

INVESTIGATING BREEDING SUCCESS OF THE GLOBALLY THREATENED GREY-NECKED PICATHARTES *Picathartes oreas* AND INITIATING A COMMUNITY-BASED CONSERVATION AWARENESS IN EBO FOREST PROPOSED NATIONAL PARK; LITTORAL CAMEROON



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I- BACKGROUND AND OBJECTIVES

Sound conservation measures for threatened species begin by understanding their ecology and factors leading to population decline (Gerber, 2011). Nevertheless, information on the ecology of many such species as the enigmatic Grey-necked Picathartes *Picathartes oreas* are still poorly known.

The Grey-necked Picathartes *Picathartes oreas* (hereafter referred to as GNP) is a highly charismatic but poorly known bird restricted to Nigeria, Central African Republic, Equatorial Guinea, Gabon and Cameroon (Birdlife International , 2016). In Cameroon, the GNP occurs in 15 of 35 IBAs, including Mount Cameroon and Mokoko Onge, Korup National Park, Takamanda National Park, Banyangbo Wildlife sanctuary, Mount Nlonako and Manengouba, Yabassi area, Campo ma'an complex, Ngovayang ridge, Dja Faunal reserve, Boumba Bek National Park and in the Yaoundé area including Mbam Minkom/Kala (Bian *et al.*, 2006). This species is highly prized by bird watchers and is an important part of ecotourism in this region. But its declining global population is estimated to be 2500 – 10000 individuals (BirdLife International, 2012). Currently listed as Vulnerable (Birdlife International, 2016), this bird is threatened by forest clearance and human disturbance, the impact of which is compounded by their highly specific nesting requirements (Awa II *et al.*, 2009).

Very little is known about the ecology of the GNP and information on its distribution and reproductive biology is particularly sparse. Furthermore, the cultural and economic value of GNP to local communities has not been explored in detail in Cameroon. Therefore, there is an urgent need to investigate the life history of this enigmatic bird to develop targeted conservation measures, since the absence of such vital data poses a critical challenge when it comes to prioritizing already limited resources for conservation management efforts.

The main objective of the project was to contribute to the understanding of the breeding ecology of the GNP, in order to provide baseline information helpful for the conservation management of the species, and specifically:

- Determine factors affecting the reproductive success of GNP using camera traps
- Assess the perception and attitude towards the GNP by local communities:

- Raise the level of awareness about the conservation of the GNP.

II- METHODS

II.1- Study area

This study was done in Ebo forest proposed National Park (4°21'N, 10°25'E; 1,115m a.s.l.), located in Nkam and Sanaga Maritime departments of Cameroon's Littoral Region (Whytock and Morgan, 2010); and extends for more than 1,500 km², of which approximately 1,200 km² is proposed as a National Park. The area is the largest of three contiguous forest blocks that compose the Yabassi Important Bird Area IBA 26 (Fotso *et al.*, 2001). The geology is ancient, highly weathered basalt complex, with some ferrallitic areas in the south. The soils are rather shallow, underlain with clay and rocks (Fotso *et al.*, 2001). Annual mean rainfall was measured in 2010–2016 at two points within Ebo Forest: Bekob (2336 mm p.a.), and Njuma (3135 mm p.a.). The wet season (successive months with cumulative rainfall > 100 mm) was between March and November at both sites (Abwe, Ebo Forest Research Program, Yaoundé, Cameroon, pers. comm. 2018 in Cheek *et al.*, 2018). The site is surrounded by nineteen villages and has a complex history of human habitation and, although much of the region is devoid of permanent habitation today, until the 1960s several villages existed within it, including Mopoun and Bekob, where two of the three permanently manned Ebo Forest Research Project stations were based (Whytock and Morgan, 2010). Ebo forest is characterized by lowland and sub-montane closed canopy forest, with subsistence farming and oil-palm plantations at its edge (Morgan, 2008). The growing number of endemic species being discovered from the site points to the importance of its conservation. Recently, a new species of plant *Palisota Ebo* (Commelinaceae) listed as Critically Endangered by IUCN was discovered there by Cheek *et al.* (2018). In addition it harbor a large threatened mammal population, including Forest Elephant *Loxodonta cyclotis*, Gorilla *Gorilla gorilla*, Chimpanzee *Pan troglodytes* and nine other diurnal primate species including *Piliocolobus preussi*, *Pan troglodytes ellioti* and drills *Mandrillus leucophaeus*. Threatened birds such as African Grey Parrot *Psittacus erithacus*, crowned eagles *Stephanoaetus coronatus* and Grey-necked Picathartes *Picathartes oreas* can also be found (Whytock and Morgan, 2010).

Despite the conservation priority of this site, it is facing major threats including logging, farmland encroachment and poaching (Whytock and Morgan, 2010).

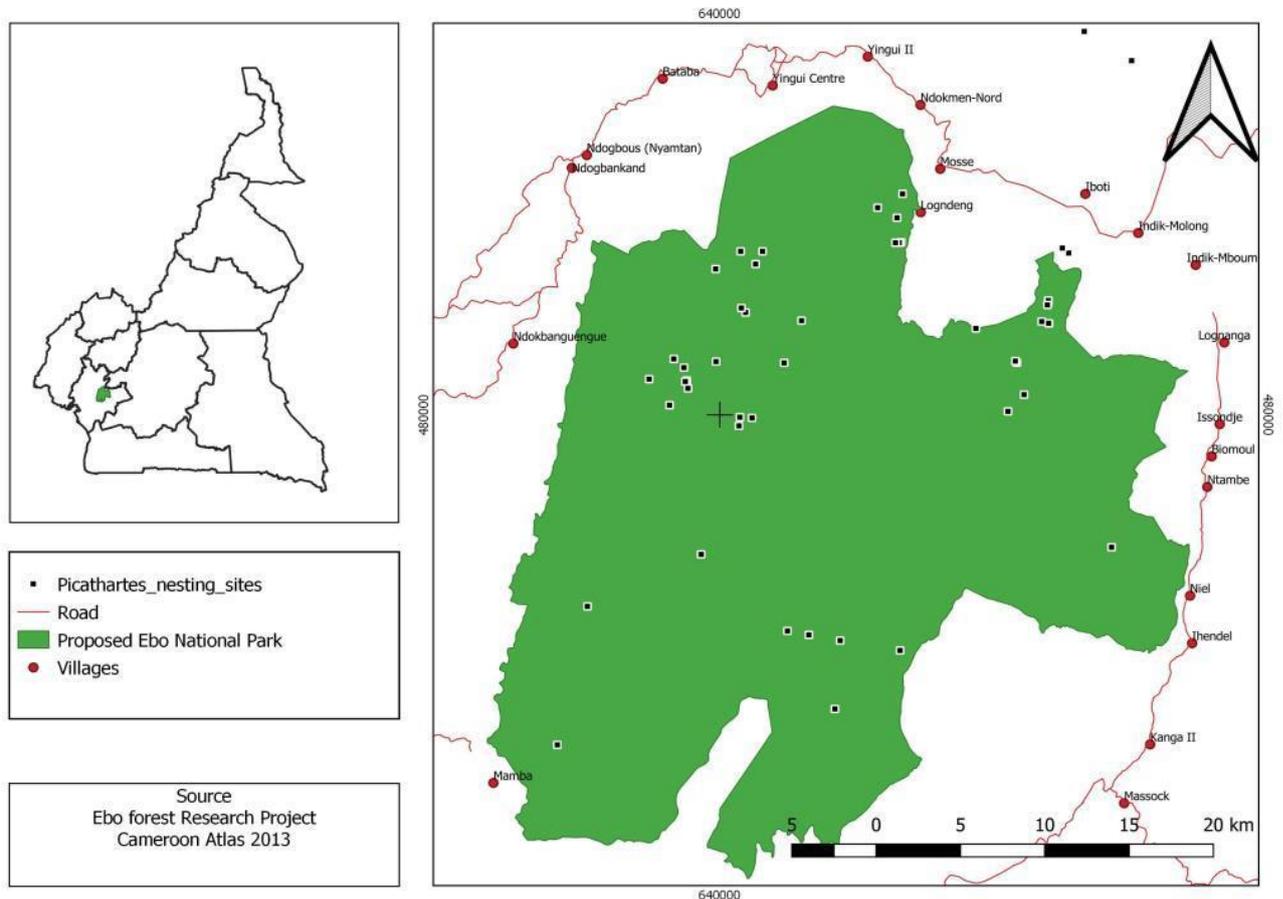


Figure 1: Map presenting the Ebo forest Proposed National Park and picathartes nest locations recorded to date

II.2- Data collection

II.2.1- GNP breeding survey

- **Nests selection**

Based on GNP nesting sites data base collected in 2018, a systematic search was done for active nests selection between August and November 2019, and 13 GNP nests were selected for monitoring. Nest inspection was done by directly looking into the nest (for nests that were less than 1.5 m high), and nests that are higher will be inspected with the aid of a mirror attached to the end of a long pole (Atuo *et al.*, 2016).

Nests were considered active if they contained fresh tree roots and plant material (preparing for eggs laying), eggs or nestlings, as well as if it was undergoing repairs/construction with fresh layer of mud on the weathered rim or other fresh patches (Awa II *et al.*, 2009).

- **Nests monitoring**

Direct nest monitoring by observers could cause disturbance for a sensitive species like the GNP and may have particularly negative effects during egg-laying and incubation by keeping birds away from their nests (Verboven *et al.*, 2001; Sutherland *et al.*, 2004). Camera traps were therefore used to monitor nest success and minimise disturbance. Camera traps have been used to monitor nest success for a variety of species (Richardson *et al.*, 2009), but this is the first time they have been used to systematically monitor GNP nests.

- **Camera traps setting and monitoring**

We used Campark camera model T40 and each camera with a 32 GB SD card was setted as follows:

- **Mode:** only photo
- **Photos series:**3
- **Photo resolution:** 14 MP
- **Shot lag:** 0.5 second
- **Sensitivity of the motion sensor:** high

Once setting was completed, cameras were firstly sealed with cling film and secondly kept in a plastic tupperware box painted in green color (figure 2) containing silicate gel. Since nests are constructed on large rock faces at least 2m above ground, cameras were mounted on a stick (Figure 2). When the camera was focused and could have access directly inside the nest, it was stabilized in front the nest at variable distance of 1 to 3 m (to ensure a good picture of the nest).

Prior to leaving the cameras permanently installed at the selected nest sites, we firstly mounted a camera in front a single nest containing eggs in order to test how tolerant the GNP is in the presence of the camera. We collected images after two days and found that the bird returned to the nest within twenty minutes after mounted the camera. Although the bird did inspect the camera, it appeared to behave normally

thereafter, incubating eggs and leaving periodically, as well as swapping incubation with its partner. In combination with our previous experience monitoring nests directly, we were confident that the birds were not strongly disturbed by the camera's presence and continued to install all of the nest cameras. Cameras were checked every three weeks thereafter to change memory cards and batteries and to perform any other maintenance.

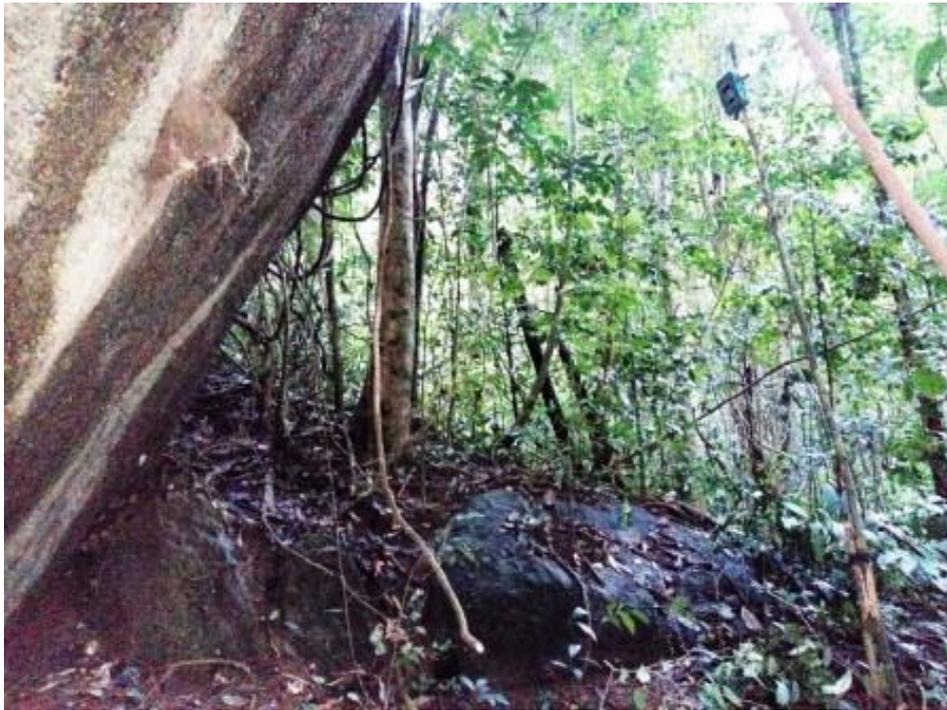


Figure 2: Camera mounted in front the GNP's nests.

II.2.2. Local perception and attitude assessment towards the GNP

Structured interview questionnaires (Newing, 2011) was used to assess local perception and attitude towards the GNP. From June to November 2020, 220 questionnaires were randomly administrated in 13 villages (among the 31 closest villages to the forest and considering that all residents as potential forest users) respectively: Yingui (41), Bataba (9), Ndogbanguengue (13), Ndougous (13), Iboti (35), Logndeng (29), Mosse(16), Mamba(8), Ndokmen-Nord (11), Ihendel (13), Niel (10), Lognanga (8) Issondje II (14). These village were selected using the stratified random sampling method (Hamed Taherdoost, 2016), based on their proximity to the forest.

Prior to the interview, a laminated picture of four bird including the GNP was used to guide our interviews in order to ensure that they effectively know the bird. The name

of the birds was pronounced in vernacular language and it was proposed to the interviewer to show the bird among the four presented.

II.2.2. Raise the level of awareness about the conservation of the GNP

Based on the presence of a conservation club known as CAG (Club des amis des Gorilles) in two villages for conservations activities, level of hunting pressure and finally the population found in each village, two village were selected for this purpose: Logndeng and Iboti. A workshop was organized in each village for results presentation and discussion with locals, as well as in School found in the area in January 2021. To ensure the success of the event, we have closely collaborate with traditional authorities in each community, in order to ensure that the participants are representative of all socio-economic groups including farmers, hunters, timber exploiters, non-timber forest product gatherers etc. To ensure that the message has been listened, a short questionnaire was used prior and after the meeting to evaluate the knowledge level of each participants (Pem *et al.*, 2016).

III. RESULTS

1- Reproductive success of the GNP

A total of 13 Cameras were deployed in the field for nest monitoring. Eight (61%) nests were not monitored for the full nesting period because cameras were destroyed by heavy rain (4 of these nests were also destroyed by the rain at the same time), 5 (39%) nests have succeeded to be monitored until the end. Among these 5 nests, 4 (80%) nests have succeeded and 1(20%) have failed (nest in bekop station).

Table 1: Table showing the status of monitored nests

| Site | Nest code | Monitoring Status | |
|----------------|-----------|-------------------|--|
| | | Date | Comments |
| Bekob | Bekob | 15/09/2019 | Mounting date: 1 egg inside the nest |
| | | 14/10/2019 | Empty, with water passing through the nest |
| Mamiock | Mamiock | 15/09/2019 | Mounting date: empty |

| | | | |
|-----------------|----------|--|---|
| | | 13/10/2019 18/11/2019 09/12/2019 | Visit1: herbs inside the nest Visit2: 2 nestlings with almost 3 days old Visit3: empty |
| Mopoun | Mop1 | 16/09/2019 15/10/2019 17/11/2019 06/12/2019 | Mounted date: nest containing 1 egg Visit1: 1 nestling with almost two days old and 1 egg Visit2: empty with nest materials in the ground Visit3: empty nest |
| Mopoun | Mop2 | 16/10/2019 17/11/2019 07/12/2019 07/01/2020 | Mounted date: herbs inside the nest Visit1: 1 egg inside the nest Visit2: 2 eggs inside the nest Visit3: empty nest |
| Logndeng | Logndeng | 18/11/2019 09/12/2019 09/01/2020 | Mounted date: Nest containing 2 eggs Visit1: 1 nestling with least than 1 week old Visit2: empty nest |

Table2: Number of pictures per monitored station

| Cameras names | Mopoun Cam1 | Mopoun Cam2 | Bekob | Mamiock | Logndeng |
|--------------------|-------------|-------------|-------|---------|----------|
| Number of pictures | 3474 | 2095 | 222 | 24714 | 678 |

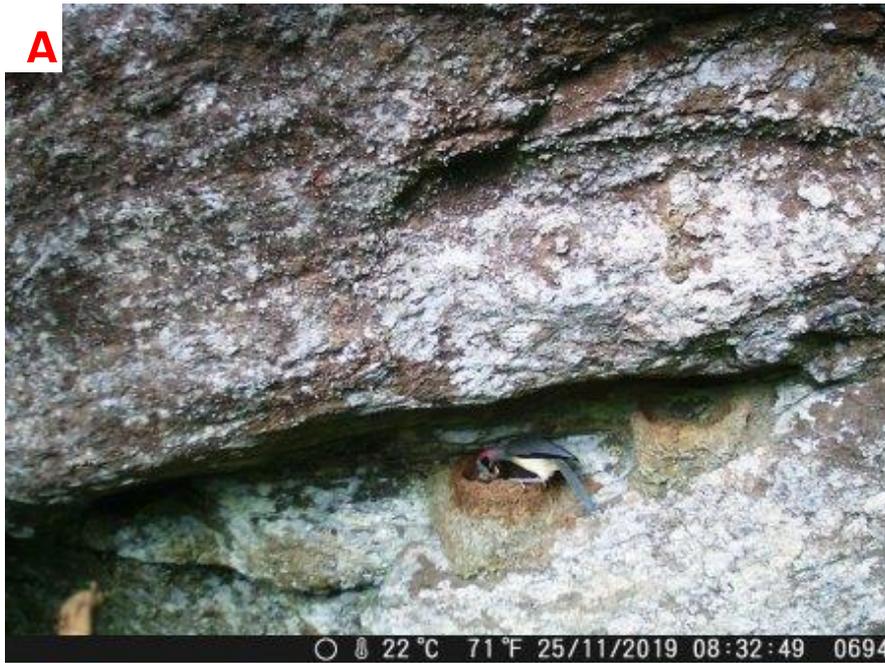


Figure 3: Images of GNP from camera traps. A= GNP feeding the nestling, B= GNP couple preparing the nest for breeding

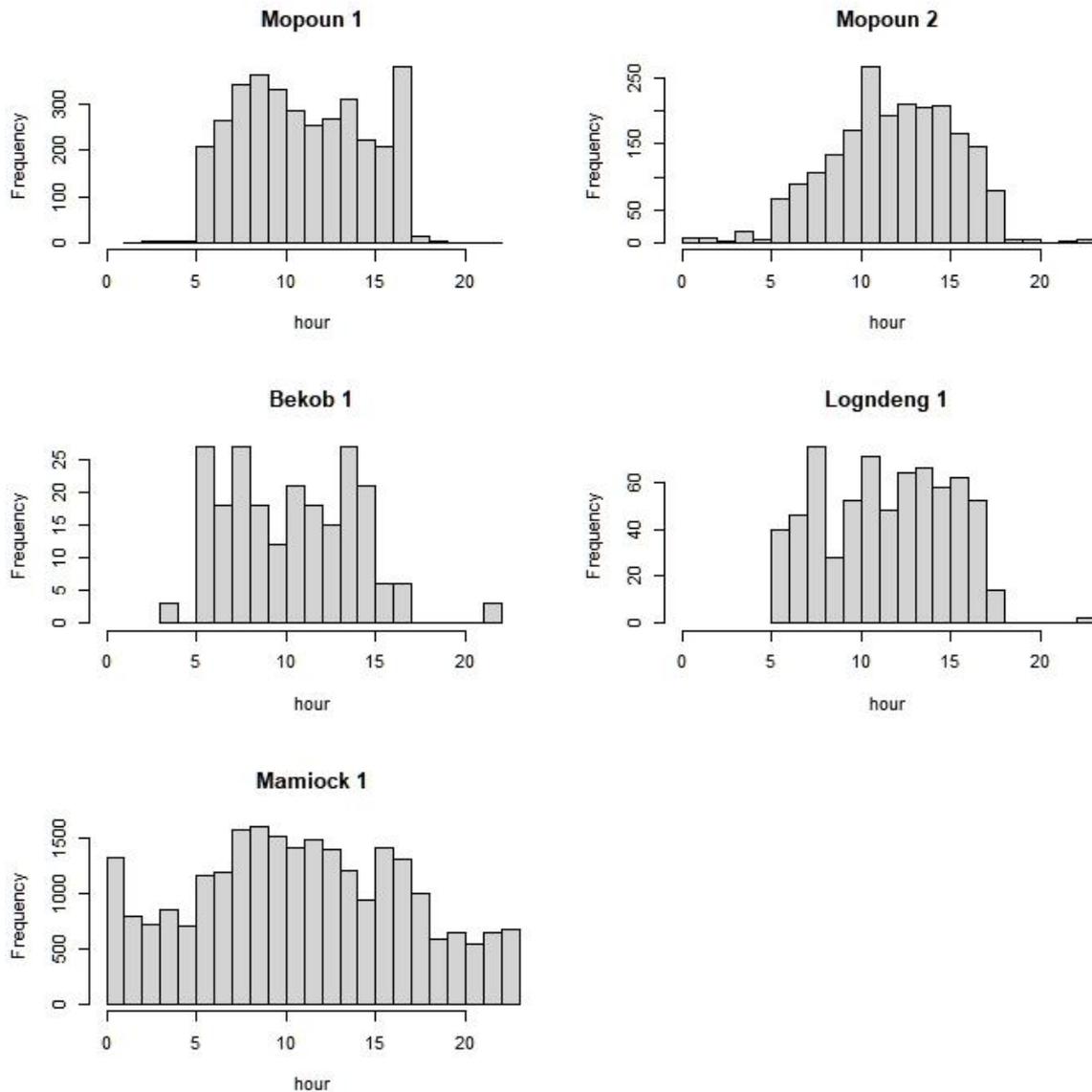


Figure 4: Graph showing the activity pattern of each nest per hour

Above figure present the activity of each monitored nest per hour using camera traps images. The figure shows that, during the reproductive period, the GNP has a diurnal activity from 6 am to 6pm, with a peak between 6 to 10 am, 11 am to 1pm and 2 to 5 pm; probably for foraging and feeding the nestlings. Awa II (2008) investigated the prey delivery rates of the GNP to the nestlings and observed that, the bird was active during the morning (7:00 -10:00), during afternoon (11:00-14:00) and evening (14:30-17:30) sessions, with a low delivery rate in the morning than afternoon and evening. This contrast with our results could due to their late start in the morning observations (7:00

am) where the bird is generally very active early the morning as observed in our work. Thus we can observed that, the GNP nest and forage in closed canopy forests where diurnal variations in temperature are not significant and so, it is active throughout the day. Previous study done on the species by Fotso (1993) reported the GNP to be active in search of food during the morning and evening periods with a break in the afternoon, but these studies did not indicate if these patterns were observed during breeding or non-breeding periods. Adeyemo and Ayodele, (2005) in Nigeria found that the GNP feeding pattern was intense between 08.00 – 10.00 h and 17.00–19.00 h. This contrast could be due to the method used.

We were also able to quantify daily activity patterns during the breeding period for five nests with sufficient data using the number of images per day as an index of activity. These preliminary analyses show the rate of change in activity post egg laying for each nest (Figure 3), and there is a clear peak around the end of October.

Although we have not completed a systematic analysis, the camera trap images also revealed prey items being returned to the nest. These mostly comprised small amphibians and insects.

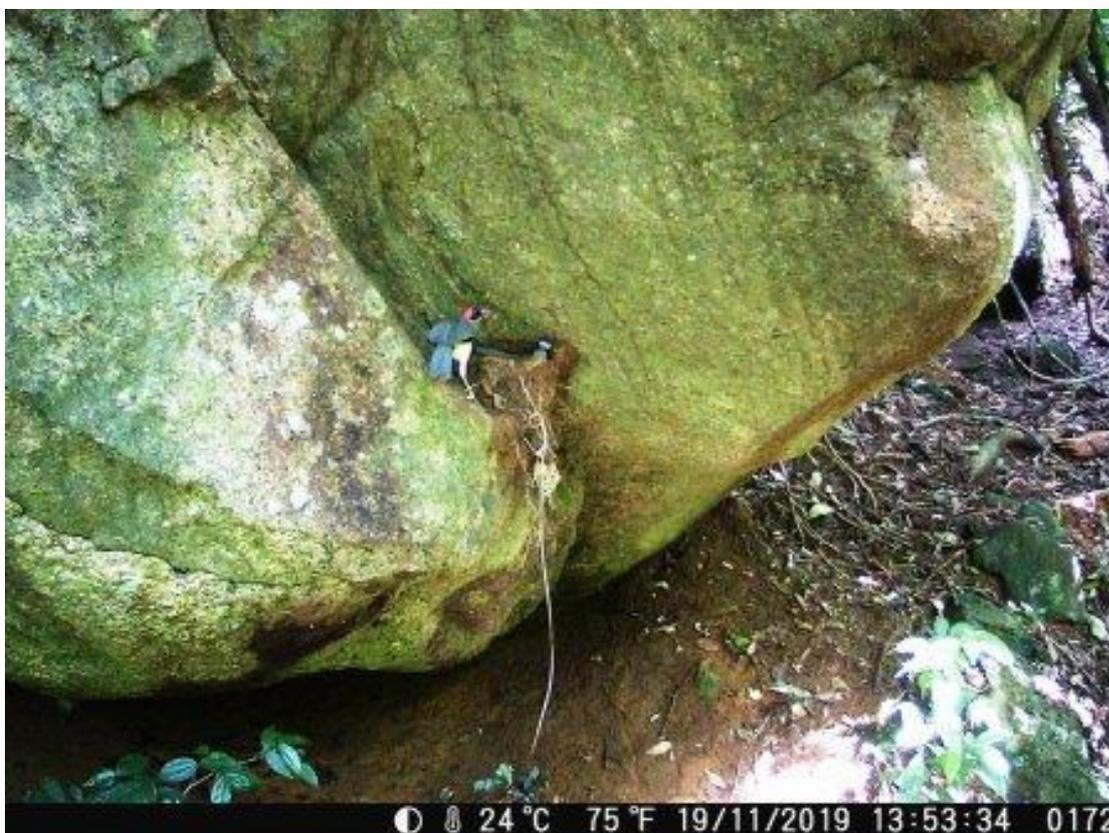


Figure 5: GNP with insect in the mouth

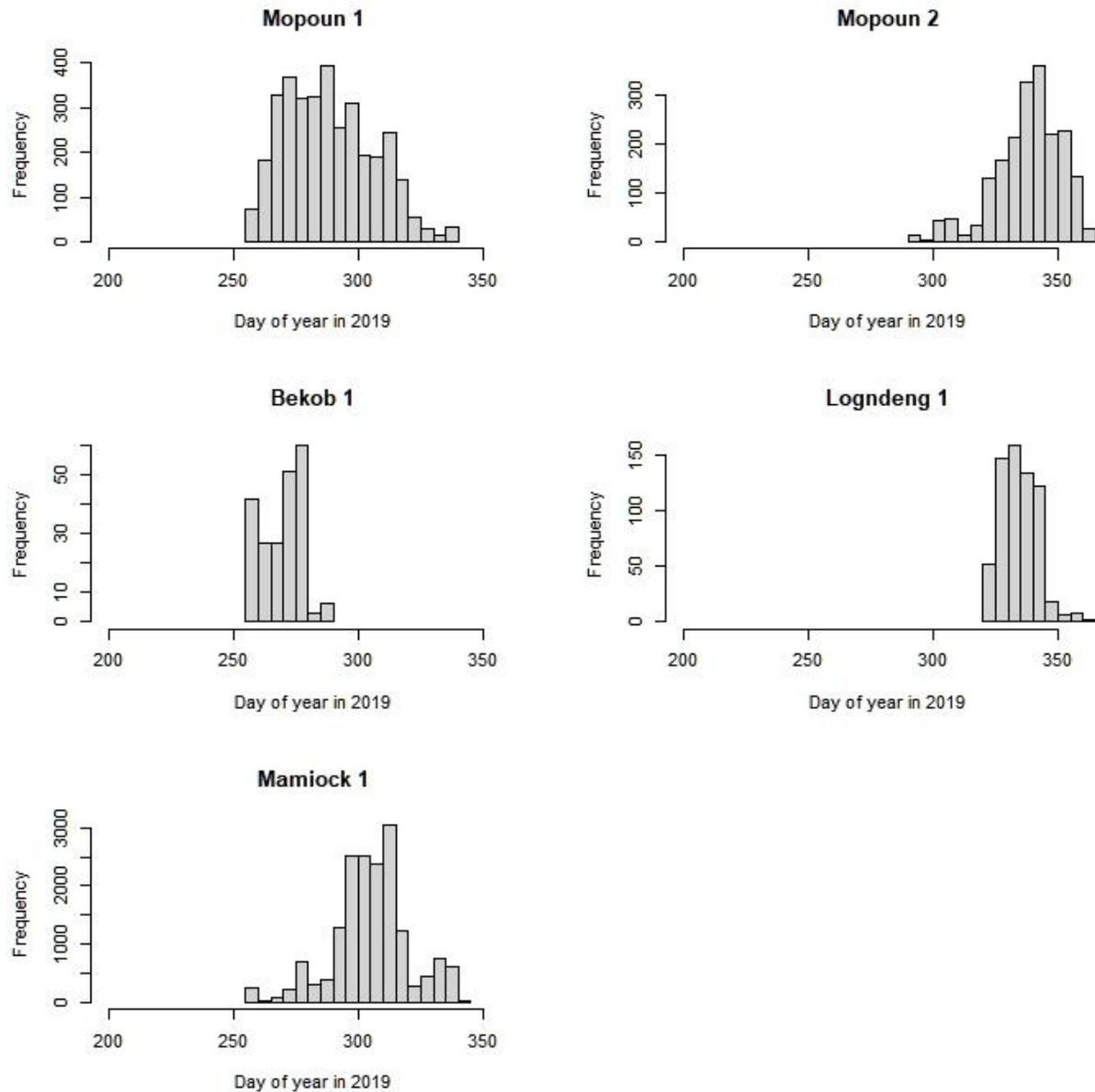


Figure 6: Graph showing the daily activity of the GNP during the reproductive period
Figure legend: Day 300 = 27th October. On the graphs the y-axis "Frequency" is the total number of photos. So assuming each photo is a bird, we can use the number of photos as a measure of activity (more photos = more active).

2- Assess local attitudes and perceptions toward the species

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 220 people interviewed, 195 were male (89%) and 25 were

female (11%). The number of participants in each age group was represented in percentages as follows 15-30 years (20.5%), 31-45 years (29.67%), 46-60 years (19.33%), above 61 years (13.67%). Analysis indicated that majority of interviewees practiced hunting as primary activity with an estimate of 67%, following by agriculture 28% respectively and others 7%. The majority of interviewed (92% over 220 persons in total) have just received a basic education (primary education and not until the end of the cycle). Most of the interviewed have had knowledge about the species: 64% were hunters, 28% were loggers. Most of farmers, bikers, fishermen and others didn't know of the bird. This could be explained by the fact that hunters and loggers are always in the forest which is the main habitat of the species. 15 over the 25 female interviewed (60%) have seen the bird mostly in the village when hunters come back from the forest with. Over the 220 interviewed, nobody (0%) knew the protection status of the GNP both at a national (in Cameroon) and international level. Our survey also revealed that, the GNP is not their target species and they don't collect GNP eggs. According to them and particularly hunters, the occurrence of the species has decreased since the last ten years and it is probably due to the accidental capture of the bird by traps. Also, the dead *Picathartes* is always seen in the trap (86%). Some eat them (66 %) and others not because it is too small for them. The GNP didn't have a significant traditional and medicinal importance in the area (63%) and only 15% reported that they use the mud of the GNP's nest to treat hernia. Most local people interviewed (80%) within the community expressed favourable attitudes towards conservation and said they would be ready and happy to be involved as stakeholders. Even those they are aware that traps are among the serious threats of the species in the area, they can only stop that activity if excellent alternative outcome activities are provided.

3- Raising the level of awareness about the conservation of the GNP

100 t-shirts bearing the ABC logo and picture of the GNP were produced and distributed to local stakeholders and meritorious students during the workshops and lectures. 250 flyers with information on the bird were also produced and shared with participants during the awareness and education campaign. For the long term impact of the work in the area, 20 A0 posters about the conservation need of the species have been produced on solid material. Some were strategically placed and were targeted to reach an even wider audience of over 5,000 people living in these communities and

beyond. Others were share with the local representation of Cameroon wildlife and forest Ministry, the local NGO: Ebo Forest research Project (EFRP) and with national Universities as well (the University of Dschang).Our Pre and post questionnaire reveal that 98% of participant learn about the GNP and its conservation importance..



Figure 7: Image of the t-shirt produced for the awareness campaign



Figure 8: Images of flyers produced for awareness campaign

and develop much technic really important to succeed during future Camera monitoring on the species.

According to this study, the main cause of nests failure was the rain. But further study could increase the sample of nests monitored in order to see if we could others information about factors affecting GNP nests failure/success. We observed that despite the nest was destroyed by the rain, the bird was always trying to repair it even those it was still destroyed. This is an evidence that limitation of nesting sites in Ebo forest could be a major problem in the area and then conservation action in favour of the species should be urgently take place so that the bird could recolonized adequate disturbed nesting sites that should be advantageous for the reproductive success of the species. Through experiences gained during this work, we recommend that future study should use good and robust quality of camera like reconyx that should be really resistant to heavy rain in the area (this was recently successfully used by the Ebo Forest Research Project for the bio monitoring in the area) and with rapid trigger speed, should capture all events around the nest, or the use of continuous video that will help to monitor the nests with accuracy (even those it is more tedious). The sexual dimorphism is absent with GNP. Then when us camera or video during future studies, researchers could ring one of the parents so that the activity of each parent should be effectively known. According to our questionnaire results, the bird is particularly threatened in the area by being caught in traps as by catch. We encourage more awareness campaign in the area to raise the conservation spirit among local populations and also, develop conservation actions that should prioritise alternative income activities in order to reduce hunting and then increase the survival of the bird there others threatened species sharing the same habitat as well.

IV- RESEARCH PERSPECTIVES

We will continue to seek funds to:

- Monitor and update the population status of the GNP in the entire forest;
- Use good camera/video recording and increase the sample size to effectively provide factors impacting the breeding success of the species in the area;
- restore degraded breeding sites of the species through the planting of indigenous tree species;

- Reinforce the involvement of stakeholders in the conservation action plan and pursue awareness on the conservation needs of the species and its habitat around Ebo forest.

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V- BUDGET

Costs are in £UK Sterling Pounds

| Materials | Description | Cost in £ |
|---|---|------------------|
| 15 Camera trap+30 SD cards + shipping cost | For nest monitoring | 807 |
| Batteries AA Energizer | Alimentation for cameras | 127 |
| Conception of 15 green boxes | To house cameras in the field | 18 |
| Preparation of 250 questionnaires | For population perception about Picathartes and conservation aspect | 20 |
| Lodging | Lodging coming back from the field | 245 |
| Feeding allowance | Daily meal for applicant and field guide during field work. | 264 |
| Field guide perdiem | field assistance salary | 661 |
| Refreshment for participants to focus-group discussions and workshop | Lunches during workshops | 238 |
| Development and printing of 20 posters A0 (£85), 100 t-shirts(£253), 250 flyers(£52) and 10 reports (£39) | For promoting material during workshop and sensitization campaign | 429 |
| Local transport(full trips to project sites) | Transportation from Douala to the study site | 191 |

| | | |
|--------------|--|-------------|
| TOTAL | | 3000 |
|--------------|--|-------------|

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VII- APPENDIX



Guilain Tsetagho mounting the camera



Image of the GNP from a Camera trap



GNP hunted (remove in the trap)



GNP inside the nest



Nest containing a nestling



GNP conservation awareness message poster in public place in Iboti village (left) and Logndeng village (right)



Threat on the GNP habitat (tree cut at 20m from a GNP nesting site)



A and B= Guilain Tsetagho during classe nature at school





A,B,C, D, E = Guilain Tsetagho during awereness workshop campaign