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Ecological Restoration as a Strategy to Ecosystem Conservation and Community Livelihood: A Case Study of Bwindi Impenetrable National Park

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Abstract: The study evaluated the strategies used to ensure the ecological process in Bwindi Impenetrable National park led to the regeneration of the fauna and flora as well as improved livelihood of the host community. The problem was that the ecological restoration in degraded areas was not efficiently done due to poor strategies used which affected the ecosystem regeneration as well as the local community livelihood. The study was guided by the specific objectives; to evaluate the restoration ecology trends of degraded fauna and flora species in the park; to assess approaches used to restore degraded fauna and flora species restored in the park; to ascertain the benefits of restoration of flora and fauna to both the park and the adjacent local community wellbeing. The study also hypothesized that anthropogenic activities had no drastic effect on ecosystem characteristics in the protected areas. The in depth literature reviewed was about the concepts and detailed information about ecological restoration and community livelihood. The methodology was descriptive and analytical while convenience sampling technique was used. The population of study was 60 whereas a sample had 40 households and 10 UWA staff. The data collection tools used included focus group discussions and interviews. The analysis of data was done by ANOVA to understand the extent of restoration and regeneration processes of ecosystems. The key results indicated that some fauna and flora species in the park were restored. The results revealed that specific restoration strategies used to stimulate regeneration had been applied. Additionally the study found out that the local community also benefited as a result of the ecological restoration process in the park. Conclusively, ecological restoration in Bwindi was practiced and has led to recovery of a number of fauna and flora species. It was recommended that the park should involve the key stakeholders in the ecological restoration process.

Keywords: Ecological, Restoration, Livelihood, Community, Strategy, Ecosystem and Conservation

1. Introduction

Ecological restoration involves the process of improving the recovery and regeneration of an ecosystem that had been degraded or destroyed by the anthropogenic activities [2-4]. It is considered as an intentional activity that initiates or accelerates an ecological pathway over time towards a particular state [8]. In the same perspective De Groot et al. [29] argue that ecological restoration goal is to assist the ecosystem in question to be resilient and self-sustaining in terms of structure, species composition, function as well as being integrated into the larger landscape or ecosystem with the capacity to support livelihoods sustainably [20]. In addition a number of healthy ecosystems have been observed to have the ability to provide products and services to humans for over a long period of time [21]. This has been the reason for encouraging the local community participation. In that regard ecological restoration influences conservation of ecosystems and sustainable welfare of the local community [45].

In the same line restoration ecology is looked at as a subordinate element of conservation biology and yet some lines of argument point out that the two principles differ from each other. Conservation aims at staving off extinction that's preserving ecological structures and services which still exist, however endangered they may be [43]. Conversely the core reason for restoration is rebuilding ecological structures and services that have been destroyed [38]. It is also principally concerned with over exploitation and landscapes that ecosystems are to be re-built to encourage regeneration of those destroyed or degraded [44]. A sizeable body of science advocates that restoration can lead to the formation of complex self-sustain interactions between biota, biophysical features and processes that make up an ecosystem [25]. However, continuing environment perturbations by humans has led to some authors to query the notion of recovery [21]. While in the same way others have questioned whether really declarations of intent to restore will actually result in practical restoration of the land degraded [55]. On the other hand, some researchers have signaled that these restorations may not deliver the expected services and improve the welfare of the local community. The argument is that due to complexity in ecosystem dynamics in methods and time required to fully recover may be a hindrance [42, 33]. Further, specialized approached such as compensatory mitigations, endangered species, endemic species as well as time can easily alter ecological restoration [44].

According to Higgs [43], restoration initiates or accelerates regeneration of degraded or damaged ecosystems and at the same time enhances ecological integrity. Restoration also improves complexity of biological groupings including species composition, structures, features and processes that help to sustain the biotic and abiotic elements in an ecosystem for a long period of time [51]. Restoration is sustainable in the long run, which are self-sustaining and resilient and thus they must be consistent with their ecosystem context and landscape setting [54]. Studies further highlight that when intervention is required, it must be able to support traditional practices of local communities and ecosystems [28]. The restoration process should be well implemented to minimize anthropogenic activities over a long period of time and also able to initiate natural processes and services that the ecosystems no longer offer. The restoration ecology intervention should have capacity to support traditional practices of local communities or ecosystems [58].

Anthropogenic activities primarily influence natural ecosystems in the process threaten the sustainable provisioning of ecosystem services [45, 35]. These activities have a long term impact on ecosystems and resilience of human natural systems [23]. More so, research indicates that restoration plays a role to regenerate the current ecosystems to a preferred state and has been observed as one of the few activities that are designed to directly benefit the ecosystems by humans [31]. Man is totally connected to the ecosystems they intend to renew and through this process to natural ecosystems are expected to have an enhanced functionality, ecosystem service improvement, resilience and minimized disturbance [1, 30]. Notwithstanding, the frequency and relevance of restoration in ecosystem regeneration must be taken in consideration. Nonetheless there is tenacious dire gap in terms of knowledge and understanding what successful restoration process involves [22]. Other researchers have voiced their concern over what measurement criteria can be used to determine the success of the restoration whether to use area restored, survival rates of species or the volunteers and improvement on ecosystem services or the improved local community welfare [6].

In that regard more inclusive frame works have been suggested by the researchers that involve the human and natural systems [23, 7]. The socio-ecological system consists of complex intertwined elements, feedbacks between the enhanced ecological environments which are expected to persist or if restored systems can easily revert back to a state of destruction as a result of failure to withstand the drivers of destruction [57]. Sometimes the stimulus of success on the human level to general ecosystem level is not well characterized and usually underestimated. It was argued by Palmer and Buhl [55] that it has been observed for instance in a situation where the restored restoration project fails to enhance the ecosystem structure and function but only motivates the participants and adjacent community to continue working to ensure better environmental change without better services to improve the welfare of the community [34]. Also community involvement in the restoration process helps to strengthen their sense of belonging and ownership and thus welfare [31].

A wide range of forests and forest ecosystems in Uganda play a crucial role in local community wellbeing and natural systems [20]. They provide the ecosystem services such as water cycle, soil protection, carbon cycle and nitrogen cycle. Due to such benefits to the local community, forest landscape restoration has been implemented to assist in reversing the trend of unprecedented deforestation rates [16]. Studies about forest covers have indicated that in the last 25 years the country's forest cover reduced by 50% of its entire forest landscapes and ecosystems [36]. So the government noted that without massive forest restoration, the aim of conservation and protection of the forest cover will not be attainable [48]. The high rate of deforestation is majorly due to the expansion of agriculture and insatiable demand for forest products that include charcoal, timber and fire wood [19]. The forest ecosystems have been further degraded as a result of secondary factors such as rapid population rates and weak forest conservation policies and institutional frameworks [59]. In relation to the above, the government of Uganda pledged to restore 2.5 million hectares of degraded and deforested land by 2020, including the use of most appropriate restoration approaches [46].

Bwindi Impenetrable National Park has had a series of changes in the forest ecosystem due to anthropogenic activities and thus affecting the quality and quantity of ecosystem goods and services [43, 41]. The forest cover trends indicate that forest cover loss between 1954 and 1990

was first assessed in Uganda lands and Survey topographic maps which were derived from 1990 aerial photographs [48]. The trend revealed that the total forest area was approximately 442.7 km^2. However in 1990 the forest cover was estimated to be 324.9 km^2 which represented a reduction in the forest area by 27% over a time period of 36 years [47]. The studies about forest degradation showed that by 1990 there were several pockets of forest that remained and were literally isolated from the main forest of BINP which was not continuous. The highest damage was done in the north west and south west where the rampant deforestation and degradation was done. This was attributed to the high population density around the park of 200-320 persons per km^2 [9, 30].

In line with the above, research by Buijs [16] and Baker et al. [5] highlighted that in 1991 the park was gazetted and upgraded to a national park status and this did not go well with local community. Whilst they felt they were denied access to forest resources and so indulged in degradrading the forest through timber harvesting, logging, firewood collection and charcoal. These activities impacted heavily on the forest ecosystems and thus affected the ecosystem services and wellbeing of the local community [9]. By 2000 the forest disturbance was rampant but the government stringent rules and policies played a crucial role and minimized degradation. Involving the local community and other stake holders reduced greatly the deforestation activities and establishment of revenue sharing [47]. The park management came up with ecological restoration as an approach to regenerate the destroyed forest parts so that they can improve on ecosystem services and local community wellbeing [11, 46]. Currently there is no remaining forest cover around the park due to deforestation. In several areas that border the park have no trees and this has prompted the ecological restoration both in and outside the park [9].

The existence of abundance of biodiversity with several taxa and from then particular mammals of interest have continuously been surveyed and monitored to observe the recovery rates way back in the 1990s [17]. More research indicated that with a lot of effort from government and NGOs the isolated ecology systems in the park have been protected heavily [5]. The trend indicates that with high population density around park has created a lot of pressure on the natural resources around the and inside park on the ecosystems and particularly on dwindling outside forest ecosystems that in some places no longer exist [53]. The over-exploitation of the ecosystems has been attributed to the over 90% of the local community that heavily rely on subsistence farming and estimated to approximately 300 persons per square kilometer [48]. The insatiable demand for agriculture and timber products have of recent threatened the regeneration of the forest areas or patches that had earlier been degraded the ecosystem [60]. To understand well the recovery process and trends of the forest degraded areas, the park has of recent carried out the ecosystem wide survey termed sweeps. These surveys covered the entire park comprising of extreme remote points that are difficult to be patrolled and thus provide a clear view of the ecosystem degradation and recovery [10].

2. Methods

Bwindi Impenetrable National Park is located in the south western part of Uganda and is located at latitude 0°53'S to 0°8'S and longitude 29°35' E to 29°50' E and has got an elevation of 2607 m above sea level while covering an area of 331 km^2. The yearly average rainfall ranges from 1400 to 1900 mm while the temperature ranges from 7°C to 15°C [49]. The park extends in three districts namely Kabale, Kanumgu and Kisoro and border the Democratic Republic of Congo the west. The forest was gazette as the Impenetrable Central Forest Reserve in 1948 [2]. The park is divided into two by the kitahurira-kayonza road that sections it into North and South sectors. Ecologically, the first scientific study on the park ecosystems and the socio-economic activities was carried out by Butynski, 1998. It was officially gazette in 1991 as a national park and majorly to conserve and restore the dwindling number of the mountain gorillas as well as the degraded ecosystem inside the park [61]. As a result of elevating the forest to a national park status, it led to the banning of consumptive use of forest resources which caused resentment amongst the local community [5]. This led to rampant illegal degradation of the forest resources through deforestation, encroachment and poaching. Putting legal framework in place and strong policies have promoted the regeneration of the degraded areas. Allowing regulated harvesting of some forest resources along the boundary and some selected points has enhanced the recovery process [2]. Bwindi forest is an ecologically isolated island of afromontane forest surrounded by one of the most densely populated areas in the region [60].

Recent research reveals that BINP is rich in flora and consists of more than 200 species of plants including 104 species of ferns [17]. Due to diverse vegetation, BINP was designated by IUCN's plant program as one of Africa's 29 most significant forests for protecting plant diversity from further degradation [47]. The name of the forest "impenetrable" was derived from thick dense vegetation of herbs, vines, shrubs and trees that grow at the valley bottoms. The park has got approximately 200 species totaling to about 47% of the entire country are identified and include 12 species which are endemic [10, 50]. Namely; *Allanblckia kimberliensis, Balthasaria schchliebenii, Croton bukobensis, Grewia milbraedii, Milbraedii spp, Guarea mayombensis, Maesobotrya purseglovei, Mamecylon spp., Strombosiopsis tetrandra* and *Xylopia standtii.* In this forest there are two internationally endangered species namely *Lovoa swynnertonii, Brazzeia longipedicellata* and more 16 species that have a very restricted spreading in south western Uganda [9]. Similarly, findings by Kasangaki et al. [47] indicate that some of the plants have been over harvested illegally by the surrounding local community to the extent that some spaces in the park have no vegetation and others are in regeneration stage. The population of the study was 62 whereby it

comprised of 12 UWA staff in addition to 48 households. These were obtained by use of Slovene's formula (N/1+ (Ne^2) where N was the total population, n was the sample, e is the margin of error with confidence interval of 95%, yielded a sample of 50. The sample of 50 comprised of 40 households from four villages each contributing 10 households and 10 UWA staff.

3. The Study Survey Process

The study was carried with the help of research 2 assistants who engaged the respondents through the questionnaires and interviews. The study employed 5 focus groups in the study area to collect data from the local community and each group consisted of 8 respondents in order to manage the groups as well as maximize their input in terms of data required. The survey was designed to collect data from the household within the distance of 100 metres from the park boundary in the sampled study areas. The survey involved interviewing the local leaders as well as the local community in their locality. The process took on average one hour and the research assistants spent 1-2 days in those selected study areas in order to maximize data collection. The language of use was Rukiga and for staff of UWA was English. The sampling technique used was convenience sampling technique. The survey was aided by the park boundary map which involved walking along the park boundary to practically see the ecosystem degradation signs as well as the regeneration ecosystem parts in the designated buffer zones. For better analysis the tools used included the vegetation types, the size of the degraded area, the restores areas, the restoration trend of and income levels at household level as well as employment. Desk review of relevant documents and reports were utilized and information from these different sources was triangulated to corroborate as well as confirm the findings of the survey. The sampling approach involved the use of the villages where degradation and restoration processes have been prominent and these were obtained by use of the National population census statistics of 2010. The villages sampled included those in table 1 below. The study specific objectives were threefold; to evaluate the restoration ecology trends of degraded fauna and flora species in the park; to assess approaches used to restore degraded fauna and flora species restored in the park; to ascertain the benefits of restoration of flora and fauna to both the park and the adjacent local community wellbeing. The study also hypothesized that anthropogenic activities had no drastic effect on ecosystem characteristics in the protected areas.

Table 1. *Sampling frame.*

Name of parish in BINP	Population in parish	Village house holds	Number of households sampled (HH)
Rubuguri	1568	65	$n = \frac{65*40}{240} = 10$
Bujengwe	1220	62	$n = \frac{62*40}{240} = 10$
Nteko	1550	58	$n = \frac{58*40}{240} = 10$
Nyamabale	882	60	$n = \frac{60*40}{240} = 10$
Total		240	40

4. Results

In line with objectives under study, the results indicated that ecological regeneration took place. The findings as shown in Table 2 indicated that L'host monkeys regenerated faster than other fauna by 73%, The fauna that showed the highest recovery rate was the blue monkeys which increased by 85%. Similarly the elephant had regenerated by 38% as well as the rate of habituated gorillas. The results also revealed that gorillas numbers were growing and this was by 25.5% rate. All these findings highlighted that restored ecosystems provided the required food, water and habitats for animals which also led to restored numbers of fauna.

Table 2. *Trends in ecological restoration 2010-2020.*

Regenerated Fauna species	State in 2010	State in 2020	Percentage increase
Fauna			
Elephants *African loxodanta*	45	78	73%
Gorillas *gorilla beringei*	400	490	25.5%
Habituated Gorilla *gorilla beringei*	156	215	37.8%
L' host monkeys *cercopirhicus lhoesti*	180	311	72%
Blue monkey *cercopithecus mitis*	55	102	85%

The findings from the discussion groups indicated that majority 78% of the discussion group respondents agreed that Bwindi forest has regenerated. The groups highlighted that it is observed to be far better that 20 years back in terms of increasing number of animals and flourishing vegetation. The results from the discussion groups also revealed that for example the buffer zone on the side of nkurungo has been expanded from 4 km^2 in late 2000s to the current expanded 12 km^2 long and 350 meters which represented 70% increase and thus promoted the regeneration of the vegetation. The key informants added that for better regeneration and to minimize the degradation of the park ecosystem resources, the management extended the buffer zone for regeneration to 12 km in length and 200 meters in width while the land on

community side covered 12 km in length and 100 meters in width. In addition, the findings from the 22% of the discussion groups argued that as a result of strict rules, in terms of illegal entry in the park the areas that had been deforested for timber were regenerating and gradually covering the cleared vegetation patches.

In addition the majority of Key Informants represented by 85% who included UWA staff highlighted that due to ecological monitoring and mapping done by the park and other partners, the flora of the park has regenerated progressively from early 2010 to date. The majority of the Key informants also emphasized that for stability of the park ecologically, the restoration of the degraded plant species has been on going. The flora species highlighted included; *Rytigynia, kigeziensis, Oceotea usambarensis, artemesia spp, arundeinaria alpine,* parinari *spp,* syzygium *guineense,* ocetea *usambarensis,* albizia *spp,* milletiadura *spp,* canthium *Vulgare,* Ficalhoa *laurifolia,* hagenia *abyssinica,* maespis *eminii, neoboutania* macrocalyx polyscias *fulva and* nuxia, L. *apocynoides congesta.* The key respondents agreed that some of the plant species had been drastically degraded but the park management has put effort to restore them. The results from 15% of key informants agreed that disappearance of some the plant species was as a result of the combined factors that involved anthropogenic activities and invasive plant species such as lantana camara, eucalyptus, Mauritius thorn and tea. However, the key informants also pointed out that a few of the plant species for instance Pardocurpus *milanjianus* disappeared and efforts were in place to restore them back in the forest.

The study results from the key informants indicated that the park authorities had number of approaches they were employing to restore the degraded areas. The majority of the respondents represented by 54% emphasized that the key approach use was the integrated restoration approach which involved putting in consideration the different the different aspects of the environment in order to ensure that the regeneration process was successful. The vegetation degenerated included *albizia spp, milletiadura spp,* Canthium *vulgare* which went through that approach. On the other hand findings revealed that 26% of the key informants agreed that the approach of restricted harvest and replant approach was used. The approach ensured that gaps created due to degradation had plant species replanted as well restricted harvesting of such plant species that were drastically degraded. The results from 13% of the key informants argued that the stake-holders involvement approach in the park was commonly used. The approach involved the key stakeholders namely the local community, the government and NGOs. This approach was believed by the key informant respondents to be more suitable because it gives the stakeholders the sense of ownership of the park resources. The final approach as highlighted by 7% of the key informant respondents was the buffer zone and boundary recovery frontier approach. The park management has put in place buffer zone on the side of Nkurungo to limit encroachment by the local community as well to restrict the problem animals to invade crops of adjacent. According to the respondents, they pointed out that the local community had encroached on the plant species along the boundary inside the park and regeneration was a not possible so the buffer zone allowed them to harvest needed plant resources in buffer zone. Additionally the results they argued that this approach allowed the regenerated parts due to over harvesting to regenerate for example, polyscias *fulva and* Pinus *percula* plant species.

The key findings indicated that due to the restoration processes and regeneration of the ecosystems in the park, the local community derived benefits from the park natural resources. The results indicated that a big number of the respondents 60% agreed that ecosystem goods such as artcraft materials, busket weaving materials, thatching plant materials, water for household use, beans supporting sticks medicinal plants in recent years were easy to find and use. The respondents added that flash floods had reduced and less soil erosion was experienced in adjacent local community. In the same line the results from the respondents revealed that the local community income generating projects had gradually improved and this was highlighted by 25% of the respondents. The results indicated that beekeeping, art-craft making, mushroom farming, cultural dances and agro-tourism has enabled the local community to supplement their incomes and thus reduced the degradation of the park resources and accelerated regeneration of flora. Further, the findings represented by 10% of respondents indicated that as a result of restored ecosystems, more animal numbers have progressively increased. This has created easy access to the food especially the herbivores and also the few predators in the park. This has therefore increased the tourism attractions inside the park that has led to increased number of tourists as well as the foreign exchange and revenue from the attractions. The increased number of tourists also generates the 10% revenue sharing package which was shared among the adjacent local community. Additionally, in line to the above, 5% of the respondents agreed that the improved health of the park and increased tourism activities in the park and the surrounding areas has led to increased employment opportunities and thus improved local community livelihood.

5. Analysis

The analysis-of-variance (ANOVA) table below was used by the study to test the equivalent null hypothesis. The mean= 48, SD= 9.66, F=40.090, $p<0.000$, the null hypothesis that Anthropogenic activities do not affect the ecosystem characteristics in and around the national Parks was rejected, meaning that at least one of the population regression coefficient is not zero. The results indicate that that an increase in the independent variables will result in to a slight corresponding increase in dependent variable.

Table 3. *ANOVA analysis of ecosystem destructive activities.*

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3208.741	3	1069.580	40.090	.000[b]
	Residual	116349.878	4361	26.680		
	Total	119558.619	4364			

a. Dependent Variable: Ecosystem characteristics
b. Predictors: (Constant), plant harvesting, Pole-wood cutting, Firewood collection.

The regression matrix below tests what independent variable is more significant to the dependent variable. The results indicated in Table 4, that Pole-wood cutting and plant harvesting where the most destructive elements to ecosystem characteristics in and around the park. The analysis revealed that the mean= 42, SD = 8.5, F test 40.0, p< 0.001. Additionally, plant harvesting and pole wood cutting were the parameters with highest t-factor as well as the significance of 1.00 and its Beta had a much bigger range than the corresponding standard error. This indicated that there is a strong link between plant harvesting and pole wood cutting with the ecosystem characteristics changes.

Table 4. *Coefficients*[a] *of parameters affecting ecosystem characteristics.*

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	.406	.060		6.799	.000	.289	.523
	Firewood collection	-1.142	.026	-.593	-44.480	.000	-1.193	-1.092
	Pole wood cutting	6.358E-013	.038	.000	.000	1.000	-.075	.075
	plant harvesting	1.736	.032	.836	53.794	.000	1.673	1.800

a. Dependent Variable: Ecosystem characteristics.

6. Discussion

The results above showed that ecological restoration in the park in terms of fauna and flora was drastically recovering and as a result the number of animal and plant species were progressively increasing in richness. These findings were in agreement with the earlier research carried out by Higgs [43] who highlighted that restoration initiates or accelerates regeneration of degraded or damaged ecosystems and at the same time enhances ecological integrity. Restoration also improves complexity of biological groupings including species composition, structures, features and processes that help to sustain the biotic and abiotic elements in an ecosystem for a long period of time [51]. Similarly a number of scientists advocates that restoration can lead to the formation of complex self-sustain interactions between biota, biophysical features and processes that make up an ecosystem [3].

The findings on the approaches pointed to the fact that the process and approaches needed to implement the restoration of the degraded forest area must put in consideration aspects such as the stakeholders, the landscape, the species regeneration rates, policies and involving the local community as agreed by Dinerstein et al. [30]. The findings were in line with those researchers who carried out similar studies. These argue that restoration process should be well implemented to minimize anthropogenic activities over a long period of time and also able to initiate natural processes and services that the ecosystems no longer offer. The restoration ecology intervention should have capacity to support traditional practices of local communities or ecosystems [7]. Studies further highlight that when intervention is required, it must be able to support traditional practices of local communities and ecosystems [51]. Additionally, studies agree that restoration is sustainable in the long run, which are self-sustaining and resilient and thus they must be consistent with their ecosystem context and landscape setting [54]. Studies indicated that currently there is no remaining forest cover around the park due to deforestation. In several areas that border the park have no trees and this has prompted the ecological restoration both in and outside the park [24]. Also community involvement in the restoration process helps to strengthen their sense of belonging and ownership and thus welfare [55].

Study findings indicated that restored ecosystem areas regenerated and improved on the ecosystem goods and services provided as pointed out by the key informants. The results revealed that animal and plant material resources increased for tourism or economic purposes such that the local community were able to benefit through say employment or income. These study results were in agreement with those studies carried out by BenDor et al. [7] argued that ecological restoration goal is to assist the ecosystem in question to be resilient and self-sustaining in terms of structure, species composition, function as well as being integrated into the larger landscape or ecosystem with the capacity to support livelihoods sustainably [22]. In the same way studies indicated that a number of healthy ecosystems have been observed to have the ability to provide products and services to humans for over a long period of

time [34]. Anthropogenic activities primarily influence natural ecosystems in the process threaten the sustainable provisioning of ecosystem services [35]. These activities have a long term impact on ecosystems and resilience of human natural systems [58].

7. Conclusion

In conclusion, the study found out that restoration in bwindi occurred and the management had approaches that enabled the recovery of the flora and fauna in the park. The fauna recovered included the mountain gorillas, Habituated Gorilla *gorilla beringei*, L' host monkeys *cercopirhicus lhoesti* and the African elephants *African loxodanta* among others. The flora that recovered included among others the parinari *spp,* syzygium *guineense,* ocetea *usambarensis and* albizia *spp.* Conclusively, the recovered ecosystems offered more ecosystem services and products that supported the livelihood of the surrounding local communities. To achieve these benefits the park management applied suitable approaches. These consisted of the stakeholders approach that was designed to be inclusive, the frontiers approach which involved establishing the buffer zone. The study also concluded that as much as there was progress in the restoration of the flora and fauna of the park, the process encountered some challenges. The challenges included the perception of the local community, the insufficient funds, the poverty and deforestation as major hindrances. Nonetheless, the park in partnership with other stakeholders put in place mitigation measures such as sensitization of the local community and replanting of the deforested areas in and surrounding areas of the park.

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