

Adaptation of institutional arrangements to management of Northern Rangelands of Kenya

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Abstract Northern Rangelands of Kenya have continued to grapple with management challenges largely due to a lack of understanding of the dynamics thereof. Eroding customary institutions and new institutional arrangements characterize the system suggesting that adaptation is taking place to cope with the change. It is imperative that these socio-ecosystems adjust to the disturbance without disintegrating into a different state that is controlled by a different set of processes to ensure sustainable rangeland management. To understand the nature of change, the study sought to evaluate institutional arrangements engaged in tackling growing socio-economic and ecological factors challenging development within the last decade. Three study sites namely Kinna, Makurian and Westgate, representing three types of institutional arrangements (elders only, group ranch committee and community conservancy board), were investigated. Key informants, focused group discussions and household survey methods were used to gather data. Data were managed and analysed using Ms Access, Ms Excel, social network analysis and SPSS. Findings indicate that more actors (internal and external) are engaging in management of social economic and ecological factors challenging development within the last decade. The co-management approach allows increased capacity to tackle these challenges and further presents more opportunities for a diversified livelihood, two key features of ecosystem resilience. Findings are useful as the Kenya government implements the National Land Policy that recognizes the need to restructure community land and its management.

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1 Introduction

Kenyan rangelands have remained marginalized as a result of misguided policy stemming from a lack of understanding of the rangelands economic value and potential. The rangelands largely constitute the arid and semi-arid lands (ASALs) within rainfall zones of 0–300 and 300–600 mm, respectively. They have short growing periods and rainfall patterns are erratic making them unsuitable for cultivation (UNOCHA 2009). Common socio-economic and ecological challenges associated with ASALs include chronic poverty, increasing population pressure, high unemployment, low literacy levels, insecurity and degradation of natural resources. Change in Kenyan government in 2003 came with higher recognition of the importance of ASALs development. Existing policy aiming to promote sustainable development is the Kenya ASAL policy which contributes to other key policies such as the Kenya Vision 2030, Constitution of Kenya 2010 and the National Land Policy. To eradicate marginalization and constructively address the environmental and socio-economic challenges, a well-thought ASAL development strategy by diverse stakeholders is crucial. The strategy needs to take a broad view of the various tenets that can be applied to enable sustainable changes because the rangelands are complex and require a multi-faceted approach in tackling challenges (Odhiambo 2013).

Governance of ecosystems such as the rangelands is a critical facet that requires extensive consideration within the Kenyan rangelands development strategy. The governance approach needs to be flexible and have the capacity to respond to environmental feedback owing to the complex adaptive nature (Levin 1998) of such ecosystems. Dynamism enables development of new knowledge and understanding to cope with the imminent change (Carpenter and Gunderson 2001). This aspect of continuous learning is critical because the capacity of humans to predict and plan for the future is instrumental in resilience.¹ Key features of resilience include the ability of the system to retain control despite of change, capability of self-organization and its ability to increase learning and adaptation capacity. Two components contributing to enhancing resilience are ecosystem diversity and sharing of resource management by a diverse group of stakeholders (Holling and Walker 2003).

It is therefore important to understand where resilience resides in a system, when and how it can be lost or gained so as to prevent a social ecological system from moving in an undesirable state as well as discover points of intervention (Holling 1973). Social ecological resilience is a useful approach in informing governance in both practice and theory through its focus on strategic spatial planning. This is by elaborating how social ecological systems can be governed in the face of transition while maintaining the ability to adapt, learn and transform (Wilkinson 2012). The resilience approach gives focus to nonlinearity in change expected and the interactions of such dynamics across temporal and spatial scales. This aspect has previously received less attention due to the common resilience focus on absorbing shocks to remain functional; however, it is now deemed essential as a systems approach gains cognizance (Folke 2006).

¹ Resilience is defined as the capacity of an ecosystem to cope with disturbance without disintegrating into a different state that is controlled by a different set of processes.

Natural resource management and the efforts to link ecology, economy and society is the source of new thinking around co-management. Rationale of co-management is that processes of allocating and using resources are shared among multiple parties, especially in common property regimes (Pinkerton 1989). Co-management concept emanates from the synergy between collaboration and adaptive management which yields a community-based system encompassing complex cross-scale linkages and dynamic learning. The self-organization is facilitated by rules and incentives of higher levels, giving social ecological systems the potential to be more robust to change (Olsson et al. 2004). Further, it is imperative that social and political contexts under co-management are examined because when political economy is not considered, the results tend to reinforce existing inequalities (Nadasdy 2003). Management approaches based on resilience also need to view events in a broader spectrum, e.g. regional rather than a local context, and the need to emphasize heterogeneity. These require the capacity to design systems that can absorb and accommodate future events in whatever unexpected form they may take (Bahadur et al. 2010).

Despite the growing interest on co-management approach, very little empirical evidence exists on how to conceptualize, analyse and evaluate co-management especially in the rangelands where data on co-management are insufficient (Carlsson and Berkes 2005). The study hypothesizes that Kenyan rangelands are moving away from pure dependency on customary institutions to address the socio-economic challenges. This is characterized by an embrace of a co-management type of arrangements that engages a diverse set of stakeholders. No clear evidence exists on how this is unfolding, and therefore, this study attempts to explore the issue. This is also with a realization that community participation in decision-making is often important because development projects defined locally target the real needs of the beneficiaries and potentially better angle communities to control both the process and the outcomes of the project (Mcpeak et al. 2009). Further, local communities possess local ecological knowledge, an imperative in development of the social ecological systems (Crona 2006). Engagement by three institutional arrangements (group ranch, trust land and community conservancy) to address negative socio-economic and ecological factors challenging development in the last decade is therefore evaluated.

2 Methodology

2.1 Conceptual framework

The study is based on social ecological resilience theory² focusing on social groups or communities that depend on ecological and environmental resources for their livelihood. Better co-management strategies that contribute to livelihood diversification are considered key indicators of resilience. The study assesses how traditional institutions are rearranging themselves into hybrid institutions characterized by an interaction of actors within and outside the community. This is necessitated by socio-economic and ecological changes that require different institutional capacities to handle (Fig. 1). Trust lands and group ranches are the two land tenure systems in the Kenyan rangelands instituted by the government following the colonial era. Community conservancy is a new emergence within the last decade and is operating within both group ranches and trust land tenure systems.

² Social-ecological resilience is the capacity of linked social-ecological systems to handle disturbance while maintaining the capacity for adaptation, learning and transformation (Folke et al. 2010).

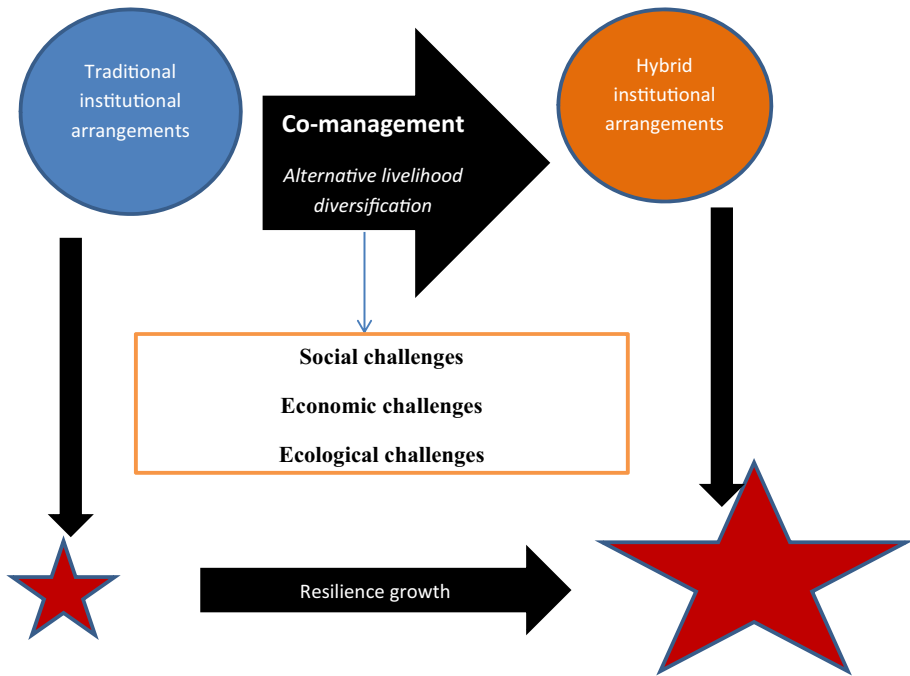


Fig. 1 Conceptual framework—adaptation of pastoralist institutional arrangements to address negative socio-economic and ecological factors

Institutional arrangements evaluated are an elder’s only system operating within a trust land system, group ranch committees and community conservancy boards.

Dheedha elders’ is the elders’ only management institution investigated in this study. Found among the Borana community in Northern Kenya, Dheedha elders form key community decision makers and are charged with resource management (land, pasture, water) at community level. This body is formed by individual elders from different closely knit households called the “Olla”. The management strategies have for a long time been guided by an unwritten laid down rules, regulations, norms, values and beliefs. This is, however, changing as the importance of customary laws takes its rightful place as seen by efforts to support documentation as well as lobbying government to gazette the by-laws (USAID 2010).³

The group ranch committee constitutes majorly elders from different clans within the group ranch but also with representation from women and youth. The committee is put in place through elections that takes place every 2 years and operate within the mandate of a group ranch constitution. The group ranch holds annual general meetings to deliberate and make decisions on management of the group ranch. Group ranches raise funds through income-generating activities such as ecotourism activities, sand sale and donor funding.

³ “In Garbatulla, a local NGO Resource Advocacy Program (RAP) is working with local communities and the local government to document relevant customary laws on natural resource management among the Boran. Kenyan laws have provisions for incorporation of these by-laws, and once the Minister gazettes the laws it will form part of the legal system.”

The conservancy board is a democratically elected body drawing its membership from different parts of the community. It has a good representation from elders, youth, women, county councils and enjoys facilitation from non-governmental organizations. The conservancy board employs staff under the day-to-day management of a conservancy manager. Community conservancy source of funds is income-generating activities (tourism and livestock marketing revenues) and donor funds. Board members are elected at the annual general meeting and are granted 3-year tenure of office. The annual general meeting is held annually and serves to communicate progress and ensure accountability of conservancy board to its members. The study compares the level of engagement by these institutions to address negative socio-economic and ecological factors that challenging development. These socio-economic and ecological factors were gathered through focused group discussions and key informants and comprise

1. Social factors: insecurity, negative politics, cattle rustling, low education levels, land tenure challenges and negative culture practices.
2. Economic factors: comprised, low infrastructure, low financial services, low entrepreneurial skills, lack of livestock markets, middlemen and untapped ecotourism.
3. Ecological challenges: droughts, disease, floods, pasture degradation and water degradation.

It is anticipated that a diverse stakeholder interaction further allows for livelihood diversification, another element of a resilient system.

2.2 Study area

The study was conducted in the Northern Rangelands of Kenya, found in the arid and semi-arid areas commonly characterized by low and unpredictable rainfall. Drought occurrences are common with the most recent one reported in 2009 (UNOCHA 2009). There are various classifications of the Northern Rangelands of Kenya based on the moisture index and annual rainfall as described in Table 1. Study sites used fall with zone four and six.

Three study sites, namely Kinna Division (Isiolo County), Makurian Group Ranch (Laikipia County) and Westgate Community Conservancy (Samburu County), were purposively selected to represent main types of institutional arrangements (elders only, group ranch committee and community conservancy board management) operating in the Northern Rangelands of Kenya (Fig. 2). The institutional arrangements selected within each county do not imply that these are the main institutional arrangements in the

Table 1 ASAL climate classification based on the moisture index and annual rainfall

Zone	Classification	Moisture index (%)	Annual rainfall (mm)	Per cent of Kenya's Land area
IV	Semi-humid to semi-arid	40–50	600–1100	5
V	Semi-arid	25–50	450–900	15
VI	Arid	15–25	300–550	22
VII	Very arid	<15	150–350	46

Source Sombroek et al. (1982)

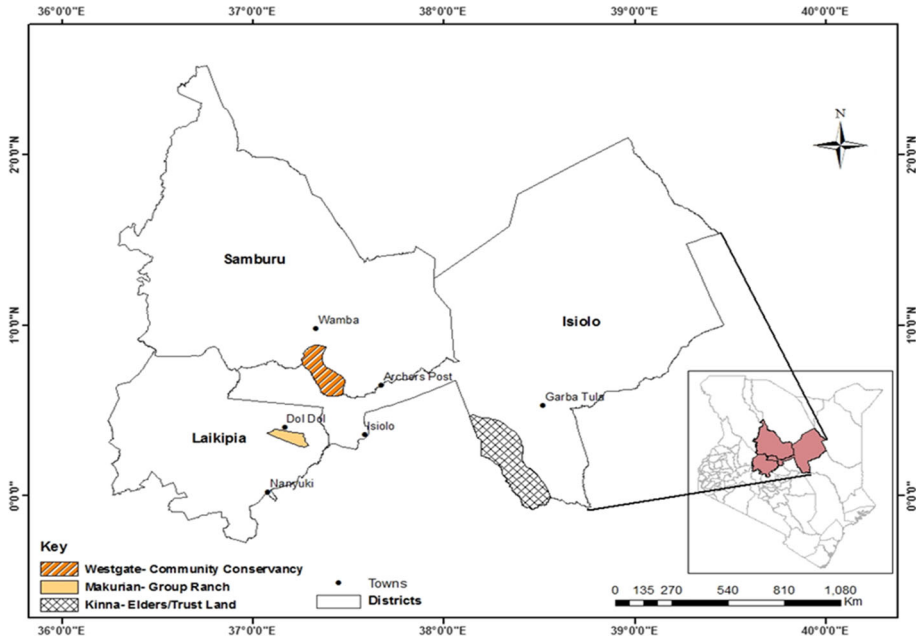


Fig. 2 Types of pastoralists institutional arrangements in the Northern Rangelands of Kenya

respective counties, but only serve as case studies that provide three distinct treatments for comparison purposes. The Kenya Constitution (2010) describes communal land as land that is lawfully managed or used by a specific community as community forest, grazing areas, shrines, ancestral land and lands traditionally occupied by hunters and gatherer communities or land lawfully held as trust land by the county governments.

Kinna Division is located in Isiolo County where all land is under trust land arrangement, meaning the local county government holding land in trust for the people. Kinna Division is located 120 km from Meru town and closely borders Meru National Park. It is a semi-arid area with long rains falling between April and May, while short rains fall in November. Pastoralism is the main livelihood; however, a significant number of households are farming as a result of two rivers flowing in Kinna. Vegetation composition is characterized by herbaceous plants dominated by *Aristida papposa* and *Digitaria velutina*, while the woody plants are dominated by *Commiphora* sp.

Makurian Group Ranch represents a group ranch system. The choice of Makurian was guided by the fact that it is one of the few group ranches in Laikipia County that was not under the influence of the community conservancy model during the data collection stage of the study period. Laikipia County comprises 13 group ranches, 10 of which have embraced the community conservancy model. Makurian is located in Mukogodo Division, covers an area of 7000 ha and is owned by the indigenous Maasai of the Ndorobo ethnic group who predominantly practice pastoralism. The topography is semi-arid and although the area gets good rainfall averaging 800 mm, overgrazing and the hilly nature of the area have greatly accelerated soil erosion. Woody vegetation is being depleted through charcoal burning, and the effect is the replacement of palatable species such as *T. triandra* with *Harpachne schimperii* and *Microchloa kunthii*. Key economic activities include pasture management, forest management, wildlife management, sand harvesting livestock

marketing and employment. Sand is the main source of Makurian communal revenue and is used on operations such as administrative costs, community projects and school bursaries. The group ranch set aside a conservation area used as a campsite with help of Kenya Forest Service in 2007; however, this has not been currently tapped due to a lack of capacity on ecotourism and ability to attract funding opportunities by the group ranch.

Initiated in 2004, Westgate Community Conservancy is one of the seven community conservancies in Samburu County and is located within Ngutuk Ongiron Group Ranch. Ngutuk Ongiron covers approximately 34,000 ha with the core conservation area taking up 880 ha. The area is semi-arid, receives average rainfall of 580 mm, thrives well in pastoralism and is notable for its immense potential and contribution to the national livestock industry particularly the slaughter stock. Some inhabitants practice agriculture and the tourism sector is tremendously growing, a trend attributed to large wildlife populations and the conservancy model. The area is dominated by *Cynodon dactylon* and *A. papposa* type of vegetation. These grasses are fast growing and when damaged are quick to recover. These are therefore found in dry lands due to their heat and drought tolerance nature allowing them to survive where few other grasses do.

2.3 Sample size, data collection and analysis

The sample size was estimated using a formula by Israel (2009):

$$N = Z^2 p(1 - p) / E^2$$

where N sample size required, Z confidence level at 95 % (standard value of 1.96), p estimated proportion of attribute that is present in the population and E desired level of precision to detect difference among strata observations.

The sample size was estimated by assuming variability in the proportion of dependent variables (p) of 0.5 and a desired level of precision of 15 % which is potentially needed to estimate a difference among the strata. The calculated sample size was multiplied by three to correct for design effect and accommodate a comparative analysis of the strata, and increased by 20 % to adjust for non-response or recording errors. The calculated sample size was rounded up to the closest number in order to match well with the number of strata (three institutional arrangements) to be surveyed. A total of 150 households made up the sample, while sample size per stratum was estimated by dividing total households (150) by the number of strata (three) to give 50 HH per stratum.

Table 2 Distribution of households within villages in the study sites

Kinna		Makurian		Westgate	
Villages	Respondents	Villages	Respondents	Villages	Respondents
Gubadida	10	Katonga	15	Lempaute	12
Jillo Dima	10	Lariakorok	19	LpusLeluai	13
Koticha A	10	Loisukut	16	Remot	12
Madina	10			Sasaab	13
Town	10				
Total	50		50		50

Fifty per cent of villages in each study site were randomly selected from the total number of villages in the study site to give a good representation of the area as well as to keep the sample to 150 households. To obtain the number of households sampled in each village, the total number of households per study site (50) was divided by number of randomly sampled villages. The number of households to be selected was proportional to village size, and the distribution of households sampled is detailed in Table 2.

Qualitative data were collected using focused group discussions (FGDs) and key informant interviews guided by a checklist. Three FGDs disaggregated by gender (five women, five men and five youth) were conducted in each study site. Two key informants in leadership within the institutional arrangement and one key informant working for an organization partnering with the institutional arrangement were interviewed from each site. Key informants were selected based on their extensive knowledge of the area and close working relationship with communities in the area. Part of the qualitative data collected such as the negative social economic and ecological factors was used to design the quantitative data collection instrument to further compare it cross different management scenarios. A household survey targeting household heads was conducted using semi-structured questionnaires with support from enumerators with a local understanding of the area.

The key themes of primary data collected were types of existing institutional arrangements. Data were also obtained on whether different institutional arrangements were engaged in addressing negative socio-economic and ecological factors. A time difference of 10 years (2002–2012) was applied to show possible trends on the institutional arrangements addressing negative socio-economic and ecological factors.

Social network analysis was used to show the type of actors as well as quantify their engagement in addressing negative socio-economic and ecological factors a decade ago and currently. Nodes were created based on the degree centrality which is simply the number of links an institutional arrangement had in addressing various socio-economic and ecological factors challenging development. Descriptive statistics were further used to highlight the role of various institutional arrangements in addressing specific socio-

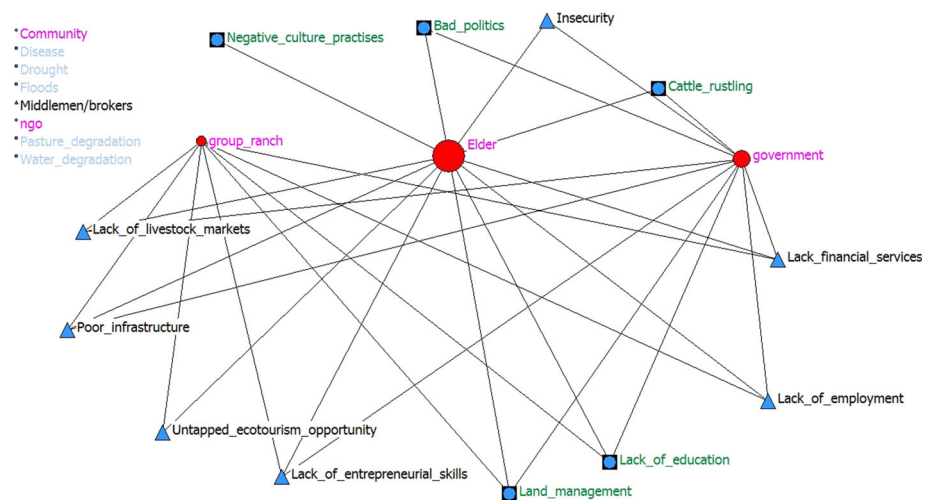


Fig. 3 Co-management to address negative socio-economic and ecological factors (2002)

economic and ecological challenges. These were further validated using Pearson's Chi-squared test to evaluate whether there were significant differences in institutional arrangements addressing challenges in 2002 and 2012.

3 Results and discussions

3.1 Adapting pastoralist institutional arrangements overtime

Results (Figs. 3, 4) obtained through social network analysis show the actors and their engagement in managing negative socio-economic and ecological factors challenging development. The size of the node in the graphs is based on the degree centrality which is simply the number of links an institutional arrangement had to various challenges. The larger the size of the node, the more links to a socio-economic and ecological factor, while the colours/symbols show different types of social, ecological or economic factors. Community perceptions indicate that a decade ago, the key actors were elders, group ranch committee and the government. This is different in 2012 where key actors are elders, group ranch committees, community conservancy, government and non-governmental organizations. The finding suggest that the role of an elders management only is challenged by the lack of capacity to address new challenges posed by changes in the socio-ecological systems such as the Northern Rangelands of Kenya. The response is engagement by diverse actors both internally (elders, group ranch committee and community conservancy board) and externally (government and non-governmental organizations). An example is the negative culture practices linked only to elders' management in 2002. In 2012, the same challenge is linked to all the actors, showing an increased level of collaboration.

Further, Westgate Community Conservancy which has rapidly emerged in the last decade demonstrates co-management within an institutional arrangement. The conservancy board is constituted by a council of elders, women representatives, government and non-governmental representative, employs young educated youth to manage daily operations of

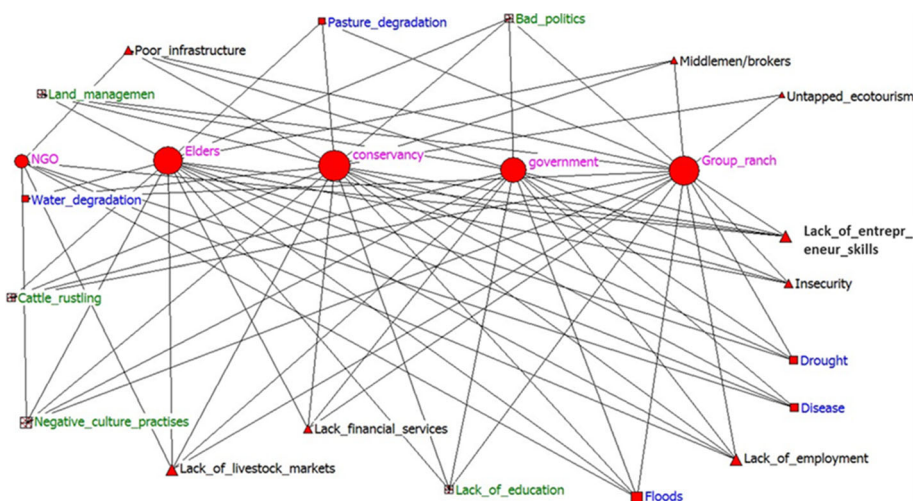


Fig. 4 Co-management to address negative socio-economic and ecological factors (2012)

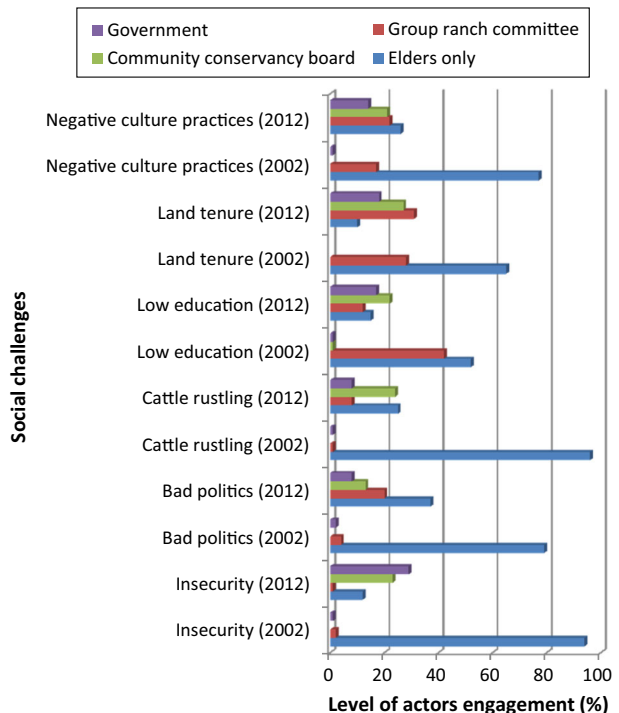
the conservancy (conservancy manager, accountants, rangers), thus demonstrating a co-management approach in institution building. Details on managing specific challenges are expounded more in the next section.

3.2 Socio-economic and ecological factors challenging development and their management

3.2.1 Social challenges

Results in Fig. 5 show specific social challenges in the Northern Rangelands of Kenya and actors supporting address them. A decade ago, the elders had more influence in addressing most of the social challenges especially insecurity (94 %), negative politics (79 %), cattle rustling (96 %) and negative culture practices (77 %). Social factors mostly revolved around the use of common resources such as pasture and water. These resources are scarce and are further diminishing as rangelands shrink owing to growing land use changes and increasing population. Reported high engagement by elders confirms the role of customary institutions in helping pastoralists communities make collective decisions on resource management based on informal rules and regulations. The group ranch made a substantial contribution toward low education (42 %) and land tenure issues (28 %). Support to improve education is enabled by funds obtained from the communal revenue kitty going to households through a school bursary scheme. In regard to land tenure, the group ranch has authority over land following legislation in 1968 when government formalized land tenure system to enable communities manage their land productively. A few group ranches have

Fig. 5 Social factors challenging development and actors' involvement



managed to secure title deeds, and others are still pursuing the process often challenged by hefty amounts of funds required to process title deeds.

In 2012, various actors elders, group ranch, community conservancy and the government all supported address negative social challenges. Group ranch engagement was observed in negative politics (20 %), land tenure (31 %) and negative culture practices (22 %). Group ranch still demonstrates authority over land tenure over time although other players are now perceived to be playing an active role. This is especially noted with the emergence of a community conservancy within the last decade. Community conservancy is proactively engaging the community address insecurity (23 %), cattle rustling (24 %), low education (22 %), land tenure (27 %) and negative culture practices (21 %). Community conservancy demonstrates a bigger role in supporting education in 2012, a finding that is largely attributed to part of communal revenue going toward an education bursary scheme.

There is positive influence noted in security and cattle rustling in 2012. This can be attributed to employment of conservancy rangers who patrol community conservancies and their environs among other security strategies. Northern Rangelands Trust supports training of scouts/rangers with the Kenya government institution called Manyani who are then redeployed to their respective conservancies. Government influence is also notable in the area of insecurity, a docket that is largely driven by government rather than development agencies. Three institutional arrangements studied are located in volatile areas where communities are competing for scarce resources, majorly pastures and water, to sustain their pastoralism livelihoods and this often erupts into resource conflict.

Chi-square test of association results in Table 3 reveals a significant change [$\chi(9) = 28.567, p = 0.001$] in institutional arrangements involved in addressing social factors in the years 2002 and 2012. For instance, while 87 % of the respondents suggested that elders were central in management of social challenges in 2002, this reduced to 28.2 % in 2012. In addition, more actors were engaged in addressing social factors in 2012 compared to 2002, with community conservancy recording highest (29 %) engagement.

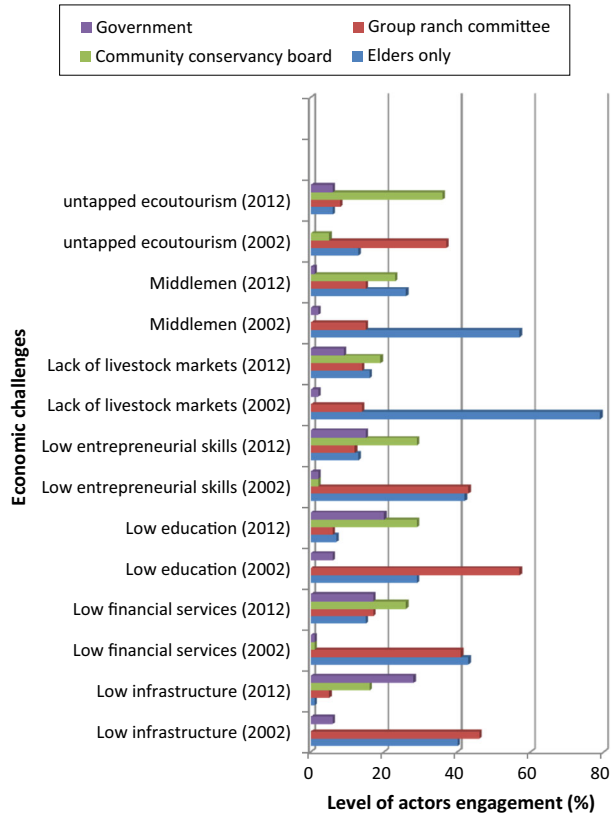
3.3 Economic factors

Both elders and group ranch engaged community in addressing economic factors affecting development in 2002 (Fig. 6). Elders were more involved in challenges around livestock marketing (79 %) and exploitation by middlemen (57 %), indicating elders' instrumental role in giving market information to the community. This finding emphasizes the significance of livestock as a livelihood asset hence the keen attention by the elders. The group ranch management showed substantial support in the areas of low infrastructure (46 %) and untapped ecotourism (37 %). Both infrastructure and ecotourism require large

Table 3 Social factors and actors engaged

Institutional arrangement	Year 2002 (%)	Year 2012 (%)	χ^2 test
Social factors			
Elders	87.1	28.2	$\chi(9) = 28.567, p = 0.001$
Group ranch committee	11.5	21.2	
Community conservancy	0.2	29.3	
Government	1.1	21.2	

Fig. 6 Economic factors challenging development and actors' involvement



investments to set up and thus require external support to implement. The results therefore imply that the group ranch has more ability to attract external partnership compared to elders only management.

A more interactive role by various institutional arrangements (elders, group ranch and community conservancy) was noted in 2012. This demonstrates growing co-management in addressing economic factors and may be attributed to the fact that addressing economic challenges often require a level of collaboration internally and externally. Community conservancy provided diverse support with its attention noted in areas of low financial services (26 %), low entrepreneurial skills (29 %), middlemen (23 %) and untapped ecotourism (36 %). Most attention by the community conservancy was noted in addressing untapped ecotourism challenge compared to other challenges. The finding can be attributed to community conservancy's role in advocating for biodiversity conservation especially wildlife conservation. There is a rapid growth in investor interest to partner with communities in setting up tourism ventures in Samburu County largely owed to high wildlife population. Institutional building capacity provided by the Northern Rangelands Trust through promotion of community conservancies is also playing a complimentary role in growing ecotourism in Samburu. As a result, communities are receiving communal revenue that is injected into community projects such as water projects, road repairs, payment of salaries and education bursaries. The community conservancy high rank in addressing low entrepreneurial skill and low financial services is attributed to capacity built on business development and micro-credits loan offered to women.

Elders are still perceived as very influential in addressing the middlemen factor in livestock trading possibly because pastoralism is the key livelihood in these communities. The elders are therefore continually engaged in protecting communities from unscrupulous middlemen. The community conservancy also scored high in addressing the middlemen challenge. This is likely to be attributed to a Livestock Market Program facilitated by the Northern Rangelands Trust. The market is available through a quota system given to community conservancies that are demonstrating success in biodiversity conservation. Westgate has received quotas to this market severally for ranking good in its performance. The market is mobile and thus provides close proximity to communities that are often situated far from markets. The communities therefore do not have to walk long distances to market, and at the same time, the arrangement reduces the effect of middlemen.

Government is perceived to offer most support in building infrastructure. Latest development in the area of study is the massive Lamu Port Southern Sudan-Ethiopia Transport (LAPSSET) corridor project which includes construction of key roads such as the Isiolo-Moyale. These roads are opening up the area, thus contributing to economic development. Community conservancy ranked high in supporting build infrastructure, a finding that may be largely attributed to the communal revenue stream from ecotourism activities. This revenue is injected to community projects such as water projects, road repairs, building community conservancy headquarters among other infrastructure.

Table 4 shows there were significant differences in the actors engaged in addressing negative economic factors over time [$\chi(9) = 27.6159, p = 0.00$]. Community conservancy ranked highest in addressing economic factors in 2012 (41 %) compared to its role in 2002 (0.7 %) demonstrating both an emergence and a domination at the same time.

Generally, elders (52.9 %) and group ranch committees (43 %) had a substantial role in economic factors in 2002 compared to elders' domination in the case of social factors.

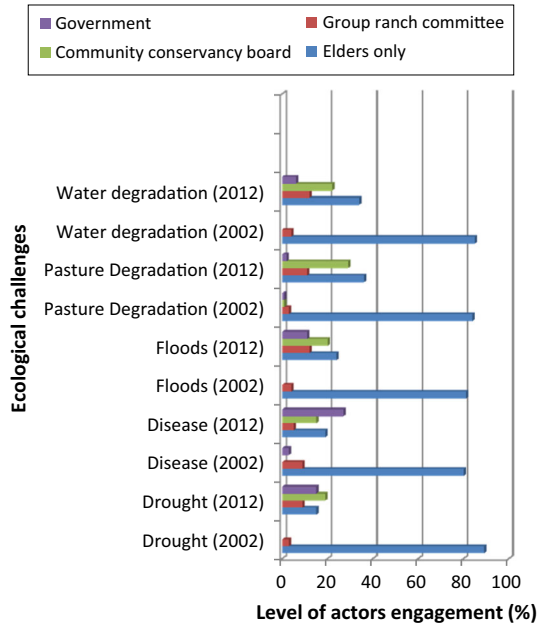
3.4 Ecological challenges

In 2002, elders played a bigger role in addressing ecological factors such as drought (89 %), disease (80 %), floods (81 %), pasture degradation (84 %) and water degradation (85 %) as noted in Fig. 7. Ecological factors have a direct impact on pastoralism livelihood and would thus explain the high level of attention by elders. Evidence of interaction among various institutional arrangements to address ecological factors is noted in 2012. Drought (39 %) and disease (30 %) attracted higher levels of co-management probably due to their high negative impact on pastoral livelihoods often leading to loss of livestock assets, as well as lack of capacity by one institution to deal with the challenge. The government demonstrated higher influence on disease (27 %) possibly because most of the veterinary regulations fall within the government mandate. Disease is a complex challenge to address at a local level owing to its trans-boundary nature and therefore requiring national and

Table 4 Economic factors and actors engaged

Institutional arrangement	Year 2002 (%)	Year 2012 (%)	χ^2 test
Economic factors			
Elders	52.9	19.3	$\chi(9) = 27.6159, p = 0.001$
Group ranch committee	43	17.7	
Community conservancy	0.7	40.9	
Government	3.4	22.1	

Fig. 7 Ecological factors challenging development and actors' involvement



regional interventions. Emergence of the community conservancy is still notable and further demonstrates its diverse support as it addresses all the ecological challenges. Community conservancy influence on pasture degradation (29 %) was higher, a finding that is likely to be attributed to the holistic grazing management plan applied by the community conservancy.

Unlike social and economic challenges, the elders influence on ecological issues in 2012 is notably present. This suggests that ecological issues remain very significant to the pastoral communities possibly because pastoralism is hinged on ecological aspects and therefore has a larger impact on the livelihood. This finding also reinforces the fact that elders still have authority even in the current institutional arrangements as is further evidenced by the role of an elected council of elders within the community conservancy model.

Chi-square test results presented in Table 5 further confirm actors engagement in addressing ecological factors as significantly different over time [$\chi(6) = 32.575, p = 0.000$]. The elders had a commanding role at 94.5 % in 2002 and still a leading, but reduced role in 2012 (37.3 %). Other actors were also involved in 2012, while a community conservancy which was not reported in 2002 had a distinct involvement in 2012 (30.6 %).

Table 5 Ecological factors and actors engaged

Institutional arrangements	Year 2002 (%)	Year 2012 (%)	χ^2 test
Ecological factors			
Elders	94.5	37.3	$\chi(6) = 32.575, p = 0.000$
Group ranch committee	4.7	14.3	
Community conservancy	0.9	30.6	
Government	0.9	17.8	

4 Conclusion

The study focused on assessing how community institutional arrangements in Northern Rangelands of Kenya are engaging communities to address negative socio-economic and ecological factors challenging development. This is compared across two time periods (2002–2012) to establish a possible trend on the type of actors and their level of engagement. Co-management is a key feature of resilience hence why the study findings are a useful contribution in developing sustainable interventions on governance of the rangelands.

The study findings indicate a growing involvement of actors managing negative socio-economic and ecological factors, thus demonstrating a co-management approach. A decade ago, elders had a substantive authority in management of rangelands, while minimal influence by group ranch committees was noted. In 2012, the distinct elders' role has declined and a co-management approach characterized by an involvement by more actors (elders, group ranch committee, government, non-governmental organizations, community conservancies boards) in addressing negative social economic and ecological factors. The elders' role is still inculcated within the group ranches and the community conservancy management, but the latter have assumed a semi-formal decision-making structure in their management. The new interactive scenario characterized by a diverse stakeholder engagement is a key feature of the resilient systems.

Unlike conventional rangeland management focusing on optimization of secondary production, a resilience-based approach also considers the diversity of resources available from rangelands which are the foundation of livelihood security for both developed and underdeveloped rural communities. In this regard, community conservancies are promoting a diversified livelihood through wildlife conservation as complementary revenue to livestock revenues. Communities such as Westgate are therefore receiving revenue that is injected into running of the community conservancy institution and community projects.

Beyond flexibility, management approaches based on resilience need to view events in a broader spectrum (regional rather than a local context). The newly established County governments have a role in engaging local institutional arrangements in county management plans. This is because local institutional arrangements have a wealth of knowledge, information and expertise on the rangelands, which if tapped can allow draw practical strategies and interventions. The political environment influences decisions made at the county level as well as the community level. The findings are useful as the government implements the National Land Policy that now recognizes community land. Restructuring community land management to accommodate co-management approach is beneficial and hereby recommended based on the findings. It allows various stakeholders, internal and external to engage, thus building capacity on the ability to address negative socio-economic and ecological factors derailing development in the rangelands. In addition to increasing management capacity, a co-management approach catalyses the ability of pastoralist to diversify their livelihood.

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