MFOMBO FOUNDATION

Forest fires and feather harvesting, threats on the Bannerman's turaco (Tauraco bannermani) in the Bamenda highland forest (BHF).

Report of bird and socio economic surveys

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Abstract

The remaining 8500 individuals of the Bannerman's Turaco leave in the Lebialem forest and the Bamenda Highland Forest (BHF). This species is endangered because of its small and fragmented range, suffering from human pressures such as hunting and forest fires. The project, Reducing Forest Fire and Feather Harvesting Threats on the Bannerman's Turaco in the BHF was aimed at ascertaining the socio-cultural pressure of feather decoration to the hunting of the Bannerman's Turaco and propose lasting conservation measures through local participation. The objectives were as follows: (i) To ascertain the socio-cultural pressure of feather decoration to the hunting of the Bannerman's Turaco; (ii) To update the population status, raise local awareness and take measures to reduce forest fires; (iii) To establish a community driven conservation program. The method included filed surveys to investigate the species population status and community seminars and meetings to prioritize community needs and develop a conservation action plan (CAP) for the BHF area. Results indicated a 6-7% increase in the species population. Field plots in the Kilum Ijim (Oku) forest indicated a higher encounter rate and bird density. The community forest and wildlife conservation program (CFWCP) that integrates diverse groups of men, women and children in the reported range of the species was established and a CAP developed for the landscape.

1.0 Introduction

The Bamenda Highland forest (BHF) is extra-ordinary diverse with high endemism. It is habitat for endemic plants, insects and birds. The endangered Bannerman's Turaco is restricted to this forest. Habitat loss resulting from forest fires and feather harvesting, pose the greatest threat. With about 200,000 people living within a day's walk of the forest, human pressure on the forest is high, particularly for new farmland. The burning of forest by farmers and herds men has indicated an increased over the past years. Rampant forest fires have increased forest fragmentation and about 40% forest losses between 2011 and 2014 (Mfombo et. al 2014). This has increased threat on the Bannerman's Turaco. Furthermore, the BHF constitutes fragments of highly degraded forest in about 5 tribes with over 30 villages. These villages and tribes have diverse but common cultural heritage of feather harvesting from this species. Harvested feathers are used for the decoration of cultural artifacts and notables. For example, cultural artifacts such as cloth and hat for masquerades are decorated with feathers from the species. Furthermore, the feather is put on the hat of famous or put on the hat to provide attention to prominent men in the communities who have worked toward the development of the village. Moreover, the feather is mostly found on the hat of men who have tirelessly to protect the customs and traditions of their villages and tribes. This however, has increased by in recent years due to the quest for fame. Data collected in 2014 showed over 10% increase in the number of notables decorated each year, compared to 2009. The project was aimed at ascertaining the socio-cultural pressure of feather decoration to the hunting of the Bannerman's Turaco and propose sustainable conservation measures through local participation. This work was also intended to upgrade information on the population status of the species and make communities identify conservation benefits with proposed conservation actions.

2.0 Aim

The goal of this work was to ascertain the socio-cultural pressure of feather decorations against the conservation of the Bannerman's Turaco and propose sustainable conservation measures through local participation.

3.0 Objectives

The objectives were as follows:

(i) To ascertain the socio-cultural pressure of feather decoration to the hunting of the Bannerman's Turaco.

(ii) To update the population status, raise local awareness and make measures to reduce forest fires.

(iii) To establish a community driven conservation program.

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4.0 Study area and methodology

4.1 Study area

The project was carried out in forest fragments of the BHF, the Mt Mbam. It should be noted that the Bannerman's turaco thrives in remnants of the highly fragmented BHF. Research was focused to forest fragments that had been reported to habit the species or primary data speculated the species existence. The portions of forest of great concern included the Bamendankwe hills (Bafut-Ngemba forest); Boyo forest (Fundong, Belo, Njinikom); mount Mbam and the Kilum-Ijim forest. The study area is located in the Northwest region, on the Northwest of the Western High Plateau of Cameroon. It constitutes the largest volcano in the Bamenda Massif, in the Cameroon volcanic line. Part of the highland forms the second highest point, after mount Cameroon in mainland Central Africa. The highest point of the mountain is 3,011 m asl, and is cut by a large caldera. Some of the rocks have ages starting from 24.9 to 22.1 million years ago, but much more recent activity has occurred. The mountain is built of basaltic and hawaiitic lavas, succeeded by trachytes, and then by large volumes of trachytic and rhyolitic ignimbrites. One of these craters holds Lake Oku (Alan Robert Woolley, 2001). Average annual rainfall and temperature are 2290mm and 20°C respectively.

4.2 Methodology

4.2.1 Field survey

A total of 50 plots measuring 25 x 25 m were distributed throughout the reported range of the species. In each forest, plots were setup 200 m apart to reduce plot interference and bird double counting. According to Forboseh et al. 2001, the plots were mostly concentrated in the montane and sub-montain forest with little grassland. The plots were setup in the Bamendankwe hills found in the Bafut-Ngemba forest; Fundong, Belo and Njinikom, all found in the Boyo forest; the mount Mbam and the Kilum-Ijim forest. The survey to estimate the species population was based on the previous work of other researchers such as Forboseh; et al. (2001) & Njabo; et al. (2000). The point-count method of Bibby et al. 1992, Buckland et al. 1993, Forboseh et al. 2001 was therefore be used. Count stations were established in each plot and the GPS coordinates were recorded. Field teams comprised of an observer, who identified the species and estimated the observer–bird distances, and a recorder, who recorded the data onto a paper.

During counting, observers recorded all birds seen or heard within a radius of 200 m, together with their visually estimated distances from the point. For flocks, the numbers in the group were recorded. Birds flying over the point were not recorded to minimize the possibilities of double counting highly mobile species. Where birds were seen the age, sex and height in the tree were recorded where possible. Counts were conducted between 07h00 and 11h00, and lasted for 30 min per visit at each point. This

was divided into four periods. During the first period (5 min), the observers counted all Bannerman's Turacos detected and permitted other birds to settle from any disturbance caused by their arrival. In the second period (10min) all birds were recorded (including Bannerman's Turacos). During the third period (5 min), the teams recorded only Bannerman's Turacos and species not detected in the previous 10 min. In the fourth period (10 min), the observers continued to count only Bannerman's Turacos.

Bird census stations were visited twice for this study. The first field visits were done between March and June and second done between October and November. This corresponds to the breeding periods of species in the BHF (Fotso and Parrot 1991).

4.2.2 Socio-economic survey

Based on field observation and historic cultural reasons, this part of the study focused only in the Bui division and Ndonga Mantung division. A total of 6 villages were visited in 6 sub-divisions (see table 1).

Division	Sub division	village
Bui	Oku	Manchock
	Kumbo	Tadu
	Jakiri	Vekovi
Ndonga Mantung	Ndu	Tallah
	Nkambe	Binka
	Misaje	Nkanchi

Table 1: Sampled villages for socio-economic survey

Categorization of targeted groups included students, civil servants, business men, farmers, and hunters. Students interviewed were from colleges such as secondary schools, high schools and higher institutions of learning such as the university. Civil servants included teachers, nurses, mid wives, community development officers, highway workers, police, general laborers, typists and civil administrators. Business men were butchers, food and drink vendors, drivers, co-operative workers, engine and machine operators and people who trade in one thing or the other. Farmers were those who domesticated animals, and/or people who cultivate crops of different types. Hunters included those who practiced hunting as a means of living. Informants also included Notables, Chiefs, Fons and Herbalists. This category of informants was designed to verify findings from household visits. They were considered to know and understand their customs and tradition with regards to the uses of the feathers and bones of the Bannerman's Turaco. These different categories included men and women of different ages and different levels of education (see fig 1 below). Questionnaire and semi structured interviews

were issued to three persons from each household in the sample in order to minimize bias. One hundred questionnaires were sampled in each village making a total of six hundred questionnaires sampled for the study. The research team was made up of the researcher; field guide and an interpreter who interpreted the questions to the local population and also led the researcher to know their responses. Interviews were done in English, Pidgin and the mother tongue for those who could understand neither English nor Pidgin. Sampling was done from 7 am to 9am and from 3 pm to 7 pm due to the fact that a majority of the local population go out for farming very early in the mornings and come back late in the afternoon. Interviews with individuals took about 10 to 15 minutes for each questionnaire to be completed. The A group interview was then later conducted in each village to compare responses from the different villages. Information on traditional knowledge relating to conservation of the Turaco and the importance of the Turaco were obtained from common meetings organized on "traditional holidays" and on market days when the people do not go to their farms. This information gotten from these community discussions was followed by a logical framework to develop a conservation action plan CAP. This was replicated in the reported range of the species.

A logical framework was used to develop a conservation action plan (CAP). The logframe was used to analyze the effectiveness, efficiency and relevance, hence success of ongoing conservation actions and the need for developing a CAP for the landscape. This was done in a 3 day workshop involving key stakeholders from the different tribes in the reported range of the species. This analysis consisted of two phases (the analysis and planning phase). Each phase consisted of three steps. The analysis phase was done in the first 2 days of the workshop. It began with the analysis of the existing situation of the project and the development of objectives for addressing the real needs. It then concluded with the development of the strategies needed to achieve the desired results for the project. In the third day which was the second phase and the planning phase, a logframe matrix was developed. It stated clearly the objectives/activities of the redesigned project, indicators, means of verification and assumptions.



Figure 1 & 2: Left – figure 1; Field team at bird watch station in the Bamendankwe hills; Right – figure 2; Picture of MfoFou staff, representatives from government and the various communities in Oku

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5.0 Results

5.1 Bird Survey

The data was analyzed in excel. The plot areas were calculated in meter (m) and summed up to get the sum of total portion of forest used in the study area. The species density was calculated by dividing the number of species for each plot (n) to the plot area (a) and multiplying the results by the sum of birds (N) counted in the study area divided by the plot size (A).

Species density/Plot 0.00009 0.00008 0.00007 0.00006 0.00005 0.00004 0.00003 Species density/Plot 0.00002 0.00001 0 Muteuff Laikum Mbam oku Oku oku Laikum **3amendankwe** Bamendankwe Mbam Mbam Oku oku oku Muteuff Mbam

Figure 3, shows recorded density of species in the various field plots and forests (villages on the x-axis represent various forests

Highest density of the species was recorded in the Oku forest as reported by Forboseh; et al. (2001) & Njabo; et al. (2000). Although other research work for example Forboseh; et al. (2001), argue that the species prefers living in secondary forest, the high density in Oku can also be because of large portions of primary forest which the species will prefer during the breeding season. Mt Mbam also recorded a high density of the species. This can be argued to the vast primary forest in the Mbam. There however are signs that the density of the species in Mt Mbam should be greater than what we found in the research. There is therefore need for further research work to supplement conservation work being done by the Mfombo Foundation and partners. This can be supported by the recorded species' high abundance in the Mt Mbam as shown in figure 4 below.

The average (D) from all plots was calculated and extrapolated to the entire study area (A) to obtain the species abundance (SA). SA = D/A

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Plot Density = (n/a)*(N/A)



Although Mt Mbam showed a lesser species density, it however indicated higher species abundance (27%) compared to Oku forest (21%). Laikum showed a lower abundance of 15%.

Figure 4, showing species abundance in the various forests

Encounter frequency was also calculated by dividing the proportion or percentage of plots on which the species was observed by the total number of plots involved for each forest (to understand encounter rate per forest) and then for total studied plots (to study encounter rate of degree of encounter of species in the landscape).



Figure 5, showing species encounter frequency in the various forests

The encounter rate of the species according to forest was higher in Laikum and Bamendankwe. This was followed by Mt Mbam and Oku forest. Muteuff showed lowest encounter rate. The time of the day (evening/morning) may be a factor but the sample size might not have been enough to gather expected information. This can also be argued by the encounter rate when plot values are extrapolated to the landscape. Oku showed and encounter rate of 35%; followed by Mbam, 20%. Laikum showed the lowest encounter rate in both forest analysis and landscape.



Figure 6, showing species encounter rate in the landscape

5.2.1 Socio-demographic profile

The socio-demographic profile describes the characteristics of respondents sampled in the study, which includes; sex, age group, occupation, level of education, village and ethnic group. Out of the 600 people interviewed, 331 were male (55.17%) and 269 were female (44.83%). People within the age groups 21-30 years, 31-40 years, 41-50 years, 51-60 years and 61 years and above were sampled. People within age group 31-40years participated most (29.67%) while people within the age group 21-30 years had the lowest percentage (13.67%). The number of participants in each age group was represented in percentages as follows 21-30 years (13.67%), 31-40 years (29.67%), 41-50 years (20.5%), 51-60 years (19.33%) and 61years (16.33%). Figure 3 shows age groups of respondents across the different villages.



Figure 7; Age groups of respondents sampled across the different villages

Analysis indicated that a majority of the sampled population practiced agriculture with an estimate of 66%. This was closely followed by business and hunting with values of 23% respectively. These percentages indicate that the greatest threats to the Bannerman's turaco in the BHF are habitat loss for agriculture and hunting. Forest is mostly cleared through the use of crude tools like cutlasses, chain saws, cutlasses and forest fires. Forest fires are becoming rampant and easier to use by farmers; hence causing most of forest loss in the BHF.

5.2.2 Knowledge and perceptions of the population on the Bannerman's Turaco

Out of 600 people interviewed, 545 people (90.83%) knew the Turaco while 55 (9.17%) did not know the Turaco. The Turaco is well known in villages like Binka (92), Manchock (96), and Nkanchi (96), while it is averagely known in the other villages like Talla (85), Tadu (89) and Vekovi (87) hence the percentage of people who know and have seen the Turaco differs significantly among the villages (p = 0.02502).

Table 2. Parameter estimates and standard errors of the logistic model for knowledge of theTuraco in relation to age group

Level of significance: `*	**'=p<0.001,	`**'=p<0.01,	`*'=p< 0.05, `. '=	=p<0.1, `'=p<1

Age group	Estimate	Standard error	Z value
≥61yrs	4.3710	1.0279	4.252***
21-30yrs	-3.7908	1.0402	-3.644***
31-40yrs	-2.6131	1.0346	-2.526*
		4 9 9 9 9	4 500
41-50yrs	-1.6708	1.0920	-1.530
F1 C0:	1 2126	1 1 2 0 4	1.070
51-60yrs	-1.2136	1.1284	-1.076

From table 2 above, the probability of knowing the Turaco increased significantly within the age group, 60 years and above (estimated coefficient of regression = 4.3710; p = 2.12e-05) which is the reference. The effect of age groups 51-60 years (estimated coefficient of regression = -1.2136; p = 0.282151) and 41-50 years (estimated coefficient of regression = -1.6708; p = 0.125994) on the probability of knowing the Turaco did not differ significantly from the age group above 60 years. But the probability decreased significantly within the age group 31-40 years (estimated coefficient of regression = -3.7908; p = 0.000268) compared to the age group above 60 years. Therefore, the probability of knowing the Turaco increased significantly within the age group 41-50, 51- 60 and above 60 years but decreased significantly in the age group 31-40 and 21-30 years.

Table 3. Parameter estimates and standard errors for the logistic model for knowing the Turaco in functionof ethnic groups

Ethnic group	Estimate	Standard error	Z value
Nso	4.3710	1.0279	4.252***
Oku	1.2803	0.5733	2.233*
Tikari	1.3238	0.5733	2.309*
Wimbum	-0.1076	0.3314	-0.325

Level of significance: '***'=p<0.001, '**'=p<0.01, '*'=p<0.05, '. '=p<0.1, ' '=p<1

Table 3 shows that the probability of knowing the Turaco increased significantly in the Nso ethnic group (estimated coefficient of regression =4.3710; p =2.12e-05) which is the reference. The effect of Wimbum (estimated coefficient of regression = -0.1076; p = 0.745436) on the probability of knowing the Turaco did not differ significantly from that of Nso while the probability of knowing the Turaco in the Tikari

ethnic group (estimated coefficient of regression = 1.3238; p = 0.020948) and Oku (estimated coefficient of regression = 1.2803; p = 0.025551) decreased significantly compared to the Nso ethnic group.

Results in the different villages revealed that the Bannerman's Turaco is a very important bird as reported by 99% of the respondents, very few (0.33%) said it is of less importance while (0.67%) did not have any idea on the value of the Turaco. The value of the Turaco does not differ significantly (p=0.5283) in the different villages. Furthermore, out of the 100 people interviewed in each village, Binka had the highest number of people (94) who said there are no village laws governing the conservation of the Turaco, followed by 89 people in Nkanchi, 83 in Tadu, 71 in Talla, 52 in Vekovi, and 37 people in Manchock. The application of the laws differs significantly in the different villages (p<0.000). This implies that the community or local population is not involved in the conservation of the bird.

5.2.3 Knowledge of the population on Turaco conservation

According to respondents, 65% of the sampled population said that the Turaco should be conserved, 34.17% of the population say it should not be conserved while 0.83% had no idea about the conservation of the Turaco. The responses for the protection of the Turaco differed significantly in the different villages (p=8.702e-10).

Table 4: Parameter estimates and standard errors of the logistic model for the conservation

Level of significance: `***'=p<0.001, `**'=p<0.01, `*'=p<0.05, `. '=p<0.1

Ethnic group	Estimate	Standard error	Zvalue
Nso	1.1803	0.1668	7.077***
Oku	0.3361	0.3091	1.087

Misaje	-0.7748	0.2636	-2.940**
Wimbum	-1.2316	0.2199	-5.602***

The willingness to conserve the Turaco increased significantly in the Nso ethnic group (estimated coefficient of regression =1.1803; p = 1.47e-12) which is the reference. The effect of Oku ethnic group (estimated coefficient of regression = 0.3361; p =0.27699) on the willingness to conserve the Turaco did not differ significantly from the Nso ethnic group, whereas the willingness to conserve the Turaco decreased significantly in the Wimbum (estimated coefficient of regression = -1.2316; p<0.000) and Misaje (estimated coefficient of regression= -0.7748; p = 0.00329) ethnic groups compared to the Nso ethnic group.

Respondents also pointed out some reasons for the protection and or hunting of the Bannerman's Turaco. 390 people who proposed it's protection and conservation advanced the following reasons; it may go extinct (45.64%), for the use of its feathers (42.31%) and for recreational purposes (3.59%). Figure 4 shows the frequency of the different reasons advanced for the protection of the Bannerman's Turaco.



Figure 8. Frequencies for the different reasons for the conservation of the Turaco

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Part of the population proposed that the bird should be hunted for its feathers, for food, and for both food and feathers. A higher percentage of the sample (59%) said it should be hunted for feathers while 37% say it should be hunted for income and just 4% said it should be hunted for food (see figure 5).



Figure 9: Frequencies for reasons why it should not be conserved

5.2.4 Reported yearly encounter of the bird

Although part of the data suggested increase hunting and habitat loss as threats to the bird, there seems to be increase in the observation of the bird in recent years compared to 1961. Figure 6 shows that the frequency of seeing the Bannerma's Turaco increases from the time interval 1961 to date. The probability of observing the Turaco increased significantly in the interval ≥2011 and decreased in the interval 1961-1970 as shown below.



Figure 10: Frequency of yearly observation of the Turaco

5.2.6 Reasons for local extinction of the Turaco in some villages

Deforestation and overhunting are the primary reasons for the extinction of the Turaco in these areas. Among the 128 people who accounted for the extinction of the Turaco in some areas, 92.19% said it is due to deforestation while 7.81% said it is due to overhunting. Reasons for the extinction of the Turaco in some places are shown on figure 7 below.



Figure 11: Reasons for the extinction of the Turaco in the different villages

5.2.7 Frequency of hunting the Turaco

According to responses, 66.67% said that the Turaco is hunted once a week, 25% said it is hunted three times a week, while 8.33% said it is hunted two times a week. The frequency of hunting did not differ significantly in the different villages. The number of birds hunted was also taken into consideration. Among those who hunt the Turaco, 91.67% reported that averagely one Turaco is hunted per hunting trip.

5.2.7.1 Methods used for hunting the Turaco

For the hunting methods and tools, hunters used traps and catapults to kill the Turaco. The main method of hunting the Turaco is the use of catapults (93.94%) while traps account for 6.06%. Chemicals are not used for hunting for it accounted for 0% of the people who say the Turaco is hunted. There was a significant difference in the methods obtained in the different villages.

To verify the level of respect of the laws put in place by the government and the local community to protect the Turaco, the question "when was the Turaco lastly hunted?" was asked to the respondents. Results from the respondents revealed that 74.77% said that the Turaco was lastly hunted within the year interval 2011-2012, 14.41% said in the year interval 2001-2010, 6.31% said it was lastly hunted within 1991-2000, 0.9% said it was lastly hunted within 1981-1990, 1.80% said it was within 1971-1980 and 1961-1970. Hunting of the Turaco was stable from 1961 to 1980 and decreased slightly from 1980-1990, when it increased from 1990 to 2010 and finally increased drastically from 2010 till date.

5.2.8 Uses of the Bannerman's Turaco

5.2.8.1 General uses of the Bannerman's Turaco

The Bannerman's Turaco is a very important bird in the culture of the people of the North West and some others areas, like the Western region of Cameroon. As to why the Turaco is hunted, several reasons were advanced such as for cultural use, for income generation and for food. Out of these responses, a significant number 517 people (86.17%) said it is hunted for cultural use, 50 people (8.33%) said that the Turaco is hunted for food and 33 people (5.5%) said that it is hunted for income. The responses on why the Turaco is hunted, showed a significant difference (x²=68.5978, df=10, p<0.000) in the different villages. The figure below shows the percentages of the different reasons for hunting the Turaco.



Figure 12: Percentages of the different reasons for hunting the Turaco

5.2.8.2 Uses of the Turaco feather

In response to the question about knowledge of the red feather of the Turaco, 99.83% indicated that they knew the red feather and only 1 person with a percentage of 0.17% didn't know it. The same percentages respectively pointed out that the feather is used for decoration and honor of individuals in the communities and the feather having no significance. The uses and importance of the Turaco feather did not show any significant difference (x²=5.0083, df=5, p=0.4149) in the villages. The analysis further categorized the group of persons that are decorated using the Turaco feather. Results indicated that,

82% is used to decorate titled men, 6% is used for the decoration of hunters, 6% for "quarter heads" **decoration**, 5% for traditional doctors and 1% by village heads (see figure 9).



Figure 13: Percentages of group of persons decorated with the feather of the Turaco

During group discussions and consultation with the notables, it was reported that the feather of the bird is used in honoring noble-men and titled men in the society and it is mostly used by the group of men who are in the "Nfuh" society. From interviews, when someone is made a leader in the "Nfuh" or "Manjong" house, he is crowned with the red feather of the Turaco. They said this is historical and needs continuation in order to sustain the culture. This group of people ("Manjong" or "Nfuh") can be compared to today's armies because they were the people who fought inter-tribal wars in ancient days. Although there are no wars in recent days, the feather is given to the leaders of the group. The direction of the feather on the hat also shows a difference to the position and type of society the person putting on the feather represents. For example, a leader of the society always has the feather on his hat facing upwards. Also, Members of another group called the "Kigha" which is attached to the "Manjong" or "Nfuh" group (members are initiated to drinking from a particular cup). Members of the group have their feather worn sideways according to interviews in Vekovi village.

Furthermore, the feather is used to honour elites who have done something significant towards the development of his community. More so, the black feather of the Turaco is used by some soothsayers as traditional medicine.

6.0 Conclusion

The population of the bannerman's turaco is distributed throughout the BHF and the Lebialem forest as reported by researchers. There has been limited information about sub population and distribution of the species. This study has been able to update information about the bird's population and distribution. For example, information exists about the species in Bamendankwe; as a sub population of this species was recorded there. Extrapolating the data collected to the entire landscape showed about a 7% increase in the species population. Highest numbers of the bird were recorded in the Oku forest. Forest fires and feather harvesting still remain greatest threats to the species. The project therefore worked with the community to develop a conservation action plan (CAP) through engaging community groups and other institutions created by birdlife international to for a network called the community forest and wildlife conservation program (CFWCP). The capacity of the CFWCP is being built to lead conservation actions such as the design and implementation of alternative livelihood activities such as bee farming, piggery etc.. (see CAP).