

Climate Change Adaptation and Tourism: Towards Sustainable Tourism development in Kilimanjaro National Park Mountain, Tanzania

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Authors' contributions

This work was carried out in collaboration between both authors. Author HOL designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of manuscript. Author GSM managed the analyses of the study and literature search. Both authors read and approved the final manuscript.

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ABSTRACT

Tourism is among the major economic sectors in Tanzania, contributing about 17.5% of the gross domestic product (GDP). However, the sector is facing many challenges including climate change leading to the destruction of tourist attractions. This study clearly identifies the impacts of climate change in KINAPA. Furthermore, the study examines the existing climate change adaptation and mitigation strategies in KINAPA. Also the study analyzes the contribution of climate change adaptation on tourism development in KINAPA and last the study examines policy option for tourism development in KINAPA. The study used cross-sectional in design employing interviews, observations and documentary review data collection techniques. The study involved 90 respondents who were randomly selected among the residents of the three villages adjacent to KINAPA. Furthermore, one month and one week used to collect data from three villages adjacent to KINAPA. Results from the study showed that afforestation, eco-tourism, green tourism, provision of

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loans, environmental conservation projects, and environmental education were the major adaptation and mitigation strategies for climate change in KINAPA and adjacent villages. In addition, there was a strong relationship of 4.705 between climate change impacts and available resources in KINAPA. The more the climate change the more the resources available were affected. Based on these findings it is recommended that all stakeholders should work together to address climate change adaptation especially those adaptation strategies, which were reported to be low.

Keywords: Tourism; climate change; climate change adaptation; sustainable tourism.

1. INTRODUCTION

Climate change, in fact, climate change has become a social, economic, environmental and political challenge facing humankind both at local and regional level [1].

In Tanzania, like other countries in the East African region, the predicted impact of climate change include reduction water availability, changes in biodiversity, and falling of snow and glacier particularly on top of Mount Kilimanjaro [2]. Due to the climate change Kilimanjaro National Park Mountain (KINAPA) has lost its natural characteristics – a negative impact on the mountain. Among the impacts include absence of signs of an increasing volcanic activity on a major scale, increase in number and intensity of wild fires, changing weather conditions, animal distributions and migration behavior and population dynamic of big game in the forests of Mt. Kilimanjaro [3].

There are global efforts to address the climate change problem and both developed and developing countries are working together to ensure that climate change adaptation exists globally [4,5]. All the adaptations to climate change play a big role to the maintenance, continuation and development of different economic activities, which are dependent to climate including tourism. Specifically, climate change adaptation on tourism development include Reduction of Emissions from Deforestation and Forest Degradation (REDD+) through a suite of relevant policies for conservation and sustainable management of forests and enhancement of forest carbon stocks.

In Tanzania, tourism is among the major economic sector, contributing about 17.5% in GDP [6]. However, it is a vulnerable sector and is likely to be affected by climate change leading for instance to the destruction of tourist attraction. The objective of this study was thus to examine the existing climate change adaptation and mitigation strategies and their contribution to

tourism development in Kilimanjaro National Park Mountain (KINAPA), Tanzania.

1.1 Demonstration of Knowledge Gap

Although a significant number of researchers have attempted to explain about climate change adaptation on tourism development towards sustainable tourism in Kilimanjaro National Park Mountain, among of them are [7,8,9]. There is still inadequate research information to examine the existence climate change adaptation and mitigation strategies in KINAPA, its contribution to the tourism development and policy option for tourism development. Therefore, this research study investigates climate change adaptation and tourism development: towards sustainable tourism in KINAPA, Tanzania in order to fill the gap information.

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1.2 Climate Change Adaptation Theories

There are number of researchers who developed different theories of climate change adaptation in order to make people understand the climate change impacts and copy with the situation by adapting different ways to address the negative impacts of climate change. The study used The Culture Theory of Risks for Climate Change Adaptation to provide more information on climate change situation and how people adapt with the situation.

1.3 “The Culture Theory of Risks for Climate Change Adaptation”

These theory show the way people perceive on climate change risk based on their social interaction and culture. The Theory of Risks for Climate Change Adaptation provided the power of understanding on the role of culture on climate change adaptation. Different social organization and institution identify risks in different way and create different frame of response on climate change risks. The theory shown that people change their risks preference based on different contexts and experience over a specific period of time [10].

2. METHODOLOGY

This study used a cross-sectional design and was conducted in Kilimanjaro National Park (KINAPA) Mountain forest and its adjacent villages. The park is in Kilimanjaro region, one among regions in Tanzania Mainland. It is located in the northeastern part of Tanzania mainland lying south of the Equator between latitudes 200 251`S and 400 151. Longitudinally the region lies between 360° 251` 30011` and 380 101° 45011 East of Greenwich (Fig. 1). KINAPA covers 756 Km square and was established in 1973. It became a World Heritage Site in 1989 with its forest reserves, which were established in 1921.

2.1 Ethnicity of the Study Area, Climate, Soil, Population, Vegetation, Culture and Economic Activities

2.1.1 Ethnicity of the study

According to [6], there are two main ethnic groups in Kilimanjaro region. These are Chagga, who are the majority, and Pare. There are other small ethnic groups who reside in the region, like Wakahe and Wakwavi. Within these two main ethnic groups there are sub-ethnic groups sometimes identified by their different dialects. The different dialects among the Chagga are identified according to the geographical identity. For example, Kichagga, Kimachame may be differentiated from Kichagga, Kibosho through their way of speaking and other linguistic characteristics. Kiswahili is the main language for communication among the various groups. Socially there is little separation between the two main tribes and inter marriage is a common phenomenon. Invariably both tribes are energetic, industrious, thrifty and enterprising.

2.1.2 Culture

The culture of Chagga people can be identified in their way of dancing, kind of food, behavior this means respect to each other from a level of family to the high level, the way the cultivate and keeping animals. For example most of Chagga who engage in livestock keeping, they keep animals inside and go to the forest to search food for their animals. In case of religion a huge number of Chagga are Christian and the remains are Muslim. According [11], through traditions and social practices within their communities and families, strong bonds are established between the Chagga and their home on the mountain. Place and culture are closely connected, and that both, in conjunction with an encroaching western influence in environmental approaches, influence environmental conservation in important ways at the local level on Kilimanjaro.

2.1.3 Climate

Kilimanjaro National Park Mountain is characterized by a typical equatorial climate. Due to its near equator location, it experiences two distinct rainy seasons. Whereby the first season occur in March to May as a long rain and the second season, which is a short rain occur in November to December, with the driest months between August to October [12]. Rainfall decreases rapidly with increase in altitude; mean precipitation is 2,300 mm in the forest belt at 1,830 m, 1,300 mm at Mandara hut on the upper edge of the forest 2,740 m, 525 mm at Horombo hut in the moorland 3,718 m, and less than 200 mm at Kibo hut 4,630 m, giving desert like conditions [7]. The prevailing wind, influenced by the trade winds, is from the southeast. North-facing slopes receive far less rainfall. January to March is the warmest months. Conditions above 4,000 m can be extreme and the diurnal temperature range there is considerable.

2.1.4 Soil

According to [1314], the majority of the soils in the region are volcanic origin, generally rich in magnesium and calcium. Although volcanic soils are generally fertile with a high base saturation and action exchange capacity, they have variations, which require specific management practices. Nitosols have low to medium inherent fertility and have high credibility, requiring fertilizers to get higher yields and soil conservation measures to prevent soil erosion [15].

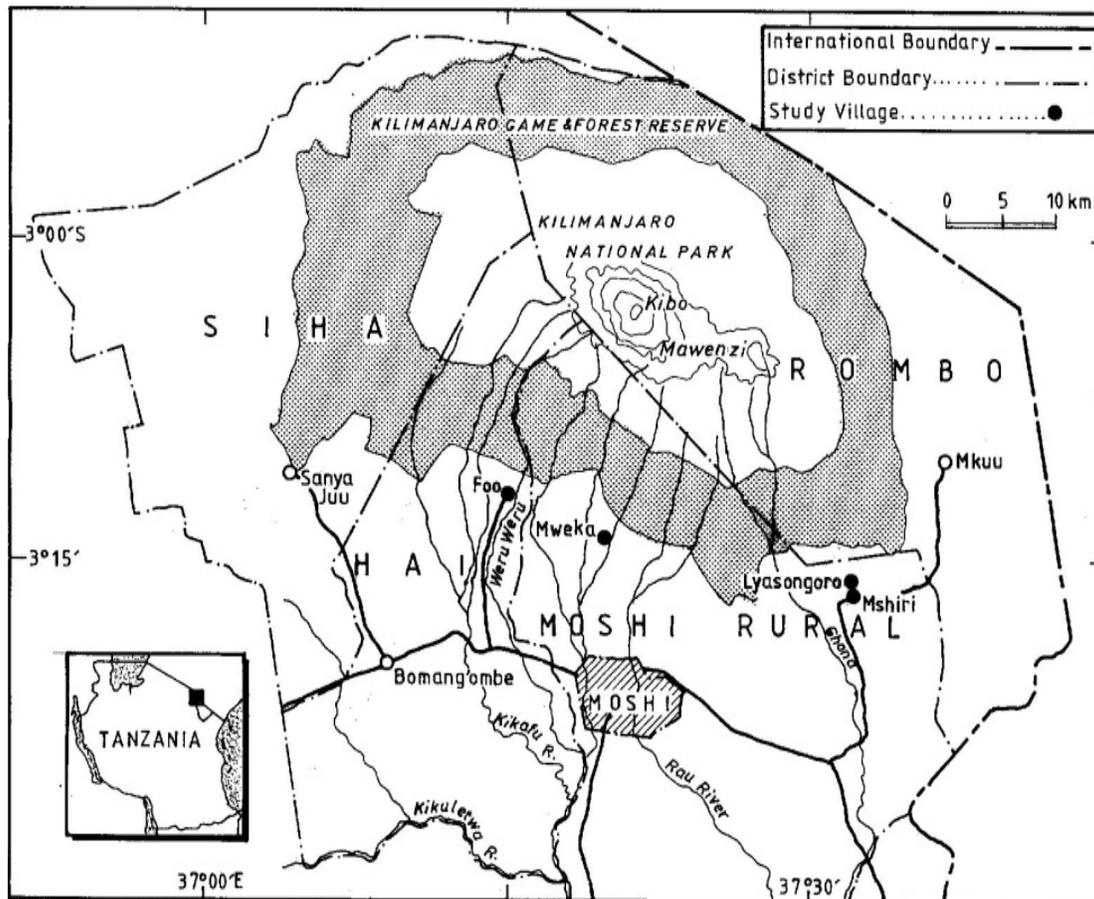


Fig.1. Location of KINAPA and the study villages (Source: Minja, (2014))

According to Clausnitzer, [16], there are four main soil groups in Kilimanjaro region all of which display great variation in fertility. These are humicnitosols and associated humicand sols, chromic cambisols and associated eutriccambisols, orchricandosols and associated chromic cambisols and vitric and sols, mollicand sols and associated eutricnitosols.

2.1.5 Vegetation cover

The mountain has five main vegetation zones such as savanna bushland at 700-1,000 m on south slopes and 1,400-1,600 m on north slopes, densely populated sub-montane agro-forest on southern and southeastern slopes, the montane forest belt, sub-alpine moorland and alpine bogs. Above this is alpine desert. The montane forest belt circles the mountain between 1,300 m to 2,800 m. Forests above 2,700 m are within the National Park. According to Lambrechts, et al. [1], there are 2,500 plant species on the mountain, 1,600 of them on the southern slopes and 900

within the forest belt. There are 130 species of trees with the greatest diversity being between 1,800 and 2,000 m. There are also 170 species of shrubs, 140 species of epiphytes, 100 lianas and 140 pteridophytes.

The forest between 1,000 and 1,700 m in the south and east has been extensively farmed with remnants of natural forest left only in deep gorges. Dominant species of the sub-montane forest between 1,300-1,600 m in the west and 1,600-2,000 m in the north are *Croton megalocarpus* and *Calodendron capense* and of the lower to middle montane forest between 1,600-2,200 m in the west and 2,000-2,400 m in the north is *Cassipourea mallosana*.

2.1.6 Economic activities

In Kilimanjaro agriculture is regarded as the main economic activity, since the sector contributes more than 60 percent of the regional GDP. About 76 percent of Kilimanjaro residents are living in

rural areas, with 60 percent depending on crop cultivation and livestock keeping for their livelihood [17,15]. Major cash crops in Kilimanjaro, include; coffee, sugarcane, sisal, flowers and wheat, while food crops include; bananas, maize, beans, potatoes, fruits and vegetables. Other economic activities include industries, trade, tourism and manufacturing. Most industries in the region are small and medium, covering food processing, textile, leather, wood products, paper products, chemicals, machinery and metal works.

In case of tourism activities, Kilimanjaro region has different tourist attraction such as Mount Kilimanjaro, Rau forest endowed with rare species of trees found only in that part of the world. Also underground caves, Chagga museum, Kinukamori and others [8]. So due to this tourist attraction makes the region to be the best destination.

2.2 Sampling and Sample Size

The study was conducted in three purposively selected villages of Mweka, Marangu and Machame. The three villages were selected due to their special characteristics in relation to tourism and is in this villages were the gateways to and from the mountain are located. A total of 90 participants (30 from each village) were randomly selected for interview. Of the 30 participants from each village, 25 were normal villagers, four were tour guides, and one was an ecologist. This means that, in total, three ecologists, 12 tour guides, and 75 villagers were interviewed.

2.3 Data Collection

Both primary and secondary data were collected in this study. Primary data collection methods included interviews using a structured questionnaire and observations using a checklist. The primary data were supplemented by secondary data that were obtained through reviewing of the monthly reports from KINAPA offices and other written information about KINAPA Mountain.

2.4 Data Analysis

Data from observation and Secondary data was analyzed qualitatively, whereas, data from interviews was double entered and analyzed using SPSS in which categorical data were summarized using frequencies and percentages.

3. RESULTS

3.1 Perceived Impacts of Climate Change on Tourism Development in Kinapa

Majority of respondents (97.8%) agreed that climate change really exists in KINAPA and adjacent villages (Table 1). Table 1 above also shows that 83.3% of the participants agreed that the glacier and snow on top of Mount Kilimanjaro has decreased. During the interview with one of the tour guide revealed that "The glacier remains on the wall and some parts at the top of the mountain".

About 66% of the respondents agreed that climate change caused the amount of water available to decrease. However, 33% of the respondents argued that climate change did not cause the amount of water available to decrease in their villages but they believed that the available water has decreased due to some other causes. Furthermore, direct field observation and interview with household and park ecologist revealed that the streams, which pass all over in all villages around KINAPA are dry.

Based on these results 82.2% of the respondents reported that fauna such as birds and wildlife migrate, white and black monkey are also about disappeared. According to the park ecologist it was revealed that there was migration of wildlife and birds in KINAPA on all routes such as Marangu, Machame and Mweka. During household interview with one woman report that "I have many dogs to help me to chase away white and black colobus monkeys which destroys our crops in the field". The findings suggest that these monkeys were seen seasonally due to migration. Furthermore 17.8% of the respondents report that flora extinct in KINAPA diminish the development of tourism.

In addition, depict that 90% of the interviewed respondents reported that there were health impacts especially emergence of malaria due to climate change in KINAPA and adjacent villages. Furthermore, 10% of the respondents did not know if climate change might result into disease. But during the interview with household and local administration leader reported that there was an increase of mosquitoes; they thought that was the main source for transmission of malaria in the villages. Furthermore, direct field observation it was revealed that there were local administration officers providing mosquitoes nets to the local people to protect them from malaria, so through

this it proved that the malaria mosquito infested the areas.

Table 1. Perceived impacts of climate change in KINAPA and surrounding villages

	Number	Percent
Whether climate change exists		
Yes	88	97.8
No	2	2.2
Impacts of climate change on glacier and snow		
Yes	76	83.3
No	14	16.7
Impacts of climate change on water availability		
Yes	60	66.7
No	30	33.3
Impacts of climate change on biodiversity		
Yes	74	82.2
No	16	17.8
Impacts of climate change on health		
Yes	81	90.0
No	9	10.0

3.2 Existing Climate Change Adaptation and Mitigation Strategies

There are different climate change adaptation and mitigation strategies in KINAPA and adjacent villages to ensure that environment resources are protected and maintained for development of tourism activities. The adaptation varied from one village to another depending on the local community administration, KINAPA department and local people. The most popular climate change adaptation and mitigation strategies in KINAPA are summarized in Table 2.

3.3 Contribution of Climate Change Adaptation on Tourism Development

The result obtained from the findings of the study revealed that afforestation is the most climatic change adaptation in KINAPA and adjacent community. Of the total respondents 96.2% reported that afforestation is the best climate change adaptation in all villages around KINAPA. Direct from the field observation and interview with villages leader and household it was reported that the local people cooperate to plant trees along the water sources and this help to

recover the forest, return of some species like black monkey and increase the amount of water.

Table 2. The existing climate change adaptation and mitigation strategies in KINAPA

	Number	Percent
Afforestation		
Yes	87	96.2
No	3	3.8
Environmental education		
Yes	71	78.9
No	19	21.1
Provision of loans		
Yes	17	18.9
No	73	81.1
Green tourism		
Yes	75	83.3
No	15	16.7
Eco-tourism		
Yes	78	86.7
No	12	13.7
Environmental conservation projects		
Yes	72	80.0
No	18	20.0

Furthermore, provision of environmental education is among the climate change adaptation, which contributes the development of tourism in KINAPA. 78.9% of the respondents reported that environmental education helps local people to be aware on environmental resources and how to protect and cope with the situation of climate change. During the interview with clubs and groups which dealing with environment issues in all villages, it was reported that local people now were aware on the situation of climate change impacts and how to cope with it, so this may contributes to the development of tourism.

In addition, the result obtained from the field indicates that there are other existing climate change adaptations, which contribute to the development of tourism. 86.7% of the respondents agree eco-tourism is among the adaptation, which contribute to the development of tourism. While 83.3% of the respondents agree green tourism is the best adaptation and 18.9% of the respondents reported that provision of loans is also an adaptation used to combat climate change impacts. Through this it was

revealed that all adaptation might contribute to the development of tourism in KINAPA.

4. DISCUSSION

4.1 Perceived Impacts of Climate Change on Tourism Development in Kinapa

This study examined the existing climate change adaptation and mitigation strategies and their contribution to tourism development in Kilimanjaro National Park Mountain (KINAPA), Tanzania. The majority of respondents in this study agreed that climate change really exists in KINAPA and adjacent villages. These findings confirm the findings from another study done in the same settings, which demonstrated that climate change was affecting KINAPA [8]. In his study, Minja found that 96% of the respondents reported that there was impact caused by climate change in KINAPA and adjacent villages. Furthermore, the majority of the participants in this study agreed that the glacier and snow has been decreasing. Hemp et al [4] also confirmed that the retreat of Kilimanjaro glacier is unprecedented scale from 12 km² to 1.7 km² [18]. Due to these it was revealed that the number of tourist arrival might decrease in KINAPA and affect the development of tourism.

More than 66 percent of the respondents in this study agreed that climate change causes the amount of water available to decrease due to the climate change. Similar findings have been reported by and colleagues [3], who reported that annual temperature average increase from 0.2°C to 0.7°C and warm direct surface and deep water, lead to the decrease in the amount of water. Direct field observation and interview with households and park ecologist revealed that the streams, which pass all over in all villages around KINAPA has recently become dry due to decreasing rainfall. In addition, interviews with some tour guides at KINAPA showed that some campsites lack water and this situation has become a big problem to the climbers like tourists and hence the development of tourism is set back. [7], commented that the maintenance of Mount Kilimanjaro forest must therefore have high priority in terms of water supply to the regional population.

The findings from this study suggest that fauna such as birds and wildlife have been migrating. Similarly, white and black monkey have been disappearing. Several previous studies have argued that shifts of wildlife and migratory birds

may affect recreational opportunities for birdwatchers, wildlife enthusiasts and hunters [4,7,17]. According to the park ecologist it was revealed that there was migration of wildlife and birds in KINAPA on all routes such as Marangu, Machame and Mweka. This might affect the tourism development in KINAPA with regard to tourist attractions.

Possible health impacts of climate change in KINAPA and adjacent villages include emergence of malaria. Increase in temperature as a result of climate change causes mosquito larvae to survive because of warm conducive environment. Findings from this study suggest that there was an increase of mosquitoes – respondent's thought that was the main source for transmission of malaria in the villages. Malaria adversely affects the labor force involved in tourism activities in KINAPA and surrounding villages. The study done by [8], confirmed that malaria is one of the diseases currently rampant in KINAPA and adjacent villages.

4.2 Existing Climate Change Adaptation and Mitigation Strategies

Climate change adaptation and mitigation strategies in this study included environmental education, provision of loans, green tourism, eco-tourism, and environmental conservation project.

The majority of the respondents in this study agreed that environment education was one of the existing climate change adaptation. Interview with household and local leaders reported that there were different clubs and groups formulated to ensure that local people become aware on their environment and copy with the situation of climate change. These clubs and groups included both private individuals and communities. Among those clubs and groups in the study areas were Evergreen group and Bent club. Direct field observation revealed that not all people in the villages were able to get this environmental education especially women from these groups and clubs due to the time constrain and willingness. In additional, wealth rank revealed that the number of poor people was high especially in Mweka, which caused local people to use most of their time in their economic activities than listening those people who provide environmental education. The study done by [8], reported 52% of the respondents agreed that environmental education was among climate change adaptation for enhance tourism and livelihood.

Provision of loans is also among the adaptation of climate change, which helps the local people to engage in other activities, which are environmental friendly like business. Of the total respondents, less than 20% agreed that provision of loans was among the adaptation. During the interviews with households, one woman revealed that *"The loans are available but do not come from KINAPA, local people organized themselves and formulate group which provide loans in a low rate of return"*. Direct field observation revealed that there are Vikoba, Saccoss and Foda foundation under the local community administration, which also provide loans to the local people. A study in the same settings [8] reported the same adaptation that soft loans and grants were used to enhance livelihood due to changing climate impacts on tourism.

With regards green tourism, it was revealed that KINAPA administration put some laws to the tourists who climb the mountain to use gas instead of firewood for cooking and not to use plastic bags. This has led to reduction in deforestation and reduction of unwanted waste in the park. Through this it was revealed that some species are coming back due to the recovering of forest and increase of water availability and lead to the tourism development. Hunt, [13,19,20] highlighted the same adaptation strategies.

More than 85 percent of respondents in this study agreed on eco-tourism as the best existing climate change adaptation over all routes (Mweka, Marangu and Machame). Interviews with the tour guides and park ecologist revealed that this adaptation emerged through the use of trash in and trash out, meaning tourists who enter in the park for climbing the mountain were supposed to enter with their different things to use and come out with their waste. Direct field observation in Mweka revealed that tour guides carry different tourists' waste. This causes the park to be clear all the time and motivate the development of tourism. IPCC, [17], also reported the same adaptation and explained how this adaptation contributes to the development of tourism.

On environmental conservation projects; according to the park ecologist there were different conservation projects conducted by the park. These projects ensured that both environment inside the park and outside are protected and maintain in its nature for the development of tourism. Among the projects are

community services, which dealt with provision of environment education to the local people and emphasize them to use biogas in order to protect the nature of environment. Furthermore, Environment impacts auditing, which ensure that all routes such as Mandara, Rombo hurt and Kibo hurt are well clean. Also Environment Impacts Assessment, which used to assess the place where people live in the park by assessing the impacts of their waste both solid and liquid. In addition, the park provides cookers, which used one firewood so through this it reduces deforestation. It was further revealed that Environmental Conservation Projects (ECP) played a big role in KINAPA and adjacent villages to maintain the nature of the environment for continuation of tourism activities. IPCC, [17], reported on the same adaptation by highlight the important of environmental conservation project in the park and adjacent villages.

4.3 Redirect Tourist from Vulnerable Areas

Findings from the study below, presented that 66% of the respondents reported that redirecting tourist from vulnerable areas is among the policy option for tourist development while 33% reported that redirect tourism from vulnerable areas is not an existing policy option for tourism development. During interview with tour guide it was reported that *"This weather condition of high rainfall cause some tourists and tour guide to die on the way before reaching at the peak of the mountain"*. But according to the park ecologist it was revealed that there is sign direction, leaflets and notice, which redirect tourists from vulnerable areas in the park such as arrow glacier, closed route in western side of the mountain. In additional, during direct interview with the tour guide at Lyasongoro it was reported that there are some stones fall from the mountain, so due to that the tour guide divert from those way which seen some stone fall down in order to protect the life of tourists and this may contribute to the development of tourism in KINAPA.

4.4 Developing Domestic Tourism

Research findings below indicate that 88% of respondents reported that domestic tourism is increasing. While 12% of the respondents reported this policy is still unknown because local people does not have enough knowledge on domestic tourism. Furthermore, during the interview with park ecologist and tour guides it was learned that domestic tourism is now

increasing at high rate. Direct field observation revealed that some residents were involved in domestic tourism at Machame and Marangu gates. Through the residents will be involved in protecting the nature of the park and adjacent environment for tourism development. The study done by Lambrechts, et al. [18], confirmed that Kilimanjaro is the popular destination with attraction features and resources.

4.5 Greenhouse Gas Offset

Based on the study findings below, 95.5% of the respondents reported that GHG emission programmed did not exist as policy option; while 4.5% of the respondents reported that this policy option exists. During the interview with households and park ecologist it was revealed that the GHG offset policy exist at low levels which include adopting solar energy in the park hence may contribute to the tourism development.

4.6 Resources Conservation Plan

Findings below from the study shows 80% of the respondents reported that resource conservation plan is one of the existing policies for tourism development in KINAPA. Furthermore, 20% of the respondents reported that resources conservation plan does not exist policy for tourism development. According to the park ecologist and household during the interview it was revealed the resource conservation plan policy exists in KINAPA where half mile of forest was completely affected but reported that was recovered.

4.7 Energy and Water Conservation

The result from the findings below, indicate that 92.2% of the respondents reported that energy and water conservation are existing policies in KINAPA, while 7.8% of the respondents reported that these policy does not exist in KINAPA. During direct field observation it was revealed that there were some planted trees around the water sources. In addition, during the interview with park ecologist it was revealed that local people were emphasized to use gas, which supplement firewood hence, reduce deforestation.

4.8 General Parking Management Plans

Research findings from the study in Table 3 below; indicate 86.6% of the respondents

reported that GPM policy existing in KINAPA, while 13.4% of the respondents reported that the policy is not existing. But during the interview with tour guide and household leaders it was revealed that there are different park management plans such as Environment Impacts Auditing, which ensures that all routes such as Lemosho, Machame, Romgai and Mweka and all huts and campsite are well cleaned. Also Environment Impacts Assessment, which is used to assess new development in the park. Furthermore, the use of trash in and trash out which ensure that the tourists, porters and guides come out from the park with their waste especially solid waste. IPCC, [17], reported on the same policies by highlighting the importance of environmental conservation project in the park and adjacent villages.

4.9 Research Intervention

Result from Table 3 below, presents that 93.3% of the respondents reported that there are different research conducted in KINAPA on climate change impacts, while 6.7% the respondents reported that research intervention is not an existing policy in KINAPA. But during the interview with the park ecologist it was revealed that mountain Kilimanjaro is a global reference point climate change and its impacts on available resources, livelihoods and ecosystem hence is the one of the policy option for tourism development.

Table 3. Adaptation and mitigation strategies for tourism development in KINAPA

Existing policy options	Response and percent	
	Yes	No
Redirect tourist from vulnerable areas	60 (66.0%)	30 (33.0%)
Development domestic tourism	80(88.0%)	10(12.0%)
GHG offset	3(4.5%)	86(95%)
Resources conservation plans	72(80%)	18(20%)
Energy and water conservation	83(92.2%)	7 (7.8%)
General park management plans	78(86.6%)	12 (13.4)
Resources intervention	84(93.3%)	6(6.7%)

5. CONCLUSION

Changes in temperature and rainfall pattern were observed as major causes of the impacts on the

environmental resources in the study areas. The decrease of glacier and snow, water resources and emergency of disease especial malaria to about 80% has significant negative implications on tourism at KINAPA and adjacent villages. Tourist attractions such as birds and wildlife migrated from the areas due to increased deforestation.

From the findings this study have shown that the most climate change adaptation for tourism development in KINAPA is afforestation since it is very easy for the local community to afford small trees for afforestation from different clubs and group which emphasis on reduction of deforestation. On the other hands, the researcher suggested various policy options towards the negative impacts of climate change on tourism development, including policy response forest and water, soil, birds and wildlife, glacier and snow. Among these policy options existing in KINAPA were redirecting tourist from vulnerable areas, research interventions, domestic tourism, general park management plans and energy, water conservation plans and resources conservation plans.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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