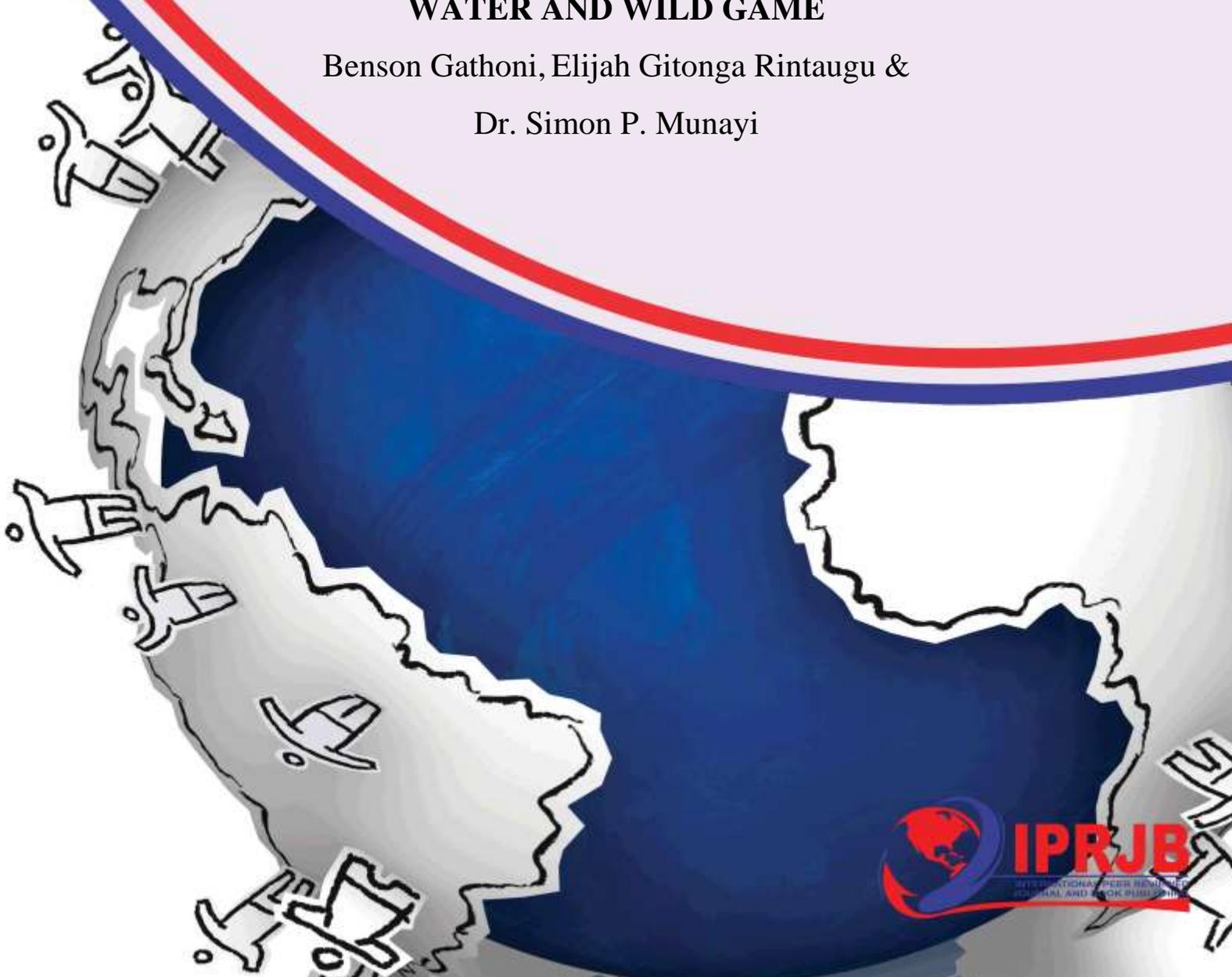


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**EFFECTIVENESS OF THE MANAGEMENT MEASURES  
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RECREATIONAL ACTIVITIES ON VEGETATION, SOIL,  
WATER AND WILD GAME**

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## **EFFECTIVENESS OF THE MANAGEMENT MEASURES UNDERTAKEN TO MITIGATE THE IMPACT OF RECREATIONAL ACTIVITIES ON VEGETATION, SOIL, WATER AND WILD GAME**

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### **Abstract**

**Purpose:** Hiking, climbing and walking have the potential to disturb wildlife and affect soil in a number of ways including trampling, littering, changing animal habitat or degrading soil through use of undesignated trail and trailside management. The aim of the study is to analyze the effectiveness of the management measures undertaken to mitigate the impact of recreational activities on vegetation, soil, water and wild game.

**Methodology:** The descriptive survey research design was used. Out of the three hundred and twenty nine (329) questionnaires administered, two hundred and sixty three 263(79.9%) responded to the questionnaires by completely filling and returning them. Descriptive statistics that included frequencies and percentages were used to organize and summarize the data. Tables and bar charts were drawn to present the collected data.

**Findings:** Proactive planning, change design of facilities and improved maintenance were the most used methods of limiting recreation impact. This is attributed to the check in and checkout procedures, hardening of recreation sites, use of already established trails, designed and established water points. Managing tourism in a sustainable way requires both a long-term perspective and careful consideration of ways in which tourist activities and environment interrelate.

**Unique contribution to theory, practice and policy:** There is need for the ministry of tourism to develop a systematic approach to address environmental conservation threat of recreation activities and come up with management frame works of monitoring visitors' impact in national parks.

**Key words:** *recreation activities, national parks, vegetation, soil, water*

### **Introduction**

National parks are latecomers to Protected Areas (PA) movements (IUCN, 1997). The IUCN has divided protected areas into six categories; strict nature reserve/wildness, National parks, national monuments, habitat/species management area, protected land escapes and managed resource protected area. Throughout history people have been setting aside and protecting areas of natural value. These areas are usually set aside by local communities to conserve environment of value

to them and for recreation purpose. They are also set aside for such uses as fodder during drought, habitats for animals and/or bees or are sanctified for their beauty or calm (Child, 2004). Cole and Marion (2004) noted that hiking, climbing, walking and camping are the most frequent and popular recreational activities conducted in natural areas such as forests, woods and parks. Hiking, climbing and walking have the potential to disturb wildlife and affect soil in a number of ways including trampling, littering, changing animal habitat or degrading soil through use of undesignated trail and trailside management (Ward & Berge, 2005). The magnitude of impact is a function of frequency of use, the type and behavior of use by visitors, season of use, environmental conditions, and the spatial distribution of use. Therefore, the primary management tools involve manipulation of these factors coupled with visitors' education programs that will ensure high quality recreation experience (Platts, 2004). Thus the present study sought to evaluate the park staff and visitors' perceptions on the negative environmental effects of recreation activities with a view to making suggestions for improving the management of the recreation in national parks

Although neither the visitors nor the protected area management (staff) are really trained observers with respect to impact assessment, their opinion and input on usage and improvement of park resources are important. Moreover, the visitors being the consumers of recreation products and the staff being the providers of the same are better placed to give their perception in assessing the impact of recreation product offered on the park environment. Furthermore, the use of visitors and staff perception on assessing the quality of recreation products is not entirely new. Eagle and McCool (2002) suggest that negative effects of tourism on park resource is less influenced by absolute number of visitors, and more influenced by weak tourism policy. Managers of the protected areas worldwide are faced with the challenge of conserving nature and cultural heritage for future generation. Parks managers most commonly address resource and experiential impact through site management actions, which include; enforcement of closures of recreation areas, relocation of recreation facilities, planning of recreation areas, design, construction and maintenance of recreation facilities, and relocation of recreation facilities (Manning, 2003).

The Kenya Forest Service (KFS) and Kenya Wildlife Service (KWS) have a memorandum of understanding for the joint management of selected forests. The Kenya Forest Department has a variety of activities: resource utilization, timber production, non-timber forest products, gene pools, water catchment, and soil conservation. Its regulatory activities are specified in the Forest Act. The KFS manages all the gazetted forest lands. But the responsibility for forestry research falls on KEFRI, which was established in 1986 from what was previously the Forest Research Department of KARI. The foremost problems of the KFS are: insufficient adoption of modern management techniques that could optimize resource use for stated goals; inadequate application of new methods of forest plantation planning and control; failure to design and implement efficient inventory and management information systems; failure to find workable and economically efficient alternatives to the shamba system; inadequate funding for various programmes and activities, inadequate policing; excisions and political interference (Rhino Ark, 2011).

KWS was established in 1989 as a parastatal organization pursuant to expansive amendments to the Wildlife (Conservation and Management) Act- enacted in 1976. Its sole mission is to conserve and protect the environment and to develop a sound foundation for environmentally

sustainable wildlife based tourism. KWS is first and foremost a management agency responsible for wildlife management in parks and reserves, tourism development, security and routine management. It also ensures that parks and reserves have adequate road networks, proper housing and offices, functional plant, vehicles, aircraft equipment and an efficient communication network. KWS has eight regional chief wardens who are key figures in its devolution strategy (KWS, 2009).

KWS also has the legal mandate to enforce wildlife laws and regulations. This mandate includes eliminating poaching, providing security to local and international visitors, safeguarding KWS property and assets, and training security personnel. It has put in place specific security measures to address wildlife crime. KWS law enforcement units work with stakeholders such as ranchers, local communities, and other law enforcement agencies in drawing up and implementing area-specific security strategies to counter poaching threats and other wildlife crimes. These measures include holding regular security meetings with private conservancies and ranchers in the vulnerable areas, joint law enforcement efforts, and wildlife security review and operations covering the entire country. They also have cross-border operations and collaborations to address crimes of trans-boundary nature. These efforts have led to significant improvements in security of wildlife and its habitats, and the guaranteeing of visitor security within protected areas. Wildlife crime threatens sustainable conservation of biodiversity in Kenya national parks reserves (Kamande, 2008; KWS, 2009).

On the other hand, the Ministry of Tourism and Wildlife is charged with overall coordination of the management of tourism and wildlife. Kenya's wildlife resources are protected in a network of National Parks and Wildlife. The Ministry of Tourism and Wildlife aims at, tourism development in general and specialty wildlife-based tourism, which is the most significant sector. KWS has implemented on a lot of activities using income from tourism and related economic activities which are currently major source of revenue. Tourism development has important implications on sustainable development, and management of protected areas. The ministry's role in wildlife management has remained supervisory.

From a management point of view, recreation visitor impacts are significant because they directly reflect management success in meeting two primary mandates: natural-resource protection and provision of recreation activities that satisfies visitors' need. In this respect, visitor impacts need to be managed since; visitor use, negatively affect vegetation, soil, water and wildlife resources as well as the quality of visitor experiences. The vegetation and soil resistance and resiliency can on the other hand influence the type and severity of visitor resource impacts. More organized strategies of dealing with visitors use/impact relationship will serve as evidence of effective resource management by park managers (Okech & Urmilla 2009).

In order to minimize recreation impact and improve quality of visitors experience, a range of direct management strategies have been applied. These strategies include; spread and concentrate use, relocate, proactive planning, site closure, change design of recreation facilities construction and maintenance (Manning *et al*, 2000)

### **Statement of the Problem**

The parks in Central Kenya are recipients of a proportion of this large number of tourists and are subsequently bound to experience environmental conservation challenges. For instance, public campsites at Chinia Falls and at Queen Banda in Aberdares were closed in early 1990s due to

trampling effect on vegetation and soil. The campsites were reportedly reopened in early 2000 (Western, 2000). Recreation resource impact is a valid management concern for both ecological and social reasons. Indeed, previous ecological research has demonstrated that recreational activities can make extensive local impact on soil, vegetation, water and wild game. Recreation resource impacts have also been found to have undesirable social consequences such as visitors' conflict and overcrowding which may affect their recreation experience (Cole, 2001). Recreation experience can also be compromised by the existence of resource impact through their resource functionality, visitors' safety and aesthetic quality (Hammit & Cole, 2003). Also, there are few studies explaining the danger posed by increased tourism to conservation of natural resources in Kenya. Park managers have been striving for knowledge on the cause and nature of impact as well as to assess environmental impact of recreation activity. Hence, there is need for this study. Recreation impact is inevitable wherever recreation use is allowed and park management can only limit, not prevent it. Cumulative impacts in the parks may affect visitors' satisfaction due to unattractiveness or even closure of the recreational sites. This may have negative impact on Kenyan economy since nature based tourism is the largest component of tourism industry in Kenya which account to 70% of tourism earning and 20% of gross domestic product (Akama, 2000).

### **Purpose of the Study**

To analyze the effectiveness of the management measures undertaken to mitigate the impact of recreational activities on vegetation, soil, water and wild game.

### **Methodology**

The descriptive survey research design was used in the study because it did not involve manipulation of variables under investigation but sought to establish the status of the phenomena (Borge & Gall, 2002). The study was conducted in the two designated national parks in Central Kenya region: Mt. Kenya and Aberdares. In Mt. Kenya 3 out of 5 of game parks entry routes were used for study. The routes were: Sirimon route, Naro Moro, Marania. In Aberdares, 3 game park gates out of 6 from Nyeri route were used: Ruhumini gate, Kiandogoro, and Wandere. Also, 2 game park gates out of 4 from Nyahururu route were selected: Rhino gate, and Shamata. The parks are managed by the KWS and the Kenya Forest Service (KFS) which have a memorandum of understanding on their operations (KWS, 2007). Hence, the subjects who were targeted to take part in the study were 103 KWS officers and 80 KFS from Mount Kenya National Park, 80 KWS and 84 KFS from Aberdares. This translates to a total of 183 KWS and 164 KFS officials making a total of 347 staff. Then the daily visitors' record at the entrance was used to target the park visitors in each park.

Stratified random sampling was used to ensure that the KWS and KFS officers in managerial, tour guide, maintenance, and security levels were represented. A proportion of 50% of the KWS officers out of 183 and 50% of KFS officers out of 164 in the two parks were randomly selected through balloting to take part in the study. Out of the three hundred and twenty nine (329) questionnaires administered, two hundred and sixty three 263(79.9%) responded to the questionnaires by completely filling and returning them. Data was coded and analyzed using the Statistical Package for Social Sciences (SPSS) software. Descriptive statistics that included frequencies and percentages were used to organize and summarize the data. Tables and bar charts were drawn to present the collected data. The hypotheses were tested using the

independent sample T-test at 0.05 level of significance. The independent sample T-test is considered the appropriate statistical tool in this case because it was used to check whether there is statistical evidence that the population means are significantly different.

### Findings

The table 1 shows the various conservation measures and the negative environmental impacts they perceived to limit.

**Table 1: Conservation Mitigation Measures and Environmental Impacts they perceived to limit**

Recreation Activity	Spread Use		Concentrated Use		Proactive Planning		Change Design		Improve Maintenance		Stop Use		Relocate		Total	
	n	%	n	%	n	%	n	%	n	%	n	%	N	%	N	%
Soil Compaction	95	69.9	10	7.4	8	5.9	4	2.9	-	-	3	2.2	16	11.8	136	100.0
Littering/ Solid waste	8	5.9	63	46.7	24	17.8	18	13.3	9	6.7	13	9.6	-	-	135	100.0
Water over use/ Water waste	1	.7	6	4.4	49	36.3	15	11.1	46	34.1	15	11.1	3	2.2	135	100.0
Water Pollution	2	1.5	4	3.0	37	27.4	28	20.7	28	20.7	24	17.8	12	8.9	135	100.0
Animal Disturbance	2	1.5	9	6.8	14	10.5	10	7.5	33	24.8	26	19.5	39	29.3	133	100.0
Animal Killing	-	-	2	1.5	5	3.7	4	3.0	5	3.7	109	81.3	9	6.7	134	100.0
Vegetation cover reduction	8	13.2	10	7.4	18	13.2	19	14.0	9	6.6	5	3.7	57	41.9	136	100.0

Table 1, Shows conservation mitigation measures and environmental impacts they perceived to limit. The study found that spread use is perceived to limit soil compaction by 95 (69.9%), while concentrated use reduce littering at 63(46.9%), proactive planning reduce water over use/water waste at 49(36.3%), while change design was perceived to limit water pollution at 28(20.7%), improved maintenance reduced water over use/water waste at 46(34.1%) and the stop use mitigation measure was indicated to limit animal killing at 109 (81.3%). On the other hand there was no response on; relocation on littering, improved maintenance on soil compaction, and spread use on animal killing. The table 4.22 shows the various conservation measures mostly perceived to mitigate environmental impact.

### Conservation Measures Mostly Perceived to Mitigate Environmental Impact

**Table 2: Conservation Measures mostly Perceived to Mitigate Environmental Impact**

Mitigation Conservation Measures	Least used		Not Sure		Most used			TOTAL	
	n	%	N	%	N	%	Rank	N	%
Proactive planning	9	6.7	23	17.0	103	76.3	1	135	100.0
Change Design of facilities	22	16.4	24	17.9	88	67.5	2.5	134	100.0
Improve Maintenance	24	17.9	22	16.4	88	67.5	2.5	134	100.0
Concentrate use	58	43.3	32	23.9	44	32.8	4	134	100.0
Relocate	62	47.3	30	22.9	39	29.8	5	131	100.0
Spread use	72	53.7	24	17.9	38	28.4	6	134	100.0
Stop use	62	45.9	37	27.4	36	26.7	7	135	100.0

Generally, from the Table 2 on the conservation measures mostly perceived to mitigate environmental impact on the resource attribute of the parks, 103(76.3%) of the respondents indicated proactive planning, 88(65.7%), change design of facility and another 88(65.7%) indicated improve maintenance. These were followed by concentrate use indicated by 44(32.8%) of the respondents. Relocation was cited by 39(47.3%), spread use by 38(28.4%) and stop use by 36(26%) respectively.

**Table 3: Mean and Standard Deviation for Staff on Conservation Measures Perceived to Mitigate Environmental Impact**

	N	$\bar{X}$	SD
Spread use	134	1.75	.87
Concentrate use	134	1.90	.87
Proactive planning	135	2.70	.59
Change Design of facilities	134	2.50	.76
Improve maintenance	134	2.48	.78
Stop use	135	1.81	.83
Relocate	131	1.82	.86

The result from the Table 3 shows that proactive planning had the highest ( $\bar{X}=2.70, SD=0.59$ ), followed by change design of facilities ( $\bar{X}=2.50, SD=0.76$ ), improve maintenance ( $\bar{X}$

=2.48,SD=0.78), and concentrate use ( $\bar{X}$ =1.90,SD=0.87). The lowest was spread use ( $\bar{X}$ =1.75,SD=0.87), stop use ( $\bar{X}$ =1.81, SD=0.83) and relocation ( $\bar{X}$ =1.82, SD=0.86) respectively.

The discussion of these findings is presented in chapter five below.

**Hypothesis 1: Ho<sub>1</sub>** – Management measures that are undertaken in the national parks in the central Kenya region have not significantly mitigated environmental impacts of recreational activities in the parks, the hypothesis was inconclusive

### Discussions

Limiting certain aspects was perceived to be the most effective conservation measure to mitigate impact. This study found that spread use was mostly perceived to limit soil compaction. Concentrated use limit littering, proactive planning limit water over use/water waste. Change of design of facility was perceived to limit water pollution, improved maintenance limit water over use/water waste. Stop use limits animal killing and relocate limit vegetation reduction. There was none despondence on: relocation on littering, improved maintenance on soil compaction, and spread use on animal killing. This study found that proactive planning, change design of facilities and improved maintenance were perceived as the most used conservation measures.

Platts (2004) suggest that characteristic of participants influence the interaction between recreation and the environment. Their attitude and behavior can be as important as the pressure of numbers. Most importantly, is that some recreationists are non conservation - conscious and they need more information on conservation mitigation measures while in the parks.

According to Marion (2002) management can be direct or indirect. Direct management involves leaving little room for visitors' freedom of choice. Indirect management attempts are made greatly to influence the decisions and behavior of visitors. On the other hand, Northrope and Higginbottom (2003) suggest two sets of management options or tools to manage recreational use. The first one relates to management of wildlife tourism at sites including restriction of visitors to specific wildlife areas, dispersal of visitors to reduce impacts on wildlife and habitats at sites. The second one is use of more strategic actions such as external regulations (by management), industry self-regulation, and physical alterations to environment to withstand visitor pressure, education and cooperative agreements. Since the Aberdares and Mt Kenya share almost the same geographical factors and challenges for successful management of environmental attribute resources the park management need to apply multiple strategies in limiting recreational impact, more, so the application of the social dimension of impact.

Independent sample t-test were used to examine mean differences between visitors and staff (Ho<sub>4</sub>)- Management measures that are undertaken in the national parks in the central Kenya region have not significantly mitigated environmental impacts of recreational activities in the parks. The hypothesis was not conclusive since it would have required analyzing and comparing each method used/selected against each other by both visitors and staff.

### Conclusion and recommendations

Proactive planning, change design of facilities and improved maintenance were the most used methods of limiting recreation impact. This is attributed to the check in and checkout procedures, hardening of recreation sites, use of already established trails, designed and established water

points. Independent sample t-test were used to examine mean differences between visitors and staff (Ho<sub>4</sub>). The hypothesis was not conclusive.

Therefore, the following recommendations were made;

- There is need for policy makers at the Ministry of Education, curriculum developers at Kenya Institute of Curriculum Development and the schools of Education in Kenya's universities to incorporate environmental impact of recreation activities in their curriculum.
- Managing tourism in a sustainable way requires both a long-term perspective and careful consideration of ways in which tourist activities and environment interrelate. Therefore, there is need for the ministry of tourism to develop a systematic approach to address environmental conservation threat of recreation activities and come up with management frame works of monitoring visitors impact in national parks.
- Tourism based on wildlife is widely assumed to be naturally sustainable. Wildlife tourism can confer many benefits to wildlife, therefore, recreation activities should proceed with caution, to recognize some of the warning signs of trouble. However, Ministry of wildlife should offer some common guidelines and collaboration with all stakeholders to monitor and report changes in wildlife behavior, populations and habitat quality and channel the information to relevant authority so as to have quality wildlife tourism operation.

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