Article

Local community attitude towards conservation of afro-alpine ecosystem in Simien Mountains National Park, Ethiopia

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Received 7 April 2022; *Accepted 15 May 2022*; *Published online 31 May 2022*; *Published 1 September 2022*

Abstract

This study was conducted in Simien Mountains National Park, Northern Ethiopia with the objective of evaluating the local community's attitude towards the afro-alpine ecosystem conservation of the park. Multistage sampling techniques were used to select respondents. Due to their vicinity to the park, four farmers' associations with two villages each were selected purposively. Sixty-three respondents were selected randomly for interview with a maximum of 2 km distance from the park boundary to the respondents' homes. Semi-structured interviews with some in-depth, focus group and key informant discussions were used to elicit information from the local community. Observations on afro-alpine ecosystem conservation efforts were made to cross-check with respondents' opinions. Pearson correlation and descriptive statistics mainly percentage and frequency were used to analyze data using SPSS version 20. The results showed that the majority of the local community's attitude is positive (90.5%). The rest, 4.75% of the respondents have negative attitudes whereas 4.75% of respondents have both negative and positive attitudes towards the conservation of the afro-alpine ecosystem of the park. Incentives were key players for the conservation of the park. The local community needs more alternative livelihood options to conserve alpine ecosystems in addition to tourism involvement.

Keywords awareness; community perception; conservation practice; environmental protection; sub-afro-alpine.

Proceedings of the International Academy of Ecology and Environmental Sciences
ISSN 2220-8860
URL: http://www.iaees.org/publications/journals/piaees/online-version.asp
RSS: http://www.iaees.org/publications/journals/piaees/rss.xml
E-mail: piaees@iaees.org
Editor-in-Chief: WenJun Zhang
Publisher: International Academy of Ecology and Environmental Sciences

1 Introduction

Earth is one of the planets in the universe known to sustain life. Yet human activities are progressively reducing the planet's life-supporting capacity to satisfy the needs of the growing human population. The combined destructive impacts of a poor majority struggling to stay alive and an affluent minority consuming most of the world's resources are undermining the very means by which all people can survive and flourish (IUCN, 1980).

In East Africa, many of the most significant protected areas are found adjoining pastoral land use systems. Extensive forms of land uses are, to a great degree, compatible with wildlife management when wildlife, livestock and local resources users are part of complex social and natural resource management systems. Where cultivation is dominant this is not the case. In the recent past there was rarely harmony, only conflict and the necessity for amelioration as wildlife were perceived as vermin (AWF, 1996).

Though Ethiopia is endowed of rich biodiversity, conservation of the natural resources is vested on not only the governmental and non-governmental efforts but also on the perceptions and attitudes of the local community. In Ethiopia, a large proportion of the population depends on subsistence farming for livelihood. The farming practices were extensive rather than intensive which demands the cost of existing natural resources including land. Land degradation remains to be a serious threat in the highlands of Ethiopia (>1500 m a.s.l) where over 88 percent of the human and over 75 percent of the livestock populations reside (Birhanu, 2014). As indicated by the high rate of soil erosion, land degradation is the most threatening environmental problem in the highlands of Ethiopia (Hurni et al., 2010; Tsehaye and Assen, 2013). This destruction and mismanagement of land resources requires an urgent consideration; and Simien mountains National Park is one of the high land protected areas of Ethiopia facing similar problems.

Simien Mountains National Park (SMNP) is one of the formerly established and secondly gazetted protected area with outstanding scenery and center of endemism both in fauna and flora with certain threatening factors. One major threat to SMNP is human settlements (Ejigu, 2012; Teshome, 2007), with 436 houses were residing inside the park boundary before the resettlement of Gitch community in the core area of the park. In addition, 3.6% of the area was under cultivation and the park was subjected to over-grazing by an estimated 243,494 sheep, 41,686 cattle, and 15,703 equines (PHE, 2014). Harboring these and other threatening factors require local community's attitude to sustain the natural resources in the national park and the national park itself.

Attitude is psychological tendency expressed by evaluating a certain object with favor or disfavor. The attitudes of local land users, such as farmers, are critical for sustainable conservation endeavors across the globe. For instance, in a research conducted by Hu et al. (2006) on the loess of hilly areas of China, the contribution of attitude in the conservation of natural resources was found to have a significant role in successful implementation of soil conservation projects. In contrast, the unsustainability of the Ethiopian massive conservation efforts carried out following the 1973/74 terrible famine was partly attributed to the low attitude of the respective stakeholders particularly the farmers who were attracted only by the food donation incentives provided by the World Food Program without any consensus made between the two actors, especially on the techniques employed (Yeraswork, 2000 in Tsehaye and Assen, 2013). This led a large section of farmers to consider the food for work program as a short lived project with little or no contribution to long lasting natural resources conservation.

There are about 30,000 people in and on the vicinity of the SMNP, with total area of 412 km2; and there was time that the park was so extremely exploited before 1991. After 1991, the government strengthened conservation strategies together with NGOs. But conservation would be effective if the local communities have positive perception and attitude towards the protected area.

Determining the local community attitude and perception is preliminary work to plan conservation strategies for the protected areas especially for those protected areas inhabited and surrounded by local communities like SMNP. The afro-alpine part of the Park is center of endemism; both in fauna and flora, as well as it is source of water. Therefore, the afro-alpine part of the Park receives the first priority for more

conservation attention than the other part of the Park. Conservation attitude and perception of the local community living adjacent to the Park was not yet studied so far. Consequently, this research work was intended to fill these gapes. The scientific world, environmentalists, policy makers and planners may use this paper concerning conservation of nature and natural resources.

2 Study Area and Methodology

2.1 Study site

Simien Mountains National Park (SMNP) is located in northern Ethiopia (Fig. 1), 850 km from capital city of the country, Addis Ababa, and 285 km from Bahir Dar city of the region Amhara. The present SMNP extends from 13°06'44.09 "N to 13°23'07.85"N latitude and from 37°51'26.36"E to 38° 29'27.59"E longitude. The total area of the site is about 412 km^2 with 58 percent of afro-alpine ecosystem. The park was established in 1966 following the recommendation or report of United Nation for Educational, Scientific and Cultural Organization (UNESCO) mission sent to Ethiopia in 1965 (ANRS, 2009).

The current altitudinal variation of SMNP is from 1900 m to 4543 m above sea level (ANRS, 2006). Because of this high range of altitudinal variation temperature and soil variations are also high. The Climate of SMNP is characterized by a wet and dry season, with about 75% of annual rainfall between June and September. The SMNP lies within the isohyets of 1350-1600 mm annual rainfall with an annual average of rainfall about an elevation of 3600 m a.s.l. (Gitch and Cheneke areas) of around 1500 mm. Temperatures are relatively constant throughout the year; however there is huge diurnal variation ranging from a minimum of -2°C to -4 °C at night to a maximum of 11°C to 18°C during the day (ANRS, 2009).

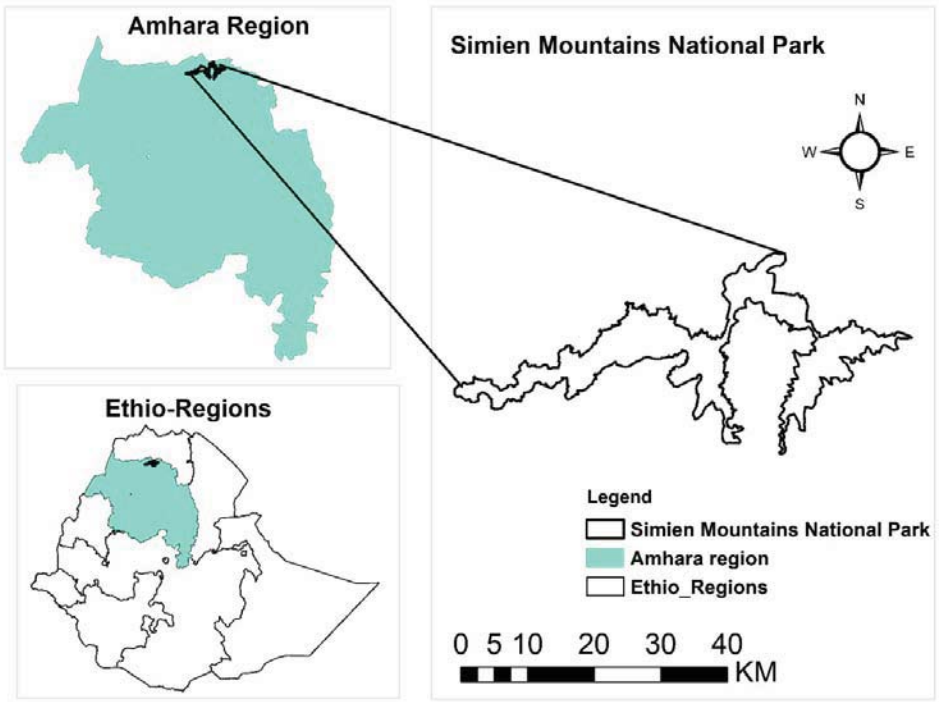


Fig. 1 Study area location.

2.2 Data collection

Two stage sampling techniques were used to select household respondents. At the first stage, afro-alpine villages were selected purposively depending on their vicinity, high interaction and dependency due to their settlement closer to the afro-alpine ecosystem of the national Park. At the second stage, household respondents were selected randomly in the selected villages of the afro-alpine ecosystems of the national park. In addition to household informants, four village leaders in the selected villages were selected purposively as key informants. Moreover, staff of the national park and park ecotourism association's members and leaders received one focus group discussion each. They were selected purposively due to high interaction with the conservation management and benefit from the park. Semi-structured interviews were used by the researcher to collected data from 63 households of four rural farmers' associations (kebele) residents (Argin, Lori, Maje and Dibl) in November and December, 2018. Randomly, fifteen household supervisions and general field observations were made for triangulation.

2.3 Analysis data

The data collected from respondents were directly encoded and entered to Excel sheet. Most of the analysis were done using excel; the other part of the analysis were done by taking the excel data in to Statistical Package for Social Sciences (SPSS) version 20. Pearson Correlation was used to know the relationship between different factors and conservation attitude of the local community. Descriptive statistics mainly percentage and frequency were used to analyze the data and presented using charts and tables. The statistics were used to describe respondents' socio-economic information, major determinant factors for perception and attitude of the local communities in the study area. Inferential statistics particularly chi-square test was used to see the relationship between variables considered to draw conclusions about the population and describe the relationship of variable with the attitude of the local communities in conserving afro-alpine ecosystem of the park.

3 Results and Discussion

3.1 Respondents' profile and conservation views

Sixty three interviews were made by the researcher with 43 males and 20 female household respondents. The minimum, maximum and mean of the ages of the respondents were 18, 61, and 36 years old respectively. Young people are willing to be resettled for better life as well as for better conservation of the afro alpine ecosystem. On the other hand, youngsters do not have plenty of domestic animals. Because of this they have better conservation attitude towards afro-alpine ecosystem of the national park relative to elders. Whereas, elders hate to be relocated far from where they grew and they have better numbers of domestic animals. They need free grazing from the afro-alpine of the national Park. The mean of respondents' household size was seven with a maximum of 11 and minimum of two. Based on Pearson's correlation, household size is slightly positively correlated with size of domestic animals ($r=0.423$, $P<0.07$). The respondents have maximum of 51 livestock with mean of 15. On the other hand, discussions made with key informants revealed that there were very few residents having about 300 animals in households. But this animal population is getting decreased due to fodder shortages.

The maximum education level of respondents was grade 6. About 53% of the community were illiterates and 10% of the respondents were able to read and write their mother tongue language (Amharic) from religious/informal schools (Fig. 2). As indicated by Dewu and Roskaft (2018), a higher and environmental education level was one of the best factors for a positive attitude towards the conservation of the National

Parks in Ghana. Again, Sinthumule (2021) and Al Amin et al. (2021) found that knowledge, attitude and practice increase with an increment in education level. But in this study, there was no significant relationship between education and conservation. This might be due to the inadequate education level they have and dominated by illiterates. Nevertheless, interviews and discussions made revealed that firewood collection was one of the threats of the national park so far and now it became reduced. This is because 90.5% of the residents have Eucalyptus plantations in their farmlands. This helped the community to get construction and farming material in addition to selling for income generation. Educated residents were better in plantation and searching wood from the park is lowered. There was significant relationship between level of education and homestead plantation (χ^2=19.857, df=5 and p<0.001). Similarly, Khan et al. (2015) observed that, education especially, the environmental education is a vital tool to change the community attitudes toward the wildlife and protected area. Inanc (2017) revealed that education is one of the factors which has positive impact on people perception of forest conservation. Education could be an important way to motivate people to develop or reinforce positive perception about biodiversity conservation.

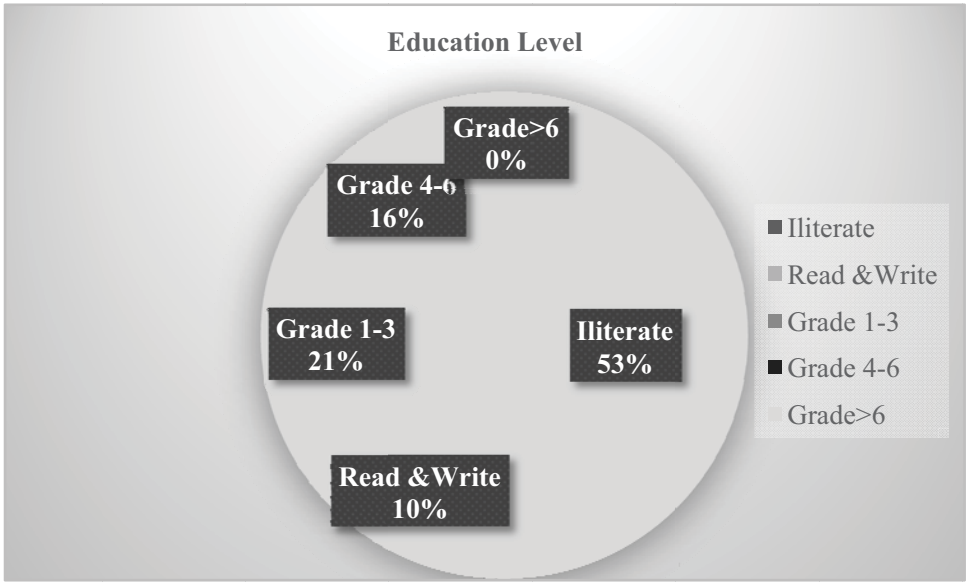
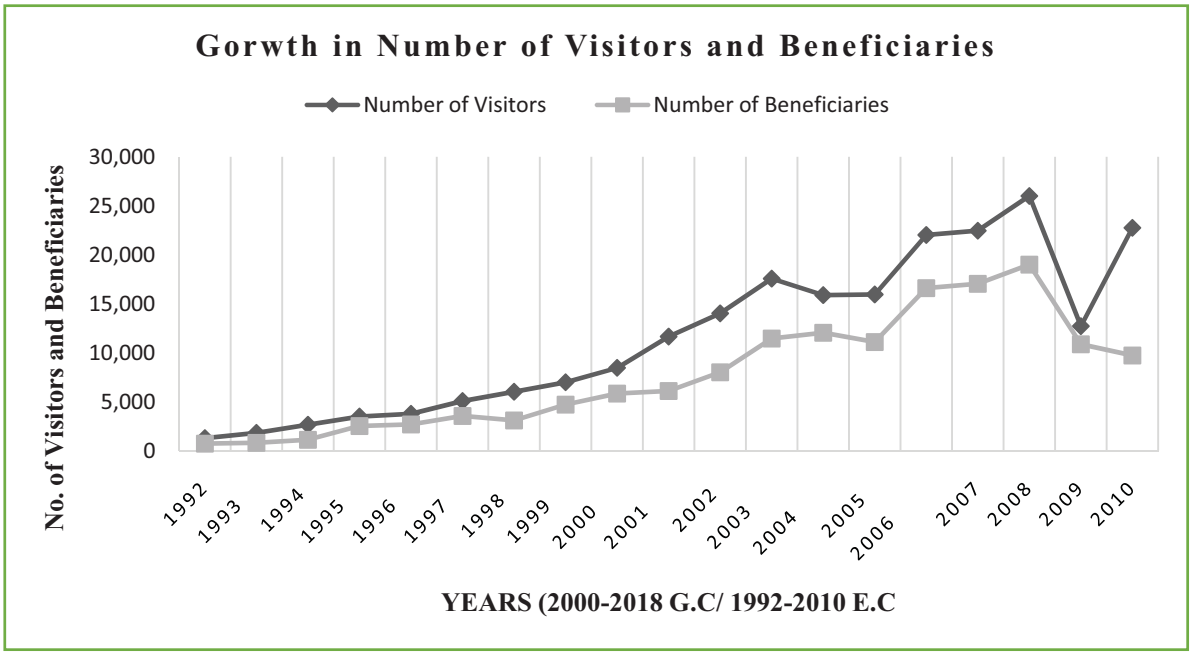


Fig. 2 Respondents' education levels.

3.2 The influence of livelihood options on conservation attitude

Among the respondents, about 95% of them depend on subsistence farming as their main source of income. Others work on trade and as laborer. This indicates that the majority of the local community have some sort of impacts on the conservation of the natural resources of the national park. This was in line with the works of (AWF, 2015; ANRS, 2009; ANRS, 2006; Puff and Nomemissa, 2005). On the other hand, all respondents agreed that their involvement with tourism activities were important to have positive attitude towards the conservation of the afro-alpine of the national park. According to the data taken from park information center, tourists flow (Fig. 3 Upper) and income generation from tourists (Fig. 3 Lower) had increasing trends. This showed that there is improvement in livelihood options and the benefit to the local community increased as well. This indicates that there is correlation between incentives/benefits and positive attitude towards biodiversity conservation as supported by the findings of Truong (2022), Llamazares et al. (2020), Dewu and

Roskaft (2018) and Inanç (2017). This in turn had a positive attitude towards the national park as investigated out by Farani et al. (2021), that economic factors play important roles to improve farmers' attitude towards conservation of environment. On the contrary, the information from key informants and focus group discussions outlined that the local communities were getting opportunities to buy more domestic animals using the revenue collected from tourism services that in turn aggravates grazing.



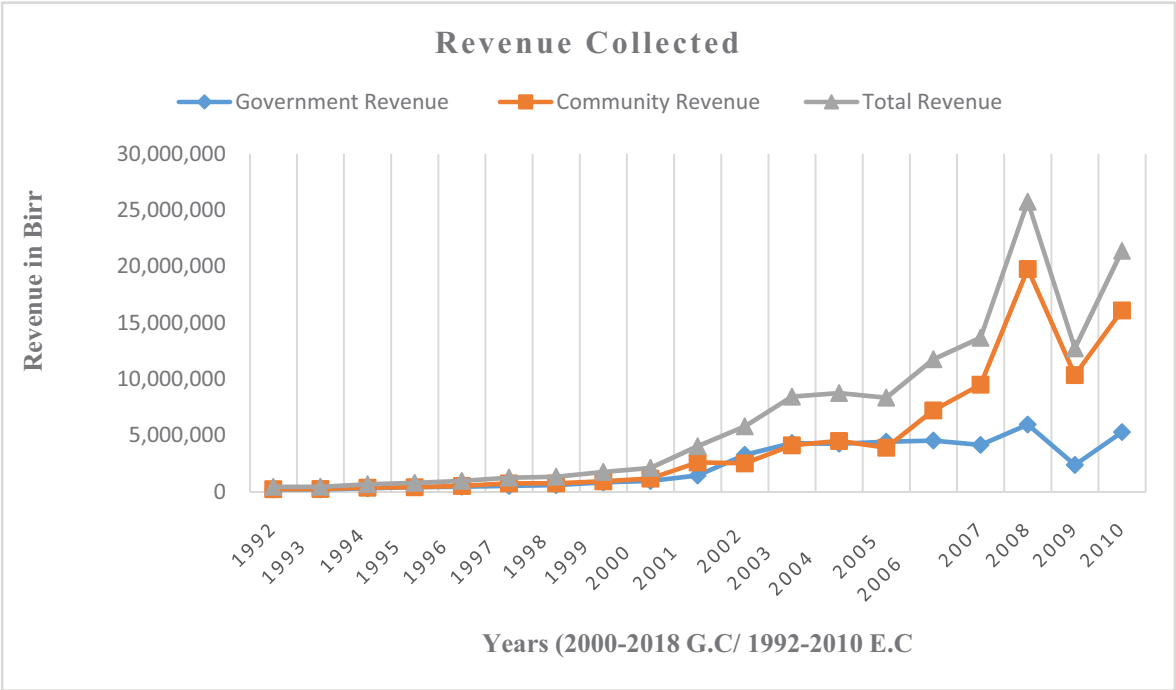


Fig. 3 Visitors growth and revenue collected.

3.3 Relationship among distance, resource use and attitude

The study was conducted within two kilometers from park boundaries. The minimum distance of respondents' home from the park boundary was 20 m with mean of 800 m. Eighty one percent of respondents settled in 1000m distance. Based on the Pearson's correlation, there were positive relationships between distance and use from the park ($r=0.55$, $P<0.014$). In this case, the local community living far from the park favors being benefited from indirect use like that of eco-tourism, regulatory ecosystem services and cutting and carrying grass from the park. As well as distance and conservation of the afro-alpine were positively related ($r=0.54$, $P<0.018$). In this case, the local community favors being benefited from direct resource use like free grazing (Table 1). They want only the upper rocky (above tree line) to be conserved. This showed that the nearest people have negative attitudes towards the conservation of the park. In some cases, as discussed with key informants, those who have high number of domestic animals and living very close to the national park have relatively negative attitude towards the protected area. They need wide range of grazing areas for their livestock. Similar studies conducted by Sinthumule (2021), Llamazares et al. (2020), Castilho et al. (2018) and Infield and Namara (2001) revealed that, pastoralists and agriculturalists have negative attitudes towards conservations in South Africa, Kenya, Brazil and Uganda respectively. This is because there is resource interest between protected areas and dependent residents on the natural resources. On the other hand, Andrade and Rhodes (2012) indicated that political and financial commitment is required for establishing and conserving the protected areas.

Table 1 Frequency distribution of direct resource use.

Does the community get direct use from the Park?				
Answers	Frequency	Percent	Valid Percent	Cumulative Percent
No	18	28.6	28.6	28.6
Yes	45	71.4	71.4	100.0
Total	63	100.0	100.0	

This finding was congruent with similar investigation results made by many of researchers (Gandiwa et al., 2014; Tsehaye and Assen, 2013; Fifanou et al., 2010).

The local community perceived that the park has not only direct benefit (source of grass for different purposes like foraging and hatching as well as income generated from tourists) (Fig. 4), but also indirect importance in beautifying the environment and plays great role in climate regulation (Fig. 5). There was strong negative relationship between attitude of the local community and importance of the park ($r=-0.69$, $P<0.001$). This indicated that the local communities had awareness of the national park conservation but demanded alternative livelihood options other than mixed agricultural activities (Yihune et al., 2008a , b). Almost all the local communities believe that the park has advantage (Fig. 5) (employment/eco-tourism, erosion prevention, climatic issues, etc.) but some of them think that it has also negative side (Fig. 6) (prevent free grazing, conflict, resettlement- especially, old residents hate being resettled, etc.) even if the positive side is more pronounced. This was supported by the findings of Gebo et al. (2022), in which 85% of local communities showed negative attitude because of carnivore attacks; as well as Tekalign and Bekele (2016), that 55.65% of

the local community had negative attitude due to prohibition of free utilization of the park resources, livestock and crop attack by wildlife. Similarly, Castilho et al. (2018) indicated that, positive values included the protection of natural resources and water bodies (29% positive) and negative values included the restrictions and prohibitions of land and wildlife use (33% negative).

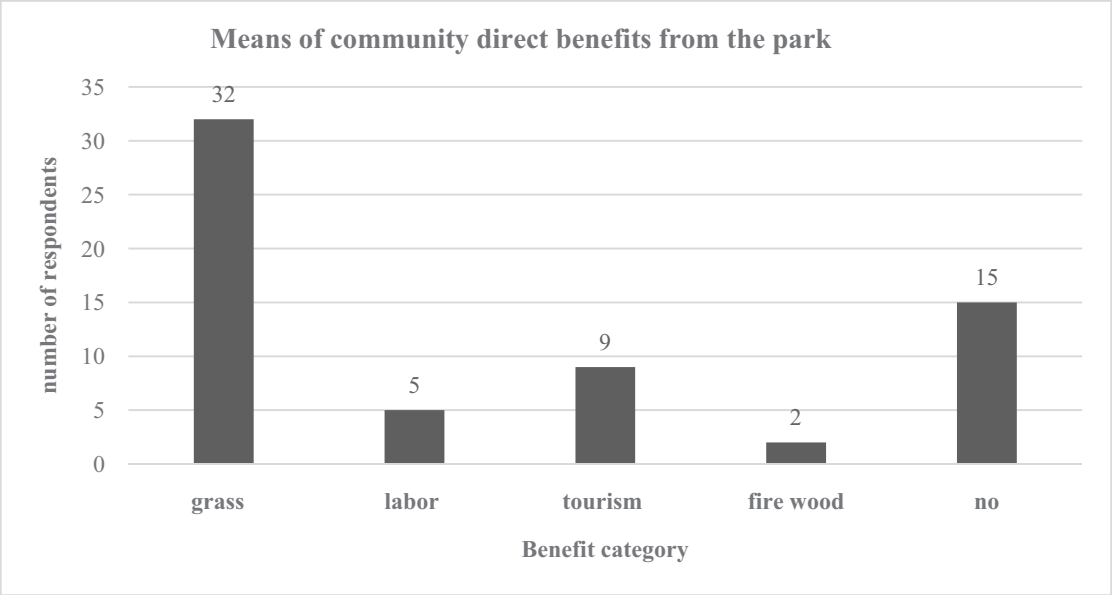


Fig. 4 Main direct benefits of the national park to the local community.

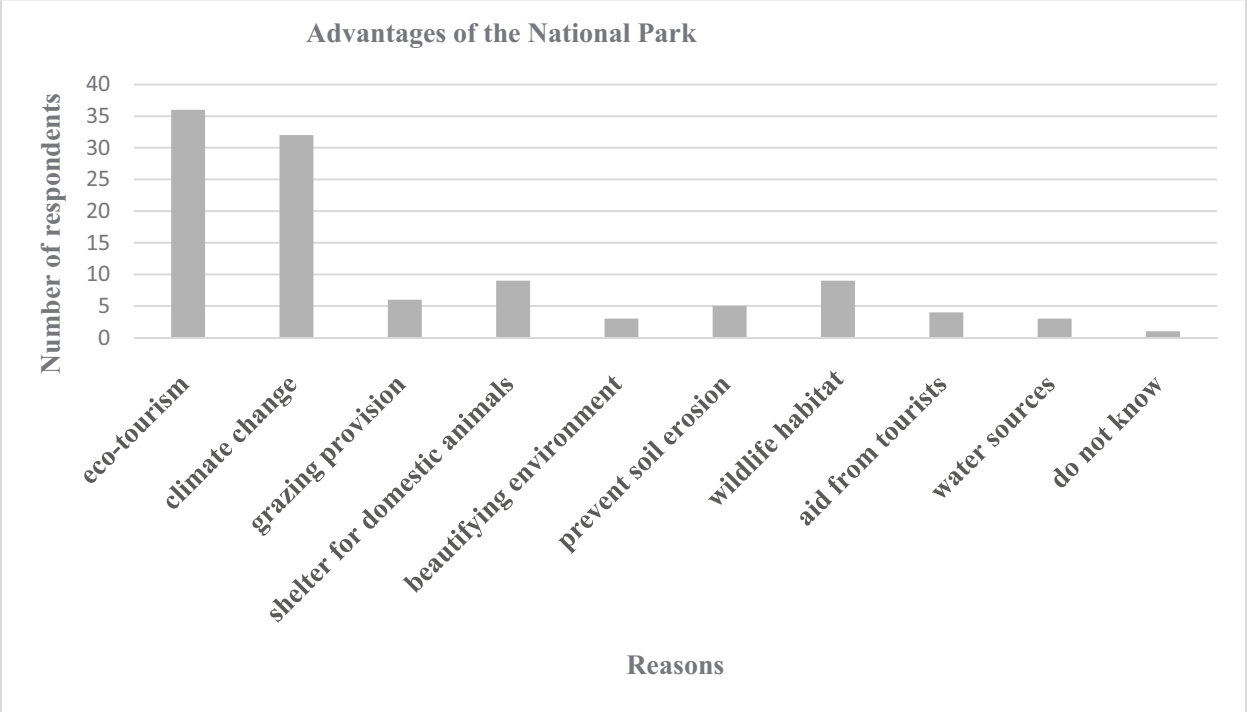


Fig. 5 Positive impacts of the national park on local community.

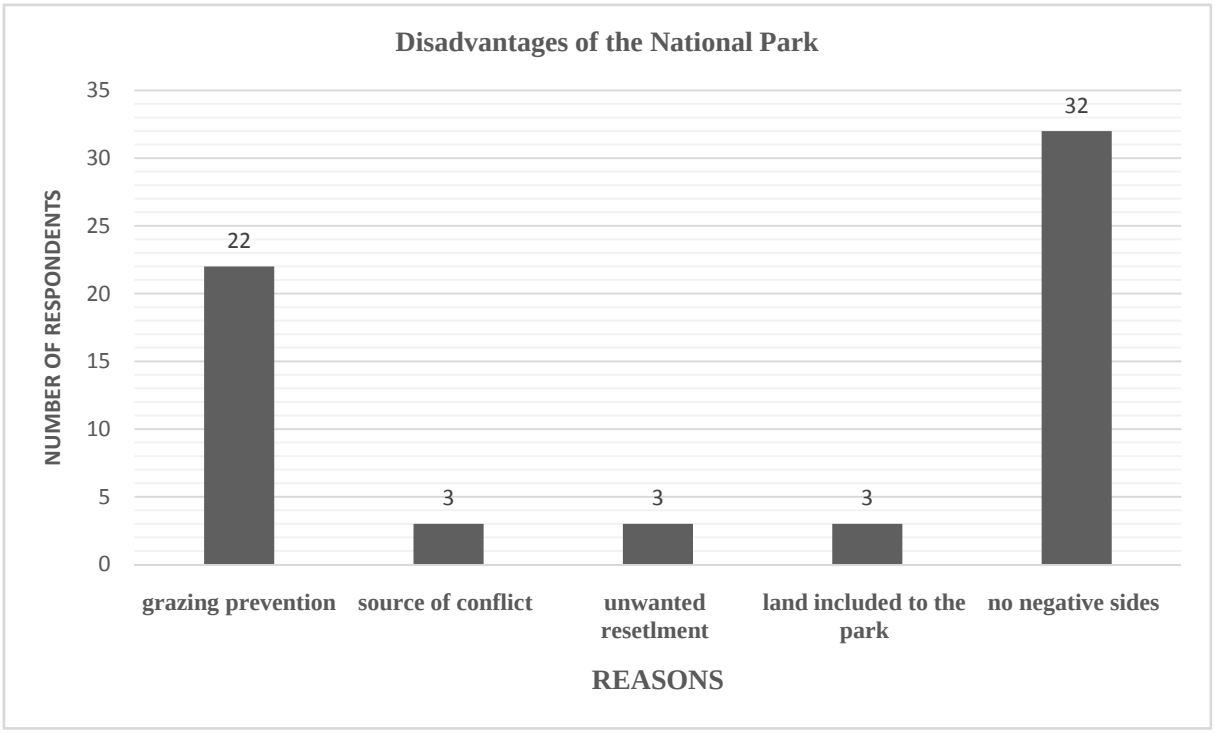


Fig. 6 Negative impacts of the national park on local community.

Almost all of the local community members agreed that the upper (afro-alpine) part of the national park should receive conservation priority (Table 2). This is because the upper part of the park is inaccessible and rocky. Due to this most of the communities were not able to access to the park resources. In addition to this, the afro alpine is far from settlement and hence conflict between the wildlife and the community would be minimized. Some respondents raised that the upper part of the park is source of pure water that flows down to their villages. On the other hand, they need the lower part of the national park for their private utilization (grazing and grass collection).

Table 2 Afro-alpine ecosystem conservation: Which part of the park should be conserved well first?

Answers		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Upper	60	95.2	95.2	95.2
	All	3	4.8	4.8	100.0
	Lower	0	0	0	
	Total	63	100.0	100.0	

4 Conclusions

The majority of the local communities (more than 90%) have a positive attitude towards the conservation of the afro-alpine of the protected area. This might not be a guarantee for conservation of the National park as the lower and middle altitudes are exposed to grazing and other threats. In addition, a single person who has a negative attitude can harm the well-being of the National Park. That was why the park was burnt so many times by human-induced fire. The most negative side of the park for the local community was that free grazing

was prohibited and due to this conflict between the park rangers and the local community existed. This was overcome because the community benefited from the ecosystem services and eco-tourism activities. But still, tourism could not assure afro-alpine ecosystem conservation as most of the local community was not benefited. To assure the conservation of the afro-alpine ecosystem of the national park, illiteracy as well as quantity of domestic animals, should be decreased in the area and relocating the local community far from the park would minimize the burden.

It would be much better if the management of the park worked on education in collaboration with the offices of education and concerned bodies to get rid of the problems in order to conserve the park better than the previous and management actions should consider people's attitudes towards conservation of the natural resources. This time the most wanted resource from the park is grass for hatching and foraging. To come up with this problem provision of agricultural technologies and conservation awareness should be done so that the community could believe in the quality rather than in the quantity of their livestock. This work was done in the afro-alpine areas and it doesn't include afro-montane to generalize to the whole park. So, it was recommendable that broader and more detail work together with the dynamics of the local community attitude and perception towards the national park is to be done including the lower park parts.

Acknowledgement

This work was not able to come to the reality without the involvement of all respondents (local community of the Simian Mountains National Park, farmers' association leaders of selected villages, eco-tourism association members and leaders as well as the management of Simien Mountains National Park office). We are grateful to Simian Mountains National Park office for the provision of transport to the park. We thank Ethiopian Wildlife Conservation Authority sponsoring the financial support and permitting the research to be conducted in Simien Mountains National Park.

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