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Analysis of current Governance in the Sustainable Management of the Virunga National Park of the Democratic Republic of Congo

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Abstract— *This study was carried out in Virunga national park (ViNP) of the Demographic Republic of Congo. The study had as objective to contribute to the sustainable management of the Virunga national park. The study area was made up of four (4) administrative territories (Masis, Goma, Nyiragonga and Rutshur); these territories are found in the North KivProvence of the democratize Republic of Congo.Data was collected through the administration of 394 structured questionnaires to household heads residing around the peripheries of the Virunga national park. The data was imputed into a Microsoft excel sheet 2016 and was analysis using an SPSSversion 21 statistical package. The results revealed that majority of respondents were youths 86% with ages below 61years. On the question; on the collaboration between local population and park management, the results showed that 76.4% of respondents had no form of collaboration with park management. The results also revealed that majority of respondents do not participate in the management of the ViNP. The presence park governance is highly contested by the local communities and should be revise to incorporate the concerns of the local population. To revive the lost trust and improve the relationship between the local populations living around the park and the management of the park; locals populations should participate in the management of the national park; benefit from park resources should be share and alternative income activities be created to prevent youths from relying on the park resources as a livelihood source.*

Keywords— ***Sustainable Management, collaboration, governance and Virunga national park.***

I. INTRODUCTION

Protected areas make up 12% of the earth surface (Dulley and Philipe, 2006). The conservation of biodiversity is the greatest challenge of the 21st century. However efforts have been made by international conservation organizations and respective state governments in the conservations drive of biological resources although these efforts are insufficient (CDC, 2012). The situation is blamed on the breakdown of national conservation institutions (Haller, 2010) and also on the administrative bottle necks on the part of the national conservation agencies (Ratner et al., 2017; Schwartz et al., 2012). The 5th World park congress in 2003 in Durban was the turning point on conservation of biodiversity. This congress recognized the co-management of protected areas.

The Central African states currently have approximately 14% of its areas under protected land. The involvement of the local population in the management of these protected areas does not live up to the expectations of the various governments in the sub-region while these populations are manifesting their dependence on natural resources, their lands are continuously been gazed as protected areas.Over 80% of the local population in this sub-region depended on substance agriculture who poses a threat to protected areas (PFBC, 2006)

The Democratic Republic of Congo (DRC) is the largest country in Africa with over 60% of its land surface covered with dense rainforest (de Wasseigeet al., 2012). These parks cover a surface areof 2 344 858 km² (terrestrial: 2 267 048 km² and aquatic: 77 810 km²) (CIA,

2015). The country is rich in biodiversity and has 51 network of protected areas both land and marine (Linkeet al., 2012, OFAC, 2015). This diversity is characterized by 11000 plant species of which 3200 species are classified endemic and out of which900 of these species are aquatic (Mittermeieret al., 1997; IUCN, 2015).These protected areas cover an area of 65,000km^2.Virunga National Park (ViNP) was created in 1925 and covers an area of 800,000 ha (OFAC, 2015). It is one of world's most diverse protected sites that are rich in fauna and flora. Its biodiversity is of vital ecological and socio-economic importance for the populations of the DRC. Virunga National Park is classified as World heritage site (Unesco, 2015a; Unesco, 2015b) and is faced with demographic pressure (Bakole, 2018). Unfortunately these biological resources are threatened to extinction due to the combined effect of armed gangs operating in the Park, poaching, illegal fishing, animal grazing, illegal logging, and encroachment by crop farmers. (Djogbenou, 2012). Recently with the putting in place of villages and services of the state around the buffer zones of this protected area has increased the threats, couple with uncontrolled immigration and forest exploitation for minerals. (MINENVI, 2019). This pressure and threats have contributed to the extensive degradation of Virunga National Park an example is the reduction of Hippopotamus population by 95% between 1957 and 1985 from 30,000 individuals to 1200 (IUCN,2015). In addition to the 30 years of political instability and armed conflict which has negatively impacted the management of Virunga national park and in particular Lake Edward's fisheries resources (Nzuzi, 2019). An appropriate management method would that of participatory management. Indeed, the approach incorporating the local communities in the management of this protected area will bring about the sustainability of ViNP (MED, 2005; Bamba, 2010).

II. THE CONCEPT OF PROTECTED AREA GOVERNANCE

The concept of governance is theoretically a vague concept. The definition given by the World Bank in the late 1980s as"the word governance corresponds to an ideal situation of good management or administration" but this is not always the case, it is for this reason that the word governance is always accompanied by a qualifying adjective as good governance. This perception means that this governance can be good or bad. When it comes to the management of protected areas, good governance is considered to be: accountable, transparent, inclusive, participatory, respected and effective in law enforcement (Shidiki et al., 2021). Good governance is governance that is capable of reconciling various interests through the integration of local communities, through the sharing of benefits that is accepted by all parties (issah et al., 2018).In the DRC, after several years characterized by irregulatory management, the ICCN officials has chosen a conservation policy for the DRC which is based on participatory management approach in which local communities are involved in the management of the park.Obviouslywe can see different integrated projects such as the electrification of the surrounding villages; however, beyond the official discourses copied in the world conservation policies, and taken up in the national policy documents, it is clear that the place given to local population is almost non-existent in the management of ViNP. So a new approach is needed that will integrate the local population into the management of the Park in order to reduce conflicts with the local population, The participatory management approach would be an alternative to open up this integrated management between the local population and the ViNP Management (Feral,2007).

2.1 Co-management Approach in protected areas

This management approach does not consider protected area as an isolated entity, but rather take into account the functional relationship between the area and its periphery. In addition, planning must be consistent with national and sub-regional land use and sustainable development policies. Simply this management plan is a technical document developed by members of the village committee with the support of local councils in collaboration with park officials. It aims is to plan over period the operations the management of the park in a sustainable manner. It is the active involvement of community members and external stakeholders in all decisions related to for sustainable community the management of the park. The community is involved, consulted, provides information, asks questions and gives its opinion on the management of the park (Balde,2004).

III. METHODOLOGY

3.1 STUDY AREA

Virunga national park is located in the Eastern part of the DRC and borders two countries; to the Northeast by the Republic of Uganda and to the Southeast by the Republic of Rwanda. It is also located between two important basins, to the North by the Nile Basin through Lake Edward and to the south by the Congo Basin through Lake Kivu. It found in latitude 55^0 0'N to 35^0 1'S and longitude 24^0 10'E to 30^0 0'N. It has a tropical climate with an average rainfall of between 1000mm to 2000mm annually. It moist and has an average temperature of 23ºC. The

province of North Kiv where Virunga National park is located has population density of 112p/km^2. The park has a surface area of 780,000ha (PAG, 2018; PFBC, 2006). There are also a chain of maintains that extends in to the Republic of Rwanda with the highest peak at Mt. Rewenzori with a height of 2700m above sea level. Virunga national park has one of the world's most active volcanoes.

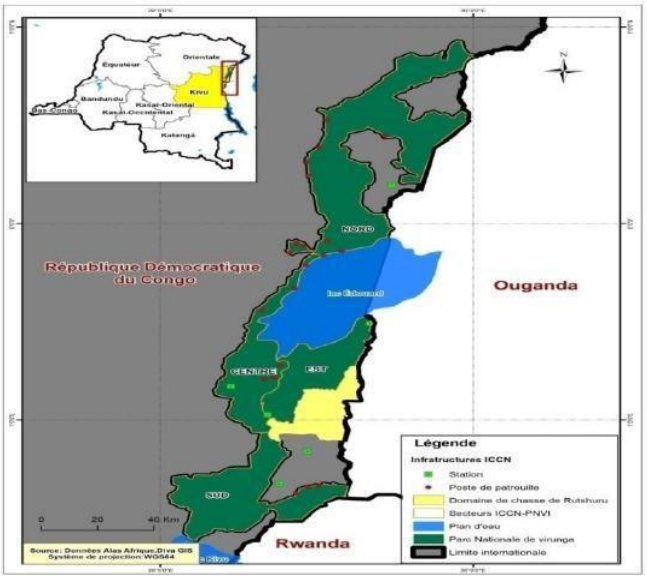

Fig.1: Map of Virunga National park

3.2. Data collection

Data was collected through the administration of questionnaires and stakeholders interviews. The questionnaires were design to provide information that certifies the study objectives. The communities around Virunga National park are divided in four administrative territories with a population of approximately 201,936 persons (Territorial Census, 2019). 394 households were survey base on statistic calculation by Lynch formula.

3.3 Data analysis

The data was inputted in an excel sheet (Micro soft excel 2016). Data on socio-economic activities was analyzed using SPPS statistical package versions 21 were the results were presented in a descriptive statistic format(frequency, mean, percentage, tables and charts).

3.4 Sample size

Household sampling was randomly stratified to identify respondents. Virunga national park is divided in to four (4) administrative territories. These territories have an estimated household numbers of about 27,174 (Territory census, 2019). The sample size was calculated using Lynch formula.

Formula: $n = \frac{NZ^2 \times P(1-p)}{Nd^2 + Z^2 P(1-p)}$

n=Sample size

N= Target population

Z= constant (1.96) corresponding to the 95% confidence interval

P= prevalence which is 50%

d= margin of error at 95%

Thus, using the above formula, the sample population for this study was calculated at 394 respondents.

Table 1: Distribution of respondents by territories and towns

Territory	Town	Population	Households	Proportion	Sample	No poll
Rusthuru	Kibirizi	52 515	8752	0,32207257	127	6
	Rugari	22000	3666	0,13490837	53	6
	Rumangabo	8000	1333	0,04905424	19	6
		82 515	13751	0,50603518	199	6
Masisi	Sake/Kimoka	19226	3204	0,11790682	46	6
	Mubambiro	17225	2870	0,10561566	42	6
		36451	6074	0,22352248	88	6
Nyiragongo	Muja	9000	1500	0,05519982	22	6
	Kibumba	11000	1833	0,06745418	27	6
		20000	3333	0,12265401	49	
Goma	Mugunga	20659	3443	0,12670199	50	6
	Lacs vert	42311	573	0,02108633	8	6

	62970	4016	0,14778833	58	6
Total	**201 936**	**27174**	**1**	**394**	

IV. RESULTS

Administered questions by territory

The results in figure 2 below reveals that majority of the respondents interviewed for this study were 51% from Rutshuru, followed by 22% in Masisi, 15% from Goma and lastly 12% in Nyiragong. This disparity in the study is due to the population difference within these territories.

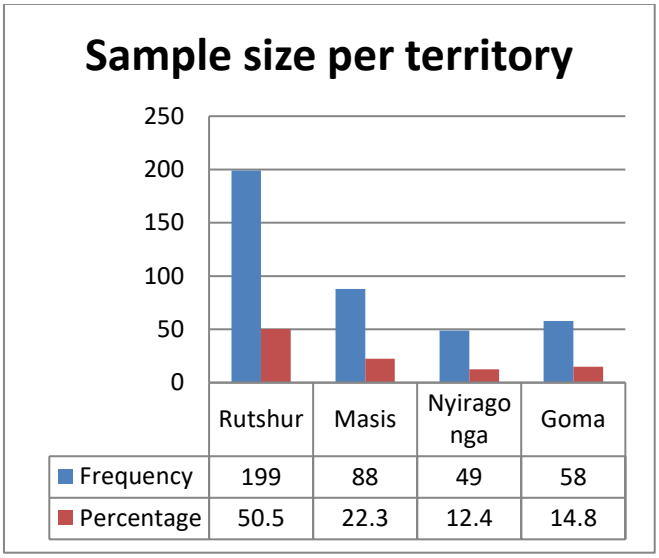

Fig.2: Distribution of respondents by territory

Age distribution of respondents

Results in table 2 revealed that majority of respondents in the study are youths whose ages vary between 20-60 accounting for 75.8% of the population while the old who are above 61 years make up 24.2%. Even though the youths are the majority of respondents in the study area, there is still a small variation within this age group in the respective territories. For example the same youth population interview with same age brackets of between 20-60 years in the territory of Rutshuru was75.3%, Masis 73.9%, Nyiragong 79.6% and Goma 72.5% respectively. Although the respondents interviewed in all the four (4) territories are within the age brackets of70 to 75years. We can still identify outliers in the territory ofNyirangong with a high of 79.6%. The differences in the levels of youth involvement in conservation related activities may be due to lack of interest, diversification of livelihood activities and alternative sources of income. This finding is inline with the study carried out by Shidiki et al., 2017 on the perception of small ruminant grazers and stakeholders in the sustainable management of biological resources in the Mt. Oku forest reserve Northwest region, Cameroon.

Table 2: Age distribution of respondents in the territories

Territory	Age (years)	Frequency	Percentage
Rutshuru	20-40	63	31.6
	41-60	87	43.7
	Above 61	49	24.7
Masisi	20-40	28	31.8
	41-60	37	42.1
	Above 61	23	26.1
Nyiragong	20-40	15	30.6
	41-60	24	49
	Above 61	10	20.4
Goma	20-40	19	32.8
	41-60	23	39.7
	Above 61	16	27.6

Respondents involved in the management of Virunga National Park

The results in table 3 revealed that only a minority of respondents 14% are involved in the management of Virunga National Park. The majority part of the respondents who accounts for 86% said that they do not participate in the management of the park. This minority is amongst others the traditional and administrative authorities.

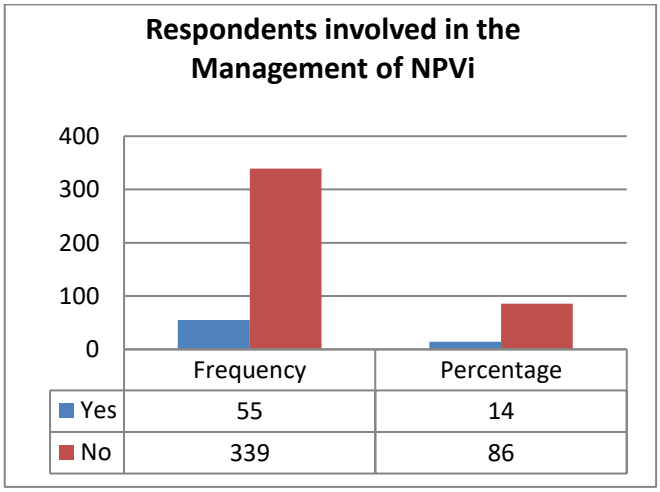

Fig.3: Shows the respondents involved in the Management of ViNP.

Opinion of respondents on the management of park

The results in Table 3 shows that majority of interviewed respondents have a negative perception towards the park management. Most respondents except for teacher are implicated in the management of the park amongst the 54 teachers interviewed, only 3% said they are involved in management of the park and they represent the highest percentage amongst all the other professionals in the study area. The others who represented a small fraction are the farmers who accounts for only 0.1% on the park management. Also, the category of the farmers who participated in the park management activities is small in terms of numbers. Out of 128 farmers interviewed only 9 farmers said that they are sometimes invited to participate in park management activities. To conclude the results in table 3 surely proves that most of the respondents in the study area are not involve in the management of the park.

Table 3: A cross table showing actor's opinion in the management of Virunga National park

Primary occupation of respondent		**Integration in management of ViNP**		**Total**
		Yes	**No**	
Small trade	Effective	4	59	63
	% of total	1,0%	15,0%	16,0%
Farmer	Effective	9	128	137
	% of total	2,3%	32,5%	34,8%
Housewife	Effective	1	8	9
	% of total	,3%	2,0%	2,3%
Pupils	Effective	3	6	9
	% of total	,8%	1,5%	2,3%
Teachers	Effective	12	42	54
	% of total	3,0%	10,7%	13,7%
Motorcyclist	Effective	4	35	39
	% of total	1,0%	8,9%	9,9%
Government	Effective	5	9	14
	% of total	1,3%	2,3%	3,6%
Students	Effective	3	3	6
	% of total	,8%	,8%	1,5%
livestock breeder	Effective	1	16	17
	% of total	,3%	4,1%	4,3%
Dressmaker	Effective	0	1	1
	% of total	0,0%	,3%	,3%
Male nurse	Effective	1	6	7
	% of total	,3%	1,5%	1,8%
Agronomist	Effective	2	1	3
	% of total	,5%	,3%	,8%
Fisherman	Effective	1	2	3
	% of total	,3%	,5%	,8%
Pastor	Effective	2	5	7
	% of total	,5%	1,3%	1,8%
Carpenter	Effective	1	7	8

	% of total	,3%	1,8%	2,0%
Without profession	Effective	5	8	13
	% of total	1,3%	2,0%	3,3%
Meat seller	Effective	1	3	4
	% of total	,3%	,8%	1,0%
Total	**Effective**	**55**	**339**	**394**
	%	**14,0%**	**86,0%**	**100,0%**

Respondents' level of integration in the management of the park

Based on the results in table 4 out 394 respondents interviewed only 55 respondents said they are involved in park management. The detail results further revealed that 58.2% are aware of park activities, followed 23.6% are involved in park protection, and while 10.9% are involved in park Patrols and finally 7.3% have participated in join meetings.

Table 4: Distribution of respondents by level of integration into Park activities

Level of integration	Frequency	Percentage
Awareness	32	58.2
Joint meetings	4	7.3
Protection of the park	13	23.6
Park patrol	6	10.9
Total	**55**	**100**

Collaboration with Virunga national park authorities

The results in figure 5 below shows that 76.4% of respondents do not collaborate with the authorities of Virunga national park while only 23.6% respondents said that they have a collaboration with Virunga national park management. Even at the level of the 23.6% of respondents who acknowledge to be collaborating with park officials. The collaboration is mostly at level of attaining meetings.

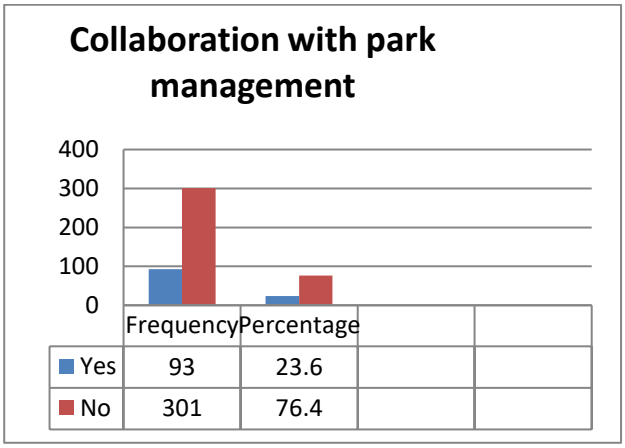

Fig.5: Showing the collaboration of respondent with ViNP management

Conflict between the local population and IUCN

The climate is often tense between the local population and the management of the Virunga national park whom the locals say has refused to collaborate with them in the management of the park. Most locals also believe that ViNP is their ancestral land and that IUCN management regards them as apeople who are not knowledgeable and informed on the importance of conserving wildlife. Many locals said that during the establishment of the national parkthey were not consulted and did not participate in the park creation. Respondents also believe that if the conflicts that exist between the local population and the park management is to be resolve; the parks has to redefined its boundaries, mode of distribution of benefits, allow access for share resources inside the park and finally include local populations in the management of the park resources.

Conflict Management Committee

There exist a conflict management committee which has been put in place by the park management to resolve simple conflicts that may occur between the park and the local population. This committee is called Committee of coordination of site **(COCOSI).** The committee seat twice a year. The committee evaluates the activities of the park and presents biannual report to its members. Most of the arrested offenders are also sued by this committee and most often the guilt are imprison in Goma Central prison.

Unlike the other protected areas of DRC where IUCN has created the Community Conservation Committee (CCC) which the local population living around the Virunga National Park believes that it is more just and fair than the conflict resolution committee created in ViNP. The local also believes that if peace needs to reign around the ViNP, the Government of DRC should harmonize all the conflict resolution mechanism for all the national parks.

Opinion of respondents on the relationship between the park and the locals

The results in figure 6 showed that majority of the respondents 64.7% believe that the relationship between park management and the local population is conflictual while only 35.3% of the respondents believe that their relationship with park authorities is harmonious.

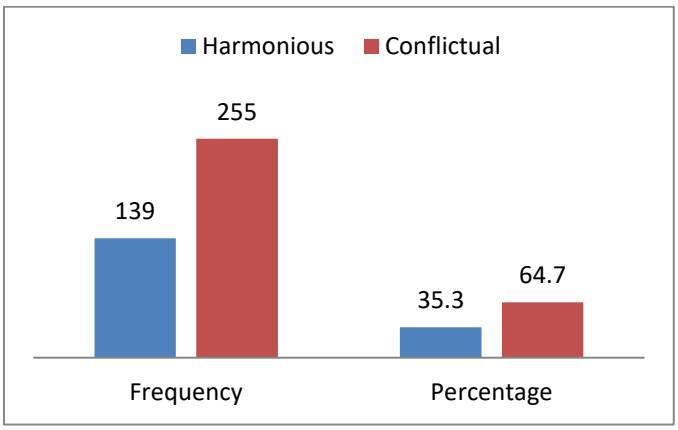

Fig.6: Shows the relationship between park authorities and the local population

Causes of conflict between locals and ViNP management

The results in table 7 showed that the major cause of conflict in the park is forest exploitation 42.9%, followed by encroachment 28%, poaching with 5.3% and destruction of crops by wildlife 5.3%. The least in the table is lack of information and laws governing the park with 1.5%.

Table 7: Distribution of respondents according to the cause of conflict

Causes of conflict between people and ViNP managers	Frequency	Percentage
Encroachment in to park	110	28.0
Forest exploitation	169	42.9
Poaching	21	5.3
Fishing in certain areas of the ViNP	9	2.3
Destruction of crops	21	5.3
Lack of collaboration between ICCN and the population	21	5.3
Lack of information from the population	6	1.5
Grazing inside the ViNP	12	3.0
Poverty	15	3.8
Not sharing park benefits	10	2.5
Total	**394**	**100.0**

Mechanisms for conflict resolution in ViNP

The results in table 8 showed the different conflict resolution mechanism in the ViNP with dialogue platform accounting for 44.7%, followed by traditional authority 32%, judicial, 7.9% and lastly by the use of law enforcement agent 0.8% respectively.

Table 8: Shows the different conflict resolution mechanism

Mechanisms of resolution of conflict	Frequency	Percentage
Law enforcement agents	3	0.8
Reconciliation with parties	42	11.1
Dialogue platform	177	44.7
Traditional authorities	126	32.0
Judicial	31	7.9
Nothing to make	13	3.5
Total	**394**	**100.0**

V. DISCUSSIONS OF THE RESULTS

In the study area, Majority of youths 86% with ages below 61year rely on farming as the main source of income. This is probably because they are not educate couple with instable governments since independence have limited skills which cannot allow them carry out alternative

household income activity. This is different from the study carried out by Shidiki et al., 2017 showing that youths in the Mt. Oku area have diversify their livelihood sources and do not rely on agro-pastoralism as a livelihood source. Majority of household heads with ages above 61 years primary occupation is farming; In addition to farming many respondents do not have other secondary livelihood sources of income.

The study also revealed that only a minority of these respondents collaborate 23.6% with park management while the majority 76.4% are disgruntled with park officials. This study shows the negative perception of respondents towards the conservation program of the ViNP. This resultvalidates the findings of Manu et al., (2014) in which they attributed causes of farmer-grazer conflicts in 24 communities to be based on resource sharing.

VI. CONCLUSION

The struggle over the use of common resource as perceived by local populations living around the peripheries of the Virunga national park has remained a bound of contention for decades. This study was design to capture the current governance of Virunga National Park geared towards a sustainable management of the park. The results of this study re-emphasize the serious nature of conflicts that exist between the management of this pristine wildlife park and the rural communities living around the buffer zones of the park. To add sail to this injury the presence of armed groups operating inside the park has hindered conservation and increased poaching. The study also revealed that majority of respondents 86% do not participate in the management of the park. The results also showed that most respondents lack trust and have no collaboration 76.4% with park authorities. Respondents also believed that in the past decades there was more collaboration with previous administrations of the national park before the park was transformed into Virunga Foundation and the management of the park was handed to IUCN. To revive trust and improve the relationship between the local populations living around the park and the conservators of the park; locals should participate in park management, benefit from park resources and alternative income sources be created to deter youths from relying on the park resources as a livelihood source. The presence park governance is highly contested by the local communities it should be revised to incorporate their concerns.

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