

# Socio-Economic and Environmental Factors Influencing Human-Wildlife Conflict in Nimule National Park -South Sudan

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**Abstract:-** In the universe, homo sapiens have ever competed with wildlife species for centuries and still continuing with them for habitat and resources. They have further innovated and adapted to become the dominant ecological force on the planet although their co-existence with other species is inevitable. The limited resources opted for this conflict has contributed to the extinction of numerous wildlife species while others threatened; changes in ecosystem structure and function; and immeasurable loss of human life, crops, livestock, and property. The amelioration and mitigation of this conflict is central to the conservation and restoration of many species, and debates over how and whether to coexist with other animals, drive social, economic, and political conflict within and among human communities. Therefore, wildlife conservation is one of the fundamental aspects of proper management of wildlife resources and resolving conflicts between man and wildlife species. This study examined the attitudes and perception of local communities residing within and around Nimule National Park (NNP) towards wildlife and its conservation, wildlife ownership, and human-wildlife conflict management. In order to identify factors influencing their attitudes and perceptions, purposive sampling method was used to select the respondents within the wildlife administrative areas including areas situated around NNP. A simple random sampling of 50 households' respondents was chosen from each of the units. Questionnaires were used to collect the data from households' respondents and then analysis was done in excel spreadsheet and statistical package for social sciences (SPSS) and Minitab v.16 majorly computed in descriptive statistics which were then displayed in tables, charts and graphics as frequencies, percentages and significance levels in regression.

The study revealed that the communities do not participate in wildlife conservation (64%) and the conflicts occurred as a result of wildlife encroachment into agricultural/farm lands, grazing lands and settlement, but crop raiding was the major source of conflicts in the landscape. The regression results also indicated that communities' conservation attitudes and perceptions towards wildlife were mainly influenced by access to education with a significance value ( $p=0.004$ ). Majority of the local people around the park had negative attitudes and perceptions toward the park, its wildlife species and conservation. By restricting access to the park resources, the people feel deprived, hence the

occurrence of conflict. Provision of tangible benefits and alternative livelihoods for local people engaged in the subsistence activities in the landscape should be considered as a central point to the park management, protection and conservation of its wildlife species, tourism development initiatives, with a view to alleviating poverty and improving human welfare and livelihoods within the park.

**Keywords:-** Human-wildlife conflict, wildlife conservation, Perceptions, impacts of human-wildlife conflict, Nimule National Park.

## I. INTRODUCTION

Evolution of the protected areas system in Africa has its roots in the hunting ethos and natural history studies that were popular at the end of the 18<sup>th</sup> century and the beginning of the 19<sup>th</sup> century in the western world. As a result of these concerns, pressure groups mostly comprised of colonial governors, Aristocrats, Sport hunters and leading land lords in the colonies began to advocate for game preservation [ 1 ]. The interest and the concern of local African people were not considered in the establishment of these protected areas. As [ 2 ] and [ 3 ] rightly argues, foreign interest and not the interest of the African people influenced the legislation for wildlife management and protected areas in particular. In many incidences, creation of these protected areas deprived local people of a resource that they had been accessing for a long time for both their cultural and economic values. The increasing human population and the resultant increasing pressure on the land resources increase the conflict between protected areas managers and the neighboring communities.

The post-colonial African governments also continued to implement conservation policies that excluded local communities [ 1 ]. Local communities who used to have access to wildlife resources within the park were excluded from the established protected areas' management. This exclusion was through deployment of military trained rangers whose jobs were to enforce wildlife laws by apprehending law breakers and levying fines on them. Local community members in the effort to secure their means of survival were culprits of this wildlife management set up. This results into tension and conflict between protected area managers and the local people [ 4 ].

South Sudan is one of the sub-Saharan African countries that harbored enormous populations of wildlife which live both inside and outside gazette protected areas.

The examples included elephants, hippopotamus, Uganda Kobs, Gazelles, Warthok species, various species of monkeys, rodents, snakes and birds, etc. These animals' interface with humans through avenues such as crop raiding, research, tourism, habituation and poaching. Although many issues faced by protected areas are the direct result of inadequate funding resources, unfavorable human impact is another major cause of concern for conservationists. Previous park management strategies have not involved any potential human support and have often focused on imposing strict rules regarding access to the protected area and the use of natural resources from the protected areas territory. As a result, local residents developed negative attitudes and perceptions of conservation efforts within the protected area management system [ 5 ]. In addition, wildlife has coexisted alongside humans in South Sudan for generation; however, recent trends indicate an increasing level of conflict. This conflict has been attributed to high demand for natural resources resulting from the ever-increasing human population [ 6 ]. In addition, South Sudan's wildlife laws do not provide for compensation of damages. This has in turn negatively influenced people's attitudes toward wildlife conservation.

The assessment of people's attitudes towards conservation has become an important aspect in many studies of wildlife conservation [ 7 ]; [ 8 ]. Wildlife conservation success depends on the attitudes of people towards conservation [ 9 ]. Considering local people's compliance and support is crucial for a favorable outcome of conservation efforts. Equally understanding their perception of the importance of protected areas and knowing how much support they would be willing to offer for nature conservation, is critical for an improved protected area-people relationship [ 6 ]. It is important that, alongside professionals in nature conservation and government agency personnel, local residents are well aware of the importance of nature protection and biodiversity conservation in order to increase their understanding towards the preservation of the protected area.

Moreso, understanding factors which influence attitudes is important to enable wildlife managers to implement approaches that attract support of stakeholders and the general public. Given this substantial economic and social support as the most often cited causes of the malfunctioning of protected areas, especially in developing countries, it is critical that greater efforts are made to raise awareness about biodiversity conservation and towards finding the adequate amount of financial resources to efficiently carry out conservation tasks. It is therefore, necessary to seek and obtain the active participation of potential stakeholders not only in the technical efficiency of a conservation technology, but also the extent of satisfying cultural, social and political considerations in the environment which can help change the attitudes of indigenous people towards wildlife existence and conservation [ 10 ]. People also need to be informed through specific awareness campaigns or environmental education which can help change their attitudes towards conservation.

## II. IMPORTANCE OF THE INTERRELATIONSHIPS AND CONFLICTS BETWEEN HUMAN AND WILDLIFE SPECIES

Human-Wildlife Conflict (HWC) has been in existence since long time back as human and wildlife share the same environment and resources. Fossil records show that the first hominid fell prey to the animals with which they shared their habitats and shelters. However, with wildlife behaviours, human-wildlife conflict has become of significant consequences for the local communities including individual human health, psycho-social stress and threat to co-existence, safety, effects to climate change and welfare, as well as biodiversity and ecosystem health and conservation. Impacts on humans can be directly or indirectly felt by communities as injuries, loss and death can result when animals fight back, bite, claw, gore, or otherwise directly attack people [ 10 ]; animals may block roads and even collisions between animals and lorries, boats and ships, and other vehicles; and transmission of zoonotic diseases or parasites can be feasible. Conflict with wildlife can cause direct material and economic damages to household properties, crops, livestock, infrastructures, game species, and other social properties [ 10 ]; [ 11 ]. Indirect impacts of conflict, more difficult to measure, include opportunity costs to farmers and rangers associated with guarding crops or livestock, diminished psychosocial wellbeing, disruption of livelihoods, and its causes to food insecurity and child malnutrition including its consequences on climate change and land degradation [ 10 ]. The intensity of human-wildlife interactions vary on a continuum from positive to negative, from minor to severe, and in frequency from rare to common. Attacks on people, domestic animals, poultry and farm crops by wildlife predators such as snakes, tigers, hippopotamus, warthogs, weaver birds, sharks and elephants in Nimule National Park are now relatively infrequent referenced to migratory species although it can be lethal once they invade communities and can lead to strong public reactions. Conversely, conflict between people and common garden pests or birds such as weaver birds and geese may be more common but provoke less community concern as farms are guarded. Conflict frequency can also be highly variable within and among geographic regions. Some households or farms within a community may suffer little damage whereas neighbors may experience a surplus killing event in which a predator may kill many animals in one attack, or some properties may be better protected than others. The most extreme biological impact is threatening, extinction of migration of certain species [ 10 ]. The decline of large, predatory animals in particular has resulted in cascading ecological consequences for other species and ecosystem services [ 10 ]; [ 12 ], and many of these declines are linked to conflict with humans. As human populations and demand for space and food continue to grow, people and wildlife are increasingly interacting and competing for resources, which can lead to increased human-wildlife conflict.





Plate 1: Common wildlife causing human-wildlife conflicts in NNP

#### A. Components of Human-Wildlife Conflict

Human-Wildlife Conflict is composed of three main components which include; the wildlife species causing the damage, the object that is being damaged, and the victim being affected, and this vary according to geographical and ecological location, land use patterns, human behavior, and the habitat and behavior of wildlife species or individual animals within the distinct wildlife species [ 13 ].

### III. MAJOR FACTORS INFLUENCING HUMAN-WILDLIFE CONFLICT

There are adverse factors that influence human-wildlife conflict risks. These emerge at various social, economic and ecological scales. The most important underlying drivers of these conflict include rapidly growing human populations, competition for habitats, land and resource use, agricultural expansion, scarcity of vegetation for animal fodder and feeds, poaching, high market prices and demand for animal products like elephant trunks and tiger hides, clearance of land for settlement and its associated urban growth, technological and industrial advancement, transportation needs, encroachments, grazing patterns and energy utilization. These further include a range of biological, ecological, and behavioural interactions that increase the probability of wildlife conflict with people. The complexity in wildlife behaviour and ecology, diverse human behaviour and changes in seasonality, agricultural cropping systems, resources accessibility, etc; has become difficult to identify and measure the patterns of human-wildlife conflicts. This is because human-wildlife conflict typically does not occur at random given that different wildlife species itinerant at different time and space [ 10 ]; [ 13 ].

### IV. MATERIALS AND METHODS

#### A. Study location

Nimule National Park (NNP) was established by the British colonial power in 1935 as a reserve but later gazetted as a National Park in 1954, mainly for the protection of the now extinct white rhino (*Ceratotherium simum cottoni*) and for its scenic beauty [ 14 ]. The park lies at the extreme end of South Sudan-Uganda border between latitudes 3.35° and 3.49° N, and longitudes 31.48° and 32.2° E. (Figure1). The park is located in Magwi County of Eastern Equatoria State, just proximal to Uganda border. Several studies been conducted by many researchers including [ 15 ] and [ 16 ] had estimated the area to be 251Km<sup>2</sup> and 256Km<sup>2</sup> respectively. However, earlier studies by [ 17 ] reiterated that the park covers an area of about 410km<sup>2</sup> including the buffer zones that extends 540km<sup>2</sup> along the border with Uganda, with wildlife moving freely back and forth, and straddles the White Nile River. The area described include both the National Park avenues and the buffer zone which extends from River Onyama to the south up to River Aswa to the north situated along Juba-Nimule road [ 18 ]. It is probably the most easily accessible park of all the six South Sudan's national parks, due to its proximity to public transport routes, its sparse vegetation (mostly wooded, bushed and savanna grasslands) within the riverine and commando landscapes, and also the fact that it can be reached even during the rainy season. For the purpose of this study, areas adjacent to the park and those located within the park were selected. In total, the communities inhabiting villages of Onyama, Ray, Apalla, Paanzala, Commando, and Isumo

with different level of human-wildlife disturbances were surveyed.

The topographical features of NNP possess an interplay of rock type and climatic conditions that date back to the Pleistocene era through into the Holocene era. The hilly terrains are generally rounded with smaller rough hill tops. This is evidence of the resistant rocks that largely underlie the area. Elevation ranges between 500m and 800m above sea level. The main physical features found in the park are the Fulla Falls-rapids on the River Nile and Illengwa hill on the western side of the park, acting as tourist attraction sites[ 19 ].

The soil types of Nimule National Park including its surrounding sites are directly influenced by the prevailing climatic conditions which is typically characterised by iron stone plateau. (Noordwijk, 1985; Baya, 2013). These soils comprised of expansion of latosols soil types that were found in the woodland savannah, characterised by presence of red mottles and discrete modules lying on top of the clay horizon rich in iron and aluminium oxides. The soils have lower pH values, high organic matter, and has largely kaolinite clay component that is natural (Baya, 2013).

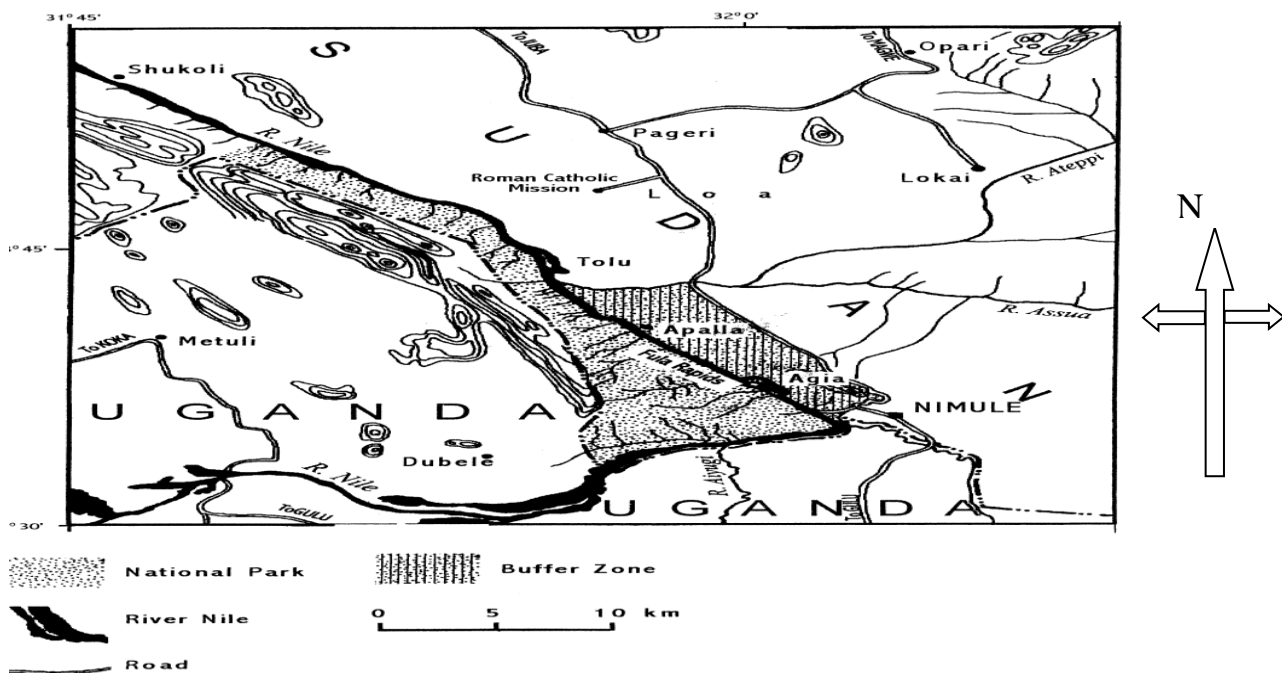


Fig. 1: A map showing the location of Nimule National Park

It has a continental type of climate characterized by orographic and conventional rainfall with thunderstorms. The rainy season in the park lasts from April to the end of November while the dry season runs from December to March. The mean annual rainfall in the park varies from 1000-1200mm, and mean daily temperature is 27°C with the maximum and minimum temperatures being 29°C and 24°C in March and July respectively [ 20 ]. The vegetation of the park is dominated by deciduous high woodland savannah. It is characterized by broad leafed and thin leafed trees and shrubs species, some of which are deciduous and others are evergreen. The grass in the park is mostly perennial and grows to a height of approximately 4-8 feet. The fauna of the park includes elephants (*Loxonta africana*), Hippopotamus (*Hippopotamus amphibious*), Uganda kob (*Kobus kob*), Oribi (*Ourebia ourebi*), hyrax (*Procaviacapensis*), baboon (*Papio Anubis*), Vervet monkeys (*Cercopithecus aethiopus*), Common Jackal (*Canis aureus*) and Leopards (*Panthera pardus*) among many other mammals [ 14 ].

**B. Research design, Sample size and Sampling Procedures**

This study used descriptive survey design where a survey was conducted through the use of structured and semi-structured questionnaires administered to households' respondents and key informants' interviews (KIIs)[ 21 ] in order to assess the attitudes and perceptions of people towards their co-existence with wildlife around and within the park setting. On the other hand, both qualitative and quantitative designs were used in areas where the data collected were capable of being subjected to statistical analysis. Normally, it would be preferable to collect data from the entire households adjacent to and within Nimule National park. However due to various constraints, sampling would be inevitable. Data was collected by simple random sampling methods. The study areas were divided into sampling units based on administrative boundaries, closeness of the community to NNP, and the study units were selected randomly. Individuals as respondents within the sampling units were also selected randomly. The study adapted the total sample size of 50 respondents[ 22 ]. This is because communities around and within the park are inhabited by few households/individuals. The sample respondents were got from homesteads or household,



Nimule markets, farms, shops, wildlife administration offices, fishing camps, and wildlife/forest rangers who were considered key informants while others grouped for Focused Group Discussion, and therefore, were subjected for interviews. The focus of this study was major lion people living in and around Nimule National Park notwithstanding, population that constituted adult individual/respondents who were perceived well versed with existence, knowledge and use of wildlife species in Nimule National Park.

### C. Data Collection and Instrumentation

In a reconnaissance survey, the surrounding communities to Nimule National Park were visited in order to conduct the overall baseline information of the area. For clarity checks and to improve the reliability of the questionnaires, pre-testing of sample questionnaires was done for few households' respondents in order to evaluate its strength or weakness, in which the necessary adjustments were done and incorporated in the final questionnaires [21] that were then administered to the target households' respondents. While administering questionnaires to respondents, adult household head or any of its willing representatives (either gender) present, but who have stayed in such household/community for at least one year would be subjected for interview. Direct translation was carried out as attempt to solve households' respondents with low literate rates. This was so for easy understanding of questions by respondents in order to be able to fill out the questionnaires accurately and to minimize misinterpretation of questions. Most of these interviews were conducted in common colloquial Arabic as the commonly used language by South Sudanese whose final responses were captured and lastly translated and recorded in English [23].

The data collection instruments used to facilitate the collection of the information from the respondents included the following: **1.** Self-administered questionnaire; a set of pre-set questions with both closed and open-ended questions to capture basic primary data. The questionnaires were formulated and filled in English. In cases where the respondent could not read and write, the researcher/assistant read out the question, translated it into local dialect and asked the respondent to answer, which is then recorded in English or an interpreter was used and the answers given were directly recorded in the case of focused group discussions. **2.** Observation; trends of animals browsing on farm crops, destroyed infrastructures/buildings, animal foot marks, faeces, etc around the park, patterns of movement could be observed by the researcher although respondents were not asked. In general terms, impacts of wildlife activities on the communities close to the park were seen and problems faced by the local people arising from the park (like crop raiding by animals) were observed. **3.** Secondary data; some data collection process involved gathering data from sources which had already been documented by other researchers. The study employed extensive library usage and

internet search, collection of relevant materials from the press (documentaries and newspaper articles), use of records, magazines, articles from South Sudan wildlife Service, books, journal papers and other published and unpublished works of students' data previously collected from NNP during students' field trips. **4.** Checklist and questions guides were also used for key informants interview and focused group discussions with the communities [24].

The survey was focused on communities' perceptions and attitudes towards the impacts of human-wildlife conflicts, demographic and socio-economic factors influencing wildlife conservation and management strategies in NNP, and to come up with recommendations and resolutions to various wildlife stakeholders on how human-wildlife conflicts can be tackled for co-existence.

### D. Data Analysis and Interpretation

After collecting the data, the questionnaires were sorted, data cleaning was carried out and the answers given by the respondents coded in an excel spreadsheet. The coded answers in excel spreadsheet were then imported and saved in a commonly used Software Package for Social Sciences (SPSS) ver.23 and/or Minitab v.16, a format suitable for analysis of these generated data [24]. The household survey data were analysed in descriptive statistic [25] that included frequency and percentages while others were analysed in regression in order to ascertain their level of significance on various factors influencing communities' attitudes and perceptions and their participation in conservation of wildlife species. For proper statistical data interpretation, the information generated from respondents were presented in tables, charts and graphic forms [26].

## V. RESULTS AND DISCUSSION

### A. Demographic Characteristics of the Respondents

- Gender of the respondents

The majority of the respondents were male that constituted 66% of the total respondents; and female respondents were represented by 34% (Figure 2). Women were few because they are majorly confined within households with roles of their family's chores. They have little knowledge about wildlife although the statistics indicated that both men and women seemed willing to participate in the survey as reiterated in the findings of [27]. Other reason could be that, most of the women might have been reluctant to answer questions due to household cultural restrictions and follow of traditions. Meanwhile men are much involved in wildlife activities such as hunting, cutting of trees, etc (Figure 2) thus, motivate their willingness to participate in the survey.

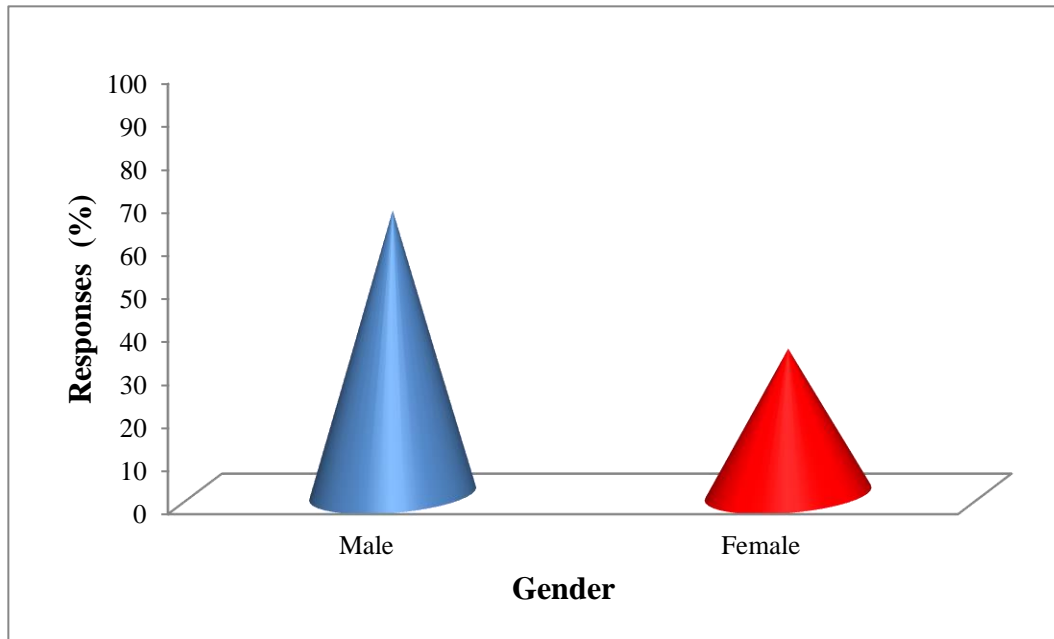


Fig. 2: Showing the gender of the respondents

**B. Age distribution of the respondents**

Majority of the responses constituted 38% of 21-30 age group. This was followed by 28% responses for 31-40 age group, and 20% for 41-50 age group. Meanwhile those with age range between 51 & above and 15-20 constituted 8%, and 6% respectively. The age group of 21-30, 31-40 and 41-

50 altogether indicated 86%, a youthful age group that is considered active and much involved in wildlife activities for wildlife resources to sustain their lives. Age group of 15-20 and 51 & above (Figure 3) were few because they are considered vulnerable and lack manpower. The finding of [ 27 ] agreed with the results of this study.

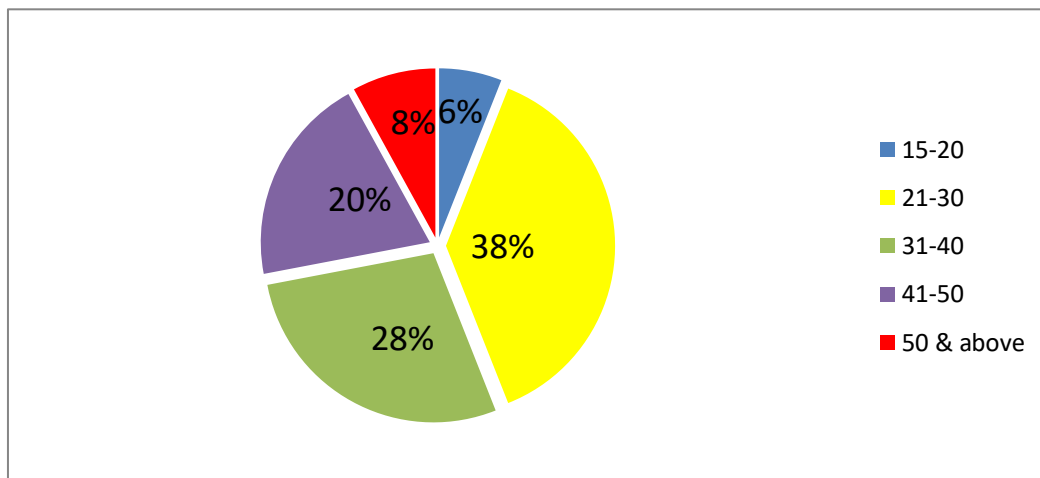


Fig. 3: Showing the age distribution of respondents

**C. The occupation of the respondents**

The research statistics revealed 38% of the respondents were self-employed farmers, followed by those unemployed with 30%, students with 17%, those fully employed were 12% and the retired personnel constituted only 3% of the respondents (Figure 4). The results indicated that those self-employed farmers have high risk of conflicts from wildlife due to their proximity of farmlands to wildlife habitats causing conflicts although they may have adequate knowledge about wildlife activities and their protection. This category was followed by proportion of unemployed and students having the ability to give adequate information about wildlife activities within the area [ 6 ].

The finding is further in line with that of [ 27 ] who reiterated that most communities living next to the park are self-employed involved in activities such as cultivation and others live in an established fishing camps/sites situated along the River Nile shores, yet this is also supported by the place where they live especially in urban villages where most of them would market their products to population engaged in different businesses other than farming, hunting, and fishing. This further would boost food availability, nutritional and income security and sustainability within most participating households including those who acquired with their earned incomes (Figure 4).

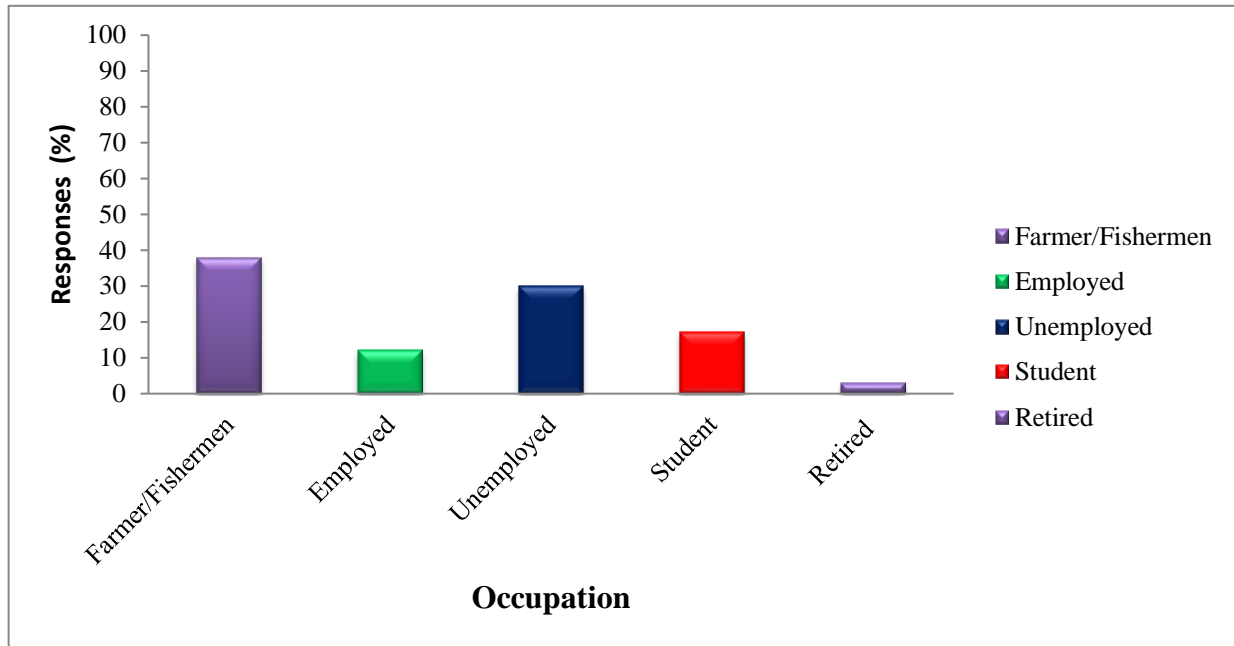


Fig. 4: Showing the occupation of the respondents

**D. Educational levels of the respondents**

The analysis revealed that most respondents had never been to school (52%), followed by those who ended at primary level and high school (22%) and (12%) respectively, those who reached University and college constituted 6% and 8% of the respondents respectively (Figure 5). The illiteracy rate composed of those who never had formal and informal education including those who ended at primary schools, a total that is over 70%. This high rate of illiteracy in the study area is as a result of subsequent civil wars/conflicts which erupted between South Sudan and Sudan in the early 1980s of which most of the South Sudanese did not get opportunity to acquire formal education. Moreso, the recently escalated inter-tribal conflicts of 2013 and 2016 respectively, that massively displaced most communities to

the neighboring countries for refugee and others asylum. This left them without option to study but to find somewhere for safety and security. In its general believe, the higher illiteracy rates amongst local communities may not allow high propensity and appreciation of the need to utilise wildlife as a sustainable resource[ 28 ].

However, this high illiteracy also has significant impacts on conservation and management of wildlife. This finding also agreed with UNESCO in [ 29 ],who reiterated that South Sudan has 58% of its population being illiterate due to the economic struggles and the ongoing conflicts in the country. Of recent the illiteracy rate in South Sudan has risen to over 70% bringing South Sudan amongst the top African Countries with low education levels.

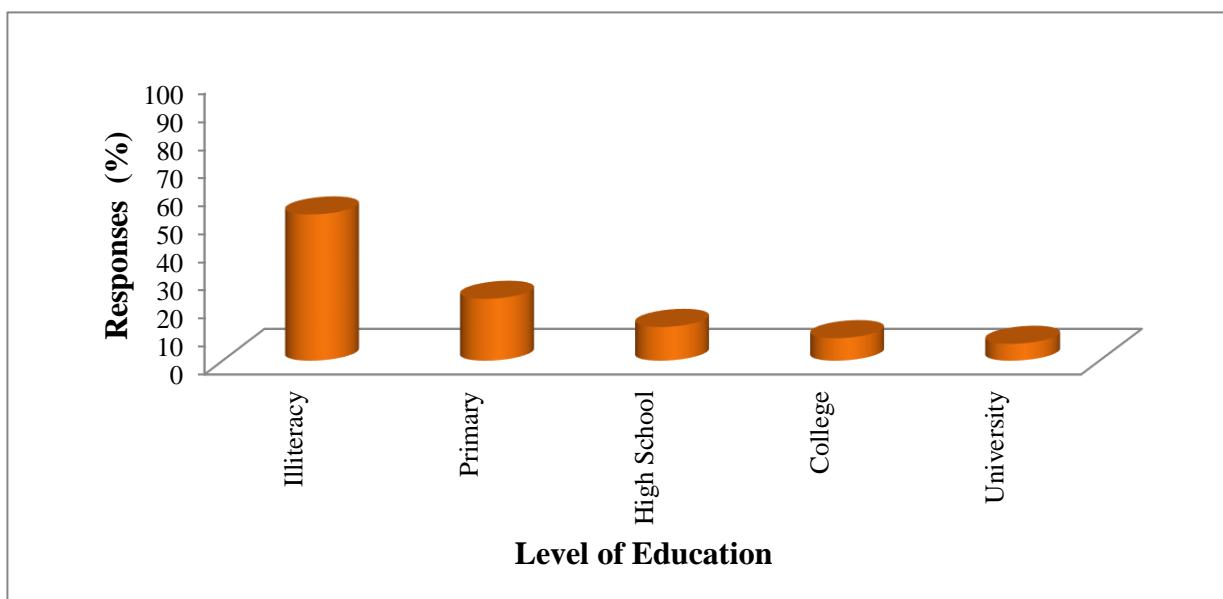


Fig. 5: Showing the level of Education of respondents

**VI. COMMUNITIES’ ATTITUDES AND PERCEPTIONS TOWARDS BENEFITS OBTAINED FROM WILDLIFE**

*A. Wildlife as an economic resource and its benefits*

The residents were asked to state their level of satisfaction with NNP as an indicator of their overall view of the buffer zone/protected area. The study found that most of them (90%) manifested positive attitudes towards their co-existence with wildlife considering wildlife as a resource to the community such as hunting, collecting wild fruits, cutting wild trees for building, collecting firewood, etc while the category of 10% were among members who practices farming activities and cattle rearing that make them to undermine wildlife as resources. However, benefits accrued from such wildlife resources included food to the

communities such as fruits, meat, nuts (40%); fuelwood (20%), incomes (16%) earned from wildlife tourists, building materials (9%); modify climates (6%), and provision of raw materials for factories (5%). Meanwhile employment opportunities accounted for 4% in the form of recruitment of local youths as wildlife officers and rangers (Figure 6). Also, in the creation and development of recreational centers that requires more personnel to work. However, in this regards government and other wildlife stakeholders’ organizations should support initiation and development of tourists attracting sites such as building hydroelectric power stations plant at proposed Fulla Falls, and impose a policy of protecting other wildlife resources within NNP for its sustainability and economic gains. This results however, conforms to that of [ 30 ] findings.

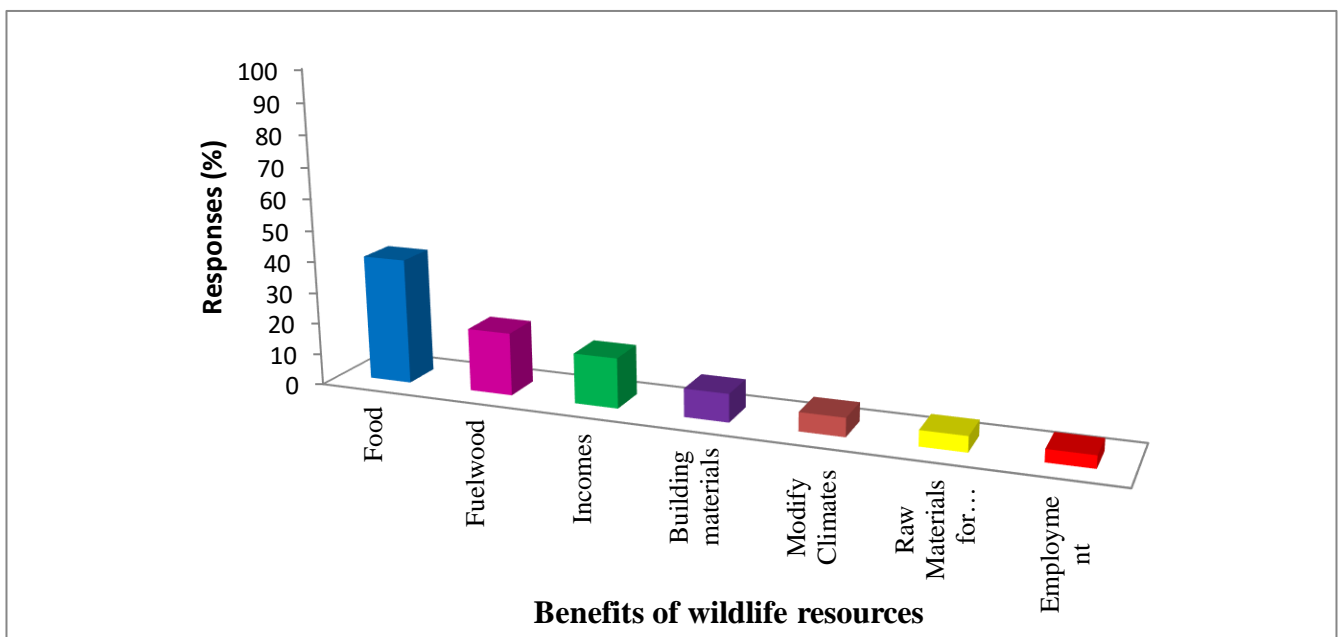


Fig. 6: Showing benefits accrued from wildlife resources

*B. Wildlife Conservation Awareness and Involvement in wildlife conservation activities*

The study found 64% of the population was not involved in wildlife conservation; The reasons being due to the fact that South Sudan has no clear wildlife policy, laws and regulations that govern and encourage the community participation in wildlife conservation activities/services (Figure 7). Furthermore, both the Wildlife and Forestry Bills have not yet been passed by South Sudan board/council of ministers to be used and followed. Therefore, because of

this, penalties to law breakers become unviable and not guaranteed. The other reason is that wildlife destroys crops and properties that make people to have negative attitudes towards its conservation. The few locals (36%) who said they are involved in the conservation activities might be amongst those who work at Nimule National Park (Game wadens, rangers, and wildlife officers and other administrative officers), the category of government employees that earned incomes from the sector [ 30 ].



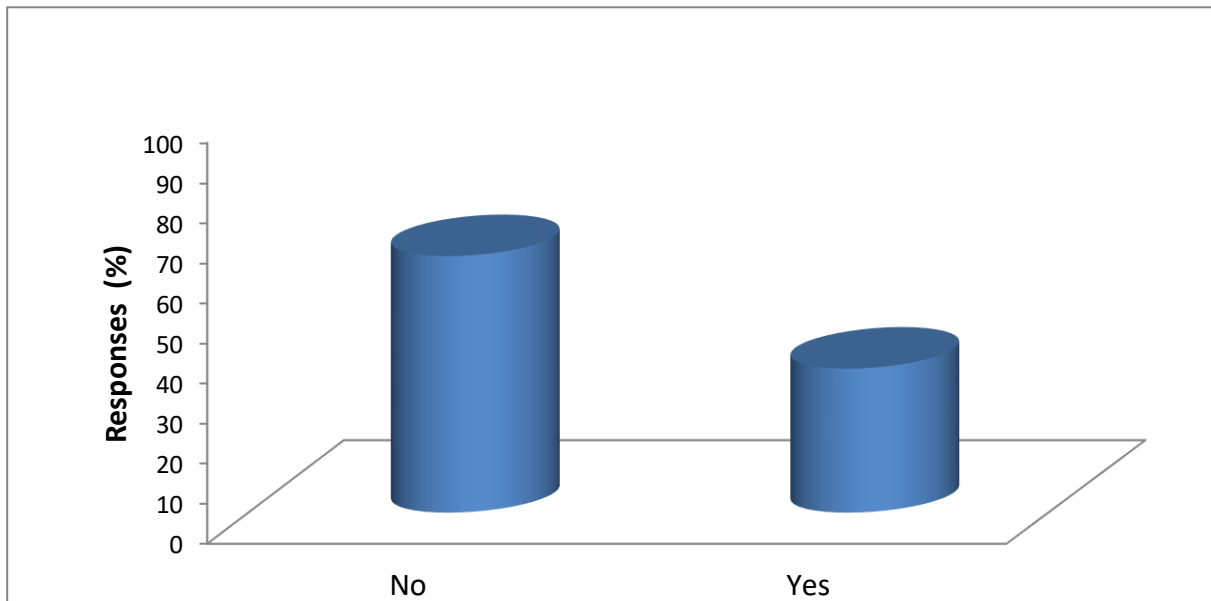


Fig. 7: Showing local people involvement in conservation activities

**C. Wildlife Ownership**

The research revealed that 86% of the respondents view wildlife resources as a property under government ownership; meanwhile 12% believed that wildlife resources belong to the community and it is a community property. Only 2% respondents agreed that wildlife is under private ownership (Figure 8). The analysis further discussed that community has little influence over the usage of wildlife resources because the government assumed the whole of the

responsibility. The respondents reported that wildlife decentralization and proprietorship was important to them, especially for all large-scale landowners, while small-scale and agro-pastoralist landowners stated that deriving benefits from wildlife was crucial to their welfare and living. According to [ 28 ], the differences in ownership responses among the three ownership types are critical in conservation and management of wildlife species.

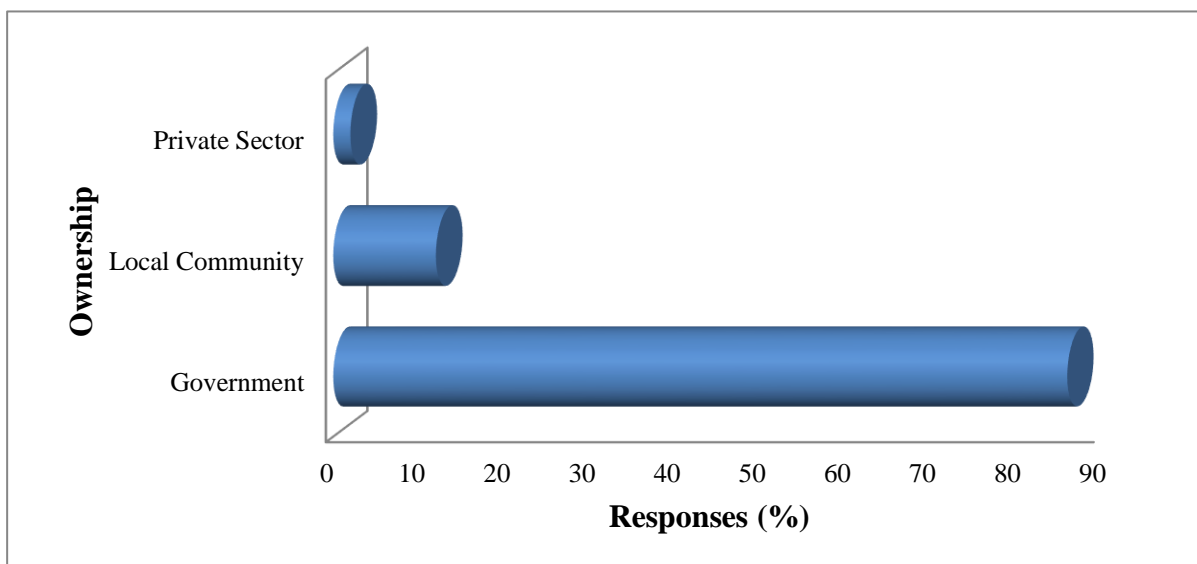


Fig. 8: Showing the ownership to wildlife resources in NNP

**D. Rating of Human-wildlife conflictand problems caused by wildlife to the local community**

Human-Wildlife Conflict has been in existence since long time back as human and wildlife share the same environment and resources. Fossil records showed that the first human fell prey to the animals with which they shared their habitats and shelters[ 10 ]. The research showed that 50% of the respondents strongly agreed wildlife as problem causing animals to the local community and 28% also

agreed that wildlife are problem animals; thus, the overallfinding revealed that over 75% of the respondents agreed wildlife as a problem-causing animals due to their eminent damage caused to crops, displacement of communities, creation of unpleasant noise, soil degradation and compaction; and loss of lives and propertieswhich conforms to findings of [ 10 ]. Meanwhile about 20% disagreed with the findings that wildlife is problem-causing animals and the reason is that they are category of people

who accrued most benefits from wildlife resources such as fishermen, wildlife rangers, foresters, poachers, including those who fetched firewood from the park, etc.; and only 2% of the respondents were not decided and did not have any

knowledge of problems caused by wildlife may be due to inadequate information and lack of awareness about wildlife resources (Figure 9).

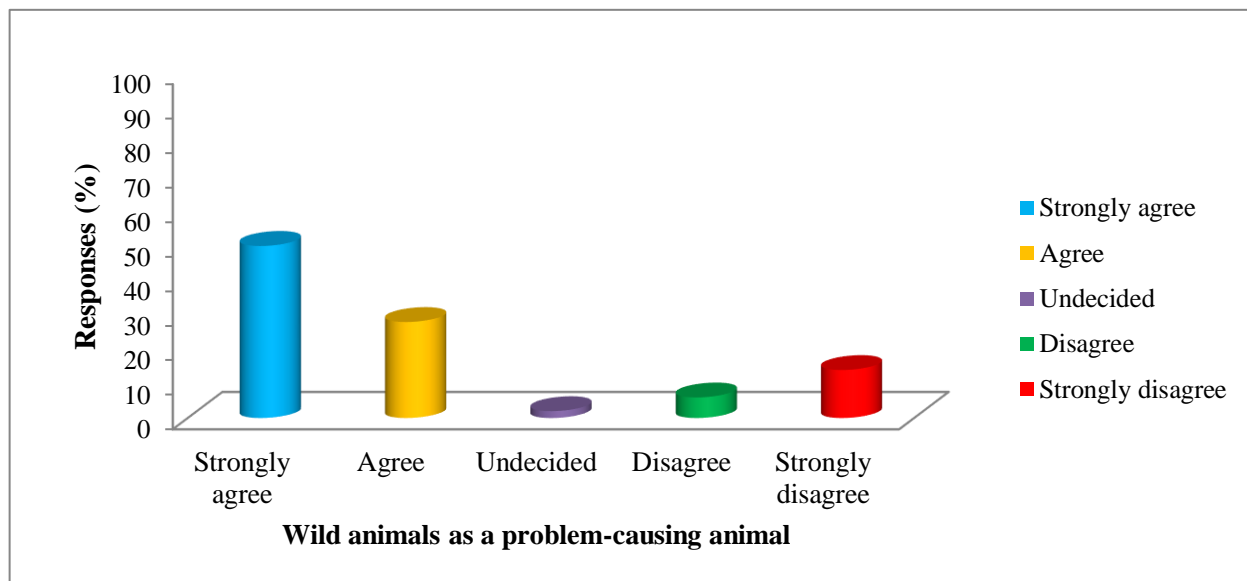


Fig. 9: Wildlife as problem causing animal

*E. The common wildlife species causing human-wildlife conflicts in Nimule National Park*

The statistics indicated that Uganda Kobs (86%) are the major wildlife species that pose threat to farm crops and causing human-wildlife conflicts. This is followed by disturbances from Vervet monkeys, Village weaver birds, African elephants, Baboon’s species and Warthogs reported by 74%, 72%, 62%, 54%, and 50% respectively (Table 1). Hippopotamus usually come out from the river periodically, browsing and feeding on crops and other vegetations, while disturbing at night hours in areas proximal to the river. In Nimule National Park, threat and damage incidents posed by many wildlife species caused

human-wildlife conflicts. However, the felt and ranked magnitude of damages caused by elephants, although is said to be periodic, occasional and temporal in nature, was perceived to be massive, greater and larger in scale, as reported by most communities surrounding the vicinity. This is in conformity to the findings of [ 31 ]. Therefore, it has become more clearer that the level of damages caused by human-wildlife conflicts varies greatly among individual households and communities and more emphasis must target the needs of those households that suffered the most in order to receive appropriate benefits to offset or compensate these incurred households’ losses. This finding is further in line with that of [ 32 ].

English Name	Scientific Name	Habitat type	Frequency	%-of Cases
Uganda Kobs	<i>Kobus kob Thomasi</i>	woodland	43	86
Vervet monkeys	<i>Papio anubis</i>	Woodland	37	74
Village weaver birds	<i>Ploceus cucullatus</i>	Wooded grassland	36	72
African elephants	<i>Loxodonta africana</i>	Woodland	31	62
Baboons	<i>Chlorocebus pygerythrus</i>	Riverine and woodland	27	54
Warthogs	<i>Phacochoerus africanus</i>	Grassland/ woodland	25	50
Hippopotamus	<i>Hippopotamus amphibius</i>	waterlog/Semi-aquatic	19	38
African BushRats	<i>Myotomys unisulcatus</i>	Grassland	14	28
Oribi (African Antelope)	<i>Ouebiaourebi</i>	Woodland	11	22
Nile crocodiles	<i>Crocodylus niloticus</i>	Fresh water bodies	9	18
Bats	<i>Scotophilus dinganii</i>	Woodland	8	16
Dikdiks	<i>Madoquakirkii</i>	Wooded grassland	7	14
Bushbucks	<i>Tragelaphus scriptus</i>	Wooded grassland	5	10
Coast puddle frogs	<i>Phrynobatrachus acridoides</i>	Flooded grassy area	3	6
Red-headed rock Agama	<i>Agama agama</i>	Common	2	4
Hook-nosed snakes	<i>Scaphiophis albopunctatus</i>	River Nile	1	2

Table 1: Checklist from Focused Group Discussion (FGDs) showing the common wildlife species of birds, amphibians and mammals causing human-wildlife conflicts in and around Nimule National Park

*F. Problems caused by wildlife to the local communities living proximal to NNP and the buffer zone /protected area*

The research found that 100% respondents collectively argued that wild animals destroyed their crops on farms. This is because most of them were farmers. Others indicated presence of wildlife in the park as attributing to difficulty in collecting fuelwood, livestock predation, loss of lives and properties, insecurity along roads or within forests, distortion of wild fruits for humans, and limited access to grazing lands reported by 82%, 68%, 60%, 56%, 54% and 52% respectively, while others (46%) caused households displacements (Table 2). Most experiences on wildlife causing problems were positive although with statistically non-significant value ( $p=0.746$ ) (Table 3). Thus, it had no influence over the communities' attitudes and perception of wildlife benefits. This finding is in conformity to that of [ 33 ]. The high rate on crop damage might be due to most wild

animals been herbivores that majorly feed on vegetation plants. Loss of lives and properties could be attributed to threat posed by humans during their activities of poaching, clearing vegetation, settling within the wildlife paths/routes and gazetted area, movement along the buffer zone and in protected areas leading to collision with wild animals in a given space and time (Table 2). Meanwhile, livestock predation and community displacement could be due to uncontrolled livestock grazing of large number of herds, overgrazing and periodic encroachment of community by wildlife predators/animals [ 10 ] (Table 2). The elevated predation pressure in farms with dense cover probably stems from reduced visibility of approaching predators, increasing hunting success. The habitats included in the dense cover are often associated with natural succession in farms that have converted from intensive grazing to game farming as reiterated by [ 27 ] and [ 34 ].

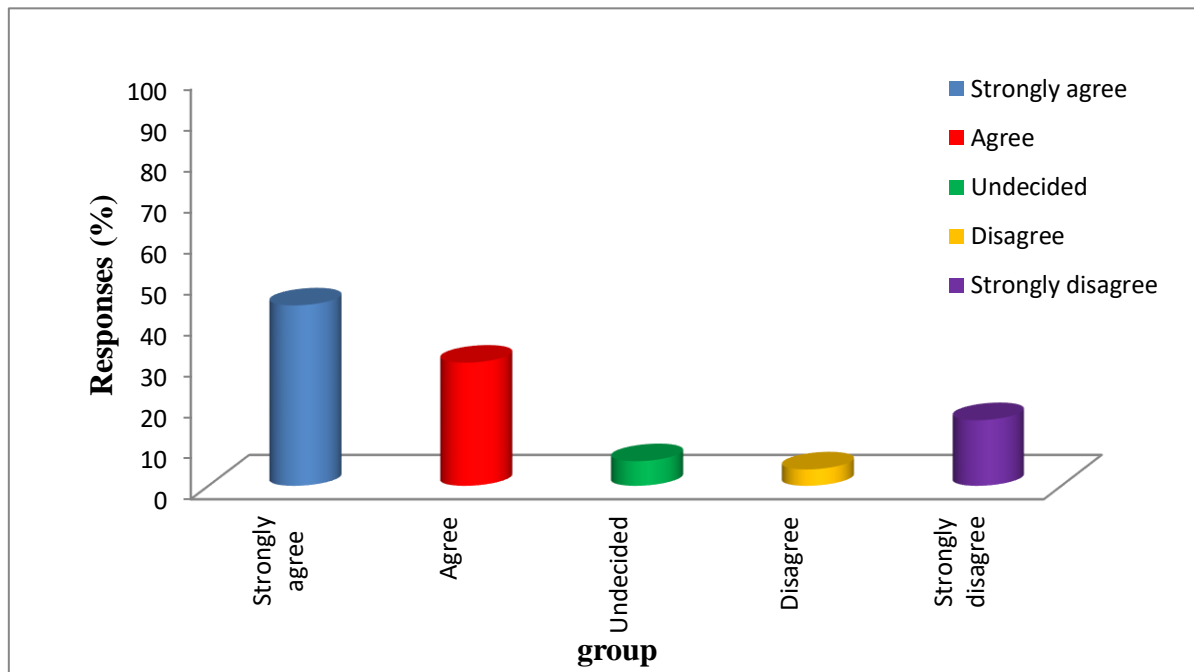
<b>Problem caused by wildlife/animal</b>	<b>Frequency</b>	<b>Percentage (%) of Cases</b>
Crop raiding by wild animals	50	100
Difficulty in collecting fuelwood	41	82
Livestock predation	34	68
Loss of lives & destruction of properties	30	60
Insecurity along roads/ forest paths	28	56
Distortion of wild fruits for humans	27	54
Limited access to grazing lands	26	52
Displacement of community	23	46
Wildlife encroachments	21	42
Limited/lack of access to bush/game meat	20	40
Human attack by animals	16	32
Limited access to farm lands	11	22
Damage to social infrastructures	09	18
Transmit diseases to both livestock and man	07	14

Table 2: Problems caused by wildlife/animals to local communities around Nimule National Park

*G. Rating impacts of proximity (closeness) of wild life protected area (NNP) to the community*

The study indicated that over 74% of the respondents collectively agreed that closeness of NNP to the local communities affected their well being (44% strongly agree and 30% agree), and about 20% collectively disagreed to not affect the local community attitudes (16% strongly disagree and 4% disagree), whereas 6% respondents were undecided (Figure 10). The former category agreed for wildlife getting access to their farms resulted into destruction of crops, houses, loss of lives and properties. This practice makes local people view wildlife as a threat to them, an argument also in line with findings of [ 35 ]. While the latter category disagreed because they might be involved in other businesses and are conservatives or they lack knowledge on issues pertaining to wildlife. Obtaining wildlife resources directly from Nimule National park is carried out in either individual, group or clan-destine ways.

This trend has made it difficult to carry out assessments and to measure effects of wildlife species. Furthermore, poaching and encroachment is substantial in NNP, although the park staff reports claimed that more than 70% of wildlife existence in the park posed problem to the communities and their activities. However, the economic scale of poaching proved difficult to assess due to unfollowed regulations. Therefore, it would be worth an in-depth study to conduct beyond the scope of this work as reiterated in [ 36 ] and [ 37 ] results. According to [ 32 ], in other developed countries like those in Asia, retaliatory killing and removal of problem causing animals as a result of human-wildlife conflict is a major threat to the species concerned although it eliminates violence, aggression and competition for resources. In South Sudan, it does not appear to have negative impacts on the main animal species involved especially if incomes, cultural factors and conservational motives are taken into consideration.



3

Fig. 10: Showing group level of satisfaction of community proximity to wildlife protected area

**VII. SOCIO-ECONOMIC FACTORS INFLUENCING LOCAL PEOPLES’ ATTITUDES AND PERCEPTIONS TOWARDS CONSERVATION OF WILDLIFE SPECIES**

*A. Education affects peoples’ attitudes towards wildlife conservation*

The research found that 48% of the respondents strongly agree and 10% agree that education affect the people’s attitudes toward wildlife conservation; meanwhile 26% strongly disagree and 10% disagree that the level of education does not affect people’s attitudes while 6% of the respondents have no idea on conservation issues. Overall findings of this study indicated 58% respondents agreed that

educated people have positive attitudes towards wildlife conservation (Figure 11). The reasons being knowledge they acquired on wildlife sciences and various conservational trainings undertaken in institutions of learning. However, in South Sudan high rate of illiteracy accounted to over 73%, a portion agreed with UNESCO and [ 38 ]findings. Whereas about 36% disagree with the findings that not all those who have access to education do conserve wildlife resources due to cultural beliefs and some might not be interested to work in the field of wildlife sciences. Only 6% had no knowledge about influence of education on wildlife conservation (Figure 11).

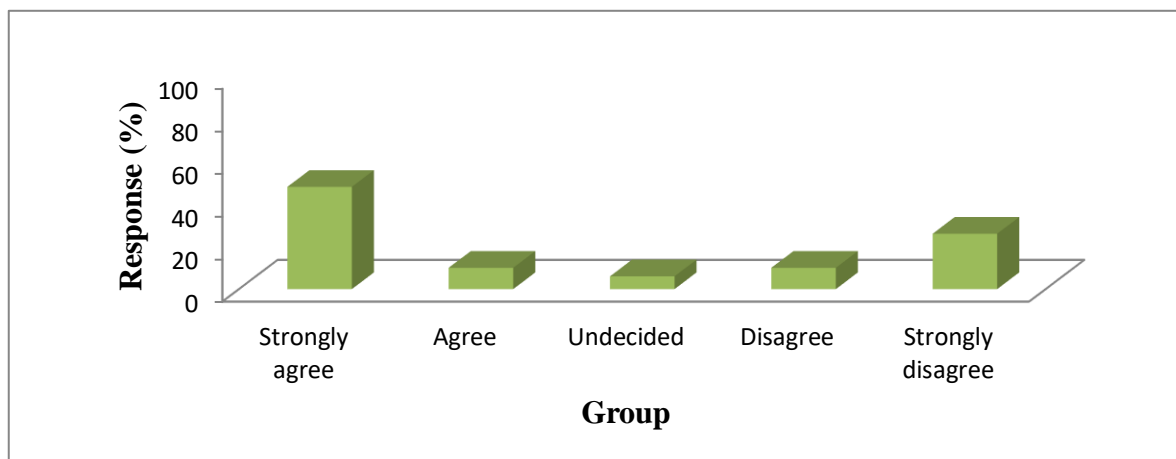


Fig. 11: Showing how education affects peoples’ attitudes towards wildlife conservation



**B. How age group affects peoples’ attitudes towards wildlife conservation**

The regression data in the table 3 below indicated most respondents age group as non-significantly computed (p=0.203). Therefore, it has no influence on the respondents’ attitudes and perception of wildlife conservation in the landscape, an argument reiterated in findings of studies conducted by [ 39 ]. The study further revealed age group of 21-30, 31-40 and 41-50 altogether indicated 86%, a youthful age that are considered to actively participate in wildlife activities for wildlife resources to sustain their lives and families (Figure 3). In NNP, majority of the local people are participating in various occupational activities that is not linked to wildlife conservation with non-significant value (p=0.407) meaning that it has no impacts on wildlife activities. Most inhabitants who settled around NNP have not received formal education (constituted over 70%), therefore, it has statistically non-significant value (p=0.991) and thus, negative attitudes and perceptions to wildlife conservation (Figure 5).

**Wildlife as a Resource:** Majority (over 75%) of the local people around NNP positively viewed wildlife as a resource though with non-significant value (p=0.142) and it had no influence over the respondents’ attitudes and perception of wildlife species (table 3). Most of the local people 40% and 20% respectively, responded with concern that the benefits they acquire from wildlife resources are majorly food and fuel wood (Figure 6), although poles for construction is valuably obtained at lower rate and periodically accessed, the fact that 64% of the population strongly denounced wildlife conservation by the local community in NNP. The reason being insecurity within the park setting and threats from wild animals that deter movement of people, game rangers, while patrolling the park with poor networks. This, therefore had no influence

towards wildlife conservation and management activities in the park. This category further positively said they do not access wildlife resources as expected and therefore, the fact that the data revealed 54% of the respondents did not have access to the wildlife resources was true. Thus, the strong belief by local community that they have no ownership rights to wildlife resources [ 39 ]. This further has no influence on the respondents’ attitudes and perception towards wildlife resources because 86% of the respondents view wildlife resources as a government property (Figure 8).

The proximity of local communities to NNP causes human-wildlife conflict that would inflict pains to humans, loss of properties and destruction of communities’ farm lands around NNP. The study further indicated that 78% respondents strongly agree that wildlife is problem-causing animals to their communities and thus, negatively viewed wildlife as affecting their individual, household and community wellbeing (p=0.623). Despite positive responses on wildlife as problem-causing animals, no any intervention clues are reiterated over conservation strategies for wildlife species [ 39 ]. The study further found statistically positive value for access to education with highly significant value (p=0.004) compared to other factors (Table 3). The knowledge and skills acquired on wildlife conservation and management allowed for respondents to positively agree that educated people have willingness to conserve and manage wildlife resources. The regression computation indicated high level of significance for access to education, with great empathy to encourage people to go to schools for behavioural change and to be able to resolve human-wildlife conflicts in NNP landscape [ 39 ]. So, South Sudan needs to particularly implement its policy of “Leave No One Behind- Participation in education, Equity and Inclusion”, the argument seconded by [ 40 ].

Socio-economic factors		Standardized Coefficients		t-ratio	Significance (Sig.)
		Std. Error	Beta		
	(Constant)	.518		-.326	.747
	Age of respondents	.081	.236	1.297	.203
	Occupation of respondents	.072	.151	.839	.407
	Edu. background of respondents	.066	.002	.011	.991
	Wildlife as a resource	.235	.142	.953	.347
	Wildlife benefits	.068	-.070	-.413	.682
	Local community involvement	.174	.025	.140	.889
	Accessibility to the park	.162	-.220	-1.294	.204
	Wildlife ownership	.300	.031	.180	.858
	Closeness of community to NNP	.088	-.135	-.628	.534
	Wildlife as Problem causing Animal	.072	.081	.496	.623
	Access to education	.061	.533	3.052	<b>.004*</b>
	Problems Experienced by residents	.081	.057	.326	.746

a. Dependent Variable: Respondent

Table 3: Regression Data showing the respondents’ dependent variables

\* highly significant

## VIII. STUDY CONCLUSION, FUTURE RESEARCH NEEDS AND RECOMMENDATIONS

Owing to the findings above, it can therefore be concluded that the communities in and around Nimule National Park (NNP) believed that the park is a source of wildlife resources to them, but they have not benefited from these resources for somewhat numerous years. Various species of wildlife in NNP and the buffer zone were largely influenced by presence of people inhabiting the surrounding communities although security is provided by the park administration. The assessment also indicated that most wildlife species are present in all the vegetation types in NNP including the buffer zone. Furthermore, the community perceived that, the presence of the riverine woodlands and the mixed woodlands vegetations attracted more wildlife including elephants, hippopotamus, Vervet monkeys, snakes, warthogs, Uganda Kobs, etc compared to the open savannawoodland grasslands that is perceived as habitat for birds (mostly weaver birds). This relationships and interactions of people with wildlife within such vegetation caused human-wildlife conflicts to the communities proximal to the park and buffer zone arena. The damages caused by wild animals to the communities' livelihoods especially their effects due to crop raiding, livestock predation and threatening of human life has created a vacuum of negative attitudes and perceptions toward wildlife conservation because of their lethal impacts on the communities' food, nutritional and income security and livelihoods. Therefore, the cooperation of all wildlife stakeholders (for example, community, government, conservationist and foreign donors' agencies) is crucial for lasting success in wildlife conservation and management programs. These initiatives will however, require hard work towards the adoption of conservation and management strategies that are proactive, mutually beneficial and environmentally friendly and sustainable for the community's wellbeing. A tourism program that benefits both the local people and body of wildlife conservation societies and institutions should be established. Local community-based monitoring program and modality to identify habitual crop raiders and hot spots frequented by radius should be set up as protection sites and to attract tourists yielding GDPs for the Country. Other recommendations included the following:

- There has to be collaboration and coordination among different agencies and institutions working in the same or related field to fill data gaps. One of the constraints to undertaking more comparative researches is the difficulty in accessing data and different approaches to measuring data from different taxonomic groups and regions. Most institutions (governments, agencies and organizations) are making data available for entire regions, but for South Sudan data sources remain limited/scarcely for most species due to limited researches.
- The Government must put in place or lobby for appropriate cost-recovery mechanisms in order to provide compensatory support to communities who bear risks and higher costs of their households living with wildlife.
- Conservation education and extension programme should be developed and implemented through community mass

awareness campaigns to improve on the relationships between the park management, local people and surrounding communities.

- Nimule National Park (NNP) administration, other Protected Areas (PAs) and Conservation Organizations or institutions should aim at, not only changing attitudes and perceptions of the local people towards the importance of direct benefits they obtained from wildlife conservation and tourism development, but also their behavior in relation to co-existence with wildlife and other indirect benefits stakeholders accrue as a result of conservation and tourism development.
- There is need to review and strict follow of the South Sudan wildlife act, regulations and policy framework, and also put in place mechanism for the interplay of joint community participation in conservation and tourism development and benefit sharing.
- There is need for more comprehensive and comparative researches on human-wildlife activities in and around the areas surrounding NNP including other national parks in order to ascertain research gaps for future scholars. Although some studies have been conducted in NNP, more researches must focus on assessing different wildlife species, biological diversity, abundance and richness, species migration, their preferred ecological niches, potential sites for tourist attractions and for future government plans like strategic future plan for benefits of Fulla Falls.
- Provision of tangible benefits and alternative livelihoods for local people living adjacent and within NNP engaged in the subsistence activities who are conflicted with wildlife should be considered as a central point of entry into the park conservation, management and tourism development, with a view to meet Sustainable Development Goals (SDGs) of alleviating poverty and improving human welfare.

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**ANNEXES**



Plate 3: Academic staff and Data collection team in NNP



Plate 4: Group Discussion Aftermath of data collection in NNP



**HUMAN-WILDLIFE CONFLICT IN NIMULE NATIONAL PARK -SOUTH SUDAN**

