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MSc Thesis

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Analyzing Protected Area-People Relations in Communities Bordering the Serengeti Ecosystem, Tanzania: A Conservation Case Study in Well-Being Impacts and Attitudes

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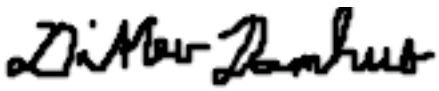
DECLARATION

I hereby declare that this thesis is the result of my own research, investigation and findings. Sources of information other than my own have been acknowledged and a reference list has been appended. This work has not been previously submitted to any other university for the award of any academic degree.

 7/11/2016

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PREFACE

This MSc thesis, credited to 45 ECTS-points, has been carried out between February and November 2016. Coming from an undergraduate in Biology with a great interest within in nature conservation (especially rainforests), I expanded into a cross-disciplinary MSc program in Nature Management. Here I have been involved in courses with cross-cutting issues such as international nature conservation, conflict management and global governance. Doing this thesis has been a journey and broadened my views on conservation to include social issues and livelihood impacts. The thesis is a study of protected area-people relations in communities neighboring the Serengeti Ecosystem in Tanzania with a focus on well-being impacts and attitudes. It seeks to contribute to the growing literature within the field as well as test and evaluate methods within the human dimension of natural resources management. I had the privilege to travel to Tanzania in March and April this year to do fieldwork with my good friend and MSc student Andreas Heinrich, who also did his MSc thesis on basis of the collected data. The trip has been an amazing personal and professional experience, building on former conservation fieldwork experiences in Nicaragua, where I worked for Forests of the World, and later Cambodia, where I worked with the UN-awarded Prey Lang Community Network. This time has been the toughest one, due to the very local conditions, the amount of bureaucracy involved, and the fact that severe malaria sent me down for several days. Overall, it has been the most independent scientific experience I have had so far. Andreas and I designed the questionnaires for data collection without help and with no former experience - really feeling the "learning by doing" process. Besides the time in the field, the project has also been hours of writing e-mails, searching for funds, drinking vast amounts of coffee, analyzing data and writing up results – all in all resulting in a great and relevant real life work experience in the social aspects of conservation management. The thesis is more or less built up as a manuscript for submission to a scientific journal. However, it does contain way more information, as there is space for that. Hence, if it had to be submitted as a scientific paper, it would probably be divided into two papers – one focusing on well-being impacts and methodological challenges and one focusing on attitudes.

ACKNOWLEDGEMENTS

I would like to thank a number of people and institutions that have facilitated the field research and supported me in this project. I send a special thank to Sokoine University of Agriculture (SUA) in Tanzania for treating my research permit application and for letting me be a part of their organization for a shorter time. Also thanks to the friendly and helpful staff at SUA. Logistical support, assistance and supervision was received from the AfricanBioservices project that receives funding from the European Union's Horizon 2020 research and innovation program under grant agreement No 641918. More specifically, I would like to thank a number of associated persons: Dr. Jafari Kideghesho (SUA) for initial discussions, PhD student Maria Mngulwi (SUA) for translation, research assistance and good company, and Martin Reinhardt Nielsen (KU) for personal supervision. I would also like to thank translator Musakamaika Lorento for assistance and good company. Furthermore, a thanks goes to the respondents in Matongo, Salalilya, Mwanyahina and Buganza villages for sharing their time, feelings and opinions. I thank Bariadi as well as Meatu District and the villages I visited for the permission to conduct this research. I would also like to thank Dennis Rentsch (Frankfurt Zoological Society), Daniel Nuhu (SENAPA) and Batro Ngilangwa (Friedkin Conservation Fund) for general advice about the region. Thanks to DANIDA, Oticon and Dansk Tennisfond from whom I received financial support for the field work. I would like to thank my good friend and MSc student Andreas Heinrich for numerous discussions and support and also for his helpfulness and care when malaria was worst. Moreover, the fieldwork would not have been the same without such good company. Finally, I would like to thank my good friend and PhD student Jesper Sonne who helped me in learning the codes in R to make the figures look professional.

EXECUTIVE SUMMARY

Protected areas (PAs), the cornerstones of biodiversity conservation, have often had adverse social impacts on local communities due to evictions, human-wildlife conflicts and restrictions on access to natural resources. The link between PAs and human well-being is increasingly gaining attention, but well-being impacts are not well documented in literature. Attitudinal studies have been adopted to evaluate acceptance, understanding and the impact of PAs. It has been suggested that when evaluating PA impact on well-being, the affected people should be allowed to define well-being. In response, one such available tool is the Global Person Generated Index (GPGI), which measures subjective well-being by asking people about the importance and performance of different domains for their quality of life (QoL). By also examining the degree of PA impact in each domain, the GPGI can be used in combination with the Importance-Performance (IPA) technique, which plots importance and performance scores in a simple grid to reveal priority areas. This thesis is a case study in villages bordering Serengeti National Park and Maswa Game Reserve in Tanzania. Applying a PA-people relationship framework, the objective of this thesis is fourfold: 1) to examine general factors within people's physical relationship with the PAs and related entities, 2) to examine the local people's subjective well-being as well as the well-being impacts of the PAs using the GPGI, 3) to examine the attitudes of the local people towards the PAs as well as determine the factors predicting these attitudes, and 4) to test the use of the IPA technique and derived analyses as impact and needs assessment tools. The results revealed high resource dependency, low level of interaction between PA staff and the locals, and some awareness of the presence of NGOs working in the areas. Benefits were received to some extent though PA-related problems predominated. The GPGI seemed to provide valuable information on the importance, performance and impact of the identified life domains. The magnitude of negative impact on life domains was large compared to that of positive impact. Perceptions of benefits as well as awareness of NGOs were associated with a positive attitude towards PA. In contrast, living in villages bordering Maswa, perceptions of costs and magnitude of negative impact on life domains were associated with a negative attitude towards PA. The use of the IPA technique and derived analyses provides a clear visualization of priorities. However, the technique suffers from methodological and conceptual challenges, calling for the development of a standardized method. Though some differences were found between Serengeti and Maswa, the most interesting finding is the more negative attitude towards PAs in Maswa villages. Overall, it is recommended that the management of the PAs take an active role in reducing the communities' costs related to the PAs, distribute resources to tangible outreach projects, increase communication with the local communities as well as raise the general awareness of the PAs.

TABLE OF CONTENT

1. INTRODUCTION

Protected Areas (PAs), the cornerstones of biodiversity conservation, have long been regarded as crucial tools for maintaining habitat integrity and species diversity (Geldmann et al. 2013). Covering almost 13% of the planet's land surface (Geldmann et al. 2013, Pullin et al. 2013), PAs are considered a key factor for conservation success. On the other hand, PAs have also displaced people from their original homelands, changed use rights and created conflicts (West et al. 2006). Furthermore, PAs have raised concerns about effects on poverty as well as about equity and fairness in general (Schmitt 2010). PAs in Africa are key examples of this complex dualism as they are critical to the conservation of the continent's outstanding biodiversity (Ehrlich et al. 1993), but as institutions, they share a history of poor public relations, which in turn has resulted in minimal support from local communities. Conservation policies and legislation have marginalized local people: Forceful evictions of native people from the PAs have taken place (Kideghesho et al. 2007), people have been deprived access to resources crucial for their livelihoods (Schmitt 2010) and local people's traditional practices have been criminalized due to the safeguarding of the ecological integrity (Kideghesho et al. 2007). These preventions on access have in turn contributed to agricultural encroachment and continued illegal natural resource use such as illegal grazing in PAs (Schmitt 2010).

Tanzanian rangelands are home to an immense amount of biodiversity harboring a great variety of animal and plant species of ecological as well as economic and socio-cultural importance. Tanzania has an extraordinary institutional record in establishing PAs (Caro & Davenport 2015). These efforts to preserve natural resources have been focusing on setting aside areas of land in form of national parks, nature reserves, game reserves, game controlled and wildlife management areas (Kideghesho et al. 2013). However, through the period between the First World War and the emergence of independence from colonialism in 1961, all natural resources management in the country was strictly top-down including forced relocation of local people who in one way or another were in the way of hunting and conservation interests (Kaltenborn et al. 2008). In addition to evictions, local Tanzanian communities living close to PAs have typically received few

benefits and high costs related to crop damage, livestock losses and restriction of resource access (Vedeld et al. 2012).

More than 75% of Tanzania's population is found in rural areas where people rely upon natural resource uses such as agriculture. The link between rural livelihoods and natural resources management is of high importance to national prospects for economic growth and poverty reduction (Ellis & Mdoe 2003), as environmental resources make a significant contribution to rural incomes (Cavendish 2000). Thus, policies that tend to work at the macro-level, should get insight into these local level links (Ellis & Mdoe 2003) for several reasons: taking into consideration rural people's dependence on natural resources may help improve macro-level estimates of income inequalities, poverty alleviation and conservation planning (Cavendish 2000, Fisher 2004, Vedeld et al. 2007).

There is no doubt that PAs, as they have been managed and currently are, have achieved great things for the conservation of biodiversity and will continue to be essential in future conservation planning efforts (Palomo et al. 2014). However, Palomo et al. (2014) recognize the disconnection between PAs and society as one of the main limitations of the current model of PA management. Nonetheless, this picture is changing slowly; protection concepts, based on the relationship between people and PAs, have recently been the focus of nature conservation (Nastran 2015). Over the past two decades the importance of understanding local communities' attitudes, needs and aspirations has received increasing attention among researchers, donors, conservation agencies and PA authorities (Kideghesho et al. 2007). As identified by several studies (e.g. Stoll-Kleemann 2001, Arnberger & Schoissengeier 2012), community perceptions and attitudes towards PAs are key factors for the long-term success of PAs. These attitudes are affected by several factors, including PA-related costs (Kideghesho et al. 2007, Schmitt 2010), the history of creation of PAs and socio-demographic factors (Mutanga et al. 2015). However Allendorf (2010) argues that socio-demographic variables might be of less importance. Factors shaping attitudes also include the presence and absence of benefits received from the PAs (Infield & Namara 2001, Lepp & Holland 2006) such as school, health or water services. Also attitudes towards general conservation (Karki &

Hubacek 2015), the level of dependence of the natural resources located in the PA (Marshall et al. 2010) as well as local people's perception of use and conservation influence attitudes towards the PAs (Kelboro & Stellmacher 2015). Finally, the relation with and perception of PA staff, PA management and other relevant actors and organizations are important in shaping attitudes (Holmes 2003, Lepp & Holland 2006 Allendorf 2007). Understanding which factors influence the attitudes of the local people towards the PAs is very important to improve their relationship (Allendorf 2007, Kideghesho et al. 2007). Studies of attitudes are indeed increasingly being used as tools for evaluating acceptance, public understanding and PA impact on local communities (Kideghesho et al. 2007). Regarding acceptance, the idea that local people's support is essential for the success of PAs is common in conservation. It is assumed that local people who are dissatisfied with conservation because of the costs and constraints it imposes on them may resist PA rules and regulations and refuse to cooperate with authorities. As such the local people have the power to make PAs fail, where failure can be defined as the PA's inability to protect biodiversity or the collapse of the PA as an institution (Holmes 2013). Besides this local support being important itself, also positive attitudes are thought to support a more environmentally friendly behavior (Holmes 2003, Tesfaye et al. 2012, Karki & Hubacek 2015). Positive attitudes towards the PAs can thus be considered indicators of success (Allendorf 2010).

With the growing recognition of and focus on the links between conservation and human livelihoods (Leisher et al. 2013), many large organizations now explicitly mention people in their conservation missions (Leisher et al. 2013). Before 1992, where the negative effect of PAs on human well-being officially gained attention in the Convention of Biological Diversity (CBD), such impacts were rarely mentioned in PA management plans (Pullin et al. 2013). A thorough understanding of the impact on human well-being that conservation efforts might have is needed for many reasons. Both for ethical reasons, as conservation executing actors have a moral responsibility for ensuring that conservation efforts do not undermine the life of local communities (Makagon et al. 2014) – but also from a conservation point of view as conservation outcomes typically are improved if local people's views are considered (Adams et. Al 2004).

The concept of human well-being is evolving and does not have one universal definition (Yang et al. 2015). Literature suggests that human well-being contains many dimensions and includes both objective and subjective components. The objective component has typically focused on material assets and the subjective component on the psychological state felt by the individual (Woodhouse et al. 2015). In the Millennium Assessment Ecosystem Services Framework, human well-being constitutes *basic material for a good life* (e.g. basic access to goods and services), *security* (e.g. physical, mental, property, resource access security), *health* (e.g. physical, mental), *good social relations* and *freedom of choice and action* (e.g. opportunity to achieve what one values) (MA 2005).

Conservation policies are not in agreement on how conservation impacts on people should be measured. Also, what conservation organizations choose to measure is what they end up defining as success (Leisher et al. 2013). In this sense, it is relevant considering whom the well-being measurement is for - as different actors may have very different ideas of what well-being constitutes. Socio-economic impact measurements of conservation efforts have often been restricted to externally defined indicators focusing on income – indicators that do not reflect people's individual priorities (Woodhouse et al. 2015). Hence, external definitions of well-being should not be pulled down on particular people and cultures. Instead, gaining a deep and contextual understanding of well-being within a community is essential (Milner-Gulland et al. 2014). This can be done by placing local people at the center of impact evaluation and let them define well-being (Woodhouse et al. 2015). Such a subjective notion of well-being is concerned with people's own perceptions and priorities and feelings about their general situation and their quality of life (Britton & Coulthard 2013).

One way to measure this subjective well-being is to use the Global Person Generated Index for quality of life (referred as GPGI) (Camfield & Ruta 2007, Martin et al. 2010a, Martin et al. 2010b). Quality of life (referred as QoL) and subjective well-being can be seen as the same concepts, though QoL has a more developed methodology than subjective well-being (Camfield & Skevington 2008). The GPGI is a QoL tool that provides a way of measuring subjective wellbeing according to individual priorities. The

GPGI is "global" because it is not related to a specific life domain (e.g. health), but instead it captures the many dimensions of well-being (Martin et al. 2010b). The GPGI is "person generated" because it allows individuals to select, rate and weigh the relative importance of domains that matter most for their QoL - instead of using external indicators or a predefined list of domains that may miss out on context specific topics (Camfield & Ruta 2007, Britton & Coulthard 2013). The GPGI is constructed from the Patient Generated Index, which has been widely used in health related QoL research (Martin et al. 2010a). The GPGI asks respondents to identify domains that contribute to their wellbeing. Afterwards it asks them to determine how important these domains are to them and then to rate the performance of each domain (Britton & Coulthard 2013). A specific link to conservation can then be made by asking the respondents to rate the level of PA impact on each nominated domain (Rasolofson et al. 2016, in press).

Rasolofson et al. (2016, in press) used the GPGI together with the Importance-Performance Analysis technique (referred as IPA) developed by Martilla & James (1977) to make an impact and needs assessment in relation to conservation interventions. The IPA is a simple and useful technique for identifying attributes that are most in need of improvement (Abalo et al. 2007). By plotting importance, performance and impact scores, it can reveal for which attributes importance is high and performance is low – i.e. areas that have to be improved. It can also reveal for which attributes importance is high and performance is high, i.e. areas that have to be maintained. As such it serves as a basic diagnostic decision tool and be used to mobilize and deploy scarce resources to where they are needed the most (Azzopardi & Nash 2013). Such approaches might be valuable to explore further given that participatory tools have been proven effective in natural resources management (Lynam et al. 2007).

The principle that PAs should not harm local people was adopted in 2003 at the World's Park Congress (Pullin et al. 2013), but injustices towards local communities continue (Makagon et al. 2014). With increasing competition for land, PAs are under growing pressure to justify their status. Hence, positive local attitudes towards PAs are a potentially important part of any such justification (Bragagnolo et al. 2016). Therefore, examinations of attitudes and perceptions are critical for designing appropriate strategies

and policies in order to address local people's needs and expectations (Mehta & Heinen 2001, Sah & Heinen 2001). Considering specific and subjective human well-being measures is as well heavily needed (Woodhouse et al. 2015), as the different well-being impacts of conservation approaches are not documented well in the literature (Brockington & Wilkie 2015).

2. CONCEPTUAL FRAMEWORK AND OBJECTIVES

Letting the individual be the unit of analysis, this thesis applies a modified version of Allendorf's framework for PA-people relations (2010). In general, a "relationship" refers to "*the interactions between two or more people in which the participants are interdependent, i.e., the behavior of each affects the outcomes of the other*" (Blumstein & Kollock 1988). A relationship can also be between people and institutions and the relationship can be negative or positive depending on how the behavior of one part affects the other. In Allendorf's framework the overall "PA-people relationship" specifically consists of three components: "*(i) local people's physical relationship with the PA; (ii) local people's attitude toward the PA and (iii) the linkage of the PA–people relationship to the broader social, political, and economic context*" (Allendorf 2010, Figure 1). The third component (iii) is not well represented in the thesis though. It has not been possible to collect all this data because it is beyond the amount of time devoted to the thesis writing process. The framework suggests that PA–people relationships should be studied as an integrated, complex system grounded in individual residents' physical relationships with the PA and their perceptions of the PA. "Perception" is "*man's primary form of cognitive contact with the world around him"* (Efron 1969).

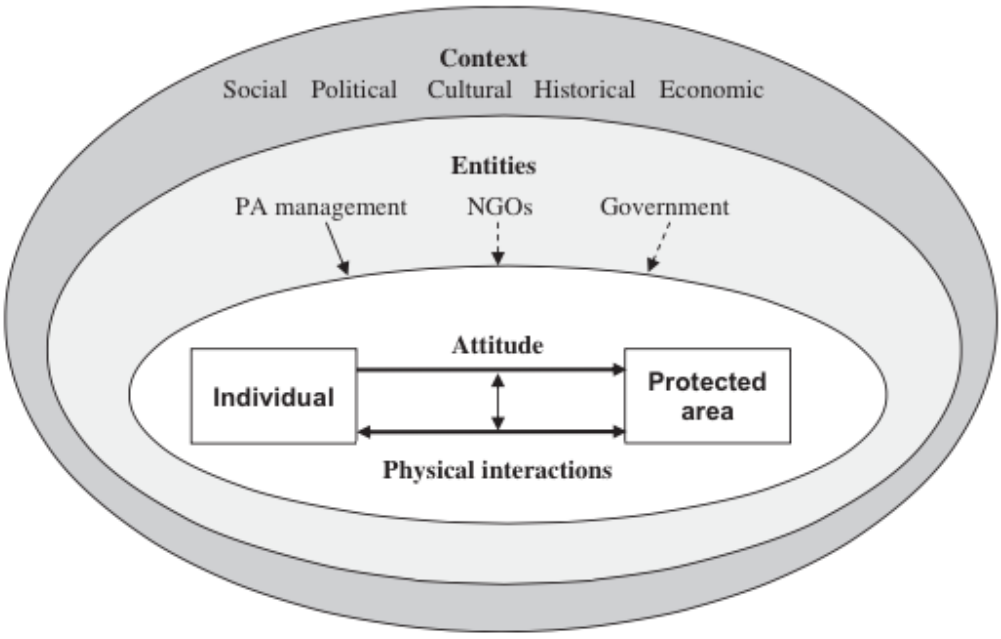


Figure 1. Original framework for the PA-people relationship as suggested by Allendorf (2010). Arrows indicate direction(s) of influence between the components. Full-drawn lines represent direct relationships. Dotted lines indicate indirect relationships. Note that these types of lines indicating direct or indirect relationship are used for example only.

To understand the overall PA-people relationship between people and PA, the different components of Allendorf's framework (2010) should be analyzed: people's physical relationship with the PA *and* people's attitudes towards the PA. "*People's physical relationship with a PA can be described by the ways they interact with the PA, including the different ways they use the area and the ways it impacts them"* (Allendorf 2010). This means that general factors of interest within people's physical relationship with the PA include resource dependency and perceptions of costs and benefits related to the PA. However, the framework includes not only the relationship between people and PAs, but also "entities" that mediate or impact the relationship between people and PAs. Thus, the relationship is at least to some degree defined by people's perceptions of other "entities". Entities can be considered as directly affecting the relationship if the villagers' themselves recognize them as components of their relationship with the PA. Entities are considered to be indirectly affecting the relationship if they are clearly present in the study system but the local people do not define their relationship with the PA in terms of them (Allendorf 2010, Figure 1). In this study "entities" will mean PA staff and NGOs

working in the area, but not the government (Figure 1). The role of these entities can be analyzed by asking local people about the level of interaction between them and the PA staff as well as their awareness of the presence of NGOs working in the area. Altogether these general factors within people's physical relationship with PA and related entities can possibly predict attitudes towards PA in a positive or negative direction (Figure 1). For the sake of completeness, socio-demographic characteristics (e.g. age, gender, household size) are also included among these general factors. An attitude is defined as the "*psychological tendency of an individual to evaluate an entity (person, place, behavior or thing) with a degree of favor or disfavor*" (Albarracín et al. 2005).

As *impact* (typically measured only by the reported costs related to the PA) is an important part of the general factors within people's physical relationship with the PA, this thesis includes a specific subjective well-being and well-being impact dimension: The GPGI asking respondents for the importance, performance and impact in their Quality of life (QoL) domains. The terms "quality of life" and "subjective well-being will be used interchangeably. Combining the thinking of Allendorf (2010) with the use of the GPGI leads to thorough information on well-being, attitudes and factors predicting attitudes. Moreover, the GPGI can be used as a needs assessment tool (McGregor et al. 2009, Martin et al. 2010a). Finally, as recently done, in combination with the IPA technique (cf. above) the GPGI can be used an impact assessment tool (Rasolofson et al. 2016, in press), which is relevant for decision making in natural resources management.

Applying the proposed and modified framework by Allendorf (2010) in combination with the GPGI and the IPA tools, this study addresses the need to explore human well-being impacts of local people living close to PAs (Brockington & Wilkie 2015) - as well as contributes to the growing literature in attitudinal studies by examining people's attitudes toward PAs. For this purpose, the Serengeti Ecosystem in Tanzania provides a good setting as many poor people live in the middle of a very rich ecosystem (Schmitt 2010). Two PAs in the western part of Serengeti were chosen for this case study to gain a broader representation of the values people hold toward different types of PAs and to look for similarities and differences among them. The two PAs; one national park (Serengeti National Park) and one game reserve (Maswa Game Reserve) have different

histories and management strategies (Caro & Davenport 2015). In order to contribute to a scientific basis for management of the Serengeti Ecosystem along with testing and evaluating methods, the objective of the study is fourfold. Through a comparison of two selected villages bordering Serengeti National Park and two selected villages bordering Maswa Game Reserve, it aims to: 1) examine general factors within people's physical relationship with the PAs and related entities, 2) examine the local people's subjective well-being as well as the well-being impacts of the PAs using the GPGI, 3) examine the attitudes of the local people towards the PAs as well as determine the factors predicting these attitudes, and 4) test the use of the IPA technique and derived analyses as impact and needs assessment tools. In particular, the following research questions for each of the objectives were asked:

1. General factors within people's physical relationship with the PA and related entities

a) What are the socio-demographic characteristics of the villages?

b) To what extent have people in the villages interacted with PA staff?

c) Are the local people aware of any other organizations (NGOs) working in the area?

d) What benefits provided by the PAs have been received in the villages?

e) What problems related to the PAs have been experienced in the villages?

2. Subjective well-being and PA impacts on well-being

a) Does the GPGI tool exhibit content validity in terms of its ability to capture life domains that other studies also find relevant to the QoL of people?

b) Does the GPGI tool exhibit construct validity in terms of a significant positive relation with household material well-being?

c) What is the magnitude and balance between negative and positive impacts on life domains?

d) What are the strengths and weaknesses of using GPGI as a basis for assessing subjective well-being?

3. Attitudes towards the PAs and factors predicting attitudes

a) What factors are associated with a negative and positive attitude towards the PAs, respectively?

b) Will the magnitude and direction of well-being impacts have an effect on attitude towards the PAs?

4. Testing the IPA technique and derived analyses as impact and needs assessment tools

a) What are the strengths and weaknesses of applying the IPA technique and derived analyses to make an impact assessment and needs assessment?

b) How can it be improved?

3. METHODS

3.1. Study location

The Serengeti-Mara Ecosystem covers 25.000 km^2 and stretches from northwestern Tanzania to southwestern Kenya, bordering Lake Victoria to the west (Figure 2). The overall ecosystem contains many different PAs with different restrictions. The Tanzanian part is referred as The Serengeti Ecosystem and its core area is Serengeti National Park, where wildlife watching is the only permitted use of land. Surrounding Serengeti National Park, there are many buffer zones: to the southeast and northeast Ngorongoro Conservation Area and Loliondo Game Controlled Area. To the southwest Grumeti Game Reserve, Ikorongo Game Reserve, Maswa Game Reserve and Makao Wildlife Management Area. The Game Reserves allow licensed hunting and tourism inside the areas, while Ngorongoro Conservation Area allows tourism as well as settlement, farming and livestock - but only for Maasai people. Loliondo Game Controlled Area allows all abovementioned including licensed hunting. The wildlife management areas are different in that the local communities set aside part of their land to conservation, giving them usage rights over wildlife so they can benefit from it - while they contribute to conservation. The Serengeti Ecosystem is probably best known for its movements of the migratory wildebeests as well as zebras. However, the Serengeti Ecosystem has

general major conservation significance, because it supports a large and varied wildlife population. In addition to the 500 birds recorded in the ecosystem, 13 species of large carnivores along with 30 species of ungulates exist here.

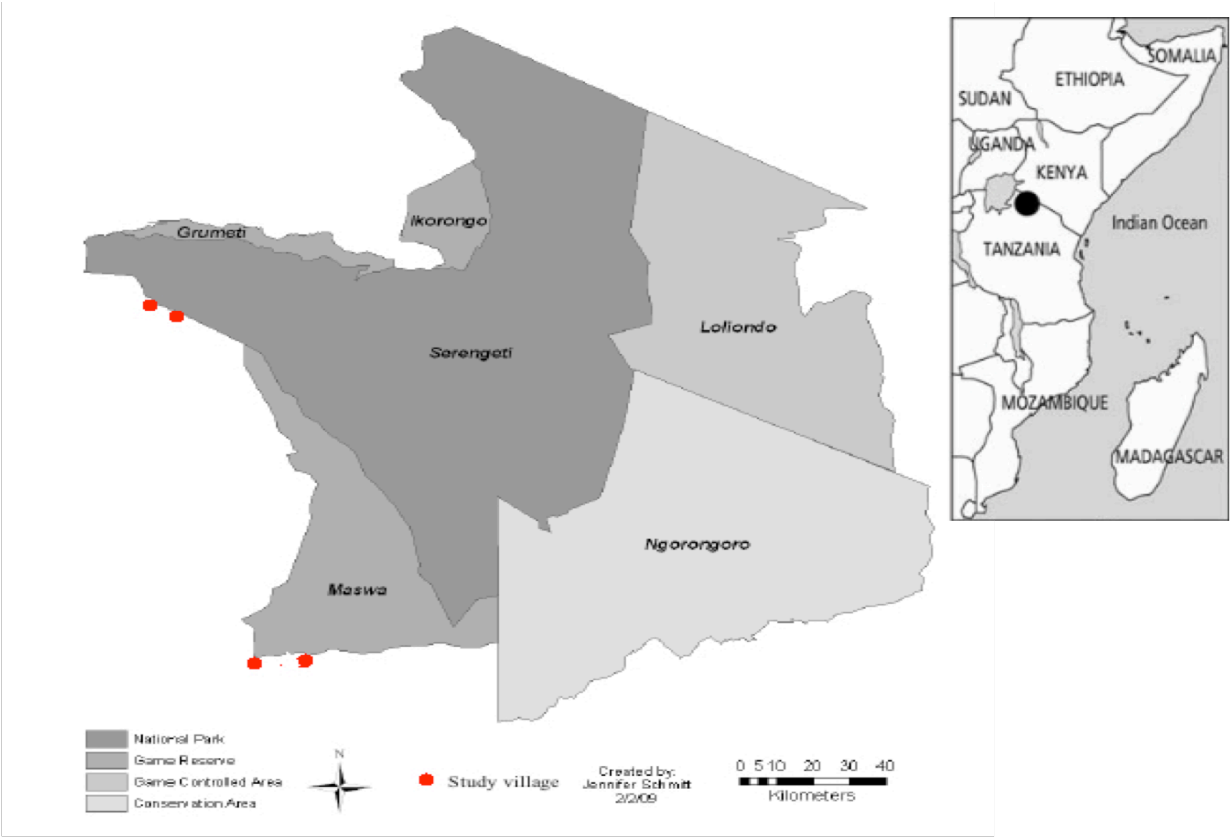


Figure 2. The regional location of the study area and the Serengeti Ecosystem. The different types of PAs in the Ecosystem are highlighted and the study villages near Serengeti National Park and Maswa Game Reserve are marked. Adopted and modified from Kideghesho et al. (2007) and Schmitt (2010).

Declared a game reserve in 1921 and gazetted as a National Park in 1951, *Serengeti National Park* (referred as Serengeti from now – not to be confused with the overall ecosystem) covers about 14.760 km^{2}and is the oldest and the second largest national park in Tanzania. Being a world heritage site, Serengeti contains a wide range of vegetation types, mostly wide grassland plains and savanna. Also woodlands and riverine forests are found in Serengeti. Tanzanian national parks are managed by the parastatal (semi-public) organization TANAPA (Tanzania National Parks), and Serengeti is managed by SENAPA - TANAPA's part for Serengeti. Serengeti is patrolled regularly.

Established in 1962, *Maswa Game Reserve* (referred as Maswa from now), covers about 2200 $km^2$and is the dry season refuge for many wild animals migrating from Serengeti. Located along the southwestern border of Serengeti, Maswa is home to the wildebeest migration, when they come to feed on grasses in January and February. The vegetation types in Maswa are mainly grasslands and woodlands. The Wildlife Division has the authority over Tanzanian Game Reserves like Maswa Game Reserve, but at the moment this is switching to a parastatal institution called the Tanzania Wildlife Authority (TAWA). However, the Wildlife Division remains in control of hunting concessions and safari fees from both national and international hunters. Maswa is patrolled irregularly.

In the Serengeti Ecosystem, benefit-sharing mechanisms have been implemented by different organizations including SENAPA, the Wildlife Division, private hunting companies and various NGOs (Schmitt 2010). Benefits are provided to the communities surrounding the ecosystem mainly in the form of infrastructural/development projects such as building of classrooms, dispensaries or provision of education on conservation issues [Daniel Nuhu: Personal correspondence, March 25th 2016].

3.2. Case study villages

The research was conducted around the western part of Serengeti, in the villages of Matongo and Salalilya In Bariadi district - both situated directly at the Serengeti border at the outermost part of the villages. Around the southwestern tip of Maswa, the research was conducted in Mwanyahina and Buganza in Meatu district - both situated directly at the Maswa border at the outermost part of the villagers (Figure 2). Although the Serengeti Ecosystem is an area composed of many different tribes, the populations of all the four villages are mainly comprised of Sukuma people. The Sukuma are agropastoralists; in all villages, subsistence farming, followed by livestock keeping are the main livelihood activities. See Table 1 for village characteristics. The villages were selected based on the following characteristics: i) they should border Serengeti and Maswa, respectively ii) they should be located directly at the boundary of the PA (as it was assumed that local communities nearby would be more affected and have more knowledge about it), iii) they should be accessible.

Table 1. Characteristics of the study villages.

	Serengeti Matongo	**Serengeti** Salalilya	**Maswa** Mwanyahina	**Maswa** Buganza
District	Bariardi	Bariardi	Meatu	Meatu
Region	Simuyi	Simuyi	Simuyi	Simuyi
Distance from nearest PA (km)	0	0	0	0
Number of households	870	500+	536	564
Population	6700	5000	3388	5470
Village formation (year)	1959	2014	1974	1993
Mean education level	Primary	Primary	Primary	Primary
Main ethnic group	Sukuma	Sukuma	Sukuma	Sukuma

The villages have not previously been subject to extensive research (as contrasted to the northwestern part of Serengeti where the risk of getting biased answers are high due to great amount of research carried out there). This makes it an interesting area to explore, as there is a high human population, pressuring the ecosystem through processes such as grazing.

It should be noted that "villages bordering Serengeti" and just "Serengeti" will be used interchangeably throughout the thesis and the same counts for "villages bordering Maswa" and Maswa. If there is information about a feature that actually is *inside* the PAs, it will be emphasized in the text.

3.3. Questionnaire design and implementation

A household questionnaire with 7 main sections was implemented (Appendix 4). The first sections gathered information on demography and household composition (e.g. gender, age, level of education, main livelihood activity of household). This section also quantified household assets. The next sections determined natural resource use as well as knowledge of the PAs, costs and benefits related to the PAs, interaction with PA staff and awareness of organizations and management.

The sixth section involved the different stages of the GPGI to gather information about the QoL of the respondents. In the QoL exercise, the villagers were asked to identify five domains that were most important to their lives (e.g. family, livestock etc..). Instead of using a list with predetermined topics, the villagers themselves generated the domains. The *Pebble Distribution Method* was used to determine the relative importance of each

domain. It is a simple scoring procedure that clarifies the priorities of the participants (as well as the level of general understanding) (Colfer et al. 1999, Sheil et al. 2002, Lynam et al. 2007). The scoring is not the end point in the method – respondents should always be asked to explain the final scores. Thus, the villagers were provided with 10 pebbles and asked to distribute them among the domains - spending more on domains they perceived as more important and fewer pebbles on less important domains. After that they were asked to rate the performance of each domain on a 5-point Likert-type response-scale ranging from "very bad to very good". Then the QoL was linked to the PAs: the respondents were asked about their perception of the level of PA impact on each QoL domain they identified (on a 5-point Likert-type response-scale ranging from "very negatively to very positively").

The last section gathered attitudinal information on conservation, PAs, resource extraction and management. Possible answers to attitude statements were also provided using a 5-point Likert-type scale ranging from "strongly disagree to strongly agree".

Together with the household questionnaire, structured discussions were also conducted with the village leader in each village. These included: village details and demography, main livelihood activities of the village as well as natural resource use and availability and relationship with the PAs (Appendix 5).

3.4. Data collection

Data were collected during a one-month period in April 2016. Prior to the collection of data, draft surveys were reviewed by a Phd Student from Sokoine University of Agriculture (SUA) and by a project manager of the Frankfurt Zoological Society (FZS) operating in the greater Serengeti Ecosystem. Permission to conduct research in Tanzania was granted at SUA. FZS and SUA provided information about the Greater Serengeti Ecosystem and thus helped with choosing the final villages. 122 households were sampled (ranging from 21-36 in each village) and the average duration for a

questionnaire was 45 minutes. The field research team consisted of two master students two Tanzanian research assistants.

In each village, the field team first approached the village leader to inform about the study as well as obtain consent on behalf of the community. Households in the villages were chosen using a modified random route sampling technique. Random route is basically that you begin the interview process at some geographic point in e.g. a village and follow a specified path of travel to select the households to interview (Bauer 2014). The field crew was split into two teams where one team chose households in the village centers and the other team chose households in the periphery of the villages. Households in the village center were accessed by foot, and a local person knowledgeable of the area assisted the field team. Household in periphery of the village were accessed by motorbikes, with a local person knowledgeable of the area to assist. This division of center and periphery of the village provides a better representation of the population. That locally hired assistants accompanied the field team, enhanced cooperation among respondents. A few of the respondents were not aware of the PAs (see 5.6. Reflections and limitations of the study). In these few situations only the socio-demographic part of the questionnaire was carried out as the rest is related to the PAs. The field team aimed at sampling minimum 30 households in each village. However, due to heavy rainfalls in Salalilya, only 21 households were sampled there.

A household was defined as a group of people that eat together from the same pot. The questionnaire was carried out with the head of the household, typically male, but if the head was not available, the next willing household member with knowledge of the household and an age more than 18 years was interviewed. The research assistants conducted all interviews in Kiswahili and recorded all answers directly in the questionnaire. Thus, only people that could speak Swahili were interviewed. If a household was not comfortable with Swahili, one continued to the next.

Prior to each interview, the research assistants presented the field team to the respondent as well as explained the purpose of the research. The independence from all other actors

was emphasized. The respondents were also explained that participation in the research was voluntary and that they did not have to answer questions that they were not comfortable with. Finally, the respondents were informed that they would remain anonymous and that they would only be referred to using the household id.

3.5. Data analyses and statistics

3.5.1. General factors within people's physical relationship with PAs and related entities

For socio-demographics, assets, interactions with PA staff, awareness of NGOs, cost and benefit information, frequencies of responses were analyzed – and simple statistical tests were performed. Chi-square tests were used to determine if there was a significant difference in the distribution of proportion of answers between the PAs as well as between the individual villages if there was no significant relationship between the PAs (e.g. comparing answers to PA-related problems throughout all villages). Fisher's exact tests were used instead of chi square when analyzing two nominal variables with two categories each (e.g. comparing human-wildlife conflict yes/no answers in Serengeti vs Maswa). T-tests were used to determine if a significant difference existed between the means of two independent groups (e.g number of bicycles in Serengeti vs Maswa). Mann Whitney U-tests were used as a non-parametric alternative to T-tests, when data failed to meet the assumptions for such a test (for instance when data was not normally distributed). For these tests, only significant results are provided.

3.5.2 Asset index

As a measure of wealth, the asset list collected during the household survey was used to develop a principal component weighted asset index (Filmer & Pritchett 2001). Principal Component Analysis extracts the linear combinations of the variables that capture the common information most successfully from a set of variables (Filmer & Pritchett 2001). The first principal component explains the largest possible amount of variation in the original data (Vyas & Kumaranayake 2006). It yields an asset wealth index that assigns larger weights to assets that vary the most across households, meaning that an asset found in all households will be given a weight of zero (McKenzie 2005). The first component or

wealth index can take positive as well as negative values (Córdova 2009). The asset index serves as an indicator of material well-being. The assets chosen for the index were based upon on a list generated by Schmitt (2010) and used as indicators of material well-being in previous studies (Filmer & Prichett 2001, Ellis & Mdoe 2003, Booysen 2008). This list includes both asset ownerships/housing characteristics such as for instance radio, sewing machine, bicycle and natural capital (or financial capital) assets such as e.g. livestock and land. Before running Principal Component Analysis, all the asset data were transformed into binary variables (0 = no, 1 = yes). However, to avoid losing important information about e.g. number of cattles and amount of cultivated land, some "range" variables were kept (e.g. 1-20 cattle, 0 = no, 1 = yes). Because all the asset variables take only the values 0 or 1, the weights have an easy interpretation: a move from 0 to 1 changes the index by the scoring factor divided by the standard deviation. A household that owns a radio has an asset index higher by 0.47 than one that does not; owning no cattle lowers the asset index by 1.71 (Filmer & Pritchett 2001, Appendix 1, Table A1.1.).

3.5.3. Validity of the GPGI

A validity check was performed to see if the GPGI was able to find the same domains that other studies find relevant to the concept of QoL in other developing countries. In order to do so, closely related domains mentioned by the villagers were grouped into the same categories. To provide an example, for instance "house", "bed" and "shelter" were all categorized as "house". However, not much categorization was needed (it ended up with 20 final domains of original 48). The domain categories were then compared to those of other QoL studies in developing countries. Most important of all was to compare with Rasolofson et al. (2016, in press) as this, to the knowledge of this thesis, is the only other study that has used GPGI in relation to conservation. The QoL domains were also compared with those of a number of other studies (Camfield & Ruta (2007) and Martin et al. (2010) that used the GPGI.

Throughout the thesis, "QoL domains", "domains" and "life domains" will be used interchangeably.

3.5.4. GPGI scores

The GPGI overall score is a number between 0 (lowest level of QoL) to 100 (best possible QoL). To create the GPGI final score, for each mentioned domain the importance/weight score was multiplied by the performance score. This was then summed for the five mentioned domains, and then this sum was divided by 5 (the maximum score for performance) and finally multiplied by 100 (Martin et al. 2010a). Notice that the importance/weight is the number of pebbles given to a domain divided by 10 (total number of pebbles).

3.5.5. Construct validity

Construct validity is defined as *"the extent to which a measure is related to specified variables in accordance with an established theory or hypothetical construct"* (Camfield & Ruta 2007). The main theory that was tested is that materially well-off individuals have higher QoL than those materially worse-off (Camfield & Ruta 2007). To overcome the absence of income data, the constructed asset index was used. The index values were divided into groups of the poorest 25 % and the richest 25 %. Then the GPGI scores of individuals in the poorest quartile were compared to those in the richest quartile. For the sake of completeness, the relationship between GPGI scores and gender and educational attainment was also explored. For the comparison, Mann-Whitney U-test and Kruskal-Wallis H-test were used (data was not normally distributed).

3.5.6. Magnitude of well-being impact

To examine the magnitude of the impact of the PAs on people's QoL, two measures were used. Firstly, domains were sorted into "negatively impacted " (1 and 2 on Likert-scale) and "positively impacted" (4 and 5 on Likert-scale). Serengeti and Maswa sites were then compared in terms of the distributions of the frequency of individuals across different numbers (zero to five) of impacted QoL domains. This comparison was carried out separately for negatively and positively impacted domains, using chi square tests. Secondly, because QoL is determined both by the performance and importance/weight of the domains (Bowling 1995, Tovbin et al. 2003), T-tests were also used to compare the mean of the weighted performance in domains perceived to be impacted in Serengeti and

Maswa. The weighted performance is the performance score multiplied by importance share score of number of pebbles.

3.5.7. Attitudes and logistic regression model explaining attitudes towards PAs

For attitudinal data, frequencies of responses were analyzed. Chi square tests were used to determine if there was a significant difference in the distribution of proportion of answers between the PAs and between individual villages if there was no significant difference between the PAs.

A logistic regression model was performed to ascertain the effects of different variables on the likelihood of villagers having a positive attitude towards the PAs (this construct is referred as PaATT). Only people that responded on the attitude section were included in the logistic regression. In order to capture a more holistic notion of attitudes towards PAs than could be achieved with a single attitude statement, the PaATT construct was created from multiple statements (Mehta & Heinen 2001). The four original attitude statements were: "the protected area should be abolished", "protected area rules and penalties are essential for the protection of natural resources and wildlife", "the protected area managers are very helpful and give priority to our problems", "the protected area has disrupted our relationship with nature". Some statements were negatively worded, so they had to be reverse coded in order to maintain consistency. More concretely, if a higher score on an item reflects more of the construct in question, this needs to be the case with all questions. To assess the reliability of the PaATT construct, a reliability analysis was used to assess the internal consistency of the constructs (Cronbachs' $\alpha = 0.65$). Cronbach's α, which takes a value between 0 and 1, provides a measure of internal consistency and describes the extent to which all the items in a test measure the same construct. Thus, it is connected to the interrelatedness of the items within the test (Tavakol & Dennick 2011).

The binary dependent variable was constructed from the PaATT construct. As the four statements making up the construct each are based on Likert-type responses (1-5, where 3 is neutral and is between negative and positive), the binary variable was defined from the

overall score of the four statements. Hence, 0-12 was coded as 0 (negative attitude) and 12 and above was coded as 1 (positive attitude). The independent variables in the model were chosen based on prior theory as defined in the introduction (Table 2). These were: socio-demographics variables, resource dependency in PA (in this thesis measured by illegal grazing – recognizing that the amount of this action is probably underestimated), interaction with PA staff, awareness of NGOs, perceived costs and benefits, attitudes towards general conservation and study site (controlling for area). Number of negatively and positively impacted domains were included to link the magnitude of well-being impact with attitudes, though there is no theoretical justification for the inclusion of these variables. Allendorf (2010) argues that socio-demographic variables might be of less importance for attitudes towards the PAs. Therefore, preliminary analyses (chi square tests, Fisher's exact tests, and correlation tests) were performed to reveal which socio-demographic variable(s) to include in the final model (Table 11).

Table 2. The independent variables in the logistic regression model. Their expected direction is provided along with sources.

Independent variables	**Expected direction**	**Example of source**
Resource dependency	Negative	Marshall et al. 2010
Interaction with PA staff	*	Holmes 2003
Awareness of NGOs	**	Allendorf 2010
Perceived benefits	Positive	Holmes 2003, Schmitt 2010
Perceived costs	Negative	Kideghesho et al. 2007, Schmitt 2010
Study site	***	Kideghesho et al. 2007
Number of negatively impacted domains	Negative	-
Number of positively impacted domains	Positive	-
Attitude towards general conservation	Positive	Karki & Hubacek 2015

* Holmes (2003) found that villagers recognizing interaction with PA staff had a more positive attitude towards the PAs than those not recognizing interaction. Thus, the expected direction is positive if there is a high level of interaction and negative if there is a low level of interaction.

**Allendorf (2010) argues that people's perceptions of other entities that they associate with the PAs - such as NGOs working in the area - can possible influence their attitude towards the PAs. Whether awareness of NGOs has an effect on attitudes towards the PAs is thus tested.

***Kideghesho et al. (2007) found a significant difference in local attitudes towards national parks and game reserves, where villagers bordering game reserves expressed a more negative attitude towards the area. Hence, it is expected that villagers bordering Maswa will hold a more negative attitude than villagers bordering Serengeti.

The variable for attitudes towards general conservation (this construct is referred as ConsATT) was constructed from multiple statements (Mehta & Heinen 2001) to catch the multidimensionality of the concept. The five original statements were: "Plants and animals have as much right as humans to exist", "Human can only protect nature if everyone cooperates", "Wildlife is important for Tanzania", "The natural resources of Tanzania should be conserved for future generations" and "I am willing to preserve the natural resources of Tanzania". As the all the answers provided to these statements were very positive, the construct was constructed in order to differentiate between more positive and less positive. The five statements making up the construct each have Likert-type responses (1-5, where 3 is neutral and is between negative and positive), so the binary variable was defined from the overall score of the five statements. The median was calculated and the resulting variable then differed between "more positive" and "less positive" attitudes towards general conservation. Hence, 0-20 ended up as being coded as 0 (less positive attitude towards general conservation) and 21 and above ended up as being coded as 1 (more positive attitude towards general conservation). To assess the reliability of the conservation values construct, a reliability analysis was carried out (Cronbachs $\alpha = 0.715$).

The equation for the final logistic regression model is:

$$\text{logit}(p) = b_0 + b_1\text{Study site} + b_2\text{PeopleHH} + b_3 + \text{IntPaStaff} + b_4\text{AwareNGO} + b_5\text{Perceptioncost} + b_6\text{IllGrazing} + b_7\text{Perceptionbenefit} + b_8\text{NRNegativeImpact} + b_9\text{NRPositiveImpact} + b_{10}\text{ConsATT} + e$$

Nagelkerke R Square value was used to determine how much variation in the dependent variable that could be explained by the model.

A stepwise regression was also performed (backward elimination) just to support the findings of the first regression model. In the first step all the mentioned variables of interest were included. This was followed by the stepwise deletion of variables so the model was improved the most. This was done using a comparison criterion (-2log likelihood). The process was repeated until the model could not get any better.

3.5.8. IPA technique and derived analyses

To make a Needs Assessment, the Importance-Performance analysis (IPA) developed by Martilla & James (1977) was used. The IPA plots the importance and performance scores from the GPGI to identify improvement prioritization (Azzopardi & Nash 2013). Martilla & James (1977) suggested to present the results in a matrix, which makes it possible to classify importance and performance on a scale of low or high, making it easy to interpret the data for subsequent management decisions. The matrix can be divided into four quadrants as following: quadrant one: domains with high importance, but low performance (concentrate here); quadrant two: domains with high importance and high performance (keep up the good work); quadrant three (no change in resources); quadrant four: domains with low importance but high performance (possible overkill) (Martilla & James 1977, Figure 3). A third dimension was added by color grading the domains according to the frequency with which they were mentioned. Data for color grading were log transformed (using natural logarithm) to improve normality.

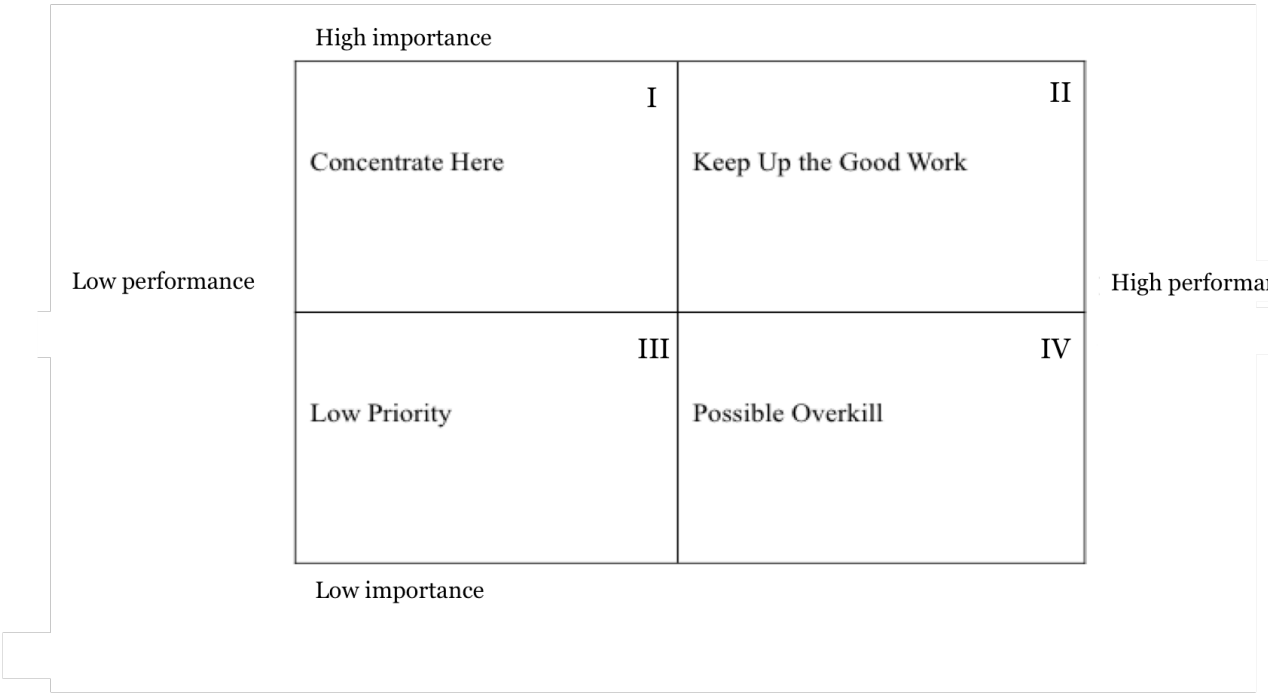


Figure 3. Importance-Performance analysis. Source: Martilla & James (1977).

A modified version of the original IPA technique was also used, as the main focus is to investigate the impact of the PAs on the performance of the QoL domains. Inspired by Rasolofson et al. (2016, in press) an adapted version of the IPA technique (Martilla & James 1977, Azzopardi & Nash 2013) was applied. Here, the performance of the domains in quadrant I and III have been negatively impacted by the PAs and the performance of the domains in quadrant II and IV have been positively impacted. This analysis is called Importance-Performance analysis with Only Impacted domains. Thus, domains that had an impact score of 3 (not affected by PA) were not included. A third dimension was added by color grading the domains according to frequency of impact. Data for color grading were log transformed (natural logarithm) to improve normality.

However, in this study the impact scores and performance scores do not follow each other well, so a third analysis was also used. This new analysis, called Importance-Impact analysis, uses impact scores on the X-axis instead of performance scores. Impact scores reveal how much the PAs have affected each QoL domain without thinking of performance. For this analysis, the quadrants can be divided as following: quadrant I: high importance and negative PA impacts ("more negative quadrant"); quadrant II: high importance and less negative or positive PA impacts ("less negative/more positive quadrant"); quadrant III: low importance and negative PA impacts (low priority); quadrant IV: low importance and less negative or more positive PA impact (low priority) (Figure 4). Also here, a third dimension was added by color grading the domains according to frequency of impact. Data for color grading were log transformed (using natural logarithm) to improve normality.

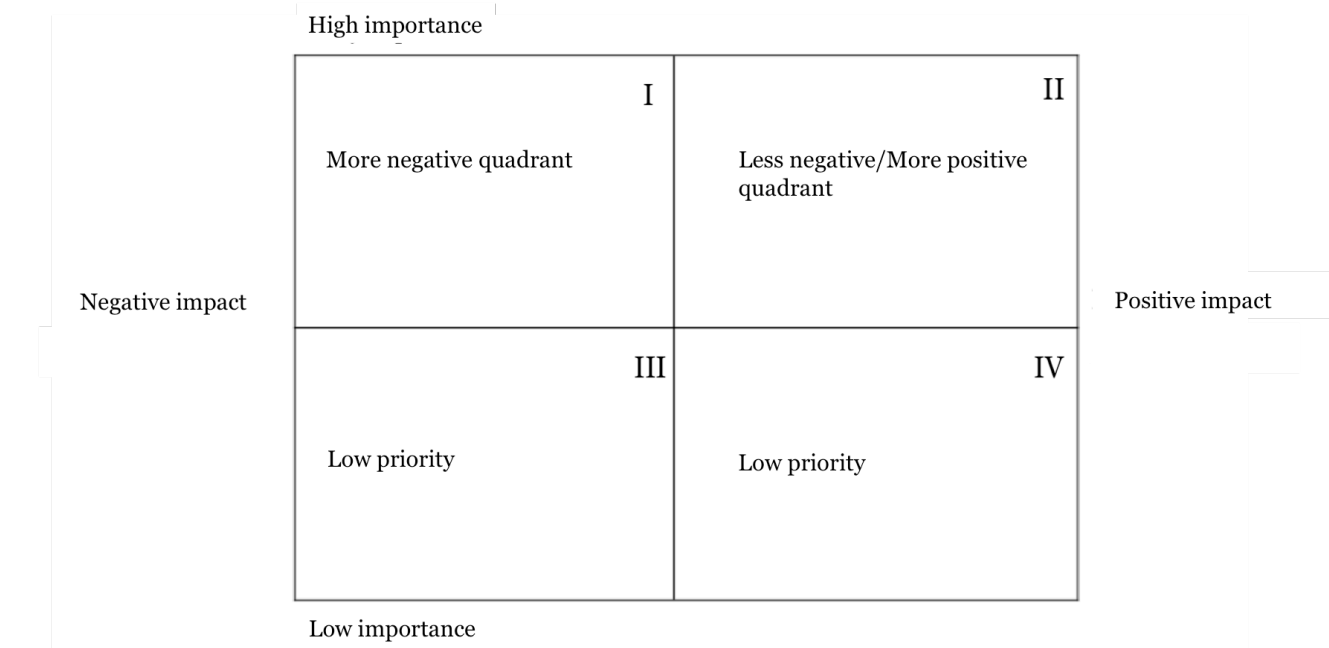


Figure 4. Importance-Impact analysis.

For the Importance-Impact analysis, the focus is on especially quadrant I, followed by quadrant II (that's why both quadrant III and IV are called "low priority"). Due to the amount of negative impact in this study, quadrant II is called "less negative/more positive". The use of this term also implies that the graphs should be seen as a continuum rather than an exact division between negative and positive. From the graphs alone, it cannot reliably be interpreted that a domain is negatively or positively impacted given that 3 on the Likert-scale for Impact scores is neutral ("PA does not affect life domain"). Thus, a domain, which is not affected by the PA might end up in for instance the "less negative/more positive" quadrant. Even a domain mentioned as negatively impacted might end up in the "less negative/more positive" quadrant, so the continuum should be seen as an average consideration. Also here, a third dimension was introduced in the color grading: the frequency of impact. Hence, to interpret the graph, one should look at the location of the domain in the graph, the color grading and the direction of impact. Data for color grading were log transformed (using natural logarithm) to improve normality.

In all three types of graphs, mean values are presented on the axes. Notice that the units are different: importance scores are pebble scores (10 is maximum value) and performance and impact scores are Likert-type answers (5 is maximum). However, only very few importance scores were above 5 and when presenting data as mean values this is not a problem. Nonetheless, with different units it is more subjective where you place the gridlines that separate the quadrants. As the focus here is on observed data, the gridlines were constructed of actual data means as suggested by several studies (E.g. Eskildsen & Kristensen 2006).

As some domains can appear close to the gridlines, One-sample T-tests were performed to reveal whether these were significantly different from the gridline means. Data that were not normally distributed were log transformed before performing the test. For importance, performance as well as impact values – each domain's mean was tested against the "population" mean (i.e. the gridline). It is possible that importance scores can be significantly different from the importance gridline mean, while performance scores can fail to be significantly different from the performance gridline mean - and vice versa. However, to be statistically confident that a domain belongs to the inferred category ("Concentrate here", "Keep up the good work", "more negative" etc), it should be significantly different from the gridline means in both measures. P-values larger than 0.05 were considered non-significant.

Finally, a form of a "sensitivity analysis" was also performed. The goal of this analysis was to remove some of the mentioned domains to see how these domains affected the results - in terms of the interpretation of the graph. As an example a domain that is only mentioned as impacted once in the Importance-Impact analysis might be located in a quadrant of high concern despite its low frequency, thereby distorting the distribution of domains throughout the graph. When removing domains, the graphs had to be standardized because the Y-axis consists of pebble scores. For the "normal graphs" this does not matter (as 10 is the total amount of pebbles distributed between domains for each household). However, when a domain is removed, the total amount of pebbles distributed between domains for each household changes and there will only be X

pebbles left for the households that mentioned that domains. If a household gets rid of e.g. 2 pebbles, in this way there are only 8 left. I.e. if the domain "farm" has 3 pebbles, it becomes 3/8 to be included in the average across the sample. This explains why the mean values are that low on the Y-axis in the standardized graphs. The focus in the "sensitivity analysis" was to remove some of the domains located in quadrant I and II as these are of main interest. Some domains located in quadrant III and IV were also tried removed, but this did not have a significant effect on the distribution of nodes. The criterion for removal was domains that were only mentioned or mentioned as impacted once or twice.

For the Importance-Performance analysis with Only Impacted domains in Serengeti, the domain "hospital" appears in quadrant I and was only mentioned as impacted once. Thus, it was removed. No "sensitivity analysis" was carried out for Maswa as the result looked reasonable (of what theoretically could be expected from the qualitative data). For the Importance-Impact analysis, the domains "health services" and "hospital" appear in the "less negative/more positive quadrant" and were only impacted once each in Serengeti. Hence, they were removed. In Maswa, the domains "family" (mentioned as impacted only once and located in the "more negative quadrant"), "education" and "agriculture" (mentioned as impacted twice each and located in the "less negative/more positive" and "more negative quadrant", respectively) were removed. In the Importance-Performance Needs Assessment, the domain "hospital" (quadrant I) was removed in Serengeti as it was only mentioned twice. Also in this analysis, no "sensitivity analysis" was carried out for Maswa as the result looked reasonable (of what theoretically could be expected from the qualitative data).

Throughout the thesis, the terms "quadrant" and "category" will both be used. While they somehow represent the same, there is a conceptual difference: the "quadrant" refers to the physical location in the graph while the "category" is the result of a given domain being located in a given quadrant: the inferred priority category for subsequent management decisions. For instance, "more negative" in the "more negative quadrant" is a category in the Importance-Impact analysis which obviously should be the main focus in management decisions. Also, "concentrate here" in quadrant I in the Importance-

Performance Needs Assessment is a category. In the Importance-Impact analysis the category of for instance quadrant I could also have been labeled as "concentrate here". However, it was labeled differently in order not to create confusion between the analyses.

3.5.9. Household comments and structured village leader discussions

Household comments as well as information from structured village leader discussions are provided to support the results. These are respectively cited as [HHXY] and [SVLD-X], with "HH" referring to "household" and "SVLD" referring to "structured village leader discussion". "X" refers to the village ID. The village ID ranges from A to D where A = Matongo, B = Salalilya, C = Mwanyahina and D = Buganza. "Y" refers to the household ID in the household comments (between 1 and 122). Here 1-36 refers to Matongo, 37-57 refers to Salalilya, 58-98 refers to Mwanyahina and 99-122 refers to Buganza.

All statistics were carried out in SPSS version 23 and PAST statistics version 3. Graphs were constructed in R 3.3.1. using R Studio.

4. RESULTS

4.1. General factors within people's physical relationship with PAs and related entities

4.1.1. Socio-demographics

122 households were interviewed (Table 3, Serengeti n = 57, Maswa n = 65). Socio-demographically, the respondents consisted of 74 % men and 26 % women. The average age of the respondents was 43. The average number of people living in the households was 9. 75 % had attended primary school, 11 % secondary school and 14 % had no formal education. 55 % of the villagers had emigrated from surrounding areas, whilst only 45 % were born in the villages. Ethnically, the sample was very dominated by people of the Sukuma tribe (97 %). Most people had primary education (75 %). 90 % of the respondents had not been interviewed before. The main occupation mentioned was

farming (93 %) (Table 4). Although a lot of people kept livestock, it was rarely mentioned as an occupation. 49 % of all villagers had two livelihood activities. This information is consistent with the structured village leader discussions, where subsistence farming was mentioned as the most important livelihood activity in all of the villages, followed by livestock keeping [SVLD-A, SVLD-B, SVLD-C, SVLD-D]. No significant difference was found between Serengeti and Maswa among the socio-demographic and livelihood variables.

Table 3. Socio-demographic characteristics of the surveyed households in villages bordering Serengeti and Maswa.

Socio-Demographics	Serengeti	Maswa	Total
Number of HHs interviewed	57	65	122
Average number people in HH	10+8.03	9+4.82	9+6.57
Average education level of HH			
None	0 %	0 %	0 %
Primary	63 %	58 %	61 %
Secondary	33 %	37 %	35 %
High school	2 %	0 %	1 %
University	2 %	5 %	3 %
Ethnicity			
Sukuma	100 %	94 %	97 %
Other	0 %	6 %	3 %
Gender of respondent			
Male	77 %	72 %	74 %
Female	23 %	28 %	26 %
Average age of respondent	41+14.73	46+14.28	43+14.61
Household position of respondent			
Head of household	72 %	72 %	72 %
Wife	23 %	28 %	26 %
Other	5 %	0 %	2 %
Education level of respondent			
None	9 %	17 %	13 %
Primary	82 %	69 %	75 %
Secondary	9 %	12 %	11 %
Other	0 %	1 %	1 %
Residential status of respondent			
Local inhabitant	52 %	38 %	45 %
Migrant	48 %	62 %	55 %
Interviewed before			
Yes	9 %	11 %	10 %
No	91 %	89 %	90 %

Table 4. Livelihood characteristics of the surveyed households in villages bordering Serengeti (n = 57) and Maswa (n = 65).

Main occupation of HH head	**Serengeti**	**Maswa**	**Total**
Farming	94 %	91 %	93 %
Livestock	2 %	1 %	2 %
Wage labor	2 %	1 %	2 %
Own business	0 %	3 %	2 %
Other	2 %	3 %	2 %
Combination of livelihood activities			
One activity	100 %	100 %	100 %
Two activities	47 %	51 %	49 %
Three activities	6 %	1 %	3 %

4.1.2. Assets and asset index

Household assets and housing characteristics are presented in Table 5. A total of 72 % of the respondents owned livestock, 63 % owned cattle and 91 % owned cultivated farmland. Of these assets, only a few showed statistically significant difference among the areas. There was a significant difference between number of shoats (sheep and goats together) in Serengeti and Maswa (Mann-Whitney U = 1319.5; $p < 0,01$) (mean = 24.25 Serengeti, mean = 40.91 Maswa). There was a significant difference between amount of farmland cultivated (Mann Whitney U = 1419; $p < 0.05$) (mean = 24.25 Ha Maswa, mean = 10.70 Ha Serengeti). There was also a significant difference between number of bicycles owned between Serengeti and Maswa (Mann Whitney U = 1296; $p < 0.01$) (mean = 1.26 Maswa, mean = 0.84 Serengeti). Together, this suggests higher wealth in Maswa. This is in line with the constructed asset index (Appendix 1, Table A1.1.). According to this index, Maswa showed higher wealth compared to Serengeti (T-test: T = -2.1733; $p < 0.05$) (mean = 5.14 Maswa, mean = 3.58 Serengeti).

Table 5. Assets and housing characteristics owned by the surveyed households in villages bordering Serengeti (n = 57) and Maswa (n = 65).

	Serengeti		**Maswa**		**Total**	
	% owned	Mean±SD	% owned	Mean±SD	% owned	Mean±SD
Livestock	66 %		77 %		72 %	
Cattle	58 %	33+54.07	68 %	18+17.59	63 %	24+37.98
Shoats	49 %	24+30.12	68%	48+42.90	59 %	39+40.02
Chickens	86 %	16+12.76	85 %	19+21.30	85 %	18+17.83
Farm land cultivated (ha)	90 %	12+18.80	92 %	26+37.96	91 %	20+31.46
House	93 %	4+5.88	92 %	3+1.36	92 %	3+4.18
Generator	0 %	0	6 %	1+0	3 %	1+0
Radio	39 %	1+0.57	31 %	1+0.39	36 %	1+0.48
Water Tank	0 %	0	3 %	1+0	2 %	1+0
Improved charcoal stove	18 %	1+0.70	40 %	1+0.42	29 %	1+0.64
Cellphone	91 %	2+1.49	86 %	2+0.96	88 %	2+1.27
Sewing machine	9 %	1+0.54	14 %	1+0	11 %	1+0.36
Motorbike	21 %	1+0.36	22 %	1+0.62	21 %	1+0.49
Bicycle	63 %	1+0.63	84 %	1+0.73	74 %	1+0.69
Monetary savings	9 %	NA	18 %	NA	14 %	NA
Asset Index		3.58+3.56		5.14+4.23		4.41+4.0

4.1.3. Resource dependency and use

Besides most people being dependent on land for cultivation and grazing, virtually everyone was dependent on fuelwood extraction (96 %). Village leaders stated that fuelwood, grasses, animal fodder, medicinal plants, timber and charcoal are all important natural resources to the villages [SVLD-A, SVLD-B, SVLD-C, SVLD-D]. Especially grass for grazing seemed to be a contested issue as 39 % of the village respondents admitted that they graze their cattle illegally in the PAs, although this percentage is likely to be underestimated because of the illegal nature of the topic. All village leaders confirmed that illegal grazing by the villagers is taking place in the PAs [SVLD-A, SVLD-B, SVLD-C, SVLD-D] – both because of general lack of land for grazing due to population increase [SVLD-A, SVLD-B] and because of seasonal variations in grass availability: "*During the dry season, the availability of grasses for animals is scarce (e.g. July-January), so the only place the people can graze is in the protected area where the grasses are plenty*" [SVLD-D]. Several households agreed on this, for instance through comments like: *"There was no rain so the grasses for animals*

were scarce – the only option was to graze in the protected area" [HHA9] and "*I think the government should allow us to graze in the protected area during the dry season because we do not have places to graze*" [HHD28]. One household also just expressed general discontent: "*I just wish that we could be allowed to graze our cattle in the protected area. That is all I wish"* [HHA22]. Another household expressed its discontent with the difference in rules and regulations across the PAs: "*Since the Maasai graze their cattle in the NCA (Ngorongoro Conservation Area bordering Serengeti), I will also graze mine in Serengeti*" [HHA23]. Finally, the cultural belonging to the land was also mentioned: "*We ask the government to give us back the land that once belonged to us and our forefathers*" [HHD25].

Three of four village leaders also reported that villagers extract fuelwood from the PAs [SVLD-A, SVLD-C, SVLD-D]. When asked about which resource the villages are going to lack the most in the future, answers were all centered around space as there will not be enough land for cultivation and grazing (SVLD-A, SVLD-B, SVLD-C, SVLD-D).

4.1.4. Knowledge, interaction with PA staff and awareness of NGOs

95 % of the respondents were aware of the PAs (Table 6). To identify levels of interaction between the PA staff and local villagers, the respondents were asked, "*Have you experienced any interaction with the protected area staff*". Only 18 % reported some kind of interaction with the PA staff. The most frequently mentioned interaction was through village projects (10 %), followed by staff providing info (5 %), staff buying food (2 %) and village meetings (1 %). Differences were observed between villages (χ^2 = 8.634; df = 3; $p < 0.05$) - no households in Salalilya (Serengeti) reported any interaction. Only village leaders in Mwanyahina and Buganza (Maswa) reported interaction with PA staff – and only related to village projects [SVLD-C, SVLD-D]. For instance, a couple of households mentioned the building of a school [HHC10, HHC11]. Some other households stated that they only have interaction with the PA staff when they are caught grazing their cattle in the PA – referring back to the lack of land for grazing issue [HHA1, HHA20, HHC5]. The main source of conservation information as mentioned by the respondents was the village council (39 %), followed by information from PA staff

(12 %) but 34 % of the respondents stated that they get no information. When asked about awareness of other organizations (NGOs) working around the areas, 69 % of the respondents were not aware of any and 26 % were aware of NGOs. A significant difference was observed between Serengeti and Maswa (Fisher's: $\chi^2 = 11.405$; df = 1; $p < 0.01$), and more people were aware of the presence of NGOs in Maswa (Table 6).

Table 6. Knowledge of PA, interaction with PA staff, main source of conservation info and awareness of NGOs in Serengeti (n = 57) and Maswa (n = 65).

	Serengeti	**Maswa**	**Total**
Knowledge of PA			
Yes	89 %	100 %	95 %
No	11 %	0 %	5 %
Interaction with PA staff			
Yes	14 %	23 %	18 %
No	75 %	75 %	75 %
Type of interaction with PA staff			
Providing information	5 %	3 %	5 %
Purchasing food etc	0 %	3 %	2 %
Village meeting	2 %	0 %	1 %
Village project	5 %	15 %	10 %
Other	2 %	2 %	2 %
Main source of conservation info			
PA staff	12 %	11 %	12 %
Village council	49 %	29 %	39 %
No information	23 %	44 %	34 %
Awareness of NGOs			
Yes	11 %	40 %	26 %
No	79 %	60 %	69 %

4.1.5. Benefits and problems reported

Benefits and problems are reported in Table 7. 62 % of the respondents reported no benefits related to the PA and only 34 % reported benefits. 22 % reported benefits related to village projects. Most frequently mentioned village projects were offices (10 %), water projects (7 %) as well as education and dispensaries (2 % each). 22 % of the respondents reported benefits related to school projects (e.g. building of classrooms and dormitories), and 8 % of the respondents reported benefits related to access to PA resources. The most frequently mentioned access to PA resources benefits were land for grazing (7 %), followed by fuelwood (2 %). Other benefits mentioned only once each were employment and "helping orphans going to school". Significant differences were found between

villages (χ^2 = 12.075; df = 3; $p < 0.05$), as only 1 household in Salalilya (Serengeti) reported benefits from the PA. Significant differences were found between Serengeti and Maswa with respect to school project benefits (Fisher's: $\chi^2 = 6.7533$; df = 1; $p < 0.05$), and more people in Maswa reported benefits.

66 % of respondents reported problems related to the PA. 47 % reported problems related to human wildlife conflicts. The most frequently mentioned type of human-wildlife conflict was crop raiding (44 %) followed by livestock depredation (2 %) and killing of people by animals (1 %). 34 % reported problems related to arrests or conflict with PA staff. The most frequently mentioned type of arrest or conflict was getting arrested (30 %), conflict with PA staff (3 %) and finally livestock confiscation (2 %). 9 % reported problems with lack of resources. The most frequently type of lack of resources mentioned was lack of grazing land (5 %) followed by general loss of land (3 %). Significant differences were found between Serengeti and Maswa with respect to human-wildlife conflicts (Fisher's: $\chi^2 = 7.631$; df = 1; $p < 0.01$) and more people in Serengeti had these kinds of problems. In contrast, the number of people reporting having been arrested was significantly higher in Maswa than Serengeti (Fisher's: $\chi^2 = 17.358$; df = 1; $p < 0.01$).

Several quotes from the individual households elaborate on the problems related to the PAs. Regarding lack of resources (here grazing land) one household stated: *"They could allow us to graze like the Masai in NCA"* [HHD3]. Regarding human-wildlife conflicts (crop raiding) a couple of households stated: *"The government should think of ways to stop the animals from raiding our crops "*[HHD29] and *"The workers of the protected area should protect the wild animals from entering into our plantations"* [HHC10]. Also, one household reported killing of livestock by lions [HHA2]. With respect to conflicts with PA staff and arrests, several households stated that the workers of the PA charge too much money of the villagers for doing illegal grazing – and they beat them too much [HHD27, HHD28]. One household even claimed that " *If caught grazing in the protected area you might be beaten to death*" [HHD26].

Table 7. Benefits and problems reported in Serengeti (n = 57) and Maswa (n = 65).

	Serengeti	Maswa	Total
Type of benefit			
Yes	23 %	44 %	34 %
No	67 %	55 %	62 %
Type of benefit			
School related projects	11 %	31 %	22 %
Village projects	16 %	29 %	22 %
Access to PA resources	8 %	8 %	8 %
Problems			
Yes	63 %	68 %	66 %
No	26 %	32 %	30 %
Type of problem			
Human-Wildlife conflict	56 %	37 %	47 %
Conflict or arrests	14 %	54 %	34 %
Lack of resources	11 %	6 %	9 %

4.2. Subjective Well-being and PA impact on well-being

4.2.1. Validity of the GPGI

114 households answered questions about the GPGI and QoL (n = 51 Serengeti, n = 63 Maswa). The most significant domains mentioned as important to respondents' QoL were *food* (80 %), *house* (70 %), *water* (68 %), *livestock* (40 %), *money* (26 %), *land* (25 %), *family* (24 %) and *education* (23 %) (Table 9). Further 12 domains were mentioned by less than 20 % of the respondents (Table 8). There was a significant difference between mentioned domains in villages bordering Serengeti and Maswa ($\chi^2 = 59.865$; df = 19; $p < 0.01$). For instance, "food", "house" and "water" were mentioned more frequently in Mwanyahina (Maswa) compared to Salalilya (Serengeti). "Clothes" was not mentioned in Serengeti villages and "Farming equipment" was not mentioned in Maswa villages. See Table 13 and Table 14 for differences between Serengeti and Maswa in percentages and frequencies.

Table 8. The final 20 QoL domains and the original 48 mentioned domains. If mentioned by more than 5 % of the respondents it became a domain.

Final classified domains	**Original domains mentioned**
Agriculture	Agriculture, Land for cultivation, Farming
Bicycle	Bicycle
Business	Business, Cooking stove
Clothes	Clothes
Education	Education, School, Conservation education,
Food	Food
Family	Family
Farm	Chicken keeping, Chickens
Farming equipment	Farming equipment, Plow, Tractor, Machine
Health services	Health services, Health
Hospital	Hospital
House	House, Bed, Shelter, Roof, Home appliances, Radio, Dishes, Sewing machine,
Land	Land, Land for grazing
Livestock	Livestock, Cows, Animal fodder,
Money	Money
Motorbike	Motorbike
Phone	Phone, Cell phone, Mobile phone
Transport	Car, Road
Water	Water
Wood resources	Forests, Fuelwood, Fire, Firewood, Grasses, Trees

Comparing with other QoL domains found in the literature, there is a strong overlap between the most significant domains as important to respondent's QoL. The QoL domains most often mentioned in this study are directly comparable to e.g. Rasolofson et al. (2016, in press), Camfield & Ruta (2007) and Martin et al. (2010a). However, the frequencies of land related domains (agriculture, livestock, farming equipment, land) are higher in this study and Rasolofson et al. (2016, in press) compared to Camfield & Ruta (2007) and Martin et al. (2010a) (see Table 9 for comparison). However, this also makes sense due to the purpose as well as the setting of the study.

Table 9. Comparison of QoL domains with domains from other literature. Domains are listed in order of percentage (n = 114). Table adopted and modified from Rasolofson et al. (2016, in press).

Domains	**Percentage**	**Rasolofson et al. (2016, in press)**	**Camfield & Ruta (2007)**	**Martin et al. (2010a)**
Food	80 %	X	-	X
House	70 %	X	*X	X
Water	68 %	-	-	-
Livestock	40 %	X	X	X
Money	26 %	X	X	X
Land	25 %	X	X	*X
Family	24 %	X	X	X
Education	23 %	X	X	X
Bicycle	21%	-	-	
Clothes	18 %	*X		X
Farm	18 %			*X
Agriculture	13 %	X	X	
Phone	11 %			
Transport	11 %		X	X
Health services	10 %			
Hospital	9 %			
Wood resources	9 %			
Business	7 %		X	*X
Motorbike	6 %			
Farming equipment	5 %	*X		

*****Some of the domains are more or less the same as domains in the other papers, though their names are different. "House" is called "home" in Camfield & Ruta (2007). Land and farm is combined into one domain in Martin et al. (2010a) called "land/farm". "Clothes" is called "clothing" in Rasolofson et al. (2016, in press). Business is called "own business/shop" in Martin et al. (2010a). Farming equipment is called "work equipment/agricultural equipment" in Rasolofson et al. (2016). Note that health is mentioned in the other papers, but in this thesis it is service related.

4.2.2. Construct validity

The individual GPGI scores ranged between 0 and 92. The wealthiest respondents according to the constructed asset index had a higher mean GPGI score than the poorest, but the difference was not statistically significant (Mann-Whitney U = 288; p = 0.09). The GPGI mean score was a bit higher in Serengeti compared to Maswa (27.8 compared to 24.1) – even though villagers in Maswa were more wealthy according to the constructed asset index. There was also a slight difference in the mean GPGI score with respect to gender, but the difference was not statistically significant (Mann Whitney U = 1073; p = 0.50). There was a slight difference in the mean GPGI score with respect to education level (primary, secondary and no education) and "no education" had the

highest mean and secondary the lowest. However, the difference was not statistically significant (Kruskal-Wallis H = 0.51; p = 0.7751) (Table 10).

Table 10. Construct validity. Difference in mean GPGI scores between poorest and richest quartile of the asset index. Also difference in mean GPGI scores between gender and between respondents with primary, secondary or no education. The sample descriptions indicate the highest index values for the poorest 25 % (ranging from -4.40-1.1) and the richest 25 % (ranging from 7.51-12.65).

GPGI - Wealth	**Poorest 25%**		**Richest 25%**
Sample description	1.1		12.65
Mean GPGI score	24,23		33.2
Mann Whitney U			p = 0.09
GPGI - Gender	**Male**		**Female**
Mean GPGI score	26.24		24.44
Mann Whitney U			p = 0.50
GPGI – Education level	**Primary**	**Secondary**	**No education**
Mean GPGI score	26.27	21.5	28.16
Kruskal-Wallis H			p = 0.7751

4.2.3. Magnitude of well-being impact

A high proportion of respondents reported perceived negative impacts of the PAs. Only 10 % in Serengeti and 22 % in Maswa had zero negatively impacted domains. In contrast, very few of the respondents reported perceived positive impacts of the PAs. 75 % of the respondents in Serengeti and 79 % of the respondents in Maswa reported that zero of the mentioned domains were positively impacted (Figure 5). In terms of the distribution of the frequency of individuals across difference numbers (zero to five) of negatively impacted domains, no statistically significant difference was found between Serengeti and Maswa, but between individual villages ($\chi^2 = 28.259$; df = 15, $p < 0.05$). Mwanyahina (Maswa) seemed to have most individuals reporting zero and one negatively impacted domains, while Buganza (Maswa) had most individuals reporting two negatively impacted domains. Matongo (Serengeti) had most individuals reporting 3, 4, and 5 negatively impacted domains. In terms of the distribution of the frequency of individuals across difference numbers (zero to five) of positively impacted domains, a significant difference was also found between individual villages here ($\chi^2 = 13.235$; df = 15, $p < 0.05$). Buganza (Maswa) seemed to have most individuals reporting zero positively impacted domains compared to Matongo (Serengeti). Throughout all villages, no individuals reported 3,4 or 5 positively impacted domains.

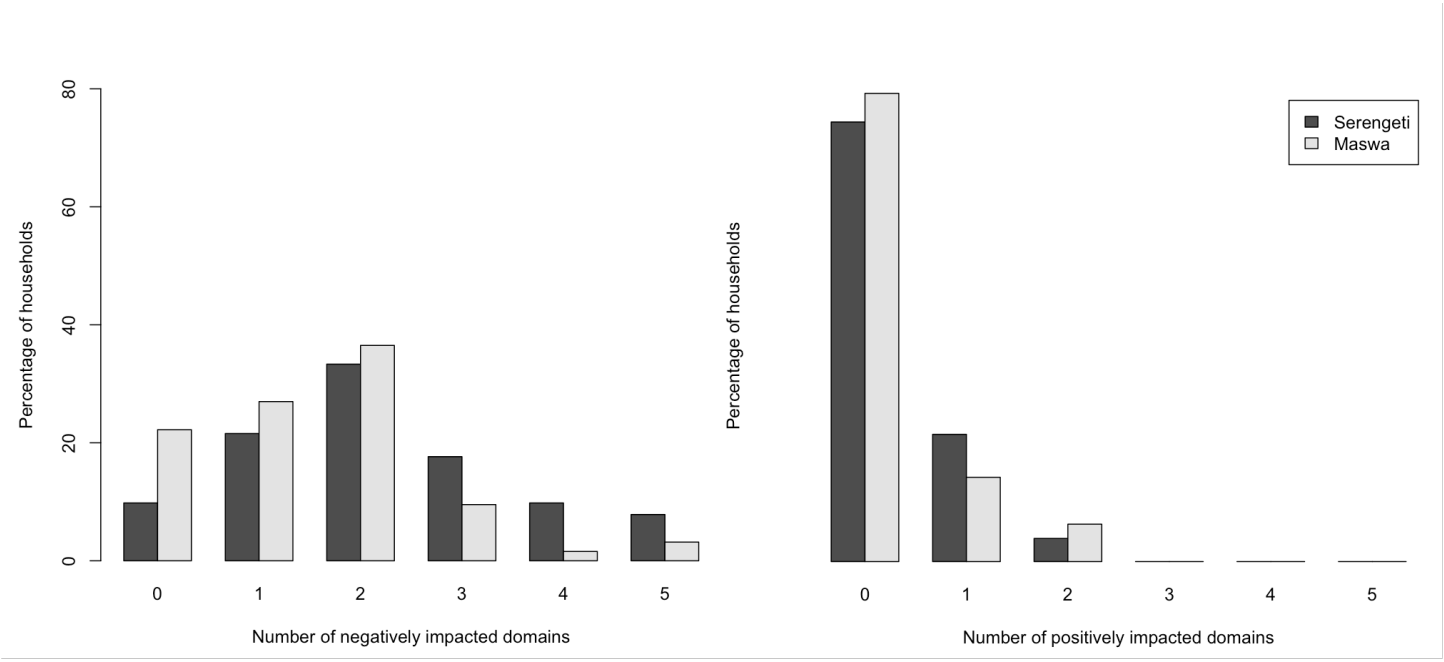


Figure 5. Distributions of the frequency of individuals reporting different numbers (zero to five) of negatively and positively impacted domains in Serengeti and Maswa.

The mean of the weighted performance in domains perceived to be impacted was higher in Serengeti than in Maswa (1.39 and 1.20 respectively), but the difference was not statistically significant (T-test: T = -1.6224; p = 0.11).

4.3. Attitudes

4.3.1. Attitudes towards general conservation

113 persons answered questions about attitudes (n = 51 Serengeti, n = 62 Maswa). Five statements were used to understand people's attitudes towards general conservation. See Figure 6 for original Likert-type answers – in this section there is not differentiated between agree/strongly agree and disagree/strongly disagree. 70 % agreed that "*plants and animals have as much right as humans to exist"* and 24 % disagreed. 83 % agreed that "*humans can only protect nature if everyone cooperates*" and 8 % disagreed. 96 % of the respondents agreed that "*wildlife is important for Tanzania"* and only 2 % disagreed. 87 % agreed that "*the natural resources of Tanzania should be conserved for future*

generations" and 5 % disagreed. Finally, 90 % agreed on the statement "*I am willing to preserve the natural resources of Tanzania"* while 5 % disagreed.

Besides the positive attitudes towards general conservation, village leaders also all stated that they were interested in learning about the sustainable use of natural resources [SVLD-A, SVLD-B, SVLD-C, SVLD-D]. Village leaders in Salalilya (Serengeti) and Mwanyahina (Maswa) expressed more specific ecological and climatic concerns: "*Because people cut trees for fuelwood, the land remains bare and thus prone to shortage of rainfall, which we depend on for cultivation and grazing land*" [SVLD-B] and *"Due to climate change it is very important to know about deforestation and issues that can result in long periods of drought*" [SVLD-C].

4.3.2. Attitudes towards the PAs

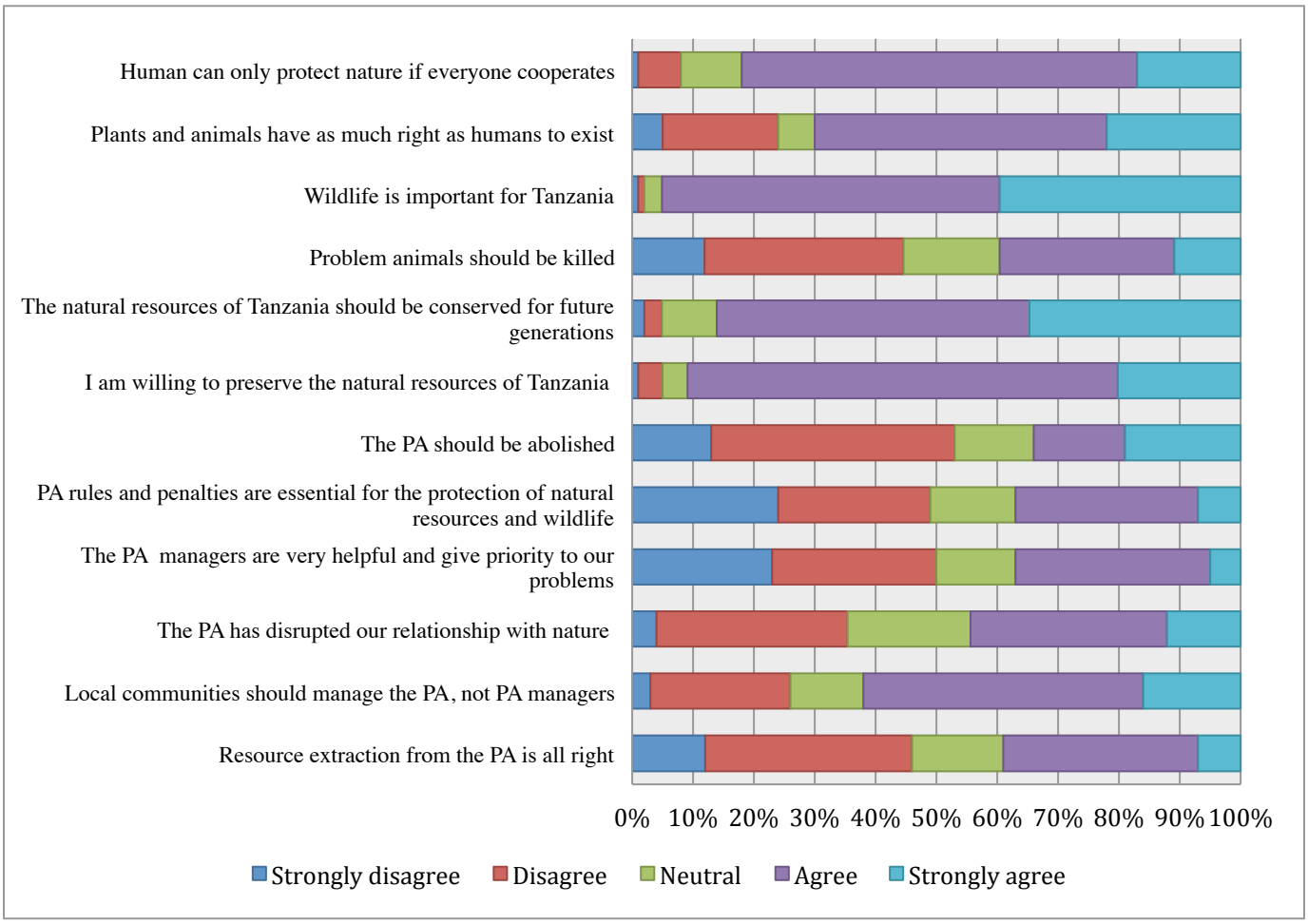
Four statements were used to understand peoples' attitudes towards the PAs (Figure 6). 43 % disagreed that "*the protected area should be abolished*" and 34 % agreed. Differences between villages were observed for this statement (χ^2 = 26.475; df = 12; p < 0,01). In Matongo (Serengeti) and in Buganza (Maswa) most people agreed with the statement. 49 % disagreed that *"Protected area rules and penalties are essential for the protection of natural resources and wildlife"* and 37 % agreed. 50 % disagreed that "*the protected area managers are very helpful and give priority to our problems"* and 37 % agreed. 44 % of the respondents agreed that "*the protected area has disrupted our relationship with nature*" and 35 % disagreed. Differences between villages were observed for this statement (χ^2 = 26.587; df = 12; p < 0.01) and villages in Buganza and Mwanyahina (Maswa) appeared to be most in agreement with the proposition.

For the PaATT construct used to measure attitude towards the PAs in the logistic regression (consisting of the four abovementioned statements), 60 % expressed a negative attitude towards the PAs and 40 % a positive attitude towards the PAs. The overweight of negative attitudes is in line with information from the structured village leader discussions as all village leaders stated that the relationship between the local communities and the PAs were "bad".

4.3.3. Resource extraction attitudes and attitudes towards management

46 % of the respondents disagreed that "*resource extraction from the protected area is all right*" and 39 % agreed. Finally, 62 % of the respondents agreed that "*local communities should manage the protected area, not protected area managers*" and 27 % disagreed.

Figure 6. Respondents' attitudes towards general conservation, PAs, resource extraction and management. Original single statements.



4.4. Logistic regression model explaining attitudes towards PAs

The results of the preliminary correlations, chi square and Fisher's exact tests between socio-demographic variables and PaATT are shown in Table 11. Only one socio-demographic variable showed a statistical significant association with attitudes towards the PAs (at the 0,1 level), and was thus included (PeopleHH = number of people living in the household).

Table 11. Preliminary analyses for socio-demographics on the PaATT dependent variable (Fisher's exact, Pearson's chi square and correlations).

	PaATT
Asset wealth index ***	0.370
Gender (female) *	0.258
Age ***	0.454
Education level Interviewee *	0.760
People HH ***	0.065
Ethnicity *	0.648
Average education level household **	0.491
Main occupation household head **	0.556
Residential status **	0.179
Two or more livelihood activities*	0.702

*Fisher's exact test; p-value
**Pearson chi square; p-value
***Pearson's correlation; correlation coefficient

The logistic regression was performed to ascertain the effects of the predictor variables of interest on the likelihood that respondents have a positive attitude towards the PAs (PaATT):

The model was statistically significant ($\chi^2 = 44.40$, $p < 0,01$) and explained approximately 43.9% (Nagelkerke $R^2 = 0,439$) of the respondent's variance in attitude towards the PAs. Of all the predictor variables, five were statistically significant:

Study site, Perceptions of benefits, Perceptions of costs (at the 0.1 level), Number of negatively impacted domains and Awareness of NGOs (Table 12). The strongest predictor was the perceptions of benefits. If respondents perceived benefits, they had 4,631 times higher odds to exhibit positive attitude towards the PAs than if they did not perceive benefits (Epx(B)). Living in Maswa was associated with a more negative attitude towards the PAs. Being aware of NGOs working in the area was associated with a more positive attitude towards the PAs. The perception of costs was associated with a more negative attitude towards the PAs and finally an increasing amount of negatively impacted domains was also associated with a more negative attitude (Table 12). A stepwise logistic regression was also performed to support the results, resulting in the same five significant variables in the last step.

Table 12. Logistic regression model. Outcome variable: PaATT. Explanatory variables: Study site, Household size (nr of people in HH), Interaction with PA staff, Awareness of NGOs, Perceptions of benefits and costs, Resource dependency (measured by Illegal grazing), Magnitude of well-being impact (Nr of positively and negatively impacted domains) and Attitudes towards general conservation (ConsATT) (n=113, –2 log likelihood=107.536). The sign of the coefficients (B) shows whether the value is positive or negative.

Variables	B	S.E.	Wald	df	Sig.	Exp(B)
Study site	-2.013	0.625	10.383	1	0.001***	0.134
PeopleHH	-0.086	0.062	1.925	1	0.165	0.918
IntPAstaff	-0.317	0.683	0.216	1	0.642	0.728
AwareNGO	1.401	0.645	4.716	1	0.030**	4.061
PerceptionCost	-0.775	0.410	3.573	1	0.059*	0.461
IllGrazing	-0.441	0.552	0.638	1	0.425	0.644
PerceptionBenefit	1.533	0.472	10.553	1	0.001***	4.631
NRNegativeImpact	-0.526	0.231	5.186	1	0.023**	0.591
NRPositiveImpact	-0.497	0.494	1.012	1	0.314	0.608
ConsATT	-0.397	0.594	0.447	1	0.504	0.672
Constant	2.155	0.821	6.890	1	0.009	8.627

Dependent variable: PaATT
* = P < 0.1. ** = P < 0.05 og *** = P < 0.01
*Study site coded as 0 = Serengeti, 1 = Maswa
*IntPaStaff,AwareNGO and IllGrazing coded as 0 = no, 1 = yes
*PerceptionCost and PerceptionBenefit coded as number of type of benefit/problem e.g.school, village project, arrested, human-wildlife conflicts
*NrNegativeImpact and NRPositiveImpact coded as number of impacted domains per individual (negative or positive, respectively)
*ConsATT coded as 0 = less positive attitude, 1 = more positive attitude

4.5. Testing the IPA technique and derived analyses

4.5.1. Importance-Performance analysis with Only Impacted domains

The Importance-Performance analysis with Only Impacted domains links the impact of the PAs to the performance of specific domains. In Serengeti: “business”, “hospital” and “motorbike” appear in quadrant I, indicating that they are negatively impacted with a strong effect on QoL. In quadrant II “water”, “money”, “transport”, “land”, “house”, “food”, “farm”, “family”, “education” all appear, suggesting that they are positively impacted with a strong effect on QoL (Figure 7). In Maswa: “farm”, “family”, “food”, “land” and “agriculture” all appear in quadrant I, indicating that they are negatively impacted with a strong effect on QoL. “Hospital” and “Water” appear in quadrant II implying that they are positively impacted with a strong effect on QoL (Figure 7).

4.5.1.2. Statistics

According to the One-Sample T-tests only few of the domains can be interpreted as belonging to the inferred category. In Serengeti “hospital” in quadrant I is significantly different from the gridline means (One sample T-test: $T = -6.2407$; $p < 0{,}01$ (Importance); $T = 2.7125$; $p < 0.05$ (Performance)). In Maswa only “agriculture” in quadrant I can confidently be interpreted as belonging to its category (One-sample T-test: $T = -3.1605$; $p < 0.01$ (Importance); $T = 2.2053$; $p < 0.05$ (Performance=)). None of the domains in quadrant II in Serengeti and Maswa can with statistical confidence be interpreted as belonging to their category.

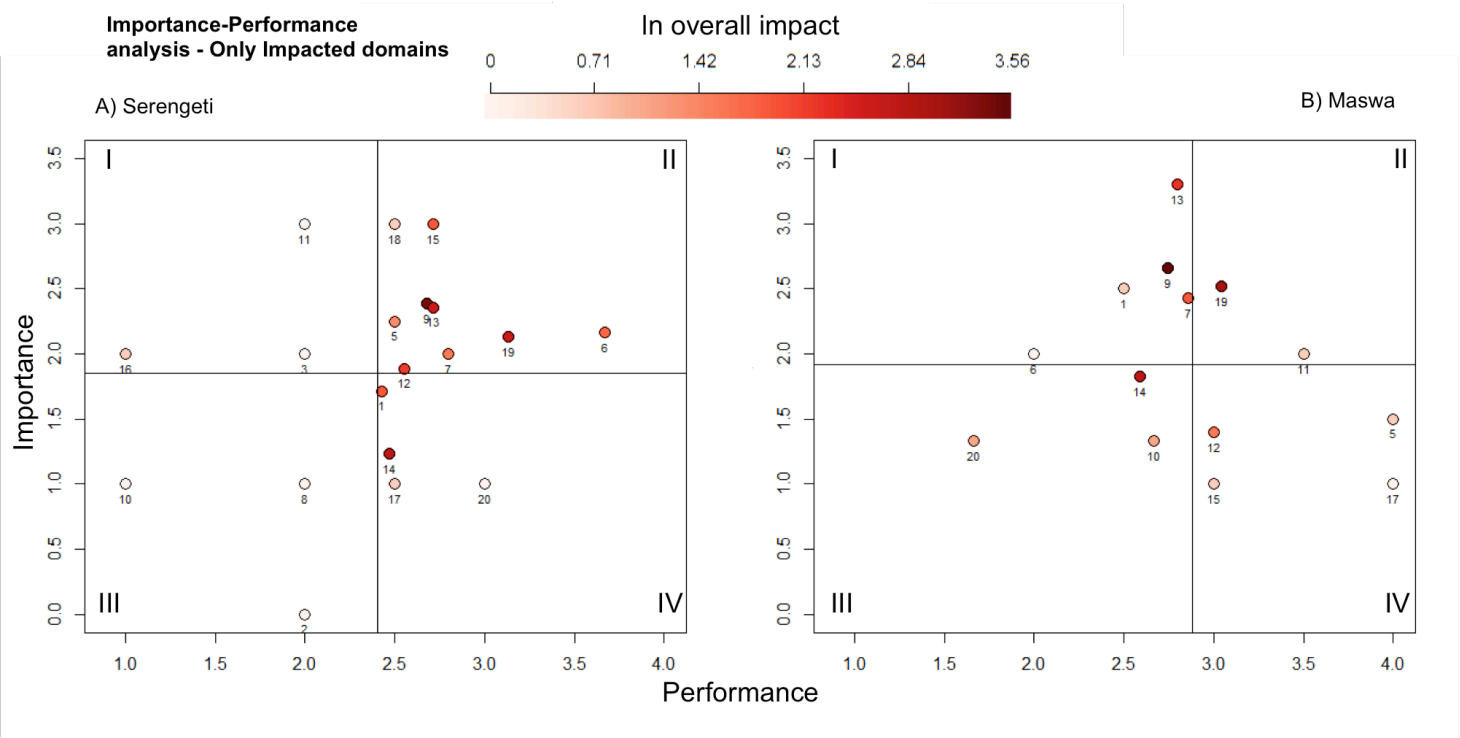


Figure 7. Importance-Performance analysis with Only Impacted domains in (A) villages bordering Serengeti and (B) villages bordering Maswa. X-axis: mean performance scores of mentioned domains, Y-axis: mean importance scores of mentioned domains; Quadrant I: Negatively impacted domains with stronger effect on QoL, Quadrant II: Positively impacted domains with stronger effect on QoL, Quadrant III: Negatively impacted domains with weaker effect on QoL, Quadrant IV: Positively impacted domains with weaker effect on QoL. The color grading of the nodes indicates the frequency with which respondents perceived a particular domain to be impacted. The stronger the color, the more the domain was mentioned as impacted. Domains are indicated by following numbers 1: Agriculture, 2: Bicycle (only Serengeti), 3: Business (only Serengeti), 5: Education, 6: Family, 7:Farm, 8: Farming equipment (only Serengeti), 9: Food, 10: Health services, 11: Hospital, 12: House, 13: Land, 14: Livestock, 15: Money, 16: Motorbike (only Serengeti), 17: Phone, 18: Transport (only Serengeti), 19: Water, 20: Wood resources. Note that the Y-axis is mean pebble scores (of 10) and the X-axis is mean Likert-type responses (1-5). Gridlines were constructed from the grand means of the means of the domains.

4.5.1.3. "Sensitivity analysis"

The "sensitivity analysis" changes the distribution of domains throughout the graph in Serengeti, where "hospital" was removed as it was only mentioned as impacted once (Table 13). After adjustment, no domains appear in quadrant I, but "money" and "livestock" now appear in quadrant II (Appendix 2, Figure A1.1.). These domains are however not significantly different from the gridline means. In Maswa, no "sensitivity analysis" was carried out, as the results were consistent with the qualitative comments (land-related issues were of main concern).

The domains in Serengeti that appear to be of high concern in the Importance-Performance analysis with Only Impacted domains have no connection to what could be expected from the background information. Also, the domains of concern were mentioned only very few times. Thus, the following analysis was developed to look more specific at impacts. The interpretations of negative impacts on the performance of a given life domain are provided in the next section.

4.5.2. Importance-Impact analysis

The Importance-Impact analysis should be understood in relative terms as most domains were negatively impacted. Hence, the graphs should be carefully interpreted. In Serengeti only 4 domains were mentioned as genuinely positive (frequency of impact ranged from 1 to 11) compared to 7 in Maswa (frequency of impact ranged from 1 to 8). In Serengeti 19 domains were mentioned as negatively impacted (frequency of impact ranged from 1 to 31) compared to 11 in Maswa (frequency of impact ranged from 1 to 34). The frequencies of impact as well as percentages are shown in Table 13 and Table 14.

Table 13. QoL domains mentioned in villages bordering Serengeti (n=51), their frequency and percentage and how often they are perceived as being negatively and positively impacted.

Domains	**Frequency**	**Percentage**	**Negatively impacted: frequency**	**Negatively impacted: percentage**	**Positively impacted: frequency**	**Positively impacted: percentage**
Agriculture	9	18 %	7	78 %	0	0 %
Bicycle	8	16 %	1	13 %	0	0 %
Business	4	8%	1	25 %	0	0 %
Clothes	0	0 %	0	0 %	0	0 %
Education	15	29 %	2	13 %	2	13 %
Family	20	39 %	6	30 %	0	0 %
Farm	6	12 %	5	83 %	0	0 %
Farming equipment	6	12 %	1	17 %	0	0 %
Food	38	75 %	31	82 %	0	0 %
Health services	7	14 %	1	14 %	0	0 %
Hospital	2	4 %	1	50 %	0	0 %
House	31	61 %	8	26 %	1	3 %
Land	16	32 %	14	88 %	0	0 %
Livestock	22	43 %	17	77 %	0	0 %
Money	15	29 %	7	47 %	0	0 %
Motorbike	6	12 %	2	33 %	0	0 %
Phone	8	16 %	1	12.5	1	13 %
Transport	5	10 %	2	40 %	0	0 %
Water	30	59 %	4	13 %	11	37 %
Wood resources	1	2 %	1	100 %	0	0 %

Table 14. QoL domains mentioned in villages bordering Maswa (n=63), their frequency, percentage and how often they are perceived as being negatively and positively impacted.

Domains	Frequency	Percentage	Negatively impacted: frequency	Negatively impacted: percentage	Positively impacted: frequency	Positively impacted: percentage
Agriculture	6	10 %	2	33 %	0	0 %
Bicycle	13	21 %	0	0 %	0	0 %
Business	4	6 %	0	0 %	0	0 %
Clothes	21	33 %	0	0 %	0	0 %
Education	11	17 %	0	0 %	2	18 %
Family	7	11 %	1	14 %	0	0 %
Farm	14	22 %	7	50 %	0	0 %
Farming equipment	0	0 %	0	0 %	0	0 %
Food	53	84 %	34	64 %	1	2 %
Health services	4	6 %	1	25 %	2	50 %
Hospital	8	13 %	0	0 %	2	25 %
House	49	78 %	4	8 %	1	2 %
Land	13	21 %	10	77 %	0	0 %
Livestock	24	38 %	17	71 %	0	0 %
Money	15	24 %	2	13 %	0	0 %
Motorbike	1	2 %	0	0 %	0	0 %
Phone	4	6 %	0	0 %	1	25 %
Transport	7	11 %	0	0 %	0	0 %
Water	48	76 %	14	29 %	8	17 %
Wood resources	9	14 %	3	33 %	0	0 %

4.5.2.1. The "more negative quadrant"

The graphs show that "food" and "land" are main domains of concern in the "more negative quadrant" in both Serengeti and Maswa (Quadrant I, Figure 8). Regarding frequency of impact, "food" is the most important being mentioned as negatively impacted 31 times in Serengeti and 34 times in Maswa (Figure 8, Table 13, Table 14). That "food" is a problematic topic makes sense as virtually all villagers mentioned crop raiding as a problem related to the PAs. Several households also explicitly mentioned the link, e.g. [HHA9], [HHB11], [HHC2], [HHD21]. The problem of "land" is confirmed through the general problems mentioned by villagers as well as by village leaders. Again, crop raiding was one of the main reasons – e.g. [HHB4], [HHC21]. The issue with lack of

land for grazing was also very contested and conflicts with the PA staff were many (cf. above). The other domains of concern in this quadrant are "farm" in Serengeti and "farm" and "agriculture" in Maswa. However, "agriculture" was only mentioned as impacted twice in Maswa. The location of these domains in this quadrant can be explained by crop raiding mechanisms as well as disturbance by wildlife, e.g. [HHA16], [HHD15]. In Serengeti, "money" also appears in this quadrant. It makes sense given that Serengeti is less wealthy than Maswa according to the asset index, though the negative link to the PAs must be explained indirectly. For instance, one household stated, "*I lose income because all my crops are raided*" [HHD31]. In Maswa, "Family" exactly appears in the "more negative quadrant", which could be explained indirectly as stated by one household: *"there is lack of enough food for the family as a result of crop raiding by elephants"* [HHA15].

4.5.2.2. The "less negative/more positive quadrant"

"Water", "house" and "education" appear in this quadrant in Serengeti and Maswa (Quadrant 2, Figure 8). That "water" appears here can possibly be explained by outreach services. For instance, one village leader explained that a well was built in Matongo (Serengeti) [SVLD-A]. Statements from a couple of households confirmed this [HHA13, HHA15]. Also "water protection" was mentioned as a reason, e.g. as explained by one household: "*Sources of water are from inside the protected area and they keep it very clean"* [HHC6]. In Serengeti, "water" was mentioned as positively impacted 11 times compared to 4 times negatively impacted. Therefore in this instance it can be interpreted with some confidence to be "more positively impacted". However, in Maswa "water" was mentioned 14 times as negatively impacted and 8 times as positively impacted why it in that instance should be interpreted as "less negatively impacted" (Table 13, Table 14). Having in mind that the Importance-Impact graphs are relative rather than some exact truth, there is possibly no explanation that "house" appears in the "less negative/more positive" quadrant in both areas - any that its higher mean impact value: "House" is mentioned as positively impacted only once in Serengeti and Maswa, while it is mentioned as negatively impacted 8 and 4 times in Serengeti and Maswa, respectively. That "education" appears in the same quadrant in both Serengeti and Maswa might be

explained by outreach services. For instance one village leader stated that a primary school as well as two rooms in a teacher house had been built [SVLD-D]. Also, one household mentioned the building of a school [HHC22]. However, in Maswa "education" was only mentioned as negatively impacted twice.

In Serengeti, "hospital", "health services" and "family" also appear in the "less negative/more positive" quadrant. It would have made more sense if "hospital" and "health services" were perceived as positively impacted (or less negatively impacted) in Maswa, as both a village leader [SVLD-D] and a household [HHC29] mentioned the donation of a dispensary there. However, both domains were only mentioned as impacted once (and as negatively impacted). This might influence the graph in terms of interpretation. That "family" appears in the "less negative/more positive" quadrant in Serengeti must again be attributed to its higher mean impact value, as it was not mentioned as positively impacted - again showing how carefully these graphs should be interpreted.

4.5.2.3. Statistics

In the "more negative quadrant": According to the One-Sample T-tests only few of the domains can with confidence be interpreted as belonging to the inferred category. In Serengeti, "food" (One-Sample T-test: $T = -4.4031$; $p < 0.01$ (Importance); $T = 7.1032$; $p < 0.01$ (Impact)) and "land" (One-Sample T-test: $T = -4.5229$, $p < 0.01$ (Importance); $T = 8.0298$, $p < 0.01$ (Impact)) are significantly different from the gridline means. Also in Maswa, "food" (One-Sample T-test: $T = -4.6392$; $p < 0.01$ (Importance); $T = 7.1436$; $p < 0.01$ (Impact)) and "land" (One-Sample T-test: $T = -8.015$; $p < 0.01$ (Importance); $T = 7.977$; $p < 0.01$ (Impact) are significantly different from the gridline means. In Maswa "agriculture" is also significantly different from the gridline means (One-Sample T-test: $T = -6.4863$; $p < 0.01$ (Importance); $T = 3.6802$; $p < 0.01$ (Impact)).

In the "less negative/more positive quadrants": According to the One-Sample T-tests only few of the domains can with confidence be interpreted as belonging to the inferred category. In Serengeti, "water" (One-Sample T-test: $T = -4.7226$; $p < 0.01$ (Importance);

T = -6.9735; p < 0.01 (Impact) and "health services" (One-Sample T-test: T = -3.8096; p < 0.01 (Importance); T = -2.649; p < 0.05 (Impact)) are significantly different from the gridline means. In Maswa, "education" is significantly different from the gridline means (One-sample T-test: T = -7.5692; p < 0.01 (Importance); T = -3.868; p < 0.01 (Impact)).

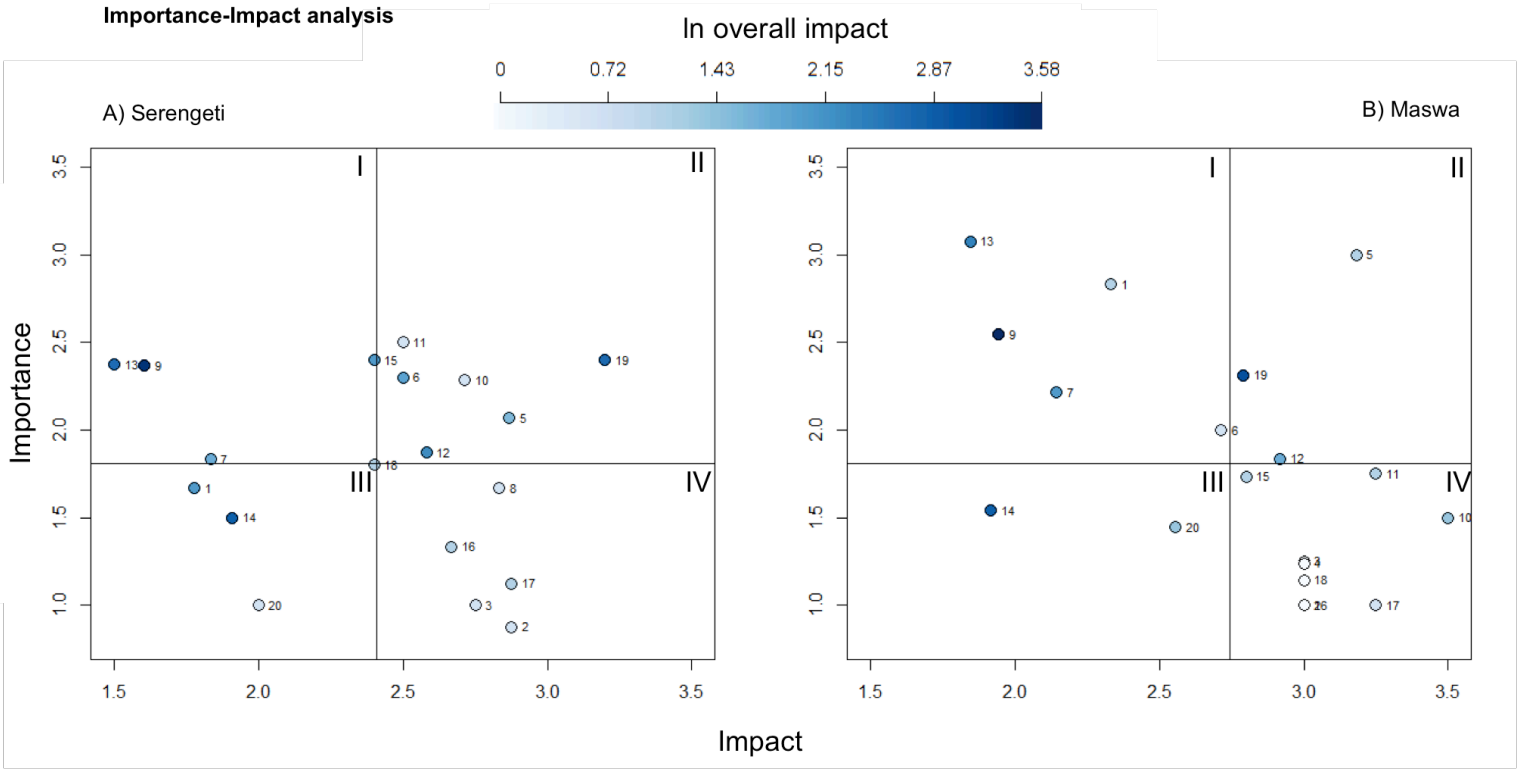


Figure 8. Importance-Impact analysis in (A) villages bordering Serengeti and (B) villages bordering Maswa. X-axis: mean impact scores of mentioned domains, Y-axis: mean importance scores of mentioned domains; Quadrant I: Higher importance and more negative impact ("more negative quadrant"), Quadrant II: Higher importance and less negative or more positive impact ("less negative/more positive quadrant"), Quadrant III: Lower importance and more negative impact ("Low priority"), Quadrant IV: Lower importance and more positive impact ("Low priority"). The color grading of the nodes indicates the frequency with which respondents perceived a particular domain to be impacted. The stronger the color, the more the domain was mentioned as impacted. Domains are indicated by following numbers: 1: Agriculture, 2: Bicycle, 3: Business, 4: Clothes (only in Maswa), 5: Education, 6: Family, 7:Farm, 8: Farming equipment (Only in Serengeti), 9: Food, 10: Health services, 11: Hospital, 12: House, 13: Land, 14: Livestock, 15: Money, 16: Motorbike, 17: Phone, 18: Transport, 19: Water, 20: Wood resources. Note that the Y-axis is mean pebble scores (of 10) and the X-axis is mean Likert-type responses (1-5). Gridlines were constructed from the grand means of the means of the domains.

4.5.2.4. "Sensitivity analysis"

The "sensitivity analysis" changes the distribution of nodes in the quadrants through removal of domains in Serengeti and Maswa (Figure 9). In Serengeti "health services" and "hospital" ("less negative/more positive quadrant", impacted once each) were removed. In Maswa "family" and "agriculture" ("more negative quadrant", impacted once and twice respectively) and "education" ("less negative/more positive quadrant", impacted twice) were removed. After adjustment, "livestock" appears in the "more negative quadrant" in both Serengeti and Maswa. Even though it is not significantly different from the gridline means in both Serengeti and Maswa, many factors explain that livestock is negatively impacted: lack of grazing land, e.g. [HHA22], [HHC11], livestock depredation, e.g. [HHA6], [HHC20], and arrests in the parks, e.g. [HHB9], [HHC6], [HHD18]. In Serengeti "money" now appears in the "less negative/more positive quadrant" and in Maswa "farm" appears in the "more negative quadrant".

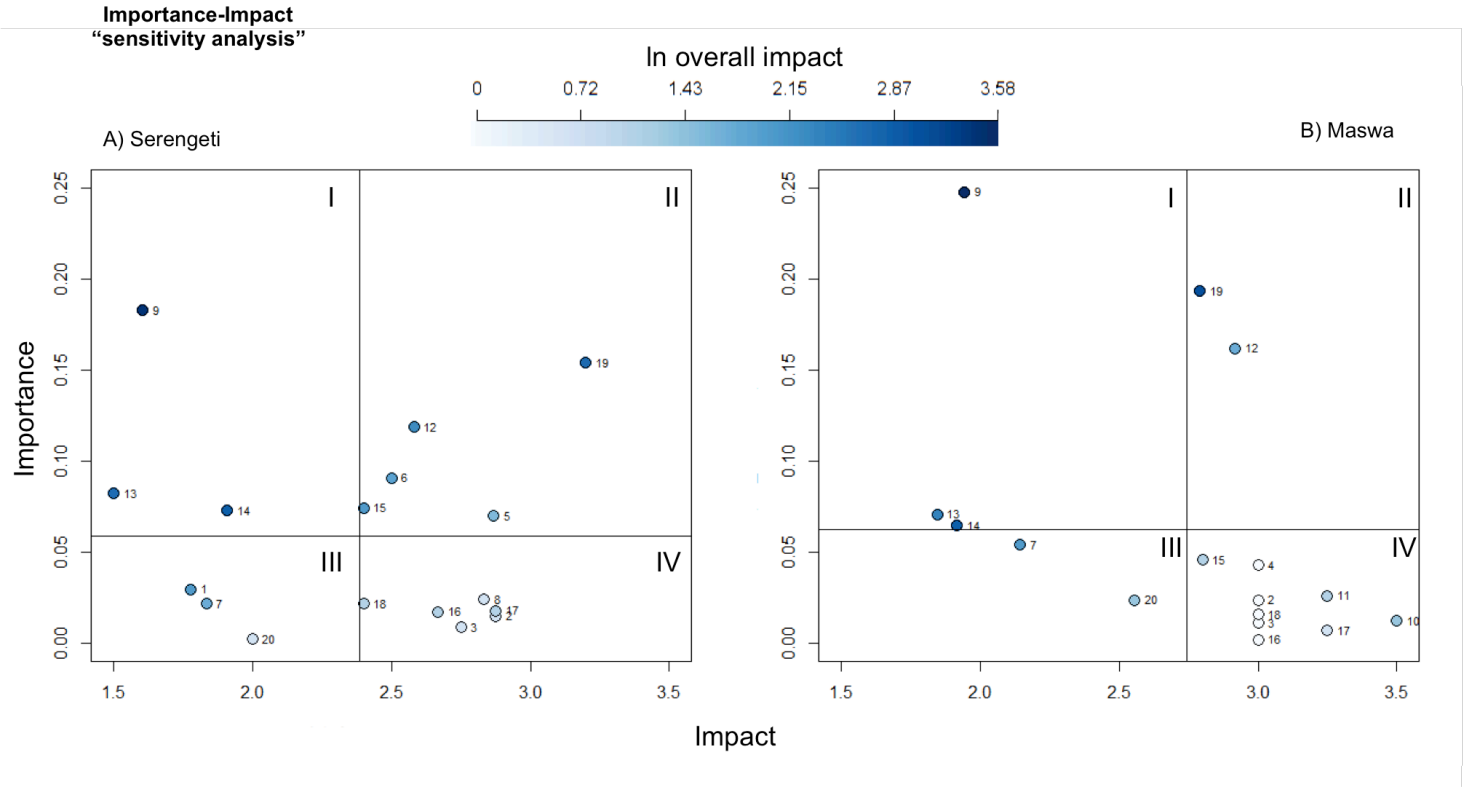


Figure 9. "Sensitivity analysis": Importance-Impact analysis in (A) villages bordering Serengeti and (B) villages bordering Maswa. Removed domains include in (A) Serengeti: "health services" and hospital" and in (B) Maswa: "family", "education" and "agriculture". X-axis: mean impact scores of mentioned domains, Y-axis: mean importance scores of mentioned domains; Quadrant I: Higher importance and more negative impact ("more negative quadrant"), Quadrant II: Higher importance and less negative or more positive impact ("less negative/more positive quadrant"), Quadrant III: Lower importance and more negative impact ("Low priority"), Quadrant IV: Lower importance and more positive impact ("Low priority"). The color grading of the nodes indicates the frequency with which respondents perceived a particular domain to be impacted. The stronger the color, the more the domain was mentioned as impacted. Domains are indicated by following numbers: 1 Agriculture (removed in Maswa), 2: Bicycle, 3: Business, 4: Clothes (only in Maswa), 5: Education (removed in Maswa), 6: Family (removed in Maswa), 7:Farm, 8: Farming equipment (only in Serengeti), 9: Food, 10: Health services (removed in Serengeti), 11: Hospital (removed in Serengeti), 12: House, 13: Land, 14: Livestock, 15: Money, 16: Motorbike, 17: Phone, 18: Transport, 19: Water, 20: Wood resources. Note that the Y-axis is mean pebble scores (of 10) and the X-axis is mean Likert-type responses (1-5). Gridlines were constructed from the grand means of the means of the domains.

Reasons for positive and negative impacts on QoL domains are provided in Table 15.

Table 15. Some of the main reasons for negative and positive impacts from PA on life domains. Domains targeted by the mentioned mechanisms are named "Target domain". Frequencies are not specified, as this was additional information provided by the individual respondents.

Negative issues	**Target domain**	**Positive issues**	**Target domain**
Crop raiding	Food, Land, Agriculture, Farm	Water protection in PA	Water
Livestock depredation	Livestock	Well	Water
Wildlife entering houses	House	School	Education
Park extension	Land	Dispensary	Hospital
Lack of grazing land	Land, Livestock		
Lack of land for cultivation	Land		
Arrests	Livestock		

4.5.3. Importance-Performance analysis – Needs Assessment

In Serengeti, priority domains that need to be improved to enhance QoL are "education", "house" and "money" (Quadrant I: Concentrate here, Figure 10). They are frequently mentioned, have a lower performance and a higher importance. "Health services" and "hospital" also appear in quadrant I. Nevertheless, "hospital" was only mentioned twice and might influence the graph too much in terms of interpretation (Table 13). "Family" and "water" are domains of high importance, high performance and were frequently mentioned in Serengeti and are thus located in quadrant II (Keep up the good work) (Figure 10). Also "food" and "land" appear in this quadrant, which is very much in contrast to what the impact scores reveal in the former analysis. "Transport" is located directly at the gridline division between quadrant I and quadrant III (Low priority) and, thus, cannot be interpreted with statistical confidence as belonging to any category.

In Maswa, the priority domains that need to be improved to enhance QoL are "land", "food" and "agriculture". These are mentioned frequently, have a high importance and a lower performance (Quadrant I, Figure 10). In Maswa, "water", "education", "family", "farm", "house" are the domains mentioned frequently (especially "house" and "water"), having high performance and importance and are thus located in quadrant II (Keep up the good work) (Figure 10).

4.5.3.1. Statistics

According to the One-Sample T-tests only some of the domains can with confidence be interpreted as belonging to the inferred category. None of the domains are significantly different from the gridline means in quadrant II in Serengeti. “Health services” (One-Sample T-test: $T = -3{,}8096$; $p < 0{,}01$ (Importance); $T = 4{,}0629$; $p < 0{,}01$ (Performance)) and “hospital” (One-Sample T-test: $T = -5{,}5214$; $p < 0{,}01$ (Importance); $T = 10{,}336$; $p < 0{,}01$ (Impact)) are significantly different from the gridlines means in quadrant I in Serengeti. In Maswa none of the domains are significantly different from the gridline means in quadrant I. However, “education” (One-Sample T-test: $T = -7{,}5692$; $p < 0{,}01$ (Importance); $T = -4{,}2713$; $p < 0{,}01$ (Performance)) and “farm” (One-Sample T-test: $T = -2{,}5628$; $p < 0{,}05$ (Importance); $T = -4{,}7137$: $p < 0{,}01$ (Performance)) are significantly different from the gridline means in quadrant II.

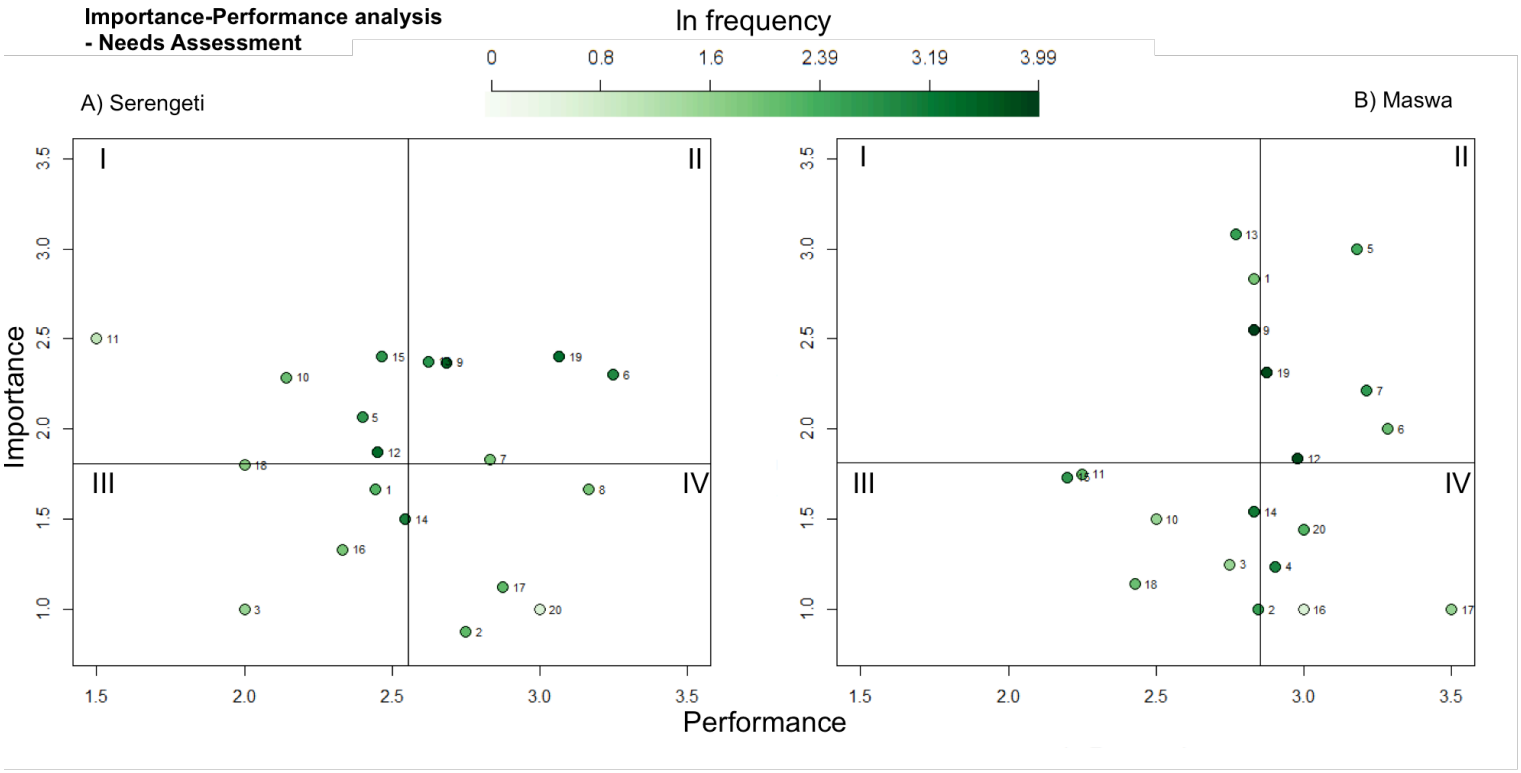


Figure 10. Importance-Performance analysis - Needs Assessment in (A) villages bordering Serengeti and (B) villages bordering Maswa. X-axis: mean performance scores of mentioned domains, Y-axis: mean importance scores of mentioned domains; Quadrant I: high importance and low performance (Concentrate here), Quadrant II: high importance and high performance (Keep up the good work), Quadrant III: Low importance and low performance (No change in resources), Quadrant IV: Low importance and high performance (Possible overkill). The color grading of the nodes indicates the frequency with which respondents mentioned the particular domain. The stronger the color, the more frequently the domain has been mentioned. Domains are indicated by following numbers: 1: Agriculture, 2: Bicycle, 3: Business, 4: Clothes (only in Maswa), 5: Education, 6: Family, 7:Farm, 8: Farming equipment (only in Serengeti), 9: Food, 10: Health Services, 11: Hospital, 12: House, 13: Land, 14: Livestock, 15: Money, 16: Motorbike, 17: Phone, 18: Transport, 19: Water, 20: Wood resources. Note that the Y-axis is mean pebble scores (of 10) and the X-axis is mean Likert-type responses (1-5). Gridlines were constructed from the grand means of the means of the domains. Source: Importance-Performance analysis (Martilla & James 1977).

4.5.3.2. "Sensitivity analysis"

The "sensitivity analysis" changes the distribution of nodes throughout the graph in Serengeti (where "hospital" was removed as it was only mentioned twice) (Figure 11). After adjustment, "livestock" appears in quadrant I (concentrate here). "Food" is located close to this quadrant although it appears in quadrant II together with "family" and "transport". "Health services" now appears in quadrant III (low importance, low

performance). As previously mentioned, this displays how much influence one domain can have on the distribution of nodes in the overall graph. For Maswa no such "sensitivity analysis" was constructed because the results looked plausible: no domains mentioned with a low frequency could possibly influence the graph in terms of interpretation, and the (land-related) domains of high concern were consistent with the qualitative comments. None of the domains appearing in new quadrants after adjustment are significantly different from the gridline means according to the one-sample T-tests.

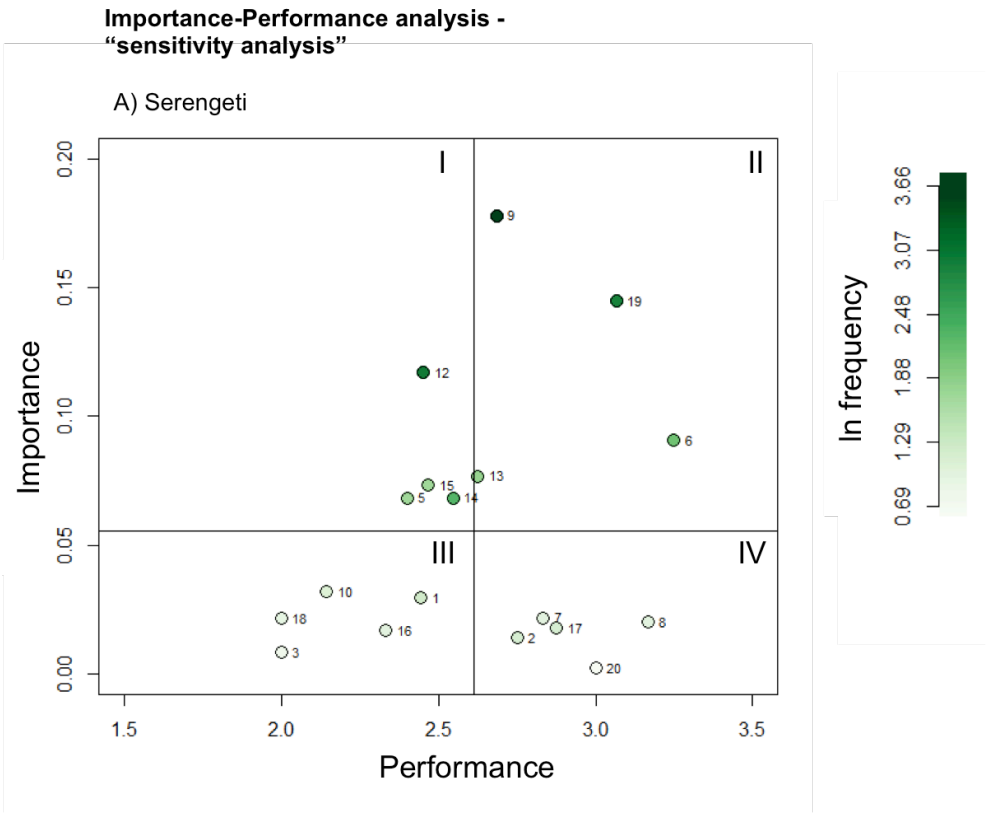


Figure 11. “Sensitivity analysis” - Importance-Performance analysis - Needs Assessment in (A) villages bordering Serengeti. The removed domain is “hospital”. X-axis: mean performance scores of mentioned domains, Y-axis: mean importance scores of mentioned domains; Quadrant I: high importance and low performance (Concentrate here), Quadrant II: high importance and high performance (Keep up the good work), Quadrant III: Low importance and low performance (No change in resources), Quadrant IV: Low importance and high performance (Possible overkill). The color grading of the nodes indicates the frequency with which respondents mentioned the particular domain. The stronger the color, the more frequently the domain has been mentioned. Domains are indicated by following numbers: 1: Agriculture, 2: Bicycle, 3: Business, 5: Education, 6: Family, 7:Farm, 8: Farming equipment (only in Serengeti), 9: Food, 10: Health services, 12: House, 13: Land, 14: Livestock, 15: Money, 16: Motorbike, 17: Phone, 18: Transport, 19: Water, 20: Wood resources. Note that the Y-axis is mean pebble scores (of 10) and the X-axis is mean Likert-type responses (1-5). Gridlines were constructed from the grand means of the means of the domains. Source: Importance-Performance analysis (Martilla & James 1977).

5. DISCUSSION

5.1. General factors within people's physical relationship with PAs and related entities

5.1.1. Socio-demographic characteristics, assets, resource dependency, interaction with PA staff, awareness of NGOs and perceptions of benefits and costs

Based on the modified framework from Allendorf (2010), important PA-people issues were investigated. Among the initial results, the constructed asset index showed that villagers in Maswa were wealthier than Serengeti. This is also consistent with the few significant differences in assets between the areas: Maswa was richer in farmland, shoats and bicycles. The results also showed that that 55 % of the villagers were migrants. This might suggest that people are congregating around the PAs despite their disturbing effect on bordering villages e.g. through rules and restrictions (Baird & Leslie 2013). This is interesting as some households mentioned their cultural belonging to the land. Those of the respondents who were migrants do not then have a legitimate claim to the area. The results indicated that people were highly dependent on several resources: grazing land and land for cultivation, as virtually all were farmers. Also fuelwood was mentioned by almost all of the respondents. This is similar to the findings of Schmitt (2010) in her study across the entire Serengeti Ecosystem. Village leaders also mentioned the lack of land for cultivation and grazing as a problem in the future. This kind of information has policy relevance. Research findings show that rural poverty is connected to lack of land as well as trouble in securing off-farm alternatives (Ellis & Mdoe 2003).

Many factors that could influence a PA-people relationship in a negative direction are present in the study. In general, there was a very low level of interaction between the local people and the PA staff. One third had not received any information about conservation, suggesting that conservation activities in the Serengeti Ecosystem do not fully engage people. The available information was mainly provided through the village council. Awareness of NGOs working in the area was reported, though only by around a quarter of the respondents. Only one third of the respondents reported benefits, and these

were mainly related to outreach projects such as building of schools and dispensaries – again consistent with Schmitt (2010). Some households mentioned access to PA resources as a benefit. This emphasizes the difference in perceptions of costs and benefits since most people perceive the restrictions on access as a serious cost of living near a PA. This means that even though it is illegal to extract resources and graze in the PAs, it might be worth the risk for some of the villagers. As Schmitt (2010) argues, the benefits from resource use might be higher than the costs. Some of the migrants might have moved to the PA border because of the availability of grazing land inside the PAs.

More than 60% of the villagers reported costs similar to the results of several studies: Crop raiding was mentioned most frequently - consistent with Schmitt (2010). In fact, crop raiding is an issue of great concern for farmers throughout the region and African continent (e.g. Graham & Ochieng 2008, Larson et al. 2016). Conflicts with or arrests by PA staff were the next problem mentioned. This is an issue in line with the findings of Kideghesho et al. (2007) who were also working in the Serengeti Ecosystem. Finally, restrictions on resource access were mentioned - something Vedeld et al. (2012) claim that is a problem for communities bordering PAs throughout Tanzania.

Summarizing the general factors within people's physical relationship with the PAs and related entities, the initial findings showed that Maswa was wealthier than Serengeti and that many of the villagers were migrants. People were very dependent on natural resources, especially land for grazing and cultivation. Low level of interaction between people and the PAs was found and some degree of awareness of NGOs working in the areas was present. Finally, benefits in relation to the PAs were reported to a certain extent, but there was an overweight of reported costs.

5.2. Subjective Well-being and PA impact on well-being

5.2.1. Content validity

Generally, the GPGI seemed to work well in capturing domains important to the villagers' QoL. Overall, the domains identified as important in this study are similar to

those identified in Rasolofson et al. (2016, in press), Camfield & Ruta (2007) and Martin et al. (2010a). However, land-related domains were more frequently mentioned in the present study and in Rasolofson et al. (2016, in press). The higher frequencies of land/agricultural related domains (land, livestock, agriculture, farming equipment, farm and food) in the present study and in Rasolofson et al. (2016, in press) may be because almost all respondents were subsistence farmers compared to in Camfield & Ruta (2007) and Martin et al. (2010a) where the respondents had a more mixed background.

5.2.2. Construct validity

By analyzing the construct validity according to general theory, it was found that the richest respondents (according to the constructed asset index) had a higher GPGI mean score than the poorest respondents, though the difference was not statistically significant. This might be because the sample size is small and there is small economic variation across the sample, as virtually all of the respondents were farmers. However, the relationship between material well-being and subjective well-being (QoL) is complex. Camfield & Skevington (2008) also conclude that an increase in material resources do not directly lead to improvements in subjective well-being. With respect to gender, male respondents had a higher mean GPGI score than female respondents. Regarding the level of education, people with no education, surprisingly, had the highest GPGI mean score followed by people with secondary education. These findings emphasize the multidimensional nature of such a measure as the GPGI overall score. However, for both gender and level of education the differences were not statistically significant.

5.2.3. Magnitude of well-being impact

Locally perceived impacts on well-being are important because they represent people's own perspectives on their own situation. They might therefore have consequences on conservation related behavior and conservation engagement (Raboanarielina 2011, Woodhouse et al. 2015). To examine the magnitude of the relative impacts of the PAs, a couple of different measures were used. Firstly, the distributions of the frequency of individuals across different numbers of negatively or positively impacted QoL domains. Secondly, the weighted performance in domains perceived to be impacted by the

villagers. The latter did not reveal a significant difference between Serengeti and Maswa, although the mean of the weighted performance was higher in Serengeti than in Maswa. People had a high amount of negatively affected domains and a low amount of positively affected domains. The magnitude of impact is interesting to compare with Rasolofson et al. (2016, in press) which, to this thesis' knowledge, is the only other study linking GPGI and conservation. In their study, 60 % of the households reported zero negatively impacted domains and between 50 to 60 % reported no positively impacted domains depending on location. This difference emphasizes the magnitude of negative impact in the present study. Therefore, it is also interesting to look at how this variable influences attitudes towards the PAs. The magnitude of negative impact is also consistent with the many problems mentioned related to the PAs.

5.2.4. Reflections on the use of the GPGI tool: Strengths and weaknesses

The respondents identified mainly concrete issues (e.g. "money", "food") as important to their QoL, whereas abstract psychological issues were not mentioned. This supports the findings of Camfield & Ruta (2007) and Martin et al. (2010a) who suggest that the GPGI might be better in capturing objective and physical concepts of QoL. Also, if living standards are not high, the first things one thinks of is probably some more mundane issues such as food and water rather than psychological well-being. Further, Martin et al. (2010b) argue that the GPGI fails to capture potentially shameful and personal areas of life such as debt or mental health problems. Instead, it is slightly biased towards universally acknowledged important areas. Whether this is the case in the present study is not clear. Individual QoL measures such as the GPGI are also criticized because each person might actually rate something different in terms of content (Martin et al. 2010a). However, this would also be a potential problem when applying questionnaires that specify which QoL domains participants should rate. Martin et al. (2010a) observed in their study that even when respondents nominated the same domain, there were differences in how this domain was understood. For instance, the way in which one person understand the term "family" may differ to another's (e.g. family could be understood as an extended family or just the wife/husband of the respondent). Nevertheless, the GPGI should be seen as a tool for global perceptions of QoL. A

substantive difference in the domains between individuals is only problematic if one wants to understand the difference in quantity of QoL relating specifically to one domain (Martin et a. 2010a). Even though the GPGI was clearly explained, one should bear in mind that there exists a discrepancy between what people want and what they need (Lavers 2008). It seemed that people mainly identified and rated their needs in the present study, instead of for instance listing any extraordinary material things they would like to acquire.

Overall, the GPGI was indeed able to capture some reasonable information about the villagers' QoL. The measure is good, since it focuses on component domains and not just overall well-being. The GPGI provides a rapid, reliable and valid assessment of global perceptions of QoL and reveals areas of need, which can then be addressed to improve QoL through intervention development (Pitkänen et al. 2009). The final GPGI score provides an idea of overall QoL. However, the fundamental strength of the GPGI tool is the extensive information it provides on what domains the respondents values the most as well as their performance (and impact) in these domains (Camfield & Ruta 2007). Individual measures of QoL have before been used to reveal areas of needs, typically within a health context (Ruta et al. 1994), and the GPGI is now extending this to a more holistic global measure, not just focusing on one life domain. The information obtained through the selecting, rating and weighting the relevant aspects in people's life, provides an in-depth understanding of well-being (Camfield & Ruta 2007) – something that could not have been obtained through objective approaches which might ask participants to rate items that are not important to their life (Tovbin et al. 2003, Martin et al. 2010a)

Summing up, the GPGI seemed to successfully capture domains as important for people's QoL. However, more abstract psychological concepts and shameful areas were not captured. The findings were similar to other those of other studies. The GPGI is useful in providing information on what life domains people value as well as the importance, performance and impact in these valued domains. There was a difference in construct validity tested as mean GPGI score against asset wealth index, gender and education though it was not statistical significant. The magnitude of negative well-being impact was

very large compared to that of positive, which is in line with the many PA-related problems reported.

5.3. Attitudes

5.3.1. Attitudinal data

The attitudinal data showed that villagers had very positive attitudes towards general conservation implying that they seemingly value the surrounding nature to a great extent. However, questions on conservation issues might be subject to social desirability bias - the tendency to present oneself in the best possible light according to what is perceived to be "correct" or socially acceptable (Fisher 1993). Also, it is not clear whether the villagers actually link these presumably held conservation values to perceptions about the PAs. Through the structured village leader discussions, it was revealed that people are interested in getting knowledge about the sustainable use of resources, which is in line with positive attitudes towards general conservation. Further, almost half of the villagers disagreed that resource extraction in the PAs is all right. In contrast, single statement attitudes towards the PAs were very mixed, showing the interplay of costs and benefits and other predictors on attitudes. For the construct used to measure overall attitude towards the PAs (PaATT), 60 % of the villagers held a negative attitude. All village leaders also stated that the relationship between the local communities and the PAs was "bad" and 62 % of the villagers expressed that they rather wanted the local communities to be in charge of the management of the PAs.

5.3.2. Factors predicting attitudes

Significant predictor variables for the likelihood that respondents have a positive attitude towards the PAs (PaATT) were found using the logistic regression analysis.

The strongest predictor of attitudes was perceptions of benefits. Thus, respondents who perceived benefits from the PAs had more positive attitudes compared to those not mentioning any benefits. This importance of benefits is documented in several other studies (e.g. Holmes 2003, Allendorf et al. 2006, Schmitt 2010). Hence, the results of this

study support the general idea that benefit-based approaches is an important motivational factor in securing local support to conservation (Kideghesho et al. 2007). As found in Infield & Namara (2001), even small benefit flows from conservation can improve local attitudes. Though perceptions of benefits were found to be the most important predictor of attitudes, only one third of the villagers reported benefits, so there is room for improvement for the management. However, recognition of outreach services can vary a lot within communities (Holmes 2003). Most of the perceived benefits were not related to the PA, but rather related to infrastructural projects or school projects, as found in Schmitt (2010). This suggests that the management need to ensure the provision of tangible benefits. Finally, for benefits to work, they should be sufficient to offset both the direct costs that the local people get from conservation as well as the indirect costs of stopping the ecologically destructive activities that they perceive to be economically viable (Kideghesho et al. 2007).

Study site was the second most important predictor for attitudes towards the PAs. Respondents living in Maswa had a more negative attitude towards the PAs than respondents living in Serengeti. This suggests that local conditions might influence attitudes and as Kideghesho et al. (2007) suggests, the age of the game reserve might be an important factor. In his study, he also finds that communities have a more supportive attitude towards Serengeti than the surrounding game reserves. Maswa is younger than Serengeti and its borders have been extended four times (latest in 1980) since its establishment in 1962 [Batro Ngilangwa: Personal correspondence, September 10th]. Thus, the memories of any translocations might still provoke a negative attitude towards the area. In contrast, many of the respondents were probably not born when Serengeti was created and therefore might not feel the pain of translocation. The history of creation of PAs is also listed as one of the main factors of failure regarding the conservation of biodiversity in PAs as identified by Muhumuza & Balkwill (2013).

Linking the well-being impacts with attitudes, the magnitude of the impacts in terms of number of negatively impacted domains per household had a significantly predictive

effect on attitudes towards the PAs. Respondents with a higher number of negatively impacted domains held more negative attitudes towards the PAs.

Awareness of NGOs was significant in predicting a positive attitude towards the PAs, although only a quarter of the respondents reported it. This finding is described by other studies: Allendorf (2010) as well as Karki & Hubacek (2015) state that the relationship between people and PAs includes not only the local people and the PA, but also other entities such as NGOs that mediate the relationship between people and PA and inform attitudes towards the PA. NGOs working with conservation or development in communities near the PAs can for instance provide financial or physical capital such as infrastructural resources to individuals and thereby improve access to key resources (Baird & Leslie 2013). It is not clear whether the influence from the NGOs is direct or indirect in villages bordering Serengeti & Maswa – i.e. whether the NGOs were recognized as a component of the local people's relationship with the PA or whether NGOs were present in the study area, but the people did not define their relationship with the PA in terms of the NGOs. This consideration aside, it should be noted that the presence of such organizations shape positive attitudes towards the PAs. As NGOs play a role in distributing benefits in the form of e.g. development projects in the Serengeti Ecosystem [David Rentsch, Personal correspondence, March 28th], it is important that the local communities are consulted and involved in designing and implementing the projects (Karki & Hubacek 2015).

Perceptions of costs had a significant predictive effect on (negative) attitudes towards the PAs similar to the findings of numerous other studies (e.g. Holmes 2003, Allendorf et al. 2006, Schmitt 2010, Karki & Hubacek 2015), though only at the 0,1 level. The main problems were crop raiding, arrests, conflict due to illegal grazing and loss of access to PA resources (e.g. land). This indicates that conservation efforts should aim at reducing the impact of human-wildlife conflicts as well as be open to participatory discussions about resource use, rules and regulations. Lack of adequate compensation for communities' loss of land is also listed as one of the main factors of failure regarding the conservation of biodiversity in PAs as identified by Muhumuza & Balkwill (2013).

In summary, five of the ten predictor variables in the logistic regression model were significant in predicting attitudes towards the PAs: Perceptions of benefits (positive), study site (negative), awareness of NGOs (positive), the magnitude of negative impact measured as number of negatively impacted domains (negative) and perceptions of costs (negative). Studying attitudes seems to be an informative step towards making management decisions about the utility of for instance PA outreach, but also to reveal which other general factors in people's physical relationship with the PAs are shaping the attitudes (as outlined in the framework).

5.4. Testing the IPA technique and derived analyses

The IPA technique and derived analyses have to this thesis' knowledge, only been used once before in relation to conservation (Rasolofson et al. 2016, in press), although it has been used in tourism visitation of PAs (Wade & Eagles 2003, Tonge & Moore 2007). Therefore it is important to test and evaluate the tool and its derived analyses in this context. The findings are first discussed where after a critical discussion of the empirical validity of the tool follows.

5.4.1. Comparing the three analyses

In Serengeti, The Importance-Performance analysis with Only Impacted domains did not reveal anything of relevance as domains only mentioned few times had too much influence. The priority domains are very much in contrast to those found in the Importance-Impact analysis. Also, the domains appearing to be of high concern were not in line with the qualitative comments. For instance, no information can explain why e.g. "business" and "motorbike" should be negatively impacted with a strong effect on QoL. Also, "land", "food" and "farm" appear in quadrant II, which indicate that these domains are positively impacted with a strong effect on QoL. Hence, there seems to be no congruence between performance and impact scores. In Maswa, the location of "food", "land", "livestock" in quadrant I and "water" in quadrant II make more sense from what one could expect from the qualitative information provided. Though the Importance-

Performance analysis with Only Impacted domains looks reasonable in Maswa, only "agriculture" can with statistical confidence be interpreted to belong to its category (quadrant I). The rather low sample size in the present study can probably explain some of the oddities. In Rasolofson et al. (2016, in press) the Importance-Performance Analysis with Only Impacted domains seemed to capture the performance of impacted domains well and the domains were in line with information from qualitative comments. Knowing that the analysis potentially could work well, it would be useful to repeat the study. Rasolofson et al. (2016, in press) did however not use statistics on the domains in the inferred categories.

The Importance-Impact analysis was in this study created as an alternative analysis as there was no congruence between impact and performance scores in Serengeti. With the great amount of negatively impacted domains as a bottom line, the Importance-Impact analysis can be used to reveal which domains are worse off and which of the (maybe negatively impacted) domains are better off. "Land" and "food" are frequently mentioned and can with statistical confidence be interpreted as belonging to the "more negative quadrant" in both Serengeti and Maswa. In Maswa, "agriculture" is also significantly different from the gridline means. Though qualitative information supports the importance of agriculture, the domain is only mentioned as impacted twice. This shows the importance of using both the color code (frequency of impact) and the statistics for obtaining a reliable result. The main impacts and the implications will be discussed in the following section.

That the land-related domains are of most concern in both Serengeti and Maswa makes sense due to the setting of the study. Nearly all of the respondents were farmers and/or pastoralists. Also, the negative impacts were well explained by the general problems of the villagers and are consistent with comments from the village leaders. Taking the Millennium Assessment Ecosystem Services Framework's components of well-being into consideration, "basic material for a good life", "security" and "freedom of choice and action" are all affected through the impacts of these life domains (MA 2005). "Basic material for a good life" covers among others adequate livelihoods and access to goods -

and "security" covers among others secure resource access. These components are threatened through crop raiding, restrictions on resource use and lack of land. "Freedom of choice and action" is also affected, as the local people do not have the opportunity to be able to achieve what they value (MA 2005). For instance well exemplified by the individual [HHA22] that stated that all he wished was just to be able to graze in the PA.

After adjustments were made in the "sensitivity analysis", "livestock" appears in the "more negative quadrant" in both Serengeti and Maswa. Through the last decades, there has been a rise in both the human and livestock population making the resources scarce (Kideghesho 2007). Village leaders also mentioned that they are afraid that there will not be enough land for grazing in the future. For local people and tribes in Tanzania, livestock is an important resource for the families as cultural capital and as a source of power. Livestock also represents stored capital, which can be used in times of trouble, or to meet other household needs (Ellis & Mdoe 2003). That livestock grazing is important was frequently emphasized. Some households also mentioned that they consider it unfair that the Maasai are allowed to graze their cattle in the Ngorongoro Conservation Area, when they themselves are not allowed to graze their cattle in Serengeti and Maswa. From the PA's point of view, cattle inside the areas is a growing problem, especially in game reserves (Caro & Davenport 2015) where there is less patrolling (Caro et al. 2009). Most of the village leaders mentioned the possibility of getting restricted access to grazing land in the PAs as an opportunity to improve the relationship with the PAs.

The fact that the domains "money" (in Serengeti) and "family" (in Maswa) also appear in the "more negative quadrant" emphasizes the importance of understanding that issues such as crop raiding are not only having a direct influence on life domains, but also indirect through the loss of income or lack of food for the family. That there is this indirect link to "money" in Serengeti makes sense, as the villagers were significantly wealthier in Maswa villages than Serengeti villages. In Serengeti, "water" can with statistical confidence be interpreted to belong to the "less negative/more positive quadrant". A positive effect on "water" suggests that outreach efforts (here building of well) do have some effect, even though the domain is almost as often mentioned as

negatively impacted. Even though "education" (Maswa) and hospital" (Serengeti) are only mentioned as impacted two and one times, respectively, the building of schools and a dispensaries are mechanisms that can explain these positive effects. Altogether, this suggests that tangible benefits should further be provided and the provision should be linked to the existence of the PAs.

The findings of the Importance-Performance Needs Assessment indicate some differences between Serengeti and Maswa in the priority domains that could be targeted by increased resource allocation to improve QoL. However, per statistics, only few domains can with confidence be interpreted as belonging to the inferred category. Exactly as in the Importance-Performance Analysis with Only Impacted Domains, some of the findings in quadrant II in Serengeti ("land", "food") are very much in contrast to what the impact scores reveal. From the qualitative background information as well as the setting of the study one could expect that domains such as e.g. "land" or "food" would not perform well, for instance, due to lack of land and crop raiding. In Maswa the findings seem more plausible as "land", "food" and "agriculture" are domains of main concern in quadrant I (concentrate here). But according to the statistics, none of the domains can be interpreted with confidence to belong to that category.

5.4.2. Discrepancy between impact and performance scores

In Maswa the respondents were more consistent in linking the impact with the performance of the life domains. They did also have a more negative attitude towards the PA in Maswa. Different things could influence the general discrepancy between impact and performance scores in Serengeti. When asked only about performance, respondents could rate the domains as performing well. In contrast, when asked about impact of the PA, they could rate the exact same domains as being highly impacted by the PA. This could indicate that either the respondents are content about their life and only say negative thing when they are asked for it - or they are, as described by Tourangeau & Yan (2007), deliberately misreporting on sensitive topics by editing the information they report to avoid embarrassing themselves in the presence of an interviewer. One could also expect that they generally express themselves more critically as soon as PAs come into

question because of existing and historical conflicts. The expectation of compensation or assistance might also have influenced the answers of the respondents. Nonetheless, a lot of the mentioned domains were rated as neutral with no impact from the PA suggesting that the respondents actually had a reasonable approach to the exercise. The discrepancy between impact and performance could also be explained in another way. Baird & Leslie (2013) find that changes in livelihoods are high near the PA In their study system (Tarangire National Park in Tanzania). This suggests that households are adapting to opportunities as well as constraints. Nonetheless, in the present study virtually all were farmers and if they had a second livelihood strategy it was grounded in cattle grazing, showing no real evidence of alternatives to traditional agro-pastoral practices.

5.4.3. Reflections and shortfalls of the IPA technique

A crucial discussion within the IPA literature is about how to set the gridlines as the placement of these determines in which quadrant the domains will show up. The method for doing this is rather subjective and depends on the objective of the researcher (Azzopardi & Nash 2013, Martilla & James 2013). In this study, pebble scores were used on the Y-axis and Likert-type responses on the X-axes. This makes the choice of setting the gridlines rather subjective. One could argue that the middle of the Likert-scale (in this case 3) might be the most neutral value to use for the performance measure. Some studies suggest the use of this scale-centred approach (e.g. Tonge & Moore 2007, Tontini & Silveira 2007) because it might be better in terms of its transparency in explaining the research outcomes. However, this would not make sense in the present study. The middle value of the pebble scale would be completely different to the performance measure. For this reason, the actual data means were chosen as basis for constructing the gridlines. The use of the data-centered approach using mean values of observed importance and performance is consistent with several studies (e.g. Eskildsen & Kristensen 2006, Hudson & Miller 2004).

No matter which approach is chosen, the quadrant approach has a problem in distinguishing between domains located in the same region (Tarrant & Smith 2002). Some domains can overlap the two axes or even be located too close to the intersection of

all the quadrants, making it hard to come up with a valid interpretation of categories. If a domain is located in one of the quadrants but only by a small margin, one cannot interpret with confidence that it belongs to this quadrant and thus that inferred category. This problem gets worse with small sample sizes (less than 400) (Tarrant & Smith 2002), which is the case in this study. Wade & Eagles (2003) suggests conducting statistical tests to determine whether a mean value is significantly different from the gridline value. In response to this, One Sample T-tests were used to determine whether importance, performance and impact mean values are significantly different from those of the gridline means in the present study. The use of simple statistics provides valuable information about whether a given domain really belongs to the assigned category.

When using statistics, many of the domains can suddenly not be interpreted with confidence as belonging to a given category. The question that then arises is whether the IPA technique originally was meant for statistical analysis or mainly to provide an overall clue about priority categories. The use of statistics in the present study basically reveals that except domains such as "land" and "food" in the Importance-Impact Analysis – only few of the domains can be interpreted with confidence as belonging to the inferred categories. This also applies to domains that actually could be explained by qualitative information. As both axes are real scales, the location of a domain in the graph makes sense in itself and the strict division of quadrants should maybe be reconsidered. Nonetheless, the cornerstone of the IPA technique is to provide an easy interpretable graph with an overview of priority categories for subsequent management decisions.

If conducting statistical tests is not feasible, at least a "zone of caution" could be exercised for all values that fall below a certain range (i.e. 0.05) of the gridline value (Wade & Eagles 2003). Using this "zone of caution" as a confidence criterion, most of the domains throughout the analyses in this study are valid, meaning that they do belong to the quadrant in which they appear in the graph. However, for instance the domain "transport" in the Importance-Performance Needs Assessment appears too close to the gridline (i.e. less than 0.05) and can thus not be interpreted with confidence to belong to any of the quadrants (Figure 10). There is a huge difference between conducting

statistical tests, using a zone of caution or simply just interpreting the graphs as they appear.

The "sensitivity analysis" was carried out to show that a small change in the position of a domain could result in a significant change in the inferred categories (Eskildsen & Kristensen 2006, Tarrant & Smith 2002). The removal or one or more domains changes the distribution of domains. For instance, after adjustment, "livestock" appears in the quadrant I in the Importance-Impact analysis and the Importance-Performance Needs Assessment. It did, as mentioned, also seem suspicious that livestock did not appear to be of high concern in the first sense, again showing the uncertainties of the analysis. Sever (2015) suggests to use standard deviations, standard errors and 95% confidence intervals to estimate the potential shift in location of domains. This would again add to the complexity of interpretation – when looking at the standard deviations in this study, the domains could potentially shift between many quadrants (Appendix 1, Table A1.2.). An alternative approach with a more continuous transition in the inferred priorities is the diagonal line approach to Importance-Performance analysis (Eskildsen & Kristensen 2006). Other studies have used this to divide the plot into two separate areas (Ziegler et al. 2012, Azzopardi & Nash, 2013). For the Needs Assessment the domains on this 45-degree upward line represent domains with equal importance and performance ratings. The area above the line contains domains that have higher performance than importance ratings while domains below the line require improvement because their performance level is lower than importance level. However, in the present study the diagonal approach would still not change anything specific in terms of priority categories because mean performance values were that high.

Troubles and uncertainties may also arise due to the conceptualizations and the actual measurements of "importance" and "performance". In this study, direct ratings were used, which is in line with most published IPA studies (Azzopardi & Nash 2013). There is evidence that direct measures are better than statistically derived importance measures, though the low predictive validity of such approaches cannot be explained (Azzopardi & Nash 2013). It is believed that direct measure ratings of importance (usually rated on a

Likert-scale) can possibly be subjected to social desirability bias (Sever 2015). Other studies use estimates of importance through indirect measures such as linear regressions. In linear regression, the importance weights are typically derived from standardized regression coefficients obtained by regressing an overall measure of performance on the performance ratings of individual attributes (Abalo et al. 2007). Some argue that this method is better at fully reflecting the importance of attributes that the respondents would not admit to or is not aware of.

In this study, the scale on the two axes is not the same because the IPA is based on the GPGI (pebble scores and Likert-type responses). It might be better to use the same scale on both axes (either pebble scores or Likert-type responses). However, the use of pebble scores seems valuable, as this procedure requires participants to evaluate their preferences relative to the rest of the attributes. Also, the fact that respondents are required to state only their top preferences should reduce rater fatigue and induce greater involvement (Azzopardi & Nash 2013). However, domains of less importance for the analysis might take up pebble space and have too much overall influence (cf. "sensitivity analysis"). As for this study, the GPGI measured overall QoL and PA impact, but it might make sense to restrict the analysis to a more specific livelihood-oriented approach (i.e. "which areas of life are important to your livelihood?"). To keep it subjective and person-centered, it would make sense to do another round after all domains are identified and categorized, and then get back to the same respondents and ask again with new pre-determined categories (developed from what they originally mentioned). In this study, domains were accepted when mentioned by more than 5 % of the respondents, but it might make sense to develop another criteria to avoid similar categories as "health services" and "hospital". While the 5% seems to be a good cut-off value for a final domain, it should be noted that when comparing Serengeti and Maswa, a domain might be included overall as a final domain even though it is only mentioned once in one of the areas. Such a domain has too much influence on the overall interpretation, not just in its own inferred category but also in terms of the distribution of the rest of the domains as shown by the "sensitivity analysis".

5.4.4. Summarizing strengths and weaknesses of the tools

Summarizing the use of the IPA technique and its derived analyses as impact assessment and needs assessment tools reveals a couple of interesting things. Domains can be both negatively and positively impacted in different analyses, the same analysis or between areas. They can shift between locations from one analysis to another – or from one area to another. Land-related domains such as "land" and "food" are of main concern. From the qualitative information given, this makes sense – and since these domains are also frequently mentioned as impacted and supported by statistics, there is a solid basis for these topics being considered in decisions processes. In this study, the Importance-Impact analysis provided the most reliable results from what could be expected of the qualitative information. However, the analysis suffers from a scale issue as "3" on the Likert-scale for impact scores is neutral (PA is not affecting life domain). Therefore, Importance-Performance with Only Impacted domains might be a better solution, as all domains with impact score "3" are discarded. For further studies it would be usable to look further into the relationship between impact and performance, particularly if there are similar discrepancies as in the present study. No matter what approach is chosen, there needs to be a balance between the criteria of analysis. The color code (frequency or frequency of impact) is important to see if the domain actually is mentioned as impacted frequently – before running any kind of statistics.

In conclusion, the strength of the IPA technique and the derived analyses is the visualization of priorities and the ease of presenting it, making it easier to take better actions. However, it needs to be supported by great amounts of qualitative data.

The weaknesses of the IPA technique and derived analyses lie within the methodological and conceptual challenges, which seriously threatens the validity of the analysis. If used globally or simply in comparison between locations (as in this study) or over time, there is an urgent need for a standardized method. First, and probably most important of all, to improve the method, a larger sample size is needed to avoid that minor coincidences diverts the analysis (Tarrant & Smith 2002). A good idea would also be to repeat the analysis to see if there is consistency in the results. For future studies using the IPA

methodology, it is important to critically validate the findings. At least a minimum zone of caution should be used when analyzing if the attributes really belong to their categories - and probably a stricter one than the 0,05 criterion, as suggested by Wade & Eagles (2003) (cf. above). Depending on availability of resources, if possible statistical tests, as done in this study, should be carried out to check if the location of a domain in the quadrants is significantly different from that of the gridline. Again related to sample size, an analyst must ensure that the analysis will not include domains only mentioned once. Such a domain could still be significantly different from the gridline according to the statistics and thus have too much influence on the graph in terms of the interpretation. The way to categorize final domains should be rethought; as for now a domain that is only mentioned once in either of the areas can still be a part of the analysis. If there is any doubt about whether one domain gets too much influence in terms of interpretation, "sensitivity analyses" can be conducted - as in the present study. Measurement of importance and performance (direct vs indirect) and the placement gridlines are unclear issues. However, it is advised to use the same scale on both axes. Altogether, there is an emphasis for further research to improve the validity of IPA technique and derived analyses (Azzopardi & Nash 2013) as a refined technique can provide a quantitative, theoretically robust method that is easy to apply in empirical studies. Periodic analysis with such an improved tool will provide valuable and visual information to managers about the effectiveness of management actions taken (Shin et al. 2003).

5.5. Comparing findings in Serengeti and Maswa villages

Summarizing the characteristics in villages bordering Serengeti and Maswa, a number of differences were found, although the main thing of interest is that they held a more negative attitude towards PAs in Maswa villages than in Serengeti villages. According to the constructed asset index, villagers in Maswa were wealthier than those in Serengeti. There was no interaction with PA staff in Salalilya (Serengeti) and only village leaders in Maswa villages reported some interaction with PA staff. However, there was not a statistical significant difference between the areas with respect to interaction with PA staff. More people in Maswa villages were aware of NGOs working in the area – a factor, which in turn overall was associated with a more positive attitude towards the PAs.

People in Maswa also reported more benefits (related to school projects) compared to Serengeti - only one household reported benefits in Salalilya (Serengeti). Perceptions of benefits were otherwise also associated with more a positive attitude towards the PAs. More people had experienced human-wildlife conflicts in Serengeti, though more people had experienced being arrested in Maswa. The latter is not in line with the fact that game reserves are less patrolled than national parks (Caro et al. 2009).

There were some differences in mentioned QoL domains, but only between individual villages in Serengeti and Maswa. "Clothes" was mentioned only in Maswa, "farming equipment" only in Serengeti. "Food", "house" and "water" were mentioned more frequently in Mwanyahina (Maswa) but were still frequently mentioned in Serengeti villages. Altogether this did not reveal a clear difference in preferences. A bit more people in Maswa had zero negatively impacted domains, though a bit more people in Maswa also had zero positively impacted domains. The mean of the weighted performance in domains perceived to be impacted was higher in Serengeti than in Maswa, though the difference was not significant. In Maswa, the IPA and derived analyses showed compliance between impact and performance of the domains. The land-related domains were of highest concern throughout all analyses.

In conclusion there is no clear trend in the differences between the areas. The overall more negative attitude towards game reserves (Maswa) is also described in other studies (e.g. Kideghesho et al. 2007), where the age of the game reserves is believed to explain the tendency. On the other hand, in the present study the more negative attitudes in Maswa is not consistent with the fact that Maswa villages also reported more benefits and were more aware of the presence of NGOs.

5.6. Reflections and limitations of the study

Although the data collection process went well, it has been subject to factors that are inevitable within research. The collected data are of course influenced by how the villagers perceived our team. Thanks to our local assistants, much of the possible distrust

could be reduced when approaching households. However, in some cases it was difficult to obtain trustworthy answers even though we were accompanied by local assistants and got strong support from community leaders. One example is the questions about illegal grazing. We saw illegal grazing happen with our own eyes and even though it seems that most of the villagers were involved, only 39% admitted it.

In Matongo, we experienced some people who did not know about the PA (Serengeti). However, after asking the village leader, we were told that this probably was a strategic answer as they were afraid of us thinking that they were poachers. In Salalilya, after finishing interviews in the center of the village, our assistants overheard a conversation about us: "now they are probably going to write a book about us back in Denmark so they can become rich". Whether this rather negative perception about us as Western people influenced the answers given from these persons is not clear.

Our research assistants conducted all interviews in Kiswahili and recorded all answers directly in the questionnaire. Thus, only people that could speak Swahili were interviewed, which could cause a biased sample. However, the actual number of people that was rejected was minimal.

The study area is home to many conflicts. Illegal grazing is common and the tension between villagers and PA staff is conspicuous. Villagers reported beating, arrests and even killings by PA staff. This situation and the obvious opposition towards the PAs might have influenced some of the responses we got.

Cooperation was generally very high – however, some respondents' understanding of the questionnaire was rather low – among other things evidenced by problems of using the response-scale. We also recognized a few examples where the pebble distribution method was quite challenging. In these few instances, it could mean that important information might have been lost in some of the interviews. We were only able to spend a few days in each village and a short while with each respondent, which might have limited our ability to build up trust, and to become an observant participant in village life.

Even though probabilistic sampling theoretically is statistically superior, non-probability sampling is frequently used due to unexpected situations and settings. We were not provided with village lists, making it hard for us to do wealth rankings and thereby stratify the sample along that dimension. As we were also experiencing the hardship of the rainy season and had limited time with our research assistants, it was simply not possible to make a random sampling without village lists. We acknowledge that the use of a non-probabilistic sampling technique might have created a biased sample. However, we believe that the population of the four study villages is well represented in our sample, and as it is a case study aiming at testing rather new methods, a strict random sampling is not the most important in this case.

Inevitably, the data are therefore influenced by time and duration of our visit as well as general field constraints and villagers' perceptions about us.

6. CONCLUSION

This study has analyzed local well-being impacts and attitudes applying a modified version of Allendorf's PA-people relationship framework (2010), and using the individual as the unit of analysis. It has contributed to literature by conducting research in an area of the Serengeti Ecosystem, where there has not previously been done extensive research. More specifically, the thesis examined: 1) General factors within people's physical relationship with PA and related entities, 2) The local people's subjective well-being as well as the well-being impacts of the PAs using the Global Person Generated Index (GPGI), 3) The attitudes of the local people towards the PAs as well as the factors predicting these attitudes, and 4) The use of the IPA technique and derived analyses as impact and needs assessment tools. The initial findings showed that many of the villagers were migrants and villagers were very dependent on natural resources, especially on land for grazing and cultivation. The study found low interaction between the villagers and protected area (PA) staff and some awareness of NGOs working in the area was present. Related to the PAs, benefits were reported to some extent and many costs were

experienced. The GPGI worked well in considering the subjective and multi-dimensional concept of human well-being in conservation impact evaluation. Rather than the final GPGI score measuring overall quality of life (QoL), the GPGI is valuable in providing information on what life domains people value as well as the importance, performance and impact in these valued domains (Camfield & Ruta 2007). The magnitude of negative impact was consistent with the many problems reported related to the PAs. The most impacted domains found in the analysis were all land-related. Attitudinal data showed a large percentage holding a negative attitude towards the PAs, which again was consistent with village leader statements. Perceptions of benefits as well as awareness of NGOs working in the area were associated with a positive attitude towards the PAs. In contrast, living in villages bordering Maswa, perceptions of costs and magnitude of negative impact on life domains were associated with a negative attitude towards the PAs.

The IPA technique and derived analyses provides an easy interpretable visualization of priorities, which is usable for management decisions. Together the GPGI and IPA could provide relevant insight that cat be used to design policy seeking to increase local participation and develop more positive attitudes towards conservation. However, the IPA technique and derived analyses suffers from methodological as well as conceptual problems, so its empirical validity and usefulness can be questioned (Sever 2015). There is an urgent need for a standardized method. The sample size should be large and it is a recommended to carry out statistics to be able to interpret the location of domains within the quadrants with confidence. When these needs are met, the Needs Assessment will work fine. Among the two analyses for impact assessment - though it did not work well in the present study - the best solution is probably to implement the Importance-Performance analysis with Only Impacted domains, as it links the impact with performance. By using this analysis the neutral impact value (3) where PA does not affect life domains is avoided. However, it is important to analyze whether there is congruence between performance and impact. Concluding on the differences between Serengeti and Maswa, many differences were found across the variables without any clear trend. The most conspicuous finding was that villagers held a more negative attitude towards PAs in Maswa villages.

7. RECOMMENDATIONS

Managers of the PAs need to give serious considerations to monitoring the impacted life domains, and taking action. The impact on land-related domains is in line with the general problems reported. Crop raiding, conflicts and arrests and lack of grazing land are all problematic issues. Also, positive issues should be considered as benefits were found to shape positive attitudes.

The village leaders themselves came with some suggestions for improvement of the relationship between their villages and the PAs. In villages bordering Serengeti they said: *"The relationship can be improved if the society will be incorporated in the activities concerning the protection of the natural resources"* [SVLD-A] and *"workers of the parks and the villagers should sit together and discuss on what has to be done, especially on issues regarding protected area borders and places for grazing"* [SVLD-B]. In villages bordering Maswa the village leaders suggested setting apart areas specifically for grazing with restrictions [SVLD-C] as what is allowed for the Maasai people in Ngorongoro Conservation Area [SVLD-D].

These suggestions from the village leaders follow up on the low level of interaction between the PAs and the communities and the generally low amount of conservation info. It is recommended to *i)* Increase communication between the PAs and the local communities, and *ii)* Increase awareness of the PAs – through education and concrete awareness programs.

In terms of PA-related costs, the following actions are recommended:
i) Monitor and assist the local communities with problem animals to minimize crop raiding issues, *ii)* Investigate the possibility of temporarily allowed restricted and carefully managed cattle grazing access into the PAs, and *iii)* Provide help and education to the local people in developing alternative livelihood strategies (e.g. non-farm alternatives) to overcome the restrictions that the PAs impose on them in terms of access to resources.

In terms of benefits, the following actions are recommended:
i) Distribute more sources to tangible community outreach services, create awareness of the services and link these to the existence of the PAs, *ii)* Make sure the benefits are equitably distributed and guarantee their future provision, and *iii)* Work to make the benefits offset the costs of living near PAs.

The general communication should be increased along with educational involvement. Communication should be between village leaders and PA staff, but also the general visibility of the PA staff in the villages should be increased. Furthermore, awareness programs based on people's value they hold towards the PAs should be developed (both negative and positive values). Specific awareness programs could involve the arrangement of trips into the PAs with corresponding conservation information. If the local people see PA staff taking an active role in assisting with problem animals, it could probably change their general perceptions of the staff as well as prevent the transposition of blame from wildlife to PAs. Allowing restricted grazing could for instance be in the dry season, where the land for grazing especially is scarce. However, the ecological consequences of taking such steps need to be considered and held up against the overall goals of the PA. Regarding alternative livelihood strategies, it may be a good idea to create incentives that will motivate and assist the local people to convert livestock into alternative forms of capital, which has less impact on the environment and which relieves the pressure on the PA conservation resources. This is only partly something that the PA management is capable of; other sources should be secured on a local scale through other institutions or globally. Incorporating the non-utilitarian benefits into management strategies could improve the PA–people relationship. However, provision of benefits alone will probably not stop the local people from illegal activities if they cannot meet their resource demands for survival, so offsetting costs is important (as well as general help and assistance in minimizing costs).

The different recommendations should of cause be balanced in relation to each other. What actually is possible is a question of availability of resources from the management. It might be therefore recommended for the management to be flexible and to be able to

switch resources rapidly between the different management components such as community projects, patrols, education, and wildlife monitoring.

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APPENDIX 1. Tables

Table A1.1. Asset index development via Principal Component Analysis (Filmer & Pritchett 2001).

Assets	**Scoring Factor**	**Mean**	**SD**	**Scoring Factor/ SD**
Cattle 0	-0.825	0.367	0.484	-1.71
Cattle 1-20	0.365	0.417	0.495	0.74
Cattle 21+	0.529	0.217	0.414	1.28
Shoats 0	-0.691	0.408	0.494	-1.40
Shoats 1-20	0.162	0.358	0.482	0.34
Shoats 21+	0.620	0.233	0.425	1.46
Chickens	0.512	0.8500	0.359	1.43
Farm land 0-3	-0.610	0.3250	0.470	-1.30
Farm land 4-13	0.047	0.4250	0.496	0.09
Farm land 14+	0.607	0.2500	0.435	1.40
House	0.302	0.917	0.278	1.09
Generator	0.242	0.033	0.180	1.35
Radio	0.226	0.350	0.479	0.47
Water tank	0.215	0.017	0.129	1.67
Improved charcoal stove	0.232	0.292	0.457	0.50
Cellphone	0.254	0.875	0.332	0.77
Sewing machine	0.142	0.117	0.322	0.44
Motorbike	0.459	0.208	0.408	1.13
Bicycle	0.524	0.758	0.449	1.16
Monetary savings	0.396	0.133	0.341	1.16

*Each variable takes the value 1 if true, 0 otherwise. The Scoring factor is the "weight" assigned to each variable in the linear combination of the variables that constitute the first principal component. The percentage of the covariance explained by the first principal component is 20%.

Table A1.2. Mean importance, performance and impact scores in villages bordering Serengeti and Maswa (including standard deviations).

	Serengeti			**Maswa**		
Domains	Importance	Performance	Impact	Importance	Performance	Impact
Agriculture	1.66+0.87	2.44+0.73	1.77+0.83	2.83+1.17	2.83+0.75	2.33+1.03
Bicycle	0.88+0.35	2.75+0.87	2.88+0.35	1.0+0.71	2.85+0.99	3.0+0
Business	1+0.82	2+0.82	2.75+0.50	1.25+1.50	2.75+1.26	3.0+0
Clothes	-	-	-	1.24+0.70	2.90+0.70	3.0+0
Education	2.07+1.10	2.40+1.06	2.87+0.83	3.0+2.76	3.18+0.75	3.18+0.40
Family	2.30+1.17	3.25+1.16	2.50+0.83	2.0+0.82	3.29+1.11	2.71+0.76
Farm	1.83+1.17	2.83+1.33	1.83+0.75	2.21+1.19	3.21+0.89	2.14+0.95
Farming equipment	1.67+1.21	3.17+1.47	2.83+0.41	-	-	-
Food	2.36+0.97	2.68+1.02	1.60+0.79	2.54+1.17	2.83+1.05	1.94+0.93
Health services	2.29+1.50	2.14+0.90	2.71+0.76	1.50+1.0	2.50+1.0	3.50+1.29
Hospital	2.5+ 0.70	1.50+0.71	2.50+0.70	1.75+0.89	2.25+1.04	3.25+0.46
House	1.87+1.08	2.45+1.03	2.58+0.85	1.83+1.18	2.98+0.92	2.92+0.53
Land	2.38+1.78	2.63+0.96	1.50+0.73	3.08+1.44	2.77+1.17	1.85+0.80
Livestock	1.50+1.18	2.54+0.91	1.91+0.75	1.54+0.98	2.83+1.24	1.92+0.83
Money	2.40+1.24	2.47+0.99	2.40+0.73	1.73+1.22	2.20+0.94	2.80+0.56
Motorbike	1.33+1.51	2.33+1.51	2.67+0.52	1.0+0	3.0+0	3.0+0
Phone	1.13+0.35	2.88+0.83	2.88+0.83	1.0+0	3.5+0.58	3.25+0.50
Transport	1.80+1.48	2.0+1.0	2.40+0.89	1.14+1.07	2.43+0.79	3.0+0
Water	2.4+0.86	3.07+1.17	3.20+0.89	2.31+1.13	2.88+1.25	2.79+0.97
Wood resources	1.0+0	3.0+0	2.0+0	1.44+0.53	3.0+1.58	2.56+0.73

* Mean importance based on pebble scores.
**Mean performance based on rating scale: = Very Bad; 2 = Bad; 3 = Normal/average; 4 = Good; 5 = Very Good.
*** Mean impact based on rating scale: 1 = Very Negatively; 2 = Negatively, 3 = Does not affect; 4 = Positively; 5 = Very Positively.

APPENDIX 2. Figures

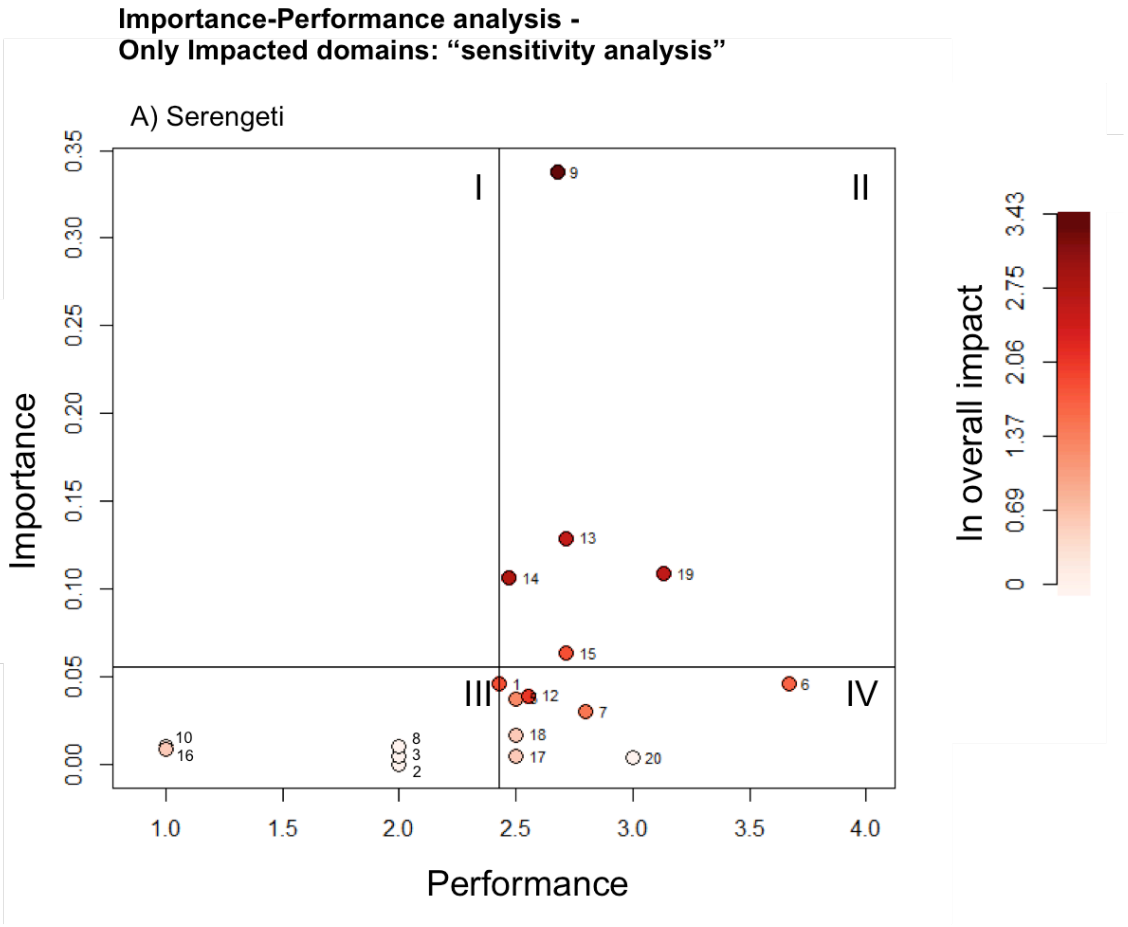

Figure A2.1. "Sensitivity analysis": Importance-Performance analysis with Only Impacted domains in (A) villages bordering Serengeti. The removed domain is "hospital". X-axis: mean performance scores of mentioned domains, Y-axis: mean importance scores of mentioned domains; Quadrant I: Negatively impacted domain with stronger effect on QoL, Quadrant II: Positively impacted domain with stronger effect on QoL, Quadrant III: Negatively impacted domain with weaker effect on QoL, Quadrant IV: Positively impacted domain with weaker effect on QoL. The color grading of the nodes indicates the frequency with which respondents perceived a particular domain to be impacted. The stronger the color, the more the domain is mentioned as impacted. Domains are indicated by following numbers 1: Agriculture, 2: Bicycle, 3: Business, 5: Education, 6: Family, 7:Farm, 8: Farming equipment, 9: Food, 10: Health services, 12: House, 13: Land, 14: Livestock, 15: Money, 16: Motorbike, 17: Phone, 18: Transport, 19: Water, 20: Wood resources. Note that the Y-axis is mean pebble scores (of 10) and the X-axis is mean Likert-type responses (1-5). Gridlines were constructed from the grand means of the means of the domains.

APPENDIX 3. Fieldwork pictures

Figure A3.1. A typical residence.

Figure A3.2. The field team.

APPENDIX 4. Household Questionnaire

Section A: Introductory Information

A1. Questionnaire number ____ *A2*. Date: _____
*A3.*Village: (subvillage) _____ *A4*. Ward: _____
A5. Household position: 01 Husband ___ 02 Wife ___ 99 Other (specify) _____
A6. Interviewed before: 01 Yes __ 02 No __

Any comments:

Section B: Socioeconomic Information

B1. Gender: 01 Male ___ 02 Female ___
B2. Age: _____ *B3*. Ethnicity:_____
B4. Education level of interviewee: 01 Primary __ 02 Secondary __ 03 High school __ 04 University __ 05 No education __ 99 Other (specify) _____
B5. Nr. of people living in household: ___ *B6.* Average level of education in household: 01 Primary __ 02 Secondary __ 03 High school __ 04 University __ 99 Other (specify) _____
B7. Main occupation of household head: 01 Farming __ 02 Livestock __ 03 Natural resource __ 04 Wage labour __ 05 Own business, rental __ 99 Other (please specify) _____
B8. Member of village committee: 01 Yes ___ 02 No ___
B9. Place of birth: 01 This Village __ 02 Ward __ 03 District ___04 Region __ 99 Other __
B10. If not in the village, why did you move here: 01 Marriage __ 02 Employment __ 03 Grazing __ 04 Family __ 05 Cultivation __ 06 Natural resources (specify) _____ 99 Other (specify) _____

Any comments:

In this section, we would like to know more about the economical situation of your household.

B11. Please mention and rank the 3 most important livelihood activities that have contributed to your household income the last 12 months?

Activities*	**Rank**

**01 Farming, 02 Livestock, 03 Natural resources, 04 Wage labour or similar, 05 Own business or similar, 06 Remittance (e.g. support from PA or tourism), 99 Other (specify)*

B12. Which assets does your household own?

Type of asset	**Number**	08 Generator		16 Bicycle	
01 Cattle		09 Radio		17 Tractor	
02 Sheep		10 Water tank		18 Monetary savings	
03 Goats		11 Improved charcoal stove		99 Other (specify)	
04 Pigs		12 Cell phone			
05 Chickens		13 Sewing machine			
06 Farm land cultivated (ha)		14 Car			
07 House		15 Motorcycle			

Section C: Natural resource use

C1. We would now like to know about the natural resources you use in your daily life. Please name the 3 most important natural resources that you use in your daily life (both harvested and purchased)?

01 Type of resource*	**02 Frequency****

** 01 Fuelwood, 02, Grasses, 03, Medicinal plants, 04 Grass for grazing, 05 Timber, 06 Charcoal, 07 Land for cultivation, 99 Other (specify)*
***01 Daily, 02 Weekly, 03 Monthly, 04 Yearly*

Section D: Livestock grazing in the protected area

D1. Do you graze livestock in the protected area? 01 Yes __ 02 No __
D2. If yes, why? 01 Unavailability of land __ 02 Quality of land __ 03 Traditional and cultural reasons __ 99 Other (please specify)
_____
D3. How often the past 12 months? 01 Daily __ 02 Weekly __ 03 Monthly __ 04 Yearly __ 99 Other (please specify) _____

Any comments:

Section E: Knowledge of Protected Areas

We would now like to know how much you know about protected areas. Therefore, we would like you to answer the following questions:

E1. Are there any protected areas near your village? 01 Yes __ 02 No __
E2. If yes, do you know the name of the protected area? 01 National Park __ 02 Game Reserve __ 03 Wildlife Management Area___ 04 Do not know __ 99 Other (specify) _____

If yes, please specify? _____
E3. Have you experienced any interaction with the PA staff? 01 Yes __ 02 No __
E4. If yes, which: 01 Providing information __ 02 Purchasing supplies, food, drink etc. __ 03 Village meeting __ 04 Village project __ 05 Uncertain of purpose __ 99 Other (specify) _____
E5. Are there any NGOs or others organisations working in or near your village? 01 Yes __ 02 No _
If yes, please specify? _____
E6. Which is the main source of information about the protected area in your area? 01 PA staff __ 02 Village council __ 03 District council __ 04 Central government __ 05 NGO __ 06 Do not know __ 07 No information __ 99 Other (specify) _____
E7. Have you received any benefits from the protected area? 01 Yes __ 02 No __
If yes, 1) please name the 5 most important benefits you have received from the protected area

E8. Have you experienced any problems with the protected area? 01 Yes __ 02 No __
If yes, please name the 5 most important problems you have experienced with the protected area.

Benefits	Comments	Problems	Comments

Section F: Quality of life and the protected area

We would now like to know what you think about your life and how the protected area affects it. For example, the protected area might either affect your life positively by providing extra income through tourism or affect you life negatively by limiting your access to natural resources.

1) Firstly, we would like to ask your opinion about the life you are living now. We therefore ask you to indicate/identify 5 crucial things for your life as it is now.

2) Secondly, we would like to know how important the things you mentioned are for your overall quality of life. We therefore want you to spend/distribute a total of 10 pebbles on all things you mentioned in 1). Spend more points on areas you feel are more important to you and less on areas that you feel are not so important.

3) Thirdly, we would now like to know how you feel about each of the things you mentioned are performing in your life. We therefore ask you to rate the performance of each thing using the scale below:

1 Very Bad	2 Bad	3 Normal/average	4 Good	5 Very Good

4) Lastly, we would like to know if you think that the protected area affects each of the things you mentioned in 1). We therefore ask you to rate how you think the protected area affects each thing you mentioned using the scale below:

1: Very negatively	2: Negatively	3: Does not affect	4: Positively	5: Very

01 Domains	02 Importance (pebbles)	03 Performance	04 Link to protected area	Why/How?

Section G: Attitudinal Data on Nature, Conservation and Protected Areas

We now want to know how you feel about the role of humans in nature, nature protection and how you feel about the protected area and the people who manage the protected area. We therefore kindly ask you to answer the following statements.

1 Strongly disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly agree

List of statements	Score
Plants and animals have as much right as humans to exist	
Human can only protect nature if everyone cooperates	
Wildlife is important for Tanzania	
The natural resources of Tanzania should be conserved for future generations	
Problem animals should be killed	
I am willing to preserve the natural resources of Tanzania	
The protected area should be abolished	
Protected area rules and penalties are essential for the protection of natural resources and wildlife	
The protected area managers are very helpful and give priority to our problems	
The protected area has disrupted our relationship with nature	

Resource extraction from the protected area is all right	
Local communities should manage the protected area, not protected area managers	

Any comments:

APPENDIX 5. Guide for structured village leader discussion.

Village Details

Date _____ Village _____ Ward _____
District _____ Region _____
Distance from nearest protected area _____
Interview start time _____ End time _____

Demography

Total number of households in the village	
Total population in the village	
What is the total area of your village lands	
When was this village formed?	
Average education level in village	
Ethnic groups in village	

Livelihood activities
List the most common forms of livelihood strategies in this village and then rank them in order of importance

Livelihoods	**Tick**	**Rank**
Cash crops		
Subsistence farming		
Small Business		
Wage Employment		
Livestock		
Other (specify)		
Other (specify)		
Other (specify)		

Did your village engage in the same livelihood activities that you mentioned 50 years or more ago or have they changed?

_____
_____

Natural Resources
List which natural resources your village has access to and rank them in order of importance.

Livelihoods	**Tick**	**Rank**
Fuelwood		
Grasses		
Animal fodder		
Medicinal plants		
Grass for grazing		
Water		
Timber		
Charcoal		
Land for cultivation		
Other (Specify)		

Do you think the availability of the natural resources that you mentioned has increased or decreased the past 50 years? Can you explain why?
_____
_____

Do you think the availability of the natural resources that you mentioned would increase or decrease in the future?
_____
_____

Which natural resource is your village lacking the most now? _____
… do you think your village is going to lack the most in the future? _____

Do you have any specific rules on the use of natural resources in your village?
_____
_____

Are you interested in learning more about the sustainable use of natural resources?
_____
_____

Relationship with the Protected Area

Are there any restrictions of the use of natural resources in the protected area?
_____
_____

From whom do you know about the restrictions?

_____
_____

Do people in your village extract/use resources from the protected areas?

_____
_____

Are there people in your village who graze their livestock in the protected area?

_____
_____

What actions do you think should be taken to stop people from grazing livestock in the protected area?

_____
_____

What kind of interaction have you experienced with the PA staff?

_____
_____

How is the relationship between your village and the protected areas? How can it be improved?

_____
_____

Has any other organizations worked in your village?

_____
_____

Has there been any services/projects provided in your village by the protected area?

_____
_____