

Problems Facing Conservation of Kipsaraman Fossil Site, Tugen Hills, Kenya

Mr. Daniel Kipkorir¹ & Prof. Simiyu Wandibba²

Abstract

Kipsaraman (sometimes spelt Kipsaramon) is one of the most significant fossil sites in Tugen Hills, Rift valley region in Kenya. Many researchers who have worked in the area since 1980s have been able to recover faunal and floral fossils from stratigraphic units that have been naturally preserved for millions of years. The area was declared a National Monument in 1990 following the discovery of high concentrations of fossils of ancient creatures. It is managed by the National Museums of Kenya (NMK), a state agency mandated to collect, preserve, study, document and present Kenya's past and present cultural and natural heritage. In the recent past, there has been encroachment on the site by people, a factor that has depleted vegetation cover in and around the site, hence threatening the fossil resources. Extraction of forest products, overgrazing and cultivation has contributed to damage of the sediments. Most of the fossils have been exposed, eroded and vandalized.

Keywords: Kipsaraman, fossils, damage, conservation, human activities.

1. Introduction

This paper discusses anthropogenic impact on Kipsaraman Miocene fossil site in Tugen Hills, Kenya (Fig.1.1). Together with other paleontological/archeological sites spread across Kenya, Kipsaraman is protected under the Museums and Antiquities Heritage Act of 2006, Ministry of Culture, Arts and Sports.

¹ Department of Anthropology and Human Ecology, Moi University, Po Box 3900 Eldoret 30100, Kenya. Korirdaniel@yahoo.com; kipkorirdaniel69@gmail.com, Tel+254 (053) 43001-8/43620; cell+254 725903404, Fax No. (053) 43047

² Institute of Anthropology, Gender and African studies, University of Nairobi, Po Box 30197 Nairobi 00100, Nairobi.

It lies on the western side of the Tugen Hills at 005°N, 35°50'E at an altitude of 1840-1940metrers above sea level. Administratively, the Monument is located in Kapkomol sub-location in Kipkata location of Kipsaraman, one of the divisions in Baringo County. According to Hill (1989and2000), Kipsaraman holds Africa's richest *in-situ* fossil sediments in Eastern Africa. The site is significant in the study of life and climatic changes in the Kenya's Rift Valley. The fossils are preserved in stratigraphic fossil beds that are largely distributed horizontally. They are in form of vertebrate fossils, petrified wood, mollusks, coprolites, pollen grain amongst other specimens (Behrensmeyer, 1999). The site covers approximately 1km².

Since investigation in 1980s, a total of seventeen fossil localities have been documented and categorised into three main sites namely # BPRP 89 (A-K), BPRP #91 (A-D) and BPRP #122 (Hill, 1989 and 2000). All the deposits are characterized by red and green clay exposures. The most significant discovery made in one of the sites was a partial skeleton of *Equatorius africanus hominid*, including its 41 isolated teeth (Brown *et al.* 2002a). The specimens are currently conserved and studied at the Nairobi National Museum.

Although Kipsaraman continues to yield evidence of past remains, it faces destruction from human activities. Over the years, the site has been encroached and highly exploited by members of the Arror clan of the Tugen people, an indigenous population in the Tugen Hills. Oral traditions state that the clan migrated from Mount Elgon towards Mount Kenya and Menegai area in the central Rift valley before settling in the northern crest of Tugen Hills (Akong'a and Were, 1986). The clan chose to settle on the hills for defense against invaders, particularly the Maasai and Pokot pastoralists who raided other communities for cattle in the early 19th century. When the first British colonialist arrived in Kenya, Arror lived in shallow caves dug of loose volcanic ash so as to protect herds of cattle from the attackers.

Today, the Arror continues to keep livestock that include cattle, goats and sheep. They have also grown crops such as sorghum, and maize. Due to the topography of the land no modern machinery are used but hoes made of small iron plates are used to break the soil. The same implement is also used for weeding. It has been observed that the recent years increase in population and scarcity of resources has triggered encroachment into the site. Katebaka (2007) and Karoma (1996) report that increased population and poverty continues to threaten many conservation of sites in Africa.

It is estimated 70% of the population continues to depend on the natural resource for livelihood.

2. Methodology

This paper is a product of field study conducted from April-May 2005 in Kapkomol Sub-Location, Kipkata Location of the Kipsaraman Division, Kipsaraman area of Baringo County, Kenya. The objective was to identify human activities affecting conservation of the Kipsaraman fossil site. A descriptive research design was used and the population of the study comprised residents of Kapkomol sub-location. A sample of 100 people living in the study area was randomly selected. A structured questionnaire was administered to collect data, particularly on natural resources exploited in the monument and its effect on *in-situ* preservation of fossil deposits. Data was analyzed using Microsoft Excel computer programme and results presented in form of narrative and descriptive statistics. In addition, direct observation, key informant interviews and, focus group discussions were also conducted to collect data.

3. Findings

3.1. The depletion of the Kipsaraman vegetation cover

Through observation and interviews, it was found that extraction of forest products contributes to damage of fossils in the site. More often than not, people intrude the monument to harvest forest products. Inadequate fencing of the monument's land and the fact that there is a single staff guarding the site causes this problem. Because of this, it has been, and still is, a major problem to conservation of the monument. People intrude into parts of the monument to cut down poles for construction of houses, cattle pens and granaries while others collect firewood and herbs for use. The activity has degraded vegetation cover in parts of the monument, for example, in fossil site 89E; most fossils have been exposed due to cutting of poles (Plate3.1).

Vegetation cover is essential for preservation of fossil resources in the hilly monument often prone to erosion during heavy. Over the years trees and shrubs have protected buried fossils from being washed down the hill.

According to the key informant, intruders have exposed fossils by trampling on them during the illegal harvesting of the forest product. In addition, the absence of definite footpaths within the monument has led to more erosion. During heavy rains, tracks that connect the monument are filled with runoffs, thereby increasing soil erosion and exposing fossils. This was observed on the western part of the monument at site # BPRP 89E (Plate3.2).

Whereas erosion is likely to lead to discovery of fossils and other archeological finds which positive development is, it may also carry them away and may take time to re-discover hence it is a serious problem (Spencer *et al.* 2006; Rowland, 2008). The research findings show that 84% of the respondents indicated that they obtain natural resources from the site. On the other hand, 8% indicated they do not obtain natural resources from the site while the missing information constituted another 8% (Fig3.1).

Most of those who indicated that they do not obtain resources from the monument are employed. The category included three women and two men. This shows that occupation influences use of the resources. The respondents identified the resources as firewood, medicinal plants, wild fruits and building poles. The harvesting of herbal medicines from the site formed the highest number of users. From the analysis, there were 21 medicinal herbal collectors, 11 wild fruits collectors, 9 firewood collectors, and 9 pole cutters (Figure3.2). Medical herbal collectors comprised 13 women and 8 men, wild fruit collectors consisted of 5 men and 6 women, while all firewood collectors were women and pole cutters were men. The study showed that some of the activities are organized along gender lines. Women collect firewood while men cut poles.

The medicinal plants were identified as *Warburgia ugandensis*, *Carisa endulis*, *Olea africana*, *Grewia bicolor*, *Amarathus dubius*, *Faurea saligna*, *Croton macrostachyus*, *Trichoclaus ellipticus*, *Boscia coriacea*, *Garcinia livingstonei*, *Vangueria volkensii*, *Ficus thonningii*, *Ziziphus mauritania* and *Aerva lanata*. Most of the respondents gave different uses of the medicinal plants (Table3.1). From the analysis 18 men and women aged between 41 and 49 years and over 50 years form the majority in the harvesting of the medicinal plants. The study reveals that the Arror people continue to use herbal medicine to treat various diseases. The respondents also mentioned different types of wild fruits that are consumed during dry seasons when food in the households is very scarce.

Fruits of the following trees are consumed: *Carissa edulis*, *Sclerocoryya birrea*, *Ziziphus mauritania*, *Syzygium guineese*, *Vangueria madagasscanesis*, *Rhus natalensis*, *Ficus sycomorus*, *Grewia bicolor*, and *Boscia coriacea* (Table3.2).

Asked whether their activities contribute to deterioration of the monument, 74% of the respondents stated that their activities do not damage the place while 26% stated that their activities do contribute to destruction of the monument (Figure3.3). Only 2 herbalists, 2 firewood collectors and 9 pole cutters with primary level of education stated that their activities contribute to destruction. On the other hand, 19 herbalists, 11 wild fruit gatherers and 7 firewood collectors with no education indicated that their activities do not contribute to the deterioration of the monument. The reasons they gave were that they only collect the resources as opposed to other destructive activities like cultivation and grazing on the site. The fruit collectors also stated that they only enter the monument at a particular season when the fruits are ready for harvesting. From the study, those collecting herbal medicine and wild fruits are not aware that their activities pose a danger to the site. The findings indicate that people are unaware that trampling on the site contributes to damage of fossils.

The study also revealed that extraction of resources in the monument is determined by distance. Those who live close to it extract resources more than those who live far from it (Fig3.4). People living less than 2 km from the monument are the majority. They harvest more resources as compared to those living 4 km away. This implies that distance also determines the nature of activities. 95% of the respondents indicated that they value the monument while 5 indicated that they do not value it. Those who stated that they do not value the site were the original owners of the monument land. They stated that the government has not compensated them since their land was declared a national monument to preserve the fragile fossils. In addition, 95% of the respondents indicated that they would like to contribute to the conservation of the monument. On the other hand, 5% stated that they have conflicts with the NMK over the monument land and so cannot contribute to the conservation of the site until the issue is addressed.

During the focused group discussions a number of factors were pointed out that contribute to harvesting of forest products. Low income was singled out as one of the major contributing factors. The consensus was that:

“Low income compels people to use resources from the monument to supplement their needs”.

The group pointed out that basic needs such as food, shelter, and health are essential and that the ways and means of satisfying them vary according to income. The wild fruits, for example, supplement the household food. They are available at different seasons. In addition, the medicinal plants were mentioned as the alternatives for people who cannot afford modern medicine due to low income. Furthermore, low-income earners have no alternative but to use wood fuel for their cooking and heating activities.

Harvesting of wood fuel from the site could not be stopped completely since most people in the area still survive on it. They cannot afford other sources of energy such as gas and paraffin. From the discussion, the group was of opinion that the NMK should initiate a policy that permits the local people to collect firewood on a particular day so as to control entry into the monument. On the other destructive activities such as pole cutting, it was stated that local people should be sensitized, through community meetings, the importance of the fossil site. However, during the discussion, the NMK was challenged to develop the monument into a site museum so as to benefit the local people through employment opportunities and indirect benefits from tourists. It was also suggested that people be educated on the importance of conserving the monument.

3.2 Cultivation

An observation made during the study reveals the damage to the monument as a result of the cultivation in and around it. The monument is located on a sloppy land. Thus, any cultivation in the area causes damage to the monument as it encourages soil erosion. Since the monument is not fenced, land encroachers have taken advantage of this to cultivate in the area. The key informant pointed out one such cultivation by an individual. The individual claims that the northern part of the monument contains the graveyards for his relatives and so he has a right to cultivate the land and at the same time maintain the ancestral graves. The cultivation in this northern part of the monument has depleted the vegetative cover. In addition, the slash-and-burn technique used has accelerated the deterioration of the monument (Plate3.3).

Observation revealed that the communities cultivate too close to the peripheries of the monument and also their farms are not adequately terraced (Plate 4.4). Consequently, soil erosion in the monument is frequent. In fact, heavy down pours in the monument have eroded the fossil bearing soils down the valley (Plate 3.5). Lack of compressive policy that restricts cultivation on peripheries of the site has contributed to erosion in the monument. During the group discussion, it was stated that efforts to reduce erosion in the monument may be minimized by persuading owners of the neighboring farms to make terraces and plant grass on their boundaries.

3.3 Overgrazing

The key informant identified grazing as a factor that interferes with the conservation of the monument. During the dry season, scarcity of grass compels people to intrude into the monument and graze their livestock there. This has interfered with the conservation of fossils at the site because the grass that normally acts as protective layer is lost and erosion in the fossil beds is frequent during the rainy season. Stock tramping over decades has completely washed away site deposits. This was again attributed to lack of physical barriers like a fence around the monument. Thus, the informant stated that the threat would be minimized if the monument is fenced.

3.4 Clandestine Excavations

Clandestine excavations were also identified as one of the damaging human activities affecting the conservation of the monument. With the high demand for gemstones such as ruby and green garnet, people have been venturing into the parts of the monument for minerals and other treasures. Some fossils have been lost in the process of this activity. The excavations have also left pits, which are a risk to the people working in the monument.

When the key informant was asked what NMK should do to effectively conserve the monument, he was of opinion that physical barriers be created on the boundaries and 2 guards employed to reinforce patrols at the site. The informant was also of suggestion that the monument be developed into a site museum. The argument was that it would generate more revenue and used as a resource centre for educational institutions in the area.

4. Conclusion

- The Depletion of vegetative cover has contributed to the deterioration of the monument.
- Trampling resulting from the harvesting of forest products has led to the exposure of fossils in the monument.
- Cultivation in and around the monument has led to massive erosion of the fossil resources.
- The failure to provide physical barriers has led to encroachment on the monument.
- The local community is willing to contribute to the conservation of the monument.
- Lack of adequate security staff has resulted in the destruction of the monument by people.

5. Recommendations

- There is need to erect physical barrier to protect the site.
- There is need for the NMK to employ additional staff to guard the monument.
- The monument needs to be developed into a site museum.
- There is need to involve the local people in conservation of the site

6. Acknowledgment

The research was accomplished through the support of the Italian Ministry of Foreign Affairs and International Cooperation (IMFAIC) the National Museums of Kenya (NMK), and Center for Heritage Development in Africa (CHADA). Appreciation is further extended to Mr. Andrew Cheptum (former Curator of Kabarnet Museum) and Joseph Murta (Caretaker of Kipsaraman National Monument), as well as residents of Kapkomol Sub-location and entire members of Kipsaraman Division.

8. Reference

- Akong, J and Were, G. (1986) Socio-Cultural Profile of Baringo District. Nairobi: Uzima.
- Behrensmeyer, A., L. Deino, A. Hill, D. Kingston, & J. Saunders (2002). Geology and Geochronology of middle Miocene Kipsaramon Site complex, Muyurur Beds, Tugen Hills, Kenya. *Journal of Human Evolution*, 42: 11-37.
- Brown, B., D. Duren, J. Kelly, & S. Ward (2002a). Dental remains of *Equatorius africanus* from Kipsaramon in Tugen Hills Baringo District. *Journal of Human Evolution*, 42: 39-6.
- Hill, A. (1989). Kipsaramon: A Miocene Hominoid site in Kenya. *American Journal of Physical Anthropology*, 78: 241.
- Hill, A. (2000). *Baringo Palaeontological Research Project Report (1999-2000)*. Nairobi: NMK.
- Karoma, N. (1996). The Deterioration and Destruction of Sites in Tanzania. In J. M. Roderick & P. R. Schmidt (Eds). *Plundering Africa's Past*, pp. 199-200. Indiana: Indiana University Press.
- Katebaka, R (2007); Effective Biodiversity Conservation Challenges in Africa: A Case of East Africa: *Journal of Biology International* 52: 36-37
- Rowland M (2008) Saving the past for the future: *Journal of Historic Environment* 21: 19-29.
- Spencer, G, Justin, S and Patricia, H (2006). Americas Antiques: 100 years of Managing Fossils on Federal Lands. Albuquerque: Authority of the State of Mexico.

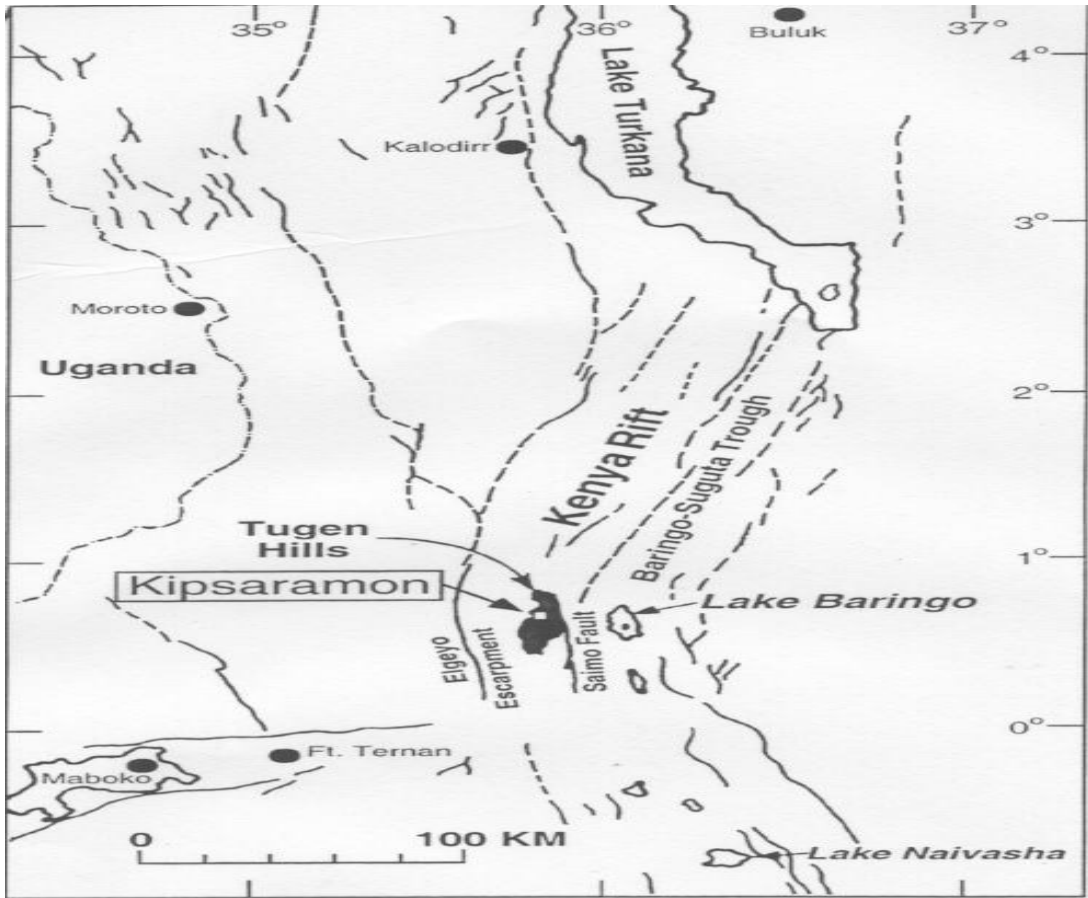


Fig1. 1. The location of Kipsaraman Monument, within Kenya's Rift Valley.
Source: Behrensmeyer et al. (2002)



Plate3.1: Deforestation in Site 89E



Plate3.2: Fossils exposed from an eroded track

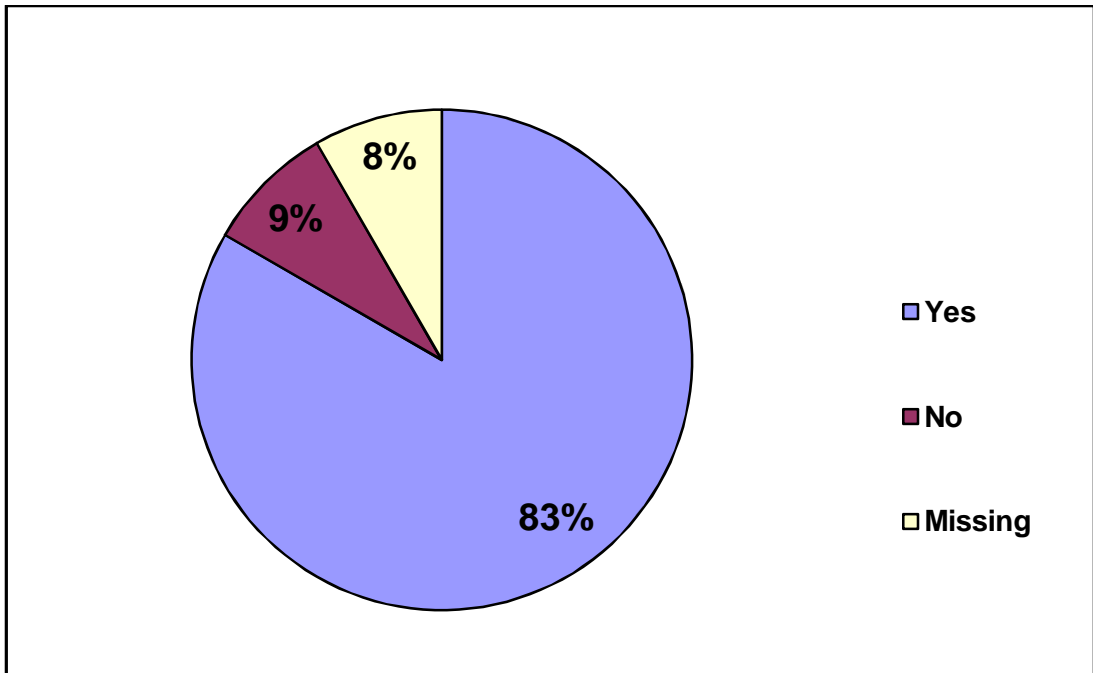


Figure3.1: Responses on the harvesting of natural resources from the

Monument

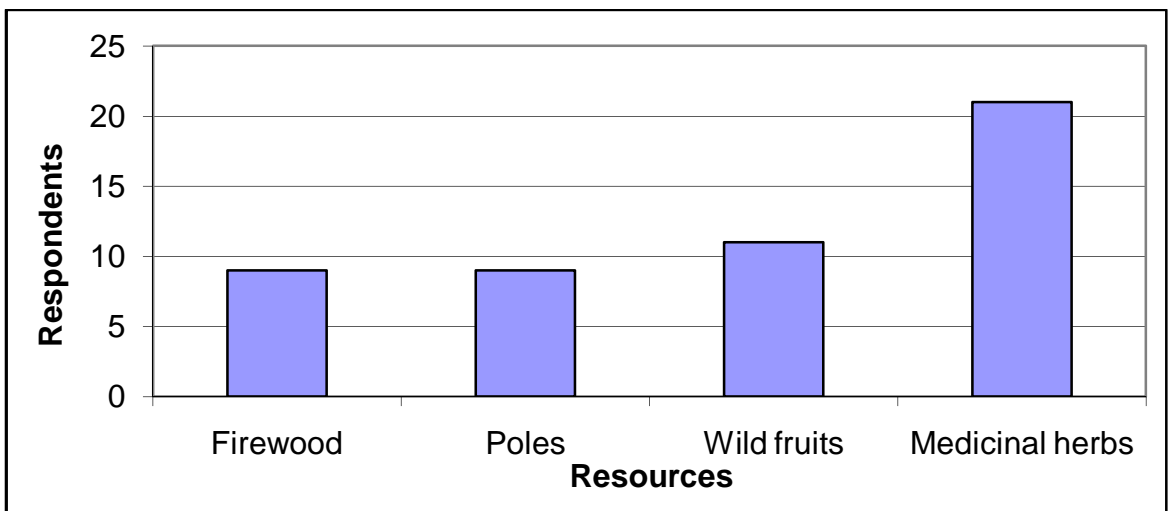


Figure3.2: Responses on the type of resources harvested from the Monument

Table 4.1: Medicinal plants in the Kipsaraman Monument and their use

Scientific Name	Local Name (Arror)	Disease Treated
<i>Warburgia ugandensis</i>	Soke	Skin Disease
<i>Ritchiea albersii</i>	Seretetwo	Stomachache (Adults)
<i>Carisa edulis</i>	Leketetwo	Stomachache (Adults)
<i>Olea africana</i>	Yemit	Worms
<i>Grewia bicolor</i>	Misistwo	Headache (Adults)
<i>Amarathus dubius</i>	Chepkwandiya	Headache (Adults)
<i>Faurea saligna</i>	Mokwo	Diarrhoea
<i>Croton macrostachyus</i>	Toboswo	High Blood Pressure
<i>Trichocladus ellipticus</i>	Barkowo	Skin Disease (Children)
<i>Boscia coriacea</i>	Sirkwa	Impotence
<i>Garania livingstonei</i>	Nerkwo	Headache
<i>Vangueria volkensii</i>	Tobirbirwo	Diarrhoea
<i>Ficus thonningii</i>	Simotwo	Diarrhea (Goats/ Sheep)
<i>Ziziphus mauritania</i>	Tilomwo	Bronchitis
<i>Aerva lanata</i>	Simotwo	Stomachache (Children)

Table3.2: Wild fruit Trees in Kipsaraman Monument

Scientific Name	Arror Name	Fruit Colours
<i>Carissa edulis</i>	Leketetwa	Dark purple
<i>Sclerocorya birrea</i>	Tololokwo	Yellow
<i>Syzygium guineas</i>	Lamaiywa	Purple black
<i>Ziziphus mauritania</i>	Tilomwo	Reddish brown
<i>Vangueria madagascanesis</i>	Komolwo	Green
<i>Rhus natalensis</i>	Sirian	Reddish brown
<i>Ficus sycomorus</i>	Simotwo	Yellow / Red
<i>Grewia bicolor</i>	Sisit	Orange
<i>Boscia coriacea</i>	Sirkwa	Green

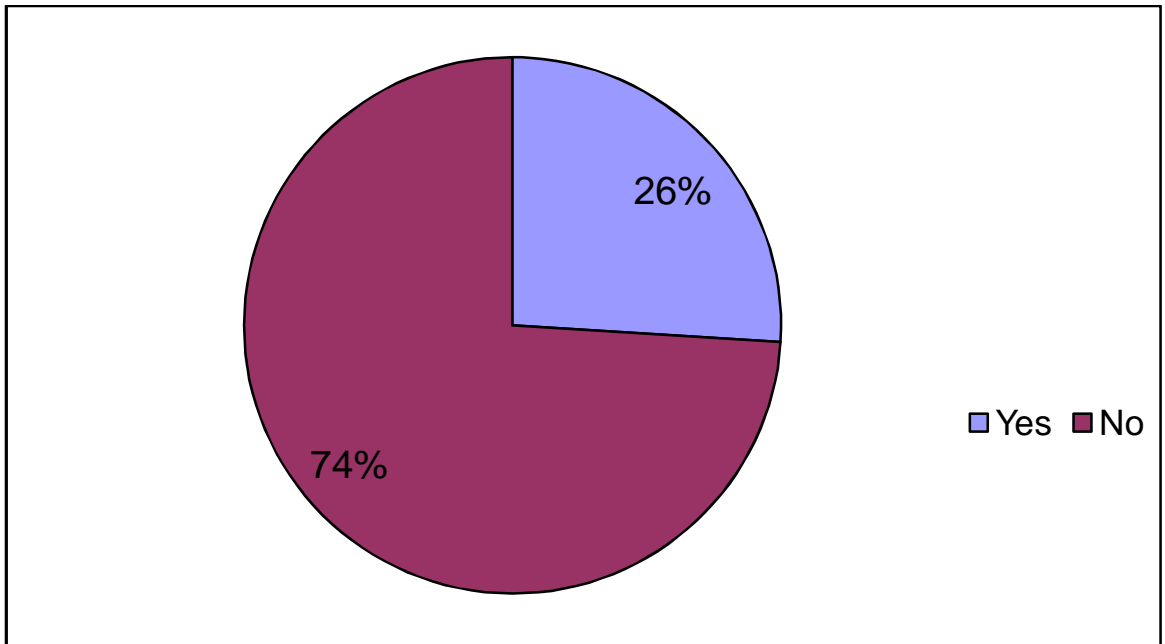


Figure3.3: Responses on effects of harvesting natural resources on the conservation of the monument

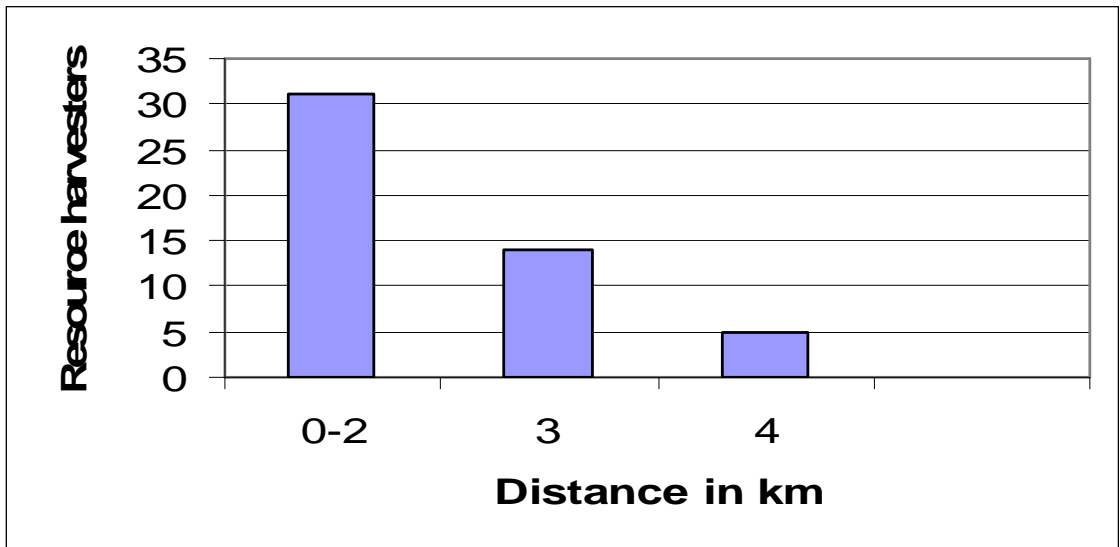


Figure3.4: Responses on distance from the monument by the resource harvesters



Plate3.3: Slash-and-burn cultivation at the Kipsaraman site



Plate3.4: Inadequately-terraced farm on the monument boundary



Plate3.5: Fossils eroded due to cultivation