Final Evaluation Report

Your Details	
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Project Title	Engaging and Empowering Communities for Sustainable Wildlife Management and Biodiversity Conservation of Nyungwe National Park (NNP), Rwanda.
Application ID	36678-D
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1. Indicate the level of achievement of the project's original objectives and include any relevant comments on factors affecting this.

Objective	Not achieved	Partially achieved	Fully achieved	Comments
Assessing the communities' basic perceptions and knowledge about the chimpanzees' importance and their threats.				This objective was achieved through meeting with the local communities and authorities and park authorities.
Raising the communities' awareness for the sustainable conservation of NNP' chimpanzees and biodiversity.				Awareness raising campaigns on biodiversity conservation, chimpanzee importance and threats have been conducted within different community groups.
Long term contribution and knowledge transfer through trainings sessions offered to different targeted community groups for the sustainable conservation of chimpanzees and other park's wildlife and biodiversity				Different community groups (local leaders, community representatives, religious leaders, students representatives, environmental journalists and science teachers) were trained on the ecological and economical importance of the chimpanzees and the park's biodiversity and wildlife as well.
Raising ownership and creating the future chimpanzees advocates through youth competitions.				The inter and intra schools competitions in singing, painting and poster displays were conducted where the winners were awarded. This activity helped us to assess at which level the students have digested what they were given during awareness raising campaigns.
Improving the communities' livelihoods and minimizing their dependency on the park towards the sustainable conservation of the chimpanzees and the park's wildlife and biodiversity as well.				The project beneficiaries were grouped into cooperatives and trained in poultry farming and manufacturing environmentally friendly cook-stoves. After the training sessions, the created cooperatives became operational. The beneficiaries also got the practical skills in making the productive kitchen gardens to fight malnutrition.

Evaluate the project's contribution in changing the communities' attitudes and perceptions, improving their living standards towards the sustainable management and conservation of the park and its chimpanzees.				A questionnaire was designed to be open ended, and it was administered to the project beneficiaries to evaluate the success of the project and the data were analysed for statistical significance and inferences.

2. Describe the three most important outcomes of your project.

a). Increased level of understanding and ownership, changed attitudes and perceptions: Prior awareness raising sessions, we have conducted the pre-assessment surveys to some communities where open ended questions were asked. We were basically asking them what they think about the importance of the chimpanzees, the park's wildlife and its biodiversity in general, the threats they are facing and how to overcome them. We were also asking them whether there may be any negative effect in case the chimpanzees are depleted in the park. The findings from the pre-assessment survey have shown that the majority of respondents thought that the most importance of chimpanzees is generating income from tourism and source of food. Asked the importance of the park's biodiversity and wildlife, the majority has responded that the park gives them the firewood, meat, rain and oxygen. The respondents added that if the chimpanzees are depleted in this park, there will be a loss in economy as the species is the most visited in this park. They added that there may me the lack of meat as some poachers may hunt them or a chimpanzee can be caught in the snares by accident. After gathering the baseline information, we have started the planned activities and at the end, we have conducted post-assessment survey where we have noticed a significant contribution of the project in increasing the level of understanding, changing the mindset and behaviour and attitudes of the project beneficiaries. The communities were no longer only seeing the chimpanzees as the source of income through tourism or meat through poaching. Instead, they got to know that chimpanzees have various ecological importance such forest diversity and regeneration as well as the establishment of new habitat via seed dispersal. Regarding the consequence of losing chimpanzees in the park, the respondents understood and responded well that this can cause the reductions in carbon storage and ultimately influence the climate.

b). Empower the communities and improved their living standards through creating income generating activities. This project came in the right time where the financial capacity of some communities was decreased due to the Covid-19 pandemic. Before the project, it was harder for the beneficiaries to earn some income that could feed their families and make some savings. But because the project, beneficiaries are gaining the income to feed their families and provide the other basic needs and do some savings.

c). Knowledge transfer for the long-term contribution in managing and preserving the park's biodiversity and chimpanzees as well through training sessions on biodiversity conservation.

d). Environmentally friendly cooking stoves trainer halted risky behaviour of indigenous people who were used to go in the protected forest for searching primary clays to manufacture and produce stoves by identification of secondary clays deposits that have been transported over the years from protected forest through water erosion and deposited in a huge secondary sedimentary deposit of clays accessible to all indigenous people. Local authorities gladly facilitated and granted permission to these groups to exploit identified secondary clay deposits for overall protection of the forest.

This project has touched different community groups and we strongly believe that the skills obtained will be shared with a broad number of audiences and this will bring a positive and long-term contribution towards the sustainable conservation of the park and its wildlife and biodiversity as well. Another key achievement I can highlight is that through the Income Generating Activities (IGAs) created, the project had and will be continuously leveraging the communities' living standards hence reduce their dependency on the park's resources.

The new approach of secondary clays deposits in environmentally friendly stove manufacturing is being shared to REMA (Rwanda Environment Management Authority) for further research and investigation whose finding may help to spread these approaches to all stove manufacturers countrywide to ensure protected forest are safe in the future.

3. Explain any unforeseen difficulties that arose during the project and how these were tackled.

Some of the planned activities were carried out during rainy season where the roads were sometimes impassable due to the landslides. In order to tackle this, we have taken alternative roads even though it was a bit farther.

Heavy rainfall gradually affected the poultry farming for cooperatives surrounding cyamudongo forest within 500 to 2000 m asl that resulted into death of some chickens (cold climate adaptation was the root cause) and the veterinary officer advised us to implement strategies of reducing moisture content into the chicken sheds by increasing additional 2 m space around the poultry shed and setting up an adequate water drainage, then we increased moderated temperature by heating woods when necessary. Chicken dead were replaced by half to contain expenses as chicken supplier covered the loss for first 7days.

4. Describe the involvement of local communities and how they have benefitted from the project.

Without the local communities' involvement, this project's implementation would not be feasible at the same level it was.

From the initial stage to the completion, we have been working hand-in-hand with the communities. The communities were assisting us during the field reconnaissance, gathering baseline information from the project beneficiaries. They were directing us

to the interviewees' houses as they knew the directions, helping us in collecting the data from interviews. The communities were also assisting and facilitating us during the awareness raising sessions where they were helping in setting the venues and facilitating the sessions. They have also provided the seedlings and organic manure for kitchen garden set up and we have acknowledged their ownership and participation in this activity.

Benefits:

- Theoretical and practical skill in poultry farming and being part of the created cooperatives.
- Knowledge about biodiversity conservation; its importance and threats.
- Knowledge about cook-stoves manufacturing and how to make a productive kitchen garden and how to prepare a balanced meal to fight malnutrition.
- Improved living standards through selling and consuming the products from the created income generating activities (IGAs).

5. Are there any plans to continue this work?

Yes, based on how this project and the previous ones have contributed to reducing the communities' dependency on the park's resources, improving their living standards and their attitudes and increasing their level of understanding, I strongly have a plan to continue this work and extend it in the other districts adjacent to the park. My dreams are to create an NGO which will be mainly composed by women and the main reason is that there is a gap in gender mainstreaming in biodiversity conservation field while educating and empowering a woman is educating and empowering a nation. It is in this regard, my future plan through this NGO is to empower and engage as many women as possible in biodiversity related activities through providing capacity building opportunities such as giving them short courses and trainings on biodiversity conservation so that they can be competent in different jobs such park rangers, tour guides, porters and others.

Also, through my organisation, I will be training them in making different handcrafts from wastes and other different IGAs for not only their sustainable and improved livelihoods but also for the sustainable conservation of the park's biodiversity. In addition to these above mentioned plans, I am also planning to teach different communities who didn't have a chance to go to school where they will have a chance to learn some basic communication skills so that they can be able to communicate with the tourists and clients who don't speak our local language. Also, as a female conservationist who is working for Rwanda Cultural Heritage Academy, my last but not least plan is to train the communities in heritage and culturally based fields, highlighting how our ancestors were indirectly preserving the biodiversity in cultural ways through myths and taboos. We will be showing them different plants and animals that were supposed to not be threatened or killed as it was said that if you threatened/killed them, they could cause a big harm to you. My aim is to create a conservation, culture and heritage centre under the NGO which will be previously created, and this centre will be engaging the trained women in receiving and guiding visitors including tourists and students who will be coming for study tours. We plan to start in Nyamagabe district touching the park and neighbouring Huye

district which has good number of tourists coming to visit Ethnographic Museum as the country's mother museum and other tourism products in this district. Our aim is to scale up the project in Nyaruguru district (also adjacent to the park) where females will also be the main project beneficiaries and we will be partnering with different conservation, culture and heritage organisations in Rwanda.

6. How do you plan to share the results of your work with others?

Below are channels that are planned to be used to share our work's results with others:

- Publication of findings in a peer review journal.
- Newsletter and seminar: The CoEB has a bi-annual newsletter where there is room for research and publication and a weekly seminar series where different researchers share their works with a large audience.
- Presentation at national or international conference.
- Presentations at continuing educational in-services and verbal information at local unit meetings and community work.
- Having talk at RC Rusizi, salus radio and Ibinkikije online TV.
- Working with local newspapers as the ideas rooted from the story that I have read in one of the local newspapers. So, sharing this project's findings will be a good way to respond to the issue raised in the story.

7. Looking ahead, what do you feel are the important next steps?

As my dream is to own NGO which will be mainly composed by women I have in my mind different important next steps. The main reason of thinking about women NGO is that gender mainstreaming is a gap while educating and empowering a woman is educating and empowering a nation. It is in this regard, my future plan through my nonprofit organisation, is to empower and engage as many women as possible in biodiversity related activities through providing capacity building opportunities such as giving them short courses and trainings in biodiversity conservation so that they can become competent in different jobs such park rangers, tour guides, porters and others.

Also, through my organisation, I will be training them in making different handcrafts from wastes and other different Income Generating Activity (IGA) for not only their sustainable and improved livelihoods but also for the sustainable conservation of the biodiversity through waste management. In addition to these above-mentioned plans, I am also planning to teach different community groups who didn't have a chance to go to school where they will have a chance to learn some basic communication skills so that they can be able to communicate with the tourists and clients who don't speak our local language.

Also, as a female conservationist who is working for Rwanda Cultural Heritage Academy, my last but not least plan is to train the communities in heritage and culturally based fields, highlighting how our ancestors were indirectly preserving the biodiversity in cultural ways through myths and taboos. We will be showing them different plants and animals that were supposed to not be threatened or killed as it

was said that if you threatened/killed them, they might cause a big harm to you. My aim is to create a conservation, culture and heritage centre under the NGO which will be previously created, and this centre will be engaging the trained women in receiving and guiding visitors including tourists and students who will come to learn in this centre. We plan to start in Nyamagabe district (adjacent to the park) and neighbouring Huye district which has good number of tourists coming to visit Ethnographic Museum as the country's mother museum (created in 1989) and other tourism products in this district. Our aim is to scale up the project in Nyaruguru district (also touching the North-Eastern part of the park) where females will also be the main project beneficiaries and we will be partnering with different conservation, culture and heritage professionals and institutions in Rwanda.

8. Did you use The Rufford Foundation logo in any materials produced in relation to this project? Did the Foundation receive any publicity during the course of your work?

Yes, the Rufford Foundation logo was used on all materials (such as t-shirts, questionnaires, banner, awareness raising materials and awards given to the winners) produced in relation to this project. The logo was used on the project proposal, timeline and budget submitted to the local authorities. For any activity that we were going to carry out, from meeting with the local and park authorities to the project implementation and completion, we were telling the participants that the project has been funded by The Rufford Foundation. This was a good opportunity for the authorities to hear again about The Rufford Foundation as this project is not the first one funded around Nyungwe National Park.

For the project beneficiaries, they were explained in detail about the foundation, what does it do, and we took this opportunity to explain to them about the other projects that the foundation had funded either in or around the park in line with sustainable conservation of our biodiversity and human wellbeing. The project beneficiaries were thankful for The Rufford Foundation's continuous support which improves their living standards and changing their attitudes and perceptions on biodiversity conservation. In their own words, they have said" Tell the Rufford Foundation that we are thankful and grateful for their continuous support".

9. Provide a full list of all the members of your team and their role in the project.

Jeannette Batamuliza: I was leading the project implementation, report and manuscript preparation.
Benjamin Nkurunziza: He was helping in training the formed poultry farming cooperative about how to take care of chicken from the chicks to the mature chicken.

Christian Rugwiro: He was training the project beneficiaries in making environmentally friendly cook stoves.

Yves Rugero: Conducting awareness raising campaigns, taking pictures, pre & post assessment surveys intra schools' competitions, data entry, cleaning and analysis.

Joselyne B Ihirwe: Conducting inter & intra schools' competitions, pre and post assessment survey, awareness raising campaigns and data cleaning.

Marie Louise Ingabire: Conducting post assessment survey, data entry and data analysis.

Claudine Mukazayire: Coordinating the activity of making kitchen gardens, assist in pre and post assessment surveys.

Chantal Nyirabucyeye: Designing the awareness raising materials, generating questionnaires and facilitating awareness raising campaigns.

Rosine Isaro: Facilitating inter & intra schools' competitions and awareness raising campaigns.

10. Any other comments?

My heartfelt appreciation and gratitude to The Rufford Foundation for funding this project and the previous ones. You have truly encouraged me to pursue my dreams of being among the top community and primate conservationists in my country. In Rwanda, the early career conservationists have the brilliant ideas about how to sustainably preserve our biodiversity, but the challenge is the funds to put their ideas into actions. So, when such opportunity is given, this encourages other youth who have either finished their studies or still enrolled in universities. Taking an example from me, I was inspired by a friend of mine who got a funding from the donor, and she was doing an amazing work! I have approached her and asking some advice. Fortunately, she took my hand, mentored me and guided me on how to write a competitive proposal, how to look for donor and other skills. The same now, I feel motivated when some fresh graduates tell me that they appreciate what I do and ask me some advice or ideas about their projects. This honestly touches my heart and I tell them that it is because of The Rufford Foundation because without them, my ideas would stay in my computer.

I am personally thankful for The Rufford Foundation to fund my projects. You honestly gave me the floor as now I have something to share with the audience. I feel excited and encouraged when I receive an email inviting me to speak about my projects findings in different seminars or talks. I couldn't reach this far if I didn't get your support and I will forever be grateful for that, and I can't thank you enough!

ANNEXES

Project Data and Findings Analysis Methods

The initial findings of this project led to the human-driven environmental challenges and natural resources over-consumption in general as we found that data were interrelated. Thus, we considered for models to fit data analysis: Mixed Linear Models of Statistical Package for the Social Sciences (SPSS). Analysis and interpretation only focused on the objectives and goals assigned to this project and strong predictors of a specific behaviour.

Final Data were collected from January 2023 to February 2023 through distance-based stratified random samples. First, relative distances of all villages to the Cyamudongo forest boundary were partitioned using adjacent visual mountains shoves and all the areas were divided into four distance strata: less than 500 meters to more than 5 kilometres of Cyamudongo forest. By estimation at 95% confidence interval and 5% precision level; we purposively considered 20 villages whose at least three distant villages were located in the same stratum. Then, 40 households were chosen for interview in each sample village and the expected responses were 280. The average number of people by households was 4 persons. In each of the selected household, only designed family representatives whose willingness to be interviewed and fulfilling inclusive criteria was accepted to participate.

A questionnaire was designed to be open-ended and included information on (1) Socio-economic variables of targeted people (2) Attitude of local communities towards biodiversity conservation, (3) Level of awareness towards conservation activities, (4) Effectiveness of Income Generating Activities (IGAs) in biodiversity protection and (5) Youth conservation participation status.

Socio-economic variables and awareness level were used as independent variables. Attitudes of local communities and effectiveness of IGAs as well as youth participation in conservation were the dependent response variables.

With respect to stratified spatial boundaries to Cyamudongo forest, variables were recorded and entered into SPSS statistical package software and Attitudes toward the biodiversity conservation were recorded on a five-point Likert: Lowest level of negativity to highest level of positivity. However due to low responses in the two extreme levels, the records were converted into practical three-point scale to avoid bias and maximize better analysis by SPSS; therefore negative, neutral and positive that were late converted into finite continuous variable suitable for generalized mixed linear models.

Youth participation in conservation was measured in binomial responses (fully committed (1) and not committed (2). Furthermore, the effectiveness of income generating activities (IGAs) was initially recorded as three-point scale lately converted into continuous variable by 33.3% basis on evolving scale in order to apply its related weights into generalized mixed linear model.

1. Data Analysis and Presentation

Descriptive statistics were used to understand the nature of collected data and to analyse the frequency distribution of different variables. We performed chi-square analyses to test significant differences between conservation attitudes and youth participation in conservation as well as effectiveness of IGAs implemented through this project. Then, multivariate analyses using generalized linear mixed model were followed to find the contribution of independent variables. For this project, we assumed non-independence of data because of stratification that resulted into an unequal number of villages in each stratum and the number of households' members interviewed. Therefore, the effect of the village was fixed as a random factor in the model building attempts.

To identify factors shaping attitudes of local communities toward biodiversity conservation, we used a generalized mixed linear model by grouping initial hypothetical approach (first level) and predictors retrieved in the model (second level) through previously recorded chi-square tests and related weights in the model. The thresholds for significant level were set at $p < 0.05$ by default.

These findings consisted of 273 respondents whereby (57.9%) were females and 42.1% were males and the majority of respondents (167= 61.2 %) were aged 25 to 40 years old followed by less to 25 years group (98=35.9%).

The less represented group (8=2.9%) was over 40 years. Distribution by occupational status was that 40 people was in group of indigenous people producing and selling stoves made from clays (40=14.7%), livestock (87=31.9%), traditional farming (133=48.7), illegal hunting (7=2.6%) and no occupation (5) accounted for 1.8%. For educational level, only 84 respondents (30.8%) had primary education level compared to 67% without any recognized education level.
Initial cross tabulation of variables was conducted to examine the relationships between variables and the results showed a significant association between gender and effectiveness of Income Generating Activities $\chi^2 = 2.382$, ($df= 2$, $p < .05$), with a higher proportion of females (158) reporting their effectiveness of IGAs in biodiversity conservation compared to males (115). Occupational status also showed a relatively moderate relationship $\chi^2 = 3.824$ ($df = 8$, $p <.05$) with positive attitudes towards biodiversity conservation and poultry farming cooperatives' activities also have shown strong relationship $\chi^2 = 13.718$ ($df = 4$, $p < .05$) for youth participation in conservation.

1.1. Raising Awareness of Biodiversity Conservation through school competition

Biodiversity conservation awareness in schools intended to initiate students on basics knowledge of biodiversity conservation and how impact of human behaviours on the biodiversity issue and steps to be taken to successful conserve.

Methods on schools' children.

Initial competitions were carried out in 6 primary schools and top scorers' students were awarded and qualified for the final interschool competition whereby each school send 4 students. the effect of knowledge, experience and attitude of students towards the awareness of biodiversity conservation were

examined qualitatively by analysing responses provided on self-designed questionnaire. The questionnaire consisted of 4 sub- sections which were awareness, knowledge, experience and attitude. All data were evaluated using 5-point Likert like scale over the range of 1 "strongly disagree" to 5 "strongly agree". A total of 24 respondents have submitted their questionnaire and the results showed that (8/24) realized 83.5 to 87.5% of promising response; (15/24) were in range of 62.5% while (1/24) failed with 4.2%. The overall success for champions of students in primary schools is rated at 71.2 %.

1.2. Generalized Mixed Lineal model output and interpretation

Multivariate analyses using generalized linear mixed model was used to measure the contribution of independent variables as predictors. As stated early, we assumed non-independence of data because of stratification that resulted into an unequal number of villages in each stratum and number of Households members interviewed. The effect of the village was fixed as a random factor in the model building. Two levels hypothetical approaches in models' validation on predictors retrieved through testing and related weights in the model. The thresholds for significant level are at $p < 0.05$ by default except if Walid -Z test; a two -tailed test that shall be divide by two for the model thresholds significance.

For Effectiveness of income generating activities as win alternative solution and by controlling both the effects of household's composition and their spatial positioning to the Cyamudongo forest. Generalized Mixed lineal model provided us with a goodness fit to the data: b=4.76, S.E=6.24, (t=7.620, p<0.001) and Chi-square deviance tests were performed for the purpose of model comparison and deviance chi-square was 59,92 (df = 256, $p < .001$)

Table 1.1 **Type III Tests of Fixed Effects[a]**

Source	Numerator df	Denominator df	F	Sig.
Intercept	1	256	941,045	,000
sex	1	256	23,100	,000
education	2	256	4,012	,019
Occupations	4	256	161,995	,000
Ages range	2	256	2,237	,109
a. Dependent Variable: Income Generating Activities.				

Table1.2 **Estimates of Fixed Effects[b]**

Parameter	Estimate	Std. Error	df	t	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Intercept	4,761649E1	6,248589	256,000	7,620	,000	35,311305	59,921671
[sex=1]	9,656851E0	2,009231	256	4,806	,000	5,700126	13,613576
[sex=2]	0[a]	0	.	.	.	.	.
[education=1]	1,116618E1	4,028060	256,000	2,772	,006	3,233825	19,098533
[education=2]	1,158886E1	4,103312	256,000	2,824	,005	3,508317	19,669407
[education=3]	0[a]	0	.	.	.	.	.
[Occupations=1]	-3,085856E1	3,909820	256,000	-7,893	,000	-38,558062	-23,159051
[Occupations=2]	1,954210E0	3,574416	256,000	,547	,585	-5,084795	8,993215
[Occupations=3]	1,648444E1	3,775364	256,000	4,366	,000	9,049712	23,919162
[Occupations=4]	-8,047037E0	4,672188	256,000	-1,722	,086	-17,247855	1,153782
[Occupations=5]	0[a]	0	.	.	.	.	.
[Ages range=1]	3,274699E0	3,046360	256	1,075	,283	-2,724419	9,273818
[Ages range=2]	4,960138E0	3,002490	256	1,652	,100	-,952587	10,872863
[Ages range=3]	0[a]	0	.	.	.	.	.
a. This parameter is set to zero because it is redundant.							
b. Dependent Variable: Income Generating Activities.							
a. Dependent Variable: income generating Activities.							

Table1.3 **Estimates of Covariance Parameters[a]**

Parameter	Estimate	Std. Error	Wald Z	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Residual	5,982561E1	5,287887	11,314	,000	50,309596	71,141566

According to these findings, the effectiveness of IGAs was predicted significantly by gender of respondents and more females' respondents were more predictors than males to dependent variable b=9.656, S.E=2.009, (t=4.806, p<0.001).

These findings may be partially explained by the fact that women in rural communities acquired financial stability and were the only one who used to go out to search vegetables in the forest to feed their families and any alternatives to leverage the financial status and well-being for their respective family is welcomed by them. Educational level and occupation status were also significant predictors of effectiveness of income generating activities respectively but with variance

effects within groups , the respondents with primary level were significant predictor of the model compared to others b=3.085, S.E=4.103, (t=2.824, p=0.05) while occupational status predicted the model strictly by respondent whose occupation was livestock activities b=3,085, S.E=3.909, (t=-7.893 , p<0.001) and stove manufacturers b=1.648, S.E=3.574,(t=4.366, p<0.001).

The recognition by stove manufactures may be explained by the fact that they have fully access to secondary clays deposits identified for them by trainers as alternative and they are now financially fit with producing affordable and accessible stoves to all. A negative t- test in findings for livestock appraisal would simply reveal their acceptance trends to grazing grounds favouring biodiversity conservation.

Lastly, the age was not found to predict the dependent response variable of the generalized mixed lineal model and the mean variance of the intercept across the groups residuals to residuals was 0.443; therefore the 44.3% of the effects of dependent variable were more likely reflected by these predictors in the model.
Furthermore, Multivariate analyses using generalized linear mixed model was used to weight factors shaping positive attitudes of biodiversity conservation in rural communities surrounding Cyamudongo forest fragment. These include positive attitudes towards chimpanzee, primates and other diverse biodiversity of Cyamudongo forest, by controlling both the effects of household's composition and their spatial positioning.

The outputs revealed the model is statistically fit to predict the dependent variable: shaping positive attitudes on biodiversity conservation and the outputs are presented in the following tables (df=256, F=320.78, p<0.001).

Table 2.1: **Type III Tests of Fixed Effects[a]**

Source	**Numerator df**	**Denominator df**	**F**	**Sig.**
Intercept	1	256,000	320,783	,000
sex	1	256	,003	,959
education	2	256	1,939	,146
Occupations	4	256	,974	,422
Ages range	2	256	4,991	,007
a. Dependent Variable: Positive attitude Biodiversity conservation.				

Table 2.2: **Estimates of Fixed Effects[b]**

Parameter	Estimate	Std. Error	df	t	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Intercept	4,443657E1	1,108843E1	256,000	4,007	,000	22,600416	66,272725
[sex=1]	-,183441	3,565479	256	-,051	,959	-7,204845	6,837964
[sex=2]	0[a]	0	.	.	.	.	.
[education=1]	-1,337190E0	7,147992	256,000	-,187	,852	-15,413544	12,739164
[education=2]	-5,321779E0	7,281530	256,000	-,731	,466	-19,661105	9,017547
[education=3]	0[a]	0	.	.	.	.	.
[Occupations=1]	1,089940E1	6,938168	256,000	1,571	,117	-2,763756	24,562551
[Occupations=2]	9,503347E0	6,342978	256,000	1,498	,135	-2,987715	21,994409
[Occupations=3]	7,025613E0	6,699569	256,000	1,049	,295	-6,167674	20,218899
[Occupations=4]	1,105482E1	8,291029	256	1,333	,184	-5,272483	27,382131
[Occupations=5]	0[a]	0	.	.	.	.	.
[Ages range=1]	1,609892E1	5,405917	256	2,978	,003	5,453190	26,744653
[Ages range=2]	1,682956E1	5,328066	256	3,159	,002	6,337142	27,321986
[Ages range=3]	0[a]	0	.	.	.	.	.
a. This parameter is set to zero because it is redundant.							
b. Dependent Variable: Positive attitude Biodiversity conservation							

Table 2.3: **Estimates of Covariance Parameters[a]**

Parameter	Estimate	Std. Error	Wald Z	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Residual	1,883924E2	1,665169E1	11,314	,000	158,426197	224,026603
a. Dependent Variable: Positive attitude Biodiversity conservation.						

According to these findings, positive attitudes towards biodiversity conservation was predicted significantly within respective groups of less 40 years olds: less 25 years age groups of respondents b = 1.60; S.E = 5.40; (t=2.97; p = .003) and 25 to 40 years groups b = 1,68; S.E = 5.32, (t=3.15; p = .002); Such that young respondents had higher positive attitudes compared to elderly people in communities. However, over 40 years groups were not significantly predictor of positive attitudes on biodiversity conservation.

Sex b = -0.18; S.E = 3.56, (t=4.007; p > 0.958); occupations b = 1.08; SE = 6.93, (t=1.57; p > 0.116 and educational level were not significant predictors of positive attitudes towards biodiversity conservation in rural communities surrounding Cyamudongo forest fragment. This result is promising on this multi-level sample of rural communities where most respondents were recorded as no educational level 67% (N=183) or only basic education such as primary level 29,3% (N=80) for Rwandan population whose majority are young 38,26% according to Population Pyramid of Rwanda in 2023.

Residual intercept for individual differences accounted for a significant amount of the variance in positive attitudes by 21.8% (X^2 = 1.88, p < .001). The effect of age on positive attitudes on biodiversity conservation was moderate (df=256) and not statistically significant pairwise comparisons were observed by Generalized mixed lineal modelling of Residuals. This mean that elder people in the group of over 40 years olds were more reluctant with terms of shaping positive attitudes towards biodiversity conservation by 21.8% if compared to young groups: therefore, evidence of youth participation in conservation initiatives implemented by this project.

2. Conclusion and Recommendations

On the basis of above findings, this project concludes that the overall attitude of community toward biodiversity conservation, chimpanzee, primate and other diverse biodiversity is likely positive with youth participation in conservation initiatives. Income Generating Activities (IGAs) implemented were significantly predicted by gender by female than in males as both educational level and occupational status predicted effectiveness of these IGAs in targeted communities. Alternative solutions were created to decrease pressure on Cyamudongo forest and the whole park as well and specifically chimpanzee and other primate as secondary clay deposits were identified and availed to stove manufacturers (indigenous people who were trained in manufacturing environmentally friendly stoves: affordable and accessible to all).

However, poultry activities faced challenge of climate adaptability with heavy raining for some cooperatives and a continuous monitoring is required for veterinary officers' input and cooperative members. All things considered, the expected goal was achieved through chicken farming to strengthen population commitment of park conservation as currently park-wide observation of primates' density is higher near villages (< 2 kilometres) whose poultry farms are created, crucial signal hunting pressures and other human activities were controlled, no more scare to primates.

Knowledge sharing on kitchen gardens may help in speeding up the practices within villages to contain malnutrition and balanced diet preparation.

Awareness raising campaigns reached all types of people in the communities as they realized and witnessed the potential of biodiversity in poverty reduction, economic development, health, and sanitation and why we must maximize the outcome at all levels of the communities (schools, religious leaders, local authorities, community and neighbourhoods).

Based on findings, the project retained recommendations for Government and the stakeholders as well as for the whole community.

- Commit support to, and engage in, inclusive knowledge-sharing awareness campaigns by targeting all people surrounding protected areas as well as school kids at their early education curriculum.
- Enable rural community ownership of decision-making structures and resource flows mainly from biodiversity protection.
- Implement local initiatives as much of alternative win solutions that consist of Income Generating Activities (IGAs) with a focus on stimulating youth employment whose success decrease pressure on biodiversity.
- Proper management of IGAs created by the project in rural communities to reconcile with development discourse.
- Further research on effectiveness of secondary clays deposits to contain and mitigate the use of primary clays mostly found in protected forest, milestone in decreasing protected forest dependency by stove manufacturers as a need arises to report on the alternative solutions of secondary clay deposits.

Students during awareness raising campaigns.

Awareness raising sessions and announcing the winners.

Chicken in their cages.