, previously thought to be mainly destructive to the environment and of low productivity, actually do provide several benefits, including, carbon sequestration and maintenance of biodiversity. These are in addition to the dairy, meat, skins and fibre products and services provided by livestock, and transport, ploughing and weeding services provided by animals in support of crop production enterprises. These contributions to national economies are now known to be at much higher levels than previously thought. Unfortunately, due recognition in this respect has not been given by many governments in countries where pastoralism is important. It would make economic and security sense for such governments to weigh these benefits to the economy and the environment and provide the political will and develop budgetary and social protection policies and mechanisms towards pastoralism and pastoral modes of production in their respective countries. To better manage cross-border pastoralism and its attendant conflicts, governments should make deliberate efforts to politically and financially support their regional integrating and economic communities in developing the required protocols and instruments. For the reduction of the rising tension and clashes between crop farmers and transhumant herders in West Africa in particular, ECOWAS Member States should be encouraged to develop and implement policies and strategies aimed at supporting transhumant pastoralism, while creating conditions for voluntary change to sedentary agro-pastoralism, where feasible. Furthermore, Member States should endeavor to fulfill their obligations under the ECOWAS Transhumance Protocols by providing the agreed pastoral infrastructure in support of transhumant herders while supporting local by-laws protecting the rights of farming communities. Awareness creation among the citizenry on the provisions of the ECOWAS Transhumance Protocols should be mainstreamed in the countries' information systems for the general public. Similar approaches can be adapted by SADC and IGAD regions that have adopted the ECOWAS initiative.





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Changing the landscape of measuring livestock vaccine potency in developing countries and challenges involved

Viskam Wijewardana,¹ Richard T. Kangethe,² Youhani Samarakoon,³ Giovanni Cattoli,⁴ and Gerrit Viljoen⁵



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Summary

Vaccines are the most cost effective tool for the prevention of livestock diseases and are of immense value among livestock farmers. However, vaccines have not been developed for some of the most devastating transboundary livestock diseases and many of those that are available are sub-optimal. Measuring vaccine efficacy is a key component in vaccine development and in evaluating currently available vaccines. Here, novel approaches of testing vaccine efficacy and the challenges in adopting them for under-resourced laboratories are discussed.

Scope

The potency of vaccines as a cost-effective tool in controlling animal diseases has been strongly reiterated at many developmental forums. The impact of vaccination in the prevention of animal diseases is evident as seen during the eradication of Rinderpest, a devastating viral disease of cattle that plagued the African livestock in the 1890s (Roederet al. 2013). In fact, investing in development of livestock vaccines fits well within the framework of the Sustainable Development Goals – specifically SD Goal 2: to end hunger, achieve food security and improved nutrition, and promote sustainable agriculture not only does rearing of livestock provide meat and milk but also serves as an income generation activity that aid in the sustainability of the industry which is highlight under tasks of SD Goal 2. The risk

of contracting and spreading diseases amongst livestock is high especially on the African continent due to the movement of a sizable number of animals by pastoralists. This was evident during the vaccination campaign against Rinderpest where small pockets of the disease prevailed amongst some communities at the last stages of eradication due to movement of animals.

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It is therefore extremely important to develop robust livestock vaccines that reach remote communities from veterinary stations in an effective condition, that is, vaccines that can withstand very high temperatures. However, major livestock diseases in Africa like contagious bovine pleuropneumonia (CBPP), tick-borne diseases like red water, heart water or East Coast Fever (ECF) or tsetse fly transmitted diseases like trypanosomiasis continue to plague livestock due to the fact that vaccines are either non-existent, sub-optimal or not available or inaccessible when needed. Despite major advances in biotechnology and vaccinology, very few vaccines that address these challenges have been introduced over the recent past decades. One reason for this is the absence of these diseases in developed countries, where there is no commercial value in developing vaccines against them and where most biotechnological companies or even state research organizations do not prioritize research areas addressing such diseases. In addition, research on tropical animal diseases in western laboratories faces various difficulties where there are restrictions on working with foreign pathogens. It is therefore of great importance to encourage and promote the establishment of laboratories located in disease endemic countries, possibly through public-private partnerships and donor support, to conduct research that will lead to the discovery of new and improved vaccines against livestock diseases that are prevalent there (Lubroth et al. 2007). This could most effectively be done, in terms of finance and manpower, by establishing a laboratory in each region (group of countries) where similar diseases are prevalent. In addition facilities should be

established where adequate amounts of vaccines can be produced.

The value of having veterinary research institutes in Africa is demonstrated by the major achievements of the Onderstepoort Veterinary Institute in South Africa; where the Rinderpest vaccine was developed about a century ago, and where other vaccines and cures for various livestock diseases in Africa were subsequently developed (Bigalke and Verwoerd 2008).

Testing the effectiveness of vaccines is a critical requirement when considering their use in the prevention of livestock diseases. The gold standard for effectiveness is the complete eradication of a disease when vaccinated animals are subjected to the disease causing agent. Such trials can reveal immune markers that correlate with immune protection (Plotkin 2010) which could be used in assessing the vaccines under field conditions; and to serve as a measure of the effectiveness of the vaccine without having to carry out further trials. Assessing humoral immunity through measuring serum antibodies (disease specific neutralizing antibodies) is used both during the developmental stages and the quality control stage of manufactured vaccines. However, measuring antibodies alone is not a conclusive method for assessing the effectiveness of all vaccines especially those whose protection involves multiple immune parameters other than neutralizing antibodies. Other areas that have been shown to play a significant role in vaccine development (Siegrist 2013) are cell mediated immune responses, innate immune responses and mucosal immunity (Fig 1).

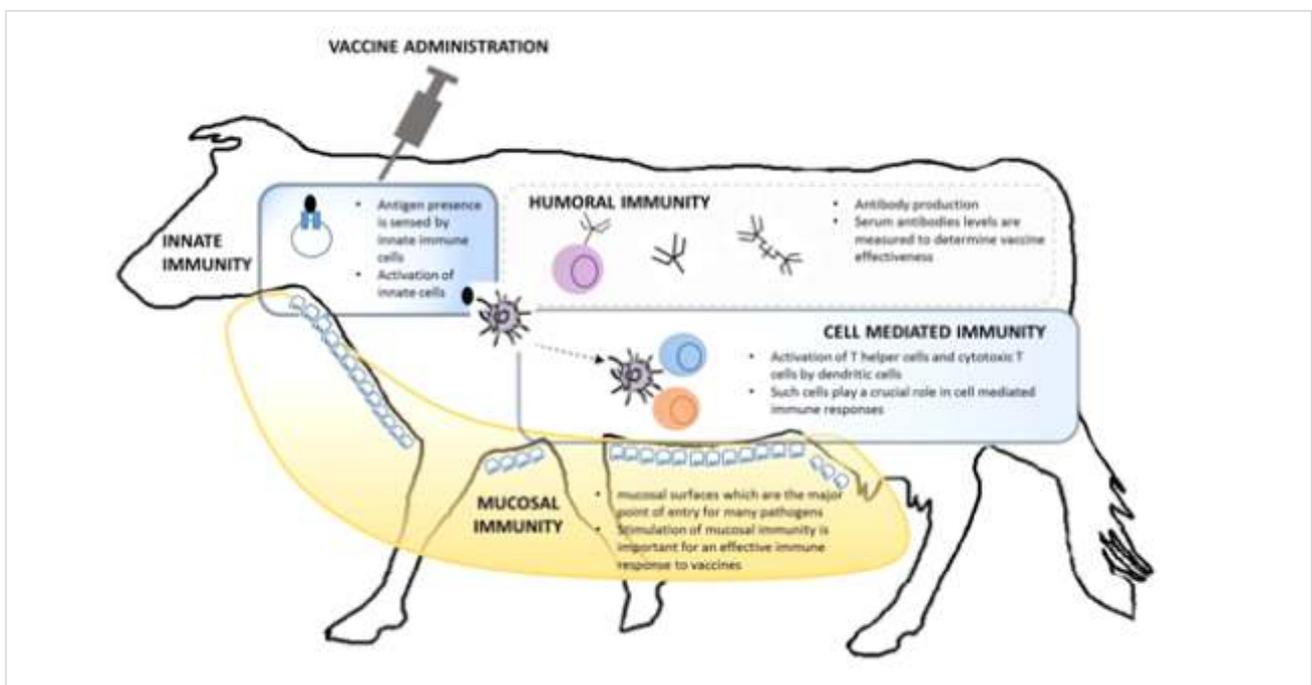


Figure 1: Multiple pathways of immune activation following vaccination (Source: Siegrist, 2013)

The focus here is to briefly introduce the methods associated with these three areas other than humoral immunity and expound on tools that can be used to measure these parameters along with the challenges in adopting such technologies in under-resourced laboratories. Already, these tools and technologies are increasingly used in human vaccine potency evaluation (Halder et al. 1998) and their use in veterinary vaccine development and evaluation is recommended (Knight-Jones et al. 2014).

1. Cell Mediated Immunity

In addition to antibodies, effector cells in the immune system are essential in controlling pathogens; especially viruses and intracellular bacteria e.g. Mycobacteria or Brucella. CD8 T cells which are potentiated by a vaccine can clear intracellular pathogens by directly killing pathogen infected cells or by producing cytokines. CD4 T cells on the other hand assist CD8 T cells and B cells during their maturity and activation using a wide range of cytokines. The efficient potentiation of T cells can be measured through a simple lymphocyte proliferation assay in the lab with minimum resources using radio-active, colorimetric or fluorometric markers. The use of cytokines produced by activated lymphocytes to measure Cell Mediated Immunity (CMI) is another comparatively low-cost method that can be upgraded to address multiple cytokines produced by various sub populations of both effector and helper cells (polyfunctional T cell assays) (Seder, et al. 2008). The frequencies of various sub populations can also be measured in order to derive more specific information on CMI.

2. Innate immunity

The first steps that occur in an animal following vaccination is the innate recognition and uptake of antigens by antigen presenting cells (APCs) which subsequently lead to the generation of antigen specific T and B lymphocytes. A good vaccine that generates these steps of innate immunity can be measured by its ability to create an inflammatory local environment. Recruitment of the most powerful APCs, dendritic cells (DCs) and accessory cells such as NK cells and neutrophils to the vaccination site is a good sign of an efficient vaccine (Pulendran and Ahmed 2006). Uptake and presentation of vaccine antigens by DCs is another measure of an efficient vaccine.

3. Mucosal immunity

As most livestock diseases that require attention in vaccine development are contracted through mucosal routes, the immunity induced at mucosal sites by a vaccine is yet another measure of its efficiency (Ogra et al 2001). The major determinants of the mucosal immunity induced by a vaccine can be measured through the availability of secretory IgA and IgG at mucosal surfaces. Measuring effector T cells at mucosal areas could also be of value although methods of doing so are scarce.

Table 1: Tools for measuring vaccine immunogenicity

Tool/ technology	Application in vaccine immunogenicity
Flow cytometry	Analysis of immune cells by counts, surface cell markers for subtypes and intra cellular cytokines. Phosphoflow can measure multiple cytokine signaling molecules.
ELISPOT	Analysis of cells for cytokine production and secretion or antibody expression
Immunofluorescence microscopy	Analysis of immune cell subtypes and cytokine production
Bead based array (Luminex etc.)	Measurement of cytokines in plasma and also in-vitro cell cultures
Classical/ Real-Time PCR	Analysis of cytokine gene expression
ELISA	Measurement of Antibody production and cytokine production
Protein microarrays	Measuring antibody responses to multiple antigens

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Pastoral ecosystems in Maghreb countries: between fragility and multi-functionality

Malek Hayder¹



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Summary

Arid and semi-arid rangelands in Maghreb countries (Algeria, Libya, Mauritania, Morocco and Tunisia) play an important role for feeding livestock, combating desertification and conserving biodiversity. In fact, these rangelands are characterized by their multi-functionality and play a crucial role at economic, social, and ecological levels. Sustainable rangeland management systems contribute to soil conservation, provide feed and habitat for livestock and wildlife, food for pastoral and local communities, and offer opportunities for decent employment for the youth through ecotourism and for the valorization of aromatic and medicinal plants. Nonetheless, inadequate policies and unsustainable management of resources, often in combination with inappropriate practices adopted by local communities, are the main cause of the degradation of this ecosystem. Accordingly, countries are encouraged to implement participatory and inclusive strategies involving local communities. They also should, together with international organizations, strive to conduct technical and economic feasibility studies related to the opportunities offered by rangelands.

This paper briefly examines the actual situation of rangelands in Maghreb countries. In fact, and despite their fragility, arid and semi-arid rangelands offer a set of products and services that would improve the socioeconomic situation of local communities and contribute to natural resources conservation (fauna and flora).

Introduction

Characterized by a semi-arid to arid ecosystem, rangelands in Maghreb countries (Algeria, Libya, Morocco, Mauritania and Tunisia) play a vital role in maintaining livestock activities. At environmental level, they have a fundamental impact, their sound use could help control desertification and erosion and preserve animal and plant biodiversity. At socio-economic level, they play a tremendous role among rural communities and contribute to food security and poverty alleviation for households. They are most often used in the form of pasture in extensive livestock production and in the form of feed in intensive livestock production. In pastoralism, rangelands contribute up to 90% to the dry matter used in animal feed.

In Maghreb countries, pastoral livestock is not registered as statistics do not differentiate between the various livestock systems, however small ruminants are known as the most dominant in terms of numbers (Carrière, 1996). Also, pastoral communities are not known with precision, even if the number of strictly nomadic livestock farmers decreases rapidly (Carrière, 1996). The size of the pastoral population varies from country to country: in Mauritania for example, the share of pastoral population in the total rural population exceeds 98% and is approximately 25% in Libya, 17% in Morocco and 6% in Algeria (Carrière, 1996).

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For decades, Maghreb countries have put in place forestry and pastoralism development strategies and programmes aiming at the sustainable conservation and management of resources. However, these programmes were unable to prevent the deterioration of pastoral spaces, including forest rangelands.

By presenting the situation of pastoral ecosystems in Maghreb countries, this paper proposes to demonstrate that, despite its fragility, the pastoral landscape has a significant socio-economic and environmental potential. Its sustainable and participatory management could namely contribute to food security among communities, the preservation of wildlife and flora, and soil conservation and erosion control.

1. Pastoral Ecosystems' Fragility in the Maghreb region

Rangelands in the Maghreb region are increasingly weakened by the various pressures induced by the growing population, overgrazing and climate hazards with their negative effect on biodiversity. These worsen the impact of desertification and climate change and reduce pastoral production quantitatively and qualitatively. These rangelands are faced with several ecological and climatic challenges such as water scarcity, irregular rainfall and drought that lead to the deterioration of pastoral spaces.

An observation of satellite pictures of several regions in Maghreb countries at various periods, unequivocally shows dwindling pastoral lands. In Morocco, for example, the surface area of arid rangelands of about 33,961 million hectares now shows 57% of bare land (Mahyou et al., 2010). In Tunisia, rangelands' surface area has dropped from 6.1 million hectares in 2005, to 5.5 million hectares in 2012 (Tunisian Ministry of Agriculture and Water Resources, 2012).

1.1 Rangeland Degradation

Climate conditions are often difficult and the rural socio-economic context of Maghreb countries make the sustainable management of arid and semi-arid pastoral systems relatively complex. Rangeland degradation, one of the main problems of these systems, is due to several environmental, institutional and social factors such as drought and water and wind erosion, the collective land tenure system and inadequate policies, as well as human intervention on rangelands through unsustainable agropastoral practices. Indeed, with irregular rainfall and relatively long drought periods of about 3 months in Tellian regions, 5 to 7 months in steppic regions and 10 to 12 months in southern regions, the availability of the plant cover tends to be seasonal and increasingly vulnerable.

In countries where animal production is a major source of income that contributes 30 to 40% to the total agricultural production, the number of animals is consistently increasing as is the demand for animal products, and livestock production is based on extensive management. In these countries, rangeland rehabilitation programmes are even more difficult to implement and the reduction of the livestock size is not an obvious solution. Thus, pastoral size in Maghreb countries can only be high.

1.2. Overgrazing

The presence of animals on rangelands could be highly beneficial for pastoral regeneration when the stocking capacity limit is complied with. A high stocking density may deteriorate rangelands and slow down, or even prevent, the natural regeneration of pastoral species, destroying seedlings and compacting the soil - which leads to its depletion. The evolution of the number of ruminants in Maghreb countries is shown in Table 1 below (cattle was not included since they are mostly reared in intensive systems).

Table 1: Ruminants size trends in Maghreb countries

Animal species	Year	Algeria	Libya	Morocco	Mauritania	Tunisia
Sheep	1994	17,841,840	5,000,000	13,308,900	-	6,137,100
	2004	18,293,300	5,200,000	17,026,300	8,850,000	6,948,660
	2014	27,807,734	7,150,000	19,230,835	10,575,000	6,805,700
Goats	1994	2,543,790	-	3,973,000	-	1,351,300
	2004	3,450,580	2,100,000	5,358,600	5,600,000	1,411,550
	2014	5,129,839	2,580,000	6,147,225	7,040,000	1,248,200
Camels	1994	114,120	-	37,000	1,102,000	232,000
	2004	273,200	48,000	39,000	1,556,000	235,000
	2014	354,465	57,000	182,830	1,399,000	236,500
Total	1994	20,499,750	-	17,318,900	-	7,720,400
	2004	22,017,080	7,348,000	22,423,900	16,006,000	8,595,210
	2014	33,292,038	9,787,000	25,560,890	19,014,000	8,290,400

(Source: FAOSTAT, 2017)

Mainly based on extensive livestock production, the increase in cattle number combined with the decrease in pastoral land, illustrates the increased animal pressure and consequently overgrazing, thus worsening rangeland degradation. It should be noted that the drop in sheep and goats numbers between 2004 and 2014 in Tunisia is explained, on the one part, by the animals crossing borders to neighboring countries during the revolution period, and on the other part, by the excessive culling following the outbreak and declaration of zoonotic animal diseases in the country (such as the pest of small ruminants).



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1.3. Socioeconomic Challenges

The traditional pastoral system is based on principles that favor sustainable natural resources management and take into account specific biological, physical and climatic patterns of the environment. This system ensures rangeland rehabilitation, good water resources management and biodiversity conservation. This is the Hima pastoral management system.

Nevertheless, with the ongoing urbanization and agricultural expansion, we observe the increasing impact of the pastoral community's activities on rangeland degradation and this is due to inadequate pastoral and agropastoral management practices, i.e. cattle grazing throughout the year, non-compliance with grazing prohibition and the practice of family farming in transhumance areas. This puts a strong pressure on rangelands. At the same time, farming and agropastoral systems are faced with other constraints such as difficult access to water, low mechanization at farm level, lack of water for fodder, farmland expansion, competition between fodder farming and market gardening, the poor development of pastoral products, failing professional organizations, the emergence of middle-men and occasional livestock farmers that only exacerbate the impact of pastoral communities on rangeland degradation. This is why rangeland conservation and sustainable management programmes are not feasible without the integration of pastoral communities, namely through developing and strengthening professional structures.

Hima is the governance system of an area protected by local authorities for the public interest and the conservation of natural environment. This system was developed in the Arabian Peninsula before Islam emerged. However, Muslim influence has transformed the old private Hima system that belonged to select powerful individuals, into a legal system that protects natural areas to benefit from increased collective advantages. The Hima system helps protect rangelands during the vegetation regeneration season and indirectly control the grazing capacity of pastures by specifying the size of herds. (FAO, 2017)

1.4. Rangeland management policies

The interventions implemented for the sustainable development of natural resources (including forests and rangelands) abound. Every year, in a bid to limit overgrazing on rangelands, countries in the Maghreb region increase their forage lands and diversify production, and this helps improve the quantity and quality of forage rations distributed to the livestock and improve soil structure and fertility. However, in spite of the efforts made, implementing these programmes was not always efficient. This is mainly due to the lack of involvement and participation of pastoral communities in defining and implementing these actions, the inefficiency of extension programmes, the large number of institutions involved in pastoral management and the poor coordination between them.

Moreover, some projects and pilot cases have recorded some success, however their results have not been sufficiently documented and publicized.

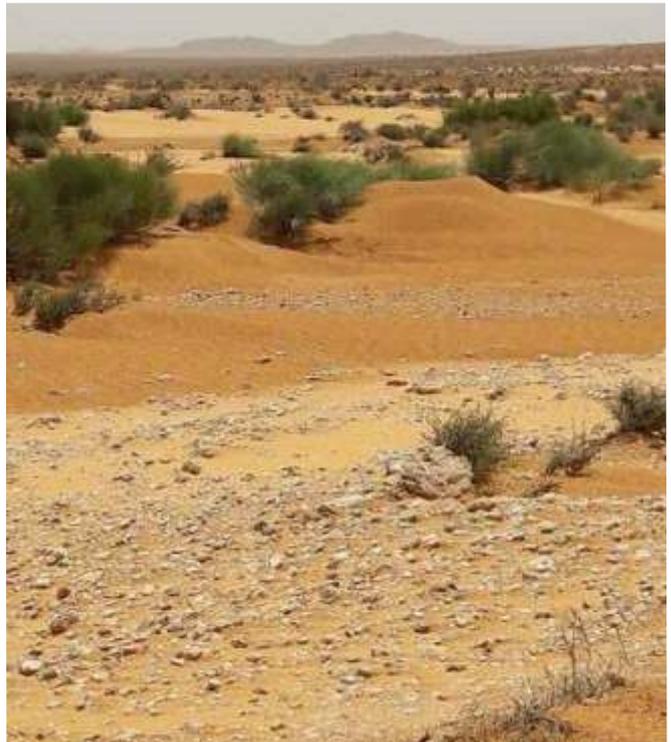
2. Rangelands products and opportunities

Despite their fragility, rangelands in Maghreb countries are characterized by their rich multi-functionality. Indeed, in addition to providing feed for the livestock, rangelands contribute to food security for populations by providing meat and milk. They can help with climate change mitigation and adaptation and fauna and flora preservation (animal habitat, etc.), soil conservation and erosion control, as well as have cultural and leisure functions. Rangeland products are also a very important source of income for the pastoral and rural community since they provide fuelwood, building material, medicinal, aromatic, food plants, etc. (FAO, 2011). In addition, rangelands are increasingly used for cultural and entertainment purposes by capitalizing on their ecotouristic potential. The future of this activity is promising as long as the establishment of this innovative vision is environmentally-friendly and is based on sustainable development principles. Such an activity namely enables to create decent job opportunities for vulnerable communities in the region (especially the youth) as tourist guides, local products vendors, artisans, traditional food producers, local produce vendors, etc. This potential should be enhanced by setting up sustainable rangeland management programmes centered on pastoral and rural communities and that enable to benefit from these pastoral products, to improve the standard of living of these communities, to reduce poverty, to preserve natural resources and to mitigate the impact of climate change.

Conclusion and recommendations

Following their strategies, Maghreb countries have put in place rangeland restoration systems, either through direct seeding, or restricted grazing. Assessing these works and experiences at national level has shown that the results of these systems have not always been satisfactory (FAO,

2012). Indeed, pastoral seeds produced at national level by the state bodies involved and used as experiments, often have relatively insufficient production performance and are not adapted to the environmental conditions of rangelands. Managing these shrubs is not easy in view of the high cost of water, the scarcity of which does not enable proper farm growth. Rangelands closing off programmes that have not integrated the pastoral community have always been rejected, especially since species regeneration takes time in arid and semi-arid areas.



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Even though the situation may seem critical, there are several interventions to be implemented to ensure a conducive environment for sustainable pastoral resources management and to improve the living conditions of vulnerable communities.

From an institutional standpoint, it is recommended to: put in place inclusive, participative and decentralized intervention programmes; strengthen public-private partnerships; support professional bodies at organizational and technical levels to enable them fully play their development role; promote entrepreneurship by putting in place incentives for the youth that enable them to invest in ecological projects; support applied research; and document the results of intervention programmes. In fact, documenting successful works would promote national investment and international financial support. Harmonizing the policies and strategies of Maghreb Arab Union States for natural resources conservation should also be considered. FAO, through its sub-regional programmes and the Near East Forestry and Range Commission (NEFRC), could play a major role in developing Maghreb-wide sustainable pastoral programmes and policies.

At technical level, it is recommended to conduct strategic studies on the value chains to be developed and on the existing potential and niche employment in the context of managing pastoral systems. Research work on resistant and performing pastoral seeds adapted to the needs of the livestock and the environment should also be conducted. The socio-economic challenge being an essential component of sustainable rangeland management, special attention should be given to developing the human resources involved in extension and to strengthening professional pastoral bodies that facilitate their involvement in pastoral ecosystem management programmes.



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Pastoralism and rangeland management in drylands of Eastern Africa: a review of issues, challenges and practices

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Summary

This article reviews recent publications and projects on issues, practices and challenges that characterize pastoralism in Eastern Africa's rangelands. It was found that pastoralists have tremendous indigenous knowledge, which can be integrated in sustainably managing drylands' rangelands. The issue of rangeland overgrazing, despite receiving high attention, is found more related to political and economic factors than ecological factors. Rangeland management policies are often inadequately informed by land use assessments that do not integrate local spatial knowledge and constraints. Such policies force pastoralists to adopt alternative livelihood options, particularly through market systems that are not necessarily beneficial to them. Nevertheless, the contribution of livestock to the economy in the sub-region remains non-negligible. In spite of the challenges, the paper pinpoints promising practices that are enhancing sustainable rangelands management. Finally, concluding that pastoralism retains a huge potential for countries in eastern Africa, policy recommendations are formulated particularly in order to integrate into rangeland management approaches the local pastoral knowledge and needs to enhance their livelihood outcomes.

Introduction

Eastern Africa is a sub-region with a diversity of agro-ecologies, but dryland is the most common. Drylands represent over 40 percent of the World's land areas characterized by an aridity index below 0.65. The aridity index defines the ratio between rainfall and potential evapotranspiration, and helps to group drylands into four subcategories, namely hyper-arid deserts for aridity index less than 0.05, arid areas for an index between 0.05 and 0.20, semi-arid areas for an index between 0.20 and 0.50 and dry sub-humid areas for an index between 0.5 and 0.65 (UN 2011).

Due to the difficulty to sustain rain fed crop production in drylands, pastoralism is considered as a more adaptive livelihood for rural communities. Consequently, rangelands are the predominant dryland use, estimated at 97% in hyper-arid deserts, 87% in arid lands, 54% in semi-arid lands and 34% in sub-humid areas (UN 2011). Dryland rangelands are found in shrublands, savannah, grasslands, deserts, coastal marshes and meadows. Nomadic or semi-nomadic pastoral communities roam in search for green pastures and water sources. Transhumance pastoralism, i.e. regular back and forth movement between two specific areas with different ecologies, has in some regions been a common practice. Both these types of pastoralism have been sustained through generations and were relatively effective in dealing with the vagaries of the climate in drylands (Lopez-i-Gelats et al. 2016).

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³In this context, Eastern Africa comprises Burundi, Djibouti, Ethiopia, Eritrea, Kenya, Rwanda, Somalia, South Sudan and Uganda

On the environmental side, the traditional knowledge and mobility of pastoralists have allowed the sustainable management of natural resources in drylands. Drylands are characterised as “unstable but resilient ecosystems”, due to the fact that drylands ecosystems abound with seed banks in the soil, capable to generate new species composition, if not overly exploited (UN, 2011).

Methodology/study approach

Published articles and reports were reviewed to identify common highlights on issues, challenges and practices for sustainable pastoralism and rangeland management in Eastern African drylands. A total of 122 project reports were reviewed in order to identify promising practices for sustainable pastoralism under a changing climate in Eastern Africa's drylands. The selected projects and reports concerned those implemented by FAO in the sub-region and also from other stakeholders.

Findings

From this study it was found that rangelands in drylands possess tremendous potential that is threatened by management issues. These issues include the new approaches to land use, the disintegration of traditional institutions and rangeland degradation.

Pastoralists have developed their own knowledge systems to manage their rangelands, without causing degradation of the resource base (Barrow et al. 2007). Pastoralists have immense indigenous knowledge that helps in sustainable rangeland management, such as weather prediction, finding pasture and water as well as livestock disease treatment (IRRR, 2002). However, this knowledge is currently threatened by inappropriate policies, environmental changes that cause natural resources scarcity and the establishment of administrative borders (El Hadary et al. 2012). Borders have the implication of confining pastoralists to restricted spaces, instead of being able to roam free (Lankester and Davis, 2016). This confinement has often resulted in unsustainable grazing practices (Oxfam, 2008).



In addition, it is critical to note that pastoral communities' populations and livestock have substantially increased. Countries such as Ethiopia and Somalia are important suppliers of meat, cattle and goats to the Middle East. The increase in livestock population in confined environments is a cause for concern in regards to sustainable rangeland management. On one hand, in policies regarding the management of rangelands affected by degradation, the concept of carrying capacity is a major concern. However, carrying capacity is often difficult to determine in practice due to the realization that political and economic factors outstrip ecological factors in rangeland management approaches (Nyima, 2014). It is also crucial to integrate pastoralists' local spatial knowledge in land use assessments that aim to inform policy on rangelands management (Basupi et al. 2017). On the other hand, community-based rangeland management as a common property resource is reported to fail in most cases, due to the resources' overexploitation particularly by overgrazing. However, a disregarded hindrance is the absence of appropriate institutions to support such management by targeting improvement in livelihood outcomes (Swallow and Bromley, 1995; Cao et al. 2013; Beyene, 2015; Ulambayar et al. 2016).

The inadequate rangeland management is compounded by limited pro-pastoralist infrastructure development. The pastoral communities would for instance be interested to have water infrastructure developed in order to deal with climate vagaries (Schilling et al. 2015). Effective rangeland management should be adjustable to the occurrence of drier than normal conditions by taking into account the relationships between land, water, people and their animals (Schnegg and Bollig, 2016).

The above constraints have forced some pastoralists to change their way of life (Waters-Bayer, 2017). Dynamics of change were found to differ from one pastoral system to another and poverty was found to deepen. Consequently, after several shocks, particularly due to conflicts and climate change (Schilling et al. 2015; De Haan et al. 2016), there is a variety of pathways – unfortunately with limited chances of poverty eradication – for pastoralists to return to productive livestock keeping (Lind et al. 2016). Some of the livelihood options that pastoralists identify include the involvement in trade activities (using their livestock as a commodity in exchange of money), but in market processes they barely have control or influence (Lopez-i-Gelats et al. 2016). Pastoralism contributions to the economy however remain substantial in eastern Africa. To illustrate, Kenya's livestock is worth USD 800 million, while 8.5% of Uganda's GDP is contributed by the livestock sector (De Jode, 2009).

Through several projects and initiatives targeting to assist pastoral communities in the sub-region, there are a number of promising practices for rangeland management. These practices specifically concern fodder bank development and management, grass reseeding and invasive tree species management. The practices may avoid a financial burden if they are associated with other productive activities, such as

sugarcane production providing also fodder for livestock (Chinasho et al. 2017).

Other promising practices concern the development of incentives to promote pastoral communities' participation in rangeland management. The incentives can include participation in controlled charcoal making from invasive trees, such as *Prosopis*, and shrubs that impact negatively on grasslands. Success was observed in involving the communities in the processing of *Prosopis* pods into animal feed and the use of *Prosopis* timber as construction material.

Policy recommendations and conclusion

From the above narratives, it emerges that there are increasing concerns on sustainable management of rangelands for livestock keeping and pastoralism, particularly in the context of climate change and variability in drylands, land use delimitation and political borders. These concerns should not overshadow the fact that livestock and meat export represent invaluable sources of income and livelihoods to some countries in eastern Africa. Taking into account the concerns and benefits of pastoralism, the following recommendations are therefore formulated to enhance sustainable rangeland management:

- Draw lessons from pastoralists' indigenous knowledge and enhance it with scientific knowledge for sustainably managing rangelands;
- Optimize the potential benefits from pastoralism as a climate-resilient livelihood system in drylands;
- Revise policies in order to accommodate pastoralism as one of the efficient livelihood systems that survive under harsh climatic conditions in drylands by, amongst others, effectively considering the governance of rangelands as common property resources;
- Conduct proper land suitability evaluation to determine the carrying capacity of the land for different land uses, in order to sustainably manage rangelands in drylands, particularly balancing stocking rates with vegetation biomass;
- In consideration of the limited understanding of rangeland dynamics, generate location-specific practical knowledge for policy makers in order to address the rising land degradation, food insecurity and conflicts in drylands;
- Support infrastructure development in drylands in order to limit the need to roam in search for water;
- Promote fodder agribusiness as a way to enhance livelihoods and sources of income for both pastoralists and crop producing communities; thus also reducing the risk of conflicts;
- Taking into account changing dynamics, develop and provide opportunities for acceptable alternative livelihoods to those who want to leave pastoralism;
- Promote integrated and flexible approaches to rangeland management that would address the complexity of issues that surround dryland rangelands in Eastern Africa, including issues of socioeconom, political and environmental nature.

The authors conclude that pastoralism will remain a key, and often the dominant, source of livelihoods in arid and semi-arid lands (ASALs) in Eastern Africa and efforts are needed to make it sustainable in all ways.

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Youth perspectives on pastoralism: opportunities and threats faced by young pastoralists

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Summary

Studies with pastoralist youth has found that young pastoralists show a strong identification with their livelihood. They face both increasing opportunities as well as threats. While on the one hand growing recognition of pastoralism and the penetration of technology provide favourable conditions, on the other, loss of resources and exclusion from policy dialogues deter them from a future in pastoralism.

This article looks at the pushes and pulls faced by pastoral youth with the aim of reflecting some of their views and needs. It calls for greater recognition of the role of pastoral youth in the development of the livelihood. It recommends greater engagement with pastoral youth, and attention to addressing youth concerns to secure the future of pastoralism.

Introduction

Pastoral youth today stand at the intersection of opposing worlds – urban versus rural, wage labour versus subsistence labour, statutory versus customary, and so on. They face both increasing opportunities as well as threats. While on the one hand growing recognition of pastoralism and the penetration of technology provide favourable conditions, on the other, loss of resources and exclusion from policy dialogues deter them from a future in pastoralism. Despite their importance to the long-term sustenance of pastoralism, the voice of pastoral youth remains unheard. This article looks at the pushes and pulls faced by pastoral

youth with the aim of reflecting some of their views and needs. By articulating these views, the article alerts us to the need to integrate young people's perspective into policy dialogue. The article is organized as follows: the second section looks at some of the challenges faced by pastoral youth, the third section offers some positive developments to address these challenges, and the fourth and final section reiterates the need for closer attention to youth perspectives in policy making.

Challenges faced by pastoralist youth

Studies with pastoralist youth in Kenya has found that young pastoralists show a strong identification with their livelihood, and many want to go on with herding in the future, at least on a part-time basis (Archambault, 2014; Pickmeier, 2014). Yet, they have been increasingly diversifying their income sources, or abandoning pastoralism altogether. This can be attributed to the innumerable challenges pastoral youth have been facing – from the lack of adapted social services, such as schooling, health provision and financial inclusion, to loss of resources, and greater market barriers.

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Services such as education, healthcare, and banking have only recently adapted to the mobile lifestyle of pastoralists. Lack of these services in the past has added to the negative perception of pastoralists as primitive and backward. Studying Maasai pastoralists in Tanzania, Munishi (2013) shows that young pastoralists migrate to urban centres in search of wage labour, seen as more modern, lucrative and dignified, but they often return dejected and rejected. They are disadvantaged in many ways owing to their cultural, social, economic and political marginalisation since colonial times (ibid.).



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Public programmes exclude pastoral youth due to their lack of education. Apalokinei Lokut, a pastoralist youth from Lomeris Kaabong, Uganda says, "If the government also targeted uneducated youth to benefit from youth programmes then they would develop out of the black environment." By saying so he expresses disappointment with the government for privileging those youth who can write on "white paper."

While livelihood opportunities outside of pastoralism remain limited due to the lack of adapted services, pastoralists have been facing increasing pressures on their resources from conservation efforts, climate related shocks, conflict, and privatization of communal rangelands. Privatization of rangelands is promoted as an efficient and productive way of managing resources. Additionally, large scale land acquisition for commercial agriculture and industry also leads to the privatization and enclosure of grasslands. Historical and cultural conceptualizations of the child as incompetent and an assumption that young people lack interest in tenure matters has contributed to a view that their participation in land planning is unnecessary (Francis and Lorenzo, 2002; Knowles-Yanez, 2005). Therefore young people not only feel vulnerable to the loss of common pastures for herding their livestock, but also a loss of personal property due to a lack of agency in decision making about resources for their future. But as Archambault (2014) has shown not only are they competent, interested, and invested, they also bring to the table a whole series of issues that do not feature prominently in the experiences of adults and so are rarely integrated in planning.

Opportunities for pastoralist youth

Education and technology provide two important opportunities for pastoralist youth to adapt pastoralism to the changing times.

Education services have been extended with the growing recognition of pastoral systems and mobility. For example, Kenya established a Policy Framework for Nomadic Education in 2010 and set up a National Council for Nomadic Education in 2012 (Unicef, 2015). While some elders fear, and not without reason, that education will drive youth out of pastoralism, others highlight the role of education in enabling pastoral youth to adopt new technologies and methods to enhance livestock rearing, as well as to better advocate for their rights. They reiterate the need to develop a curriculum with topics relevant for pastoralism.

Vocational training also provides important opportunities for youth to contribute to pastoralism and to supplement their income through animal based industries such as cheese making or as community based animal health workers (CBAHWS). Recently, 60 Fulani youth were trained in artificial insemination in Nigeria (PM News, 2017). Initiatives such as youth livelihood programmes and agro-pastoral field schools allow youth to incorporate modern and scientific methods into their livelihood.

Allied to these education and training initiatives is the role of pastoralist youth in conflict mitigation and resolution. Through schooling, and groups such as youth animal health workers association, young pastoralists have been interacting with other pastoral and farming communities. For example, pastoral youth in the Tana Delta area of Kenya referred to their farming counterparts as "close friends" and even as "brothers and sisters," even while older generations fostered negative feelings towards each other (Pickmeier, 2014). This helps to mitigate conflict situations, as each party is able to understand the other better (ibid.). Other youth initiatives such as peace caravans in Kenya (Okumu, 2013) have been significant to conflict management. Conflict undermines adaptation strategies and pastoralism altogether, therefore by working for conflict resolution the youth promote sustainable pastoralism.

The penetration of technology, including computer electronics and information and communications technologies (ICT), in pastoral areas has opened up new avenues for innovation and adaptation that pastoralist youth can capitalize on. Satellite technology promotes pastoral resilience through early warning systems that caution against upcoming climate shocks. Satellite-generated data and GIS maps have proved to be useful tools for pastoralists to monitor forage quality, water availability,

fire hazards, and infrastructure development, and thereby improve their resource management practices (Bayer and Bayer, 2016).

Communication through mobile technology can be used to access pasture, water, veterinary services, market and security. It provides safeguards against the vagaries of nature and market by closing information gaps. For example, a study in Kenya found that 93% of Maasai herders rely on cellphones for some aspect of pastoral work (Butt, 2015). Mobile banking provides a safe saving mechanism for those who cannot access conventional financial services. M-Pesa, an electronic money-transfer system, has more subscribers and transfers more money than do all Kenyan commercial banks together (Reinke and Speradini, 2012).

Information access enabled by technology allows pastoralists to keep informed, to better organize themselves and be represented in policy processes. But technology also has its limitations; rangelands often have unreliable network, lack electricity and also vendors to buy airtime. Innovations such as solar powered cellular charges allow pastoral youth to remain connected even while migrating. Governments should make greater efforts to develop infrastructure to support the telecommunication of pastoralists.

How can we better support pastoral youth?

The Africa Economic Outlook 2016, predicts that the population of Africans in the age group of 15 - 35 will double to over 830 million by 2050. The current median age of the African population is 19.5, and it is expected to remain below 25 in the near future. A significant proportion of this is pastoral youth, who are especially vulnerable to drought, disease and political marginalization. Pastoral youth have the potential to contribute meaningfully to the development of the livelihood, and integrate it within a changing socio-economic milieu. Yet young people's perspective and experiences have been neglected in programme and policy formulation, as well as in academic research.

Youth play a significant role in maintaining pastoral lifestyles. While young men and boys herd livestock, young girls contribute to several household activities. Therefore, the youth envision inclusive decision making, where they can participate meaningfully in policy dialogue. They believe that pro-pastoral policies are key to the future of pastoralism, especially when it comes to resource allocation. Additionally, adapted social services such as health and education, and technological advancement can further support pastoralism.

There is increasing policy advocacy in support of pastoral systems by the international community. Attempts must also be made to create local platforms where pastoral youth can have their voices heard and express their vision for pastoralism. More civic education at the grassroots is required to increase awareness of existing legislations and policies that protect pastoral interests.

In summary, this article has provided a brief overview of the challenges and opportunities facing young pastoralists today. It calls for greater recognition of the role of pastoral youth in the development of their livelihoods. It recommends greater engagement with pastoral youth, and attention to addressing youth concerns to secure the future of pastoralism. Pastoral youth must be included within decision-making processes and encouraged to express their views. Bringing youth perspectives into policy making will deepen our understanding of the various pressures faced by pastoralists, and enable more socially equitable outcomes.

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Land tenure system in pastoralist societies: findings of a study tour to Peru

Diida Karayu¹



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The author participated in a study tour to Peru (November 6-15th 2016). The tour was organized by Evidence and Lessons from Latin America (ELLA). Twelve learners from among a team who did online study on land tenure systems in pastoralist societies that preceded the tour were sponsored for the study tour. The ELLA programme is a South-South knowledge exchange and learning programme that seeks to inspire development policies and practices grounded in evidence on what works in varied country contexts. Practical Action supported two research organizations, namely Tegemeo Institute in Kenya and Group for the Analysis of Development (GRADE) in South America to design the ELLA online training curriculum, moderate the training and organize a study tour. The learning alliance had over 100 people around the globe as participants in the online learning, out of which 12 were selected to participate in the study tour. The tour was a good learning opportunity for me both as a Kenyan pastoralist and as a practitioner in pastoralists' livelihoods development.

Despite differences in environmental conditions, animal species and other, Andean pastoralists have mobility as common key feature shared with other pastoralists. The most common livestock kept by Andean Altiplano pastoralists are four families of Camelids namely alpaca, llama, guanaco and vicunya, while the pastoralists from Northern Kenya keep cattle, camels, goats and sheep. In the case of Peruvian Altiplano alpaca and llama are domestic animals while guanaco and vicunya are wild camelids.

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Below is a summary of the learning outcome from the study tour:



Llama and Alpaca in a Kraal

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1) Land tenure system in Peru

The land tenure system of the Peruvian Altiplano tends to favour individual land holding as opposed to communal land holding. Individuals/families seem to have a form of land allotment document showing ownership of land. The land is divided into parcels, where each family has the right to use their own land plot and transfer it to heirs as family inheritance. However, as a result of massive land use, serious land degradation occurs. The sharp deterioration of pastures as a result of climate variability, combined with the large increase in numbers of alpacas, intensified the problems of overgrazing in Caylloma. The deterioration of pastures from overgrazing caused conflicts between members of the condominiums as this was put down to some members having more animals than the rest, thereby jeopardising the sustainability of the natural resources. However, the successful families' coping mechanisms to counter land degradation are by (i) parcelling the land into paddocks where alpaca can graze on by rotation and (ii) herd management. Surplus animals are either sold or the owner can buy grazing rights from neighbours with lower quotas. We were told that they are able to use the letter from the government as collateral for accessing credit facilities. The local community and the government in Peru respects private ownership of land and property.

In the case of Northern Kenya, pastoralists still live in a customary land tenure system where they roam freely from one place to another in search of water and pasture for their herds. Mobility is a key strategy for using dryland resources for livestock production. However, mobility restrictions caused by droughts and climate variability have reduced pastoralists' access to areas with dry-season forage reserves. Traditionally pasture-management regimes were based on alternative use of wet- and dry-season grazing areas. This has now changed due to global change phenomenon and climate variations, leading to excessive concentration of livestock and overuse of grazing resources and rangeland degradation in certain fallback areas for dry season and wet season grazing.

2) Land use and livestock management

In Peru, there is evidence of sound management of land, even in the context of long term rain failure as witnessed at the time of our visit. The pastoralists in Peru keep alpaca and llama as their main livestock. Each family keeps their livestock on their farm, which is clearly demarcated. There was clear evidence showing that areas occupied by pastoralists in Peru are characterized by a very high altitude landscape, some culminating at 6000 m above sea level. Like many environments around the globe, the area is extremely arid with hardly any trees visible. Extremely cold climate is a main feature of the area. The pastoralists we met, informed us that there are no known tree species that can grow in their area. However, the community we visited are taking good care of the environment they live in. Wildlife like guanaco and vicunya live side by side with the community. Community members are allowed to shear the fibre from wild animals but they are not allowed to harm them. This

policy has minimized human-wildlife conflict and created a good sense of stewardship of the natural resources. The fibre from guanaco and vicunya is softer than that of alpaca and llama and can fetch extremely handsome prices at international markets. Usually shearing of wildlife is done ceremonially during a designated season where the entire community converge and participate in taming and shearing. The motivation behind maintaining the quality of fibre produced, is the high international demand for alpaca fibre, coupled with government and development partners' support for alpaca grazing. Despite the observed differences, pastoralists in both countries, Peru and Kenya, face growing pressures on their land. Individualization of land tenure is a common threat in both countries. In the Kenyan context communal land tenure and common sustainable land use practices are in use. Similarity also exists to some extent in mobility, rotational grazing, genetic improvement and herd size management.



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Wild Guanaco grazing

3) Market orientation of pastoralist production system

In the case of Peruvian pastoralists, livestock is treated as a commodity. Alpaca producers are price thinkers. Commercialization of alpaca fibre is the motivation behind keeping of large herds of alpaca. In comparison, Northern Kenya pastoralists keep livestock as a form of prestige where a person with a big herd of cattle commands high respect in his community. The majority of the Northern Kenya pastoralists only sell animals based on pressing needs which cannot be met without money. Family needs like food, medical bills, school fees and any other family

demands form the basis for selling livestock. In contrast to normal findings and beliefs a report by a High Level Panel of Experts (HLPE, 2016) states that livestock in Northern Kenya plays a crucial economic role in many food systems by providing income, wealth and employment. A common challenge for pastoralists in Peru and Northern Kenya is that they suffer price shocks of their produce while the value of feedstuffs and foodstuffs for livestock keep on escalating beyond their means. Apparently, the extent to which pastoralists are aware and are making use of their livestock products and exploit their yields to the full potential, differs widely between the two regions.

4) External actors' support to pastoralism

In both cases, support by central government is being required by the herders. It appears that governmental support to pastoralists is minimal and when it occurs it may not be in line with the priority of the pastoralists. The new Peruvian government has, for example, recently set up a Department of Livestock at the national level. However, this effort seems to be a little too late as pastoralism in Peru has been practised from time immemorial. Currently they are setting up systems with the aim to effectively serve the pastoralists. In Kenya livestock policies have been in place for a long time, but pastoralists remain marginalized due to failure to implement the policies appropriately and effectively.

Marginalization in form of rural abandonment, poor infrastructure, misplaced investments, low educational investments and poor planning for pastoral production is dragging the development of pastoral areas behind. Policies have a huge influence on the lives and livelihoods of the pastoralists, and wrong policies in the past have contributed to loss of lives and livelihoods and subjecting the pastoralists to abject poverty. Where the government or the international community intentionally and appropriately invest in the pastoral production system, a good result is usually seen.

5) Coping with environmental degradation

Intensive livestock keeping face environmental challenges resulting from land and water use affected by soil degradation and air pollution. Globally, the harm to human and animal health which is created by antimicrobial resistance, the emergence of new diseases and the social consequences of intensification are common physiognomies of pastoralists' areas. The pastoralist production model in Caylloma in Peru, the province we visited, adapts very well to the environment. Farms have protected springs where alpaca can get water. Virtually all the farms on which Alpaca are kept, were fenced. The financial support for fencing and spring protection was mainly made available from Desco, a local nongovernmental organization. The breed of livestock (alpaca and llama) is carefully selected to ensure production of high quality fibre. The offspring of the animal being kept are also selected for resistance to drought and diseases. All the pastoralist herders are aware of how to do proper breeding of livestock. It seems that Desco has built the capacity of pastoralists to the fullest to the extent that they have minimal need for the services of trained veterinarians. Desco has veterinarians that provide support and transfer knowledge to the communities. Maybe this is a good lesson for Kenya and other countries with pastoralist production systems where efficient veterinarian infrastructure does not exist presently.

6) The role of women in livestock production

In Peru feminization of livestock production was evident. Women seem to have a great say in alpaca rearing. They are

also highly skilled in working with fibre. These skills have been around for a very long time and passed down from the generation to generation. The women make clothes and ornaments from alpaca fibre, which they sell in the local markets. Both tourists and the local community buy these items, which are relatively cheap compared to the very expensive products from factories. The fibre products are highly popular in the international markets. The huge cash factories target international markets for their products and act like a monopoly. It looks like the youth and children in Peru have left to cities in search of jobs and education. Many of the families visited, informed us that their children have left. This has left the elderly to look after the livestock. Women are the key livestock herders in the Peruvian case. They also have a say in livestock management and sell. In Kenya the role of keeping livestock is for both genders but men are more engaged as women are a lot engaged in numerous domestic chores. Men have a greater say on livestock management and marketing. School going age children who are not enrolled in school are also commonly engaged in livestock herding. Pastoralist school children also provide support in livestock chores during the weekends and over the school holiday.

It is assumed that Pastoralist communities seldom benefit in an adequate way from development efforts in respect to formal education and training. Formal literacy and practical skills not only help to them adapt their pastoral system to new conditions, but also to provide communities with alternative sources of income to improve their livelihoods. I do not know the benefits the government of Peru gives to enable all children in Peru to access education, but in Kenya public primary school is free and compulsory. However, to enforce a compulsory education policy in a pastoralist areas still remains a major challenge.

Conclusion

Despite the difference in landscape and environment, there are a lot of similarities between Peruvian pastoralists and their Kenyan counterparts. Firstly, in both countries pastoralists inhabit extensive rangelands characterized by arid and semi-arid nature which are either extremely cold like in Peru or extremely hot like in Kenya. In both cases pastoralist production is the most viable option for managing arid rangelands. Pastoralists have massive land areas available.

Secondly, Kenya can learn a lot from Peru in terms of commercialization of livestock. Since livestock products like meat, milk, hides and skin are very popular in the international markets, pastoralists need to take advantage of it. In the same way the Peruvian pastoralists are concerned with quality of fibre they produce, Kenyan pastoralists should also be concerned with the quality of livestock products demanded in the markets.

Thirdly, labour for maintaining livestock in the rangelands seems to be diminishing due to globalization and younger generation enrolling in school. Also rural-urban migrated has contributed to reduced availability of livestock labour. There is a need to seriously think about an alternative to traditional nomadic pastoralism.

Finally, there is a need for the pastoralists to know their rights as citizens and demand these from their respective governments. This will make the government of the day to invest more in the development projects that can support the pastoralists.

The future of pastoralism lies in the vast unexploited lands which may have minerals and other resources that have the potential to grow the economy of a country. The vast arid lands have not been fully exploited by the government due to poor terrain and harsh conditions that characterize arid lands.



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A herd of Alpaca crossing a road to the grazing field.

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The young Herder taking livestock back to the kraal after long day grazing in Eastern Africa.

Effect of traditional rangeland management practices on vegetation structure and above ground biomass in East African semiarid rangelands

Negasa G. Bikila¹ and Zewdu K. Tessema²



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Summary

An investigation was made into vegetation structure and aboveground herbaceous biomass and browse yields in the Borana rangelands of southern Ethiopia. Sampling through random allocation of quadrats within replicated sample plots was undertaken in communally grazed areas, grazing enclosures that were enclosed for 20 years but have been grazed only during dry seasons and rangelands managed by prescribed fire for five years and grazed only post-fire during dry seasons. A total of 57 herbaceous species (24 grasses and 33 non-grasses) and 39 woody species (12 trees and 27 shrubs) were identified. Of the 24 grass species identified, 16.7% were highly desirable, 62.5% desirable and 20.8% less desirable by grazers. Biomass of both trees and shrubs was significantly higher ($p < 0.001$) in grazing enclosures than in other treatments, whereas herbaceous vegetation biomass was higher, but not significantly so, in prescribed fire managed rangeland units. We conclude that in the absence of fire, the increasing prevalence of enclosures in Borana pastoralist systems may be encouraging the proliferation of woody shrubs and trees at the expense of more desirable pasture species.

Introduction

Rangeland ecosystems provide multiple ecosystem services, including forage provision for wild and domestic herbivores (Eldridge and Delgado-Baquerizo 2016; Havstad et al. 2007). Rangeland ecosystems are generally considered vulnerable and sensitive to the pressures of anthropological effects that can have major impacts on vegetation structure and aboveground biomass (Bradley et al. 2006). Vegetation structure is also influenced by the pressure of grazing, browsing and fire regimes in rangeland ecosystems (Moussa et al. 2009). Although some studies on vegetation structure, as a whole, have been conducted in Borana rangelands (Gemedo et al. 2006a; Angassa and Oba 2010; Angassa et al. 2012; Bikila et al. 2014, 2016), information on vegetation structure and species diversity as well as aboveground biomass of both herbaceous and browse species under different traditional rangeland management practices is lacking.

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This study examined both herbaceous and woody vegetation structure, as well as aboveground herbaceous biomass and browse yield potentials under three traditional rangeland management practices:

- (i) rangelands enclosed for about 20 years as dry season grazing that have been grazed only during dry seasons;
- (ii) rangelands managed by prescribed fire for more than five years and that have been grazed only during dry seasons after fire application, and;
- (iii) communally owned grazing areas in Borana rangelands of southern Ethiopia.

Materials and methods

The study was carried out in Yabello district of the Borana zone, southern Ethiopia (Figure 1). Yabello district was selected because it is an area where different traditional rangeland management practices are known to exist. A sampling plot of 30 m x 40 m was used and replicated four times, within each of the three traditional rangeland management practices.

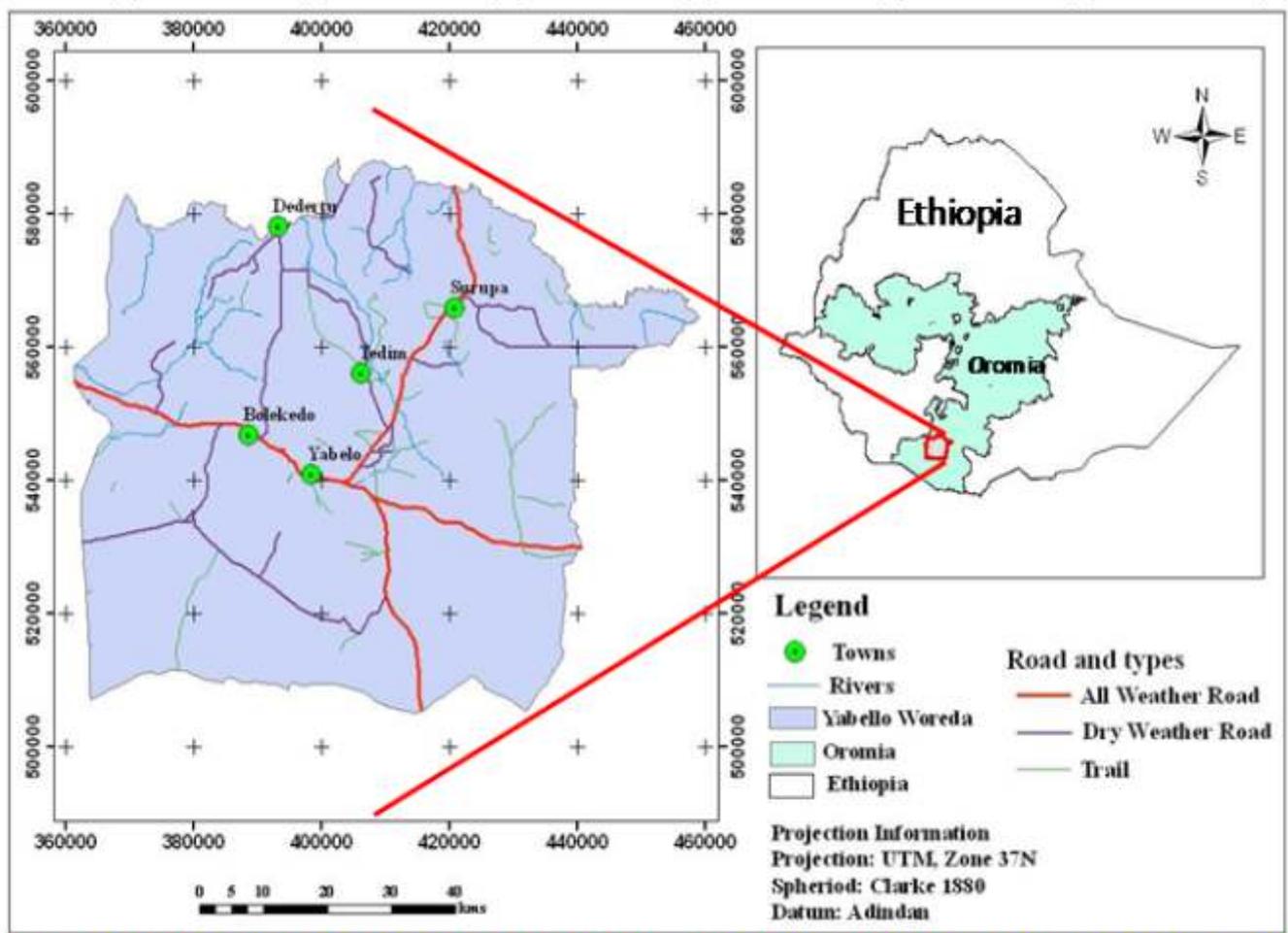


Figure 1: Map of the study area, Yabello district of Borana rangelands, southern Ethiopia

All data on herbaceous and woody species composition, number of individual plants, aboveground herbaceous and woody biomass, were collected immediately after the main rainy season when herbaceous vegetation is at its peak of biomass production and species are most easily identified (Bikila et al. 2016) as shown in Figure 2

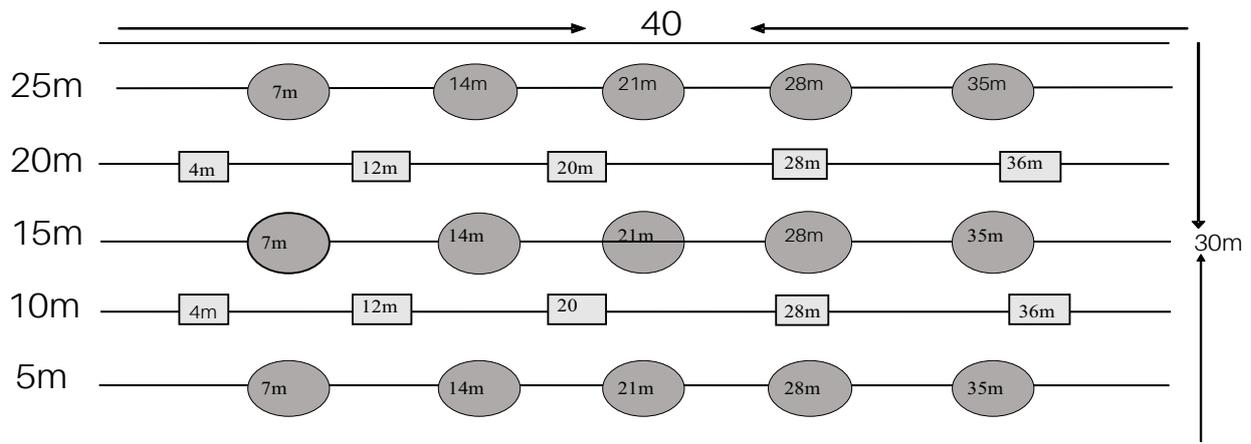


Figure 2: Field plot layout of the experimental site (key: Transects at 5 m, 15 m and 25 m were allotted for tree/shrub sampling (the larger circles in the figure) and the rest (10 m and 20 m transects) for herbaceous and litter sampling (the rectangles). Plot orientation was set in such a way that the 30 m side of the plot runs from east to west or vice versa and the 40m side of the plot runs from north to south or vice versa to make all the plots arrangement uniform). Note that this design was laid for one plot as a sample and the same fashion was followed for the rest of all the total plots.

Results

A total of 57 herbaceous species was recorded, of which communally grazed areas, grazing enclosures and prescribed fire managed rangeland areas had 39, 40 and 43, respectively. The number of grass species recorded was higher in prescribed fire managed rangeland areas than in grazing enclosures and communally grazed areas. The number of desirable and highly desirable (by grazers) herbaceous species was greater in prescribed fire managed rangeland areas than in other rangeland management types. A total of 39 woody species was recorded, of which 27 (69.2%) and 12 (30.8%) were shrub and tree species, respectively. A significant difference ($P < 0.05$) was observed among the three rangeland management practices for grass biomass and basal cover (Tables 1 and 2).

Table 1: Aboveground biomass yield (Mean \pm SEM in DM tha^{-1}) across the three traditional rangeland management practices in Borana, southern Ethiopia

Parameters	Traditional rangeland management practices		
	Communal grazing	Enclosure	Prescribed fire
Tree biomass	20.43 \pm 1.13 ^b	115.11 \pm 4.06 ^a	17.25 \pm 5.7 ^b
Shrub biomass	3.99 \pm 0.54 ^b	5.74 \pm 0.79 ^a	0.85 \pm 0.08 ^c
Grass biomass	0.29 \pm 0.06 ^b	0.83 \pm 0.16 ^{ab}	1.22 \pm 0.19 ^a
Non-grass biomass	0.55 \pm 0.12 ^a	0.69 \pm 0.13 ^a	0.89 \pm 0.10 ^a
Litter biomass	0.59 \pm 0.09 ^a	0.73 \pm 0.04 ^a	0.92 \pm 0.26 ^a
Dead standing/ tree/shrub biomass	0.44 \pm 0.14 ^a	0.01 \pm 0.00 ^a	0.08 \pm 0.01 ^a

Means within rows with similar superscripts are not significantly different at $P \leq 0.05$; SEM = standard error of the mean

Table 2: Species density and frequency (Mean \pm SEM) across the rangeland management practices

Vegetation variables	Traditional rangeland management practices		
	Communal grazing areas	Grazing Enclosures	Prescribed fire managed rangelands
Herbaceous species density ha^{-1}	27732 \pm 1180 ^b	32300 \pm 966 ^{ab}	43643 \pm 1464 ^a
Herbaceous species frequency (%)	19.34 \pm 0.36 ^a	18.17 \pm 0.51 ^a	20.18 \pm 1.3 ^a
Basal cover (%)	23.48 \pm 4.58 ^c	40.5 \pm 1.73 ^b	53.35 \pm 2.47 ^a
Tree and shrub density ha^{-1}	4635 \pm 712 ^a	6819 \pm 397 ^a	4658 \pm 998 ^a
Tree and shrub frequency (%)	80.94 \pm 1.73 ^a	88.36 \pm 1.23 ^a	81.44 \pm 4.53 ^a

Means within rows with similar superscripts are not significantly different at $P \leq 0.05$; SEM = standard error of the mean

Tree and shrub biomass was highly significantly ($P < 0.001$) greater in enclosures than under the other two rangeland management practices. The rangeland units managed by prescribed fire had a higher dead litter biomass compared with other traditional rangeland management practices. The biomass yield of dead standing trees/shrubs showed an opposite trend compared to the biomass yield of grass, non-grass and dead litter across the three traditional rangeland management systems (Table 1).

Discussion

In the present study, of the total herbaceous species identified, grass species contributed about 42.1%, and the proportion of highly desirable (to grazers) grass species was lower than desirable and less desirable herbaceous species. The proportion of desirable grass species was higher in the prescribed fire managed rangeland areas than in the other rangeland management practices, which might be due to the effect of fire in destroying noxious shrub species that suppresses the growth of grass species through their canopies. The overall density of highly desirable (by browsers) woody species was higher in communally grazed areas than other rangeland types, which might be due to the fact that communally grazed areas support heavy grazing that eventually favors the growth of many browse species (Herlocker et al. 1999). The higher composition of grasses (i.e. both perennial and annual grasses) and other herbaceous vegetation under prescribed fire managed rangeland units than in the others might be attributed to the reduced competition for light, nutrient and water as a result of suppression of shrub vegetation by fire which favors the growth of herbaceous species particularly grasses. This

finding is in agreement with the result of Scott et al. (2009) who reported that herbaceous species richness was 3.4 times greater at a 1- m² area and 26% greater at a 100- m² area in the burned area compared to the unburned area.

Of the total trees recorded, *Vachellia tortilis* and *V. nilotica* are among the most important fodder trees in Borana rangelands of southern Ethiopia, since they are evergreen and produce green shoots and leaves even during dry seasons. According to previous studies (Coppock 1994; Herlocker et al. 1999; Gemedo et al. 2006b), woody species are an important source of food, fodder, fuel wood, medicine, fiber and gum. However, *V. drepanolobium* and *V. mellifera* were among the encroaching shrub species in grazing enclosures that have a negative effect on understory grasses, which is in accord with the previous study of Angassa and Oba (2010).

The lower grass biomass in communally grazed areas compared to grazing enclosure and prescribed managed fire rangeland sites in the present study might be due to the presence of continuous grazing and trampling by huge pastoral livestock numbers, leading to the deterioration of the grass layer, which is in agreement with Tessema et al. (2011). In contrast, the higher grass biomass in rangeland units managed by prescribed fire than in the others might be attributed to the less grazing pressure, and greater basal cover of herbaceous vegetation, as well as the recruitments of herbaceous species as a result of the suppression of tree and/or shrub species due to the effect of fire. This finding is in accord with the previous findings by Bikila et al. (2014) and Rau (2011).



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The higher biomass yield of trees and shrubs in the grazing enclosures could be attributed to the higher tree density in enclosures than in the other types of rangeland management practices. Similarly, Bradd Witt (2011) reported that aboveground woody biomass increases with the exclusion of grazing due to the regeneration of tree and shrub species.

Conclusions

Rangelands have a potential to form a principal component in the mitigation of global warming and adaptation to climate change. Estimation of the rangeland biomass yield will enable to assess the amount of biomass loss during degradation/deforestation or the amount of biomass that a rangeland can store when rangelands are managed and utilized properly. Therefore, sustainable future use of the Borana rangelands, will require paying greater attention to balancing the use of grazing enclosures, for ensuring forage accumulation in the shorter term with the re-introduction of prescribed fire when necessary in order to control expansion of bush cover, while supporting abundance of palatable herbaceous grazing species over the longer term. Furthermore, indigenous practices such as grazing enclosures and the use of prescribed fire to control bush encroachment and increase forage quality and quantity can be considered both as an adaptation mechanisms to climate change and mitigation measures.

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Resilient pastoralism: towards sustainable futures in Kenyan rangelands

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Summary

This article focuses on resilience in contemporary pastoralist societies, with a particular focus on Kenya. It draws on emergent results from an ongoing, interdisciplinary research project 'Resilient Pastoralism: Towards Sustainable Futures in Rangelands', funded by the UK Global Challenges Research Fund (GCRF). Results from the initial desk-based study, in-country workshops and fieldwork highlight the contested nature and meanings of 'resilience', and its function as a "boundary object". Our study confirmed other findings that, despite widespread representation to the contrary, resilience as maintenance or restoration of particular conditions was not automatically to be desired by local informants. In contrast to prevalent apolitical and normative notions of resilience, the study also highlighted the importance of locally-grounded, cultural and aspirational meanings of resilience. In particular we highlight how new remote sensing datasets, together with local understandings and 'resilience stories', grounded in place-based environmental histories, may together produce more locally meaningful understandings of the concept. These understandings point to pastoralists' data needs and livelihood aspirations in the future, thus supporting policy intervention and uptake.

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Introduction

With contemporary pastoralism underpinning the livelihoods of some 500 million people worldwide, typically in marginal dryland environments highly susceptible to climate change, and often including the most vulnerable communities, work to understand and unpack pastoral resilience is both vital and timely. Enhanced understandings of pastoral livelihoods and resilience are also central to contemporary global development priorities, as emphasised by the UNEA (2016) resolution on sustainable pastoralism and by donors' positioning of contemporary pastoralism as essential to the achievement of Africa 2063 and UN 2030 Development Agendas (FAO, 2016). The UK GCRF 'Building Resilience' funding stream, which supports our 'Resilient Pastoralism' project, defines resilience according to the Sendai Framework for Disaster Risk Reduction (2015), namely "The ability of a system, community or society exposed to hazards to resist, absorb, accommodate and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions." This widely used definition indicates the importance of both environmental and social aspects of resilience, and reflects increasing emphasis on socio-ecological systems (SES) in resilience thinking. Nonetheless, and despite the growing dominance of 'resilience' as a goal and organising concept in rural development planning and interventions, important critiques of both the concept and its implementation remain.

Specifically, despite notable work on issues of resilience in African drylands and amongst pastoralist communities (e.g. Lind et al., 2016), there remain significant gaps in the understanding of how socio-ecological resilience may be best supported and facilitated. One of the key challenges remains providing sufficiently detailed, regular and meaningful information on the rangeland environment to enable pastoralists to better assess environmental hazards and to support diverse, resilient responses to these. A lack of attention to the cultural meanings of and local aspirations towards 'resilience' further constrains realisation of its locally desirable manifestations.

It is these concerns that inform the ongoing 'Resilient Pastoralism: Towards Sustainable Futures in Rangelands' project (RP) (2016-17). Specifically, in this project we, as an international interdisciplinary team and the authors of this paper, seek to understand diverse stakeholder/ cultural meanings of 'resilience' through work with pastoralist communities in two case study areas, Narok district, Kenya and Gov-Sumber, Mongolia. We also aim to assess pastoralist information requirements in relation to risk management and realisation of locally meaningful forms of resilience; to examine uptake of results from previous resilience-oriented donor projects; and to identify barriers to uptake. Finally, we are exploring ways in which new datasets, and innovative methods and approaches can contribute to

meeting pastoralists' information requirements and enhance policy support in the future. These new datasets include remote sensing (RS) (satellite imagery) data from the European Copernicus Sentinel series of satellites, which are able to provide more spatially explicit information for example on pasture condition and water over wide areas than previous satellite RS systems. We expect that these new datasets will be particularly powerful when used in conjunction with an appreciation of cultural meanings, norms and priorities around resilience.

In Kenya the rationale for this work reflects the demand for enhanced understanding of pastoral resilience, as evident in recent policy initiatives for development in the drylands, and given that the pastoral sector is also clearly positioned as integral to realisation of national development goals through Vision 2030. This paper summarises some preliminary results of our work in Kenya to date.

Materials and Methods

It is important to note that the GCRF 'Building Resilience' funding stream is not about large scale fieldwork, but is a 9 month foundation building call, focused on the development of interdisciplinary teams, methods and the exploration of new ideas and approaches to resilience. These considerations inform our methods and approaches. Specifically, we first reviewed existing (published and grey) literature and frameworks on pastoral resilience, whose key insights were debated at in-country workshops in Mongolia and Kenya. This was followed by short periods of primary data collection, with methods and approaches reflecting insights from the desk-based study and in-country expert feedback received at workshops. Fieldwork comprised in-depth key informant interviews and focus group discussions (FGDs) with herding households at Enkutoto sub-location, Narok, Kenya; and with county and national level policymakers, as well as with the selected pastoralist communities at the Mongolian case study sites, numbering some 60 interviews overall. These were combined with 'Resilience Stories' of local pastoralists, elicited with PhotoVoice techniques (20 overall). These latter approaches focused explicitly on exploration of local environmental histories, and the ways in which resilience was entangled with, understood and enacted in relation to these over time and place. Remote sensing (RS) data products, for each study area and highlighting variations in environmental conditions over space and time, were brought together with the above in interviews and FGDs, to explore pastoralists' information needs in support of locally meaningful and desirable manifestations of resilience.

¹*Boundary objects' are typically understood as concepts, ideas or entities that are sufficiently flexible to be interpreted differently by diverse actors, according to their interests, whilst being sufficiently robust to enable collaboration or communication between them (Garmendia, E., Apostoloupolou, E., Adams, W., and Bormboudakis, D., 2016).*

Results and Discussion

Our desk-based review and workshops highlighted critical questions around scale, unit or entity in relation to resilience. Whether the focus is on resilient households, pastoral systems, etc. is a strategic and value-laden decision. It has implications for the findings of research and donor projects, not least our own, wherein we focus on household and community scales. Resilience is further discussed as a border or boundary object, which provides links between different actors and approaches, and is sufficiently flexible for each of them to imbue 'resilience' with their own meanings; an understanding which had resonance for our research team and respondents (Bollig, 2014; Lind et al., 2016).

Furthermore, the desk based review and subsequent workshop discussions highlighted how the emphasis in much resilience work on maintenance of a particular condition of a socio-ecological system ignores the fact that this may be undesirable for some (Anderson and Bollig, 2016; Davies et al., 2015). Thus, despite its widespread representation to the contrary, resilience as maintenance or restoration of particular conditions is not automatically to be desired (*ibid*). For example, restoration of aspects of a pastoralist system within which they experience persistent poverty and marginalisation may be undesirable for poorer households, yet could still be deemed 'resilient' under Sendai and other definitions. Such understandings and critiques were reflected in our own fieldwork data wherein resilience aspirations and strategies for some households hinged on movements out of pastoralism, or increasing reliance on wider non-pastoralist networks.

Thus both the ability to be resilient and the desirability of particular forms of resilience are distributed differently amongst diverse social actors, in this case pastoralist individuals and households. A widespread critique in recent literature is the failure of much work to recognise or engage with this, but rather to present resilience in primarily apolitical, technical terms (Simon and Randalls, 2016). Therefore, there is a continuing need to be attentive to power in both defining and enacting resilience and to the costs of 'being resilient' for particular actors and in particular contexts and places, or in other words to 'unpacking the social (and political) in socio-ecological systems' (Bene, 2013; Mullenite, 2016). Weichselgartner and Kelman (2015, 249) specifically warn of the need to avoid developing and imposing 'technical-reductionist' resilience frameworks, in other words frameworks which focus primarily on externally defined quantitative measures of resilience at the expense of attention to local contexts, histories and priorities and to resilience as a process rather than an endpoint. Our project heeds this warning: our early intentions to develop a new 'resilience framework' were soon modified in response to local

feedback, towards a more exploratory, locally grounded approach.

Preliminary data from Narok district suggests that for Maasai respondents, resilience is domesticated and understood through the local concept of 'the back and forth of life'. From a household perspective, it was described as the variations and challenges of life and how one copes with them; for example diseases, rising cost of living, and loss of livestock. Thus, there was a notable difference in the understanding of resilience between households and policy-practitioner respondents. Whereas the latter defined resilience primarily through an environmental lens, pastoralist households spoke about it from a broader perspective of life's challenges – including but moving beyond issues of drought and disease. This was expressed practically in widespread local livelihood diversification into crop farming or households' aspirations to do so in the future – for both food and cash crops, and to enhance food security as an aspect of resilience.

RS data products were perceived by local pastoralists as potentially valuable where these could show water points, pasture for livestock and identify areas for conservation/protection of water catchments, as well as identify seasonal vegetation change. However, most respondents continued to rely on personal experience as their key information source as they attempted to move towards and enact their own visions of resilient futures. In the rare circumstances when they had access to external environmental/ climatic information, respondents insisted on checking this against their own experiences, with such data often overridden by their local, indigenous knowledges and environmental histories.

Conclusion

In summary, it is apparent from the initial stages of this ongoing work that resilience can usefully be conceptualised as a 'boundary object,' imbued by diverse actors with their own meanings. Our analysis is beginning to reveal these different meanings, language and translation effects notwithstanding, and their consequences for policy and practice on the ground. It is further evident that attention must be paid to the ways in which desirability and costs of particular forms of resilience are distributed amongst diverse social actors. Ongoing analysis shows that resilience stories are shaped and constrained by these considerations; which in turn shape prospects for uptake and longevity of policy/donor interventions. Although both pastoralists and policy makers regarded remote sensing data and maps as important tools for livelihood planning and resource utilization, both typically lack not only these data, but also the capacity to fully interpret and utilize them (Fig. 1).



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Figure 1. Dr Charles Recha leading focus group discussion on use of Remote Sensing (RS) images to support pastoral resilience, Narok District, Kenya. ©Richard Ochieng

For households it was also clear that, to support resilience, mapping needed to convey both human and physical aspects of the landscape in order to provide a meaningful, locally relevant representation of their lived environment. Attention must also continue to be paid to the contentious role of mapping in ongoing struggles over land tenure and land loss. Analyses and final outputs from this project are expected to further develop and substantiate these emergent insights.

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Land tenure in pastoralist societies: a personal testimony on experience in Karamoja, Uganda

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Pastoralism and Land Tenure

As I toured across the Karamoja sub-region of Uganda I got strong impressions that the recently won relative peace is under threat from emerging and spreading land and land related conflicts. The Karamoja sub-region is predominantly a pastoralist economy. Pastoralism is an extensive production system practised in the region predetermined by its semi-arid climate. Consequent to the successful disarmament exercise which restored law and order and ushered in an era of relative peace, Karamoja became open to the rest of the world. Following this there has been a rush to explore the region's business potential by local and foreign investors. This turn of events has come at the expense of pastoralists - the original inhabitants of the sub-region. Increasing infrastructural development, trade and commerce in the sub-region have increased the demand for and value of land, which has resulted in land speculation and grabbing. These phenomena are posing a threat to pastoralist livelihoods as increasingly more land is earmarked for agriculture, mining, settlement and conservation.

To decipher the relevance of the aforesaid phenomena, it should be noted that the Ngi'karimojong pastoralists of the area, like other groups of pastoralists, depend on natural resources, that is water and pasture for survival of their cattle, on which they rely to harness their livelihoods. Increasing pressure on land due to establishment of conservation areas and individual acquisition of land has set in the

quandary of survival of pastoralists amidst increasingly more restricted mobility. Illuminating this difficult situation, one of the elders from Jie, Kotido district in a private interaction had this to say:

Karamoja grazing land is diminishing. I have trekked Karamoja. From the west the Acholi community has claimed part of the land; from the southwestern side of Abim the Lango community has done a similar job; in the southern part the Teso communities are claiming our land and from the East the Turkana are pushing us out while the Toposa and Kidepo are squeezing us from the North. Internally Uganda Wildlife Authority (UWA), National Forestry Authority (NFA) and our own children are selling our land to foreign investors for their own benefits. When we request to move into Lango, Teso and Acholi areas in search of water and pasture for our animals, communities and their leaders claim we are out to grab land or steal their animals. Where shall we go then? The cow does not have boundaries and so do I. I look for nothing else but pasture and water. My cow is my wealth, my culture and my life and I follow my animals to where they lead me. Elder Lopeikume Lowari, Kotido District.

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These strong statements from elders hint on realities of pastoralism as an endangered livelihood. It calls for recognition of livelihood security in Karamoja as a demanding venture which requires deliberate integration of indigenous knowledge, experiences and traditional practices into national policies for efficient and effective interventions. It is important to recognize that pastoralists have special but untapped knowledge which enables them to survive in semi-arid ecological zones without causing much harm to the environment. Mobility is a natural mechanism by pastoralists to enhance replenishment of pastures and access reliable sources of water whenever they receive warnings of depletion. Whereas movements take pastoralists away from their homes it should be noted that such occurrences are decisive moves by herders to provide for natural resource renewal. Nutrition wise such mobility is usually intended to enhance productivity of animals as they access fresher and adequate pastures and water such that more milk, meat, blood, butter and related products can be availed to households. In practice far kraals have usually encouraged kraal-home visits to deliver supplies to old men and women, children and girls who stay back home. Pastoralism has enabled the Karimojong to survive and respond to the difficult living conditions which are prevalent in the sub-region. This is not meant to exonerate pastoralism as the only option for the Karimojong. Rather it calls for us to look at what is practicable and give outsiders a lens to look at pastoralism as a livelihood and not just an economic or abstract option.

When relating pastoralism and land tenure in Karamoja so as to underpin the land insecurity debate it is worth mentioning that there are four constitutionally recognized land tenure systems in Uganda: customary (communal), freehold, leasehold and the holding of registered land in perpetuity and having roots in allotment of land pursuant termed as mailo land tenure in Uganda. However, mailo tenure permits the separation of ownership of land from the ownership of developments on land made by lawful or bonafide occupants and the practice is not exploited in Karamoja. Of these; customary tenure is predominant in Karamoja. In recent years, however, land tenure systems in the sub-region are swiftly changing. Individual ownership of land is growing and causing tensions within and between communities. Agriculture and infrastructural developments are limiting the mobility of pastoralists. Karamoja has since time immemorial enjoyed communal land management provided for under customary tenure in the laws of Uganda. In practice communal land management involved clan leaders [elders] taking the responsibility of protecting, managing and allocating land among clan and community members. Communal land was usually divided into: grazing land mainly made up of rangelands with water holdings and forages like grass and trees; land for settlement, usually in rocky and mountainous areas; and land for subsistence agriculture mainly for growing cereals like sorghum, millet, bulrush and vegetables. Boundaries were respected even without formal land registration while traditionally set dos and don'ts provided for access to vital resources. Use of land,

water, grass, trees and salt licks was regulated to avoid degradation. However, use of land by pastoralists as common resource has increasingly come under pressure. Universal access has been constrained by individual registration of land. To the pastoralist, however, land ownership is not the main challenge to their livelihood, but rather denial of access to water and pasture, which can be as troublesome as any other man-made disaster.

Linking the pastoralist and land tenure debate to the policy framework in Uganda, the obvious findings are that a number of policies in the country have been developed with little or no consultation with pastoralist communities. A case in point is the "Draft Pastoralism and Rangeland Management Policy" with a pastoral code which was a result of consultations conducted in 2006/7 all over Uganda, but excluding Karamoja and some parts of northern Uganda due to insecurity which stalled the experts from accessing the regions. It was only in 2010, when the Ministry of Agriculture Animal Husbandry and Fisheries (MAAIF) reviewed the policy, that stakeholders from Karamoja and the greater North were included for participation and a number of gaps were identified, ranging from rangeland access rights, transboundary issues and ecosystem restoration. However, after the review by the ministry and stakeholders the policy continues to be shelved for eight years from 2010 to date still as a draft. With this policy still shelved as a draft by the ministry, the question remains 'why are experts and policy makers reluctant to put in place a policy that caters for pastoralist communities?' and 'why is pastoralism viewed as a threat to development by state actors and investors?' The answers to these questions will have to be explained by our local political representatives and technical staff working for the betterment of pastoralists livelihoods in the region and the country.

On the 24th May, 2017 I traveled to Loyoro sub-county to facilitate local land use planning with Dodoth, Jie and Loyoro pastoralists. After work I took some time to discuss what it means to be landless with Lokuda Albino, a herder of Loyoro, and this is what he had to say:

"Land is the source of our livelihoods as pastoralists; we live on land together with our livestock. Land is a home and a carrier of all we need in Karamoja. It carries water, pasture, honey, fruits, and wild game. So when they take away our land where shall we go, to the mountains or airspace? If there is grass growing on space we would not think of struggling on earth."

With this in mind, I recalled the catchy advocacy words used by the people of Kautakou of Moroto and Napak "Take anything but leave our land", a phrase now used by Karamoja Development Forum to advocate for pastoralists' land rights. Worth noting is that every time we lose land and a herder we lose vital information about land, pastoralism and nature. Karimojong pastoralists do recognize that land ownership and management is changing, but at their expense.



Herding cattle in Kagera river basin which spans Burundi, Rwanda, Uganda and Tanzania

During interactions with our visitors from Tegemeo Institute of Agricultural Policy and Development [on 13th April 2017], Nangi Joseph, a kraal leader of Loyoro sub-county, informed us that land in the pastoralist corridors of Loyoro and Kaabong and other prominent grazing areas by the 1950s was under the management and supervision of elders. Grazing areas like Kapeta and Morukoyan were used for dry season grazing. Grazing plans and movement decisions were made by elders and implemented by shepherds. Joseph reiterated that it was in 1998 that their cattle were denied access to fresher pastures and waters as Uganda Wildlife Authority (UWA) and National Forest Authority (NFA) earmarked grasslands for wildlife conservation and forest reserves. These developments meant livelihood insecurity by limiting the mobility of pastoralists. But pastoralism of today in Karamoja has gradually changed including the land use practices and social settings. There are now various policy changes within the context of pastoralism in Uganda, with some of the changes including school enrolments increasing, more settlements developing, and livestock markets established, both locally and across border.

Correspondingly, during a land rights based meeting organized by Dodoth Agro-Pastoral Development Organization (DADO) in March 2017 in Kaabong district, a local government official clearly pointed out that pastoralists' and farmers' rights to land were insecure all over Uganda. He explained that conflicts were on the rise between land owners and users and that land governance had become increasingly challenging. These add on to the fact that pastoralists in Karamoja are finding it difficult to access water and pastures; grazing areas are diminishing

and consequently land degradation has emanated from overgrazing. Discussing land insecurity and vital natural resources is not a matter of Karimojong pastoralists only. There are other ethnic groups in Uganda like the Basongora in Kasese who have been pushed out of their land by Bakonzo agriculturalists. Encounters between pastoralists and agriculturalists have been conflictual and in some cases violent interfaces involving heavy loss of lives and property have been registered. Examples include clashes in Ntungamo and Nyabushozi. In Karamoja communities in and around conservation areas like the Ngi'porein of Dodoth west struggle to reclaim grazing areas from the Lolelia, Kacheri and Morungole groups. In Kabarole violent conflicts have been reported between pastoralists and farmers (Owaraga, 2015).

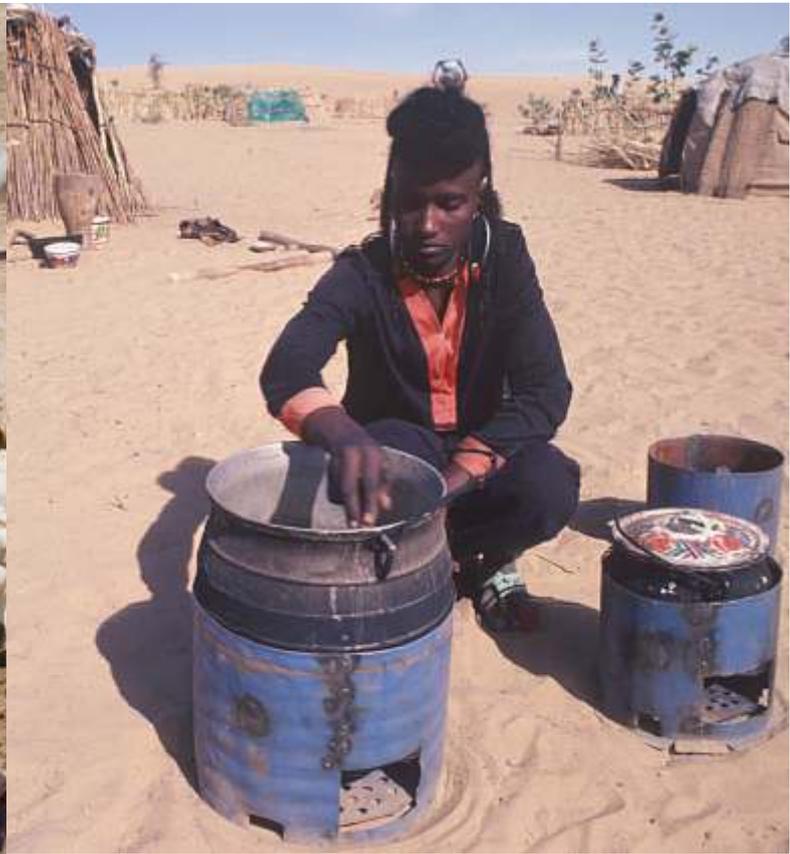
With the adversely changing climate and unsupportive policies 'What do Ngi'karimojong think about their pastoral livelihoods in the next 50 years?' This question can find answers from examples of countries and civil society networks that are calling for the United Nations to recognize pastoralists' societies. This opportunity lies in the "International Year of Rangelands and Pastoralism 2021." We can join hands to advocate for our day, our rights and our lives as pastoralists.

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The changing roles of women in pastoral areas of Somaliland

Sadia Musse Ahmed¹



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Goats and cattle are brought to this watering hole dug from a dried river bed.

Cooking outside on portable stove in Sahel/Sahara

Summary

With recurrent droughts, environmental degradation, competition over resources, lack of legal and social protection and dwindling economies, women in pastoral communities of Somaliland are forced to step to the fore and help their communities to pick up the pieces. The women become engaged in different enterprises taking up roles of both genders. In 2015/2016 drought episode, pastoralists and agro-pastoralist in Somaliland lost most of their livestock and farm products. The ensuing commodity price hikes, together with the longstanding armed conflicts exacerbate their situation, marginalizing them in terms of social services and development programs. To restore their livelihoods, investments and assistance are needed to boost women associations and other livelihood-based cooperatives in rural areas.

Background

This paper is based on a long term experience of working in Somaliland with rural communities on pastoral livelihoods,

environment and Gender issues. It is also based on a Baseline study conducted in Sahil Region of Somaliland in April 2017, undertaken by the PENHA project (Pastoral and Environmental Network in the Horn of Africa, project), for GIZ.

The purpose of the paper is to highlight the current trend in the face of prolonged droughts and commodity price hikes in the country and beyond and the changing roles of pastoral and agro-pastoral women in Somaliland.

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The problem

With changing economies, competition over resources, lack of legal protection, weakening social protection, decline of size holding, desertification, and climate change and its impact on pastoral economies, recurrent and prolonged droughts create more poverty and destitution. Communities face more challenges today than they ever had before and women in many instances pay a heavy price taking too many risks to feed their families.

Consequently gender relations/roles have been undergoing significant change over recent years in pastoral and agro-pastoral areas of Somaliland. Women's awareness of their rights seems to be improving due to awareness programs. Women are mainly the overall managers of the family resource taking more economic roles - managing farms, running small enterprises, and marketing agricultural, livestock and livestock products.

Men are devoting a large share of their time, mental energy, and incomes, to heavy Qat consumption leaving women to take greater economic roles. Chewers usually consume between 250 g and 1kg per day, costing between five to twenty dollars. Normally Qat chewing period is 2pm to midnight. In the GIZ study, data collectors find that mental health problems for young men are increasing due to Qat chewing. Also lack of alternative jobs among the youth in pastoral areas, force them to take up many practices that are harmful environment, including cutting trees, creating illegal enclosures. These haphazard, unauthorized, non-legitimate enclosures are usually meant for crop/fodder/charcoal production and are usually appropriated from range lands restricting mobility of livestock and disrupting traditional transhumance systems.

On the contrary, women find themselves in a paradoxical situation in pastoralists' societies and play very important roles in its livelihoods and the welfare of their households. On one hand, women were, and are still, considered as weak, emotional, bad managers, and in need of protection when it comes to decision making in the public arena. On the other hand, it is widely believed women are holders of the family candle. There is a proverb that says: "you can't reach a man with a better wife". In the face of various crisis caused by conflict and droughts, women proved their resilience and resourcefulness and yet women in general are absent in the political stadium where politicians are elected publicly.

Women were previously not considered producers or serious decision makers, and their role was not valued by the Somali culture. This has been changing in recent years. Women were despite the many challenges they face, resourceful in finding ways to ensure that their households' basic needs are met.

Traditionally they were in charge of small ruminant and domestic affairs but hardly engaged on socio-economic issues outside their household except for low value business such as milk selling or small ruminants slaughtering and

butchery. High value commodities' marketing and other outside work, decisions of movement, community affairs, and its relations with other groups was the domain of men.

Women were not considered as farmers in agro-pastoral communities even though they work in the farms. Men engaged in socioeconomic and cultural activities, and in the conservation and management of natural resources, marketing issues and family resource management.

Pastoral communities remain socially and politically marginalized and women and their children are more vulnerable today than they used to be. Their livelihoods and way of life is undermined by inappropriate policies, unfriendly environmental changes, and too much competition over scarce resources, especially in the rangelands on which pastoralists depend for their livelihoods.

While livestock sales and other by products are highly priced, expenses like transportation and too many middle-men left producers at the bottom of ladder in terms of returns.

Responses

Social and environmental problems including droughts, conflicts, Qat chewing, demographic changes, and urbanization induced changes in the gender roles and perceptions. Men are thus forced to seek economic ventures elsewhere, such as outside work, or remain busy in Qat-chewing.

Since the early 1960s, women started engaging in socioeconomic and cultural activities such as the conservation and management of natural resources, thus filling both roles for the welfare of their families and the communities they represent.

Pastoralists are resilient and can adapt up to a certain level of challenge. Programs like Micro-credit, rotating funds pastoralists' attitude towards women ownership and income generation. Women in rural villages own and manage small businesses, and buy and sell livestock and crop products to urban markets. They are also in charge of milk sales and other petty trading.

Rural women associations look after the welfare of their communities. They usually assist village committees on looking after the environment and other social issues, collecting money, food, clothes, butter and anything else available to feed the poor, sick and disabled within their communities. Such activities give women more voice and space for decision making, resource management, and accord them more status.

²Qat or khat, is an evergreen flowering shrub (*Catha edulis*) native to the Horn of Africa and the Arabian Peninsula, the leaves of which are used as a narcotic when chewed or made into a beverage.

³Baseline study for GIZ in Sahil Region of Somaliland by PENHA, April 2017

In the GIZ study it was shown that most marketing is in the hands of women, and men accepted that their role has been undermined by Qat chewing and casual labour in peri-urban areas.

In one village women have a milk association and daily returns are rotational. One woman gets all the money generated for that day. This created some wealth for families to cover their expenses or create small businesses.

The Outcome

The trend is a shift towards women taking over both gender roles because men either are chewing Qat or too proud to take menial jobs in peri-urban areas to provide for their families. Women increasingly dominate family small enterprises, running small shops in villages, undertaking small scale livestock sales, marketing vegetables and dairy products. Such new roles outside the house coupled with domestic work increased the burden on women in their daily chores.



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Under the current circumstances (the worst drought in memorial times in Somaliland) women find themselves in difficult situations. A choice between looking after the children and the weak elderly family members, or save animals and serve spilt families in different locations. Men and able-bodied people in the family took the strong animals and travelled with them a long distance, to where rains fell, most times in the western corner of the country, while women and children are left behind with the weak animals and the old/sick at their domicile, where hardly any fodder or water is available.

At the inception of development projects, women hardly participate in the consultation process which later undermines their role. In PENHA (Pastoral and Environmental Network in the Horn of Africa), 30% of beneficiaries in the cash for work workforce were women but in many cases women are left to tackle homestead responsibilities while able-bodied men participate in cash for work and other such schemes. They however usually spend most of money thus earned on Qat chewing.

Conclusion

Regardless of changing roles, women are still excluded from major decision-making processes and this weakens them in the Somaliland society. Gender imbalances and inequalities still exist and prevent realization of the full potential of women in social and economic spheres in rural economies.

Women usually are not included in village committees nor are they represented in development committees and, if at all, they are usually present with the insistence of development agencies. While women's role and responsibilities have changed, their status remained the same in many aspects.

Lack of social services provision including health and education in rural areas hamper their achievements. In all rural livelihoods, women dominate small enterprises holding small shops, food stores, and other different business outlets, and are engaged in the wholesale and retail business including livestock trade.

Way forward

National and regional programs for pastoral development need to take stock of the current realities and cater for gender needs and pastoral communities at large considering cross border issues, environmental degradation and climate change, and introduce technologies that complement their traditional knowledge.

Programs should also consider adopting an enterprise promotion/value chain approach, assisting small producers and build their capacity to upscale productivity-enhancing investments.

Program should consider putting women's associations and cooperatives at the centre of many enterprise program activities. During episodes of drought, there is realization that most programs and policies in the region are underpinned by imperatives of modernization that are counter to the promotion of traditional approaches to managing resources. Hence these associations and cooperatives need to be the agents of change in their own development using their long term gained experience coupled with modern technologies.

Their coping mechanisms are weakening due to the recurrent droughts and pastoralism is in need of transformative long term resilience strategies building on traditional systems to cope with these recurrent droughts. Policies have to be put in place to strengthen institutions putting human development at the centre with gender responsive mechanisms.

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Findings and provisional recommendations regarding environmental impacts of land management in pastoralist and wildlife eco-tourism co-existence: A Maasai and wildlife eco-tourism case in the Serengeti National Park, Tanzania

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Summary

Findings during reconnaissance studies in a private concession area in the north-eastern part of the Serengeti National Park, illustrated also in photographic evidence, indicate that eco-tourism and Maasai livestock do not co-exist well together. For the Maasai tribe in Kenya and Tanzania livestock (cattle, sheep and goats) play, and have for thousands of years played, a very important role, as they depend on it for food and livelihoods. However, for the Maasai, their livestock are more than just food and a livelihood, it is everything: including culture, ritual, wealth and pride. The pastoralist Maasai are brilliant cattle-herders. A person's entire life revolves around his cattle. However, when mixed with eco-tourism there exists the possibility of conflict. Eco-tourism depends on wildlife and tourists. Evidence also indicates that cattle and wildlife (especially wildlife grazers), migrate and feed differently, with consequences to the sustainability of soil and vegetation. The photographic

evidence shows that the soil is damaged irreversibly in some cases, and this will have negative consequences for the grass cover and food for the grazers (wildlife and cattle).

Introduction

Rangelands are vital for wildlife conservation and socio-economic well-being, but many rangelands face widespread degradation, partly due to poor grazing management practices (Laker, 2005).

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The Maasai pastoralists have lived with their livestock for centuries without any problems or threats to their way of life, to their cattle or to the areas in which they lived (Finke, 2000-2003; Fedders & Salvadori, 1979). However, things have changed, especially in areas surrounding National Parks like Serengeti in Tanzania. Although in conservation terms, buffer zones around protected areas are seen as a good thing, and a natural area contributing to the protection of the formal protected area, they have been shaped by restrictive conservation policies, expropriation of land, community conservation efforts, both positive and negative wildlife/livestock interactions, and political tensions (Lankester & Davis, 2016). It may be true that the Maasai have lived for most of their lives in peace together with wildlife, without destroying it, but this is no longer the case.

Klein's Camp in the Serengeti, Tanzania is a private concession area situated in the northeastern part of the Serengeti National Park, bordering the Kenyan border and the Maasai Mara National Reserve to the north. It is managed by &Beyond in collaboration with the Maasai who are the landowners. &Beyond specializes in luxury safaris in 16 countries throughout the world (Muller et al, 2016). Maasai pastoralist villages also surround the Klein's Camp concession area. Maasai pastoralists have been grazing these grasslands alongside wildlife for centuries (Finke, 2000-2003). However, despite their grazing becoming restricted and the opportunities for territorial expansion gone, they nonetheless still keep as many cattle as possible. This has become the primary reason for the environmental degradation of Maasai land, the overgrazing and subsequent soil erosion (Finke, 2000-2003). Illegal bush clearance by fire to make fresh pastures and to control ticks and tsetse flies has also increased, destroying the habitats of many species of fauna and flora (Muller et al, 2016). According to Finke (2000-2003) it takes, for a neighbouring example, just one visit to the Maasai Mara park to see the difference inside and outside the park: " - the lands outside the park look arid and desolate in contrast, and are almost denuded of trees."

These problems have spilled over to the Klein's Camp concession area, despite a formal agreement between &Beyond and the Maasai people signed during August 2016. According to a Maasai field guide working in the private concession, the Maasai herders continually break the agreement to keep their livestock outside the concession area, and continue to move their cattle, sheep and goats into the Klein' Camps concession area to graze, where wildlife eco-tourists can see them. Wildlife tourism in East and Southern Africa offer unique opportunities, that are not found anywhere else, for specific types of tourists who wish to view wildlife that roam these areas in their natural environment, without interferences of domestic livestock, etc. The motivation and attitudes of wildlife eco-tourists have been researched and documented by, inter alia, Saayman & Slabbert (2004), Beh & Bruyere (2007) and Nortjé (2014). The managers of &Beyond realized the potentially disastrous implications of a situation like that at Klein's Camp for wildlife

eco-tourism and its impact on the economy of Tanzania and for the livelihoods of the Maasai people and decided to embark on a program aimed at attempting to avoid disaster. &Beyond concluded that the first step required, would be to contract someone to make a reconnaissance study of the situation with a view to planning further steps. They consequently approached me to conduct such study. They contacted me because I did my PhD on somewhat related problems in the very big Kruger National Park in South Africa (Nortjé, 2014).

Methodology

I used scientific information from my PhD (Nortjé, 2014; Nortjé et al., 2012, 2016), as well as from the major relevant review paper of Laker (2004) and also the excellent paper by Snyman (1999) on rangeland degradation, as background upon which to base a reconnaissance survey in the Klein's Camp area in 2015 (Nortjé, 2015). I followed this up with another study in 2017. I studied the types and extent of land degradation (soil and vegetation), impacts of off-road driving, differences of impacts between livestock grazing and wildlife grazing and relationships of severity of degradation with geology and different soils.

Findings

During both the 2015 and 2017 survey studies widespread serious environmental damage, caused by both animal impact and off-road driving was found. Encroachment and densification of invader tree species, i.e. Whistling Thorn (*Vachellia drepanolobium*), a sign of severe overgrazing of grassland, could be seen wherever the Maasai livestock have grazed (Figure 1). Furthermore, overgrazed areas with severe soil erosion, including sheet and gully erosion and denuded vegetation were predominantly in areas where the livestock grazed (Figures 2, 3 and 4). In areas where livestock were absent and only wildlife present, almost no overgrazing and soil erosion exist and the grass cover is healthy (Figure 5).

The above-mentioned problems of overgrazing and soil erosion are aggravated by the fact that most of the soils in the Klein's Camp concession area can be classified as Solonetz soils (WRB, 2006) or so-called "sodic soils" (Figure 6). These soils are known in South Africa as soils of the Estcourt soil form (Soil Classification Working Group, 1991). They are highly unstable soils which are extremely vulnerable to erosion when cultivated or overgrazed, and have very low resilience (recovery potential) once they have been degraded (Laker, 2004). They are only suitable for low intensity extensive grazing due to their low carrying capacity, a result of a low biomass production capacity. The limited biomass consists of highly palatable and highly nutritious sweet veld that is preferred by animals. These soils are surrounded by areas producing unpalatable sourveld with low nutritional value, thus animals tend to concentrate on them and overgraze them, a situation often found in areas dominated by granite geology, as is the case in Serengeti.

These soils should be very carefully managed and protected from overgrazing, at all costs (Nortjé, 2015; Laker, 2004). This is very difficult in a wildlife eco-tourist situation, because the vulnerable areas cannot be fenced off to protect them, since from an aesthetic point, fences are not acceptable. Thus, such situation requires ingenious management approaches. Furthermore, serious widespread soil and vegetation degradation due to uncontrolled off-road driving (ORD) was found to be very destructive in the wildlife tourism area where the reconnaissance study was done (Figures 7 and 8), especially on vulnerable soils. Nortje (2014) outlined basic research findings regarding the negative impacts of uncontrolled ORD in protected (wildlife eco-tourism) areas. Nortje et al. (2012, 2016) summarized these findings.

Discussion

Findings regarding overgrazing and soil erosion in the Kleins Camp area led to the conclusion that the large migratory herds of wildebeest, zebra or other plains game are not the cause of the overgrazing problems in the area (Nortjé, 2015). It seems that the wildlife grazers migrate in a circular pattern (Figure 9), thus causing a typical high-pressure grazing scenario (non-selective pressure grazing) for a very short time at a site, followed by long enough recovery time before they reach the same site again (Nortje, 2015). The conclusion of the reconnaissance study was that the degradation in the areas overgrazed by the Maasai Mara livestock is caused by selective grazing by Maasai livestock. In selective grazing animals graze out the best grass species, leaving inferior species behind, which eventually take over. This leads to increased erosion, as proven by South African research, quoted by Laker (2004), indicating that soil loss increased in the order climax vegetation <sub-climax vegetation <pioneer vegetation. The cattle graze longer grasses, and then the sheep (extremely destructive short grazers) and goats, which are both also kept for specific purposes, shorter grass until only bare soil is left. The eventual outcome could be similar to a finding by Boardman and co-workers elsewhere, presented in an unpublished paper at an international symposium, that "extensive areas of bare ground (badlands)" were caused by "overgrazing by sheep goats and cattle" (Laker, 2004).

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Figure 1: Whistling Thorn (*Vachellia depranolobium*) invasion



Figure 2: Cattle foot paths

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Figure 3: Cattle grazing

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Figure 4: Sheep grazing

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Figure 5: Wildlife grazers on healthy soil and dense high quality (nutritious and palatable) grass

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Figure 6: The soils in the Serengeti are characterized by extremely unstable 'Solonetz' soils on the plains and in the valley floors



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Figure 7: Soil damage because of multiple off-road driving incidents



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Figure 8: Off-road driving damage during wet conditions



Figure 9: Wildlife circular pattern of grazing in the Serengeti (wild-wings-safaris.com)

Conclusions, Recommendations and Suggestions

With the exception of a few areas in Africa with high rainfall, the soils in Africa require close management to ensure sustainability both for agriculture, rangeland and conservation purposes. Proper land use planning is critical, in which soil surveying and appropriate land suitability assessments should play a major role. This is as important in wildlife eco-tourism areas as in areas assigned to other land uses. Thus, there is a need to develop new policies for rangeland management that support both wildlife populations and livestock herds.

Pastoralism plays a critical role in ecological, social and economic sustainability worldwide, and is especially important in semi-arid and arid areas where rainfall is too low to sustain dryland cropping. However, overgrazing of sensitive areas by domestic livestock should not be allowed, especially when they occur in formally protected wildlife areas.

In the case discussed here, an agreement to the mutual benefit of both the eco-tourism operator and the Maasai pastoralists should urgently be found, as continuation of the present situation could be disastrous for both. All the grazing land will be destroyed, with the result that there will be no grazing land for the Maasai cattle, as well as for the wildlife. The eco-tourism industry and the pastoralists' way of life will be destroyed.

There are both economic and culturally compelling reasons to ensure that the management of pastoral lands, particularly those surrounding protected areas, remains socially equitable and environmentally sustainable. To achieve this, progressive pastoral policies that learn from the failures and successes of community-based initiatives, and which respect local knowledge, land use, and livestock management practices, need to be developed (Lancaster & Davis, 2016).

It could be interesting to include opportunities to see the way of life of the people as an additional package to tourists that may be interested in it, as long as that does not impact negatively on their privacy or not interfere with their culture, because that could lead to clashes between the Maasai and tourists. This in itself would not overcome the problem of rangeland degradation, because it will not change the way that cattle grazing is managed to a way that would reduce selective grazing and consequently combat rangeland and soil degradation. If this, and reservation of areas roamed only by wildlife cannot be achieved sustainably the whole concept of wildlife parks should probably be scrapped, which could have major negative economic impacts for the two countries involved, namely Kenya and Tanzania.

The following recommendations and suggestions concerning soil and vegetation management should be considered and investigated (Nortje, 2015):

- Prevent further bare soil development by not allow overgrazing or unnecessary ORD;
- Design/re-design road networks according to a soil sensitivity map such as to minimize soil and vegetation degradation due to runoff from roads, while at the same time enabling excellent animal sightings without need for ORD;
- Combine the above with agreements between landowners, government and concession holders to enable the latter two to invest in more durable roads with acceptable types of surfaces to limit degradation;
- Prohibit ORD in the following areas: Ramsar pans, vleis, and soils with Prismatic B-horizons (so-called 'sodic' sites, Silt-loam soils and soils with high (fine sand + silt) contents, Sandy soils with less than 15% clay content, barren areas with no grass cover.
- Further research with regard to soil, grazing and vegetation management;
- Rehabilitation of damaged areas;
- Interaction by government with the Maasai people regarding their traditional way of livestock grazing, with a view to finding environmentally friendly ways of grazing that are acceptable to them. Investigate the socio-cultural factors that are over-riding and together with the Maasai people try to find ways to build on these factors to affect sustainable change, including more commercialization of livestock products, without causing social upheaval.
- If the latter can be achieved, then policies could be investigated to offer premium prices for quality animal products in order to discourage preference for quantity over quality, keeping in mind that this will have to go hand-in-hand with provision of efficient veterinarian services by government and by availability of livestock medicines.
- Investigate possible ways to promote packages for cultural tourism, in which tourists can interact with the local people to experience their way of life, in addition to packages for wildlife eco-tourism for those tourists that are not exclusively interested in the unique experiences associated with wildlife eco-tourism in these areas. Alternatively, the cultural experience can be enabled by the establishment of a small cultural village, more-or-less like a living museum, within the game park.

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COUNTRY FOCUS: REPUBLIC OF GHANA

Contested Pastures: State land reform policies, community dynamics and pastoralism in the Nkoranza South Municipality, Ghana

David Anafo¹



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Woman tending to her livestock

Summary

Despite growing reports of confrontations between pastoralists and farmers, land administration reforms in Ghana make no efforts to enhance co-utilisation of land resources in a mutual manner. This research used an ethnographic case study approach to explore the governance arrangements over access to pasture under conditions of changing land tenure systems in the Nkoranza South Municipality of Ghana. The study establishes that limits to pastoral land access are a result of a national land policy and land reform system which leads to liberalisation of the land market, commercialisation of agricultural production, individualisation of land resources and gradually disappearing commons. The study concludes that efforts at land administration reforms should designate, allocate and codify specific areas for grazing purposes, accompanied with mutually agreed transit routes in support of herder mobility. It is also recommended that a collaborative and institutionalised effort for resolving herder-farmer conflicts should be mutually developed amongst the various stakeholders.

Introduction

While confrontations between pastoralists and crop farmers over land resources have been with humanity since creation, they have assumed worrying dimensions in recent times. Nomads are accused of having little appreciation for land

property rights and their practices are seen by farmers, policy makers, and environmental ecologists to be environmentally harmful, primitive, and detrimental to national economies (Nori et al., 2008; Sayre et al., 2013). Pastoralism in Ghana suffers this fate as land administration reforms, combined with a growing population, and changing inheritance and family systems, generate systems of “universality, exclusivity, transferability and enforceability” in land use (Lengoiboni et al., 2010). Lengoiboni et al., (2010) define universality, as ownership of land; exclusivity, as rights to benefit from land; transferability, as rights to transfer ownership of land use rights; and enforceability, as a system of penalties to prevent encroachments. Casual canvassing of daily news items in Ghana discloses headlines such as “Exodus: Fleeing herdsmen face gloomy conditions”, “The FULANI menace: a product of climate change, education and misconception”, “Kwahu Residents Live in Fear Following Murder of Four by Fulanis”, “Agogo: Forcible eviction of Fulanis recommended” and “Refugee Fulani herdsmen to return to Burkina Faso next week”.

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This is not peculiar to Nkoranza, Ghana as pastoral practices are reported in places as disparate as Nigeria, Niger, Albania, Kenya, Somalia, Afghanistan, Sudan, Palestine, the Qinghai-Tibetan Plateau of China and Kyrgyzstan to have come under similar attacks due to a multiplicity of factors including state land policies, increasing human and livestock populations, climate change and its unpredictability, as well as environmental degradation and the need to enhance agricultural production (Dong et al., 2011).

In the wake of these controversies on the global scale, however, it is important to develop policies and strategies that will enhance mutual co-existence and co-utilisation of resources in a non-confrontational manner. This article explores, through the Nkoranza South Municipality case study in Ghana, the extent to which land resource governance, altered through land administration reforms, is perpetuating the confrontations over access to land and pasture. This study has become necessary because, although a number of studies (Fratkin & Meir, 2005; Galvin, 2009; Bayer, 2013) have discussed the changing trends to pastoralism, there is little discourse on the role played by land policies and land administration reforms in deepening contestations over pasture access. The study analyses the vulnerability of the pastoral system in Nkoranza using the dimensions of agroecosystems, livelihoods, and land governance institutions (Fraser 2007). This simply entails tracing changes in the agroecosystem, livelihood, and/or institutional dimensions of land governance in Nkoranza to ascertain the extent to which pastoral practices are being adversely impacted or otherwise.

An ethnographic case study design, construed as a merger of case study and ethnographic methods for socio-cultural analysis of a phenomenon, was used to undertake the study. Data collection was carried out over two, three-monthly periods (June – August, 2013 and January – March, 2014); these periods representing rainy and dry seasons, respectively. Overall 12 pastoralists and 14 land governance decision makers; drawn from traditional authority (3), officials of decentralised governmental bodies (5) and livestock owners and farmers (6) were interviewed. Structured observations enabled an appreciation of how much land was being used, and for what purpose. A Focus Group Discussion (FGD) involving 5 pastoralists was also conducted.

An Overview of Pastoralism in the Nkoranza South Municipality

The evolution of pastoralism in the Nkoranza South Municipality (NSM) is representative of the type which occurs in the sub-humid zone of West Africa. The Nkoranza area with its annual rainfall of between 800 – 1,200mm falls within this sub-humid zone. Pastoralism in this zone emerged in the late 1970s to early 1980s when protracted droughts and bush fires drove pastoralists further south of the humid Sudanian and Guinean Savannas of West Africa in search of pastures (Bassett & Turner, 2007). Alternatively,

Amanor (1995) rather indicates that the colonisation of the sub-humid zone of West Africa by pastoralists resulted from the clearance of the natural vegetation by farmers, the elimination of the tsetse fly and trypanosomiasis, and the selection of trypanosomiasis-resistant *Bos taurus* cattle by cattle owners. De Bruijn & Van Dijk (2003) also relate changes in pastoral activities in West Africa to the Sahelian droughts of the 1970s and 1980s, which pushed many pastoralists into selling their cattle to wealthy food farmers, merchants and civil servants in order to obtain cereals.

Pastoral movements into the Nkoranza area in the late 1970s and early 1980s were, however, short-lived as protracted disputes between farmers and herders led to the expulsion of the herders by armed state military personnel (Tonah, 2006). While some herders opted to leave with their cattle, others sold theirs and stayed behind as hired herders. Just as happened elsewhere in the West African sub-region, cattle rearing in the NSM was eventually taken up by other investors of Nkoranza and Ghana, who saw cattle ownership as an insurance against risk of crop failure. Currently, pastoralism in the Nkoranza area is largely the preserve of investors, who employ pastoralists, mainly of Fulani descent as herders for their cattle.

Land Tenure and Land Administration Reforms in Nkoranza

The history of land and natural resources governance in the study area has significant implications for efforts to alleviate contestations over access to land and pastures. Nkoranza's land tenure system is such, that access to land and natural resources, is governed by customary institutions, whose authority emanates from tradition. These customary institutions are headed by chiefs, clan heads, and family heads. They determine resource use rights, allocate rights and arbitrate conflicts among competing users. Overall, the Paramount Chief of Nkoranza (Omanhene) is the embodiment of this authority and all other lesser chiefs draw their power from him. Under the customary system of Nkoranza, the commons, where cattle can graze, derive from the local traditional perception of land. A long held traditional custom of the Bono of Nkoranza construe land only as the surface soil and excludes resources beneath and above the soil such as minerals, trees and pastures (Allott, 1966). This understanding governed access to the commons for grazing and other forests and non-forests resources in the past.

The Government of Ghana has since 2002 developed and began the implementation of a Land Administration Project (LAP). LAP seeks to address land sector problems such as general indiscipline in the land market; indeterminate boundaries of customary owned lands; compulsory acquisition by government of large tracts of land that have not been utilised; and inadequate security of tenure due to conflicts of interest, identified in the National Land Policy (NLP) (Ministry of Lands and Forestry, 1999).

Within the implementation process, Customary Land Secretariats (CLSs) were piloted in selected customary land areas across the country. These secretariats were tasked to provide a database on land ownership as a way of eliminating conflicts, enhancing security, broadening rights to land via formal transactions and encouraging both national and international investments in land. There are currently 37 CLSs scattered across Ghana of which the Nkoranza CLS is one. The land administration reform system routed through the traditional chieftaincy by the creation of CLS strengthens the hold of chiefs over communal resources as it places all decision-making rights (management, exclusion and alienation) in the hands of the chiefs.

Fitzpatrick (2005), theoretically discuss this system of land administration reform, and classify it as the “agency model” of land governance and administration. The state intervenes to identify an agent, who acts as a representative of the customary group, and entrust in the agent trusteeship over land on behalf of the group.

Access to Land/Pasture by Pastoralists

Access to rangeland in the Nkoranza area was until recently minimally contested. Early pastoral migrants, like other migrants, were received into the Nkoranza area by local community chiefs and their elders.



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A young boy riding oxen

They grazed their animals on communal fallow lands based on arrangements requiring them to partake in communal labour, pay homage to the local chiefs and contribute in cash or kind to the annual Munufie Kese festival of the paramount chief. This is similar to that predominantly practiced in the Sahel of West Africa where pastoral livelihoods have historically depended on negotiated and non-exclusive access to land and water (Brooks, 2006). As further reported by Watkinson and Ormerod (2001) the adaptability of negotiated access to rangeland has been adversely impacted differently, in different world regions and in the case of Nkoranza, mobile pastoralists were expelled in the late 1970s and early 1980s, leaving behind only hired herders. Currently, negotiated access to pasture in Nkoranza is no longer possible.

Grazing cattle in the NSM in recent years is a severely contested issue. Herdsmen argue that the sheer numbers of their animals require that they move them around for grazing. An interviewee of the Asunkwaa community lamented thus:

*“The main issue is that cattle just like humans are selective in the things they eat and do not eat. Commonly, cattle prefer elephant grass (*Pennisetum purpureum*) and vetiver (*Chrysopogon zizanioides*). These specific grasses are not uniformly available across the communities. As such it is our responsibility to always take the cattle to places where we can find the desirable grasses for them. However, landowners are unwilling to allow us access to the grasses even though there are fallow lands all over the place. These days I can no longer move around with the cattle to graze them; I cannot neither get the feed from the forest because of the numbers and the restrictions, and I cannot keep them locked in the kraal all day”* (Personal Interview, 2013/14).

In instances where lands are even lying fallow, entry and for that matter access to pasture is mostly restricted by the erection of sign posts with inscriptions such as “property under lease, please keep off”; “site for..., please keep off”. Such signposts are common in Nkoranza. The prevention of access to pastureland by landlords results in contestations, accusations and counter-accusations and worse still, bloody clashes between pastoralists on the one hand and landlords and farmers, on the other.

While increasing population pressure and changing inheritance and family systems threaten the co-utilisation of land resources by pastoralists and farmers, taken alone, they are not sufficient to offset the balance. Fundamental to the contestations over land/pastures access by pastoralists, beyond the socio-cultural issues, is land administration reforms and the changes to land and natural resource governance resulting therefrom. Records available at the Nkoranza Customary Lands Secretariat (CLS) indicate that between 2008 and 2013 chiefs have sold in excess of 600 building plots and about 150 large-scale agricultural plots to individuals and corporate interests. Again, the Ghana Land Bank Directory indicates that there is about 54,231.8 ha of banked land in the Brong-Ahafo Region of Ghana ready to be leased to investors for the cultivation of teak, cashew, oil palm and food crops. The directory further indicates that most of these lands are stool lands (interest in, or right over, any land controlled by the head of a particular community for the benefit of the subjects or members of that community) and private lands located in the Nkoranza and Kintampo districts.

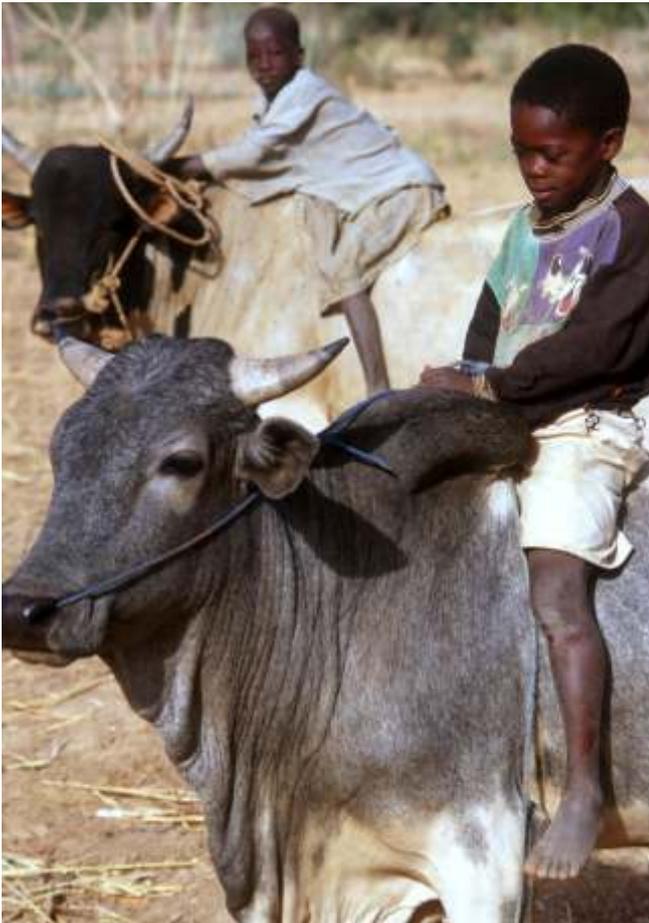
The growing exposure of communal land resources to metropolitan capital investments, through the agency model of land governance introduced through land reforms, leads to restrictions to the access of pastures by pastoralists. Absentee landowners erect signposts to restrict entry to fallow lands that they have duly acquired through leaseholds. Similar developments occurred in the Tibetan Plateau following land reforms where seasonal grazing lands were individualised, throwing communal pastoral systems into

chaos (Nori et al.). Smith & Wishnie (2000) and Behnke (2008) argue that land administration reforms often seek to project the interests of governments for legibility, conscription and ease of taxation over land use. They therefore conclude that such policies are counter-productive to pastoralists land access and use rights which are built around flexible institutions and ad hoc organisations of resource access.

Closely related to, and resulting from, land reforms, is the gradual disappearance of the commons. As initially argued, the commons in Nkoranza derive from the local perception of land, which is limited only to the surface soil. Land reforms, however, result in the alienation of hitherto communal resources to private and corporate interests. The rising alienation of land by chiefs take place on fallow land resources, which served as grazing grounds for pastoralists and provided multiple productive and environmental services in support of pastoral livelihoods. The work of Tsikata & Yaro (2011) on land market liberalisation in Ghana, as well as that of Schoneveld & German (2013) on the new commercial pressures on land in Ghana, support these observations. They indicate that the large-scale acquisition of “productive and virgin” common property areas in many communities across Ghana worsens the vulnerability of the poor.

Conclusion

The Nkoranza South Municipality (NSM) case study shows that pastoralism is an important economic and livelihood activity that must be supported and sustained. Currently, however, the evolution of pastoral practices, land governance regimes and institutions, and the controversies associated with access to rangeland in the NSM are not supportive of sustainable pastoralism. Globally, there have been unsuccessful attempts at permanently settling mobile pastoralists. Common examples include the case of Iran from 1925 – 1941; Saudi Arabia in the 1950s; and Somalia in the 1970s (Nori, et al., 2005). Similarly, while sedentarisation is unlikely to succeed, individualisation of rangeland through ranching is also unlikely to succeed in the NSM given the lamentation by pastoralists that the sheer numbers of cattle involved makes it impossible to cart feed from the surrounding bushes. Given these complexities and coupled with the fact that the cattle are owned by Ghanaians as opposed to “foreigners” as was the case in the 1970s, it is recommended that land administration reform efforts incorporate initiatives to designate, allocate and codify specific areas for grazing purposes. This should be accompanied with the identification of mutually agreed transit routes, and bye-laws that allow for herder mobility while specifying sanctions against violations. Also, a collaborative and perhaps institutionalised effort for resolving herder-farmer conflicts should be mutually developed amongst the various stakeholders, including local government, farmer groups, herder associations, cattle owners and religious associations



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FAO ACTIVITIES AND RESULTS

Closing the knowledge gap to promote evidence based policy making for sustainable pastoralism in Africa

Gregorio Velasco Gil,¹ Craig Chibanda,² Natasha Maru³ and Oliver Mundy⁴



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Woman feeding her cows with fortified feed

Summary

Pastoralism is practised in rangelands that often have extreme climatic conditions. However, pastoralists continue to thrive and produce a significant amount of food, particularly animal products. In Africa, pastoralism plays an important role not only as a source of food, but also as a key provider of rural incomes. Despite their crucial role, pastoralists continue to face numerous threats and challenges. These challenges range from land tenure insecurity, degradation of natural resources, effects of climate change and poorly-designed public policies. Various researchers support the use of knowledge platforms in supporting evidence-based policy and program making to address these challenges. The Family Farming Knowledge Platform (FFKP) and the Pastoralist Knowledge Hub are concrete examples of such knowledge exchange platforms that not only promote the exchange of knowledge and experiences, but also promote dialogue among various actors relevant to pastoralism.

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Introduction

As custodians of grasslands, dryland pastures and highlands, pastoralists are livestock rearers “whose material and cultural reproduction is based on extensive traditional grazing” (Del Pozo-Vergnes, 2014). Globally, there are an estimated 200-500 million people practising pastoralism, including transhumant herders, agro-pastoralists and nomadic communities who use mobility as a key strategy for the sustainable management of resources (UNEP, 2015). Although pastoralism is practised in rangelands often characterized by variable climatic conditions, pastoralists produce a significant amount of animal products, particularly meat, milk and leather. In addition to providing useful animal products, pastoralism provides important environmental services by improving soil fertility, water cycling, restoring degraded rangelands, and preserving biodiversity, including livestock breeds that are highly adapted to their local environment. Lastly, pastoralism must be seen not just as a livelihood option, but as a lifestyle with unique cultures, traditions, and indigenous knowledge (McGahey et al., 2014).

In Africa, pastoralism plays an important role. For example, in the Sahel region, pastoral and agro-pastoral systems supply more than 80% of animal products (Kamuanga et al, 2008). Despite the crucial role that pastoralism plays in Africa, pastoralists continue to face a myriad of threats and challenges. These threats range from land tenure insecurity, degradation of natural resources, restrictions on mobility, effects of climate change and poorly-designed public policies (FAO, 2016). Research reveals that the value of pastoralism and rangelands in most African countries is usually underestimated and the pastoralists remain marginalized (FAO, 2016). Confronting the challenges faced by pastoralists in Africa requires policies and interventions that not only address the direct challenges they face but also reverse the negative prejudices that often portray pastoralism as primitive, unproductive and environmentally destructive (UNEP, 2015).

One of the concrete ways of responding to these challenges and myths about pastoralism is through effective information and knowledge exchange. According to Quinn et al (2014), the use of knowledge platforms in combination with tailored and targeted messaging can increase the use of evidence in policy and program decision making. The Food and Agriculture Organization of the United Nations (FAO) has long recognized the key contributions of knowledge platforms in supporting evidence based policy making and knowledge sharing among different actors. The Family Farming Knowledge Platform (FFKP) and the Pastoralist Knowledge Hub are key examples of such knowledge exchange portals that not only promote the exchange of knowledge and experiences but also promote dialogue among various actors relevant to pastoralism.

Family Farming Knowledge Platform (FFKP)

The Family Farming Knowledge Platform (FFKP) (<http://www.fao.org/family-farming/en/>) was launched in June 2015 by FAO as a concrete result of the 2014 International Year of Family Farming (IYFF) which aimed at raising awareness on the important contributions of family

farmers to food security and nutrition. During the 2014 IYFF, FAO and various partners expressed the need to go beyond the celebrations and to put in place a set of concrete actions aimed at addressing the issues and challenges raised throughout the year. One key demand was to share information and knowledge on key topics and the state of policy-making related to family farming across the world. In response to this, the decision was made to launch the FFKP as a web-based knowledge platform that captures these dimensions and systematize them in a user-friendly

The FFKP gathers digitized quality information on family farming and smallholder agriculture from all over the world; including national laws and regulations, public policies, best practices, relevant data and statistics, researches, articles and publications. It provides a single access point for international, regional and national information related to family farming issues; integrating and systematizing existing information to better inform and provide knowledge-based assistance to policy-makers, family farmers' organizations, pastoralists' organizations, development experts, as well as to stakeholders at the grassroots level.

Pastoralism is a crucial component of family farming as underlined in the definition of family farming elaborated by the International Steering Committee for the 2014 IYFF, which defines family farming as “a means of organizing agricultural, forestry, fisheries, pastoral and aquaculture production which is managed and operated by a family and predominantly reliant on family labour, including both women's and men's” (FAO, 2014). The importance of sustainable pastoralism is highlighted on the FFKP through a thematic page on “Pastoralism” which is one of the eight thematic pages on the platform (the other thematic pages are on : Agroecology, Forest farming, Indigenous Peoples, Mountain Farming, Rural Women, Small Family Farmers and Small-scale Fisheries). The thematic page on pastoralism has more than 700 resources (laws, public policies, best practices, researches, articles and publications) specifically on pastoralism and this number is constantly increasing. Furthermore, the Platform also has Country and Regional Pages which facilitate the users' search by guiding them geographically.

Since its launch, the Platform has had over 150 000 users, 221 617 sessions and contains more than 15,000 relevant resources. In addition, the Platform has more than 100 focal points appointed by their respective governments and 90 contributors worldwide. Contributors and focal points play a vital role because they are not only FFKP users, but they also regularly feed the database with updated and relevant material.

Pastoralist Knowledge Hub

Launched in 2015, the Pastoralist Knowledge Hub, <http://www.fao.org/pastoralist-knowledge-hub/en/> is a consultative platform that brings together key stakeholders working towards sustainable pastoralism. Born in response to an expressed need from key international organizations and pastoral representatives, the Hub is a mechanism to enhance the capacity of pastoralists and their organizations to improve their livelihoods, strengthen their networks, and influence policy.

Pastoralist Knowledge Hub

[Home](#) | [Background](#) | [Knowledge repository](#) | [Pastoralist networks](#) | [Partners](#) | [Forum](#) | [News and Events](#)



Drought-stricken herders in Ethiopia need urgent support

Pastoralist communities are facing huge losses of livestock
 Supporting herders to get back on their feet and preventing...

Pastoralists produce food in the world's harshest environments, and pastoral production supports the livelihoods of rural populations on almost half of the world's land. They have traditionally suffered from poor understanding, marginalization and exclusion from dialogue.

The Pastoralist Knowledge Hub is an initiative bringing together pastoralists and the main actors working with them to join forces and create the synergies for dialogue and pastoralist development.

Events

- 03-10-2017 > Vitoria-Gasteiz, Spain
Innovation for Sustainability in Sheep and Goats
- 16-10-2017 > Nairobi, Kenya
Symposium on Climate Change and Droughts Resilience in Africa

[Join the forum!](#)

Our pillars



Knowledge repository. A database that classifies and provides access to literature on pastoralism.



Pastoralist networks. A forum for pastoralist organizations to share knowledge and voice their concerns in policy making.



Partners. A tool for alliance with key players on pastoralism, allowing dialogue, coordination and exploration of synergies, as well as to showcase work done in the field.

Press articles

[Ruvorian Herdiers Drive Cattle Into](#)

Box 1. Screenshot of the Pastoralist Knowledge Hub's online platform

The Hub's approach to change the negative perception on pastoralism and foster effective policy making is to combine capacity development, policy advocacy and knowledge generation and sharing services. Its activities on these fronts can be grouped under three pillars:

- 1. Networks:** It strengthens the formation of regional and global pastoral networks and facilitates the participation of pastoral representatives at international forums;
- 2. Partnerships:** The Hub coordinates a partnership of 29 intergovernmental organizations, multi-stakeholder platforms, NGOs, networks and research institutes to advocate sustainable pastoralism; and
- 3. Knowledge:** The Hub supports the development of technical knowledge on pastoral systems. Additionally, it provides web-based information and communication services to share knowledge and foster exchange. The Hub facilitates well informed evidence-based policy

making through its efforts to generate and share knowledge. Most recently, the Hub began a project to support pastoral networks in Argentina, Chad and Mongolia to gather socio-economic and resource management data from their communities. Pastoral representatives will be trained to collect the data. The data will help to design better services, programmes and policies to address pastoral needs.

As a knowledge sharing tool, the Hub offers a series of web-based services on its website, as well as an email-based discussion forum. The Forum connects over 700 members, including pastoralist representatives, experts, researchers, policymakers and NGO workers worldwide. Over 400 emails have been exchanged in 2016. The Forum is open and free to join and encourages members to request information and share upcoming conferences, reports and publications. Topics that have been discussed include land use management, pastoral land tenure, farmer-herder conflicts, and the designation of an International Year for Rangelands and Pastoralism. Many discussions involve pastoralism in Africa.

Besides the Forum, the Hub also tries to connect with various stakeholders through social media channels such as Facebook and Whatsapp. One often finds that these media are better to connect with rural and remote populations, and allow for easy translation across language barriers.

The Hub's website gives access to a comprehensive, easy-to-use, openly accessible, online Knowledge Repository with over 300 technical and scientific publications, and over 500 policies and legislations. Materials are classified by geographical coverage, topic and type of publication. Half of all publications, and over 130 legislations are related to pastoralism in Africa. In addition, the website's News and

Events section provides users with FAO news articles, press releases, and upcoming events related to pastoralism. Weekly updates are sent out to the Forum's membership.

In addition to sharing this knowledge, the Hub supports the capacity development of pastoralists through regional meetings and community dialogues with pastoral networks. By providing a platform for pastoral representatives, the Hub brings the voice of the pastoralists to international policy forums. Soon we will also initiate exchange and training on implementing the VGGT Technical guide on improving the governance of pastoral lands. It is hoped that there will be a transfer of the information and knowledge thus gained to other members of pastoral communities.



©FAO/Tony Karumba

Livestock owners bringing their animals to sell at the Bamba Livestock Market in Kilifi County, Kenya

Conclusion

The FFKP and the Pastoralist Knowledge Hub are effective knowledge exchange platforms that provide access to relevant content on sustainable pastoralism. By doing so, they play a crucial role in creating a favourable environment for evidence-based policy making. These platforms also bring together various stakeholders for knowledge exchange and are also constantly being upgraded to improve their information and communication capacities. The FFKP will soon feature a selection of videos and documentaries, since video is a powerful medium to convey information and has the ability to address important issues to a general public; whilst on the Hub, a database of organizations working with pastoralists will soon be released allowing users to find and contact organizations working on pastoralism across countries or topics.

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Water and fodder availability along livestock trade routes in the Horn of Africa Developing a baseline for enhancing livestock trade and increasing resilience in drylands

Paolo Lucci Chiarissi¹ and Koen Joosten²



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Summary

The predominant livelihood system in the drylands of the Horn of Africa (HoA) is based on pastoral and agro-pastoral production, and relies heavily on livestock trade with countries in the Middle East. Pastoral livelihoods in the HoA are constantly challenged by the scarcity of pasture and fresh water, with increasing human and social vulnerability to environmental hazards and economic shocks, which are aggravated by droughts and resource-based conflicts. Enhancing productivity and health of degraded rangelands to improve animal feed availability during all seasons, as well as availability of water resources along the livestock routes, is therefore essential for millions of people.

During 2016, the FAO sub-regional office for Eastern Africa undertook a regional study to identify 1) the location and direction of the main livestock trade routes, 2) appropriate sites for rehabilitation and development of strategic livestock water sources, and 3) appropriate sites for adaptation of good practices on fodder production and commercialization units as well as rehabilitation of natural rangelands in production areas and along the livestock export trade routes. The study covered only Somalia, the Sudan, Ethiopia and Djibouti, the first three because they are the only countries in the region that export livestock and Djibouti, because it provides the port for the export.

The study recommendations are being used for future livestock interventions along the livestock routes in the HoA, in addition to advocacy, awareness and resource mobilization activities. They provide suggestions on where water and fodder/pasture interventions targeting the livestock export trade should concentrate. This will help the governments of respective countries, NGOs, development partners and other stakeholders to better select interventions aimed at improving livestock export and pastoralist livelihoods in the region. The report assists policymakers and practitioners to gain a better understanding of the prevailing livestock export system, where interventions should be implemented and what challenges pastoralists and stakeholders in the livestock trade are faced with.

Introduction

The livestock export trade from the Horn of Africa (HoA) is often considered to be one of the largest livestock export movements in the world. It is also one of the oldest and most vibrant cross-border livestock trading systems in the world.

It provides a lifeline for millions of pastoralists and traders. There are however, a number of challenges that negatively impact trade performance. FAO's sub-regional office for Eastern Africa implements a sub-regional project in close collaboration with the Intergovernmental Authority on Development (IGAD), funded by the Italian Agency for Development Cooperation (AICS). The project addresses the capacity building gaps for pastoralists, traders, and exporters, to enhance the competitiveness of the commodity trade and to expand and improve the trade and market share in the Middle East market. The study covered only Somalia, the Sudan, Ethiopia and Djibouti, the first three because they are the only countries in the region that export livestock and Djibouti, because it provides the port for the export.

The project focuses on increasing the trade of live animals to the Middle East and Gulf countries, as well as promoting the export of (higher value) meat. Additionally, FAO and IGAD support member states in accessing new markets with better prices such as Vietnam and Indonesia. Although live animals are relatively low value compared to value-added meat and dairy products, FAO recognizes the importance of the live animal trade for millions of pastoralists – as an essential livelihood activity as well as a significant source of hard currency – and therefore purposefully works on improving the physical condition of animals during transport, thereby increasing their price. FAO is supporting livestock and rangeland production along the trade routes to sustain livestock trade activities, including identification and dissemination of good practices to maintain and enhance rangeland productivity and promote rehabilitation of water infrastructure. This is especially important since severe and recurrent droughts have caused degradation of rangelands, resulting in scarcity of forage and fresh water along the export trade routes.

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During 2016, the FAO Sub-regional office for Eastern Africa (SFE) undertook a study to consolidate findings from previous activities by FAO and other stakeholders to identify:

- the location and direction of the main livestock trade routes;
- appropriate sites for rehabilitation and development of strategic livestock water sources; and
- appropriate sites for adaptation of good practices for fodder production and commercialization units as well as rehabilitation of natural rangelands in production areas and along the livestock export trade routes.

Looking at the results from the regional study, this paper introduces practical ways in which pastoral livelihoods can be strengthened and made more resilient, by enhancing the productivity and health of degraded rangelands to improve year-round animal feed availability, as well as availability of water resources along the livestock routes. It provides suggestions on where water and fodder/pasture interventions targeting the livestock export trade should concentrate. This will help the governments of respective countries, NGOs, development partners and other stakeholders to better select interventions aimed at enhancing livestock export and pastoralist livelihoods in the region.

Methodology

Data collection involved a desk review of relevant documents, reports and maps from FAO and partners related to livestock trade routes, as well as available scientific literature on good practices for rangeland rehabilitation and fodder commercialization. The

information obtained from the desk review was validated through key informant (KI) interviews during six country missions. A total of 59 key informants were interviewed, including government officials, community members, traders, FAO experts, etc. Additionally, Focus Group Discussions (FGDs) were held in several locations during field missions.

Maps that show existing livestock export routes, livestock water points and pasture potential along the export routes were produced using Geographic Information System (GIS) software. The process involved collecting, reviewing and analyzing relevant data and information, and subsequently converting the information into maps. Data were collected from government offices, FAO country offices, reports and maps (both hard and soft copy), Google Earth and Open Street Map. The base data included GIS shapefiles, satellite products, information obtained from key informants and stakeholder interviews, and field observations. The major software packages and applications used to analyze data and prepare the maps were ArcGIS for Desktop 10.4, Adobe Illustrator and Google Earth Pro.

Results and Discussions

Working together with local stakeholders in the four countries involved in livestock trading, the major livestock trade routes in these countries were mapped and priority interventions for water infrastructure development/rehabilitation and fodder production were identified. Figure 1 shows a simplified regional map with the major routes, while much more detailed country maps were produced for each country.

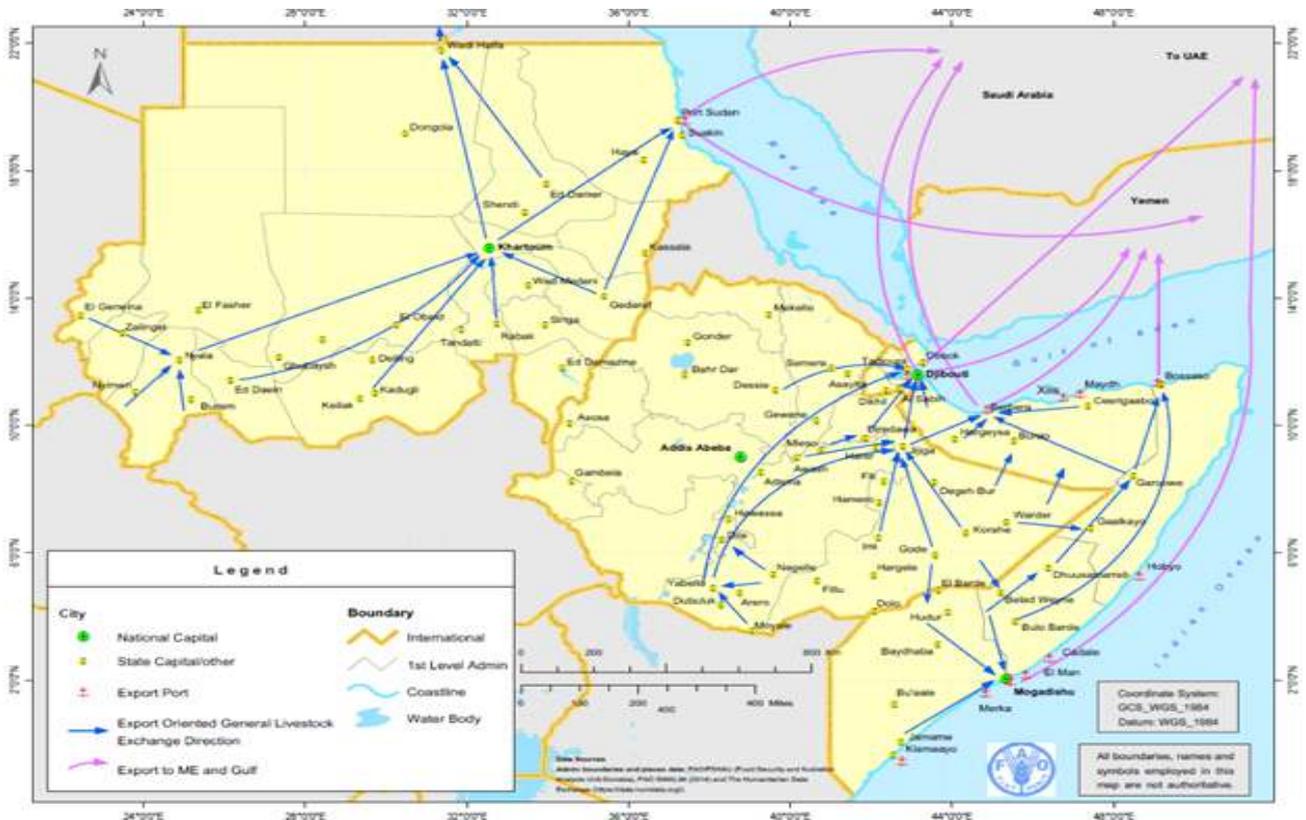


Figure 1: The general direction of livestock trade in the focus countries

The study also identified six good practices for rangeland rehabilitation, sustainable fodder production and livestock marketing, with potential for replication elsewhere and up-scaling. The good practices covered have demonstrated the potential to increase rangeland productivity and maintain ecological resilience. Other aspects considered, include economic viability/efficiency, acceptability (socially and culturally), proven effectiveness in adoption and uptake, as well as environmental sustainability.

The full report can be accessed through: <http://www.fao.org/3/a-i6828e.pdf>

The study results are also used for advocacy, awareness and resource mobilization activities. They provide suggestions on where water and fodder/pasture interventions targeting the livestock export trade should concentrate. This will help the governments of respective countries, NGOs, development partners and other stakeholders to better select interventions aimed at improving livestock export and pastoralist livelihoods in the region.

Recommendations

The regional baseline study recommends that stakeholders working on the promotion of the livestock export to the Middle East should pay due attention to create and/or rehabilitate water sources, and promote good rangeland production practices – including fodder production and commercialization. Based on the experience gained in the Horn of Africa, we recommend/conclude that:

1. By employing different approaches – such as a thorough literature review, field visits, GIS modeling, focus group discussions and interviews – this study has shown that with limited means one can provide a thorough overview of the gaps and opportunities for water & fodder provision along the livestock trade routes. This is particularly important as livestock trade in many parts of Africa forms an economic system that provides jobs and livelihoods for millions of poor (agro-) pastoralists. It enables economically marginalized pastoralists to access essential goods, but it also provides a basis for cementing social and political relations between countries. Enhancing productivity and health of degraded rangelands to improve animal feed availability during all seasons as well as availability of water resources along the livestock routes is therefore essential for improving resilience of millions of poor pastoralists.
2. Working in close collaboration with the relevant governments (at national/federal and local levels) as well as with Regional Economic Communities (RECs) – in the case of this study the Intergovernmental Authority on Development (IGAD) – not only improves study outcomes, but also makes sure there is buy-in for the recommended interventions. In the end this not only increases effectiveness and sustainability, but also ensures that the most appropriate interventions and gaps in water & fodder provision are identified.
3. Making use of GIS technology is essential. A picture (or map) speaks a thousand words, especially for policymakers with limited time. Mapping gaps and opportunities for water & fodder provision along the livestock routes in easy-to-read maps helps to advocate for appropriate interventions.
4. A high quality baseline study provides opportunities for additional resource mobilization and complementary

actions. Any study will identify a range of options for interventions, often more than a single donor or government can afford. A credible baseline study can and should be used to attract interest from other stakeholders that have the ability to fund or implement complementary activities.

5. It is recommended to use the following criteria when selecting appropriate interventions:
 - severity of water and fodder shortages along the different trade routes;
 - expected impact of the proposed interventions (number of animals and pastoralists benefitting, area covered, etc.);
 - geographical spread of the proposed interventions;
 - extent to which additional funding can complement or add value to existing activities aimed at improving water and fodder availability along the livestock routes; and
 - complementarity of proposed activities with projects or interventions by other stakeholders, such as Ministries, NGOs and other development partners.

Specific interventions identified during the baseline study and recommended include:

The Republic of Djibouti

In consultation with relevant stakeholders, and focused on the local livestock production in Djibouti only (as livestock coming from Ethiopia is trucked directly to quarantine centers), the following water and fodder interventions have been prioritized along the livestock routes in Djibouti:

- drilling of a deep borehole at Dikhil market;
- rehabilitation of excavation basins at Kourtimale and Haro river;
- establishment of shallow wells at Balambaly; and
- expansion of irrigated commercial fodder production at Haro River and Kourtimale.

The Federal Democratic Republic of Ethiopia

In general the Ethiopian lowlands are characterized by low availability of surface water and high variability of precipitation both in time and geographically from place to place. Along export trade routes and holding grounds, availing feed and water is increasingly becoming a serious challenge to the export trade. Given the fact that the livestock route from Ethiopia to Djibouti has much lower livestock numbers than the route to Somaliland, it was recommended to intervene on the latter. The report proposes to:

- Establish a fodder bank and water point at Hirna. The recommended water point is a shallow well
- Establishment of water point at Babile to support livestock to along the Jigjiga - Tog Wochale route to Somaliland. The recommended water point is a shallow well
- Establishment of a water point at Tog Wochale, for animals waiting to cross the border from Ethiopia to Somaliland. The recommended water point is shallow well
- Establishment of water points at Kombolcha, Bati, Gawane and Mille located between Awash and Semera along the route to Galafi. Spring wells are recommended
- Support to improvement of Jigjiga customs facilities and infrastructure. This will enable customs processes to be undertaken during the night, resulting in significantly less loss of animal body weight, since stresses at night are much lower.

The Federal Republic of Somalia

The study revealed that fodder scarcity is a much bigger problem than water scarcity. It is therefore suggested to focus on improving feed availability in Somalia. Of all four focus countries, Somalia is the one that is most dependent on the livestock trade. Northern Somalia suffers from frequent fodder shortages, and the study therefore focused mainly on Somaliland and Puntland territories as these areas are the main places where vibrant export oriented livestock marketing takes place. Limited resources also have the potential to ignite conflicts. The following interventions are prioritized for implementation:

- Support activities on introduction of locally adaptable fodder species (grasses, legumes, fodder tree/shrubs) and training on informal seed production to avert continued importation of seeds.
- Support physical processing to enhance feed intake by animals and reduce wastages. This includes the physical processing of the pods/seeds from the invasive *Prosopis* tree into protein-rich feed.
- Construction of fodder storage sheds

The Republic of the Sudan

It is suggested to pilot one water-related activity in the Sudan, which can be an entry point for additional resource mobilization. The Pilot rehabilitation of one “water yard” is proposed. Water yards provide water facilities, fodder and veterinary services in 51 “centers” along the Nyala-Khartoum/Omdurman livestock route, which were constructed during the 1980s. Benefits to livestock producers and traders included a reduction in livestock holding costs, a reduction in trekking weight losses and a reduction in livestock mortality during trekking. However, not all water yards are functioning anymore, and several need to be rehabilitated.

In Sudan, rangeland rehabilitation can be done by re-seeding to ensure fodder availability through production and commercialization along livestock trade export routes in the Semi-desert and Low Rainfall Savanna zones using native forage seeds. The suggested grass species include:

- Sodari area of Northern Kordofan may be re-seeded using *Cenchrus biflorus*, *Echinochloa colonum*, and *Dactyloctenium aegyptium*;
- Butana area may be re-seeded with *C. ciliaris*, *Stylosanthes* spp, *Aristida mutabilis*, *C. biflorus*, *Dactyloctenium aegyptium* and *Rhynchosia memnonia*

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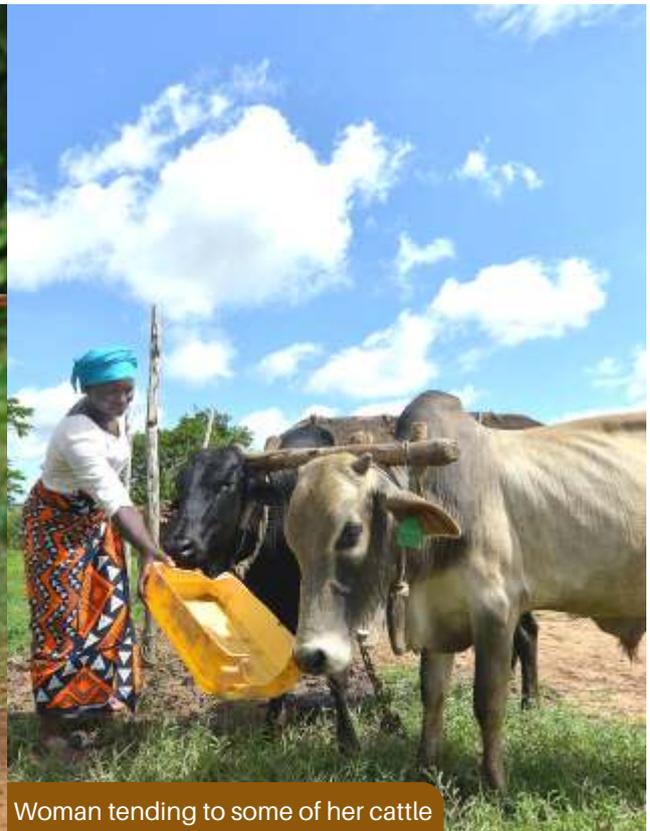
©FAO/Giulio Napolitano

Cattle drink from wells dug in a dry river bed in Shinile Zone, Ethiopia. This is the only hope of finding water for livestock in the region until the next rainy season begins.



©FAO/Erian Raizma

A young boy herding sheep



©FAO/Tony Karumba

Woman tending to some of her cattle

Livestock, a major factor in the growth of world agriculture.

The world food economy is being increasingly driven by the shift of diets and food consumption patterns towards livestock products. Some use the term «food revolution» to refer to these trends (Delgado et al., 1999). In the developing countries, where almost all world population increases take place, consumption of meat has been growing at 5-6 percent p.a. and that of milk and dairy products at 3.4-3.8 percent p.a. in the last few decades. Aggregate agricultural output is being affected by these trends, not only through the growth of livestock production proper, but also through the linkages of livestock production to the crop sector which supplies the feeding stuffs (mainly cereals and oilseeds), and benefits from the important crop-livestock synergies prevailing in mixed farming systems (de Haan et al., 1998).

Source:FAO <http://www.fao.org/docrep/005/y4252e/y4252e05b.htm>

Loss of Fertile Land Fuels 'Looming Crisis' Across Africa

Climate change, soil degradation and rising wealth are shrinking the amount of usable land in Africa. But the number of people who need it is rising fast. Read the article online:

<https://mobile.nytimes.com/2017/07/29/world/africa/africa-climate-change-kenya-land-disputes.html?referer=https://www.google.com/>

Source:By JEFFREY GETTLEMAN, July 29, 2017 © 2017 The New York Times Company

Major gains in efficiency of livestock systems needed

Intensive production holds key to feeding growing cities, but improvements in natural resource use and environmental performance are crucial. By 2050 an expanded world population will be consuming two thirds more animal protein than it does today, bringing new strains to bear on the planet's natural resources, according to a new FAO report published today. Populations and income growth are fueling an ongoing trend towards greater per capita consumption of animal protein in developing countries, says the report, World Livestock 2011. Meat consumption is projected to rise nearly 73 percent by 2050; dairy consumption will grow 58 percent over current levels.

Read more: <http://www.fao.org/news/story/en/item/116937/icode/>

Source:FAO Headquarters Viale delle Terme di Caracalla 00153 Rome, Italy. Tel:(+39) 06 57051 e-mail: FAO-HQ@fao.org

World agriculture: towards 2015/2030. An FAO perspective

Between 1997/99 and 2030, annual meat consumption in developing countries is projected to increase from 25.5 to 37 kg per person, compared with an increase from 88 to 100 kg in industrial countries. Consumption of milk and dairy products will rise from 45 kg/ person/p.a. to 66 kg in developing countries, and from 212 to 221 kg in industrial countries. For eggs, consumption will grow from 6.5 to 8.9 kg in developing countries and from 13.5 to 13.8 kg in industrial countries. Read more: <http://www.fao.org/docrep/005/y4252e/y4252e07.htm>

Source: FAO: Economic and Social Development Department. FAO Headquarters Viale delle Terme di Caracalla 00153 Rome, Italy. Tel: (+39) 06 57051 e-mail: FAO-HQ@fao.org



FAO reaches milestone in massive famine-prevention campaign in Somalia



©FAO/Karel Prinsloo

Supporting pastoralists in Somalia

12 million animals treated so far against livestock diseases and illness

The Food and Agriculture Organization of the United Nations (FAO) is pushing forward with a massive campaign that has so far treated more than 12 million animals in less than three months, protecting the livelihoods of hundreds of thousands of families who rely on their livestock's meat and milk for survival.

By mid-July 2017, FAO reached 22 million animals, benefitting over 3 million people.

"Saving animals saves human lives and livelihoods. When animals are weakened by drought, they stop producing milk or die which means people go hungry and families are pushed out of self-reliance," said Richard Trenchard, FAO Representative in Somalia.

Around 3.2 million people in Somalia are on a hunger knife-edge. The majority live in rural areas and livestock such as goats, camels, sheep and cattle are their main source of food and income.

"What we have heard again and again from displaced people in camps is that when they lost their animals, everything collapsed. It is a steep, long climb for them to get back on their feet again. We have stepped up our response to reach families before that happens," Trenchard said, adding: "Livelihoods are their best defence against famine".

FAO is deploying 150 veterinary teams across Somalia to treat goats and sheep as well as cattle and camels - up to 270,000 animals each day. The teams are made up of local Somali veterinary professionals.

Simple, cost-effective care

Livestock badly weakened by the lack of feed and water are highly susceptible to illnesses and parasites but are too weak to withstand vaccination. As part of an integrated response program to improve the conditions of livestock, animals are treated with multivitamin boosters, medicines that kill off internal and external parasites, deworming, and other treatments to fight respiratory infections.

The simple and cost-effective care being provided by the FAO vet teams is reinforcing animals' coping capacity and keeping them alive and productive.

FAO's livestock campaign in Somalia is being supported mainly thanks to generous funding from the UK's Department for International Development (DFID) with important contributions from the Canadian Department of Foreign Affairs, Trade and Development (DFATD) and the UN's Central Emergency Response Fund (CERF). FAO has also mobilized some of its own resources to back the effort.

Through its Famine Prevention and Drought Response Plan, FAO is delivering large-scale, strategic combinations of assistance to prevent famine in Somalia. In addition to livestock treatments, this includes giving rural families cash for food purchases, helping communities rehabilitate agricultural infrastructure, and providing farmers with vouchers for locally-sourced seeds along with tractor services that reduce their labour burden.

Source: *FAO Regional Office for Africa*

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Africa calls for funding to restore degraded forest land

Investing in forest and landscape restoration as well as ensuring their sustainability will improve livelihoods of African people, experts... However this agenda requires

large investments. Going by a recent analysis by FAO and the UN Convention to Combat Desertification, the key message is that "The main barrier is not the lack of investors but rather the lack of knowledge of stakeholders on the variety of financing opportunities and on how to access them". This is surprising and is a call for briefings on "funding opportunities" not only for forestry sector but for the broader renewable natural resources sector and at all levels.

By: Emmanuel Ntirenganya. Published: May 17, 2017

<http://www.newtimes.co.rw/section/article/2017-05-17/212575/>

Source: © Copyright The New Times Rwanda 2007 - 2017

Drought-hit Ethiopia moves to protect its dwindling forests

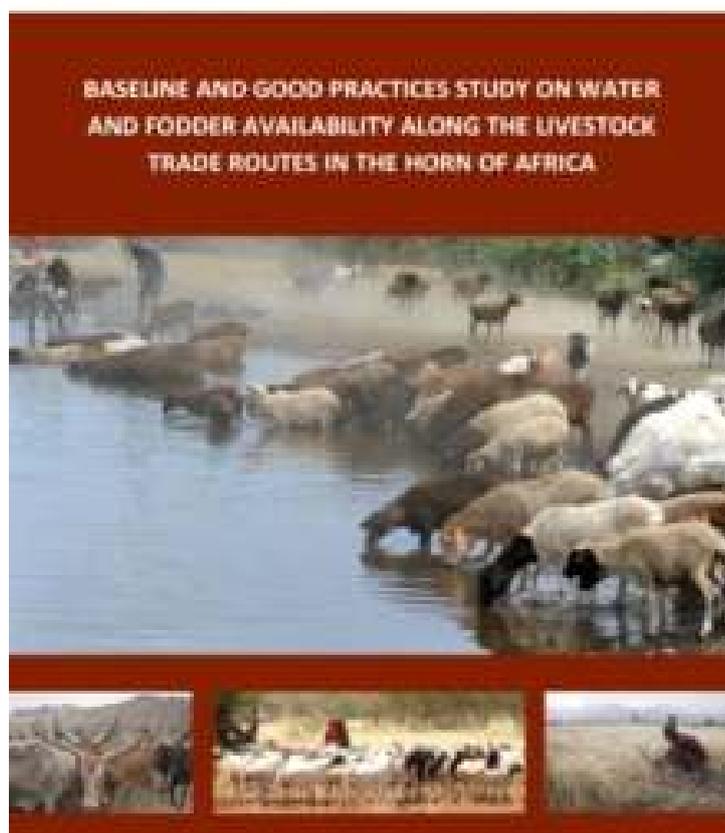
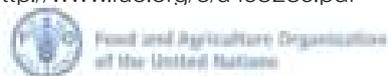
The government of Africa's second most populous country has set an ambitious aim of reducing poverty and becoming a carbon-neutral economy by 2025, in part by transforming the way rural landscapes are managed. Its Climate Resilient Green Economy strategy aims to meet half of its target reduction in carbon emissions by adding 5 million hectares (12.4 million acres) of forests by 2020 - just three years from now - and restoring 22 million hectares of degraded landscapes by 2030. The government sees adding forests as a key way to both curb climate change and help the country adapt to and deal with strong climate change impacts, including droughts, said Yitbetu Moges, the national representative for REDD+. The biggest forest conservation programmes are taking place in Oromia, which is home to a third of the country's population. The 10-year Oromia Forested Landscape Programme (OFLP), which is getting underway this year, is a community-centered program for sustainable forest management. The project, with an initial \$18 million of funding from the World Bank, aims to reduce deforestation and lower net greenhouse gas emissions resulting from land use. The program's first pilot project launched in early May in the Chilimo Forest Reserve, is one of the last remnants of a dry, mountainous forest that once covered Ethiopia's central plateau. With water resources under ever greater stress due to the country's rising population, forests are important to maintaining stable rainfall and building drought resilience, while the carbon they store reduces emissions to the environment, Moges said. The program encourages cooperative members to harvest stalks and other crop residue from fields for fuel, instead of using wood, and cultivate wild honey and crops like green pepper, onion and potatoes, which can be grown within the forest limits without requiring significant deforestation. Communities are also urged to plant fast-growing, non-native trees such as eucalyptus to harvest for timber or medicinal purposes as a way of generating income.

Read more: <http://www.reuters.com/article/us-ethiopia-forest-population/drought-hit-ethiopia-moves-to-protect-its-dwindling-forests-idUSKBN19P190>

Source: *Elias Gebreselassie, Reuters Africa - 1 2017. CHILIMO, Ethiopia (Thomson Reuters Foundation)*

ANNOUNCEMENT: new publications

BASILINE AND GOOD PRACTICES STUDY ON WATER AND FODDER AVAILABILITY ALONG THE LIVESTOCK TRADE ROUTES IN THE HORN OF AFRICA is the title of a new publication by Food and Agriculture Organization of the United Nations (FAO). It is now available and publication details are hereunder. Download: <http://www.fao.org/3/a-i6828e.pdf>



Title: Baseline and good practices study on water and fodder availability along the livestock trade routes in the horn of Africa

Publisher/Imprint: Food & Agriculture Organization of the United Nations (FAO)

Isbn/Ean: 9251096368/9789251096369

Format: Paperback

Published: 30/08/2017

Availability: Stock expected by 03/10/2017

County of Publication: Italy

Dimensions: 210 x 290 mm 94 pages

Readership: Professional & Vocational

Abstract:

The livestock trade between the Horn of Africa and the Middle East is one of the oldest and most vibrant cross-border livestock trading systems in the world.

The value of the trade is directly translated into an assortment of goods and services, including food, which are shipped from the Middle East back to populations in the Horn of Africa.

This study looks at the challenges facing this trade, and addresses the capacity building needs for pastoralists, traders and exporters to become more competitive.

Priority interventions for water infrastructure development/rehabilitation and fodder production were identified in the four focus countries.

Local communities and sustainable use of the wildlife in central Africa

The technical publication on "Local communities and sustainable use of the wildlife in central Africa" is available online and can be downloaded from: <http://www.fao.org/3/a-i7447f.pdf>

French: Communautés locales et utilisation durable de la faune en Afrique centrale

PDF URLs: <http://www.fao.org/3/a-i7447f.pdf>

Card URLs: <http://www.fao.org/documents/card/en/c/8b349b22-eea1-404b-87da-4553666102a0/>



Organisation des Nations Unies
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et l'Agriculture



Communautés locales et utilisation durable de la faune en Afrique centrale



Disrupting Territories. Land, Commodification and Conflict in Sudan.

The publication "Disrupting Territories. Land, Commodification and Conflict in Sudan" has a good outline on how what used to be a mutually beneficial relationship between the sedentary Nuba and the nomadic Baggara degenerated into armed ethnic conflict. See publication details and abstract below.

Bibliographic information

Title:

Disrupting Territories: Land, Commodification & Conflict in Sudan (Eastern Africa Series)

Author

Jörg Gertel, Richard Rottenburg, Sandra Calkins (eds.)

Publisher

Woodbridge: James Currey

Year of publication

Originally published 2014

ISBN

978-1-84701-054-4

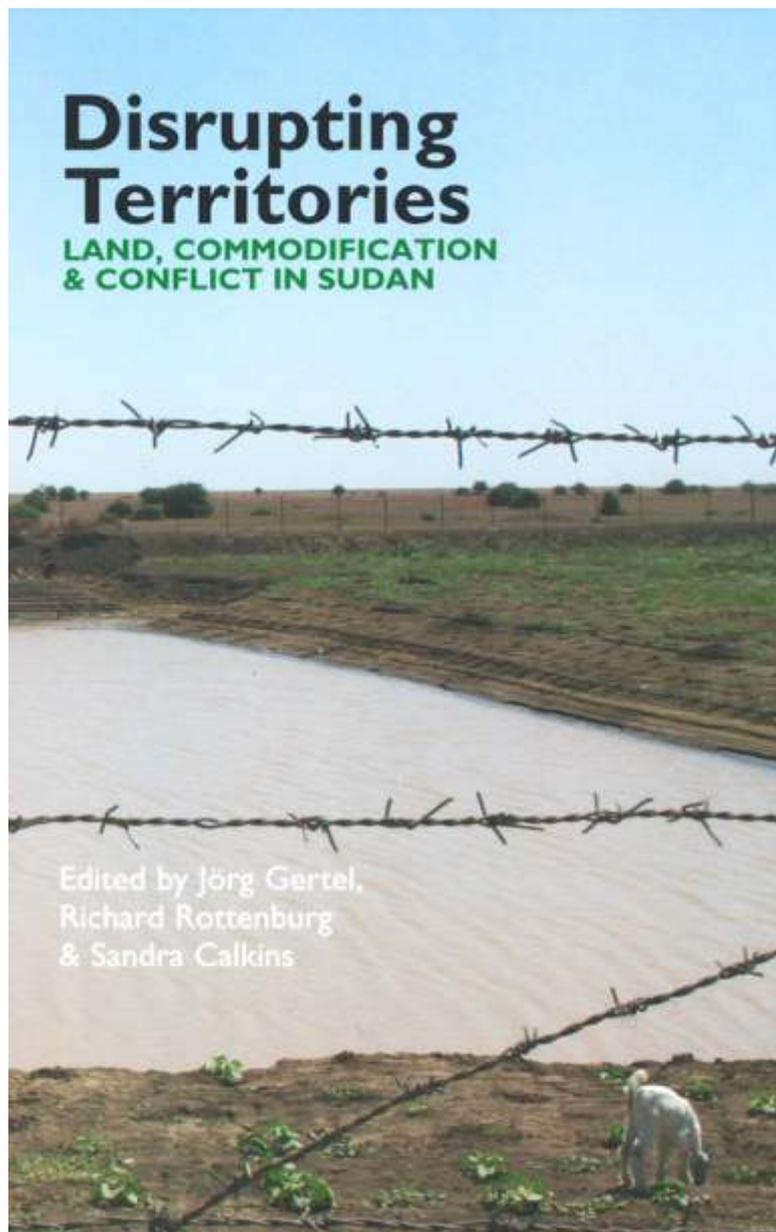
Length 255 pages

Abstract

Sudan experiences one of the most severe fissures between society and territory in Africa. Not only were its international borders redrawn when South Sudan separated in 2011, but conflicts continue to erupt over access to land: territorial claims are challenged by local and international actors; borders are contested; contracts governing the privatization of resources are contentious; and the legal entitlements to agricultural land are disputed. Under these new dynamics of land grabbing and resource extraction, fundamental relationships between people and land are being disrupted: while land has become a global commodity, for millions it still serves as a crucial reference for identity-formation and constitutes their most important source of livelihood. This book seeks to disentangle the emerging relationships between people and land in Sudan. The first part focuses on the spatial impact of resource-extracting economies: foreign agricultural land acquisitions; Chinese investments in oil production; and competition between artisanal and industrial gold mining. Detailed ethnographic case studies in the second part, from Darfur, South Kordofan, Red Sea State, Kassala, Blue Nile, and Khartoum State, show how rural people experience "their" land vis-à-vis the latest wave of privatization and commercialization of land rights.

Source: Max Planck Institute for Social Anthropology, Advokatenweg 36, 06114 Halle (Saale), Germany

Website: https://www.eth.mpg.de/3293423/book_194



Regional strategy for the control of African swine fever in Africa



Food and Agriculture
Organization of the
United Nations



AFRICAN UNION
INTERAFRICAN BUREAU
FOR ANIMAL RESOURCES

REGIONAL STRATEGY FOR THE CONTROL OF AFRICAN SWINE FEVER IN AFRICA



Published 2017 by:

The Food and Agriculture Organization of the United Nations;
African Union-Interafrican Bureau for Animal Resources;
and International Livestock Research Institute.

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It is anticipated that the strategy document will guide the prevention and control of African swine fever efforts in the continent contributing to better trade of pig and pork throughout Africa and beyond and in so doing improve the livelihood and food and nutrition security of producers and other actors.

FAO information products are available on the FAO website (www.fao.org/publications).

THEME AND DEADLINE FOR NEXT ISSUE

Creating a forest landscape restoration movement in Africa: a call to heal planet Earth

Every year nearly 3 million hectares of forests are lost in Africa. Sixty five percent (65%) of the land in Africa is affected by degradation, and 3 percent of GDP is lost annually from soil and nutrient depletion on cropland. Among the many challenges facing Sub-Saharan Africa (SSA), forest loss and land degradation stands out. Exacerbated by climate change and poor management of agricultural lands, forest degradation threatens the water supplies and ecological functions vital to all SSA economies. Rural smallholder farmers and households suffer the most from degraded land as they cannot finance counter-measures if there is disruption or loss of stable weather patterns, healthy soils and tree cover, and water.

During the Global Landscapes Forum at the Conference of Parties (COP21) in Paris, on the 6th of December 2015, African countries launched the African Forest Landscape Restoration Initiative (AFR100). It is a pan-African, country-led effort to restore 100 million hectares of degraded and deforested landscapes by 2030. AFR100 aims to accelerate restoration of degraded and deforested landscapes to enhance food security, increase climate change resilience and mitigation, and combat rural poverty.

The creation of the umbrella Africa Resilient Landscapes Initiative (ARLI) is intended to implement AFR100. It complements the African Landscapes Action Plan (ALAP) and the broader Climate Change, Biodiversity and Land Degradation (LDBA) program of the African Union and the Sustainable Development Goals. AFR100 contributes to the achievement of domestic restoration and sustainable development commitments, the Bonn Challenge, and the New York Declaration on Forests among many other targets. It builds on the experience and progress achieved through the TerrAfrica Partnership, Great Green Wall of the Sahara and the Sahel Initiative, and other related landscape restoration efforts.

To realize the target of 100 million hectares of new forests, African leaders see the need for sustainable forestry projects based on a long-term approach with multi-stakeholder benefits and intensified cooperation with the private sector to enhance resources, innovation and the ability to deliver. One such private sector collaborative initiative is the 'Forests for the Future – New Forests for Africa'. 'Forests for the Future – New Forests for Africa' is an initiative established with the aim to stimulate and drive large scale reforestation in Africa.

The next edition of Nature & Faune journal will explore the science and innovations (technological, social and policy) that can support the achievement of this African dream. Please share your experiences on challenges, opportunities

and successful restoration including farmer managed natural regeneration, improved management of smallholder woodlots, reforestation, evergreen agriculture with intercropped trees, and associated sustainable land management practices such as water harvesting and erosion control.

The editorial board invites articles on the realities - the spirit and the letter - of restoring deforested and degraded landscape in Africa. We welcome contributions from a wide field of expertise. If potential authors have reports on findings of programs and projects, success stories, and announcements on forest landscape restoration related matters please send them to the address below. We usually prefer articles some 3 pages long, and we welcome and encourage colour pictures.

We encourage contributors to share articles on:

- Rights to farmers and rural households to manage trees and forest resources
- Empowerment of community based institutions to support sustainable land management
- Access to markets for products from sustainable forestry and agriculture production systems
- Capacities for supporting adoption of sustainable land use practices
- Land use planning and management,
- Cross sectoral coordination challenges
- Securities for long term investments
- Policy and governance aspects

Please send us your manuscript(s) by email to the following addresses:

nature-faune@fao.org

Ada.NdesoAtanga@fao.org

Deadline for submitting manuscripts for the next issue is 1 December 2017.

African Forest Landscape Restoration Initiative web site:
www.afr100.org

NEPAD. 2017. African Forest Landscape Restoration Initiative, Overview by New Partnership for Africa's Development (NEPAD) 16 April 2017. (Overview prepared by the World Resources Institute, NEPAD, and German Federal Ministry for Economic Cooperation and Development and the World Bank. http://www.wri.org/sites/default/files/AFR100_Overview_English_No_Annexes-Sept_29.pdf

'Forests for the Future – New Forests for Africa' is an initiative established

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