

Extension of the IUCN Framework for Conservation Planning and Management: An Exploratory Approach

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ABSTRACT

Conservation areas are hotspots for biodiversity protection and ecosystem services. Due to their central role in environmental sustainability, the International Union for Conservation of Nature (IUCN) developed a framework for effective planning and management of conservation areas. Yet, the areas are faced with different challenges of varying intensities across nations of the globe. This research, therefore, aims to extend the IUCN framework by incorporating the dimensions of collaboration and motivation and to determine the extent to which these dimensions relate to the existing dimensions of the framework. To achieve these, the sequential mixed method comprising both qualitative and quantitative research designs were adopted. Literature search and scoping interviews were conducted at the initial stage, followed by questionnaire design and administration. Two-staged sampling techniques were used to administer 191 questionnaires. Exploratory Factor Analysis (EFA) using Principal Component Analysis (PCA) was employed for the analysis. The EFA extracted eight clusters of variables with each cluster having a high correlation between the indicators but low correlations with indicators outside their clusters. This implies that collaboration and motivation contribute significantly to the effective planning and management of conservation areas. The novelty of this research is its ability to scientifically determine suitable and manageable parameters that can adequately measure collaboration and motivation; determine the relationship of the two factors with the six factors of the IUCN framework and further integration into the IUCN framework, which has not been established by previous studies. Understanding these can guide policy and decision-makers in making evidence-based decision-making. It can also provide the institutions and agencies involved in the management of conservation areas with up-to-date knowledge that can ease and improve the performance of managers, advance ecological space protection, improve human well-being and sustain both natural and built environment. The research recommends testing this framework scientifically using a hypothesised model.

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1.1 INTRODUCTION

Conservation areas are cornerstones for protecting biodiversity and sustaining ecosystem services (Geldmann et al, 2015; Kolahi et al, 2013; Vodouhe et al, 2010; Coad et al. 2008). The last three centuries have recorded the highest urbanization rate, expansion of urban areas, and high demand for land and natural resources to support the socio-economic and infrastructural needs of the ever-growing populace. These have continued to exert pressure on ecological assets, thereby contributing to the reduction in the size of

the global green and blue spaces which ought to be protected for the sustainability of both the built and natural environment. The global green comprising all forms of protected and conservation areas constitutes more than 15% of the global total land mass (Juffe-Bignoli et al., 2014; Geldmann et al., 2015; UNEP-WCMC & IUCN, 2018). These areas play a significant role in providing valuable ecosystem services (Carney, et al., 2014; Giri et al. 2015; Calado et al. 2016; Pascual et al, 2017; du Toit et al., 2018); intended to protect the unique and valuable ecological assets

distributed across the globe (Hassan, 2017; Hassan, 2019a; 2019b).

Nature and conservation areas offer a wide range of services at local, regional and global scales. This is the reason why nations and global communities are concerned with their status and effectiveness, and several countries began to safeguard their ecological/green spaces. The International Union for Conservation of Nature (IUCN) has developed a framework for planning and management of the areas, focusing on six dimensions namely: context, planning, input, process, output and outcome (Hockings et al, 2006). The IUCN framework is more of a general one as it is designed to be adopted globally for planning, management and assessment of conservation areas. This is what Hassan (2017) referred to as the "*one size fits all approach*". The main concern is that, do conservation areas distributed across the globe have similar characteristics. The disparities such as physical and socio-cultural characteristics of locations where conservation areas are located differ, attachment of the people to conservation areas, the role of conservation areas in their sustenance/livelihood, the level of public awareness about the importance of protecting the natural areas, and approach to planning and management of the areas can have an impact on the status and performance of the areas. These are pieces of evidence that indicate the need for the extension of the IUCN framework. Substantial variations in the ecological composition and level of protection across conservation areas have been reported globally (Craigie et al., 2010; Starnes et al., 2021) as well as the effectiveness of management (Geldmann et al. 2018). Hockings, Cook and Leverington (2015) acknowledged the lack of cultural and social indicators contributing to the effective management of conservation areas. Similarly, Geldmann et al., (2015) expressed concern over the approach through which the management of conservation areas can be enhanced. Since these differences exist, they cannot have the same treatment. This implies that the framework designed by the IUCN is lacking

due to its inability to take into consideration disparities or peculiarities of different spatial locations where the conservation areas are located. This has made it difficult to achieve effective planning and management of the conservation areas.

The IUCN framework serves as a model for the planning, management and assessment of conservation areas globally. Yet, the management effectiveness of the conservation areas remains unknown. Several studies across the globe have reported ineffective management of conservation areas (Leverington et al. 2008; 2010; Laurance et al. 2012; Watson et al. 2016; Krause and Zambonino, 2013; Geldmann et al., 2013; Mahli et al. 2013; Chowdhury et al. 2014; Geldmann et al, 2015). Similarly, several studies have established failure and or ineffective management of conservation areas in the global south (Marguba, 2003; Mulongoy and Chape, 2004; Thompson and Hollis, 1995; Carey et al. 2000; USAID, 2008; Ogunjinmi et al. 2009; Mohammed et al. 2010; FAO, 2010; Fourth National Biodiversity Report, 2010; Usman and Adefalu, 2010; Wildlife Conservation Society 2012-2016; Oduntan et al. 2013; Ejidike and Ajayi, 2013). Management of some conservation areas in the global south is merely theoretical, as some of the conservation areas no longer exist in real space due to ineffective management. This has resulted in to decline in ecological space (Bruner et al, 2001; Fan et al., 2021). The United Nations Conference on Sustainable Development (2012) reported that the size of the ecological spaces in Nigeria decreased from 11% to 5.7% of the nation's total landmass, mainly attributed to ineffective management. This is what literature termed as "paper parks" as some of the areas no longer exist in reality.

Due to growing concern over poor planning and ineffective management of conservation areas globally despite the IUCN framework, several researchers calls for improvement of the model (Watson et al. 2014; Anthony and Shestackova,

2015; Geldmann *et al.*, 2015; Hausner *et al.* 2017). In response to the call, the framework has been updated to improve its robustness; however, the extension only focuses on incorporating the dimension of climate change (Belle *et al.*, 2012). No study attempted to extend the IUCN framework to capture the dimensions of collaboration and motivation despite the location of most conservation areas in human-dominated environments. This has contributed to the neglect of public cooperation and welfare, and the motivation of conservation managers, which are both central to the successful planning and management of the areas. As such, these factors that may tend to promote proper planning and management of the areas are ignored.

Empirical studies from a wide range of disciplines including planning, environment and management identified collaboration as a key to successful planning and management of conservation areas (Parks and Wildlife Commission 2002; Parr *et al.*, 2008; Lookwood, 2010; Brekes, 2010; Kurdoglu and Cokcaliskan 2011; Woodland and Hutton, 2012; Pfahl *et al.*, 2015; Bockstael *et al.*, 2016; Powlen, Gavin Jones, 2021; Deci *et al.* 2001; Grouzet *et al.*, 2005; Schwartz, 2006; Nielsen, 2012). Similarly, literature revealed that the motivation of personnel improves their performance in carrying out their duties (Cetas and Yasue, 2017; Nielsen, 2012; Ogunjinmi *et al.* 2008; Maslow 1954; 1970). Understanding the contribution of collaboration and motivation to the successful planning and management of conservation areas is crucial in safeguarding the conservation areas and declining ecological spaces. Therefore, this study aims to scientifically explore the ability of collaboration and motivation to fit into the IUCN framework for planning and management of conservation areas. The objectives are (i) to identify indicators that can adequately measure collaboration and motivation in conservation area planning and management (ii) to determine the relationship between the two additional factors with the six factors of the IUCN framework (iii) to determine the contribution of

collaboration and motivation to effective planning and management of conservation areas in Nigeria.

2.1 METHODOLOGY

The study was conducted in three conservation areas namely Yankari Game Reserve, Lame-Burra Game Reserve and Sumu Wildlife Park, all located in Bauchi State, Nigeria. Yankari was established in 1957 for ecosystem conservation, with an area of 224,410 hectares and lies in the Sudan Savannah vegetation zone. It is under category II of the IUCN management category. Lame-Burra was established in 1972 for the same purpose as Yankari and covers an area of 205,767 hectares located in the guinea savannah vegetation zone. It is under category IV of the IUCN management category. Sumu was established in 2005, with an area of 8,159 hectares within the guinea savannah vegetation zone. These sites were selected because they are the most managed conservation areas in Bauchi State, and the state holds the highest number of conservation areas in the country. They have managers at the sites that carry out management and conservation activities.

The study used a sequential mixed-method research design undertaken in two phases starting with the qualitative approach and then followed by the quantitative approach (Creswell, 2010). The earlier involves an extensive literature search of published journals/articles, reports and best practices for sourcing variables to be used in developing a close-ended questionnaire. The literature search was conducted on Web of Science, Science Direct, Research Gate, Google Scholar, IUCN database and WorldBank repository. 87 publications were sourced using the following keywords (i) conservation area planning (ii) protected area management (iii) collaboration and conservation area planning (iv) motivation and environmental management (v) motivation and conservation area management; however, 23 were excluded due to their content, and 64 were further reviewed by the study. Similarly, scoping interview was conducted with the managers of the conservation areas and government agencies

overseeing the conservation areas as shown in Table 1 below.

Table 1: Background of Respondents of Interview

Code	Position	Organization
PMWCS	Project Manager	World Conservation Society (WCS)
HPYGR	Head of Protection	Yankari Game Reserve
GMSWP	General Manager	Sumu Wildlife Park
GMLBGR	General Manager	Lame-Burra Game Reserve
CPMDF	Chief Personnel Manager	Bauchi State Ministry of Agriculture, Department of Forestry

The interviewees were selected based on their experience with conservation-related activities. The interviews lasted for a minimum period of 33 minutes and a maximum period of 57 minutes in-line with the recommendation of (Newing, 2011). The study adopted 37 sets of indicators used by the IUCN in developing its framework (Hockings et al., 2006). Similarly, six and four indicators

measuring collaboration and motivation respectively were sourced from the literature search and scoping interview, thereby totalling 47 indicators. The adapted indicators and those obtained from the literature and the scoping interview guided the development of a close-ended questionnaire for this research (refer to Table 2).

Table 2: Factors and Indicators Used in Planning and Management of Conservation Areas

Factor	Item Description	Source
Context	The protected area sustains a range of animals and animal species in it	Hockings et al, (2006)
	The protected area has unique features of aesthetic values for recreation	Hockings et al, (2006)
	The protected area contributes to the representativeness of the PA system	Hockings et al, (2006)
	The protected area has high educational and scientific value	Hockings et al, (2006)
	The protected area is under intense threats and pressure	Hockings et al, (2006)
	Protected area resources are of high demand and market value	Hockings et al, (2006)
	Our protected area is easily accessible for illegal activities which makes it difficult to monitor illegal activities in and around the protected area	Thomas and Middleton (2003), Hockings et al, (2006)
	The protected area supports community development through the provision of employment and increased local communities earnings	Hockings et al, (2006)
	Local communities depend on the protected area resources	Hockings et al, (2006)
Planning	The protected area has adequate laws and regulations	Hockings et al, (2006)
	There is consistency between protected area objectives, management plans, and policies	Hockings et al, (2006)
	The protected area boundary is clearly demarcated	
	The protected areas are connected to other protected/conservation areas	Hockings et al, (2006)
	The management plan is comprehensive	Thomas and Middleton (2003), Hockings et al, (2006)
Input	Adequate staff are available to undertake management activities	Hockings (2003), Hockings et al. (2006), Neilson (2012)

	The necessary infrastructure and equipment required for management activities are available	Hockings (2003), Hockings <i>et al</i> , (2006), Kurdoghu and Cokcaliskan (2011), Neilson (2012)
	Funding in the past 5 years has been adequate to conduct critical management activities	Hockings (2003), Hockings <i>et al</i> , (2006), Neilson (2012), Kurdoghu and Cokcaliskan (2011)
	There are adequate information, communication and access to technology	Hockings (2003), Hockings <i>et al</i> , (2006), Kurdoghu and Cokcaliskan (2011), Neilson (2012)
Process	Patrol and enforcement of laws and regulations are effective	Hockings <i>et al</i> , (2006)
	Managers undergo required training to perform management activities	Hockings <i>et al</i> , (2006)
	Administration and financial management in the protected area is effective and stable in the last 5 years	Hockings <i>et al</i> , (2006)
	Infrastructures and equipment are maintained regularly	Hockings <i>et al</i> , (2006)
	Adequate studies on ecological and socio-economic aspects of the PA are conducted for planning purposes	Hockings <i>et al</i> , (2006)
	Illegal activities are monitored and recorded accordingly	Hockings <i>et al</i> , (2006)
	The mechanism for resolving conflict exist and are implemented effectively	Gray (1989), Hockings <i>et al</i> , (2006), Parr <i>et al</i> . (2008)
	Management effectiveness evaluation is undertaken periodically	Hockings <i>et al</i> . (2006)
	The management support community development through infrastructure, empowerment and educative programmes	Carey <i>et al</i> . (2000)
Output	Law enforcement	Hockings <i>et al</i> , (2006)
	Threat prevention and site restoration	
	Community outreach and education efforts	
	Infrastructure development and equipment provision	
	Staff training and development	
	Research and monitoring	
Outcome	Protected area objectives have been achieved	Hockings <i>et al</i> , (2006)
	Sites have been restored from previous threats	
	Communities benefited significantly from the management	
	The management plan is well implemented	
Collaboration	There is a collaboration between our protected area and international organizations/NGOs in management	Gray (1989)
	Local communities and community-based organizations are actively involved in the decision-making process	Berkes (2010), Gbadegesin and Ayileka (2000), Gray (1989), the outcome of the scoping interview
	There is an adequate dialogue between parties involved to resolve conflict	Gray (1989), the outcome of the scoping interview
	The decision agreed upon by the parties involved is binding on all members	Berkes (2010), Berkes <i>et al</i> . (1991), Gray (1989)
	There are shared management responsibilities among the parties involved	Berkes <i>et al</i> , (1991), Gray (1989)
	There are joint activities/research and information sharing between our protected area, other protected	Gray (1989), Nielsen (2012)

	areas researchers in the academic environment	
Motivation	My earnings adequately cater for my shelter and other basic needs	Cetas and Yasue, (2017); Nielsen (2012), Ogunjinmi <i>et al</i> (2008), Maslow (1954), the outcome of the scoping interview
	Being a ranger, I am respected by my community members and colleagues	
	There are incentives such as bonuses, best performance, and over-time to appreciate staff performance and boost their morale	
	My duty post is safe	

Key to the Table

	Items adapted from IUCN (Hockings et al., 2006)
	Items sourced from literature and scoping interview

The latter which used the quantitative approach of inquiry, solely comprised aspects of questionnaire design, validation, piloting, and administration to collect quantitative data. The target population for this approach is conservation managers of the selected conservation areas under study. Conservation managers in this study comprise personnel of the conservation areas involved in either recreation, protection, conservation, forestry, patrol/protection or research departments. Two-staged sampling involving stratified and simple random sampling was used to select respondents for the study. Each

conservation area is considered a stratum, and simple random sampling was used in each of the strata to select respondents to be included in the study. Individual conservation areas were visited to draw samples and administer the questionnaire. The population of the study and the ratio of sample size for each of the strata is presented in Table 3. The sample size was determined based on Krejcie and Morgan's technique (Krejcie and Morgan 1970). The population of Lame-Burra and Sumu were oversampled in line with the recommendation of Chawla et al. (2002) to overcome the challenge of under-representation as their population size is small compared to Yankari.

Table 3: Ratio of Sample Size for Managers/Rangers

S/N	Name of Protected Area	The population of Managers/rangers	Sample Size	Percentage of the Total Sample Size
1	Yankari Game Reserve	281	109	57.1%
2	Lame-Burra Game Reserve	47	47	24.6
3	Sumu Wildlife Park	55	35	18.3
Total		383	191	100%

The questionnaire was validated by three experts in the area of conservation planning, environmental management, and geography. The questionnaire was pre-tested with 37 conservation managers. The questionnaire is made up of nine sections. The first section comprises questions regarding the demographic profile of the respondents, and the remaining eight sections comprised 47 indicators measuring eight factors under study: context with 9 indicators; planning with 5 indicators; input with 4; process with 9;

output with 6; outcome with 4; collaboration with 6; motivation with 4. Five-point Likert Scale was used (1=Strongly Disagree, 2=Disagree, 3 Moderate, 4=Agree, 5=Strongly Agree), and is the most commonly used technique in the field (Hockings et al. 2006). A total number of 191 closed-ended questionnaires were administered face-to-face by the researcher, with the aid of a research assistant to the conservation managers.

Data collected were subjected to a reliability test, descriptive test, and Exploratory Factor Analysis

(EFA) using Principal Component Analysis (PCA) with Varimax rotation method with Kaiser Normalization used as recommended by (Hair, et al, 2013; Tabachnick and Fidell, 2013), using Statistical Package for Social Sciences (SPSS) version 22. Even though the indicators were scientifically sourced, the use of EFA becomes necessary because the items were adapted from different sources and EFA is the only technique that can scientifically sieve the indicators and identify the ones that adequately measure the factors under study, and retain as much their originality and information regarding them, explore patterns of multivariate data and relationships between variables with their underlying factors. Four indices were used in assessing the results. The first index is the reliability coefficient, where factors with a reliability coefficient of 0.70 were retained (Nunnally, 1967). Similarly, Eigenvalue was used to assess the reliability of the factors extracted by EFA, where an eigenvalue of 1 is acceptable (Hair, et al., 2013). The second index is factor loading, which is a criterion used to determine the correlations between the observed variables (which are the variables on the questionnaire), where higher loadings indicate a strong relationship. For the two proposed factors (collaboration and motivation) to be acceptable for integration into the IUCN framework, indicators used in measuring the factors should be able to achieve factor loadings of 0.6 and above (Guadagnoli and Velicer, 1988), while those that failed to meet the criteria were excluded. The third index is the Kaiser-Meyer Olkin (KMO) which represents the ratio of the Squared Correlation between variables to the Squared Partial Correlation between variables (Field, 2009), and was used to assess the compactness of the indicators and reliability of the factors. A value of 0.5 for KMO was used to determine the

adequacy of sample size and percentage of variation above 0.6 (Awang, 2015; Hair et al., 2013). The fourth index is communality. A higher communality value (closer to 1) indicates that the sample size is adequate (Mac Callum et al, 1999). This was despite meeting the requirement of sample size as recommended by the literature (Hair, 2009; Bernard, 2006) that a minimum sample size of 150 is required for Factor Analysis, and the sample size was based on 95% confidence level as suggested by the sampling theory (Bernad, 2006; Sekaran, 2003).

3.1 RESULTS AND DISCUSSION

Results of the study revealed that more than half of the respondents were from Yankari, while respondents from Lame Burra and Sumu combined constitute less than half of the sample as shown in Table 4 below. The majority of the respondents are within the active category of the population, this is good for the conservation areas as the managers are active enough to undertake management and related tasks. As mentioned in the methodology, the respondents who are the managers of the conservation areas were from six departments namely recreation, research, patrol, protection, forestry, and conservation managers' level of education is generally low, with a greater majority attending a lower level of education, thereby constituting the bulk of junior staff in their respective conservation areas. Average respondents' years of experience revealed that they have adequate experience to respond positively to issues related to their respective conservation areas. However, respondents' monthly earnings are generally not encouraging as their pay is very low, with more than 70% of the managers earning less than \$30 per month (less than a Dollar per day), which is against the standard.

Table 4: Demographic Profile of the Respondents

Variable		Frequency	Percentage
Age	Minimum age is 20 years; Maximum is 65 years; Mean age is 37.60 years; Standard deviation is 10.42.		
Department/Unit	Recreation	15	7.9

	Research	4	2.1
	Patrol	116	60.7
	Protection	9	4.7
	Forestry	17	8.9
	Conservation	30	15.7
	Total	191	100%
Highest qualification	Primary	119	62.3
	O level	53	27.7
	Diploma/NCE	17	8.9
	Degree/HND	2	1
	Others	0	0
	Total	191	100%
Rank	Junior staff	180	94.2
	Senior staff	9	4.7
	Management staff	2	1
	Total	191	100%
Years of Experience	Mean = 11.6; SD = 6.6 Range 2 – 34 years		
Income	Below N10,000	59	30.9
	N10,001 – N20,000	76	39.8
	N20,001 – N30,000	48	25.1
	N30,001 – Above	8	4.2
	Total	191	100%

The analysis revealed that there were more respondents from Yankari than Lame-Burra and Sumu combined. The dominance of managers/rangers of Yankari in the study is due to a high number of managers/rangers in the conservation area than in Lame-Burra and Sumu. Having the majority of the conservation managers within the active category is good for the conservation areas because managers/rangers can carry out management activities and conduct patrols actively. The respondents from patrol and protection units were familiar with the general condition of the conservation areas, they perform core management actions which are patrol and protection and therefore are in a better position to be included in the study so that they can give information that is vital for the research. The managers/rangers generally have a low level of education. This is despite the knowledge and skills required in managing, conserving and protecting nature areas. Their low level of education is not surprising because it is the general characteristic of the nations in the global south. A low level of education in rural communities is a common characteristic of rural areas (National Population Commission, 2006). However, this can have a negative implication on the planning and management effectiveness of the conservation areas because it will be difficult for the rangers to understand the protection policies and objectives in the management plan. The low rank of the respondents in their workplace is a reflection of their level of education. Their years of experience is an indication that the respondents are familiar with their respective conservation areas. Therefore, they can provide relevant and valid information regarding the management effectiveness of the conservation areas. The monthly earnings of the managers/rangers are very low. The income of the managers cannot cater for their basic needs a month. This can have a negative implication on the socio-economic well-being of the people and their performance in management.

3.2 Assessment of Sampling Adequacy

Data collected were subjected to a reliability test (Cronbach Alfa), and the value obtained revealed that the instrument is reliable and in line with the recommendation of (Hair *et al*, 2006; Pallant, 2007; Hair *et al*., 2014; Sekaran, 2003; Nunnally and Bernstein, 1994; DeVellis, 2012). The result of the KMO revealed a

relatively compact pattern of correlations between the variables, thereby providing evidence of yielding factors that are distinct and reliable (Kaiser, 1974; Field, 2009). Interestingly, the study was able to achieve a KMO value of 0.839 as in Table 5. According to Field (2009), a KMO value closer to 1 indicates a relatively compact pattern of correlation which in turn yields distinct and reliable factors. This implies that the sample size selected for this study is sufficient and can ensure stable and reliable factors. Similarly, the result of Bartlett's Test of Sphericity which is a measure of interdependence of the subscales of scales is statistically significant $p < 0.05$. It also revealed that the correlations between variables are significantly different from zero, implying significant relationships between the variables. This is evident that the sample size and the data can undergo Factor Analysis and yield a better result. Both the findings of the KMO and Bartlett's Test of Sphericity are within the acceptable range and provided evidence that the data is fit for Factor Analysis.

Table 5: Sampling Adequacy and its Level of Significance

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.839
Bartlett's Test of Sphericity	Approx. Chi-Square	4374.544
	df	820
	Sig.	.000

For generalization beyond the sample studied, a normality test was conducted. The two indices used in assessing normality are skewness and kurtosis are all within the acceptable range of ± 1.986 , implying that the data set is normally distributed, except for three variables out of the forty-seven that were not normally distributed. The variables were further excluded. Therefore, the findings of this study can be further generalized beyond the studied sample.

3.3 Exploratory Analysis of the Constructs under Study

Findings of the study as presented in the Scree plot of the study (Figure 1) shows the number of factors extracted based on the achievement of an eigenvalue of > 1 . The vertical axis represents the eigenvalues, while the horizontal axis represents the total number of indicators extracted. To determine the exact number of factors extracted by EFA using PCA, the point of inflexion on the Scree Plot marks the cut-off point of the factors. From the Scree plot, it can be seen that from the point of inflexion upward, there are eight points, where each point above the inflexion point represent a factor. Therefore, the study extracted eight factors. Interestingly, all the eight extracted factors have achieved eigenvalues of greater than 1 as recommended by (Kaiser, 1960), where the eigenvalues represent the amount of variation by the extracted factors. The extracted factors are too many, according to Field (2009) can produce great values for the communalities. In this kind of scenario, Field stated that less information is discarded. The 8 retained factors, therefore, explained a high level of variation of 65.36%, and a high level of internal consistency. Similarly, there exists a correlation between the components which further revealed their interrelationships.

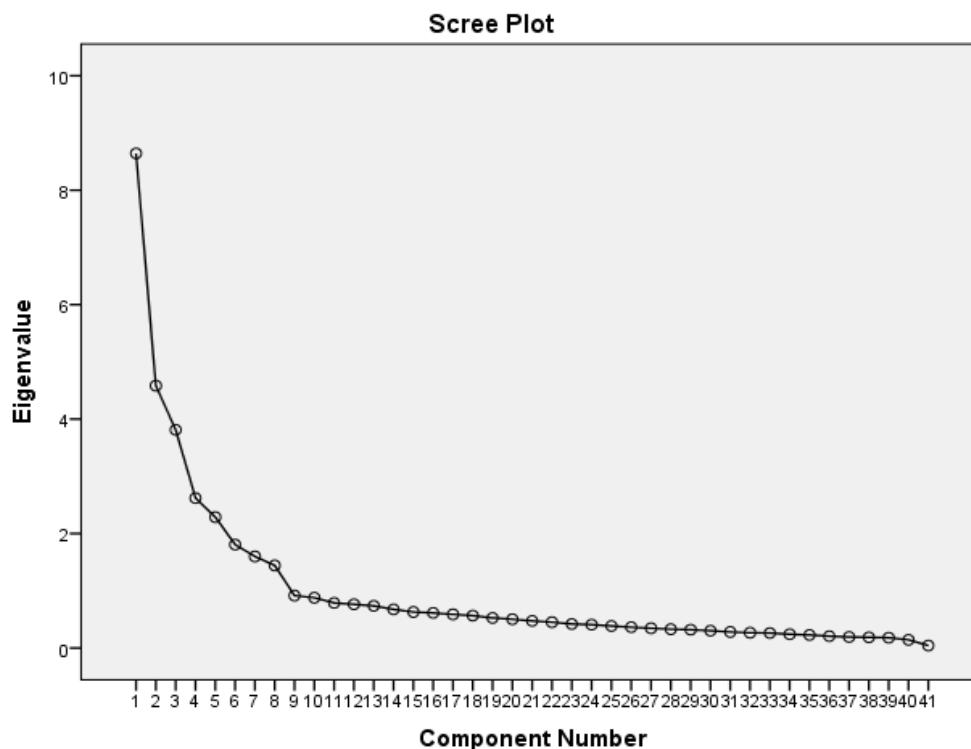


Figure 1: Scree Plot for Eight Factors Extracted During Exploratory Factor Analysis

Out of the 47 indicators subjected to EFA using PCA, 41 were retained to measure 8 factors as presented in Table 6. EFA was used because several indicators measuring collaboration and motivation were added to the indicators of the International Union for Conservation of Nature (IUCN). This is to determine the relationship between collaboration, motivation and IUCN factors, and also the extent of contribution of collaboration and motivation to conservation area management theory of the IUCN, which Field (2009); Hair *et al* (2006); and Hair *et al* (1995) indicates necessary to identify poor items and

validity. Six (6) indicators were excluded because they failed to achieve the minimum requirement of the selected indices. The indicators were considered not good enough to measure their underlying factors. This implies that the 6 indicators do not add any weight or value to their underlying factors. Factor loadings of the variables represent the regression coefficient, and it is used to gauge the relative influence or contribution of a variable to its underlying factor. From the results, we can see the extent of influence or contribution of each variable, where higher factor loadings represent a higher influence of the variable in measuring the factor.

Table 6: Extracted Factors and their Assessment Criteria

Factors	% Variati on Explai ned	Cronbac h's Alpha	Eigenval ue	Statement	Factor Loadin g
Process	21.082	.877	8.643	Patrol and enforcement of laws and regulations are effective	.858
				Infrastructures and equipment are maintained regularly	.791
				Adequate research on ecological and socio-economic aspects of the PA are conducted for planning purposes	.788

				Illegal activities are monitored and recorded accordingly	.755
				A mechanism for resolving conflict exists	.732
				Managers undergo required training to perform management activities	.729
				Administration and financial management in the protected area is effective and stable in the last 5 years	.723
Context	11.179	.752	4.583	The protected area contributes to the representativeness of the PA system	.908
				The protected area support community development through the provision of employment and increased local communities earnings	.903
				Local communities depend on the protected area resources	.769
				The protected area has high educational and scientific value	.723
				The protected area has unique features of aesthetic values for recreation	.692
				The protected area sustains a range of animals and plants species in it	.689
Output	9.300	.840	3.813	Threat prevention and site restoration	.763
				Infrastructure development and equipment provision	.752
				Law enforcement	.703
				Staff training and development	.680
				Community outreach and education efforts	.664
				Research and monitoring	.633
Planning	6.390	.815	2.620	There is consistency between protected area objectives, management plans and policies	.765
				The management plan is comprehensive	.759
				The protected area boundary is clearly demarcated	.738
				The protected area has adequate laws and regulations	.696
				The protected areas are connected to other protected/conservation areas	.666
Collaboration	5.578	.769	2.287	There is a collaboration between our protected area and international organizations/NGOs in management	.804
				Local communities and community-based organizations are actively involved in the decision-making process	.742
				There are shared management responsibilities among the parties involved	.718
				There is an adequate dialogue between parties involved to resolve conflict	.715
				The decision agreed upon by the parties involved is binding on all members	.636
Input	4.407	.867	1.807	There is adequate information, communication and access to technology	.833
				Adequate staff are available to undertake management activities	.768
				The necessary infrastructure and equipment required for management activities are available	.767
				Funding in the past 5 years has been adequate to conduct critical management activities	.706
Outcome	3.903	.837	1.600	The management plan is well implemented	.831
				Sites have been restored from previous threats	.786
				Protected area objectives have been achieved	.754
				Communities benefited significantly from the management	.681

Motivation	3.517	.802	1.442	Being a ranger, I am respected by my community members and colleagues	.813
				My earnings adequately cater for my shelter and other basic needs	.809
				My duty post is safe	.756
				There are incentives such as bonuses, best performance and overtime to appreciate staff performance and boost their morale	.742

Interestingly, the variables of the study correlate fairly well with each other and the level of correlation is significant. This implies that the variable measuring the two additional dimensions namely collaboration and motivation are related to the indicators of the IUCN. Conversely, seven out of the nine indicators namely patrol and enforcement, infrastructure and equipment, research, monitoring, conflict resolution mechanism, training, administration and financial management were extracted under factor 1. The variables correlate highly with each other but indicate a low correlation with indicators estimating other factors. These indicators have indicated significant contribution to the factor as their factor loadings are above 0.60 and eigenvalue >1 ; explaining 21.08% of the variation in the data set. The seven indicators were adapted from Hockings *et al.*, (2006) to measure “process”, the same factor name was retained for the extracted factor. Surprisingly, two indicators namely periodic evaluation and support for community development loaded under factor 10. The two items were adopted from Hockings *et al.* (2006) to measure ‘process’. However, the two indicators were excluded from the analysis due to their failure to achieve the minimum requirement of factor loading and eigenvalue as recommended by (Field, 2009; Hair *et al.*, 2006; Hair *et al.*, 1995). Six out of the nine indicators converged under factor two namely representativeness of the conservation area system, support for community development, dependence of the communities on conservation areas, educational and scientific values, presence of unique features, and sustenance of animals and plants diversity. These indicators indicated a strong relationship with each other and a low relationship with other indicators outside the group, with loadings above 0.60 and

eigenvalue >1 , explaining 11.18% of the total variation in the data set. All the converged indicators were those adopted from Hockings *et al.*, (2006) measuring “context”, the same factor name was retained in this study. However, three indicators namely threats and pressure, resources are of high demand and market value, and easy accessibility for illegal activities were also excluded by EFA fact that two loaded under factor nine (9) while one loaded under factor eleven (11). The two factors “9 and 11” failed to meet up with the requirements of the factor loadings and the eigenvalue, and therefore excluded (Field, 2009; Hair *et al.*, 2006; Hair *et al.*, 1995).

Furthermore, six indicators namely threat prevention and site restoration, provision of infrastructural development, law enforcement, staff training and development, community outreach, and research and monitoring were extracted under factor three. The variables revealed a high correlation between them and a low with other variables outside the group. They also indicated a significant contribution to the factor, with factor loadings above 0.60 and eigenvalue >1 , explaining 9.30% of the total variance. The indicators were those adopted from Hockings *et al.* (2006) measuring “output”, therefore, the same factor name was retained for this analysis. In a similar revelation, five indicators were extracted under factor four namely consistency between conservation area objectives, management plan and its policies, comprehensiveness of management plan, clarity of boundary, adequacy of laws and regulations, and connectivity to other conservation areas. The indicators also indicated a high correlation with each other but low with indicators estimating other factors, thereby indicating a significant contribution to the factor, with factor loadings

above 0.60 and eigenvalue >1 , explaining 6.39% of the total variance in the data set. The indicators were those adopted from Hockings et al. (2006) to measure “planning”, therefore the factor was retained as planning in this study.

Interestingly, five out of the six items measuring the additional dimension of the study “collaboration” were extracted namely collaboration with international organizations and NGOs, involvement of local communities in the decision-making process, shared management responsibilities, dialogue, and agreement on decisions taken. The indicators revealed a high correlation with each other and a low with indicators estimating other factors, with factor loadings above 0.60 and eigenvalue >1 , explaining 5.58% of the total variance in the data set. The factor is therefore named “collaboration”. This implies that the five extracted indicators can adequately measure “collaboration” and retain as much of its originality. The indicators were those adapted from the literature relating to collaboration in environmental conservation and co-management (Nielsen, 2012; Berkes, 2010; Del Pilar Moreno-Sánchez and Maldonado, 2010; Gbadegesin and Ayileka, 2000; Berkes et al., 1991; Gray, 1989). One indicator “joint activities/research and information sharing with other conservation areas” loaded alone under factor 12. The item was therefore excluded by EFA because of its inability to meet the requirements of factor loading and eigenvalues of 1 as recommended by (Field, 2009; Hair et al., 2006; Hair et al., 1995). This implies that the indicator is redundant and does not contribute significantly in estimating the factor, and including it in the analysis can decrease convergent and divergent validity.

Similarly, the sixth factor extracted four indicators namely adequacy of information, communication and access to technology, adequacy of staff, adequacy of infrastructure and equipment, and funding. The results revealed a high correlation with each other but a low correlation with

indicators estimating other factors. They also indicated a significant contribution to the factor as their factor loadings are above 0.60, with eigenvalue >1 ; thereby explaining 4.41% of the variation in the data set. The indicators were adapted from Hockings et al., (2006) to measure “input”, the same name was retained for the extracted factor in this study. Additionally, factor seven extracted four indicators namely management well implemented, site restoration, achievement of objectives, and benefits derived by communities. The indicators revealed a high correlation with each other in the group and a low correlation with those estimating other factors, with factor loadings above 0.60, and eigenvalue >1 , explaining 3.90% of the total variance. The indicators were adopted from Hockings et al. (2006) to measure “output”. The same name was retained for this study.

Interestingly, the eighth factor extracted all the four indicators used in estimating “motivation” namely the level of respect earned by rangers, adequacy of earnings, the safety of duty environments, and availability of incentives. The indicators that converged under this factor were adapted from the literature relating to motivation (Cetas and Yasue, 2017; Nielsen, 2012; Ogunjinmi et al., 2008; Maslow, 1954). The indicators correlate highly with each other in the group, but indicate a low correlation with indicators measuring other factors of the study, with factor loadings above 0.60 and eigenvalue >1 , explaining 3.52% of the total variance in the data set. The factor was therefore named “motivation”, and it is the additional dimension in the study.

The findings of the study revealed that the eight extracted factors (context, planning, input, process, output, outcome, collaboration and motivation) and their underlying indicators are uni-dimensional and at the same time factorially distinct. By implication, the study was able to reveal that, collaboration and motivational factors

which are the additional dimensions to the IUCN framework can also contribute to effective planning and management of conservation areas, and were not incorporated in the IUCN framework for effective planning and management of conservation areas. Overall, only 6 out of the 47 variables failed to meet the requirement of the assessment indices. This is a good scenario because Field (2009) stated that, a study that extracted many factors will have great values of communality, and less information will be discarded.

3.4 Discussion

This study is aimed at assessing what makes conservation area planning and management effectiveness. Six factors established by IUCN appeared to be inadequate to achieve effectiveness, therefore, the study measured collaboration and motivation, and added to the six dimensions of the IUCN framework. This study scientifically proved that collaboration and motivation are related to the six established factors of the IUCN framework for effective planning and management of conservation areas. Similarly, EFA using PCA scientifically proved that indicators sourced from literature can adequately measure the two underlying dimensions and retain as much of their originality.

The study revealed that there are eight clusters of interrelating variables, thereby implying that these variables are measuring some common underlying dimension. Interestingly, dimensions of collaboration and motivation have appeared to fit within the IUCN framework. It can therefore be deduced that effective planning and management of conservation areas depend not only on the six factors of the IUCN framework (context, planning, input, process, output and outcome) but also on the level of collaboration with local communities and motivation of conservation managers. This presents evidence that collaboration and motivation are related to the IUCN factors, and this implies that the factors can fit into the framework. This is interesting as it is indicating the need for a paradigm shift from

environmental management to environmental governance.

Context and planning factors of the IUCN focus on design and planning aspects of conservation areas, input and process focus on adequacy and appropriateness of the conservation areas to achieve expected conservation goals and output and outcome are concerned with the delivery of the conservation goals. With the findings of this study, collaboration and motivation are added to the framework to focus on the aspect of conservation area governance. These factors as revealed by the study are related to the IUCN factors and can contribute to effective planning and management of conservation areas.

Interestingly, the Exploratory Factor Analysis (EFA) using the Principal Component Analysis technique extracted the indicators adapted from the IUCN framework to measure the underlying IUCN factors. This is not surprising because the indicators have been established to measure those factors (Hockings et al., 2006). Similarly, indicators sourced to measure collaboration were reduced by EFA, where only one indicator was revealed to have no significant contribution in measuring the factor, while all the indicators measuring motivation were extracted.

The findings of the study revealed that collaboration and motivation contribute to effective planning and management of conservation areas as the underlying indicators revealed significant correlation coefficients between them. The findings are similar to the findings of (Nielsen. 2012; Del Pilar Moreno-Sánchez and Maldonado, 2010; Nakakaawa *et al*, 2015; Gbadegesin and Ayileka, 2000) who revealed that views of the public particularly local communities surrounding the conservation areas and their local knowledge contribute to successful management of conservation areas. Conservation areas cannot be successfully managed if they are stand-alone, because they are located in human-dominated environments (Hassan, 2019b). As

such, incorporating dimensions of collaboration and motivation becomes necessary in achieving sustainable conservation. This can build trust between the public and managers. The issue is beyond mere collaboration, but to the extent of participation in decision-making about the conservation areas and their ability to influence decision-making. Participation of the public in decision-making about conservation areas and their ability to influence decision-making have been identified as key to successful planning and management of conservation areas (Hassan, 2019a; Hassan, 2022). Similarly, a study conducted by Hassan (2020) revealed that the level at which the public is involved in decision-making and their ability to influence decision-making in conservation planning and management need to be enhanced for better performance of the conservation areas. The findings present the need for collaboration in the planning and management of conservation areas. Collaboration, in particular, is an integral part of the general planning process that allows the public and stakeholders to express their views, and take part in all planning and management phases. The case is not different for conservation areas, where in most cases local and traditional knowledge plays a key role in planning and management. This is important because the public and stakeholders can have a sense of belonging. With regards to motivation, both the public particularly the local communities surrounding the conservation areas and the managers of the conservation areas need to be motivated to boost their morale in conservation-related activities. The findings of the study are similar to the findings of (Cetas and Yasue, 2017; Nielsen, 2012; Ogunjinmi *et al*, 2008; Schwartz, 2006; Deci *et al.*, 2001) that revealed the role of motivational parameters such as well-paid salary, incentives, and enabling environment to contribute to successful conservation outcomes. It can be deduced that effective planning and management of conservation areas depend not only on the six factors of the IUCN (context, planning, input, process, output and outcome) but also on the level of collaboration with local

communities and the level of motivation of conservation managers. Similarly, motivation which boosts managers' morale and improves performance is weak as revealed by the study. Going by the estimated monthly earnings of the managers means that, even if they are motivated, the motivation is low. This is because their monthly income cannot cater for their basic needs despite living in rural areas. Therefore, incorporating these two factors into the IUCN framework can go a long way in mitigating unsustainable practices in conservation areas, as the practices are human-related and many of the areas are located in human-dominated environments.

4.1 CONCLUSION AND RECOMMENDATIONS

The contribution of this study is three-fold. The first is the theoretical contribution through the extension of the IUCN framework to include two new additional dimensions (collaboration and motivation) that contribute to effective planning and management of conservation areas which previous research in the field of conservation planning and management has not highlighted. Based on the findings of the Exploratory Factor Analysis, the indicators used in measuring collaboration and motivation have adequately measured the factors. The second contribution to the body of knowledge is by providing insight into conservation area planning and management. The third contribution is by providing the policy and decision-makers with evidence for evidence-based decision-making. Managers and public agencies overseeing the areas can use the piece of evidence in this research to re-strategize towards active involvement of the public in both the planning and management phases of the conservation areas.

4.2 Recommendations

The study made the following recommendations:

- i. This study can be further extended to confirm the result using Confirmatory Factor Analysis to develop a structural model that can be adopted for effective planning and management of conservation areas

- ii. Policy and decision-makers and conservation managers should act urgently on the need to actively incorporate these two additional dimensions in the planning and management phases of conservation areas for better performance of the areas and successful outcomes.
- iii. Policy and decision-makers about the conservation areas should come up with means of motivating the managers for better performance and conservation outcomes.

5.1 Declaration of Interest

The author declares no conflict of interest.

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383.

Appendix A: Questionnaire for the Study

S/N	CONTEXT
Q_1	The protected area sustains a range of animals and plants species in it
Q_2	The protected area has unique features of aesthetic values for recreation
Q_3	The protected area contributes to the representativeness of the PA system
Q_4	The protected area has high educational and scientific value
Q_5	The protected area is under intense threats and pressure
Q_6	Protected area resources are of high demand and market value
Q_7	Our protected area is easily accessible for illegal activities which makes it difficult to monitor it
Q_8	The protected area support community development through the provision of employment and increased local communities earnings
Q_9	Local communities depend on the protected area resources
	PLANNING
Q_10	The protected area has adequate laws and regulations
Q_11	There is consistency between protected area objectives, management plans and policies
Q_12	The protected area boundary is clearly demarcated
Q_13	The protected areas are connected to other protected/conservation areas
Q_14	The management plan is comprehensive
	INPUT
Q_15	Adequate staff are available to undertake management activities
Q_16	The necessary infrastructure and equipment required for management activities are available
Q_17	Funding in the past 5 years has been adequate to conduct critical management activities
Q_18	There is adequate information, communication and access to technology
	PROCESS
Q_19	Patrol and enforcement of laws and regulations are effective
Q_20	Managers undergo required training to perform management activities
Q_21	Administration and financial management in the protected area is effective and stable in the last 5 years
Q_22	Infrastructures and equipment are maintained regularly
Q_23	Adequate research on ecological and socio-economic aspects of the PA are conducted for planning purposes
Q_24	Illegal activities are monitored and recorded accordingly
Q_25	The mechanism for resolving conflict exist
Q_26	Management effectiveness evaluation is undertaken periodically
Q_27	The management support community development through infrastructure, empowerment and educative programmes
	OUTPUT
	In the last 5 years, the following outputs have been consistent with the threats and

	pressures, PA objectives and Management Plan
Q_28	Law enforcement
Q_29	Threat prevention and site restoration
Q_30	Community outreach and education efforts
Q_31	Infrastructure development and equipment provision
Q_32	Staff training and development
Q_33	Research and monitoring
	OUTCOME In the last 5 years, the following outcomes have been achieved based on the protected area objectives and the management plan. <20% (SD), 21%-40% (D), 41%-60% (M), 61%-80% (A), 81%-100% (SA)
Q_34	Protected area objectives have been achieved
Q_35	Sites have been restored from previous threats
Q_36	Communities benefited significantly from the management
Q_37	The management plan is well implemented
	Collaboration
Q_38	There is a collaboration between our protected area and international organizations/NGOs in management
Q_39	Local communities and community-based organizations are actively involved in the decision-making process
Q_40	There is an adequate dialogue between parties involved to resolve conflict
Q_41	The decision agreed upon by the parties involved is binding on all members
Q_42	There are shared management responsibilities among the parties involved
Q_43	There are joint activities/research and information sharing between our protected area, other protected areas and researchers in the academic environment
	Motivation
Q_44	My earnings adequately cater for my shelter and other basic needs
Q_45	Being a ranger, I am respected by my community members and colleagues
Q_46	There are incentives such as bonuses, best performance and overtime to appreciate staff performance and boost their morale
Q_47	My duty post is safe

Key

	Factors of the Study
	Questions excluded by EFA