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**The XXIV International Grassland Congress / XI International Rangeland Congress (Sustainable Use of Grassland and Rangeland Resources for Improved Livelihoods) takes place virtually from October 25 through October 29, 2021.**

Proceedings edited by the National Organizing Committee of 2021 IGC/IRC Congress

Published by the Kenya Agricultural and Livestock Research Organization

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# The role of indigenous knowledge in the effective collective management of the communal rangelands.

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**Key words:** Communal rangelands; Indigenous knowledge; Participatory GIS

## Abstract

Numerous scientific studies have highlighted the complexities associated with the collective management of communal rangelands. To date, policy interventions in rangelands have largely ignored people's traditional ways of managing, with adverse effects on rangeland productivity. Thus, local knowledge has not been considered in spatial planning, despite the fact that local rural communities are often repositories of key indigenous knowledge. Hence this study set out to evaluate the role of indigenous knowledge in the management of the communal rangeland in Cata and Guquka, now and in the future. This was achieved through the use of Participatory GIS (PGIS), specifically participatory mapping to analyse how the communities use and view their rangelands now and how this has changed over time, and whether this can form a potential resource for effective communal rangeland management in the future. Results revealed that Cata and Guquka participants held extensive indigenous and spatial knowledge in relation to their communal areas. However, the existing knowledge is not translated into effective management of the communal rangelands, instead it is trapped in the older generation. These findings were attributed to social challenges including an ageing population, lack of youth involvement, fear of livestock theft, lack of mutual trust amongst community members and lack of resources such as fencing, access to dipping tanks and government services, and financial constraints. Thus, factors inhibiting the use of the existing indigenous knowledge for effective management of the communal rangelands in Cata and Guquka are more social than environmental. This suggests that new policy approaches incorporating local people's indigenous knowledge in spatial planning which takes into account their unique local situations and the relationships between people and their resources are necessary. When people feel like their voices are heard and opinions valued, the adoption and sustainability of policy-based interventions becomes less challenging. Therefore, indigenous local knowledge, if effectively harnessed, could form a key component in adaptive management of these communal rangelands.

## Introduction

Numerous scientific studies have highlighted the complexities associated with the collective management of a common pool resource such as communal rangelands (Ostrom 1990, 2010; Bennett et al. 2013; Hae 2016). In fact, Hardin (1968) stated that "Freedom in a commons brings ruin to all". Although Ostrom (1990) believed individuals are capable of successfully governing common pool resources, she also claimed that there are no universal solutions on how to organise the management of such common pool resources. However, successful governance arrangements have to take into account the unique local situation, and the relationships between people and their resource (Vetter 2013). Accordingly, such arrangements should be crafted on a case by case basis, taking local indigenous knowledge and spatial awareness into account (Reed et al. 2015). A useful and effective way of capturing indigenous knowledge is Participatory Geographic Information Systems (PGIS) which is a form of participatory mapping that uses GIS technologies in a manner that accommodates the needs and capabilities of the communities directly involved and affected by planned projects and programmes (Abbot et al. 1998). Wang et al. (2008) defines PGIS as a tool designed to reflect local people's spatial knowledge.

Traditionally South African land management policies have not taken local knowledge into consideration, despite the fact that local rural communities are often repositories of key indigenous knowledge (Bennett et al. 2013). This suggests that indigenous local knowledge, if present and effectively harnessed, could form a key component in adaptive management of communal rangelands.

This study aims to explore the local spatial knowledge of the Cata and Guquka communities located in the Eastern Cape Province of South Africa, using PGIS particularly participatory mapping (p-mapping) to understand and analyse how the communities use and view their rangelands now and how this has changed over time, and whether this can form a potential resource for effective communal rangeland management in the future.

## Methods and Study Site

The participatory mapping exercise employed had two phases which included the initial hand drawn maps and the final community map with narratives. The locations and existence of the features identified on the hand drawn maps were validated through transect and virtual walks. The first phase of the p-mapping involving identifying and locating important landscape features including, amongst others, village boundaries, grazing areas, roads, rivers and dams, summer and winter camps, areas with good and poor grazing, areas with erosion and those with invasive alien plants. Participants were provided with Google Earth aerial maps showing their communal areas for visual reference and A1 paper to draw the features on using different colours and shapes. This phase was conducted with eleven and ten participants in Cata and Guquka respectively. The second phase delved deeper into people's knowledge of their rangelands and focused on eliciting narratives linked to specific features. A set of carefully designed questions prepared beforehand were used to lead the discussions which were based on the features and boundaries identified on the initial hand-drawn community maps. The second phase had thirteen participants in Cata and six participants in Guquka. In both phases there was representation in terms of gender and age.

## Results

### *Hand Drawn Maps: Cata and Guquka*

A range of common features were identified and drawn by participants from Cata and Guquka on the initial and final hand drawn maps during the participatory mapping exercise. Figure 1 shows the Final hand drawn maps prepared by the participants.



**Figure 1:** Cata (left) and Guquka Final (right) Hand Drawn Community Maps, showing boundaries (rangeland, arable plots, residential areas, grazing camps), water sources (dams, rivers and streams), areas currently or previously used as summer or winter grazing, areas regarded as good or poor grazing, and changes to the grazing lands (e.g. invasion of alien plants, grass species changes, erosion gullies).

### *Narratives linked to features identified in Cata and Guquka communal areas*

Three common themes emerged from the participatory mapping process and the narratives shared by the participants in relation to land use change and grazing namely:

(i) **Social structure and perception of community well-being**, in particular the effects of relocations and the underlying issues behind the abandonment of cultivation. The relocations were linked to the implementation of the Betterment planning and mostly affected Cata residents. These occurred between 1963 and 1964 and had resulted in a reduction of land allocated for settlements, arable plots and the communal grazing. Cata and Guquka participants attributed the abandonment of cultivation to the 1982/83 drought, cessation of the provision of tractors, seeds, fertilizer and working tools; health issues associated with ageing; lack of youth

involvement, and absence of the boundary fence separating the arable fields from the residential areas resulting in livestock entering the arable and destroying the crops.

(ii) **Grazing management strategies and rangeland condition** including the location of the camps and the associated grazing quality of the camps. Summer and winter grazing camps were clearly marked and their names identified and recorded, suggesting that participants from both Cata and Guquka are intimately connected with their lands and possess a high level of knowledge in relation to them. In Cata, summer camps were all identified and delineated on the mountains beyond the indigenous forest and pine plantations, while winter camps were all located on the foothills and lowlands (Figure 1). Generally, the view of the Cata participants was that the quality of their entire grazing area has declined and is being overtaken by black wattle. On Guquka's final community map, participants located the summer camps on the mountain above the pine plantation and the indigenous forest and placed the two winter camps within the area below the mountains (Figure 1). The participants reported the mountain summer camps and the forest winter camp as having good grazing when compared to the lowland and foothill areas (Figure 1).

(iii) **Rangeland condition indicators** - Three ecological issues were identified as contributing to the poor grazing quality of both the Cata and Guquka communal rangelands including invasive alien plants (*Acacia mearnsii* – black wattle and *Vhachellia karroo* – sweet thorn), soil erosion and grass species composition change. Information about the rehabilitation efforts for both the invasive alien plants and soil erosion were only shared by Cata participants. These included clearing of black wattle in 2003, 2015 and 2016, in areas close to the dams, with regrowth observed for areas cleared in 2015 and the rehabilitation of erosion gullies on either side of the river in 2007 and 2017. With regards to grass species composition change, grasses such as *Cymbopogon marginatus* (commonly known as turpentine grass) and *Hyperrhenia hirta* (commonly known as thatching grass) were said to be replacing good grasses such as *Themeda triandra* and *Cynodon dactylon* in certain part of the communal grazing both in Cata and Guquka. The reason provided for this change in grass species composition included the prevalence of unplanned veld fires, drought and the fact that people are no longer using the grass for thatching their houses and therefore it is not harvested anymore.

## Discussion and Conclusions

Local knowledge has been viewed by experts as inferior, untrustworthy and largely unstructured for decades (Golobič and Marušič. 2007). It is only in more recent years that the role of insights provided by local people in informing complex land use planning activities is gaining attention (Kasemor et al. 2003; Hessel et al. 2009; Moos, Struwig and Roberts 2010; McCall and Dunn 2012). This is largely due to the growing awareness of localised environmental issues which has prompted the need for the participation of local people in spatial planning. When expert's knowledge and indigenous knowledge are incorporated into one process, successful and collaborative planning outcomes can be generated (Brown et al. 2014) and can co-evolve to mutual satisfaction (Rolston et al. 2017). Findings from the participatory mapping and PGIS have revealed that the people of Cata and Guquka do indeed have intimate spatial and temporal knowledge of their communal areas. They were clearly able to identify and locate key features and boundaries including those of the grazing camps that no longer exist. These features and boundaries were accompanied by shared narratives which included events, their periods and the effects they had on people's well-being. The process has revealed that local people's knowledge of their rangelands is extensive. However, this deep knowledge that the people of Cata and Guquka hold about their rangelands is not currently being translated into effective grazing management for their rangelands or towards policy implementation. In fact the knowledge the communities hold in relation to rangeland and livestock management is held within or 'trapped' in the older generation who find it difficult to transfer it to the younger generation. In Cata and Guquka, participants revealed two key factors that they believe are impacting upon the optimal utilisation of the communal rangelands by livestock across both rangelands, i.e. ageing of livestock farmers and lack of youth involvement. This also suggests that the value placed on livestock farming in rural development is dwindling amongst the younger generation and strongly suggests that there is a need for new policy approaches that would restore and instil the value of livestock farming for rural well-being amongst young people. A good starting point should include mechanisms to transfer the existing knowledge banks between generations or find young people already investing in livestock farming and currently profiting from livestock production to act as community champions to make agriculture attractive again and motivate other young people (Mashala 2013). If nothing is done, this valuable knowledge may be lost which will have implications on rural well-being into the future.

In addition incorporating this local knowledge in policy planning and implementation is also important in ensuring that it is translated into effective management of the communal rangelands. Golobic & Marusic (2007) noted that ideally planning decisions and policy interventions are not supposed to be taken or implemented without the consent of the communities affected. According to Friedmann (1993), disconnect between planners and stakeholders often results in poor adoption of policies by the targeted groups. Indeed, the exclusion of indigenous knowledge in the development and implementation of plans and policies makes it difficult to solve people's real problems in a sustainable manner. Moreover, people in Cata and Guquka have knowledge resources that could be vital in paving a way for restoration of rangeland productivity, improved livestock health and rural well-being. PGIS in particular, can allow this local knowledge from communities to be used in a meaningful way through translation into accurate digital maps with accompanying shared narratives. Inclusion of people's indigenous knowledge in planning and decision making on their common resources, is known to make people feel valued and that their voices are heard (Wolff et al. 2019). When people know they are participating effectively, their opinions are valued and they are given an opportunity to contribute to the challenges they are facing, it improves the quality of decision making and makes adoption of policy-based interventions less challenging. It also increases the sustainability of the interventions.

### Acknowledgements

Agricultural Research Council; Dundulk Institute of Technology (Center for Freshwater and Environmental Studies); Delft University of Technology (Faculty of Technology, Policy and Management), National Research Fund – Thuthuka Grant: PhD Track

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