Effectiveness of the Management Models of Protected Areas in Southern Africa: Examining the Link between Local Communities and Savannah Ecosystems

For centuries, people all over the world have set aside places that they decided had special, sacred, or cultural importance. Since Yellowstone Park was designated the first national park in 1872, people have created areas to protect wildlife, plant species, or entire ecosystems. Today 245,210 protected areas are recorded in the World Database on Protected Areas (WDPA, 2020). Yet, according to UNEP-WCMC, IUCN, and NGS (2018), only 20% of the total coverage of protected areas in the WDPA has been assessed for management effectiveness. It has been shown that protected areas alone are not enough to safeguard and sustain the rapidly declining biodiversity (Pretty & Smith 2004, Hayes 2006). In 2021 when we are still struggling with social issues such as poverty, food security, social inequalities, and climate injustice creating more boundaries between nature and people can no longer be a solution.

The overall goal of this two-part project is to gain a deeper understanding of changes in the savannah ecosystem of protected areas in southern Africa in relation to ecological processes, history, and social context, including park management priorities and local perceptions of people living within and adjacent to the protected areas.

Part one of this dissertation project will study the changes in the savanna ecosystem Kruger NP based on available data and extrapolate from that to the Great Limpopo TFCA. The second part of the project will focus on studying the people's perception towards conservation of natural resources with a comparative analysis of protected areas in southern Africa.

Overview of part one

This part of the dissertation is designed to take advantage of the existence of historical aerial photography of the Kruger NP from 1940 to 2010, which will be also analyzed in relation to more recent satellite imagery to permit a deeper understanding of changes in the savannah landscape. This work aims to better understand how the history, removal of the local communities and past management has shaped current vegetation patterns in the Kruger NP. Assuming that satellite imagery for the Limpopo NP in Mozambique can be obtained, these will be then compared with those from the Kruger NP in order cover the entire Kruger-Limpopo Transfrontier park.

Until the early 1900s, elephants were largely absent from Kruger NP due to extensive hunting, most of which supported the ivory trade in the 1700s and 1800s. left a long window of opportunity for trees and shrubs to grow. Since then, elephant numbers have steadily increased during several different eras of management and in turn, studies have shown how the vegetation (especially large trees) has decreased. Park managers, both past and present, have generally had the perception that elephants negatively affect the vegetation of Kruger NP. Analysis of the impact of elephants on vegetation will help inform management decisions

and will be valuable for the Kruger NP's elephant management plan, as well as that of the larger trans-national conservation area of which it is part.

The two main objectives

Objective 1: Accurately document changes in woody cover over the past 80 years and relate these to changes in the elephant population.

Objective 2: Ascertain how past removals of people from the park have affected vegetation dynamics.

Methodology

To better understand these long-term changes in vegetation dynamics, historical aerial photography and remote sensing products will be used to accurately document vegetation changes over the past ~ 80 years in the Kruger-Limpopo Transfrontier Park. The historical aerial photography fully covers the area of the Kruger NP with images from 1940-1942, 1963-1965, 1977-1978, 1990-1994, and around 2010 or later. For the Limpopo National Park in Mozambique, we are not sure what is available and would need to make enquiries at the relevant institute or ministry in Maputo. The photos need to be scanned at high resolution then geo-referenced. Once georeferenced, woody vegetation canopy cover can be calculated using object-based image analysis. A comprehensive ground-truthing campaign would need to be taken for the most recent classification. For the second objective, archival material and more recent images will be used to determine where past human settlements were and the activities (e.g. cultivation) carried out in the park. Changes in the vegetation of these areas can then be tracked in subsequent imagery.

Overview of part two

The second part of the dissertation will focus on using qualitative data to gain insight into the different management strategies adopted by the protected areas. This will be done using a comparative case study design.

Four case studies in Mozambique have been chosen: two national parks (Limpopo NP, Gorongosa NP) and two national reserves (Gilè National Reserve, Special Reserve of Maputo). Limpopo NP has been chosen as a case study because it has a high number of indigenous people (approx. 26,250 according to Biofund (2020)) still living within the park's boundaries and it is currently one of the Mozambican parks that part of the Peace Park Foundation Great Limpopo Transfrontier Park project. Case 2, Gorongosa NP, like many other areas in Mozambique, was ravaged by the civil war. However, the park has experienced a remarkably fast recovery; even though it still lacks the incredible density of elephants, buffalo, zebra and wildebeest it once had, today many species are once again thriving. Furthermore, even though indigenous people are no longer living inside the boundaries anymore, the park has implemented a new form of conservation, mixing traditional conservation biology with solutions for practical challenges in the adjacent community, serving as a model of sustainable conservation. Case 3, the Gilè National Reserve also has no indigenous people living inside the reserve, although it has some community-based projects, such as sustainable farming or carbon credits, with the people living in the buffer zones. The biggest threats inside the park

are deforestation, forest degradation, coal production and land use change (Biofund 2020). Finally, the Special Reserve of Maputo, previously called the Special Elephant Reserve, was chosen because it is also part of the Peace Parks Foundation initiative, part of another Transfrontier Conservation Area that links the Special Reserve of Maputo in Mozambique to the Tembe Elephant Reserve in South Africa.

The two main objectives

Objective 1: Review of past and current the management plans, their implementation, and effectiveness of the four study cases, with a focus on the role of indigenous people.

Objective 2: Establish what qualitative factors in the comparative study contribute to creating an effective and successful protected area.

Methodology

The Limpopo NP, Gorongosa NP, Gilè National Reserve, and Special Reserve of Maputo have been chosen because they all have similar historical backgrounds, but different management, conservation, and community integration priorities. An extensive literature research will be conducted, gathering as much information about the parks, management models, previous studies regarding local communities and community-based projects in the area. The data will be collected using interviews/surveys/questionnaires administered either in-person or, if this is not possible due to travel constraints, remotely by Skype/phone. The questions on the survey will be developed based on the literature review of existing assessment tools and, importantly, of the assessments that have been done on each of the four cases. The latter will permit a strong focus in the survey on the perceptions and needs that local communities living outside the borders of protected areas deem most important. Once the survey instrument has been finalized, a statistically significant number will be distributed based on gender, age, educational level, proximity to the park of local people, to tourists and park staff. This study will help understand which best practices could be implemented to make the protected areas of Mozambique more effective from a social-ecological perspective.

Provisionally, the proposed dissertation project would begin:

Year 1 (2020-2021)

During the first two trimesters (Nov 2020- Apr 2021), an in-depth literature review of the savannah dynamics and Kruger NP history and management will be carried out. Furthermore, an overview of which local communities used to inhabit the park and the history of their eviction will be studied. The literature review will help determine how the local communities were pushed out of their land, by, to the extent possible, retracing their movements in the NP. During the first trimester (Nov 2020- Jan 2021), the georeferencing of the historical aerial photography of the Kruger will be completed and all the images catalogued and organized. Starting in February 2021, the vegetation cover analysis of the first set of aerial photos will be conducted and inquiries for high resolution images of the Limpopo NP will be sent out. After the first part of the vegetation analysis has been completed, a ground truthing mission in the Kruger NP, South Africa, could be planned (May-Jul 2021), including developing the

appropriate sampling protocols. If travel is not possible due to the Covid-19 emergency, inquiries would have to be made to arrange for some local teams on the ground in Skukuza Base Camp to carry out the on-site data collection. The sampling protocols would be sent to structure the validation. Any necessary meetings or trainings can be carried out remotely with Skype/Zoom calls. In the last trimester of Year 1, assuming that satellite imagery of the Limpopo NP has been obtained, image processing would start. The movements of local communities will be analysed looking at any traces of farming or houses present in the aerial images while considering any publications/books that have followed their footsteps. On the basis of the data analysis, an initial outline of a paper mentioned in section c) will be drafted by the end of the first year, with the manuscript submitted between the end of 2021 and beginning of 2022. Towards the end of 2021, the literature review for the second part of the dissertation will start; it will encompass the 4 protected areas in Mozambique that have been chosen as case studies and analysis of the current evaluation models at an international and national levels.

At the end of year 1, a presentation with reports and discussions of the results will be presented and reviewed by the PhD committee.

Year 2 (2021-2022)

The first trimester of the second year will continue with the review of the four case studies, paying attention to what theories and values underpin the link between humans-nature and recommendations for incorporating local peoples' needs and voices in managing and reshaping the objectives and integrative models of protected areas. The people-parks debate and the linkages between the ecological system, the economy, management, and social development will be studied, internationally and more specifically regarding Mozambique. Given the novelty of the second part of the study, the literature review will be extensive (Aug 2021- Apr 2022). Furthermore, the literature review is the starting point for the creation of the survey questioners/interviews, therefore, it needs to be strong and solid. Two missions are planned in the middle of the second year for in-situ/in-person data collection: Mission 1 to Mozambique, travel to Limpopo NP and Special Reserve of Maputo to meet local partners and for on-site data collection of surveys and field observation and Mission 2 to Mozambique, travel to Gorongosa NP and Reserve of Gilè to meet local partners and for on-site data collection of filed surveys and field observation. A long period has been carved out in the timeline (Feb 2022- Oct 2022) because it may and still also depend s on the Covid-19 situation (see Note below).

At the end year 2, a presentation with reports and discussions of the results will be presented and reviewed by the PhD committee.

Year 3 (2022-2023)

The first part of the final year of the PhD will be focused on finalizing the data collection and analysis of the second part of the project. Based on the results of the comparative study of four cases, a paper, as outlined in section c), will be prepared: first outline (Nov 2022-Jan 2023), first draft (Feb-Jul 2023), and manuscript submitted by the end of the year 2023. The second part of the final year (Feb-Aug 2023) will be dedicated to preparing the last paper and

writing the final dissertation. The dissertation defence is not scheduled, but the target date is Oct-Nov 2023.

Note:

I am aware of the difficult coronavirus pandemic health emergency. Regarding the three missions that have been planned to support the data collection, alternative methods can be applied. For the first part of the project, most of the data analysis that needs to be completed in the first year will be done based at the Sapienza. If the Covid-19 situation continues to preclude travel to South Africa, all missions will be suspended, and we will ask local teams at the Skukuza Rest camp if they can collect the data. This is not a predictable situation now and will be further discussed in the coming months. The missions in Mozambique are planned for the beginning of 2022, and we hope that the situation will have been resolved by that date. Again, if this is not the case, we will reassess the situation and employ local teams for data collection. Our sampling method might have to change, and virtual interviews via Skype/Zoom interviews would be conducted. With respect to the in-person option, if Rome-based researchers are unable to travel to Mozambique, a local team could administer the surveys (the SECOSUD (http://www.secosud2project.com/ an Italian cooperation project has been contacted and a local team could help with data collection if necessary).

Reference list

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(For further references, refer to the full Research Project submitted)