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Final report of the research project RSG-21933-1 in Nyungwe National Park, Rwanda

“Assessing conservation efforts, incentives, and current status of threats on the Hamlyn’s monkey and its bamboo habitat in Nyungwe National Park”

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Content

Acknowledgement.....	3
List of acronyms	4
I. Introduction, rationale and project overview	5
II. Status and outcomes of conservation efforts around the bamboo zone of Nyungwe	7
2.1. Conservation programs and activities at Ruheru and Busanze	7
2.2. Surveys of cooperatives and community groups	11
2.3. Park’s benefits to the communities and impacts	13
2.4. Reliance on bamboo and alternatives on bamboo resources	19
2.5. Collaborative networks with transboundary and neighboring districts.....	29
III. Assessing impacts and effectiveness of bamboo planting initiatives	31
3.1. Bamboo planting at the buffer zone of Nyungwe forest, Ruheru	32
3.2. Surveys of bamboo in agricultural field and woodlots	33
3.3. Current threats to the bamboo habitat of Nyungwe and impacts on <i>C. hamlyni</i>	35
IV. Project evaluation and future plans	39
References	44
Appendixes	44

List of figures

Figure 1: Nyungwe National Park and the study sites (Ruheru sector closer to Nyungwe, Busanze sector distant apart, next to Ruheru).....	7
Figure 2: People’s knowledge of past activities at the sites.....	8
Figure 3: Responses on activities that reached to households that participated in interviews.....	8
Figure 4: Views of people on the role of the Park in general	14
Figure 5: Stakeholders of RDB for the protection and management of Nyungwe NP	15
Figure 6: The time when Nyungwe Park’s conservation activities were known by the local communities at Ruheru and Busanze sectors	16
Figure 7: Categories of people who are most unfavored in conservation programs.....	16
Figure 8: People’s views in how to meet a win-win situation between the Park and local people.....	17
Figure 9: Conditions that motivate people's responsibility for Park's protection.....	18
Figure 10: Bamboo uses today in Ruheru and Busanze sectors.....	19
Figure 11: Source of bamboo the local people use	20
Figure 12: Source of bamboo the local people use, comparing Busanze and Ruheru	21
Figure 13: Estimates of households still using bamboo around each respondent household.....	22

Figure 14: Estimates of number of people seen by interviewed people with bamboos in 2017 around Ruheru and Busanze	22
Figure 15: Knowledge or identification of the source of bamboo that people are carrying around	23
Figure 16: Cost of bamboo sourced from the Park	24
Figure 17: Cost of bamboo sourced from community fields	24
Figure 18: Level at which bamboo is valued in comparison to the past	25
Figure 19: The level people perceive change of bamboo use in comparison to the past	26
Figure 20: Decision about the users of bamboo.....	27
Figure 21: The perceptions on options to better value bamboo in comparison to the past	28
Figure 22: Ideas on possible alternatives of bamboo planting in addressing bamboo issues	29
Figure 23 : Reference for the location of different destinations for bamboo products, mainly baskets, fabricated in Nyaruguru district (Busanze and Ruheru sectors)	30
Figure 24: People’s suggestions for an efficient Nyungwe-Kibira collaborative approach.....	31
Figure 25: The zone of the buffer zone of Nyungwe planted with bamboo in 2009-2010 in Uwumusebeya cell, Ruheru sector, Nyaruguru district	32
Figure 26: Photos of bamboos planted in the buffer zone in 2009-2010, (on left) most observed unhealthy and disturbed bamboos, and (on right) one of the few persisting bamboos that remain bushy and hardly visible (photos by T. Nsengiyumva 1-Feb-2018)	33
Figure 27. Map of the visited patches of bamboo in Ruheru sector	33
Figure 28: Arrangements of bamboo within clumps in visited patches (a) and Number of shoots counted in 146 patches visited during the study (b)	34
Figure 29: Relationship between culm and total height (a) and Relationship between total height and DBH (b) showing a positive correlation (Black line).....	34
Figure 30: Ongoing threats around the bamboo habitat of Nyungwe National Park	35
Figure 31: Distribution of the threats as recorded during field surveys in Nyungwe	36
Figure 32: Threats to Hamlyn’s monkeys (32a) and Age of the threats (32b).....	37
Figure 33: Correlation between bamboo cuts and germinating bamboos in the bamboo forest	37
Figure 34: Linking bamboo cut frequency and Hamlyn’s monkey occurrence	38

List of tables

Table 1: A summary of conservation activities and interventions	9
Table 2: Cooperatives surveyed in each sector	11
Table 3: Role of the Park from people’s views, different answers presented in clusters.....	13
Table 4: Agenda of the workshop held on 26 th June 2018 at PIASS for the project in Nyungwe, Nyaruguru district	40
Table 5: Summary of the results from the topics discussed in groups during the completion workshop ...	40
Table 6: Different options for possible future projects	43
Table 7 : List of participants in the project completion workshop	44

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List of acronyms

ANICO: Animateurs de Conservation

BDEPO: Business Development and Employment Promotion Officer (of sector)

BEST: Biodiversity and Environmental Sustainability Trust

CoEB: Center of Excellence in Biodiversity and Natural Resources Management

DASSO: District Administration Security Support Organ

DBH: Diameter at Breast Height

GEF: Global Environmental Facility

NNP: Nyungwe National Park

PAB: Protected Area Biodiversity

PES: Payment for Ecosystem Services

PIASS: Protestant Institute of Arts and Social Sciences

RDB: Rwanda Development Board

RDF: Rwanda Defense Force

REMA: Rwanda Environment Management Authority

RWABASO: Rwanda Bamboo Society

SEDO: Socio-Economic Development Officer (of cell)

UNDP: United Nations Development Program

UR: University of Rwanda

WCS: Wildlife Conservation Society

I. Introduction, rationale and project overview

Nyungwe National Park (NNP) is a tropical mountain rainforest located in south-western Rwanda, and a biodiversity hotspot of the Albertine Rift. Nyungwe is an area of large conservation importance in research and an excellent tourism destination in Rwanda and across eastern Africa due to its large size, pristine habitats, a rich biodiversity, physical characteristics, and conservation efforts. The Park extends to an area of 1013 km² of the main forest block; it is sometimes estimated to cover 1019 km² while including the Cyamudongo, a small forest relict located at 10 km far from Nyungwe forest, and some other associated forest patches such as Gisakura natural forest. Nyungwe is known for its diversity of primates, including ones found on the global list of threatened species such as the ‘endangered’ eastern chimpanzee *Pan troglodytes schweinfurthii* and the ‘vulnerable’ Hamlyn’s monkey *Cercopithecus hamlyni*. A group of Angolan black-and-white colobus monkeys lives in Nyungwe in an exceptionally large group that can be made more than 300 individuals. Nyungwe forest in a Key Biodiversity Area (KBA) and an Important Bird Area (KBA) among few ones known in Rwanda. Nyungwe forest in Rwanda is contiguous in the south to Kibira National Park in Burundi.

Several research projects have been conducted in Nyungwe and Wildlife Conservation Society (WCS) that has established an office near Nyungwe, Gisakura office, since more than the past 30 years and has been triggering more research works and monitoring programs for the long-term management of Nyungwe National Park. RDB is the lead manager and a government authority in charge of NNP. The formerly known Nyungwe forest reserve (status received from 1933) became officially launched as a National Park in 2005, being the third established in Rwanda, after Akagera National Park and Volcanoes National Park. Today there is a fourth National Park in Rwanda, the one of Gishwati-Mukura, established in 2016. Under the status of a forest reserve, Nyungwe forest was managed by ORTPN (Office Rwandais du Tourisme et des Parcs Nationaux) while research activities and monitoring were harnessed under a project PCFN (Projet pour la Conservation de la Foret de Nyungwe) of WCS. Recently, following governmental reconstitutions, Rwanda Government Board took the lead for the management of NNP as a continuation of the existing park management policies.

Among different other activities that have been framed in the collaborative network between WCS and RDB is the research and monitoring for the unique bamboo habitat found in Nyungwe forest where is found a rare and elusive monkey species aforementioned, the Hamlyn’s monkey *Cercopithecus hamlyni*. The monkey is also called the Owl-faced monkey and any of the two common names is used according to preference, but for convenience we will choose to use only Hamlyn’s monkey throughout the rest of this report. WCS initiated a research and monitoring program around the bamboo zone and on the Hamlyn’s monkey in 2003, which was planned to finish in 2009 (Easton *et al.*, 2011). We did not know the information on conservation activities that were conducted on that species or the bamboo habitat before 2003 apart from regular ranger patrols. In 2005, the management of NNP (from a collaboration between RDB and WCS) initiated a transboundary program for Nyungwe-Kibira ecosystems, to increase management partnership between two contiguous forests, one found in Rwanda and the other in Burundi. A ten-year program was planned for the period 2009-2018 (WCS, 2009). We learned about some conservation efforts around the species and knew about the conflicts that arose near the bamboo zone, due to illegal bamboo collection from Nyungwe as the details will indicate in the findings. We documented also some joint RDB-WCS efforts and projects that were deployed at the sites but did not find results about the reduction of threats to bamboo habitat of Nyungwe and to the Hamlyn’s monkey; therefore, in 2017 a project was proposed to contribute in addressing that issue.

The project “Assessing conservation efforts, incentives, and current status of threats on the Hamlyn’s monkey and its bamboo habitat in Nyungwe National Park” started in late dates of July 2017 funded by Rufford Small Grants under the Rufford Foundation was implemented in Rwanda. The project was initially proposed for a duration of 10 months and took place in the south-eastern part of Nyungwe National Park. The zone of our study lies close to the border of Burundi and the bamboo forest of the Park is located in the transboundary zone of the Park connecting Nyungwe (in Rwanda) and Kibira (in Burundi) National Parks. The project formally started on 24th July 2017, referring to the time of first day on the field and first contact with local collaborators for data collection.

The organization leading the project is Biodiversity and Environmental Sustainability Trust (BEST) which has office in Huye district, Rwanda and is operating since 2014 (www.bioenviron.org). The project team included a project leader, a project assistant, a local assistant and guide, and three students hosted and supported by the project. The three students were from the University of Rwanda (UR) department of Biology and two of them conducted their professional internship in the project at its beginning. The students were funded by this project for final research projects. Three topics were discussed and assigned for the students to conduct their final research projects as follows:

- Constantine Mukarukundo, Zoology option, Biology department, UR: *Assessing conservation efforts and actions on the Hamlyn’s monkey and the bamboo habitat in Nyungwe National Park*
- Theogene Nsengiyumva, Botany option, Biology department, UR: *Evaluating impacts and effectiveness of incentive strategies for bamboo habitat protection in Nyungwe National Park*
- Laurent Twizeyimana, Zoology option, Biology department, University of Rwanda: *Status of threats to the Hamlyn’s monkey and the bamboo habitat in Nyungwe National Park*

The data were collected both as primary and secondary. Secondary resources of data were explored for extensive documentation on past conservation activities. While the initial proposal mentioned the objective to cover three sectors of Nyaruguru district that were considered influential on the bamboo zone of Nyungwe, we later learned from the situation of the field and the conservation attention at the sites, then selected only two of them, namely Ruheru lying just adjacent to Nyungwe and Busanze not touching to the Park but with intense influence on the bamboo because of the trading of bamboo products. Any change to the study design and data collection was discussed with RDB as the management lead authority for the Park, with WCS also involved. The areas surveyed include households, community groups, community fields, buffer zone and the bamboo forest of Nyungwe. Interviews to households, meetings with community groups, focus group discussions, bamboo field surveys, and field work in the bamboo zones were the main methods used for data collection in this project. With community-based surveys, we selected five cells (3 out of 5 in Ruheru and 2 out of 5 in Busanze) on basis of the prevalence of concerns about bamboo. In each cell we selected all villages; all of them had 5 villages except one in Busanze sectors that had 6 villages. As in each village 6 households were selected at random based on records of households kept in cell’s offices, we had in total 156 households interviewed.

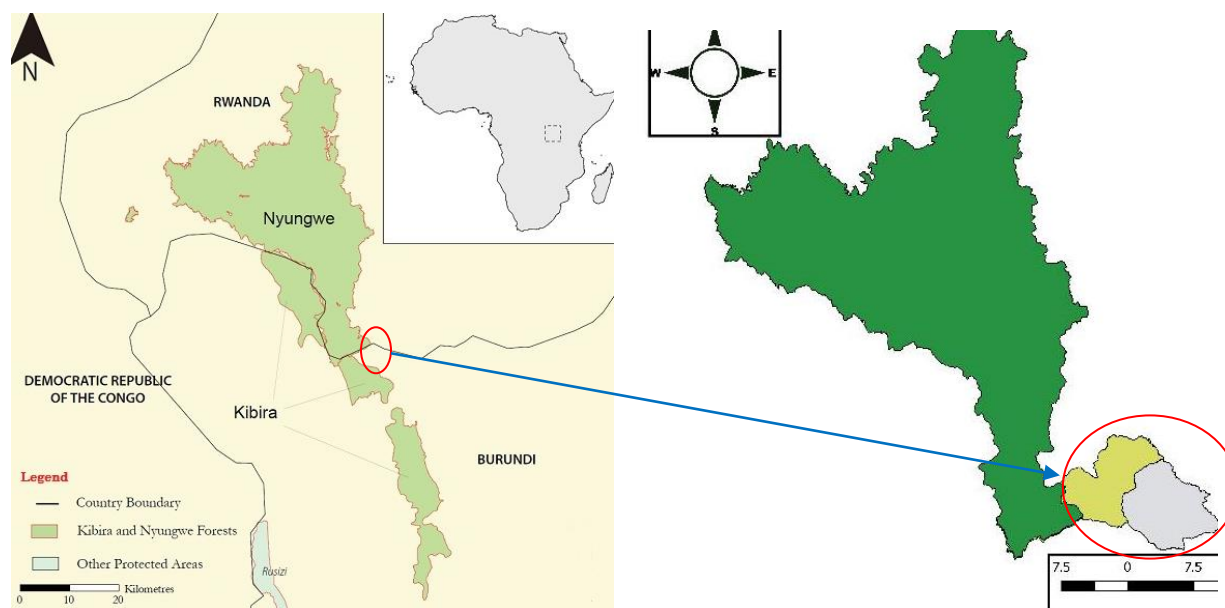


Figure 1: Nyungwe National Park and the study sites (Ruheru sector closer to Nyungwe, Busanze sector distant apart, next to Ruheru)

II. Status and outcomes of conservation efforts around the bamboo zone of Nyungwe

2.1. Conservation programs and activities at Ruheru and Busanze

People's knowledge of past conservation programs and activities at the sites was investigated before using supplementary sources and observations. The findings from interviews indicated that people know various activities that occurred at the site linked with the Park's conservation (Figure 2). There are small differences in the frequency of each two successive activities, but some activities were less known to communities than others. The first activity to be most known by the people is about conservation education programs (23.69%) and the second is infrastructures (20.11%). While the total responses give different answers, the situation is characteristically different for the people living in Ruheru with those living in Busanze except for the first two activities. For example, revenue sharing, community groups and bamboo plantation are much little known in Busanze in comparison to Ruheru.

We asked the people which ones impacted them. Different responses were given, which actually will not be representative for all the people but will give a general picture on how different activities have reached to people. Among the 156 people surveyed, 4 of them mentioned that they did not know any past conservation activity conducted at the site (Figure 3). Most people know conservation education as a program that has reached to them. For comparison between the two sectors, all interviewed households at Busanze don't know anything that reached to them but community education, but people at Ruheru have different other activities, including infrastructures, efficient cooking stoves and cooperatives.

We made an extensive documentation and exploited all secondary sources supplemented by observations and direct field information. We found different conservation programs that have been operated at the project site. Among those, we selected the ones that direct link with the conservation of Nyungwe National Park and the role of the community in addressing the challenges regarding bamboo conservation. We attempted a comprehensive insight into all possible relevant activities, with each discussed separately.

Most information available was dated from 2005, the time when Nyungwe became a National Park. Information before 2005 was not seen in the literature except where noted 2003 for WCS; no other noticeable conservation activities before 2005 were highlighted with our surveys. For simplicity, we present those programs in a table with a summarized description for each item (Table 1).

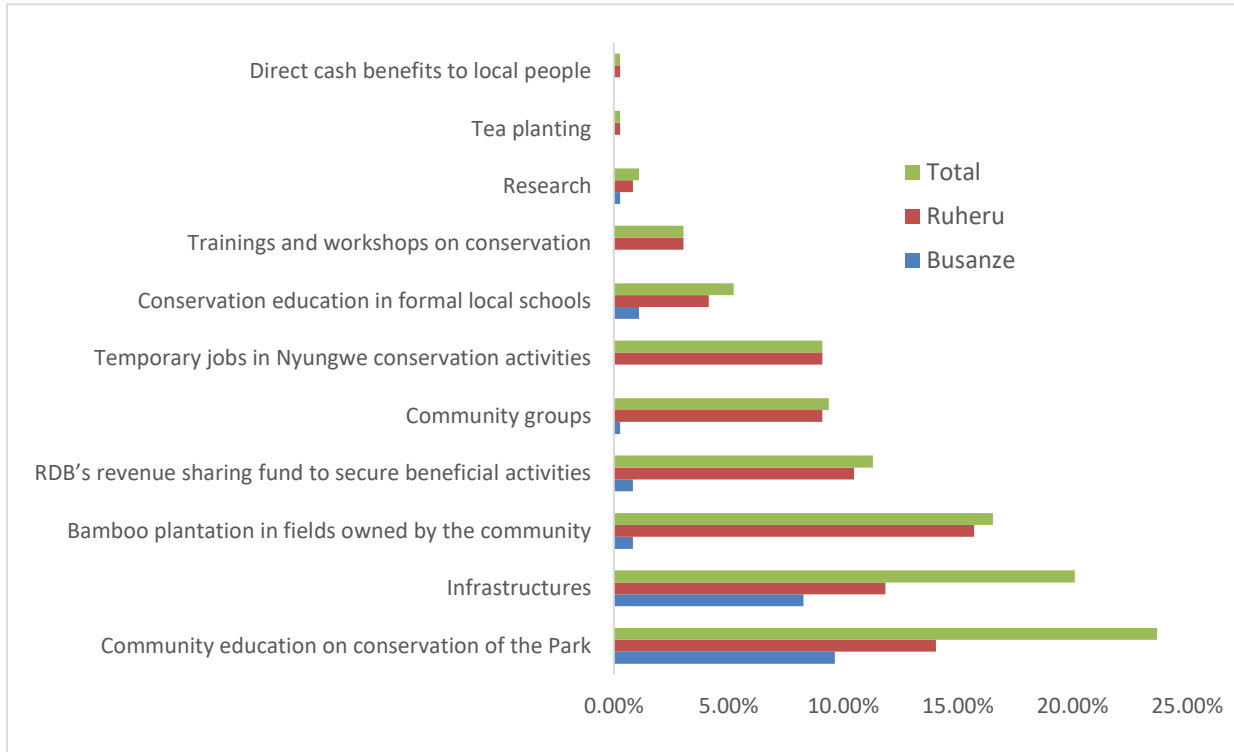


Figure 2: People's knowledge of past activities at the sites

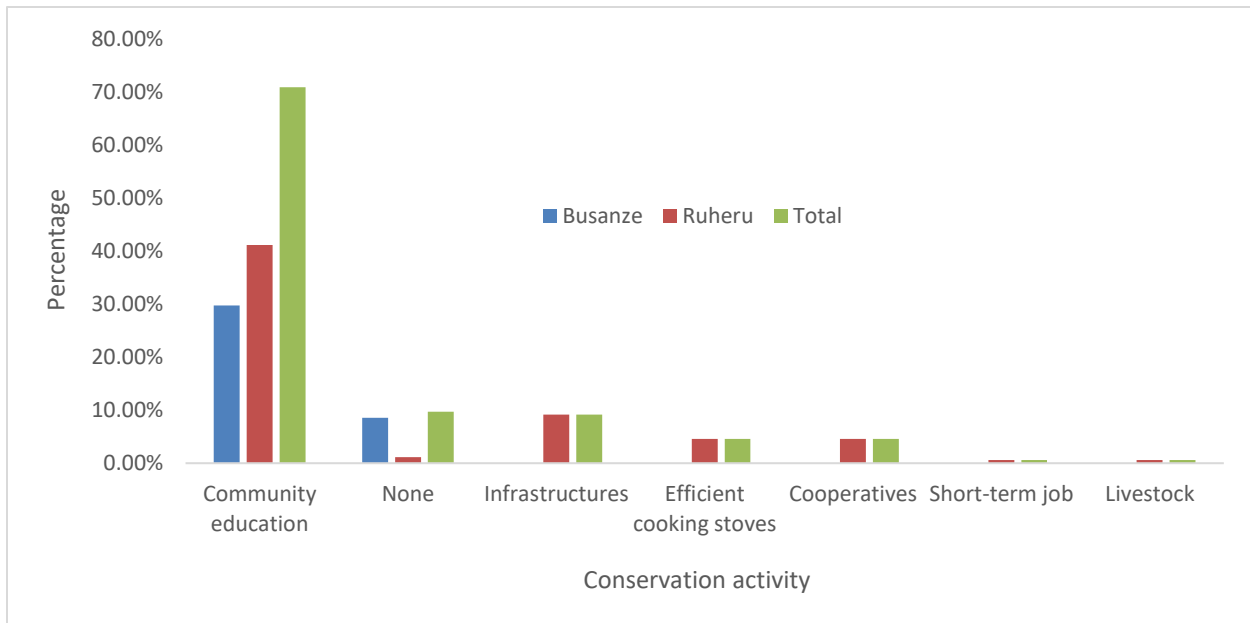


Figure 3: Responses on activities that reached to households that participated in interviews

Table 1: A summary of conservation activities and interventions

	Program or activity	Description	Time
1	Research works in bamboo zone and Ruheru communities	Research and monitoring program of WCS in the zone of bamboo habitat and <i>Cercopithecus hamlyni</i> . Under those activities, the publication of Easton <i>et al.</i> (2011) provided baseline data on the relative abundance and distribution of the owl-faced monkey and the level of current threats in Nyungwe	2003-2009
		Research memoir by Nicolas Ntare, under the funding of WCS : « Contribution à l'étude écologique du régime alimentaire et du comportement de <i>Cercopithecus hamlyni</i> de Nyungwe »	2007
		Research memoir by Emmanuel Ndayisaba, under the funding of WCS : « Etude socio-économique da la coupe des bambous et de son impact sur le <i>Cercopithecus hamlyni</i> au Parc National de Nyungwe »	2008-2009
		The research entitled “Influence of bud position on mother stem and soaking duration on sprouting of bamboo cuttings” in the buffer zone of Nyungwe at Ruheru sector (Ntirugulirwa <i>et al.</i> , 2012)	2007
		The research explored the potential for payments for ecosystem services (PES) to reconcile conservation and development goals, using a case study of Nyungwe National Park in Rwanda (Gross-Camp <i>et al.</i> , 2012). Of the 8 cells used in the study, two cells in Ruheru sector were selected, namely Ruyenzi and Uwumusebeya	2009
		A “Baseline study on bamboo development potential around Nyungwe National Park” for Sustaining biodiversity conservation in and around Nyungwe (ARECO, 2012). Conducted in Ruheru, Busanze and Nyabimata sectors. This study selected Ruyenzi, Uwumusebeya and Remera cells in Ruheru	2012
2	Projects targeting bamboos: RWABASO ¹ , PAB ² , Tumwesigye	Project for enhancing biodiversity conservation and livelihoods' using bamboo at Nyungwe National Park farmers' individual plots, Nyaruguru district, Southern Province (RWABASO, 2010); more than 14,000 seedlings of bamboo were planted in farmers' individual plots in December 2009 and January 2010	2009-2010
		“Strengthening Biodiversity Conservation Capacity in the Forest Protected Area System of Rwanda (PAB) Project” (Kisioh and Bizuru, 2012); around 9,000 bamboo seedlings were planted in the buffer zone of Nyungwe at Ruheru in 2010 by GEF/UNDP/REMA/PAB project (RWABASO, 2010)	2007-2012
		Trans-boundary conservation of <i>Cercopithecus hamlyni</i> , <i>Apalis argentea</i> , <i>Phodilus prigoginei</i> , and their habitat along Nyungwe-Kibira landscape (Tumwesigye, 2014); this project offered	2013-2014

¹ RWABASO: Rwanda Bamboo Society

² PAB: Protected Area Biodiversity

		workshops (at inception and completion), trainings for bamboo growing, and rewards to best bamboo growers at Ruheru	
3	Revenue sharing programs of planting bamboo	‘Imbere Heza’ cooperative located in Busanze sector was supported by the RDB revenue sharing program to propagate bamboo in community fields and woodlots	2010
		COAIBU ³ cooperative, located in Remera cell, Kivugiza village was supported by the RDB revenue sharing program to propagate bamboo in community fields and woodlots	2014-2015
		‘Turengere Ubuzima’ cooperative located in Uwumusebeya cell was supported by the RDB revenue sharing program to propagate bamboo in community fields and woodlots	2016
4	ANICOs ⁴	RDB and WCS initiated an association of “Animateurs de Conservation” (ANICOs) for linking Park managers with local community and motivating the people to stop illegal activities and take responsibility in informing about ingoing threats to the Park; at Ruheru sector there are 3 ANICOs	Since 2011
7	Community programs and incentives	WCS provided efficient cooking stoves to communities to reduce fuel wood costs and pressure for firewood collection in Nyungwe	2017-2018
		WCS and RDB created the initiative of financial support groups among the community members, to promote mutual financial support through shares, interests, and short-term loans	2016-2017
		WCS conducts community education activities in different categories of the community and to the cooperatives, while promoting environmental clubs in formal schools	Unspecified, before 2003
8	Transboundary collaboration	Ten-year transboundary strategic plan (2009-2018), Nyungwe-Kibira (WCS, 2009); on the side of our project site, it focused on a better monitoring of the bamboo, a preferable habitat for the endangered Owl faced by organizing joint patrols and sensitization programme in the two countries, as well as organizing study tours and exchange of experience	Initiated in 2005

The number and relevance of the different initiatives that were undertaken at the sites for the protection of bamboo habitat of Nyungwe are sufficient to ensure that proper actions addressed the objectives that were intended. However, the outputs and outcomes from those activities are not evident for most of the cases, either revealed with direct observations in the field and in the documentations. Substantial research works were conducted at the site but many of them are not presented in scientific publications and dissemination of results has not been effective as they seem to be scarcely mentioned in further documentations. Some of the mentioned programs were characterized by gaps in their implementation or results, thus leading to failure to take proper effect; for example, all three projects for bamboo propagation around the study sites (2 at Ruheru and 1 at Busanze) did not produce good yields. The real reasons for some bamboo project failures need further investigation; while inadequate handling of seedbed preparations and planting techniques can be ones of the reasons (Tumwesigye, 2014), lack of careful project preparation and monitoring after implementation can be other aspects of failures.

³ COAIBU: Cooperative des Agriculteurs de bambou

⁴ ANICOs: Animateurs de Conservation

In general, the different activities that were undertaken at the sites to complement RDB staff in the management of the Park including law enforcement and community-based programs could have direct effect on the issue of bamboo. In most of the cases, there was lack of monitoring, long-term plan on outcomes or contribution to other works, dissemination and publication of information, careful analysis of stakeholders, and integration into governmental policies. On the last point for example, we know that in Rwanda there was a ‘Bamboo policy’ (GoR, 2011), an environmental management policy regarding bamboo only. If the projects were implemented under the framework of that policy, or if the concerned agencies were actively involved, the results should have been better. Despite the gaps noticed, we witnessed that the volunteering ANICOs are working enthusiastically and are contributing with an insightful visibility towards a better management of the Park regarding illegal activities around the bamboo zone, while linking the Park and communities. Those important Park’s collaborators need continued technical support, regular assistance, and active integration in the matters of the human-wildlife conflicts in order to be more efficient in their responsibilities.

2.2. Surveys of cooperatives and community groups

In the surveys, we found seven cooperatives and three conservation clubs from primary schools in the sectors of Ruheru and Busanze. 8 of those active conservation-based groups are found in Ruheru sector, while only 2 cooperatives are found in Busanze. We are noting here only groups that have link with the conservation of Nyungwe in their core objectives. The cooperatives that have received support for projects under the RDB’s revenue sharing programs were indicated in the previous section.

Table 2: Cooperatives surveyed in each sector

Cooperatives	Mission	Cell and village	Members	Year created
COAIBU (Cooperative des Agriculteurs de bamboo)	Promotion bamboo and bamboo products	Ruheru, Remera, Kivugiza	30	2013
COOGIRU (Cooperative Girubuzima Ruheru)	Production of bricks and clayed tiles	Ruheru, Uwumusebeya, Yanza	81	2010
Nyungwe Nziza Ruheru	Honey production	Ruheru, Ruyenzi, Rukarakara	22	2014
Impuzaruvumu	Honey production; has different sub-groups both in Ruheru and Busanze	Ruheru, Ruyenzi, Ruyenzi	79	2004
Club de l'environnement	Environmental education	Ruheru, Remera, Kivugiza	36	2013
Club Protection de l'environnement	Environmental education	Ruheru, Uwumusebeya, Yanze	80	2016
Club Turengere ibidukikije Gakaranka	Environmental education	Ruheru, Uwumusebeya, Gakaranka	185	2000
Urugero Busanze	Agroforestry and environmental protection	Busanze, Nkanda	17	2013
Imbere Heza	Bamboo propagation	Busanze	38	2010
CODURU ⁵	Honey production	Ruheru, Kabere	54	2012

⁵ This was mentioned as we knew about it, but it is not operating in one of the 5 cells we selected

Those cooperatives and clubs were created from 2000 to 2016 and are dedicated to the conservation of natural resources in Nyungwe. They act for that purpose by providing opportunities to create resources within community's lands (e.g. bamboo production or tree planting), creating alternatives (e.g. job opportunities, improved livelihoods), or enticing people for ownership of conservation (e.g. through conservation education). The mean for each cooperative is 59 persons (17-185 persons). All the cooperatives and environmental clubs are still functioning and have committee staff. Among the eight cooperatives, we found only three with permanent offices. For others, they choose occasional venue to convene for meetings. COAIBU, Imbere Heza and COOGIRU received Revenue sharing support, the first two for propagating bamboo and the last for a brick-making enterprise for minimizing the need of trees and bamboos in construction. Different actions noted across the different groups include community development through saving and credit, bamboo dissemination, agricultural improvement and food security, livelihood through small-scale businesses such as bricks and roof tiles, mobilize and advocate for the conservation of Nyungwe, promote and conserve the biodiversity, agro-forestry production, increase honey productivity, sell bamboo products, encourage youth's participation in conservation, biodiversity awareness, greening schools, and restoring degraded forest lands.

For the cooperatives to be active, as economic status group, it is important to have source of fund and any other kind of arrangement between its members to sustain its functionality. They mentioned some sources including: saving of 100 RwF to 2500 RwF by person per month (depending on the size, cooperative's objectives and the will of its members), support from donors, founder and government entities (revenue sharing and aid, support of books and bag), fines or charges when member is not presented in meeting or in activity of the cooperatives, money from the products they harvest or produce (honey products, bamboo products), and interests from the credit and project they do. The role of cooperatives can extend beyond its members and the people may benefit from different activities undertaken by the cooperative such as buying community materials (hives, bees or bees with entire hive), conservation education (community education, kids in conservation education), workforce provision or job creation (bamboo cultivation, handcraft, distribute seedlings, brick and roof-tile construction), and product delivery (buy honey as medicine or for food, selling fruits, tree saplings on small price).

The cooperatives improve the local livelihoods and have good record in relation to their objectives. Some cooperatives give the bonus to its members each year or pay health insurance to its member, others participated in schools greening or buy livestock to its members (goat and pig) or buy property (buy house for rent, buy land), buy some equipment to its members (portable telephone, mattress, their own hives), behavior change toward conservation (mindset of their past thinking, plant eucalyptus or avocado, grow vegetables), help to access to financial means (increase money in the pocket, save and credit). It is also witnessed that cooperatives have other achievements which are not relevant to their basic objectives, including; support to FARG and National Electoral commission; support genocide memorial event; buy uniform, notebook to some students; roofing some houses for poor people to eradicate Nyakatsi; paying health insurance; support other cooperative members when they lost their relatives, renting house for poor people, give honey freely to some people for medication.

The cooperatives can contribute to the management and conservation of Nyungwe in the way that they mobilize people that collecting natural resources is harmful to the park, share the message of protecting the forest, participate in firing off the forest when it is burned, distribute bamboo shoots to local people, stop grow bees in park or even buffer zone, participate in raising awareness on conservation and report to

the leaders when poachers are seen from the park. While the cooperatives have economic and environmental potentials, they face some obstacles that stop their basic objectives and activities to go forward. The main challenges are the poverty or inadequate capital (30%), information, training and awareness (20%), and low skills in bamboo maintenance (10%). While other obstacles seem to have low percentage, they can affect the cooperatives management and planning strongly (shortage of grant, lack of pasture for bees, lack of market for their honey, equipment stolen or damaged...).

Overall, we noticed that the cooperatives and community groups are operating but the functioning has a slow progress and achievements are not clearly visible for most given the time they have been established. As it was realized in the field, the cooperatives that received financial support to initiate projects under revenue sharing program were not satisfactorily successful in the implementation and results that came out, namely the two projects of bamboo propagation for COAIBU and the one for brick-making enterprise. As it can be seen, cooperatives and relevant community groups need technical and financial support in order to be more efficient in their responsibilities.

2.3. Park's benefits to the communities and impacts

People were asked about the role of Nyungwe in general. The responses were diversified and after collecting them, we categorized the responses into 5 groups (clusters), namely Climate regulation and healthy surrounding environment, Livelihood improvement and interventions, Useful raw materials and products, Conservation benefits and wildlife protection, and Development achievements. 12 people (4.62%) of the responses of the people did not give any answer to the question, while 1.54% (4 people) showed that there is no benefit known from Nyungwe. The different roles (clusters) are presented and the responses given to the questions are indicated as role sub-categories (Table 3).

Table 3: Role of the Park from people's views, different answers presented in clusters

Role of the Park	Role sub-categories	%	
Climate regulation and healthy surrounding environment (59.62%)	Rainfall	34.23	
	Fresh air	16.92	
	Health security	3.85	
	Security	2.69	
	Agricultural improvement	1.15	
	Clean water provision	0.38	
	Climate regulation	0.38	
	Rainfall	34.23	
	Cash incomes	13.46	
Livelihood improvement and interventions (20.38%)	Efficient cooking stoves	2.31	
	Revenue sharing	1.54	
	Community support	1.15	
	Capacity building	0.77	
	Livestock	0.38	
	Health insurance	0.38	
	Cooperatives	0.38	
	None	0.38	
Useful raw materials and products (8.46%)	Firewood material	3.08	
	Utilizable materials	1.54	
	Medicinal plants	1.15	
	Fodder	1.15	
	Roofing materials	0.77	
	Honey	0.38	
	Household materials	0.38	
	No answer (4.62%)	No answer	4.62
	Conservation benefits and wildlife protection (3.08%)	Wildlife protection	1.92
		Wildlife shelter	0.77
Development achievements (2.31%)	Park's value	0.38	
	Infrastructures	1.54	
None (1.54%)	Socio-economic development	0.77	
	None	None	1.54

By combining responses in clusters, the findings show that 59.62% of the responses from the local people under surveys stress climate regulation as most known role of Nyungwe forest; livelihood improvement and interventions (20.38%) which follows in nearly 1/3 in occurrence (Figure 6). 12 interviewees did not find an answer to the question, while only 4 people mention that they do not perceive any role of Nyungwe. It is worth mentioning that 8.46 consider that Nyungwe provides useful raw materials they need in their households and other business matters.

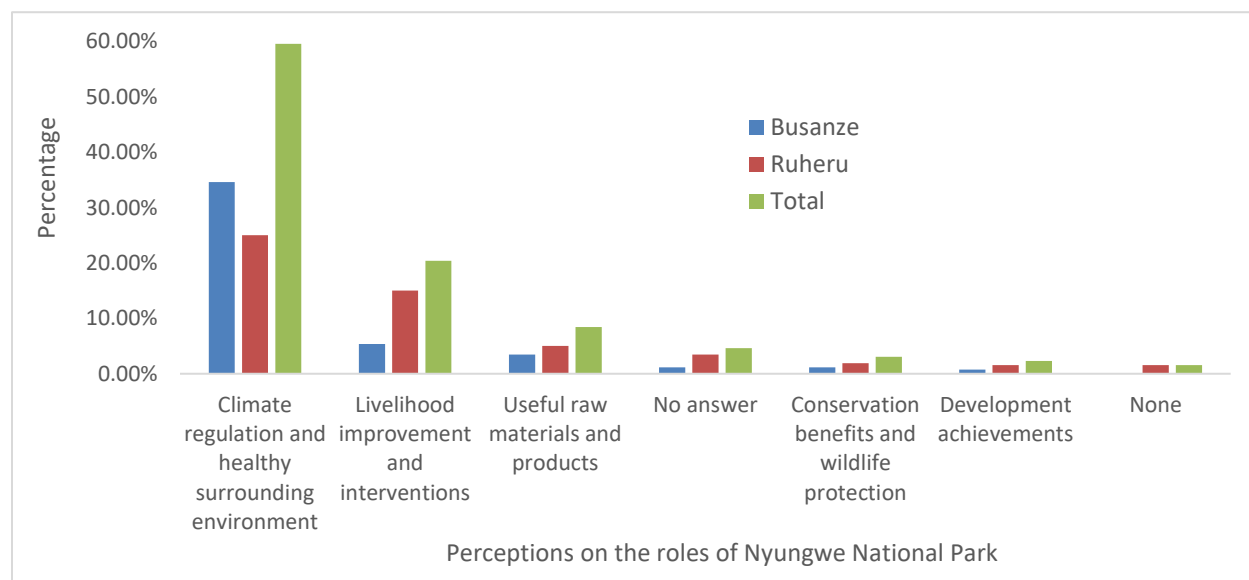


Figure 4: Views of people on the role of the Park in general

The results highlight that people really know the role of Nyungwe, and it gives comfort for conservation that the most known role is ecological, the one of climate regulation. People feel much how they receive even benefits to their agricultural production from a forest that is located far away and that clean air provided by the cool atmosphere created around such a tropical forest is good for health. This emphasizes that community education has played a critical role in upgrading the perceptions of people regarding the role of the Park. On the other side, people consider that the forest provides raw materials needed in their daily life, which provides the facts for how much they have built the culture of depending on the forest for such products including bamboo, firewood, timber, fodder, honey, etc. Actually, it came such as a deprivation to refrain them from collecting those resources, which is still the central conflict around the ongoing threats not only at the project sites but also all around Nyungwe.

We investigated the difference in how people perceived the role of the Park considering the sector that is directly adjacent to Nyungwe and the other far from the forest. The difference is noticed on the role in climate regulation where people from farther away (Busanze sector) sense that importance more prevalent and reaching to them than other options. Conversely, people from farther away feel less favored or concerned about livelihood intervention and extraction of raw materials unlike communities from Ruheru, which matches with what we would be predicting.

People were asked about the stakeholders of RDB in the protection and management of Nyungwe National Park. Security forces that come at the second level of stakeholders (20%), include as exactly mentioned in the original responses RDF (Soldiers) (11.9%), the Police (5.24%), DASSO (1.9%), and

security forces (0.95%). A number of people mentioned that they do not know the stakeholders of RDB, to the level of 17.4% of all responses, corresponding to 36 among 156 people interviewed (23.07% of interviewed households).

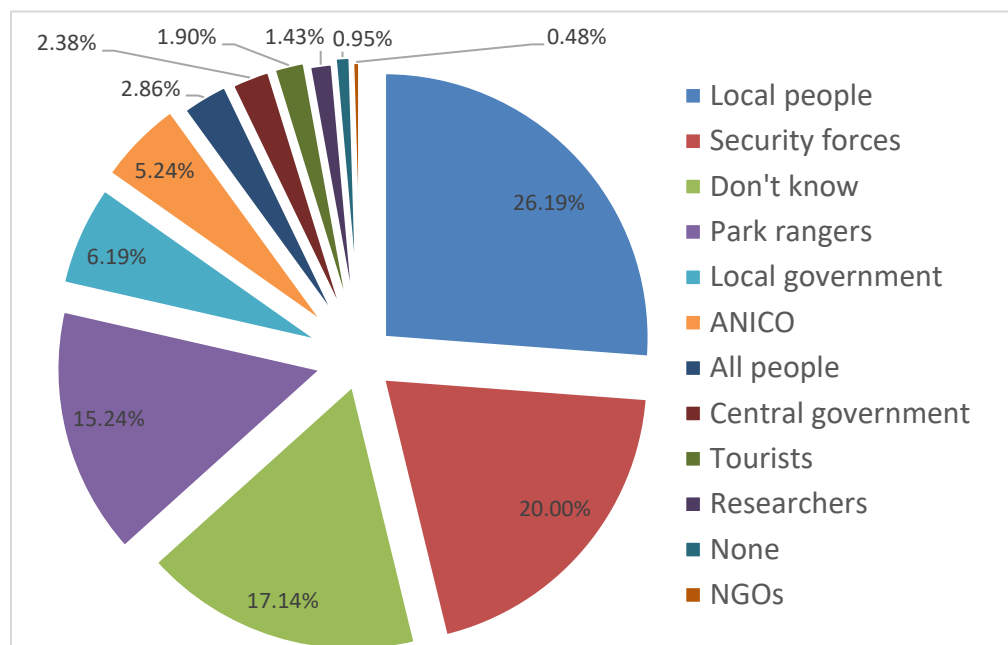


Figure 5: Stakeholders of RDB for the protection and management of Nyungwe NP

The way people think of the stakeholders of the Park matches with the management strategies of Nyungwe National Park which want a participative approach with the communities, as shown with the efforts of WCS in the communities and the association of ANICOs that was put in place to link the Park and communities. Of all the observations, an attention can be put on the case of many people who report not to know any stakeholder of RDB (17.24%). This indicates that more people need education programs and community outreach needs to attract more local people so that they feel among the first stakeholders in the management of the Park.

We wanted also to know when the different people knew about conservation activities about Nyungwe. We fixed the response for 'long in the past' with the meaning of the time before 2005 when Nyungwe forest was not established as a National park. Three responses for three people we received were grouped as 'other options'; they included responses 'With building of the model village, With the time of revenue sharing, and Since last year'. The results are presented showing that most people (74.19%) knew conservation activities long in the past (Figure 6). We asked also if they think or knew how the activities intended reached to the people who were concerned. Different options came (no figure indicated for simplicity), but people confirm those activities reached to the people who needed them (68.42%). The proportion of the people who do not have any answer to the question follows and is 16.45%. 12.5% is the proportion for 'most of them', 1.97% for 'few of them' and 0.66% 'don't know'.

We asked if they think any people were not taken into consideration while they should be prioritized for particular involvement or benefits regarding the different conservation activities. The findings from people's views show that poor people (49.67%) are pointed out at the first level as people disregarded for

different activities while they should be paid attention to. At the second level come the bamboo subsistence sellers (23.53%) because they are almost always relying on products made from bamboo that was illegally collected and should be helped to find alternatives (Figure 7).

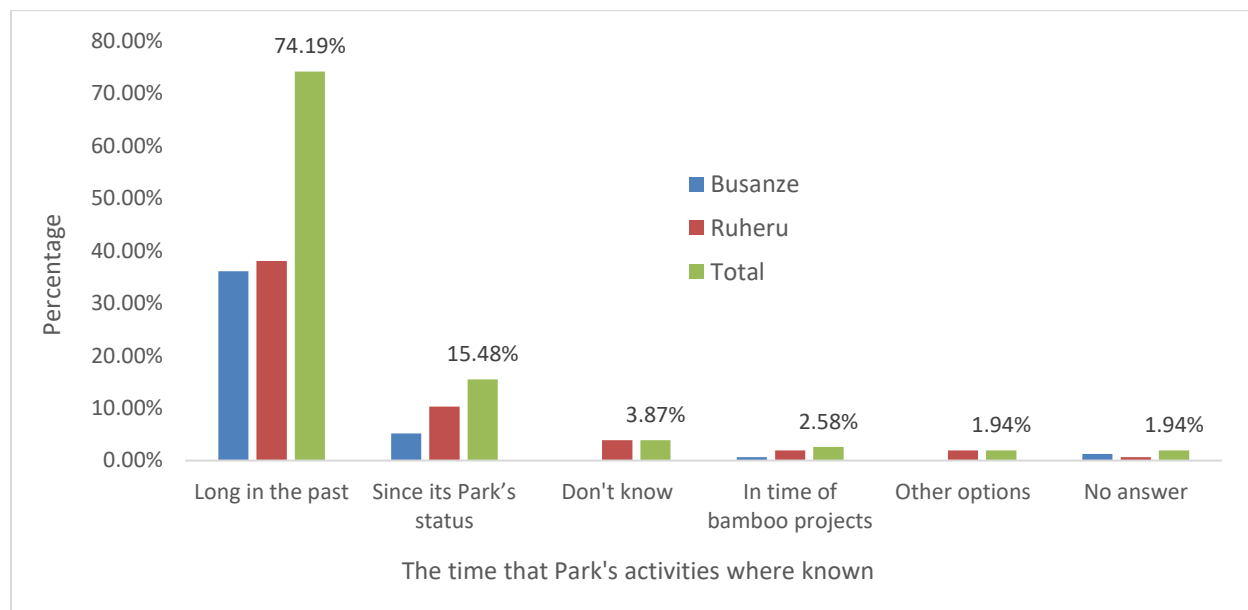


Figure 6: The time when Nyungwe Park's conservation activities were known by the local communities at Ruheru and Busanze sectors

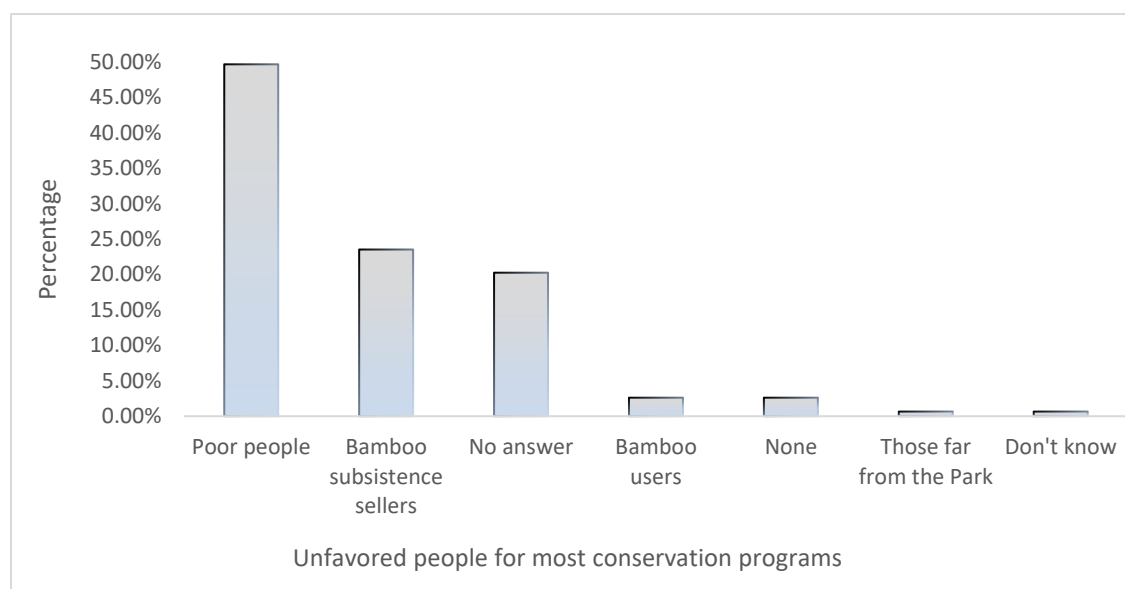


Figure 7: Categories of people who are most unfavored in conservation programs

As people knew conservation activities long in the past (before 2005 when Nyungwe was launched as a National Park), it was not difficult to involve them in conservation when more efforts were put in the management with tourism activities. Another fact from those results is that people obviously knew about conservation activities for the Park but did not understand their importance, given ongoing threats and the rate of change in mindset concerning their involvement. Most people agree that conservation activities

known (especially bamboo project activities are most reported) reached to the concerned people; this could be an encouragement and give insight into how people have played participative role in conservation but maybe a question is on how many people the activities impacted and how they were selected. In the same regards, poor people might have been dissatisfied as probable primary beneficiaries of conservation activities when considering the perceptions of the people. In other responses, people mentioned that poverty reasons (near 100%) are the basis for people to be dependent on bamboo resources for livelihoods; accordingly, bamboo subsistence sellers were noted as the group among those poor people who were neglected in conservation activities. However a pro-poor approach in the conservation management around protected area is sometimes debated, even around the study site such as Uwumusebeya cell of Ruheru sector (Gross-Camp *et al.*, 2012).

People were asked about what they think of the needed approaches or conditions that can be strengthen to ensure meeting a win-win situation between the Park and local communities (Figure 8). The responses were put together and categorized. Most responses came with stressing that severe measures should be applied to the criminal cases regarding the Park (17.29%). If we divided the responses received into four clusters as it seems to be practical on the figure, the first (61.46%) includes also “education and awareness, employment opportunities, and care on people’s well-being”. The second cluster of three responses includes “effective protective measures, agricultural production, and trainings and workshops” (27.4%). The other options altogether take up 11.14%.

With a similar information, an accent was put on asking what should be the priority or conditions that can motivate people to feel responsible for active involvement in Park’s protection (Figure 9). At a great extent, people showed that they need to receive benefits from the Park (57.95%).



Figure 8: People’s views in how to meet a win-win situation between the Park and local people

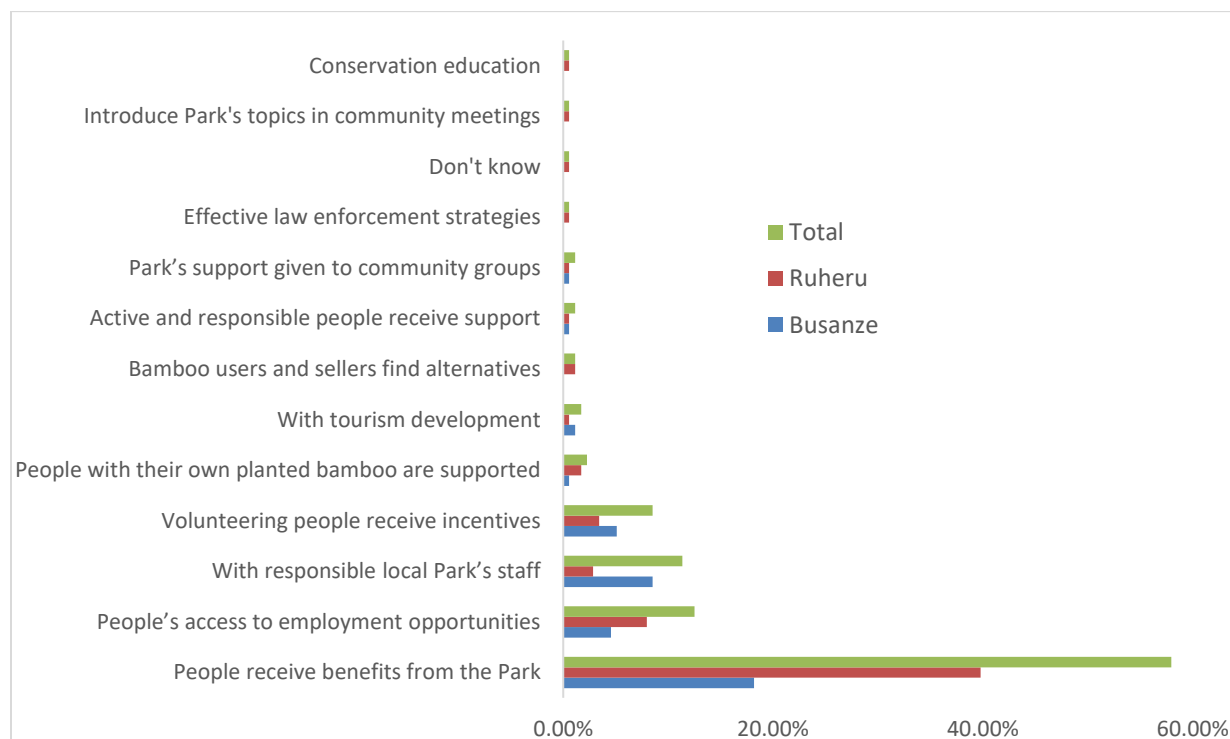


Figure 9: Conditions that motivate people's responsibility for Park's protection

If people are proposing severe measures on criminal cases as the prime condition to meet a favorable environment of mutual collaboration to meet both Park's benefits and people's aspirations, it appears that they consider some weaknesses in or dissatisfaction regarding the management of criminal cases. Maybe if people that are involved in illegal activities do not receive serious and suitable judicial treatment, it lures other more people in them. The people need more education and awareness activities for conservation to ensure that their commitment to conservation can bring about efficient and long-lasting impacts. Employment opportunities is another big issue, because people at the sites often report that on other sides of Nyungwe and around other Parks in Rwanda local people receive different jobs for the Park, including the Park ranger positions and temporary jobs from tourism activities and different projects. Yet at the sites, people do not realize tourism activities and relatively few projects from RDB are operative at the sites. People would as well need their living standards increased owing to more investments of RDB in community activities and strengthening of revenue sharing programs. Most of the given suggestions need careful attention according to their respective frequencies, but the most pertinent they can be all grouped in three areas: strengthening the management of the Park (e.g. treatment of criminal cases, protection measures), involve people in direct win-win beneficial relations with the Park (e.g. trainings, employment opportunities, awareness), and finding alternatives to people to reduce human-wildlife conflicts (e.g. revenue sharing, support for agricultural production). The differences that exist in the responses from the two sites have a justification in the different situations and interests of people living just close to the park (Ruheru) and those benefiting from illegal activities but live far from the Park (Busanze). This is why for example on the other side, while people of Ruheru mention how much they need employment opportunities and receiving benefits from the Park, those of Busanze emphasize the effective management of the Park, incentives of volunteering people and tourism development, those activities that do not provide immediate incentives.

2.4. Reliance on bamboo and alternatives on bamboo resources

To investigate how much people are relying on bamboo today, we first inquired the uses of bamboo today from the different interviewed households. We found diversified uses of bamboo which could not be easily presented without categorizing them into clusters (Figure 10). We made 8 clusters of bamboo uses, which comprised 3 in construction and 2 in handcrafts. Construction alone as use among others has the value of 40.45% and handcrafts without different specifications take the proportion of 47.48%. Construction comprised the clusters for roofing materials, walls and fences, and ceiling mats. Many of the specified materials have Kinyarwanda local names and could not be correctly translated into English. Some would be meant clearly with showing figures rather than describing them with words. Ceiling mats, called locally as *ibibambano* or *seke*; are somehow local traditional materials. Roofing materials are used in either of the two ways: split bamboo pieces are put on roof alone to cover the house as roof (which is much banned today in Rwanda under a long campaign to fight ‘thatch-based’ roofing) or put just below for serving as basement material under clayed tiles (refer to photo C in the Appendix).

The response cluster for handcrafts comprised diversified materials that were mentioned and which are the traditional handcrafts for different places around the country. However, in other places sorts of other raw materials are used for weaving those products instead of bamboo. Most of those materials have names that can be applied almost in the local language Kinyarwanda only, and for some others, similar materials have English names. The first which is most prevalent as bamboo use part (30.78%) comprised different sorts of baskets. They range from tiny baskets called ‘*inkangara*’ to medium ones comprising ‘*ibitebo*’ and ‘*imitemeri*’ then the large versions for storing crops called ‘*imitiba*’. The second part comprised the handcrafts that are not baskets but comprise ‘woven chairs’ and ‘*intaro*’ (fans). About what was referred to as various equipment, this category less reported comprise few types of equipment that are needed for home use and sometimes for collective services including ‘*ingobyi*’ (litter), sleeping beds, water channels, skewers, beehives, etc. Finally, bamboos are used also as supporting poles for beans (4.43%) or as firewood materials (2.62%). Some related photos are provided in the Appendix.

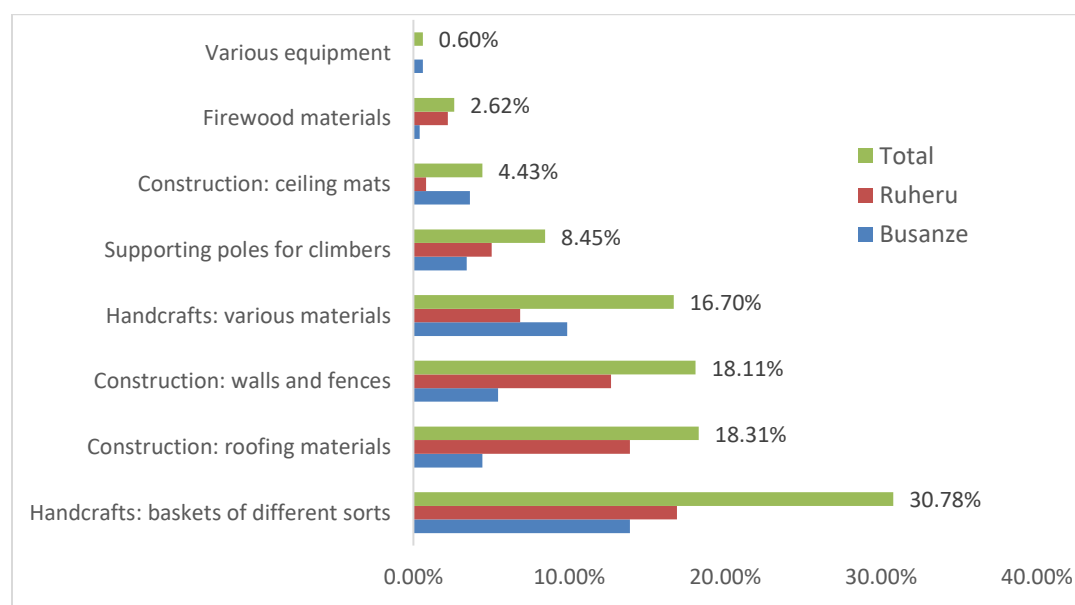


Figure 10: Bamboo uses today in Ruheru and Busanze sectors

It is obvious that the uses of bamboo are diversified and all those uses can be concentrated around many places in Ruheru and Busanze sectors, given the rate at which people are still using bamboo. The use in construction might not be prevalent as it was in the past ten years as with Ndayisaba (2009), because from that time there has been a government-driven policy to ‘eradicate thatched roofings’ (a literal translation of the Kinyarwanda ‘Guca Nyakatsi’). With the expanding knowledge about issues related to bamboo in the sites, people did not feel always comfortable with using bamboo on noticeable places such as roof tops and fences, but they furtively use bamboo for the inside of houses while such cases are not easily controllable. From the information received from different sides and personal observations, people are collecting raw and fresh bamboo collected from the Park in early morning or at evening for fear to be caught. So far, the only people that can be actively involved in chasing after the people illegally collecting bamboo from the Park are Park rangers. The other people are only informed on the cases they are indicated by Park rangers and can react afterwards.

Due to such difficult control of illegal collection of bamboo, it is always difficult to know how much bamboo is collected today apart from infrequent observations seen in the zone of bamboo inside Nyungwe during ranger patrols. A revealing case for that bamboo used in construction for the inside of house includes mainly the kind of ceiling material made from bamboo (‘ceiling mats’ = ‘ibibambano’); that material alone was mentioned by 22 people and has a frequency of 4.43% of all received uses in the responses. While we were working with households for interviews, we often took seats in the houses and we could estimate about or more than half of the roofs seen that were made from bamboo-based ceiling mats. Of course, ceilings were made at different times; there might be ones that were made in the ten years back, but sometimes we found fresh ones, and most of the time, old ceilings are replaced by new ones. When walking to or traveling in Busanze, where there is trading of bamboo you could notice always people carrying basket products (of one standard type) and ceiling mats made from bamboo. Those two products are the main ones seen on the markets.

People were asked about the source of bamboo they use. It was clear that people know how much and consciously they utilize the bamboo that is collected illegally from Nyungwe (80.25%).

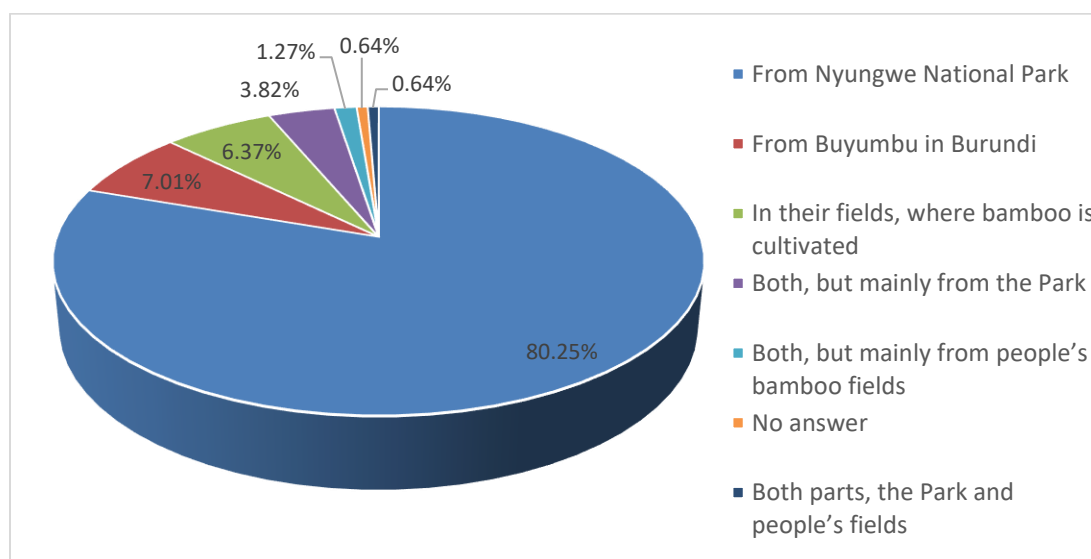


Figure 11: Source of bamboo the local people use

There is a large difference between where people from Busanze and those from Ruheru consider where bamboo is sourced. They consider that almost all bamboo utilized there is from Nyungwe and when mentioning Buyumbu in Burundi, they believe they probably collect it from Nyungwe. Only one person in Busanze could say that people use the bamboo taken from community's agricultural fields.

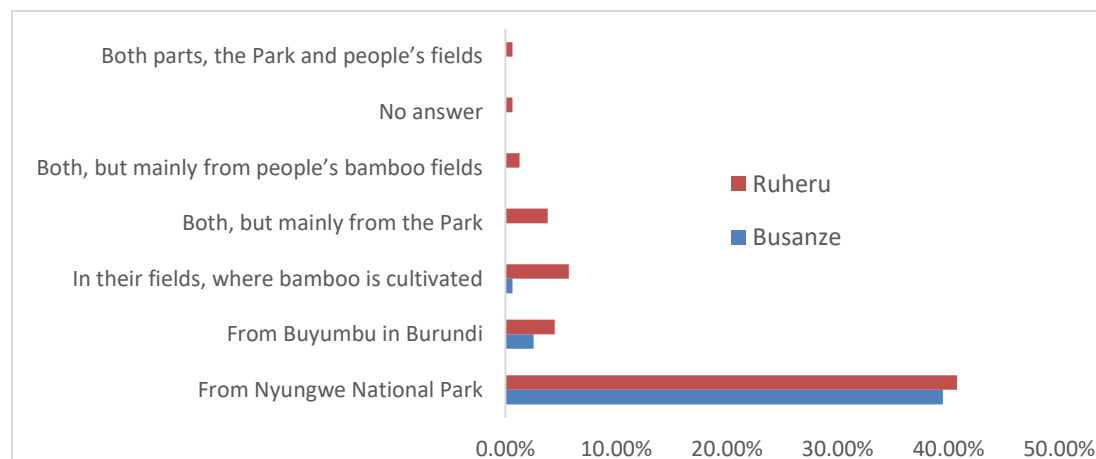


Figure 12: Source of bamboo the local people use, comparing Busanze and Ruheru

We asked the people to give an estimate of households still using bamboo around each respondent and of the number of people seen around carrying bamboo culms (most of the time they are from Nyungwe and bamboo from the Park is much recognizable) in order to have a general idea on how the situation of bamboo use is today.

Different responses were given when people were asked about how many households they know in their zone are still using bamboo. We presented the values given with a scatter (X, Y) chart to show the distribution and dispersion of the different numbers given in responses (Figure 13). For the 141 households that provided responses, the summary of statistics revealed the following important values for the number of households still using bamboo:

Statistic data	Value	Standard Deviation	41.91504
Mean	22.02837	Minimum	0
Standard Error	3.529883	Maximum	200
Median	7	Sum	3106
Mode	10	Count	141

When asked about how many people they saw in the year 2017 carrying bamboos, they equally gave estimations (Figure 14). Only 83 people among 156 could provide the answers to the question. It is only slightly only a half of them. The summary of statistics yielded such values:

Statistic data	Value	Standard Deviation	50.47195
Mean	21.42169	Minimum	0
Standard Error	5.540016	Maximum	300
Median	5	Sum	1778
Mode	0	Count	83

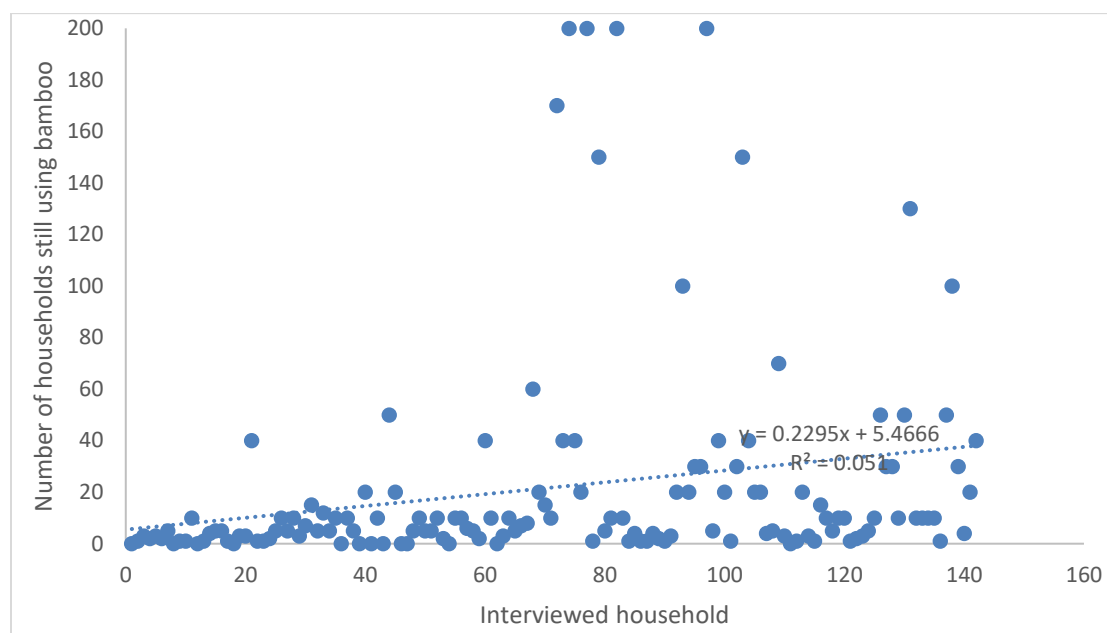


Figure 13: Estimates of households still using bamboo around each respondent household

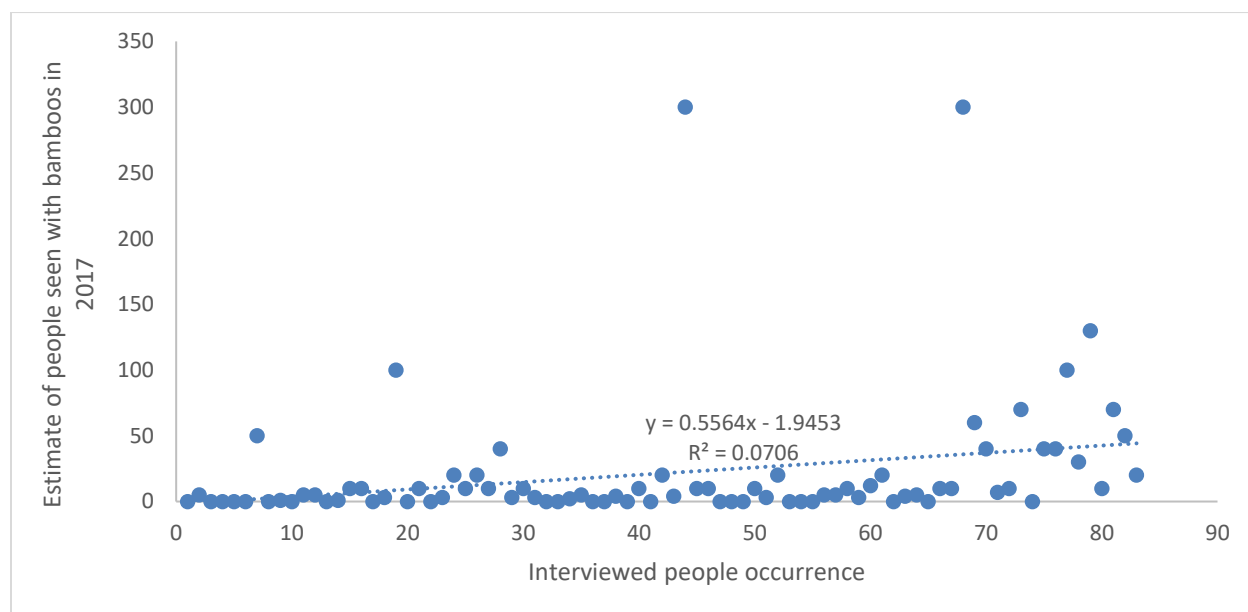


Figure 14: Estimates of number of people seen by interviewed people with bamboos in 2017 around Ruheru and Busanze

Considering the statistics that were yielded on the two questions aforementioned, it is clear that the standard deviation is very high in either case. Different approaches to the justification of the answers can be attempted, but two of the most plausible can be that the question is very sensitive for the people who feel not comfortable to respond to it (as shown by the number of people who abstained to respond) or the situation of knowledge is dependent on the different localities of the respondents who could have different experiences or some based answers on speculations. In the interviews to households, we can estimate that each household was selected from among 30 households of the population for each village. Upon judging on the responses about households still using bamboo based either on the means given (22)

or the mode (10), we can judge that the number of people still using bamboo is at least 25% at a the densely populated places. For the number of people seen with bamboos, the standard deviation is such high, the mean is 21, while the mode is 0; this means that there might be factors affecting how people are willing to give response to that question, leading to the recommendation on further exploration of that issue with different approaches.

When respondent households were asked about the source of bamboo which they saw people carrying around, we noticed that most people mention how they were not feeling concerned about knowing its source (59.35%), literally meaning that they did not pay attention to it.

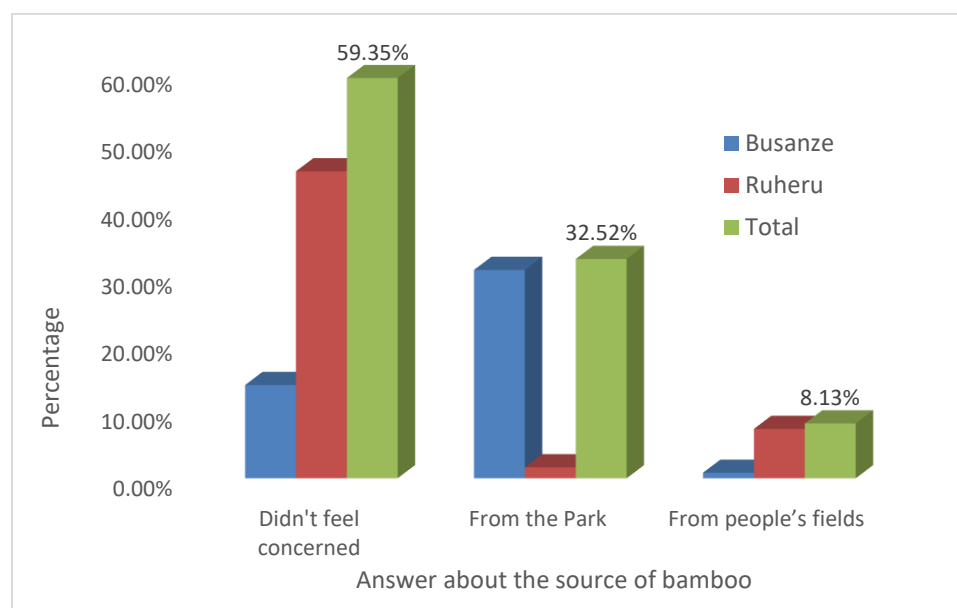


Figure 15: Knowledge or identification of the source of bamboo that people are carrying around

On the question, there is a large different between the people at Busanze who mentioned that they recognized the Park as source of bamboo in comparison to those who say they did not feel concerned knowing. The contrasting responses and attitudes regarding mentioning Park as source of bamboo collected by the people can be rooted from the fear of people from Ruheru to reveal that reality which they think it can be bearing some consequences on the local people while maybe those of Busanze feel free because they do not feel judged to be involved in collecting bamboo from the Park but indirectly by receiving it from the other people who collected it from the forest.

About the bamboo from the Park, 149 members of households could respond to the question of how much one mature, well-grown bamboo costs in Rwandan francs. Of those, 17.95% (28 people) said they don't know how much the bamboo collected from the Park costs. Data presented from among the values that were given on the bamboo from the Park showed 400-500 RwF with highest frequency (39.67%) (Figure 16). Because the value is double of the any other following value in frequency, yet the following value (300-400) includes also the value mentioned in the previous, we can consider both values and combine and judge that the value of bamboo from park is between 300 et 500 RwF. For the bamboo in community fields, 151 members of households could respond to the question of how much one mature, well-grown bamboo costs in Rwandan francs. Of those, 17.3% (27 people) said they don't know how much the bamboo collected from the community fields costs. Data presented from among the values that were

given on the bamboo from community fields showed highest frequency for value of 100-200 RwF (37.10%) followed by 200-300 (29.84%) with others relatively very low, thus leading to consider the value of bamboo from community's fields between 100 and 300 RwF.

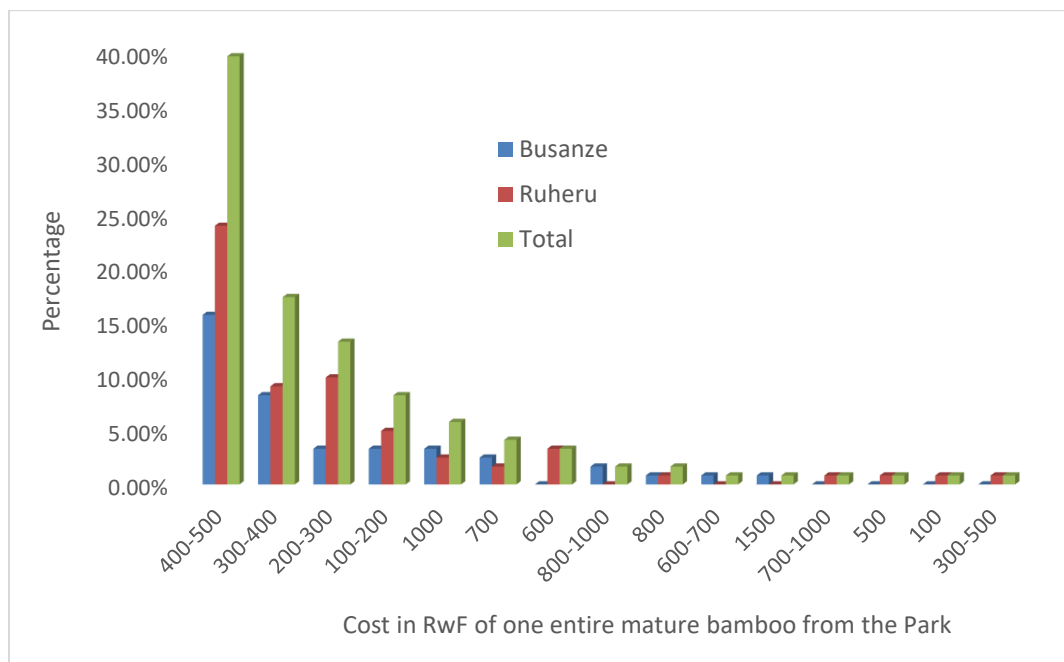


Figure 16: Cost of bamboo sourced from the Park

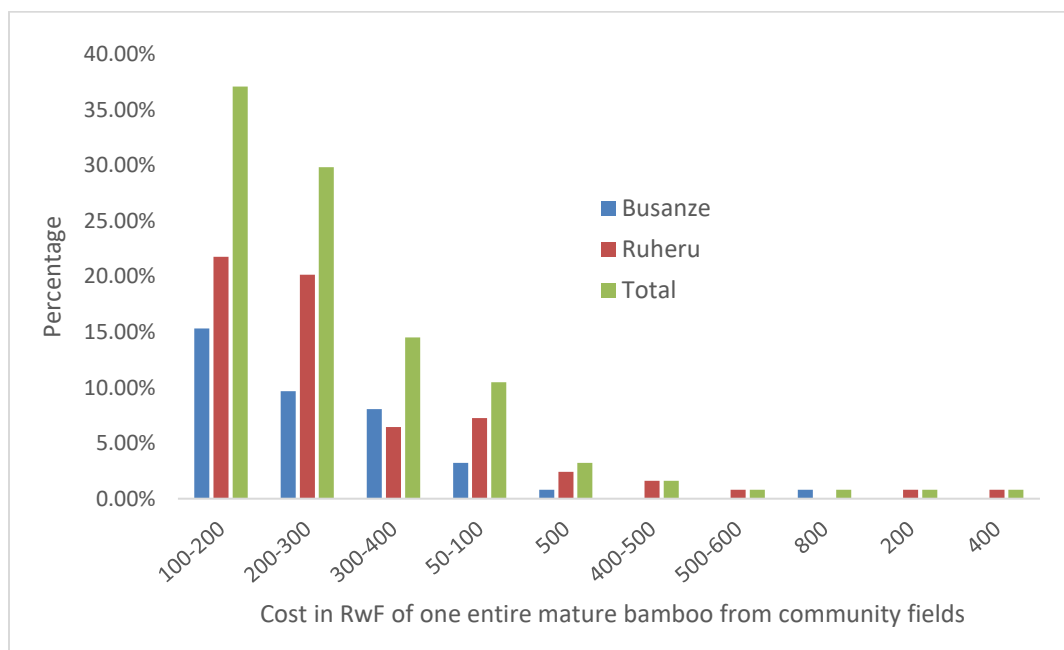


Figure 17: Cost of bamboo sourced from community fields

We consider that people know very well the price of bamboo as a frequently seen resource and one that is needed by all categories of people and are bargained in rural and public places. Even if there may be some significant differences, but the values are logical with the current situation. We left for ourselves to

compare those differences but we asked the people to give their opinion whether they consider the monetary value (price) given to bamboo collected from the Park fair or as item undervalued due to how it was sourced and because it had no agricultural cost for someone trading them. Despite that the bamboo from the Park was given more value (300-500 RwF) compared to one collected in community agricultural fields (100-300 RwF), it is still considered undervalued in its price (73.03%) (Figure 18).

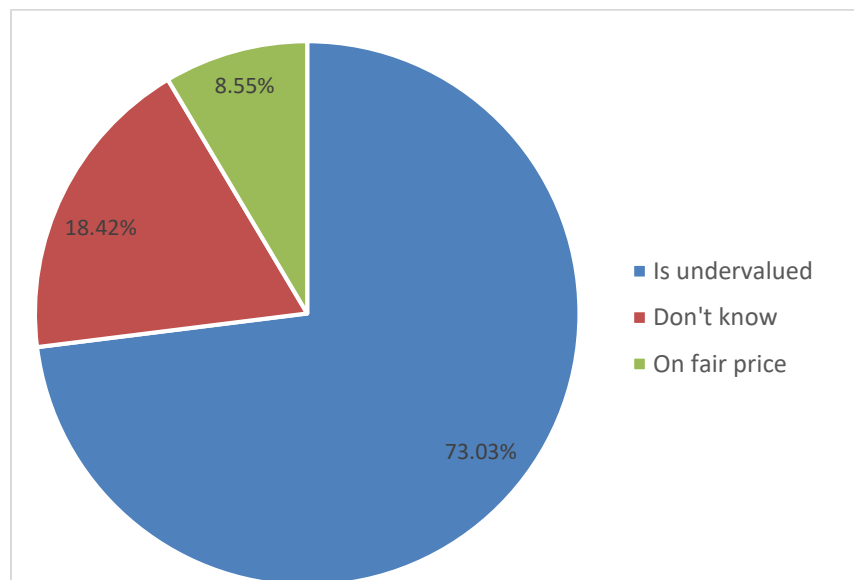


Figure 18: Level at which bamboo is valued in comparison to the past

The observation that the bamboo which costs almost or sometimes a double of the one from community fields indicate that bamboo from the Park must be somehow over-sized and more attractive in its quality or purpose for use to the different users (figures E to I in the Appendix). A comparison can be given between bamboo from the Park of which three to three large internodes could be taller than one of our field team members who actually measure about 1.5 and 1.6 m tall (Figure E). For the bamboo that grows in agricultural fields you can hardly find a bamboo with internodes larger than 2/3 of those from the Park. Another aspect to consider is the diameter (circumference) of the culm, which shows similar differences. In general, we consider that the bamboo from the Park that is harvested selectively is much valuable in terms of price than the one from the field, so that if such bamboo size could be found in agricultural fields, the price could be double to triple relatively.

We asked the people if bamboo is still value today as a material in terms of its frequency, market price and the role in sustaining the livelihoods of some people. We wanted to know how people perceive the current situation in comparison to when Nyungwe was not instituted yet as a National park. With decreasing levels of consideration on whether bamboo is still valued, the answers were given as 'absolutely', 'obviously', 'reduced use', 'minimal use', and 'abandoned' (Figure 19). Most people respond by 'obviously' (50%), meaning that bamboo is still needed and exploited but not 'absolutely' (14.67%). Others mention that bamboo use has only reduced slightly (28%).

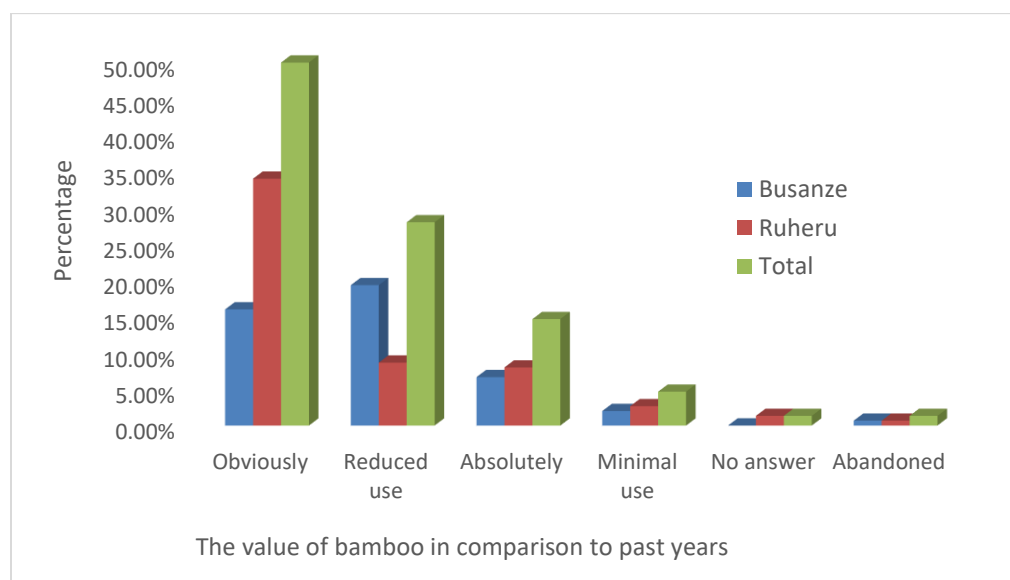


Figure 19: The level people perceive change of bamboo use in comparison to the past

The trend in people's dependency on bamboo as only showing a minimal change was proven by other means of investigation in this study including mainly observations and other sources of information. For instance, it was clear from different observations and from local authorities that the use in roofing of houses has decreased in comparison to the past years, owing to the implementation of development plans made by the government and the different collaborators. However, it does not give any guarantee that the habitat of Nyungwe has been going restored or less disturbed than in the past, due to two among the other possible reasons: first, the population has always been increasing, thus minimal use in the proportion of people does not mean minimal quantity of bamboo collected over time, and second, cumulative impacts are much influential in disturbance because no measures have been able to favor the restoration of degraded past zones of the bamboo forests.

Considering not the bamboo collected from Nyungwe forest but the products that are made from bamboo, especially those fabricated for sale, we asked the views of the people on the measures that can be taken, after reaching a common ground on the understanding of the bamboo issue. The decision was specified as the one that RDB as institution in charge of protecting the Park, and the bamboo habitat near the sites in particular, should take regarding the challenge of bamboo. They made four answer options (Figure 20); the last and the second choices are almost similar. Despite all the discussions that were held, and all information provided, the people responded that for them bamboo products could be definitely canceled (80.79%). Some people (7.95%) mention that they don't know which appropriate decision can be taken. If trading of bamboo products was a choice for continuation, one possibility that was given more votes was 'to issue formal permits for people selling bamboo products' (9.93%), and another possibility mentioned only by two people that 'selling bamboo products continue as usual' (1.32%). The option of issuing formal permits to bamboo traders was however mentioned by only two people in Busanze compared to many who support that option in Ruheru.

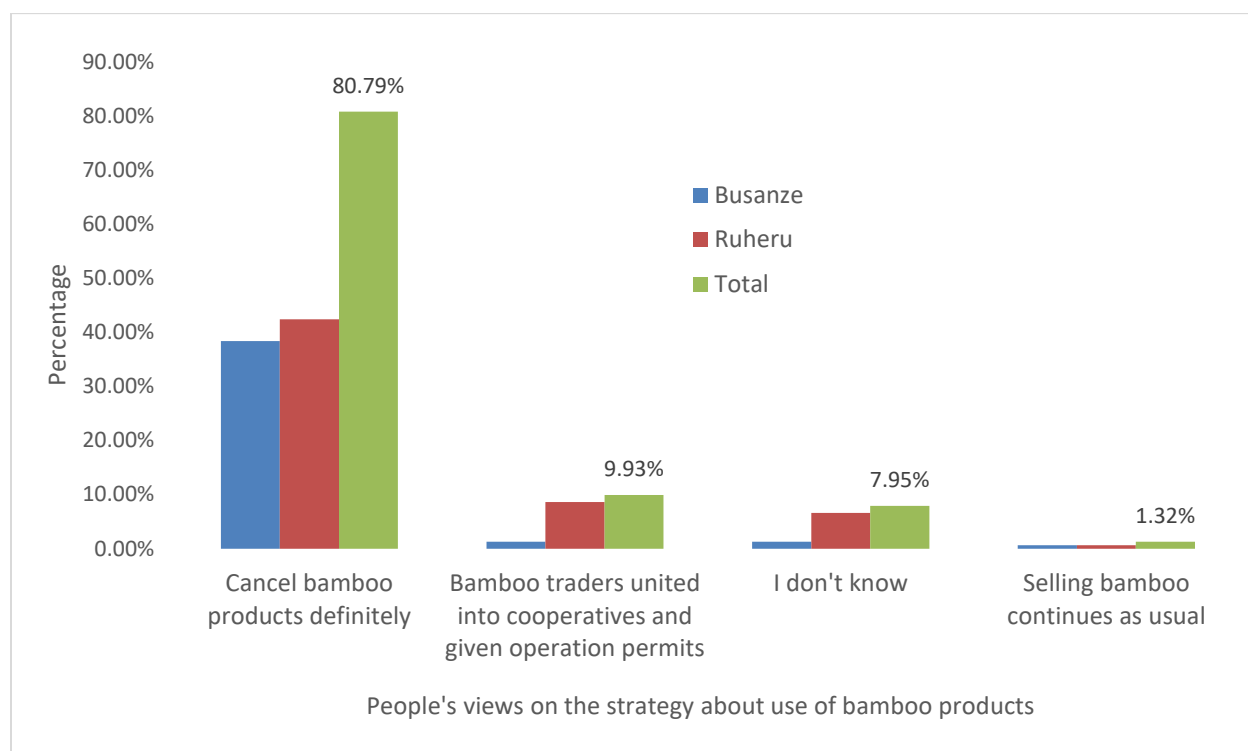


Figure 20: Decision about the users of bamboo

The people are not just believing that they can accept the total ban of bamboo products in Ruheru and Busanze without costs incurred to the decision maker. For any respondent who said that bamboo products should be cancelled definitely, they explain that it could be better if they can access other opportunities for sustaining their livelihoods rather than using bamboo because elsewhere people live without any bamboo resource among the products that sustain their life. They mention that people are relying on bamboo only because of poverty and bamboo has never been a satisfactorily income generating activity; it has always been an activity for subsistence. Also, it is important to note how such response indirectly implies that most bamboo used is the one illegally collected from Nyungwe. If no other alternatives are provided to people using bamboo products, there seem to be no way out and the problem probably will continue to persist.

Whatever the aspect in which they consider that possible solution, some people support that the rate at which bamboo is illegally harvested and the impacts it has on Nyungwe could require urgent measures, including canceling temporarily the trading of bamboo products while a proper sustainable solution will be under investigation. The other option, which could be most unanimous after that one, is to accept for some people to sell bamboo products but unite them into cooperatives for easy monitoring to ensure that they will never use the bamboo collected from Nyungwe. Permits for cooperatives working on that purpose will be issued and anyone who will not be affiliated to a cooperative will not be in any way tolerated for producing bamboo products, but if any will be operating, it will be a reason for suspect of using illegally collected bamboo. Such strategy will also help increase the value of the bamboo and bamboo products and upgrade the livelihoods of people who are professional users of bamboo then doing it as a market business.

We also conducted a focus group discussion to investigate how different people having leadership responsibilities among the community and elite people (teachers) perceive the role and impacts of bamboo in the livelihoods of local communities. Information was collected from the teachers of six primary schools (Zirambi, Gakaranka, Yanze, Remera in Ruheru sector and Masiga and Nkanda in Busanze sector) and from the local leaders of cell administrative entities for Ruyenzi, Nkanda and Uwumusebeya. The findings showed the common understanding about the issue under discussion as summarized in the following: *“We generally consider that bamboo contributes absolutely to the wealth of local people here, and there is no other crop that must replace it to serve the same role. The roles bamboo can serve include but are not limited to erosion control, roofing, production of different materials such as basket, ceiling mat, skewers, poles for bean and/or peas, walls and fences, etc.”*

Equal number of participants in the interview support two opposite arguments. Some of them consider that if people are prohibited to use bamboo products, there will be no other consequences; instead, it will help to ensure that people can only use bamboo grown on their lands. Other participants support that if bamboo products are stopped, there will be some consequences as that those who use bamboo, are still poorest, have infertile land or are landless, and have no source of incomes. About conservation efforts and the sustainability of bamboo projects, the participants added: *“The efforts deserved to the conservation around this zone of Nyungwe are not sufficient; in fact, planting bamboo initiatives have not been successful due to the lack of mobilization, monitoring and evaluation of the activities done. The projects and actions done for the protection of Nyungwe did not reach to all people who deserve it; but some people received efficient cooking stoves for free or benefited some incomes for health insurance, agriculture intensification, or livestock. The actions undertaken for the protection of Hamlyn’s monkey and its bamboo habitat are generally little successful. The challenges on bamboo projects mean bamboo shoots not adapted to local soils, low skills and lack of mobilization, insufficient local people consultations, lack of monitoring and evaluation for the actions already implemented.”*

We investigated the perceptions of the people about the approaches that can be attempted to better value bamboo in comparison to past situations. Of the 146 who provided answers, 4 people indicated that they think the value of bamboo is already satisfactorily explicit, thus does not need to be increased (Figure 21). An almost equal number have two different answers, with one side supporting the ‘increase of pricing and quality for bamboo products’ (49.32%) and the other side saying that there is absolutely no need to think about bamboo because the activities around them actually needed to be discontinued, of course of there are effective alternatives, thus ‘non-applicable’ (47.95%).

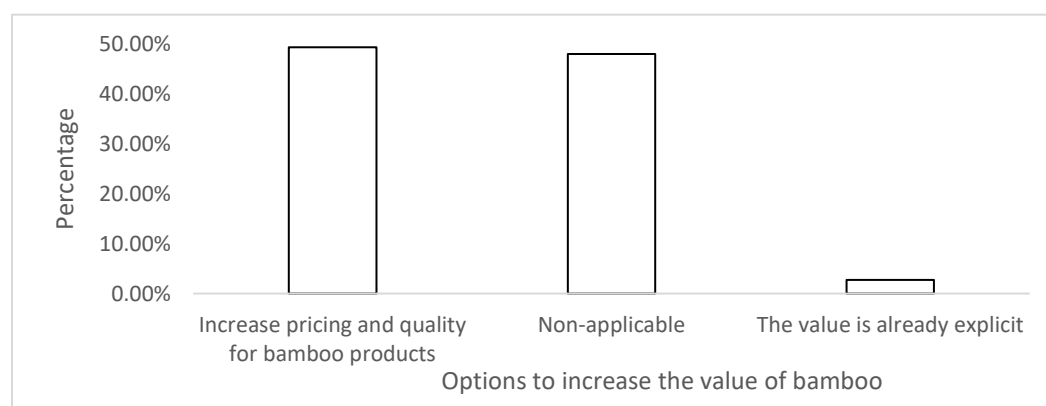


Figure 21: The perceptions on options to better value bamboo in comparison to the past

We asked the people what they think as alternative for bamboo planting, if illegal collection of bamboo from Nyungwe is continuing, given bamboo planting and propagation in community fields was most applied incentive to reduce that threat. Most people didn't have an idea on which alternatives can be applied (44.67%) (Figure 22). In the responses given, the largest fraction of them support that agricultural production which is the traditional way of livelihoods for those local people needs to be promoted (32%); for other options with smaller percentages, people mention promoting livestock farming (6.67%) and forestry and agroforestry (4.67%) among others. People note different ideas or specifications in agricultural promotion, focusing on some specific cases of where agricultural intensification can be resourceful for them and prevent any further reliance to bamboo collected illegally. Such options include interventions with: Irish potatoes, beans and corn, agricultural fertilizers, tea plantation and promotion, and wheat. Of those, Irish potatoes received more attention for agricultural farmers.

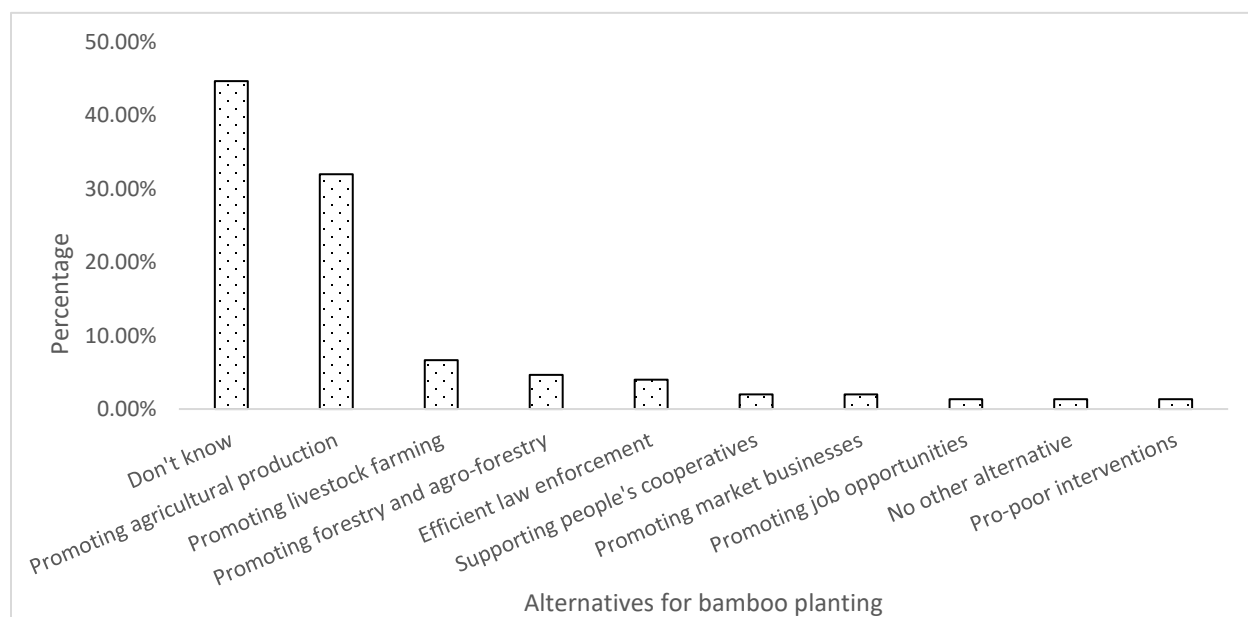


Figure 22: Ideas on possible alternatives of bamboo planting in addressing bamboo issues

2.5. Collaborative networks with transboundary and neighboring districts

We inquired the market places for bamboo raw materials. The responses from key interviewees showed that nearly 50% of respondents knew someone who sold bamboo and they only revealed that the existing local market of raw bamboo culms was Buyumbu in Burundi, very close to Ruheru sector. As most reveal it in their testimonials, the responses stress that: *“The people from Burundi enter Nyungwe and destroy the bamboo habitat; they sell secretly that bamboo to local communities in Rwanda, and bamboo craftsmen and other bamboo users in our sector purchase them at an affordable price”*.

In this study, 11 markets were identified as the area in which bamboo products from Ruheru sector are being sold: Gatunda, Kabere, Ruheru, Nyanza, Nyamasheke, Gasarenda, Gakaranka, Nkanda, Buyumbu, Huye and Remera. Gatunda and Ruheru are the main public market places of Busanze and Ruheru sectors respectively. Kabere, Gakaranka, Remera and Nkanda are small market sites in Ruheru and Busanze. Buyumbu is a place in Burundi, the transboundary country. Gasarenda, Nyamasheke, Huye, and Nyanza are distant places from the project sites. Gasarenda (in Nyamagabe district, southern province) and Nyamasheke (Nyamasheke district, western province) are close to Nyungwe forest, while Huye and

Nyanza districts are located far from it (Figure 23). Whatever the destination, bamboo products reach there by people who are itinerant travelers, and often those products reach to remote places being handled between several traders who buy and sell them to next ones. Small and smart bamboo products, such as small baskets “uduseke” and other ornamental products from bamboo, can be sold to large institutions such as the National Museum of Rwanda in Huye; we witnessed this fact and discussed with one trader who we met in Huye in September 2017.



Figure 23 : Reference for the location of different destinations for bamboo products, mainly baskets, fabricated in Nyaruguru district (Busanze and Ruheru sectors)

One of the most sensitive questions in our project was the inquiry about transboundary issues with Burundi. Only few inquiries were addressed to some RDF leaders with camping near the transboundary zone, who said: *“There is reluctance on the side of Burundi to cooperate in catching perpetrators of illegal activities on Nyungwe, not only about bamboo collection, but also other threats such as fodder collection and tree cutting. Guarding the park is the duty of Park rangers; we are ready for contribution where needed, if they ask us, but often we are not asked to help. We witnessed that Park rangers want to catch Rwandans who they find in illegal activities; those jump over the small river that separates Rwanda and Burundi in the forest, then you can’t do anything to chase them because they are already in Burundi. Even if you find security forces of Burundi on the other side, they don’t feel concerned to help. Sometimes you see people traveling on the side of Burundi in the forest, with machetes and intention for cutting bamboo; they see you watching them but continue walking; you cannot know their identity. The Park rangers of Kibira National park are almost never seen around this side.”*

After identifying the scope and extent of the transboundary collaboration impacts, people were asked the advice during interviews to households (Figure 24) to suggest any ways they think can be efficient in providing sustainable resolution to the trans-boundary forest zone (Nyungwe-Kibira) issues. Most people consider that the approach to address the transboundary issues on the bamboo is the judicial framework between the Park managers and collaborating authorities (28.5%); other options are possible and were given closer value such as ‘Park’s hierarchical units between two sides’ (25.13%) and ‘better work of Park’s rangers’ (22.54%). Local government authorities are not considered to have the capacity to play a key role in addressing transboundary issues. Most efforts are required to the Park managers and their staff, and to the justice instances and security forces.

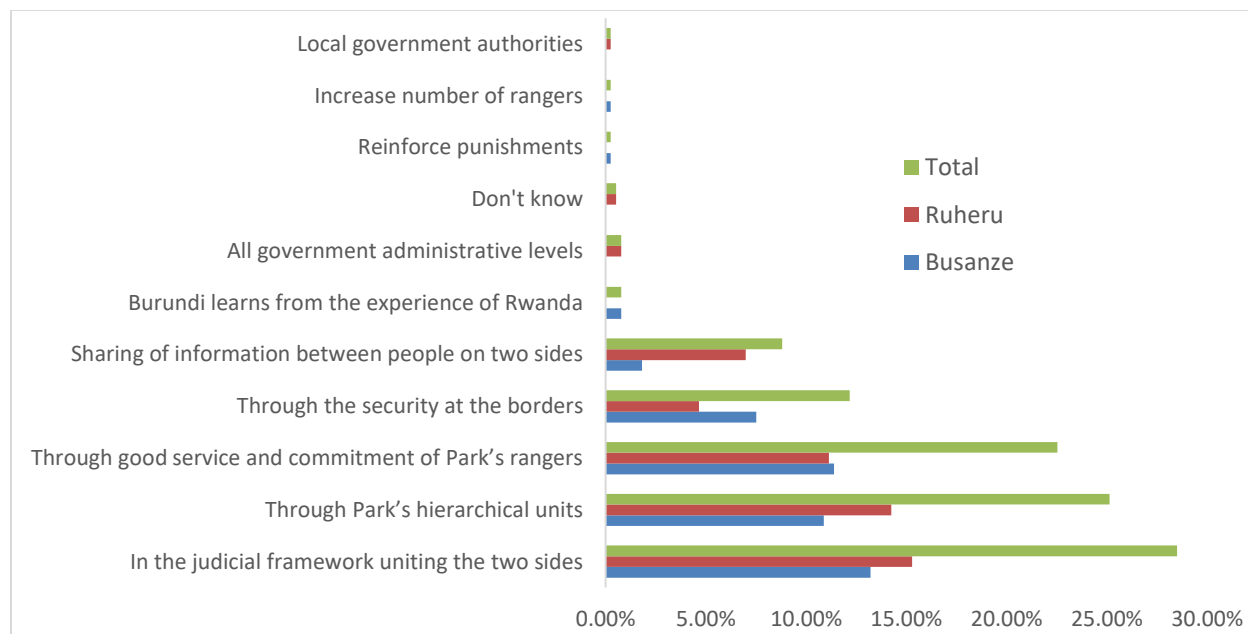


Figure 24: People’s suggestions for an efficient Nyungwe-Kibira collaborative approach

It does not seem straightforward to understand why since a long time of applying conservation efforts at the site like everywhere around Nyungwe National Park, there is consideration by people of the gaps for the Park’s staff in working efficiently and include actively all concerned stakeholders. Law enforcement, collaborative plans, and judicial treatment on illegal activities are considered inefficient by the local people and the people’s responsibility or resistance is overlooked. If we consider the juridical framework between the two sides of the Nyungwe-Kibira complex, we can notice that it matches with the suggestion given in Figure 8 for conditions to meet a win-win situation between people and the Park. Because the transboundary issue was complex in its kind and local context, we advised to discuss it again in the last section devoted to the completion workshop where we plan for possible future work at the sites.

III. Assessing impacts and effectiveness of bamboo planting initiatives

We assessed the impacts and effectiveness of bamboo planting initiatives and conducted field surveys in the buffer zones and inside the bamboo forest zone to assess current threats to the bamboo habitat and the Hamlyn’s monkeys. For the bamboo surveys in the community agricultural fields, we covered the three sectors among five of Ruheru sector, those in which household surveys were conducted: Uwumusebeya, Ruyenzi and Remera. The whole bamboo spaces were sampled as possible across the 3 sectors.

3.1. Bamboo planting at the buffer zone of Nyungwe forest, Ruheru

In the buffer zone lying adjacent to Uwumusebeya cell of Ruyenzi sector is an extensive area covered by a marshland and extending on slope to the tree-planted buffer zone. In 2009-2010, bamboos were planted under a project conducted in the partnerships of GEF, UNDP, WCS, and REMA called the Protected Area Biodiversity (PAB) project. The project of bamboo plantation in Nyungwe was facilitated by Helpage Rwanda (Kisioh and Bizuru, 2012). 11 ha were covered with bamboos, with 7000 plants over the buffer zone of Nyungwe in Nyaruguru district (GEF, 2011). We visited the area that was planted with bamboos (Figure 25), and with the help of Park rangers for the localization of the zone that was planted with bamboo, we observed the situation of bamboo today and the area that was covered.

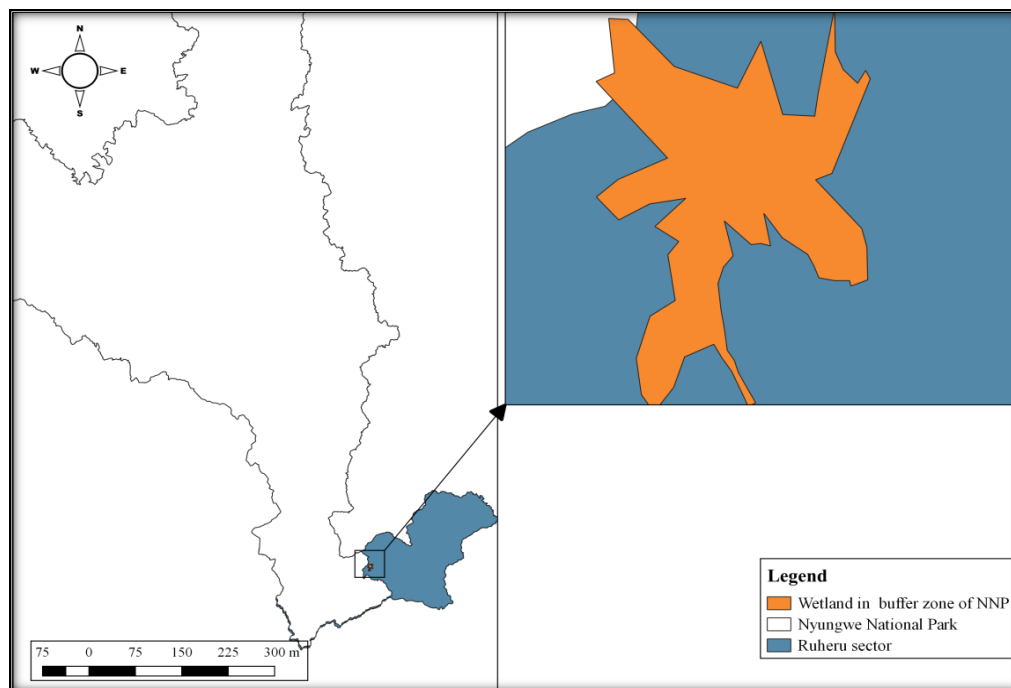


Figure 25: The zone of the buffer zone of Nyungwe planted with bamboo in 2009-2010 in Uwumusebeya cell, Ruheru sector, Nyaruguru district

During the observations, we realized that almost all planted cuttings of bamboo in the buffer zone have failed to proliferate and the remaining small plants are unhealthy. We only saw some few disturbed and stunted clumps of bamboo as shown by the photos below (Figure 26) taken during the assessment. In and along the marshland, small disturbed bamboos remain and can be seen, but on the sides further from the marshland, the bush cannot help the remaining small bushy bamboos being easily visible.

In general, we can consider that the bamboo planted there has failed to grow, but the reason has never been assessed. In our analysis, we assume that whatever the reasons, if no monitoring and/or follow-up has been done after the project, it was difficult to expect good results, given ongoing disturbances at the place, as it will be discussed in the threats afterwards.



Figure 26: Photos of bamboos planted in the buffer zone in 2009-2010, (on left) most observed unhealthy and disturbed bamboos, and (on right) one of the few persisting bamboos that remain bushy and hardly visible (photos by T. Nsengiyumva 1-Feb-2018)

3.2. Surveys of bamboo in agricultural field and woodlots

All bamboo patches (made up of one or more clumps) located in Uwumusebeya, Ruyenzi and Remera cells of Ruheru sector were visited, except for some few patches (not more than 15) which were neglected by their owners to lead us to. Note that we calculated the area of each visited patches of bamboo by GPS while turning around the patch by tracking on its edges. We found a total of 146 patches, covering an area of 9922.5221 m² (the mean area is 67.9624 m²). The following map (Figure 27) indicates the distribution of all bamboo patches visited.

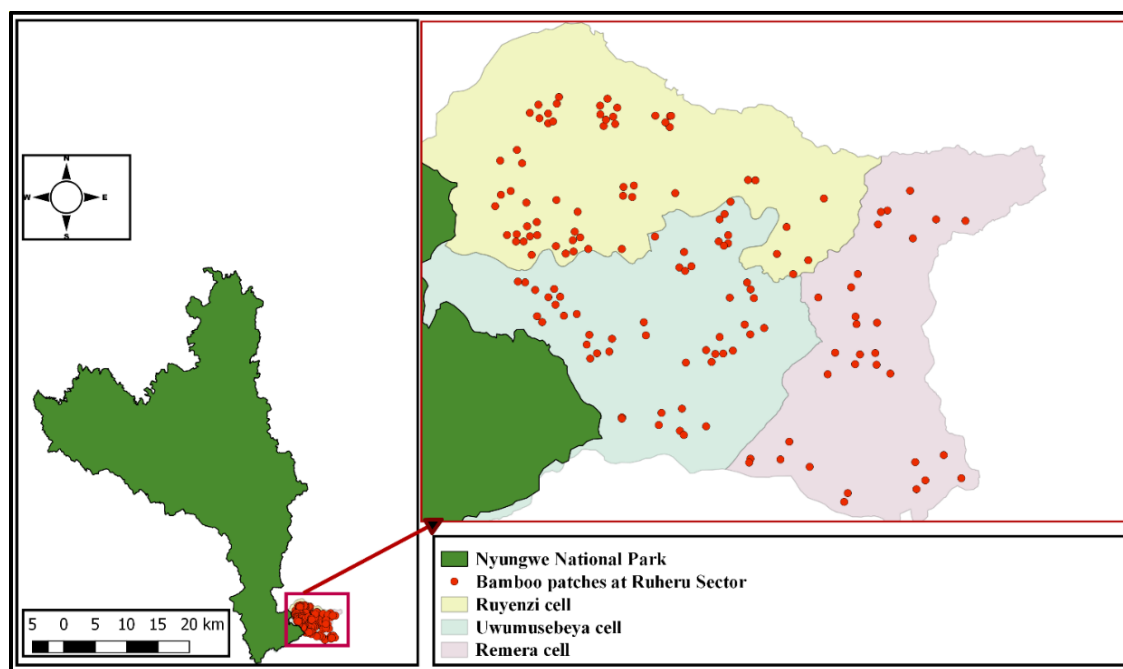


Figure 27. Map of the visited patches of bamboo in Ruheru sector

The patches displayed a significant difference (Figure 6a) in arrangement of bamboos within clumps ($X^2 = 16.86$, $Df= 2$, $P= 0.00071$) in community's fields. Few of them were compactly arranged, most of them (44.52%) were moderately spaced, but many others highly spaced. The number of shoots was counted in each visited patch of bamboo. They were a small number in general, where in 146 patches, the total of 1710 bamboo shoots were counted. Most of them had [0-10] bamboo shoots (Figure 6b).

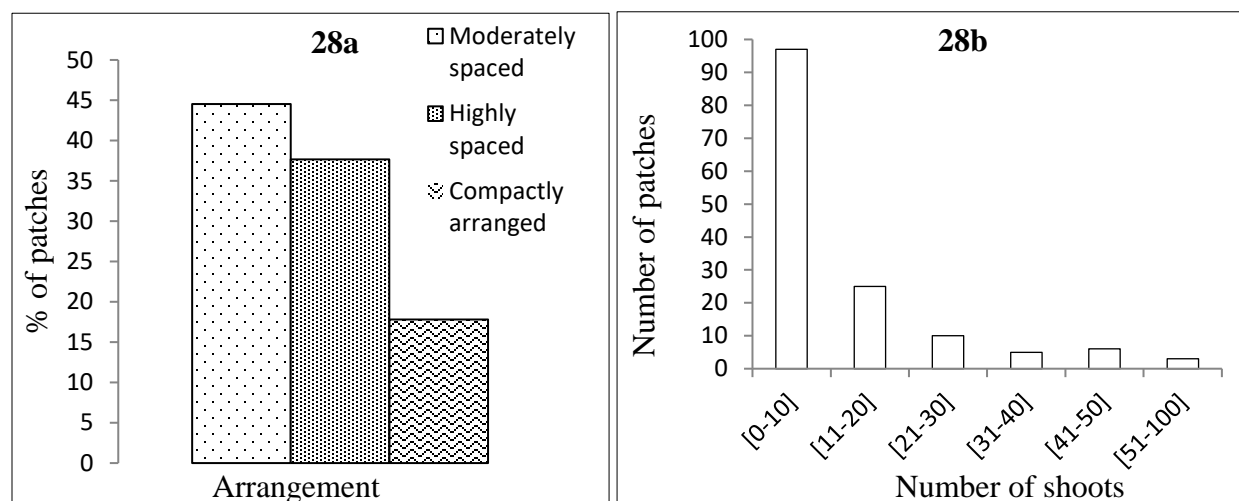


Figure 28: Arrangements of bamboo within clumps in visited patches (a) and Number of shoots counted in 146 patches visited during the study (b)

Culm height and total height were measured in visited patches with the circumference of ≥ 14 cm as proved to be the size of less preferred bamboo by the community at Ruheru sector. Their culm height were ranging from 3.5cm to 15cm and total height ranging from 4.4cm to 20cm (Figure 7a) showing a positive correlation ($P < 0.05$, $R^2 = 0.781$ and $df = 1$). The findings displayed a positive correlation (Figure 7b) between total height and DBH ($P < 0.05$, $R^2 = 0.6444$, $Df = 1$).

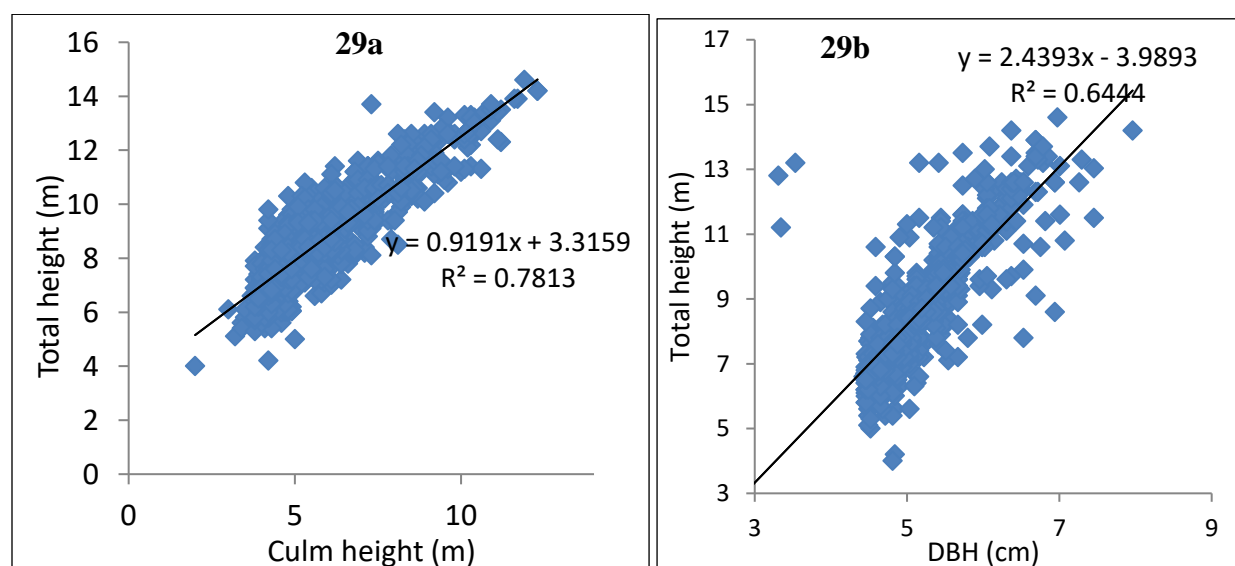


Figure 29: Relationship between culm and total height (a) and Relationship between total height and DBH (b) showing a positive correlation (Black line)

At Ruheru, 146 patches (made up of one or more clumps) of bamboo were visited and the total area of 9922.5221 m² of bamboo was calculated by GPS. The patch with largest size was 1,880.45 m², followed by the one with 722.56 m². The total surface covered by bamboo was 9,922.5 m². The size of area that each household should own showed the average of 3.62 m² per household, given 2471 as total number of households of the three cells. 1024 were counted as mature bamboo (≥ 14 cm circumference) culms to be harvested, indicating that only about a half of the households could harvest all mature bamboo present at once in all the three sectors, with single mature culm to each household, which is really insufficient in comparison with the need of bamboo. If available resources inside protected area cannot be found sufficiently outside or their alternatives, threats are too hard to manage in the case of bamboos.

When considering the relationship between culm height (part to be harvested), total height and DBH, we realize that the bamboos are healthy in the normal growth, but we do not know the situation of bamboo growth at the area in the past, so that we can evaluate well how intensive harvesting, land use change, and geomorphological factors have affected the bamboo yield. Each bamboo patch can be estimated with less than 10 mature bamboos, which suggests that there are really insufficient bamboo patches or the growth slows at a critical level where bamboos from agricultural fields take much long to mature enough to be harvested. We observed also the recent cuts of bamboos from those agricultural fields surveyed and we realized that only a small number of cuts of recent bamboo like dating in one month could be seen. This brought us to wonder how bamboo is always being used, but one can hardly see bamboo cut from community's fields. That observation was confirmed by many local people including local leaders and some elite members of the community in informal discussions.

3.3. Current threats to the bamboo habitat of Nyungwe and impacts on *C. hamlyni*

Here we first present the data on the threats that we found with household interviews to allow for comparisons with those that were collected in the field in and around the bamboo zone of Nyungwe, which is the selective habitat of *C. hamlyni* (Figure 30). The first frequently noted threat to zone of Nyungwe forest around the study sites is 'bamboo cutting' (22.07%). The differences are small between bamboo cutting and other following threats: animal poaching (19.34%), fodder collection and logging. There are several threats known by the people around the site as it can be seen on the figure.

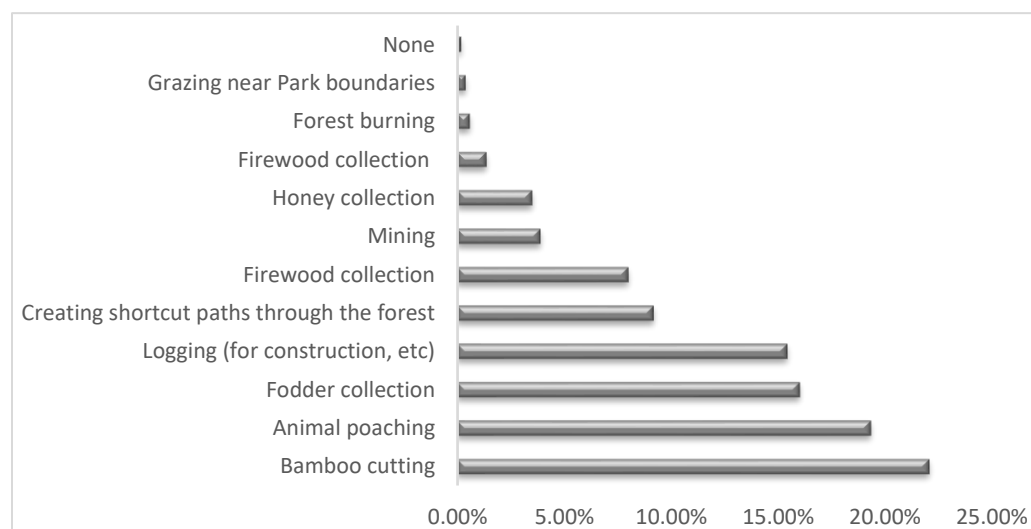


Figure 30: Ongoing threats around the bamboo habitat of Nyungwe National Park

Hamlyn monkeys are restricted to a small (32 km²) area of bamboo and bamboo-forest mix in the southern sector of the Park, close to the international border with Burundi. With field work, we investigated the current threats to the Hamlyn's monkey inside Nyungwe around the bamboo habitat. As we had some information on some level of vigilance needed for security reasons, we first waited for information from Park authorities in collaboration with their rangers on the best strategies and places for sampling activities. We covered only 6 days inside the forest with intensive field work, selecting purposively the parts with easy access, more secured, and near outer borders with regard to the threatened bamboo habitat. We recorded all the data along the trails and to some distance on their sides, as well as in the plots of 20x20 m we had designed while in the fields. We recorded different threats we came across along the trails selected for our field work (Figure 31). All threats were distributed along reconnaissance and poacher's trails, mostly in parts which are closer to local community.

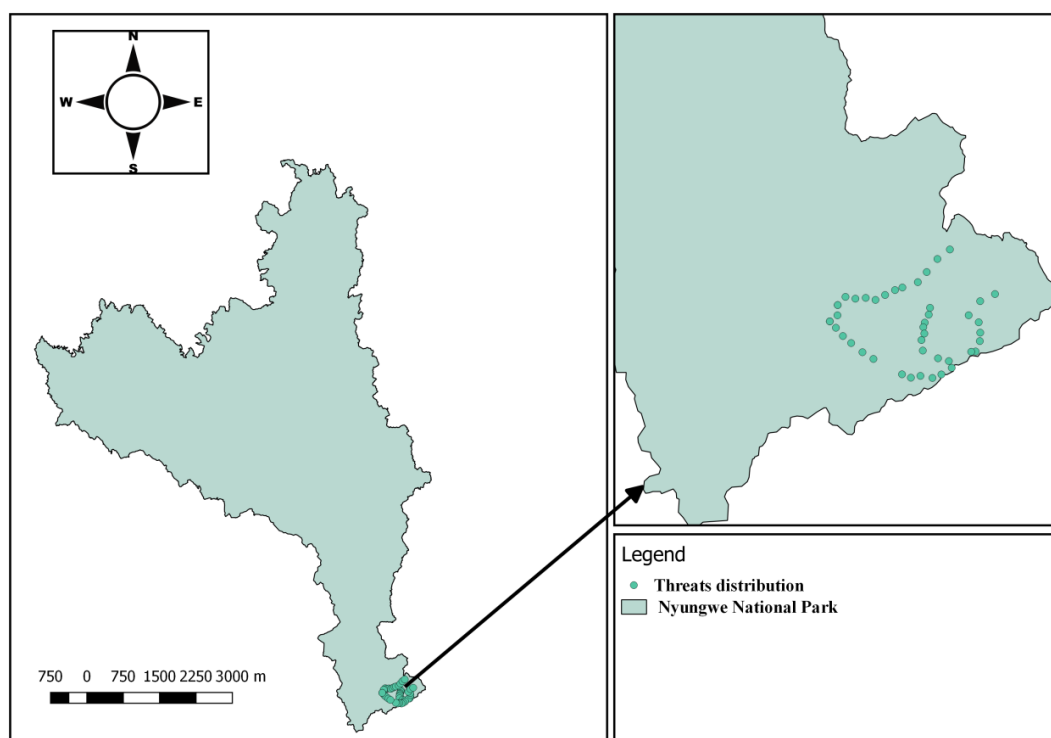


Figure 31: Distribution of the threats as recorded during field surveys in Nyungwe

During my study on its status of threats, we found that the most characteristic threat is illegal bamboo cutting inside the park (75%). Around and inside the bamboo forest, there are other forms of threats including fodder cutting (10%), firewood collection (7.5%), snares (5%) and mining activities (2.5%). To Estimate the age of the threats, we set arbitrary a range of 6 months for a threat to say that it is 'recent' and beyond 6 months to qualify it as 'old'. By considering the status of threats based on age, we found that threats are increasing compared to the past: new threats (57%), old threats (34%).

The main observation is that bamboo cutting is clearly more prevalent than other threats. It is possible that other threats are also important at the sites as it was seen in the interview responses, but the sampling strategy used could not permit to surveys those threats in more remote places. For example, it was difficult to go further inside the forest to check for more snares, identified as 'animal poaching' in household interviews.

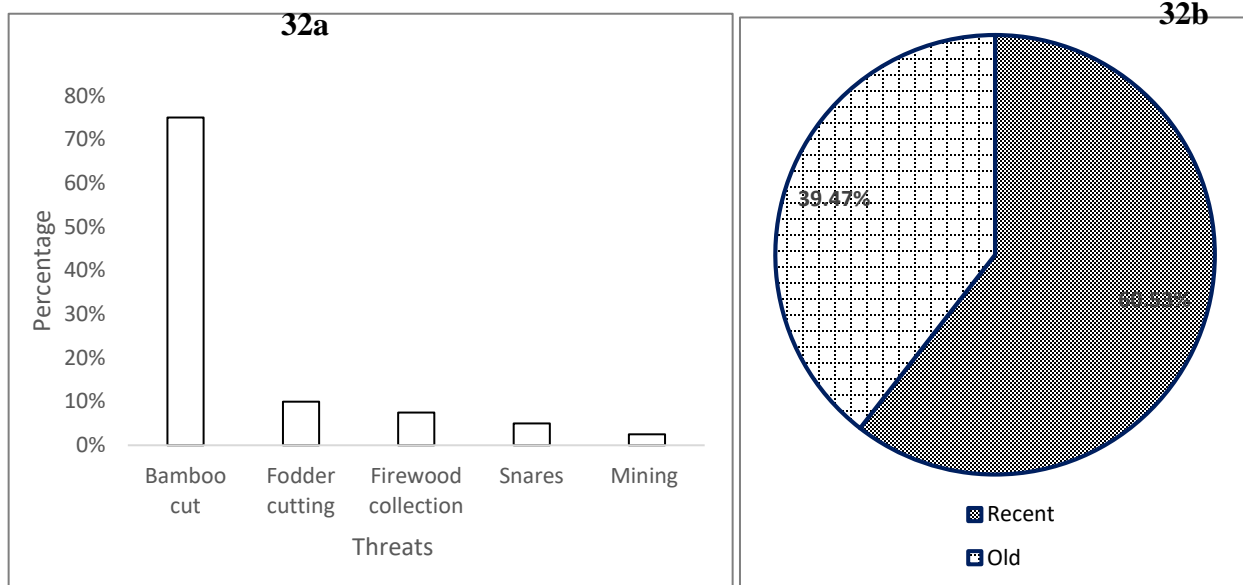


Figure 32: Threats to Hamlyn's monkeys (32a) and Age of the threats (32b)

We show here the relationship between the number of bamboo cuts and number of regenerating bamboos found in each plot. The results indicate that there is a positive correlation, showing that when bamboo cuts are increasing, we find more germinating bamboos (Figure 33).

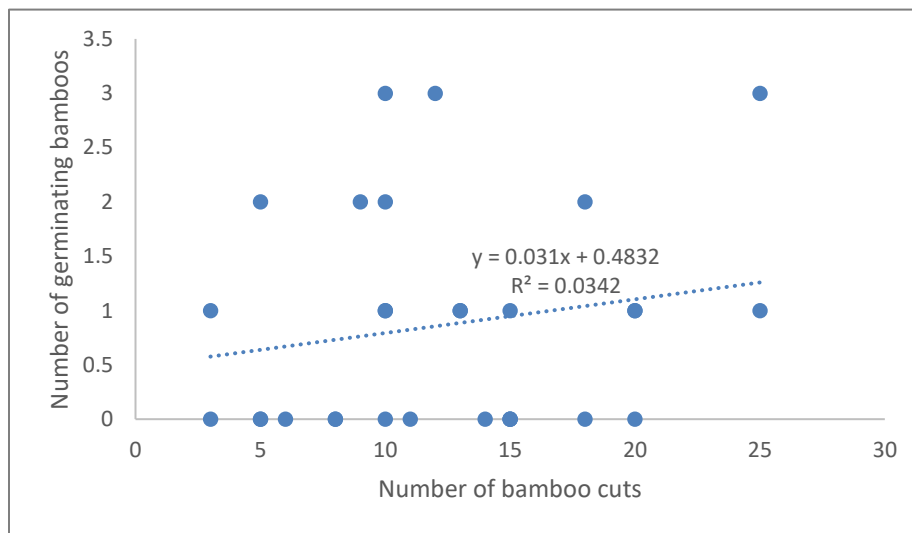


Figure 33: Correlation between bamboo cuts and germinating bamboos in the bamboo forest

The relationship indicated that cutting bamboos cause more germination, but the habitat becomes more and more exposed while those germinating shoots are not receiving proper protection. As bamboo cuts are being increased more, germinating parts will be exposed to trampling because those cleared lanes are where people will create paths to travel throughout the forest.

We analyzed the relationship between the occurrence of threats and the presence of Hamlyn's monkeys which we have never seen during the survey period, but we recorded indirectly by sound (twice) or movement (4 times). The results indicated that *C. hamlyni* could be detected at the places where there are fewer threats and avoid places where there are more threats.

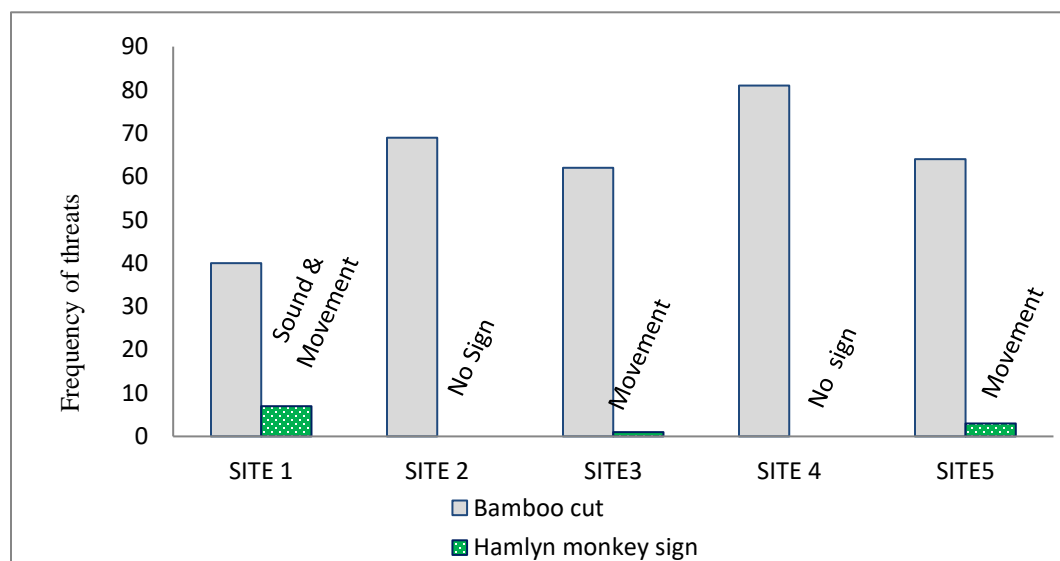


Figure 34: Linking bamboo cut frequency and Hamlyn's monkey occurrence

The data are not sufficient to confirm that Hamlyn's monkeys avoid the places because there more threats on one side than the other. It is rather probable that minor levels of threats are always stressful for Hamlyn's monkeys because their sightings have been always rare in the recent years in comparison to the past years, like when Ntare (2007) was studying their feeding ecology. We consider that studying the ecology of Hamlyn's monkeys today is a difficult research task, because sightings are today not easy mainly because of increasing disturbance of their habitat. It is the same opinion that Park rangers consider most applicable for current research on those monkeys: *"Their habitat should be protected from further disturbance so that they become accustomed again to secure conditions and become visible"*.

We had also the objective of evaluating the effects current threats have on ranging shifts, behaviors, and possible fatalities on Hamlyn's monkeys. We could not access fully the information that could guarantee sound conclusions about such effects, but some few data and information from Park's staffs at the site provide good directions towards the answer and some speculations after analyzing the situation met at the field can provide orientation for further insights. Hamlyn's monkeys are not easily detectable today and since some long time (around 2009 with the work of WCS) the population has remained not further assessed. The work of Park rangers who are watching out for the ever-ongoing threat of illegal bamboo cutting cannot allow them to concentrate efforts in the ecological study of the species. One among the chief park rangers at the site said: *"We see them very rarely; it is like by chance. We can happen to see one individual on a fourth, fifth or sixth round in the forest. Sometimes we happen to see one group of 3 to 5 individuals once in 3 months, or so. Often, they pass very quickly, and when they see you watching them, the quick reaction is to flee away. However, sounds and movements are very frequent but they cannot allow to estimate the population"*.

It seems obvious that increasing threats that continued to occur in their habitats caused them to shift their ranges or induce different changes in their behaviors which cause them to be more elusive than they were. We did not see any sign of death or other fatalities on Hamlyn's monkeys, but we cannot prove the impossibility of such cases. Views from different Park rangers added more on the previous information, saying that: *"We do not know where Hamlyn's monkeys can go if they shift from the bamboo habitat; no one has informed us finding them in another place. We have never seen a dead Hamlyn's monkey; yet we cannot confirm or deny about possible deaths. But it is not probable as far as we have not known any people from here who hunt them for meat as it is done from other poached animals, such as duikers and squirrels. Besides, when we remove snares, we have never seen one caught or injured Hamlyn's monkey. Hamlyn's monkeys need further studies on their status today at this habitat"*.

Some special occasions helped us to know more threats about the Hamlyn's monkey and the bamboo habitat, and the buffer zone around the bamboo zone of the Park. On 22nd August, there was an event organized by RDB and WCS to conduct a field trip with local governance partners and different stakeholders in matters of law enforcement (including lawyers, the Police and RDF) and community representatives (refer to photo O in the Appendix). We were invited and we visited the bamboo habitat of the Park to learn the status of bamboo and the impacts of illegal bamboo collection. We witnessed how the situation was alarming. One of the facts around the habitat of bamboo is that many parts of bamboo are cut but remain inside the forests in large piles. Another occasion was the situation of grazing cows and small livestock in the buffer zone of Nyungwe, just inside a marshland. That is the exact place we mentioned earlier which was planted with bamboo under the PAB project. For all two observations, some pictures are found in the Appendix at the end of this report.

IV. Project evaluation and future plans

A completion workshop was planned for this project and took place at Protestant Institute of Arts and Social Sciences in Huye district. For a first time, the workshop was planned on 12 June 2018, but we met an inconvenience of incomplete communication to Nyaruguru district office, who would give permission for their employees to attend our event. A second date was then planned for the workshop, and it took place on 26th June 2018 at the same venue with same agenda.

We had invited the local governance authorities at the level of the sectors and cells in which our project was conducted. At Busanze and Ruhuru sectors, the staff in charge of cooperatives called Business Development and Employment Promotion Officers (BDEPO) were invited and attended. The Socio-Economic Development Officers of cells for the five cells surveyed, namely Ruyenzi, Remera, Uwumusebeya, Nkanda and Kirarangombe were invited and all attended. The list of those local administrative authorities is found in the table in the Appendix.

Different other people attended the workshop which brought together up to 18 participants. We missed the staff of RDB and WCS who did not attend while they had confirmed their availability. However, the announced that they support our ideas and trust good resolutions as their local partners were present, including one ANICO who has been in the team of the project. Photos for the completion workshop event are found in the Appendix of this report. On the following few pages, we present the agenda (Table 4) and different resolutions from the discussions held in relevance to that agenda.

Table 4: Agenda of the workshop held on 26th June 2018 at PIASS for the project in Nyungwe, Nyaruguru district

Time	Activity/task
9:00 - 9:15	Registration of participants
9:15 - 9:30	Welcoming and introduction of participants
9:30 - 10:30	Presentation: Overview of the project, results and outcomes
10:30 - 10:50	Tea break
10:50 - 11:20	Plenary session: Open discussion, clarifications, and questions
11:20 - 12:20	Group works and discussion Gr 1: What are the strengths noticed in the completed project (design, implementation, outcomes)? Gr 2: What are the weaknesses or gaps noticed in the completed project (design, implementation, outcomes)? Gr 3: What are the challenges and limitations that will likely affect future projects in the same field area? Gr 4: What can be the best measures to include more effectively the local communities in future projects? Gr 5: What are the implications of the current transboundary situation for the management of Nyungwe bamboo habitat?
12:20 - 13:00	Group presentations
13:00 - 14:00	Lunch
14:00 - 14:30	Group discussion 1) Which priority can we take for the next project considering urgency, feasibility and effectiveness? 2) Which improvements can be incorporated in the next project (planning, design, implementation)?
14:30 - 14:50	Group presentations
14:50 - 15:00	Conclusion and departure

After presentation of the findings by the project leader, we split people into 5 groups that were led by each representative of the cells used in the project activities. Those SEDOs were designated as the reporter for the results and resolutions from the discussions (Table 5).

Table 5: Summary of the results from the topics discussed in groups during the completion workshop

	Question	Answers	Reporter
1	What are the strengths noticed in the completed project (design, implementation, outcomes)?	<ul style="list-style-type: none"> - The project had financial support, Rufford Foundation - Project was prepared by skilled, scientist people - Linked the Park and local people - Considered views and perceptions of people, as well as local authorities - Considered how people understand the Park - Highlighted the conservation challenges - Showed the Hamlyn's monkey is at risk of extinction due to 	Uwumusebeya

		<p>bamboo cutting</p> <ul style="list-style-type: none"> - Show how the people involved in illegal bamboo cutting are poor and vulnerable - Assessed past projects to show where there have been gaps 	
2	What are the weaknesses or gaps noticed in the completed project (design, implementation, outcomes)?	<ul style="list-style-type: none"> - Not involving efficiently and effectively the Park's authorities for proof-checking all information regarding the Park - No preliminary project information between project leaders and local people before implementation - The project so far does not show clearly the past situation of threats to the Park in time of bamboo planting as incentives 	Ruyenzi
3	What are the challenges and limitations that will likely affect future projects in the same field area?	<ul style="list-style-type: none"> - People most of the time are secretive about Park's issues which are sensitive subjects to them - Most people are bound to the culture that materials making the bamboo are irreplaceable - Different episodes of travels between communities of the two sides (Rwanda and Burundi) - Particular secretive behaviors of Hamlyn's monkey - Possible insecurity episodes around or near the bamboo zone of the Park - Reluctance of political agents to consider the issue of bamboo or understand its value to the communities 	Nkanda
4	What can be the best measures to include more effectively the local communities in future projects?	<ul style="list-style-type: none"> - More sensitization to all stakeholders on the bamboo value for the Nyungwe National Park - Continued and more collaboration with local communities in project implementation - Promote revenue sharing with the communities - More and anticipated clarifications on the objective of the project thereby proposed - Information sharing for the project findings to all concerned stakeholders including local people 	Kirarangombe
5	What are the implications of the current transboundary situation for the management of Nyungwe bamboo habitat?	<ul style="list-style-type: none"> - Improve bilateral diplomatic relations between Rwanda and Burundi, and apply such collaboration into a formal regulatory framework - Collaborative law enforcement framework regarding the protection of the Park - A collaborative sensitization and awareness program for communities adjacent to the bamboo zone Park in the two neighboring countries - Institute a forum for Park rangers and managers between Nyungwe and Kibira - Bring together bamboo users into cooperatives and set regulations on how to use bamboo rationally, by avoiding over-exploitation 	Remera

All the participants were given floor (plenary session) to suggest possible future projects that we discussed in the workshop and tried to reach a common understanding on. Suggestions of subjects to balance for choice about future projects were given sequentially as follows:

1. Bring bamboo users into cooperatives and set regulations
2. Provide building facilities so that people are evicted from bamboo-made houses
3. Initiate a framework of advocacy before REMA for campaigns about environmental protection
4. Include people into cooperatives and initiate alternative materials, businesses, and opportunities to bamboo
5. Community education and campaigns about conservation in local communities supported by livelihood improvement
6. Applying capacity building programs for bamboo value chain and improved markets, with linkages to marketing and trading network
7. Strengthening people through cooperatives and other community groups with financial support, capacity building and education
8. To investigate fully the impacts of bamboo cutting on the Hamlyn's monkey in its habitat
9. Plant more bamboos without cost to the bamboo growers, as incentives
10. To definitely stop the use of bamboo because there is never enough to be used
11. Promote and mobilize the environmental clubs of secondary schools and involve them in the protection of Nyungwe
12. Payment for ecosystem services with cash benefits to perpetrators of illegal bamboo activities
13. Financial and technical support for more bamboo planting as bamboo remains a necessity
14. Delivering prices and tributes to most bamboo caring growers to keep them motivated
15. A project that integrates both a community education program and assessment of bamboo cutting impacts on the Hamlyn's monkey
16. Business development for sustaining livelihoods
17. Producing more bamboo nurseries and monitor well their production
18. Promote use of bamboo, look for best markets, promote product monetary value, provide trading permits, conduct education, and monitor impacts
19. Provide incentives for people to plant and care for bamboo and make meticulous follow-up
20. Research and awareness project on motivating the government to care for the critical situation of bamboo in Nyaruguru district
21. School building to integrate a particular environmental education program
22. Assessing the law enforcement impacts, implementation and effectiveness to promote more efficient strategies for Park's protection

Those different topics were discussed in plenary round of opinions and we found that only few among them met the three criteria that we had fixed, namely urgency, feasibility and effectiveness. After more understanding of the problem and challenges around them, we formulated other directions basing on a reflection of individual proposed opinions and their combinations. We later ended up with 6 possible activities or projects which we voted for and decided that where applicable, a combination of objectives or activities can constitute a direction to a project that can be proposed to follow (Table 6).

Table 6: Different options for possible future projects

	Objective or activity	Votes	Decision
1	Community sensitization	8	Meets our criteria
2	Surveys of people involved in bamboo cutting and use	7	Meets our criteria
3	Grouping bamboo users into cooperatives and support them financially for valuing bamboo products	10	Meets our criteria
4	Planting more bamboo nurseries to provide more bamboo to grow in the communities	4	Not convincing; not combinable to others into a single project
5	Assess the conservation status of the Hamlyn's monkey species	2	Does not meet our fixed criteria
6	Motivation of the collaborative mechanisms to address the transboundary issues	2	Does not meet our fixed criteria

The resolution from the discussion was unanimous among the participants that the three first objectives will be combined and will constitute different activities for a future project at the past project site. The proposed future project will include: 1) Community sensitization (conservation education) about bamboo conservation, 2) full inventory and a monitoring of people involved in bamboo cutting and use, and 3) grouping bamboo users into cooperatives and support them for value promotion of bamboo products. We decided that we will suggest to Rufford Foundation a project that will combine the three activities if Rufford will be willing to be supportive for our future project at the same sites.

During the implementation of our project we have met some unforeseen difficulties. Such difficulties have been met even recently with the planning of the completion workshop. Some of those were indicated in the progress reports, but also in the summarized report which is sent enclosed to this detailed report. We addressed all obstacles and managed well our time to conduct our project properly and we had at the end satisfactory achievements. The main outcomes of our project are indicated here:

- We investigated all conservation activities that have been conducted at the project sites for the purpose of Nyungwe protection on the side adjacent to bamboo habitat and the Hamlyn's monkeys
- We evaluated all past conservation efforts and received the opinions of all RDB's stakeholders in evaluating them, an activity that no other previous project had conducted at the sites
- We interacted with the communities and through interviews about Nyungwe, the issue of illegal bamboo collection has received more attention both in the communities and their local leaders
- We used some data from the project to contribute to a paper presented in PIASS scientific week 21-23 July 2018, with title "*Conservation challenges and illegal activities around Nyungwe and Mukura natural forests, Rwanda*" co-authored G. Umuziranenge, M. Majyambere and F. Muhirwa
- After the acceptance of an abstract, a full paper as a result from some data of the project was sent for a scientific conference in UNILAK Rwanda, with title "*Evaluating impacts and effectiveness of bamboo planting initiatives for sustainable conservation management in the south-eastern part of Nyungwe National Park, Nyaruguru district, Rwanda*" co-authored M. Majyambere and T. Nsengiyumva
- The project has shown that the species of monkey *C. hamlyni* is becoming more and more threatened, therefore more efforts are needed even to guarantee easy access to its location and possible sightings of that animal that becomes more elusive for the complex challenges it faces
- Our project indicated that the local people in the surveyed sectors cannot provide bamboo for themselves from their fields, thus bamboo products should be closely monitored

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Appendixes

I. Participants in the project completion workshop held at PIASS in Huye, on 26 June 2018

Table 7 : List of participants in the project completion workshop

	Names	Institution or employer	Responsibility or position	Origin (District, Sector, Cell)
1	Methode Majyambere	UR & BEST	Project leader	Huye, Tumba, Rango B
2	Felix Niyonzima	BEST	Program manager	Huye, Mukura,
3	Diane Uwitonze	BEST	Financial Manager	Nyanza,,
4	Fidele Munyaneza	Nyaruguru district	SEDO/ Uwumusebeya	Nyaruguru, Ruheru, Uwumusebeya
5	Jean Pierre Bahigirora	Nyaruguru district	SEDO/ Ruyenzi	Nyaruguru, Ruheru, Ruyenzi
6	Emmanuel Mbarushimana	Nyaruguru district	SEDO/ Kirarangombe	Nyaruguru, Busanze, Kirarangombe

7	Jean Calude Turatsinze	Nyaruguru district	BDEPO/ Busanze	Nyaruguru, Busanze, ...
8	Jean Claude Sekamana	Nyaruguru district	BDEPO/ Ruheru	Nyaruguru, Ruheru, ...
9	Gregoire Twagiramungu	Nyaruguru district	SEDO/ Remera	Nyaruguru, Ruheru, Remera
10	Jean Paul Nemeyimana	Nyaruguru district	SEDO/ Nkanda	Nyaruguru, Busanze, Nkanda
11	Gerard Nzabandora	Nyaruguru district	ANICO	Nyaruguru, Ruheru, Ruyenzi
12	Muhirwa Fabien	PIASS	Tutorial Assistant	Huye, Ngoma, Taba
13	Muhammad	CoEB	Volunteering researcher, PhD	Huye, Ngoma, Taba
14	Barakagwira Joselyne	UR	UR BSc finalist	Huye, Mukura,
15	Nzibaza Venant	CoEB	CoEB staff	Huye, Tumba, Rango B
16	Twizeyimana Laurent	UR	UR BSc finalist	Muhanga,
17	Nsengiyumva Theogene	UR	UR BSc finalist	Huye, Ngoma, Mamba
18	Mugenga Protogene	PIASS	Student	Huye, Ngoma, Taba

II. Different photos taken during project activities

Here are the photos that indicate different events we met during the project activities. Some of them were referred to in the body of the report. These photos indicate, respectively: Marshland in the buffer zone near the bamboo zone of Nyungwe (A & B), Bamboo uses in construction (C & D), Bamboo collected from the Park (E, F, G & H), Bamboo from community's fields (I), Products made from bamboo (J, K, L & M), After field trip of RDB, WCS and stakeholders (O), Threats in the bamboo zone (P & Q), Field team photos (R & S), Group photos after the completion workshop (T, U, V & W).





