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THE PRICE OF CONSERVATION

BIOSPHERE RESERVE MANAGEMENT IN THE MOUNT ELGON REGION, UGANDA

BACKGROUND INFORMATION

BIODIVERSITY LOSS – A GLOBAL CRISIS

Humankind has relied on the earth's biodiversity for survival and modified the earth's ecosystems for its benefit for millennia – it cut down forests for croplands and pastures, bred new genetic variants, introduced species to different continents and altered limnic, riverine and marine systems to its demands .

Currently, around 75% of the terrestrial surface and 66% of the marine area are significantly altered (Balvanera *et al*. 2019). Land use change, resource exploitation, pollution and the spread of invasive alien species have caused severe biodiversity loss (Butchart *et al*. 2010; Jaureguiberry *et al*. 2022; Pereira *et al*. 2012), whose current rate of species extinction is worthy of the name of a *‚sixth mass extinction'* (Cowie *et al*. 2022) not experienced since 65 mil years (Ceballos *et al*. 2015).

Protected areas (PAs) have become a central tool in the fight against biodiversity loss and climate change (Butchart *et al*. 2010; Chape *et al*. 2005). Various studies have shown their effectiveness regarding habitat conservation (Andam *et al*. 2008; Geldmann *et al*. 2013), mitigating species extinction risk (Hoffmann *et al*. 2010) as well as for socio-economic development (Oldekop *et al*. 2016).

PROTECTED AREAS – A COLONIAL LEGACY

PAs are largely areas of access and resource restriction. Since their primary establishment in the 19th century in North America, the concept was widely expanded to the European Imperial powers' colonies (Adams & Hutton 2007; Jones 2012). Approaches of fortress conservation, which create vast human-less, highly militarised protected areas through sometimes violent displacement of indigenous peoples are prime examples of the conflict-ridden conservation, widespread in formerly colonised countries (Agrawal & Redford 2009; Brockington & Igoe 2006; Duffy *et al*. 2019).

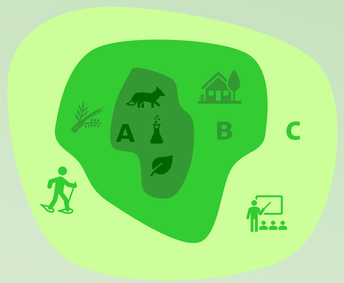

Fig. 1: The UNESCO BR zonation model showing core (A), buffer (B) and transition (C) zone. Own figure, 2022.

UNESCO BIOSPHERE RESERVES

UNESCO Biosphere Reserves (BRs) are protected area concepts specifically developed to integrate socioeconomic needs into holistic landscape conservation approaches by using a zonation model (see Fig 1). They combine three functions:

1. **Conservation**
2. **Development**
3. **Logistic support** (UNESCO 2015)

SUSTAINABLE DEVELOPMENT THROUGH NATURE CONSERVATION

UNESCO BRs are feasible alternative protected area models in areas with high population growth, natural resource demand and existing conflicts. Study results suggest that BRs can be a beneficial alternative for man and nature in biodiversity rich regions under high resource pressure (Ferreira *et al*. 2020). The participatory approach empowers local communities and marginalised groups in decision-making processes in conservation and development processes in biodiverse regions. Conflicts between various levels of stakeholders can be mitigated through fostering sustainable development via the promotion of justice, equal rights, good relations, participatory methods and benefit sharing mechanisms (UNESCO 2021, 2015, see SDG 16 - Fig. 2).

Fig. 2: SDG 16. UN 2022.

While UNESCO BRs are considered as low-conflict alternatives to traditional fortress conservation concepts, evaluation data is highly limited to mostly well-financed BRs and knowledge about their effectivity is limited (Ferreira *et al*. 2020; Coetzer *et al*. 2014).

STUDY AREA: MOUNT ELGON, UGANDA

KEY FACTS

- Extinct shield volcano on the border of Uganda and Kenya with afromontane vegetation and diverse fauna (MTTI & UWA 2009, van Heist 1994)
- Coffee producing region characterised by small-scale agriculture (UBOS 2019; UCDA 2020)
- High population growth and widespread poverty above the national average (UBOS 2019)
- 25% forest cover loss between 1979-2005 in the Mount Elgon National Park (Sassen *et al*. 2013)

PROTECTED AREA SYSTEM

1938 – Crown Forest during British Occupation
1993 – National Park designation (1.121km²)
2005 – UNESCO Biosphere Reserve designation

RESEARCH QUESTIONS

1. *How does the management of the protected areas in the Mt. Elgon area affect community welfare?*
2. *How did forest cover develop in the Mt. Elgon area since the establishment of the two management concepts (National Park (1993) and UNESCO Biosphere Reserve (2005))?*

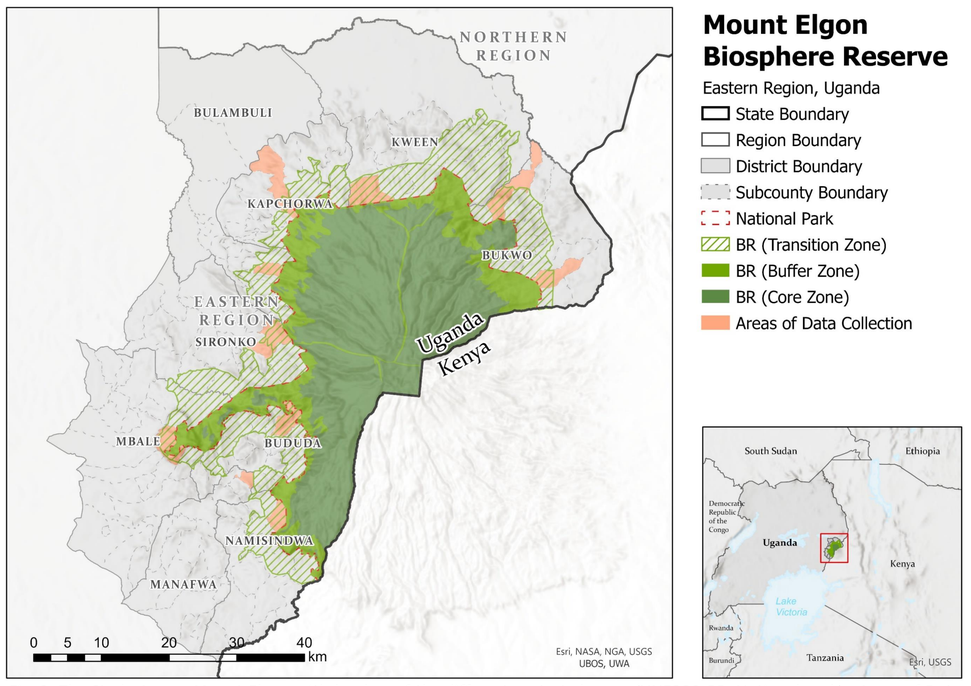

Fig. 3: The Study Area – Mount Elgon with borders of the different protected areas (UNESCO BR, National park). Areas of Data Collection are added as well. Own figure, 2021.

METHODOLOGY

The methodological approach combines socio-scientific methods, such as interviews, as well as remote sensing to create a holistic view of situation and management effectiveness at Mount Elgon.

INTERVIEWS

In October 2021, all nine districts adjacent to the Mount Elgon Biosphere Reserve were visited during a field trip (Fig. 3). During a four-weeks stay, the following methods were carried out:

1. **10 community focus group discussions**
2. **16 stakeholder interviews with people involved in the management of the BR** (e.g. members of the Uganda Wildlife Authority (UWA), local authorities, research and tourism sector)
3. **Several field observations**

A total of 530 pages of interview material were analysed and coded in MaxQDA with a specifically designed coding manual.

REMOTE SENSING

Multispectral satellite data (Landsat 1-8) from the years 1973-2021 was analysed for **land use and land cover change (LULCC)** in the biosphere reserve and a 5km surrounding radius. A **change detection analysis (CDA)** was carried out in SAGA-GIS to assess changes in vegetation.

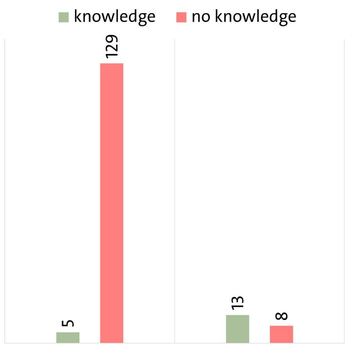

Fig. 4: Knowledge about the existence of the UNESCO BR Mount Elgon for the community members (n=134) and stakeholders (n=21) interviewed. 'Knowledge' refers to respondents being able to connect the term to the protected area on the ground by question and map observation. Furthermore, questions about the zonation concept were asked but could only be answered by a few stakeholders.

RESULTS

INTERVIEWS

The analysis reveals that the UNESCO BR Mount Elgon was unknown to almost all community members (96.27%) whereas most of the stakeholders interviewed had knowledge about the existence (61.9%). The results indicate that communities have been insufficiently involved and show a clear imbalance in power and in flow of information between stakeholders. The concept of the UNESCO BR does not seem to have been actually implemented on the ground, as structures and programmes are seemingly non-existent. Instead, the National park has been a source of intense conflict since establishment.

Problems include

- Fortress conservation approach with rigid resource restriction
- Lack of alternative livelihood opportunities for communities
- Lack of community participation in planning, implementation and management of the BR
- Community displacement and lack of compensation
- Severe human-rights violations in the name of nature conservation

REMOTE SENSING

The LULCC was carried out for six scenes (1973, 1987, 1995, 2003, 2014, 2021) with an average Kappa value of 0.85. Classes were combined to distinguish between 'forest' (F) and 'non-forest' (NF).

From 1973-2021, a total of 112.67km² (12.70%) of forest was lost in the UNESCO BR Mount Elgon of which large parts can be attributed to clearances made in the northern areas as well as later losses in the buffer and transition zone during the period 2003-2014. Forest cover did partially increase in certain periods of management for areas overlapping with the strict law enforcement of the National Park and the establishment of development and conservation projects (buffer, core zone) but significant losses were recorded in the transition zone (Fig. 5, 6, Table 1).

Overall, the outer margins of the forest remain at high risk of degradation under the current management system.

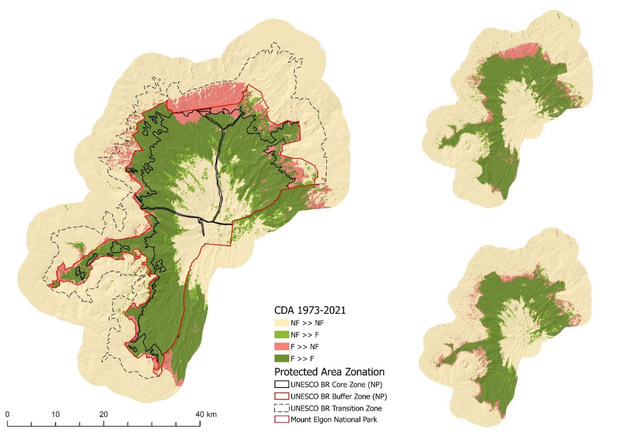

Fig. 5: Results of the CDA for the UNESCO BR (+5km buffer) for the periods of 1973-2021 (left), 1973-2003 (top right) and 2003-2021 (bottom right). Own maps, 2022.

Table 1: Rate of Change for different protected area zones for 1973-2021.

	National Park	BR (5km buffer)	BR	core zone	buffer zone	transition zone
[%]	-2,85	-10,47	-12,70	5,75	-24,94	-81,43

CONCLUSION

These pre-results show that the prior implementation of the UNESCO BR Mount Elgon suffers from several shortcomings. Currently, local interests are insufficiently considered in the management, whereas the resource restriction enforced through the national park severely threatens the livelihood bases of the communities and fostered a violent conflict between authorities and local people. Additionally, the establishment of a UNESCO BR has not significantly improved degradation or deforestation (Fig. 5, 6). While the national park management enforces seemingly effective conservation measures in many areas, the lack of livelihood alternatives and population pressure against the backdrop of a lack of a holistic and fully implemented management approaches puts additional pressure on the fragile ecosystem.

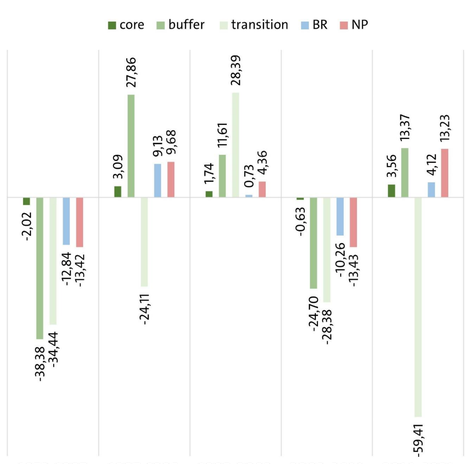

Fig. 6: Rate of change [%] for the UNESCO BR Mount Elgon (+5km buffer) and its zones as well as the National Park.

OUTLOOK

UNESCO BRs can contribute positively to sustainable conservation and development in conflict-prone, densely populated regions facing ecosystem degradation. However, a lack of proper implementation and management lead protected areas to miss target and potential of the holistic nature conservation concept.

As all communities and stakeholders involved endorsed the concept when thoroughly discussed, the proper implementation of a highly participatory UNESCO BR Mount Elgon involving all relevant parties is urgently required to counteract the conservation conflict as well as the ongoing degradation.

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