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Full Length Research Paper

Perceptions of tourists on trail use and management implications for Kakamega Forest, Western Kenya

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The study aimed at providing Kakamega Forest Management with empirical information that can be used to make judicious trail and visitor management decisions. This is important because trails form the main means for accessing visitor facilities and attractions in protected areas. However, most of the methods that have been used to asses trail use impacts have involved elaborate field measurements and laboratory analyses which are time consuming and economically not feasible for use by protected area managers. The study therefore used a survey approach in which standardized response categories were used to gauge tourists' perceptions on trail use impacts following the peak and off-peak tourist seasons. Spearman rank correlation was used to analyse the data. Results arising from the study showed that trail use impacts namely footpaths formed outside permitted trails and vegetation trampling were persistent in Kakamega Forest in both tourist seasons. On the basis of these results, the study recommended that tourist activities perceived to have high trail use impacts should be dispersed, contained or prohibited in order to enhance the regeneration of vegetation and soils. In addition, the management should mainstream studies similar to the current one in their future management programmes as one way of monitoring trail use impacts.

Key words: Tourist, trail, trail use impact, vegetation trampling, soil erosion, footpaths outside permitted trails, management implications.

INTRODUCTION

Over the past few decades, degrading trail conditions have been increasingly reported in different park systems and have become a common concern amongst park managers (Marion et al., 1993; Ruff and Maddison 1994; Tasmania Parks and Wildlife Service 1994). Major forms of trail degradation include wet muddy treads, tread widening, tread incision, and soil erosion (Hammitt and Cole, 1998). These impacts often result in difficult and unsafe travel conditions, and have been found to affect the quality of recreational experiences (Vaske et al., 1982).

Kakamega Forest in Western Kenya is the only remaining Eastern patch of the Guineo-Congolian rainforest that once stretched across Zaire, Uganda and Kenya (Kokwaro, 1988; Tsingalia, 1988; Cords, 1992). The forest has a high biodiversity value making it an attraction for local and international tourists. Most of the tourist experiences in the forest (for example, viewing of birds, butterflies and primates) are wholly dependent on trails. As a conesquence, trail over use and compromised tourist experience, is a common observation in the forest. Although trail degradation problem in protected areas has received research attention for decades (Leung and Marion 1996), most of the studies have involved elaborate field measurements and laboratory analyses which are time consuming and economically not feasible for use by protected area managers. Furthermore, most studies in Kakamega Forest (Kambona and Stadel, 2006; Kokwaro, 1988; Emerton, 1992; Greiner, 1991; Bennun and Oyugi, 1994; Mutangah et al., 1992; Cords et al., 2004; Cords, 1987, 1984, 1982; Zimmerman, 1972) tend to have a focus on livelihood tourism nexus, forest resource use as well as ecological aspects of animals and plants. In view of this, the current study primarily aims at providing protected area management of Kakamega Forest with empirical information that can be used to make judicious trail and

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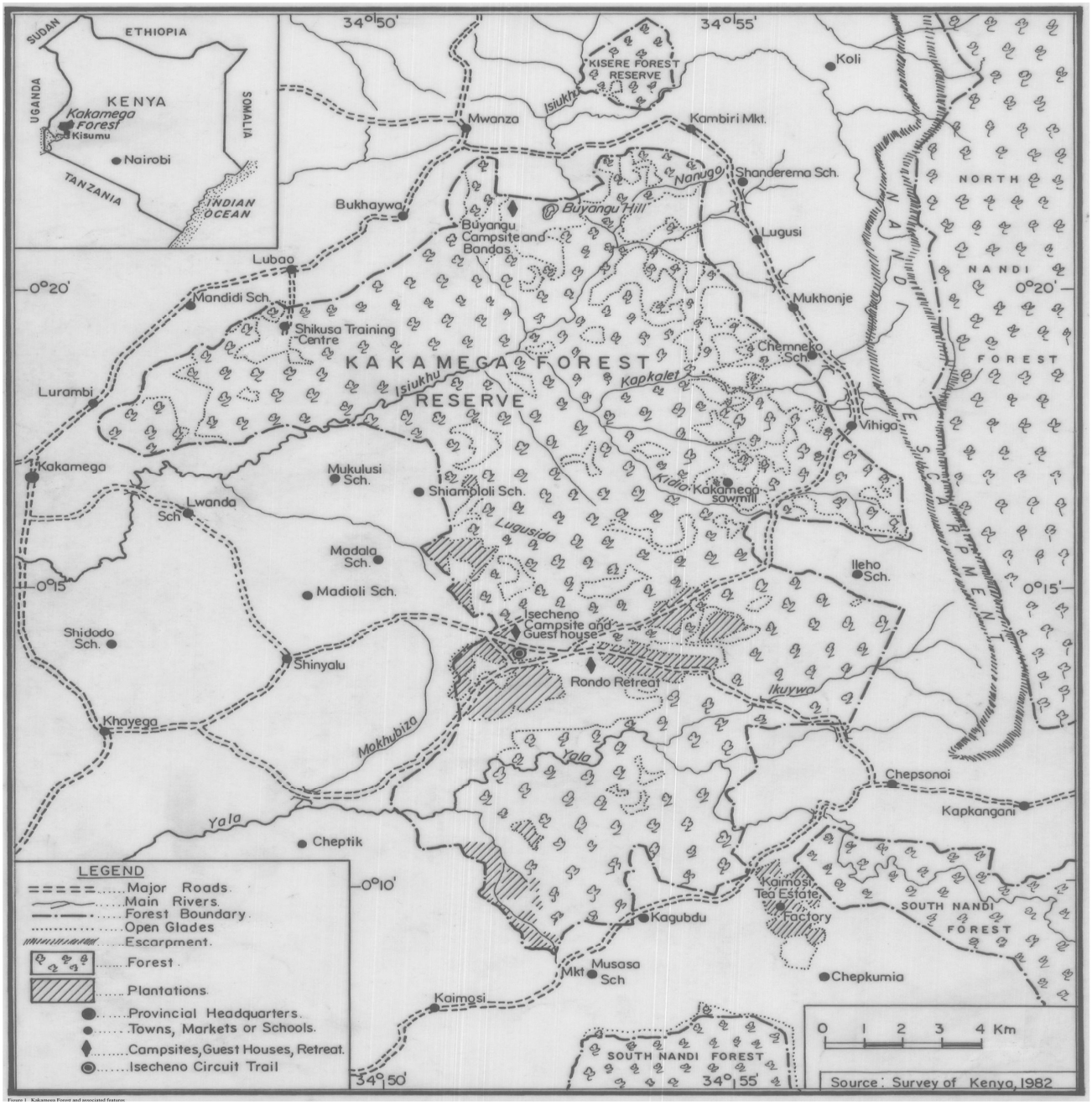

Figure 1. Kakamega Forest and associated features.

visitor management decisions. The study applied a survey approach in which standardized response categories were used to gauge tourist perceptions on trail use impacts (soil erosion, formation of footpaths outside permitted trails and vegetation trampling) during peak and off-peak tourist season. Considering that most tourist attractions in Kenya require trails to enhance tourist experience, the results arising out of this study are of considerable policy and applied importance to protected area management authorities in Kenya generally and Kakamega Forest in particular.

STUDY SETTING

Apart from the rich biodiversity of Kakamega Forest as aforementioned previously, the forest plays a vital ecological function as it forms an important source to several rivers that drain into Lake Victoria (Ogutu, 1997). Geographically, the forest is located between latitudes 0° 10' and 0° 21' North and longitudes 34° 47' and 34° 58' East (Figure 1). It rises to an altitude of between 1500 to 1700 m above sea level. Adjacent to the forest in the East is the Nandi Escarpment at 2200 m above the sea level. To

the South of the forest, at about 50 km is Kisumu town. The distance from the forest to the Ugandan border in the West is about 80 km.

Ecological aspects

Kakamega Forest exhibits a unique biodiversity and habitat rarity, which makes it a sanctuary for a remarkable diversity of plants, birds, insects and other forms of animal life not found anywhere else in Kenya. The forest is well known for its rich and endemic avifaunal composition. 350 bird species have been recorded in the forest (Round-Turner, 1994). The forest also supports a number of endemic primates, such as black and white Colobus monkeys (*Colobus guereza)* as well as blue monkeys (*Cercopithecus mitis*). Other primates found in the forest include red-tailed monkeys (*C. ascanius*), de Brazza's monkeys (*C. neglectus),* olive baboons (*Papio hamadryas anubis*), and pottos (*Periodicticus potto*). Kakamega Forest is also famous for its butterflies. 400 butterfly species have been identified (ibid). Like rainforests elsewhere, the physical structure of Kakamega Forest consists of multiple layers of vegetation. Three or four strata of vertically arranged forest layers can be identified in the Forest. Plant biodiversity is high with 150 woody trees, shrubs and vines, 90 dicotyledonous herbs, 80 monocotyledonous herbs of which 60 are orchids, and a further 60 species of ferns (Round-Turner, 1994). The soils are well drained, and consist of deep clay-loam, clay and sandy soils (Jätzold and Schmidt, 1982). The soils in general, do not show a high fertility. This is attributed to leaching processes over the centuries due to heavy rains and the removal of organic substances in form of firewood, and timber (Round -Turner, 1994; Kenyaweb, 1999).

Tourism in Kakamega Forest

The forest remained a largely peripheral tourist destination in Kenya during the 1980s as a result of inadequate marketing and accessibility. Since the early 1990s, the Government has increased investment in tourism marketing and infrastructure especially for the Kakamega Forest region. With the recent launch of the Western Kenya tourism circuit, tourism in the forest is expected to increase. The rich biodiversity is the major tourist attraction of Kakamega Forest. The forest is of particular interest to ecotourists, such as bird and primate watchers, butterfly enthusiasts, researchers as well as visitors in search of experiencing a tropical rainforest.

Trails provide opportunities for scenic and nature walks within the tropical forest environment. For instance, the Ikuywa River (Figure 1) is an excellent bird and butterfly watching site, the Isiukhu falls and the Buyangu Hill provide scenic attractions. The River Yala and the Isecheno Nature Reserve (Figure 1) are appreciated for forest experience as well as bird and primate watching. The Kakamega Forest region has other tourist attraction features such as the "weeping stone" and cultural activities such as circumcision ceremonies and bull fighting competitions. The Forest's location also makes it a stop-over location for tourists intending to visit Mount Elgon National Park and tourist attractions in neighbouring Uganda.

The current tourist accommodation caters mostly for the upper and lower ends of the tourism market. Low-cost self-catering accommodation is available at Buyangu and Isecheno in the form of simple *Bandas* (A Banda is a house designed along the local traditional architecture whose walls are made of mud and has a grass thatched roof). The Forest Department also operates a guest house at Isecheno which provides basic accommodation facilities. Up-market accommodation is available at the Rondo Trinity Fellowship Retreat in the southern part of the forest and the Golf Hotel in Kakamega town.

Management of Kakamega Forest

The discovery of Gold in the Forest in 1923 prompted the colonial government to declare the forest as a County Council Forest which later on culminated into its gazettment as a Government Forest Reserve in 1933 (Round-Turner, 1994). Despite the official declaration of the forest as a conservation area, intensive illegal use of forest resources continued resulting in decrease in forest size. Attempts to regulate human use of Kakamega Forest resulted in the setting aside 140 and 510 hectares of the forest by the Government as the Isecheno and the Yala Nature Reserves respectively. The northern part of the forest measuring about 4,000 hectares was considered a relatively pristine ecosystem and therefore required a more stringent management. The Government in 1985 declared it, together with the adjacent Kisere Forest (about 500 ha), as the Kakamega National Forest Reserve (Kenya Indigenous Forest Conservation Programme, 1992).

Since then, the Kenya Wildlife Service (KWS) manages this part of Kakamega Forest (Buyangu) strictly as a nature reserve. Activities permitted in the nature reserve are mainly non-consumptive for example, viewing of birds, primates, conducting research and general nature experience. Extraction of forest resources in not allowed. The southern part (Isecheno) measuring 18,500 hectares is managed by the Kenya Forest Service (Personal communication with Lawrence Mweke, Kakamega Forest Officer, Isecheno Forest Station on 15th June, 2003). This part of the forest is relatively liberalised in terms of resource use. Generally the adjacent local community is allowed to use forest resources such as firewood, poles, grass, wild honey, medicinal plants among others. Resources such as grass and firewood are harvested at a subsidized fee which is paid to the forest authorities. In addition to these extractive activities, tourism and research are also practised in the Southern part of the Forest. River Isiukhu (Figure 1) forms the boundary between the two forest management regimes (Personal communication with

Eunice Kiarie, Kenya Wildlife Service Warden, Kakamega Forest, Buyangu, on 20th August 2004). Other management strategies adopted by the two management regimes focus on law enforcement, control of animals, maintenance of trails and forest roads, the raising of public awareness on conservation and tourism development.

METHODS OF DATA COLLECTION AND ANALYSIS

Neither tourists nor protected area management are really trained observers with respect to trail use impacts. However, being the ultimate consumers of tourist products, tourists are better placed to assess the quality of products offered to them at tourist destinations. Further more, use of tourists to assess quality of tourist products is not entirely new. Several authors (for example, Hutchinson et al., 2009; Ching and DungChun, 2007) have used tourist perceptions to assess the quality of tourist products at destinations and recreation ecology impacts as well (Bigné et al., 2001; Dowart et al., 2010; Deng et al., 2003). Against this background, this study applied a survey approach in which standardized response categories (Likert scale) were used to gauge tourist perceptions on trail use impacts. A three-point Likert scale was designed to assess the perceptions of tourists on trail use impacts in Kakamega Forest. Data was collected separately in the two forest parts during peak tourism season (July to October, 2003) and off-peak tourism season (November 2003 to June, 2004).

The questionnaires were given to the tourist as they arrived at the various reception offices in Rondo Retreat (Isecheno area), Kenya Wildlife Service (Buyangu area), and Kakamega Environmental Education Programme (KEEP-Isecheno area). The purpose of the questionnaire was explained to the tourists immediately after they were through with checking in at the various hospitality facilities. The nature of trail use impacts (soil erosion on trails, formation of footpaths outside permitted trails and vegetation trampling) was also explained to the tourists after which they were instructed on the impact rating. They were asked to rate trail use impacts on a scale of 1= "Insignificant", 2 = "Significant", 3 = "highly significant". Tourist rating of the impacts was limited to trails that are officially permitted by the forest authorities. These impacts were chosen for investigation in this study because of the nature of tourist motivations to the forest. Most tourists visit Kakamega Forest to watch birds, butterflies, and primates as well as conduct research. Tourists were instructed to self administer the questionnaire only after visiting all tourist sites of their interest. The questionnaires were collected from the tourists as they checked out of the hospitality facilities. A total of 349 questionnaires were given out and 262 were filled and returned. Buyangu and Isecheno accounted for 143 and 119 questionnaires respectively giving an overall response rate of 75%. The study acknowledges that it was not practically possible to isolate trail use impacts due to the forest adjacent community from those of tourists visiting the forest. Additionally, the study falls short of delineating changes that occur naturally in the environment from those that are solely due to tourist use.

Most researchers would not use a 3-point Likert scale with a technique requiring interval data. This is because the fewer the number of points, the more likely the departure from the assumption of normal distribution, required for many tests. Since Likert scale data is of ordinal level and non-parametric, spearman rank correlation (using Statistical Package for Social Scientist software) was considered as an appropriate test in this study. Moreover, the test does not take into considerations any assumptions about the distribution of a population. Spearman rank correlation coefficient was used to test the strength and nature of the relationships between footpaths formed outside permitted trails and soil erosion on one hand and vegetation trampling and footpaths formed outside permitted trails on the other. The value of the spearman rank correlation coefficient varies from -1 (negative perfect correlation) to + 1(positive perfect correlation). A minus sign indicates a negative correlation and implies that if a visitor for example, rated soil erosion as "highly significant", he (or she) was more likely to rate vegetation trampling as "insignificant". A plus sign indicates a positive correlation and this means that if a visitor for example, rated soil erosion as "highly significant", he was more likely to also rate footpaths outside permitted trails as "highly significant". A correlation of zero means there is no relationship between the trail use impacts. However, the fact that there is a correlation does not necessarily prove causation among the trail use impacts.

STUDY FINDINGS

The findings are presented following the peak and off peak tourist seasons in Isecheno and Buyangu regions of Kakamega Forest. The details are discussed subsequently.

Perception of trail use impacts during peak tourist season in the southern part of Kakamega Forest, Isecheno

Approximately 50% of the tourists perceived vegetation trampling as "insignificant". Soil erosion along trails together with formation of footpaths outside permitted trails were perceived "Significant" by 49 and 44% of the respondents respectively (n = 70, Figure 2a). Spearman rank correlation between footpaths outside permitted trails and soil erosion along trails showed a positive, moderate correlation which was statistically significant (Spearman rank correlation coefficient = 0. *328, α = 0.006, 0.01 level - 2-tailed). Although only 36% of the respondents perceived vegetation trampling "Significant", the impact still exhibited a moderate strong correlation with footpaths outside permitted trails (Spearman rank correlation coefficient = 0. *387, α = 0.001, 0.01 level - 2-tailed).

Perception of trail use impacts during off-peak tourist season in the southern part of Kakamega Forest, Isecheno

It is notable that vegetation trampling and footpaths outside permitted trails were rated "Significant" by 86 and 82% (n = 49) of the respondents respectively (Figure 2b). Soil erosion along trails was not considered as a serious trail use impact. Majority of the respondents (76%) perceived it as "insignificant". The Spearman rank correlation between footpaths outside permitted trails and vegetation trampling indicated a moderately strong relationship with statistical significance (Spearman correlation coefficient = *0.370, α = 0.008, 0.01 level - 2-tailed).

Perception of trail use impacts during peak tourist season in the northern part of Kakamega Forest, Buyangu

While the study previously focussed on the visitor impacts

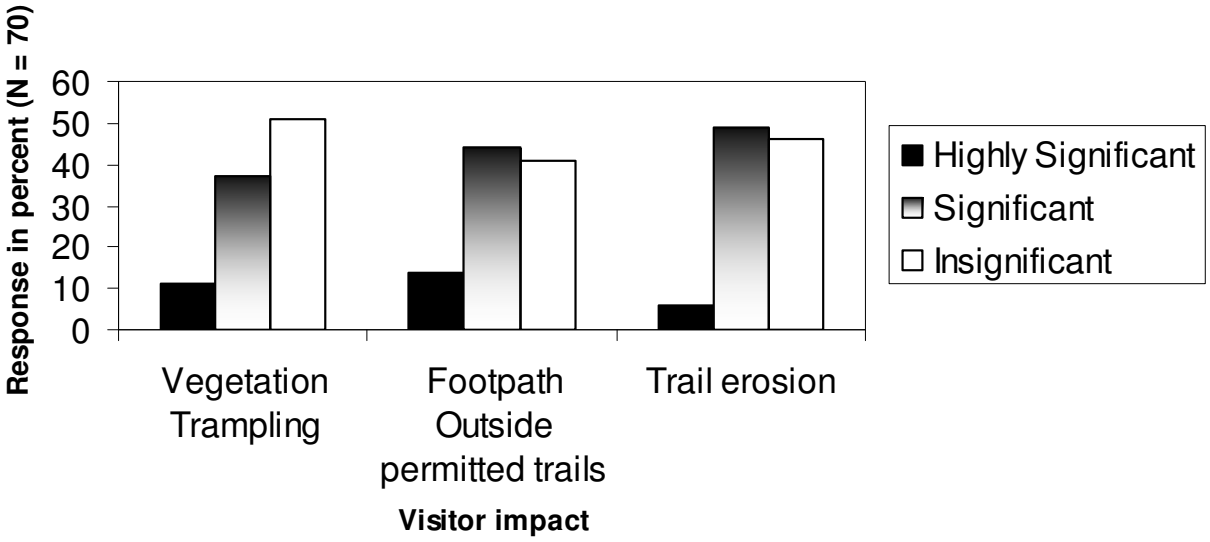

Figure 2a. Perception of visitor use impacts on trails during peak tourist season, Isecheno.

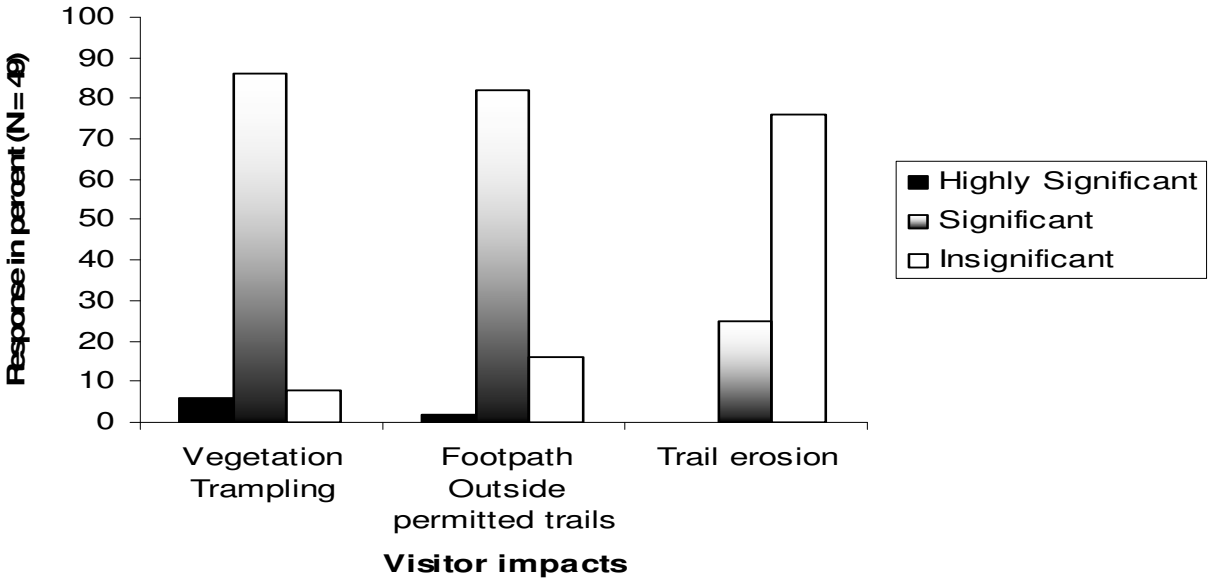

Figure 2b. Perception of visitor use impacts on trails during off-peak tourist season, Isecheno.

associated with trail use in the southern part of the Forest, it focuses on the same impacts but on the northern part of the Forest, Buyangu (Figure 1). Vegetation trampling and soil erosion along trails were perceived "significant" by nearly 50% of the respondents (n = 55, Figure 3a). Footpath outside permitted trails was perceived "significant" by 36% of the respondents. The Spearman rank correlation between footpaths outside permitted trails and soil erosion along trails gave statistical significance with a moderate strong correlation (Spearman rank correlation coefficient = *0.444, α = 0.001, 0.01 level - 2-tailed). Similar results were reported for the relationship between footpaths outside permitted trails and vegetation trampling (Spearman correlation coefficient = *0.376, α = 0.005, 0.01 level - 2-tailed).

Perception of trail use impacts during off-peak tourist season in the northern part of Kakamega Forest, Buyangu

Vegetation trampling and footpaths outside permitted were perceived "significant" by 53 and 71% of the respondents respectively (n = 88) Figure 3b. The relationship between

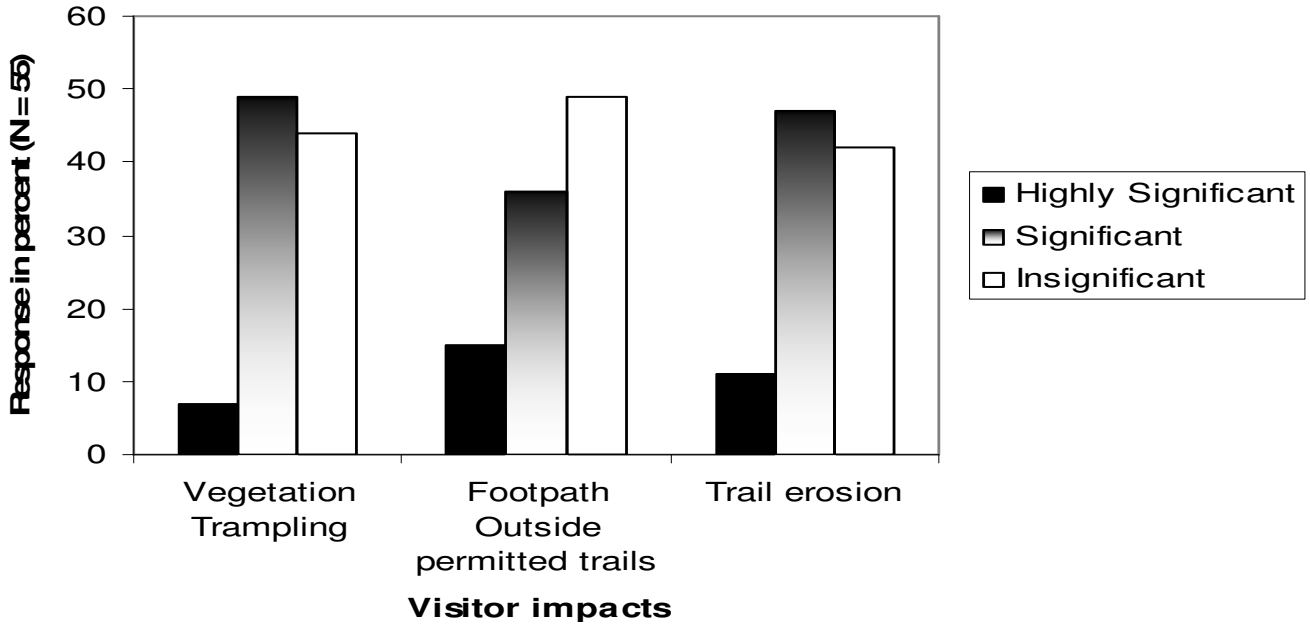

Figure 3a. Perception of visitor use impacts on trails during peak tourist season, Buyangu.

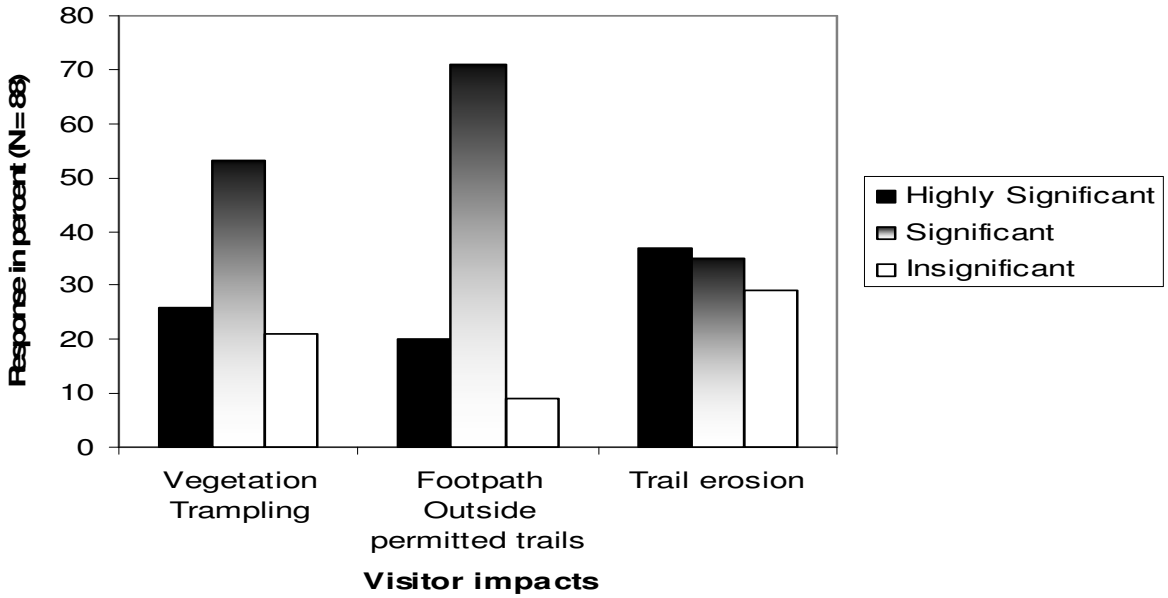

Figure 3b. Perception of visitor use impacts on trails during off-peak tourist season, Buyangu.

these trail use impacts was moderately strong and exhibited statistical significance (Spearman rank correlation coefficient = 0.*326, Level of significance (α) = 0.002, 0.01 level - 2-tailed).

RESULTS AND DISCUSSIONS

Visitor impacts frequently occur at initial or low levels of use, and result in substantial resource changes in localised areas (Hammit and Cole, 1998). Research has consistently demonstrated that all forms of protected area visitation can cause adverse impacts to natural resources, including soil erosion along trails, campsite proliferation, vegetation damage, wildlife disturbance, and water pollution (Leung and Marion, 2000; Marion, and Ferrel, 1998; Obua and Harding, 1997). Such impacts can decrease the functionality of facilities like trails and recreation sites,

increase safety concerns, reduce aesthetic enjoyment and contribute to visitor displacement, create conflict between visitor groups, and increase management costs (Leung and Marion, 2000; Marion and Ferrel, 1998). Trail and recreation site impacts are of particular concern, because trail related recreation activities like hiking and wildlife viewing are popular in developing countries. Also, trails and recreation sites often receive the most intensive use within protected areas (Leung and Marion, 1996; Backman and Potts, 1993). Trail impacts have been well documented, including trail incision, muddiness, and widening (Wight, 1996; Leung and Marion, 2000). Common trail impacts include soil erosion, trail wetness or muddiness, creation of parallel secondary treads and informal side trails, vegetation cover loss or composition change, soil compaction, and trail widening (Cole, 1991, 1993; Leung and Marion, 1999, 2000). Research has shown that vegetation and soil types differ significantly in their resistance and resilience to trail impacts (Hall and Kuss, 1989; Cole, 1995a; Leung and Marion, 2000). This is exemplified in plant species that are highly resistant to impact, such as those in dry grasslands which have the ability to minimize the impacts like trail proliferation and trail widening. Conversely, trail degradation occurs rapidly in less resistant vegetation types, such as forest herbs with tall, stiff stems (Cole, 1995b). Some vegetation types also have low resilience, and require lengthy recovery periods following trampling disturbance (Cole, 1995a).

Considering peak and off-peak tourist seasons in Kakamega Forest, it is evident that perceptional variations on trail use impacts occur. Although soil erosion along trails is positively correlated with formation of footpaths outside permitted trails during peak tourist season, it is not perceived in the Forest as a serious impact during the off-peak season. On the other hand, the relationship between formation of footpath outside permitted trails and vegetation trampling is moderately strong in both parts of the Forest irrespective of the tourism season. This observation may be an indication of the heavy trail use during peak season. Since studies (for example, Hall and Kuss, 1989; Cole, 1995a; Shafer et al., 2000; Liddle and Theyer, 1986; Bell and Bliss, 1973; Kendall, 1982; Liddle, 1973) on the effect of trampling on vegetation and soils show that vegetation and soils affected by trampling will generally recover to some degree, albeit often over a long time, it is possible that the unregenerated condition of the trails make them less attractive for tourist use in the off-peak season. In an attempt to seek for better pathways, tourists walk outside permitted trails thereby trampling over vegetation.

Contrary to expectations, the level of trail use impacts reported in the northern part of Kakamega Forest though not the highest, is particularly disturbing. This part of the Forest is managed as a nature reserve and as such should have a highly regulated resource use. These results tend to generally agree with the findings of Hammit and Cole (1998), Leung and Marion (2000), Marion and Ferrel (1998), Obua and Harding (1997) in which they note that visitor impacts do not necessarily require a high level of use and that all forms of protected area visitation can cause adverse impacts to natural resources, including soil erosion along trails, campsite proliferation, vegetation damage, wildlife disturbance, and water pollution. In this study, the high level of trail impacts reported in the northern part of the forest is attributed not only to tourist visitation but could also be a pointer to illegal use of forest resources (for example, firewood, grass, medicinal plants) by the adjacent forest community. Thus, there is need by the forest management authorities in the northern forest frontier to review the community resource user rights with a view of permitting the adjacent community to have a regulated use of forest resources. This strategy will encourage the forest adjacent community members to use designated trails while collecting forest resources thus reducing the formation of illegal trails. However, this approach will definitely have management implication for the northern frontier of the forest which is currently managed as a nature reserve.

This study has shown that there is correlation among the trail use impacts in Kakamega Forest. The forest authorities should particularly give priority to the management of trail use impacts during peak tourist season as the impacts show a positive and moderate strong correlation in both frontiers. In view of the correlation existing among the impacts, tourist activities taking place in trails perceived to have high use impacts should be dispersed, contained or prohibited in order to enhance the regeneration of vegetation and soils. Additionally, the authorities should mainstream studies similar to the current one in their future management programmes as one way of monitoring trail use impacts in the protected area.

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