FINAL REPORT

POPULATION ASSESSMENT AND CONSERVATION OF THREE CRITICALLY ENDANGERED VULTURES IN MOLE NATIONAL PARK AND FRINGE COMMUNITIES, GHANA.

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Working for birds and conservation in Africa
Acknowledgement
I would like to express my sincere gratitude to the African Bird Club (ABC) for funding this project. Additionally, the project team expresses our gratitude to the Wildlife Division of the Forestry Commission of Ghana for granting us a research permit. Our sincere appreciation extends to the management of Mole National Park for their unwavering support throughout the research duration and in facilitating vulture conservation education in the schools we engaged. Special thanks are also extended to A Rocha Ghana (Damango Office) for their proactive involvement in providing volunteers to assist in the administration of questionnaires.

Project Summary
Mole National Park (MNP) is home to three critically endangered vultures namely Hooded vulture (*Necrosyrtes monachus*), the White-backed vulture (*Gyps africanus*) and the White-headed vulture (*Trigonoceps occipitalis*). This project assessed the population, distribution and seasonal population dynamics of these three species in the southern part of MNP. Local perception and traditional use of vultures in fringe communities were also assessed and vulture conservation awareness raised in fringe communities of MNP. Transect surveys were conducted in both wet season in 2018 and dry seasons (2018/2019) for a total of 32 survey days to assess vulture population in the park. A total of 134 vultures including 69 hooded vultures, 54 white-backed vultures and 11 white-headed vultures were recorded with over 60% of the species recorded in the wet season. The average encounter rate of the hooded, white-backed and white-headed vultures were 2 individuals/km, 2 individuals/km, 0.3 individuals/km respectively for the entire survey period.

Four tree species including *Burkea africana*, *Daniella oliveri*, *Khaya senegalensis* and *Borassus aethiopum* were identified as being to be associated with vulture activity such as perching, roosting and nesting at the time of data collection. A total of 120 questionnaires were administered in 4 fringe communities of MNP. The results indicated that vultures use community areas such as refuse damps, slaughterhouses and farms for feeding and roosting. The findings suggest that the three critically endangered vulture populations, especially the White-backed vulture in MNP, face threats such as capture for food, rituals, and traditional medicine. It was confirmed by 13% of the respondents that vultures were captured by baiting with meat mixed with tobacco and marijuana. More than 50% of the respondents were willing to engage in activities to protect vultures. Some activities recommended by the respondents to protect vultures include awareness creation on the importance of vultures, and local people desisting from harmful activities such as habitat destruction and killing of vultures. At least 635 people, including adults and school children were educated on the importance of vultures and ways local people can contribute to the protection of these critically endangered vultures in the Mole landscape.

We recommend that a long-term study on the population of vultures covering the entire study area should be conducted. Secondly, local threats and use of vultures should be assessed in all fringe communities of the park to gain a better understanding of the diverse threats and severity of such threats that vultures face in the Mole landscape and to design appropriate conservation interventions. Lastly, vulture awareness creation should be heightened in all fringe communities and schools within the landscape.
Background

Vultures as scavengers play an important ecological role in our ecosystem and this is particularly evident through carrion consumption (Whelan et al., 2008, DeVault et al., 2003). Africa is home to 11 species with seven at the brink of extinction and are either globally listed as endangered or critically endangered (BirdLife International, 2018). During the last 30 years, the population of vultures has been observed to have decreased drastically and in many areas around the world, vultures are now either totally absent or confined only to protected areas such as National parks and Game Reserves (Oaks et al 2004).

Four vulture species including the Palm-nut vulture (*Gypohierax angolensis*), Hooded vulture (*Necrosyrtes monachus*), White-backed vulture (*Gyps africanus*) and White-headed vulture (*Trigonoceps occipitalis*) occur in Mole National Park (MNP) (Dowsett-Lemaire & Dowsett, 2004). The latter 3 species are classified as Critically Endangered according to the International Union for the Conservation of Nature (BirdLife International, 2018). Among these three species, *Gyps africanus* was once common and widespread (BirdLife International, 2018) but has declined by over 90% in West Africa (Thiollay in litt. 2006). In Ghana, the species has disappeared from other parts of its known range, with remnant population in MNP which serves as a refuge for the species (Dowsett-Lemaire in litt. 2004). Vulture declines have been attributed to habitat loss, declines in wild ungulate populations, hunting for trade and traditional medicine, persecution, collisions and poisoning, deliberate targeting by poachers as the presence of vultures can alert authorities to illegally killed big game carcasses, destruction of roosting sites/habitats, changing food (BirdLife International, 2018, Ogada et al., 2016).

Information gathered from the patrol team of the Mole National Park indicated that there has been consistent decrease in sightings of the most widespread and common White-backed as well as the White-headed vultures over the years. It was also gathered that tobacco is been used as an anaesthesia on carcass by some fringe communities, aiding in easy capturing of vultures. Furthermore, data on the population and distribution of these 3 species in MNP and local threats which are needed for appropriate conservation planning and management is lacking.

Aim and Objectives

This project sought to ensure protection and survival of vultures in the Mole National Park and its fringe communities through the following objectives;

1. Estimate the population of white-backed, hooded and white-headed vultures in MNP.
2. Determine the seasonal population dynamics and develop distribution map for these vultures in MNP.
3. Assess local perception and traditional use of vultures in fringe communities and raise vulture conservation awareness in fringe communities of MNP.

Methodology

Study area

MNP located in the Savannah region of Ghana, is the largest wildlife reserve in the country, protecting an area of about 4840km² of Sudanian woodland. The park lies between 09° 12'-10° 06' North and 01° 25'-02° 17' West (Fig.1) and is bordered by 33 fringe communities. MNP is one of BirdLife International’s designated Important Bird and Biodiversity Area (IBA) harbouring over 320 species of birds out of about 721 bird species recorded in Ghana with the occurrence of at least 36 out of 37 savanna biome-restricted species (Dowsett Lemaire & Dowsett, 2008). Wildlife poaching is a serious problem in the Mole National Park despite the various interventions of non-governmental organizations to ensure collaborative management of MNP.
Ecological Data Collection and Analysis

In conducting vulture surveys, a 3-days reconnaissance survey was carried out August 2018. The intended method (counts at feeding events and time-species count as describe by (Mum et al 2012)) for collection of ecological data was changed after the reconnaissance survey due to the unreliability of finding enough carcass in the park and the tedious veterinary protocols needed to be followed when introducing carcass into the park. Therefore, line transect was used to survey vultures in both wet and dry season. Furthermore, due to funding and logistics constraints, ecological survey was limited to the southern parts of the park from the Park Headquarters, Ducie, Kananto, Jang and all the way up to Bawena range and a total of 32 randomly selected transects of at least 1km were used to survey vultures in these ranges during both wet and dry seasons. All five range areas were surveyed in the dry season. However, due to inaccessibility of most part of the park in the wet season, surveys were limited to only two range areas; Jang and Park Headquarters. Where possible, some of the transects traversed waterbodies, and areas known to host vulture nests. Vulture surveys were conducted twice daily; morning (8am-12pm) including opportunistic surveys and late afternoon (4pm-5pm). Other sites of possible vulture encounter such as refuse damps in the Mole National Park were also surveyed.

Wet season data was collected over a period of 14 days from September to October 2018 covering a total of 15km. Dry season data collection was done for 18 days from December 2018 to February 2019 with 17km covered. Vultures were identified visually with a pair of binoculars. Roost count was done during late afternoon surveys from 16 GMT (Ssemmanda 2005) by selecting vantage points at each
core roost zone to allow clear view and avoid disturbance. Species of roost trees were be recorded. Hand-held GPS was used to mark all locations where the species were encountered.

Due to the change in the ecological survey method, this study could not estimate the population of the three critically endangered vultures in MNP. Therefore, population indices including relative abundance and encounter rate of the species were assessed. Encounter rate of each vulture species was calculated by dividing the total number of individuals of a species encountered by total distance (km) walked. Relative abundance of each of the three critically endangered vultures was calculated by using the formula below;

\[
\text{Relative Abundance} = \frac{\text{No. of individuals of a species}}{\text{Total no. of individuals recorded}} \times 100
\]

Due to the varying population size of the selected communities, 40 questionnaires were administered in Larabanga and Murugu while 20 were administered in Kananto and Mognori.

**Questionnaire administration and Analysis**
Semi-structured questionnaires written in English were administered in 4 fringe communities (Murugu, Kanato, Larabanga and Mognori) of MNP. These communities were selected based on proximity and logistics reasons. Three assistants were hired to support translation of questionnaires from English to local languages where needed as majority of the local people were not English speakers. The total number of questionnaires administered in each community was informed by the size of each of the four communities. Due to the varying population size of the selected communities, 40 questionnaires were administered in Larabanga and Murugu while 20 were administered in Kananto and Mognori.
Printed photos of all the three critically endangered vultures were shown to respondents for identification and to assess their knowledge on these species and their interaction with the species. Data entry and descriptive analysis were performed in Statistical Package for the Social Sciences (SPSS) version 20. Each respondent’s consent to participate in this survey was sought prior to administration of questionnaires. Data on age, gender, sociocultural (income, education, occupation and religion), level of education were collected.

**Results and Discussion**

**Population assessment of three critically endangered vultures in MNP**

A total of 134 individuals of the three critically endangered vultures were recorded during surveys covering a total of 32km for both wet and dry seasons. Hooded vultures had the highest relative abundance in the park compared to the White-backed and white-headed, the latter being the lowest (Table 1). An additional twenty-seven (27) unidentified vulture sightings were made during the wet season.

Table 1: Observations of three critically endangered vultures in Mole National Park

<table>
<thead>
<tr>
<th>Species</th>
<th>Dry season</th>
<th>Wet season</th>
<th>Total observed</th>
<th>Relative Abundance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hooded vulture</td>
<td>21</td>
<td>48</td>
<td>69</td>
<td>52</td>
</tr>
<tr>
<td>White-backed vulture</td>
<td>16</td>
<td>38</td>
<td>54</td>
<td>40</td>
</tr>
<tr>
<td>White-headed vulture</td>
<td>5</td>
<td>6</td>
<td>11</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>42</td>
<td>92</td>
<td>134</td>
<td>100</td>
</tr>
</tbody>
</table>

The highest number of hooded vultures recorded was 20 individuals/km while that of the white-backed vultures was 15 individuals/km. The maximum number of white-headed vultures recorded per kilometer was 4 individuals. The average encounter rate of the hooded, white-backed and white-headed vultures were 2 individuals/km, 2 individuals/km, 0.3 individuals/km respectively. The relative abundance of the three species recorded is in line with findings from previous studies including a 20-day Explorers Club sponsored bird survey conducted in 2016/2017 where only 6 white-backed vultures, 63 hooded vultures and no white-headed at all (Dandzo-Adzagudu unpublished data); Di Vittorrio & Petrozzi (2018) categorized the hooded vulture as very common, white-backed as common and white-headed vulture as rare. While these results suggest that the population of hooded vultures is relatively higher than that of the white-backed and white-headed vultures in MNP, it also corroborates the decreased sighting of both white-backed and white-headed vultures as claimed by the patrol team of the park. Furthermore, the low number of individuals observed for all three critically endangered vultures is in line with the rapidly declining African vulture populations (BirdLife International 2018,2021). It must be noted that, considering the total size of the study area and the coverage of the ecological survey, this research does not provide sufficient population data on these species. Thus, a comprehensive long-term survey that covers the entire MNP is needed to provide substantial conclusion on the population statuses of these species.
Fig 3: Hooded vulture recorded during wet season data collection

Fig 4: Unidentified vulture recorded during wet season data collection
Nesting and roosting tree species: Four tree species were identified to be associated with vulture activity such as perching, roosting and nesting at the time of data collection. These include, *Burkea africana*, *(Daniella oliveri)*, African Mahogany *(Khaya senegalensis)* and *Borassus Palm* *(Borassus aethiopum)*.

Distribution and Seasonal variation in species abundance of three Critically endangered Vultures
A total of 92 individuals were observed during the wet season while 42 individuals were observed during the dry season indicating a higher vulture abundance for all the three critically endangered species in the wet season compared to dry season records although survey effort was higher for the dry season than that of the wet season. The encounter rates were higher for each species during the wet season than in the dry season. The encounter rates for hooded vulture, white-backed vulture and white-headed vulture were 3 individuals/km, 3 individuals/km and 0.4 individuals/km respectively during surveys in the wet season. Encounter rates in the dry season were 1 individual/km, 1 individual/km and 0.3 individual/km for the hooded vulture, white-backed vulture and white-headed vulture respectively.

The abundance of each species varied across the areas (i.e ranges/camps) surveyed for all the three vulture species and this could be attributed to resources such as food, water, roosting and nesting sites etc. During the dry season, all three species were recorded around the Park Headquarters area. The hooded vulture was sighted in all areas surveyed in both wet and dry seasons which is typical of its association with vegetative habitat including open and wooded grassland *(BirdLife International 2018)*. Similarly, white-backed vultures were sighted in all ranges surveyed in the dry season suggesting high movement activities during the dry season across the park as they are known to travel over long distances and spend much time in flight searching for food. The white-headed vulture was recorded in only Jang and Park Headquarters throughout the entire survey.

Fig 5: A committee of hooded vultures recoded during dry season survey
Fig 7: Abundance of vultures in the 5 range areas during the dry season survey

Fig 8: Abundance of vultures in the 2 range areas surveyed in the wet season survey
Fig 9: Distribution of vultures in the 5 range (camp) areas surveyed in Mole National Park

**Local perception and traditional use of vultures in fringe communities**

A total of 120 respondents comprising 69% males and 31% females from 4 fringe communities of MNP were engaged to assess local perception and use of vultures using questionnaires. The respondents were at least 17 years and over 50% had at least basic education.

General knowledge on the importance of vultures varied amongst the respondents. Only few respondents (27%) knew vultures help in preventing the spread of zoonotic diseases. Overall, all 120 respondents were able to identify at least one of the vulture species. Majority (82%) of the respondents identified only the hooded vulture while 32% were able to identify only the white-headed vulture. Twenty-eight percent (28%) of the respondents identified only the white-backed vulture. Forty-one percent (41%) of the respondents were able to identify at least two of the vulture species. These results suggest hooded vultures frequently use community areas compared to the white-backed and white-headed vultures and confirms the hooded vulture’s association with human settlements (BirdLife International 2018). While 60% of the respondents did not associate vultures to any importance, the importance of vultures in the surveyed communities included cultural importance where vultures are used as totems by some clans as indicated by 8% of the respondents; spiritual importance (rituals and traditional medicine) for 30% of the respondents and ecological importance as bio-indicators of carcass in community areas for 2% of the respondents. These findings which indicate low knowledge of the respondents on the ecological role of vultures also highlights the need to scale-up vulture conservation awareness creation in these communities.
Community areas used by vultures: Majority of the respondents (80%) mentioned sighting hooded vultures in community areas such as riverside, slaughterhouse, market area, farm, refuse dump. While 28% of the respondents confirmed ever sighting the white-headed vulture, only 23% confirmed the white-backed in in their communities in areas such as refuse dumps and farm areas. All 3 species were seen either feeding, roosting and flying over community areas.

Local people’s perception of vulture decline through encounters in community areas: Thirty-seven percent of the respondents confirmed that vultures are becoming rare to encounter in their communities while 22% did not think vultures have become rare to encounter in their communities. The rest (41%) had no idea whether vultures had become rare to encounter. Although, the majority (64%) of the respondents were not knowledgeable about which vulture species have become rare to encounter in their communities, 23% confirmed that all three species are becoming rare to encounter in their communities. Only 8% of the respondents confirmed that the hooded vulture has become rare to encounter while 5% said the white-headed has become rare. Only 35% of the respondents were knowledgeable about potential causes of the decline in sighting vultures. Improved waste management and habitat conversion were the two most mentioned causes (Fig. 10).

Local use and threats to vultures: Only 47% of the respondents confirmed the use of vulture parts which includes for food, rituals and traditional medicine in their communities. Egg, Legs, head, claws, feathers and blood were stated as vulture parts used as ingredient in traditional medicine. Ailments treated with vulture body parts according to 26% of the respondents include bareness, headache, stroke, epilepsy, madness, polio, hypertension, hunchback, food poisoning and spiritual sicknesses. Forty-one percent of the respondents were aware that some community members were involved in capturing and trading of vulture parts. Hunters, traders and some known contacts were highlighted by 6% of the respondents as people who traded in vulture parts and in areas such as main markets, fetish markets and on demand. According to 8% of the respondents, specific markets close to the Mole landscape where vulture parts were sold include fetish markets in Tamale, Yendi, Kintampo, Bawku and Damango. Only 23% highlighted several means by which vultures were captured and this included baiting with meat mixed with tobacco (6%) and or marijuana (7%), shooting (7%), trapping (3%).

A total of 41 out of the 120 respondents owned livestock including cattle, goats, sheep, pig and poultry. Livestock diseases confirmed by respondents who owned livestock included anthrax, Newcastle, coccidiosis, ringworm, and fowl pox. Thirty-nine percent of livestock owners sought veterinary services to cure their diseased livestock. Drugs administered to sick livestock included
fluconazole, amoxicillin and acaricides and vaccines. In cases where diseased livestock died even after treatment, only 4% leave the carcass in the open to decompose. Only 16% of the respondents confirmed ever encountered a dead vulture before amongst which were all three critically endangered species. These results suggest that open disposal of dead livestock that have been treated with drugs including acaricides prior to the animal’s death, could be a potential source of poisoning to vultures in the Mole landscape. While the findings from local use and threat assessment suggests that capturing for food, rituals and traditional medicine as a threat to vultures, the respondents did not perceive this as a threat to vultures as it was not mentioned among the possible causes of the decline in sighting vultures. This finding highlights the need to increase awareness creation on anthropogenic factors contributing to vulture population declines in the landscape.

Respondents attitude towards vulture conservation: Over 50% of the respondents confirmed their willingness to engage in activities to protect vultures with ideas on what can be done to protect vultures. Some of these ideas include awareness creation on the importance of vultures, and local people desisting from harmful activities such as habitat destruction and killing of vultures.

Vulture conservation awareness in fringe communities and schools
We raised conservation awareness on vultures in the four communities which were selected for the administration of questionnaires. A total of 470 local people were educated on the importance of vultures in the ecosystem, threats to vultures, the benefit of the conservation to humans and a healthy environment and how communities can support vulture conservation. Additionally, vulture awareness creation was done in three schools namely Mole D/A Primary and JHS, Yagbon Junior High School and Damango Girls Model. A total of 165 pupils and teachers from these schools were engaged using PowerPoint presentation, videos and other learning materials with vulture images such as posters, Birds of Ghana. Conservation quiz to assess pupils’ knowledge after engagement was done. Pupils were presented with prizes including exercise books, pens and pencils and vulture conservation branded t-shirts.

This engagement enlightened the pupils and teachers as most of them were not aware of the existence of these critically endangered vultures in Mole National Park. The headmistress of Mole Basic School added in her appreciation to the team that they would be grateful for more of such engagements as these pupils who come from fringe communities of the park would become agents of change in their various homes when more of this engagement is organised.

Fig 11: Project team and staff of Mole National Park engaging school management on vulture conservation education.
Fig 12: Project Lead engaging pupils on vulture conservation

Fig 13: Award presentation during conservation quiz by;
C: Staff of Mole National Pak
D: Project team member
E: Project Lead
Recommendation

Since this project covered only the southern portion of the study area, it is recommended that extensive research employing a more rigorous method should be conducted to estimate the population of vultures in the entire study area. Secondly, out of the 31 fringe communities of Mole National Pak, this study focused on only 4 communities in assessing local people’s knowledge and threats to vultures. Thus, this study should be extended to cover all fringe communities to gain a better understanding of the human-vulture relationship in the Mole landscape and also identify possible communities where threats may be severe and also to design appropriate conservation interventions. Lastly, vulture awareness creation should be heightened in all fringe communities and schools within the landscape since only 2% of the respondents were aware of the ecological importance of vultures.

References


### Project Expenditure

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<th>Funds requested (£)</th>
<th>Funds received (£)</th>
<th>Funds Spent (£)</th>
<th>Difference (£)</th>
<th>Justification</th>
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<td>Field equipment</td>
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<td>2000</td>
<td>87.05</td>
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<td>Due to the total funds received, equipment planned to be purchased (i.e. a GPS device and a camera) were rather hired to ensure the successful implementation of all project components. Also, a pair of binoculars was donated by Mole National Park in addition to one donated by the project lead.</td>
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<td>Transportation</td>
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<td>480.77</td>
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<td>Subsistence and bird survey cost</td>
<td>1419.88</td>
<td>923.08</td>
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<td>Initially, accommodation and feeding were budgeted for 4 team members but this was cut down to 2 team members to accommodate other expenditure of the project.</td>
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<td>Educational campaign</td>
<td>365.39</td>
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<td>530.06</td>
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<td>Due to inflation, the cost of branded t-shirts for vulture conservation awareness creation was higher than the amount budgeted for and questionnaires were printed twice due to data loss.</td>
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<td><strong>Total</strong></td>
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<td><strong>2020.96</strong></td>
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