

Full Length Research Paper

Impact of protected areas on the livelihood of locals: A case study in Saadani National Park, Tanzania

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We randomly selected 200 households from the four villages (50 per village) based on the household distance from the park: villages settled close to the park and villages settled further away from the park. Besides, qualitative methods including focus group discussions and direct observations, were used. Community activities differed between the two groups of villages (close and far from the park). Furthermore, local communities benefited directly and indirectly from employment, ecotourism, and support through social services. Education level was a significant factor influencing the perception of the benefits gained from the park. Crop raiding was the biggest problem reported by most people in the study area (31.5%, n = 200), followed by livestock losses. This study revealed that the establishment and expansion of a protected area can have positive and negative socio-economic, cultural, and political impacts on the livelihoods of local people. Households close to the park had little access to land; thus, few of them practiced agricultural activities and had crop production incomes. The needs of local people and poverty alleviation should be considered as important factors during the planning and designation of protected areas (PAs) in order to meet conservation and livelihood goals. The objective of the present study was to assess the perceptions of impact of PAs on the livelihoods of local people in terms of costs and benefits in the area adjacent to Saadani National Park in Tanzania with those not adjacent to Saadani NP.

Key words: Attitudes benefit sharing, livelihood, local communities, protected areas.

INTRODUCTION

Protected areas (PAs) are considered to play important roles in the conservation of habitats of different plant and animal species throughout the world (Allendorf, 2020; Macted et al., 2013). For the surrounding local communities, protected areas can restrict access to livelihood resources, force relocations, and provide

opportunities for income generation through tourism revenues (Nepal and Weber, 1995). PAs are believed to play an important role in poverty alleviation by supplying ecosystem services, developing ecotourism, and providing conservation benefits for social and economic development (Barrow et al., 2005).

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PAs cover approximately 17% of the terrestrial Earth surface (IPBES, 2019). Protected areas are managed for different reasons, such as the protection of species and ecosystems, safeguarding of landscapes, scenic, and historic features, tourism and recreation, education, science or research, protection of watersheds, and protection of important reserves of timber, fisheries, and other biological resources (Pearson, 2016). They are also increasingly being managed for the sustainable use of natural resources by local people (Kattumuri, 2018). In Tanzania, 43.7% of the total land is protected, whereby forest reserves cover 15.7% and wildlife protected areas cover approximately 28% (UNEP-WCMC and IUCN, 2021). PAs include National Parks, Game Reserves, Ngorongoro Conservation Area Authority (NCAA), Game Controlled Areas, and Wildlife Management Areas. Conservation and management of these areas are facing different challenges, but the most important one is the current human population growth, which leads to over-exploitation, resource degradation, habitat loss and squeezing of animal species (Toonen et al., 2013; Veldhuis et al., 2019).

The livelihoods of poor rural people are particularly vulnerable to the establishment of PAs, particularly in developing countries, because their livelihoods are mainly dependent on agriculture and on the available natural resources (Young and Goldman, 2015). The impact of PAs on local livelihood has been widely studied (Roe, 2008; West et al., 2006). Benefits gained and costs paid by local people as a result of the presence of PAs in their vicinities can encourage positive or negative attitudes toward conservation activities (Clements et al., 2014; Kideghesho et al., 2007; Røskaft et al., 2007). Currently, balancing the conservation goals and needs of local people is particularly challenging (Bennett and Dearden, 2014; Clements et al., 2014). Understanding the factors that influence the relationship between local people and PAs is important for achieving conservation and livelihood goals (Kideghesho et al., 2007). During recent years, people living adjacent to PAs have been competing with wild animals, such as African elephants (*Loxodonta africana*), over resources, as well as conflicting with them because of the crop loss due to crop raiding (Hariohay et al., 2018; Hariohay and Røskaft, 2015; Redpath et al., 2013).

Conservation activities have been aiming at the establishment of PAs with the exclusion of local people on land and resource use as well as displacement of people from their lands (Lele et al., 2010). Different studies have suggested that the successful sustainable management of PAs and the acceptance of PA establishment and expansion are dependent on the participation of local communities (Bennett and Dearden, 2014; Bode et al., 2015; Campbell and Vainio-Mattila, 2003; Kideghesho, 2008).

The recognition of local support in management and

conservation has increased because of ensuring that PAs play a central role in sustaining local livelihoods. Locals' livelihoods can be sustained by providing them incentive benefits to offset the costs of conservation (Kideghesho et al., 2007; Sekhar, 2003). Participatory approaches such as the Integrated Conservation and Development Project (ICDP) and community-based conservation approaches (CBCs) are new strategies that aim to include local communities in conservation. Such strategies have been developed worldwide, including in Tanzania (Kideghesho, 2010; Lele et al., 2010).

However, there is not much information and there is still an ongoing debate as to when and how to include local communities in conservation, in order to achieve sustainable conservation (Wang et al., 2012). Benefits include social support-related projects, ecotourism benefits, employment, and cultural and environmental benefits (Bennett and Dearden, 2014). On the other hand, local people living adjacent to PAs experience certain costs and losses, such as crop damage, livestock depredation, human injuries, and restrictions on access to resources from the park (Khumalo and Yung, 2015). Thus, surveys on the perceptions on impact of PAs (including benefits and costs) on local people living in and around such areas are fundamental to balance the conservation goals and needs of these people (Sekhar, 2003).

The gained benefits and experienced costs associated with living adjacent to PAs can influence local people's attitudes towards conservation activities both positively and negatively (Røskaft et al., 2007). Therefore, an understanding of the factors that influence the relationship between local people and PAs is important for achieving PA conservation and secure the locals a sustainable livelihood. The objective of the present study was to assess the perceptions of impact of PAs on the livelihoods of local people in terms of costs and benefits in the area adjacent to Saadani National Park in Tanzania with those not adjacent to Saadani NP.

METHODS

Study area

Saadani National Park (SANAPA) is a coastal protected area in Tanzania covering an area of 1100 km². It is the only national park that includes both terrestrial and marine habitats, and it is the only national park bordering the sea. The park is located in south-eastern Tanzania (5°21' 22–6°21' 53 S, 38°34' 13–38°51' 2 E), and it spreads across three districts (Bagamoyo, Handeni, and Pangani). It was officially gazetted as a national park in 2005 from the former Saadani Game Reserve established in 1969, as well as the former Mkwaja Ranch Area, the Wami River, and the Zaraninge Forest. The area experiences a bimodal rainfall with short rains from October to November, annually averaging 100–250 mm, followed by a mild dry season from January to February, and a long rainy season from March to June with temperatures ranging between 20–30°C (Sitters et al., 2013).

The park supports a wide range and unique combination of both marine and terrestrial flora and fauna. Approximately 30 species of large mammals are present in the park, as well as a variety of reptiles and birds. In addition, over 40 species of fish, alongside turtles, whales, and dolphins, occur in the ocean. The park is dominated by *Acacia zanzibarica* and a variety of other vegetation types, including forestry-savanna-grassland mosaics, coastal forests on the Zaraninge Plateau, a shoreline with salt flats, coastal fringe forests, herbaceous vegetation, mangrove forests, and maritime ecosystems (Bloesch and Klötzli, 2004). SANAPA shares the ecosystem with Wami-Mbiki Wildlife Management Area, which is inhabited by animals such as elephants and buffalos (*Syncerus caffer*) (Bloesch and Klötzli, 2004).

The park is surrounded by 17 villages (Figure 1) engaged in different activities with negative impacts on the PA. The study was conducted to assess the impacts of SANAPA on local communities living in four villages (Saadani, Matipwili, Mkwaja, and Gongo): three villages (Saadani, Matipwili, and Gongo) are found in Mkange Ward, Bagamoyo District, and one (Mkwaja) is found in Mkwaja Ward, Pangani District. The selection of these villages was based on their different activities and impacts on the National Park. The locals in the two villages closer to park (Saadani and Mkwaja) depend on fishing for their livelihoods, whereas the locals in the two villages further away from the park (Gongo and Matipwili) depend on agriculture as the main income-generating activity. Crops such as maize, cassava, rice/paddy, pineapples, and coconuts are cultivated in the study area. Among them, maize, cassava, and rice/paddy are mostly for household use, whereas pineapples and coconuts are mostly cultivated as cash crops. In addition, native people in the study area have small businesses such as restaurants and shops for selling food and other basic needs.

Data collection

The study assessed through questionnaires (Appendix 1) the impacts of the SANAPA protected area on local people's livelihoods in terms of community cost and benefit. Survey data were collected, and questionnaire surveys were carried out from June to August 2015. Both closed-and open-ended questions were included, and a total of 200 randomly selected respondents from the four villages (50 per village) were interviewed (Figure 1). The villages were in two wards, Mkange and Mkwaja, and in two districts, Bagamoyo and Pangani. In each village, 50 households were randomly selected, and surveys were carried out with the head of the household, his wife, or another adult person who represented the household. The study villages were grouped into two groups based on the household distance from the park: villages settled close to the park (0.5–2 km, Saadani and Mkwaja) and villages settled further away from the park (4–10 km, Gongo and Matipwili). Before data collection, information was provided to the regional and district offices to obtain the introduction letter when visiting the villages. A survey of the study area was conducted for the purpose of familiarising with the area. Relevant information about the number of people in each village was provided by the village leaders. In addition, information was sent out in advance to the households to check their availability for the interview.

Information about household characteristics (age, gender, level of education, and number of household members), different economic activities (e.g., crop production, fishing, and business), costs and benefits, and types of assets owned (e.g., land size, livestock, and other physical assets) were gathered.

Qualitative methods, including focus group discussions and direct observations, were used as described by Hancock et al. (2016). Focus group discussions were conducted with the key informants such as the village leaders, experienced people, elders, and

teachers + (5–8 people in each village). Focus group discussions were useful for collecting information such as the benefits gained from SANAPA. Collecting such information at the individual level was difficult because the benefits provided by SANAPA were at the community level. Based on perception measurements, this study sought to find out about how people perceived the presence of a park adjacent to their villages and to what extent they were willing to support park management (behavioural component). Different methods used during data collection enhanced its reliability.

Data analysis

The data collected from the field were entered into a computer, coded, and statistically analysed using SPSS version 21 (IBM, 2016). Descriptive statistics were run before starting the analyses to clean the collected data and to acquire knowledge of the nature of the data. Categorical responses were analysed using Pearson's Chi-square tests to determine whether the two variables were independent of each other. T-tests were used to test for differences between the number of local people in favour or against the creation of this national park as well as for the average age-sex distribution of people living across all study villages. The association among the variables was regarded as significant when $P < 0.05$.

RESULTS

Socio-demographic variables

In the total sample, 109 of people were men (54%) and 91 were women (46%). The minimum age was 24 years, maximum age was 67 years, and the average age was 43.7 years (SD = 13.12). The average number of household members was 4.9. (SD = 1.3), the minimum being 2 and the maximum 7. Most respondents (66%) had only the primary education level, 19% have never attended school, and only 15% had the secondary education level or above. The population's occupational structure showed two dominant occupations, with 46% ($n = 200$) crop farmers and 26% fishermen, whereas 28% of the respondents had other occupations. The frequency of different occupations differed between the two genders ($\chi^2 = 56.1$, $df = 32$, $P = 0.005$).

Perceptions of positive impacts of SANAPA on the livelihoods of local people

Households recognized the different direct and indirect benefits from living adjacent to SANAPA. The perceived direct positive impacts were grouped as employment, benefits from ecotourism, and support in social services such as dispensaries, classrooms, firewood collection, water services, and emergency transport. Other perceived benefits included community participation in sustainable resource management and development schemes (or Integrated Conservation and Development Projects, ICDPs), which strengthened land tenure. Among the

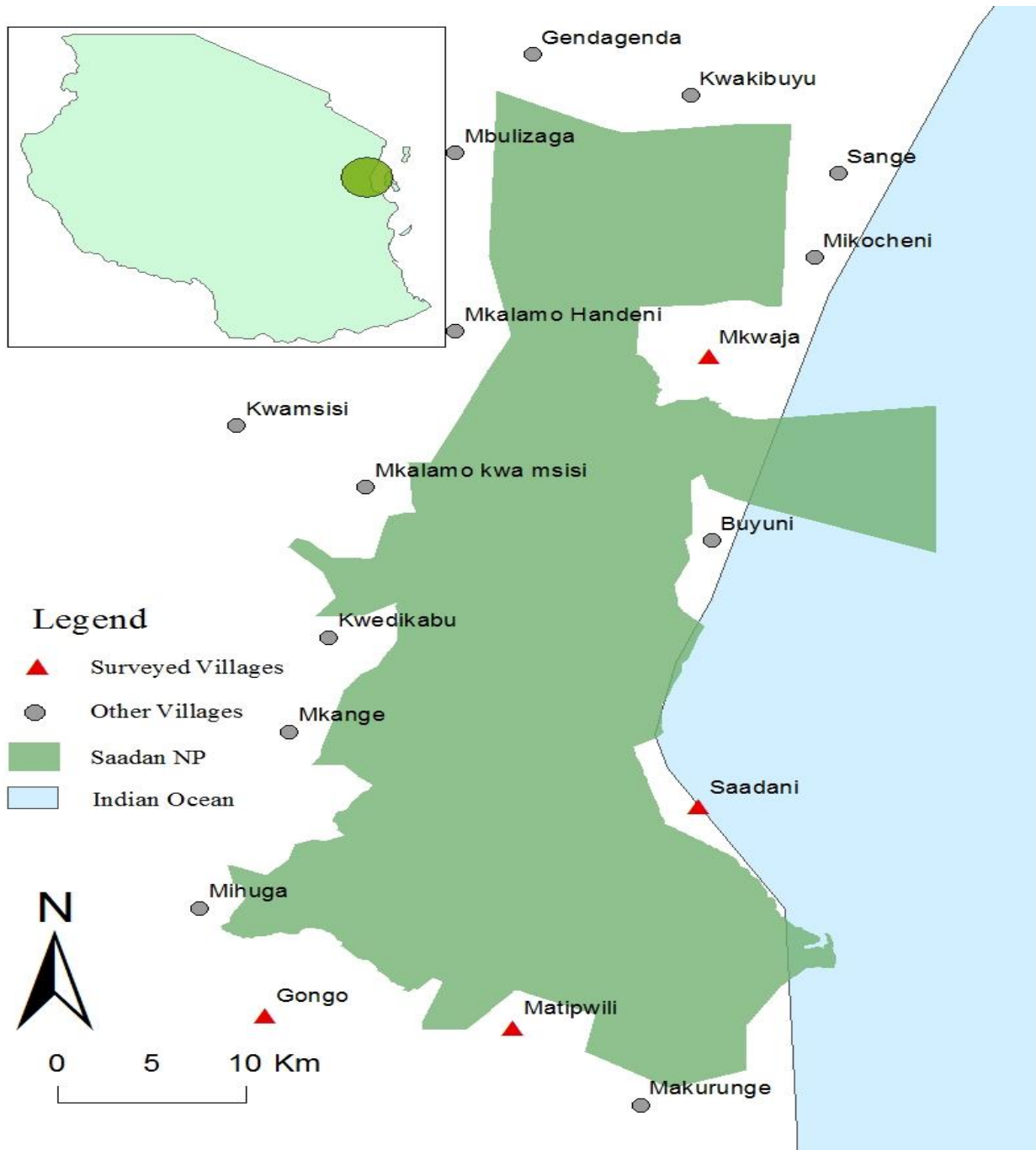


Figure 1. Map showing villages adjacent to Saadani National Park. The smaller map in the upper left part indicates the location of Saadani National Park in Tanzania.

respondents, 53.2% claimed that they benefited from SENAPA. Benefit types did not differ significantly between the two types of villages ($\chi^2 = 1.60$, $df = 3$, $P = 0.66$; Table 1).

Half of the total respondents (50%, $n = 200$) did not perceive any benefit or support from the conservation

activities. Education level was a significant factor influencing the perception of the benefits gained from the park ($\chi^2 = 8.95$, $df = 2$, $P = 0.01$), as the majority of people with formal education (75%) appreciated the benefits gained, whereas this percentage was significantly lower (25%) in people with no formal education (Table 2).

Table 1. Types of perceived benefits from SANAPA for the local communities in relation to village distance from the park.

Village type	Types of perceived benefits			
	Employment	Help in social services	Ecotourism benefits	No benefits
Close to the park	8 (8%)	35 (35%)	8 (8%)	49 (49%)
Far from the park	4 (4%)	35 (35%)	10 (10%)	51 (51%)
Total	12 (6%)	70 (35%)	18 (9%)	100 (50%)

Table 2. Influence of education level on perceived benefits.

Perceived benefit	Education	
	None	Formal education
Yes	25 (25%)	75 (75%)
No	13 (13%)	87 (87%)
Total	38 (19%)	162 (81%)

According to the interview with the Chief Park Warden and Community Outreach officers, 7.5% of annual revenue accrued from conservation activities was used to support different development projects in adjacent communities. The provision of support is based on request from the village, i.e., the village is supposed to initiate a project and request funds from SANAPA. In 2005/2006, SANAPA constructed two classrooms and toilets in Matipwili village. In 2006/2007 and 2014/2015, SANAPA rehabilitated the Doctor and Teachers houses, respectively, in Saadani village. In addition, in 2012/2013, SANAPA constructed a water dam in Gongo, and in 2010/2011 SANAPA provided laboratory equipment to the Mkwaja village hospital.

The findings from the focus group discussions showed that the villages received indirect benefits by hosting different guests, visitors, and researchers visiting the park. When researchers or tourists visited the park, they contributed to the local economies through purchasing basic necessities such as food and paying for accommodation services to the local guesthouses and lodges. Information from focus group discussions revealed that more than 50% of the villages close to the park benefited more from indirect benefits compared to the villages farther away from the park. SANAPA also reported providing opportunities for school children to visit the national park in order for them to be able to discover and enjoy the beauty of natural amenities and learn about conservation issues and ecosystem processes.

Perceived negative impacts of SANAPA on the livelihoods of local people

Perceived problems and costs reported by the

respondents included crop raiding, livestock losses, restriction in accessing certain resources, boundary conflicts, and human injuries (Figure 2). Crop raiding was the biggest problem reported by most people in the study area (31.5%, $n = 200$), followed by livestock losses. The differences in perceived problems reported by the two village groups were statistically significant ($\chi^2 = 41.69$, $df = 4$, $P \leq 0.001$), with the highest incidence of crop raiding (52%, $n = 200$) and the lowest incidence of human injuries in the villages further away from the park. All interviewed households, 24.5% reported a problem in accessing resources, including forest, land, firewood, and water resources. In addition, people reported a lack of area for collecting firewood as well as a lack of free movement, and some were not allowed to conduct certain activities such as agriculture, especially in the villages closer to the park. During the study, it was reported that one person from Matipwili village had been killed by lions in 2014 in Saadani village. Furthermore, there was no physical boundary to separate the park area and village land; thus, people reported boundary conflicts.

DISCUSSION

The results showed that even though the local communities were engaged in different activities, agriculture and fishing were the main sources of income in all investigated communities. The locals used agriculture as an alternative source of income but seemed to be facing a growing problem of crop damage by wild animals such as elephants and monkeys, which is the same problem as reported in the western part of the Serengeti National Park (Nyahongo et al., 2005). Community activities differed between the two groups of villages (close and far from the park). Most local

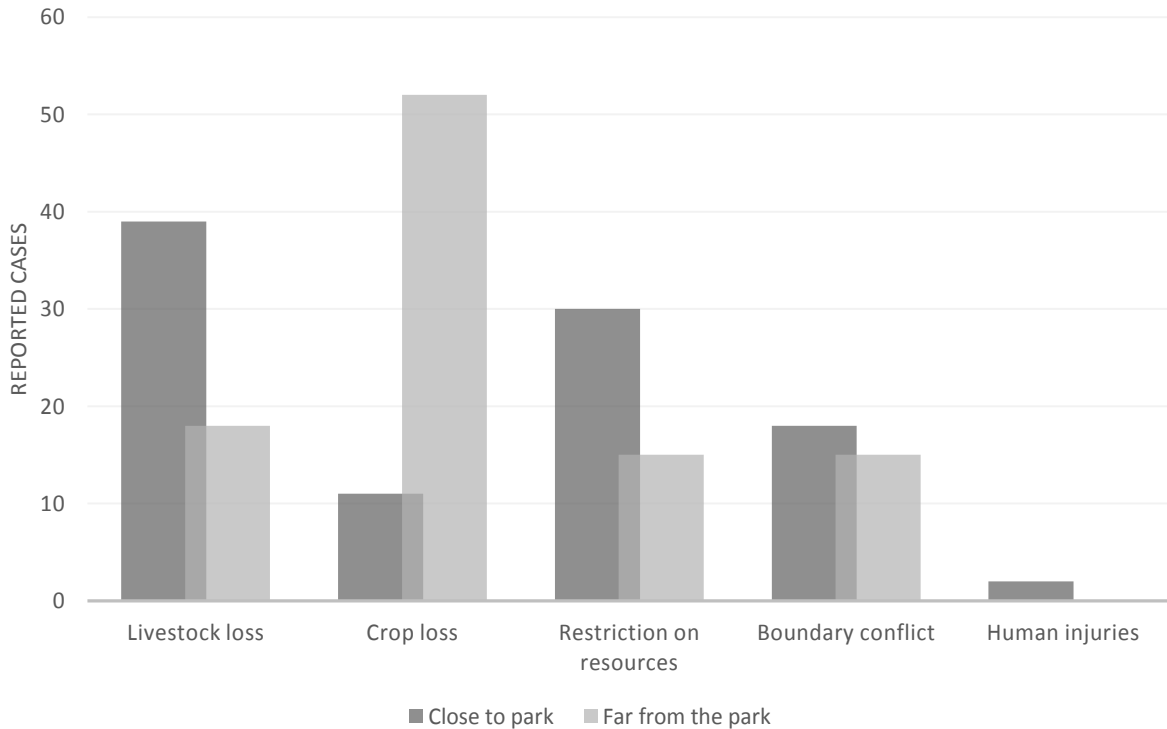


Figure 2. Different types of perceived costs in the two village types of different distance from the park.

communities close to the park depended on fishing, whereas villages far from the park depended on agriculture. Moreover, villages close to the park had the highest number of people with no income-generating activities, which affected their livelihoods. The reason for this might be that compared to the villages closer to the park, the villages far from the park had larger landholdings. During the establishment of SANAPA, the villages close to the park had to sacrifice more of their land than the villages far from the park, resulting in small land areas, which is why they were not able to diversify their economic activities as much as the villages far from the park.

Access to different resources, especially land, was considered to be an important factor in the diversification of different activities, as most people did not have other strategies and they mostly depended on agriculture and fishing. This finding corroborates the findings of Ellis and Allison (2004) on rural livelihood and diversity, which revealed the importance of accessing different assets for the diversification of livelihood strategies, which in turn reduced the dependence on natural resources. It is important for institutions such as SANAPA and other stakeholders to target the immediate livelihood needs and help create opportunities for the local communities to diversify their livelihood. The needs of local people and poverty alleviation should be considered as important factors during the planning and designation of PAs in

order to meet conservation and livelihood goals and objectives (Pfaff et al., 2014).

Furthermore, local communities benefited directly and indirectly from employment, ecotourism, and help and support through social services related to the project because they are adjacent to SANAPA. The participation, involvement, support from local people, and equal provision of the benefits obtained from conservation activities are important in achieving conservation goals (Nyaupane and Poudel, 2011). Effective and sustainable conservation of wildlife can be achieved through strengthening the capabilities and knowledge of local people and different stakeholders (Langton et al., 2014). The costs experienced by local communities were associated with living adjacent to PAs, which in turn affected people's livelihoods. The respondents acknowledged they did not have enough food throughout the year, and most of them did not know how to mitigate these problems. Problems were common in villages located close to the park boundary because there were no physical boundaries to separate the park and village lands.

Laws and regulations on the establishment of PAs are founded on the grounds that resource access is restricted to the local people (Vedeld et al., 2012). The establishment and expansion of PAs was found to have impacted and undermined the livelihood of locals, as most of them depended on agriculture and available

resources. The restrictions of resource access, costs associated with living closer to the park boundaries, and poor involvement of locals in conservation activities contributed to more negative attitudes toward conservation activities. Several researchers have pointed out that the exclusion of local communities in conservation has led to difficulties in achieving conservation goals (Ban et al., 2013; Pullin et al., 2013). The needs and interests of local people should be given priority during the establishment and expansion of PAs, and they should be provided with alternative sources of livelihood. According to Røskaft et al. (2007), the support of local people to conservation will be compromised if their needs and interests are threatened.

Conclusion

The authors found that benefits were most provided in the form of social-related projects, and most local communities were not aware of the benefits due to poor involvement and participation in conservation activities. To achieve a good and sustainable relationship between the park and local communities, it is important for the park management to provide to the locals with different alternatives for income-generating activities in order to improve their livelihoods. Furthermore, due to costs associated by living closer to the PAs, conservation managers and policy makers should provide reliable solutions to the local communities who bear most of the conservation costs such as crop raiding and livestock depredation.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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APPENDIX

Household Questionnaire

Questionnaire number _____ District _____ Ward _____

Village _____

Date _____

Household GPS: Lat _____ Long _____

Personal information

1. Respondent age

i) ≤ 37 Years () ii) 38-48 Middle aged () iii) 49+ Older ()

2. Sex: Male () Female ()

3. Occupation

Farmer () Fisher () Teacher () Businessman () others (specify) _____ 2 _____

4. Level of Education

None () Primary level () Secondary level () others (specify) _____

5. Do you have child/children in school? i) Yes () ii) No ()

Age (years)	Sex	Education level

If no what is (are) the reason(s) _____

Assets and Wealth

6. What is the area of land owned by household? _____

7. Do you own a House? i) Yes () ii) No () iii) How many houses do you own? _____

No. of Room	Wall material	Roof material	Floor material
	i)Cement ()	Grass ()	Cement ()
	ii)Burnt Bricks ()	Iron/steel ()	Soil ()
	iii)Unburnt Bricks ()	Mud/Cow dung ()	Tiles ()
	iv)Mud ()		

8. Do you own Livestock? Yes () No ()

Livestock owned	Number
Cow	
Goat	
Sheep	
Chicken	
Ducks	
Turkeys	
Pigs	
Others Specify	

9. Do you owned any of this equipment?

Name of Equipment	No. owned	Name of Equipment	No. owned
i)Ox-plough		viii)Wheelbarrow	
ii)Bicycle		ix) Tractor	
iii)Motorcycle		x)Refrigerator	
iv)Sewing machine		xi) Cell phone	
v)TV		xii)Other(specify)	
vi)Canoe/fishingnet			
vii)Radio			

10. What are the main sources of income?
 Agriculture () Fishing () Business () hunting () others
 (Specify) 1. _____ 2. _____ 3. _____

11. What other activities do you do as alternative source of income? ____

12. Do you think your activities have any impacts on wildlife population?
 Yes () No ()

13. If yes what impacts 1. ____ 2. ____ 3. ____

14. Do you have any of these?

Farm () Backyard garden ()

15. If yes how far from the park?

1-3 km 4-6 km 7-9 km Others (specify)

16. What are the major three crops you cultivate in your farm/garden?

1. _____ 2. _____ 3. _____

17. What best describes the food situation in your household for the past 12 months?

- a. In most cases, we do not have enough food
- b. We have food but with some months of food scarcity
- c. We always have enough throughout the year

18. What are the copying strategies used in the period of food shortage?

- i) Sell livestock
- ii) Borrow money
- iii) Sell household assets

19. What are the sources of energy used for cooking in your household?

- i) Firewood
- ii) Charcoal
- iii) Kerosene
- iv) Gas
- v) Electricity
- v) Others Specify

20. Where does your household obtain the energy used for cooking?

Village forest General land within the national park

Own farm land others specify 1. ____ 2. ____ 3. ____

21. Do you receive any benefits from SANAPA? i) Yes ii) No

Types of benefit		Yes	No
1	Are you employed or have you been employed by SANAPA?		
2	Do you have children at school constructed by SANAPA?		
3	Do you access to medicinal plants and ritual sites?		
4	Do you participate in eco-tourism activities?		
5	Do you have access to water for domestic use/livestock?		
6	Do you have access to firewood and building materials?		
7	Others (specify)		

22. Do you think there is fair distribution of benefits obtained from the Park i) Yes () No ()

23. Who do you think benefit more from the NP?

- i) Government leader (Village council leader) ii) Rich people
- iii) Poor people iv) Females v) Males
- vi) Young people vii) Old people

Expenses of living adjacent to PA

24a. Do you experience any problem by living adjacent to NP? i) Yes () ii) No 24b. If yes, which of the following is a problem?

- i) Crops loss ()
- ii) Livestock loss ()
- iii) Human injuries ()
- v) Others specify_

25. Which crops were destroyed and how much was your loss?

Crops destroyed by Wildlife	Loss/year
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26. Which domestic animals were killed, injured, killed or affected by wildlife?

Domestic animals	Problem types	Number of animal killed
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27. Which animals are the main causes the problem?

- a. baboon ()
 b. warthog ()
 c. elephant ()
 d. lion ()
 e. Others (specify) 1. _____ 2. _____ 3. _____

28. What do you think should be done to control these problems?

- i) Remove animals ()
 ii) Compensation ()
 iii) Others (specify) ()

Perception and attitudes

29. How do you rate your relation with the park? i) Bad () ii) Good ()

Indicators of relations	Yes	No
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Do you report any illegal activities which conducted inside the Park?

Are you or any member of your family employed by the park?

Do children attend a school constructed by SANAPA?

What are the household benefits from the income generated from the activities conducted by SANAPA?

Are you allowed to access medicinal plant or ritual sites?

Are you allowed access to water for domestic use/for livestock inside the park?

Do you have access to firewood or building materials inside the park?

Do you enjoy the services provided by SANAPA?

30. How does your household obtain information about conservation issues?

- a. By participating in the meeting ()
 b. By being a member of the village government ()
 c. By being a member of committee in the village ()
 d. By being an employer in the village ()
 e. From friends ()

31. Do you know how decisions are made? i) Yes () ii) No ()

32. Is your household involved in the decision making process? i) Yes () ii) No ()

33. How are decisions communicated at the village level?

- i) Through the village meeting ()
 ii) On the village notice board ()
 iii) Through talking with a friend ()

iv) Others (specify) _

34. How would you like to be involved in the management of natural resources?

1. _____ 2. _____ 3. _____

35. What is your opinion about the presence of the Park in this area?

- a. It should be removed
 b. It should exist, but the animals should be controlled
 c. It should exist with villagers being involved in its management