# Waste management and Hooded Vultures on the Legon Campus of the University of Ghana in Accra, Ghana, West Africa

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**Summary**

Recent rapid expansion in the human communities of public universities in Ghana has resulted in increased waste generation. The ecological implications of this phenomenon remain unstudied. Counts of Hooded Vultures *Necrosyrtes monachus* on the Legon Campus of the University of Ghana between June 2005 and February 2006 revealed that a significantly higher number of vultures existed in the residential parts of the campus, relative to the non-residential parts. The number of vultures occurring on the campus was found to be positively correlated with the academic calendar with high numbers of vultures occurring when school was in session, and vice versa. Interviews of a cross section of the university community identified defecation by roosting vultures on the human campus inhabitants as the most pronounced impact. This was reported to occur mainly in the early-morning or late-afternoon and affected 64% of the inhabitants, with the highest rate of occurrence being at least once a month (44.5%). Baseline data, on which further studies and environmental management plans can be based, are provided.

**Introduction**

Vultures are still common in some parts of the African wilderness and can be considered to occupy an ecological niche, i.e. group of species that exploit a particular resource in a similar way (Root 1967). In Ghana, the royal family of the people of Ashanti, at Kumasi, values the vultures' scavenging behaviour (Oiseaux 1996, Oregonzoo 2005). They hold vultures as sacred animals and protect them by law. However, a common Ghanaian has a different opinion. Many consider the vulture as a weird, evil and a dirty animal (Ghana News 2004a, 2004b, 2005). Along with snakes, spiders, hyaenas and sharks, vultures are regarded by many people as the 'bad guys' of the animal kingdom (Wildwatch 2005).

Despite the scorn on vultures by ordinary Ghanaians, the use of vultures in African traditional medicine has long been reported (Cook & Mundy 1980, Terrasse & Thauront 1988). Vultures have been used both wittingly (Thiollay 2006) and unwittingly for food, including mixing of vulture meat with chicken and selling them to unsuspecting individuals (Ghana News 2004a, 2004b, 2005). Hunting of vultures as a source of animal protein has been reported to have resulted in the local extinction of vultures outside national parks in Ivory

Coast (Thiollay 2006) and northern Nigeria (Elgood *et al.* 1994). Similarly, vulture populations are reported to have decreased in Mali and Niger (Thiollay 2006). However, during the 1980s, the population of vultures in Ghana was reported to be stable (Grimes 1987). High vulture populations are known to be associated with attacks on wildlife and livestock, especially when they are giving birth, damage to property (including aircrafts, high tension power lines and wiper blades of vehicles), and defaecating on lawns and houses (AgNews 2007).

There has been a rapid growth of most public university communities in Ghana since 1995. This growth results in a high demand for campus accommodation, leading to increases in the number of people in the various halls of residence. Consequently, the volume of domestic waste generated on the campuses has increased significantly. However, the ecological implications of this phenomenon remained unstudied. This paper provides baseline data on the abundance of Hooded Vultures *Necrosyrtes monachus* on the Legon Campus of University of Ghana, with special reference to the species' local habitat preferences, seasonality (i.e. according to the academic calendar) and the physical impact of the vultures on the human members of the university community.

**Study area**

The Legon Campus of the University of Ghana is located in Accra, the capital city of Ghana, and is characterized by forest type vegetation. Tall trees, mainly *Khaya senegalensis*, *Erythrophleum* sp., and *Millettia thonningii* are found along the major streets on the campus.

The Legon Campus has seen a rapid population increase in recent times; for example, the student population has increased from ca. 9000 in 1998 to approximately 27, 000 in 2005 (University of Ghana 2006). Due to the nature of the activities carried out on the campus (e.g. academic, recreation, catering services, etc.), about a ton of domestic waste is deposited daily by the sanitation unit of the Physical Development and Municipal Service Directorate (PDMSD) of the university (Kwasi Acheampong pers. comm.). However, this waste, which consists largely of food remains, empty food containers and used polythene bags, is often seen scattered around the small incinerators that are close to most halls of residence and unauthorized rubbish dumps.

This study was carried out in parts of the residential and non-residential areas of the campus. The residential areas include the surroundings of Legon Hall, through the University Athletic Oval, Mensah Sarbah Hall and the Valco Thrust Hostels, to the playing field behind Mensah Sarbah Hall. The non-residential areas encompass the area around the main school gate, through Akuafo roundabout to the entrance of the Commonwealth Gardens.

**Methods**

Field work

Between 10h00 to 12h00 in the first and third quarter of every month, from 2 June 2005 to 20 February 2006, a total distance of 700 m was surveyed on foot, using the main access roads in each of the demarcated areas. All sightings of vultures on both sides of the roads were recorded.

Interviews

A random sample of 250 individuals, comprising students and university staff living on campus, were interviewed using a structured and self administered questionnaire. The questions focused on the activities, behaviour and physical impacts of the vultures on the human university community.

**Results**

Field work

A monthly average of 84 ± 9 vultures was recorded in both study areas combined. Of this figure, a monthly average of 60 ± 7 vultures was recorded in the residential areas, while a monthly average of 28 ± 3 was recorded in the non-residential areas, giving a significantly higher number of vultures in the residential areas (Mann Whitney U-test, $U = 68.5$, $p < 0.05$).

The peak of vulture abundance, based on the total number of vultures recorded, spans the period from November to February (Figure 1). In the non-residential areas, the number of vultures remained fairly stable. However, in the residential area an increase in numbers was observed in the months of August, October, November and January (Figure 1). A Pearson correlation (using SPSS version 12.0) indicates a positive correlation between the total number of vultures on campus and the academic calendar ($r = 0.9$, $p < 0.05$). Thus, the number of vultures on campus was highest when school was in session (mid-September to mid-December, mid-January to February) and lowest when the students were away on holiday (early-June – mid-August, mid-December to mid-January)

Interviews

Approximately 62% of the respondents reported never to have seen vultures in their houses or hostels on campus, while 38% admitted to seeing them. Of the total number of respondents that have seen vultures in their houses or hostels, 54% reported seeing them near dustbins, and 40% saw them close to standing water pipes. No vultures were reported on balconies or in corridors. Bird species that were reported to often visit balconies included mainly the Pied Crow *Corvus albus*, which were reported to peck at soap and food items.

A large proportion of the respondents (64%) reported having been defaecated on by a "bird" within approximately one academic year preceding the interview, whereas 36% had never experienced this soiling. While 74% of the group that experienced the soiling were certain that the defaecating bird was a vulture, the

remaining 26% were either not sure which type of bird it was or suspected Pied Crows. Some 44.5% of the people who were defaecated on reported this soiling to have occurred at least once every month, while the remaining respondents reported varying frequencies (Figure 2). With regard to the group of respondents who have experienced soiling from defecating birds, 57% of them reported this to have occurred in the early mornings, 71% had experienced this in the late afternoons and 12% at night. However, the 12% who reported experiencing the soiling at night were made up of 93% of the respondents who reported the soiling to occur on daily basis.

**Discussion**

It is well known that some vulture species (e.g. *Necrosyrtes monachus, Neophron percnopterus*) scavenge for food in refuse dumps and gutters in urban areas (Mundy *et al.* 1992, Hertel 1994). All the vultures sighted in the study were Hooded Vultures. In fact, the vulture community of the Accra plains comprises mainly Hooded

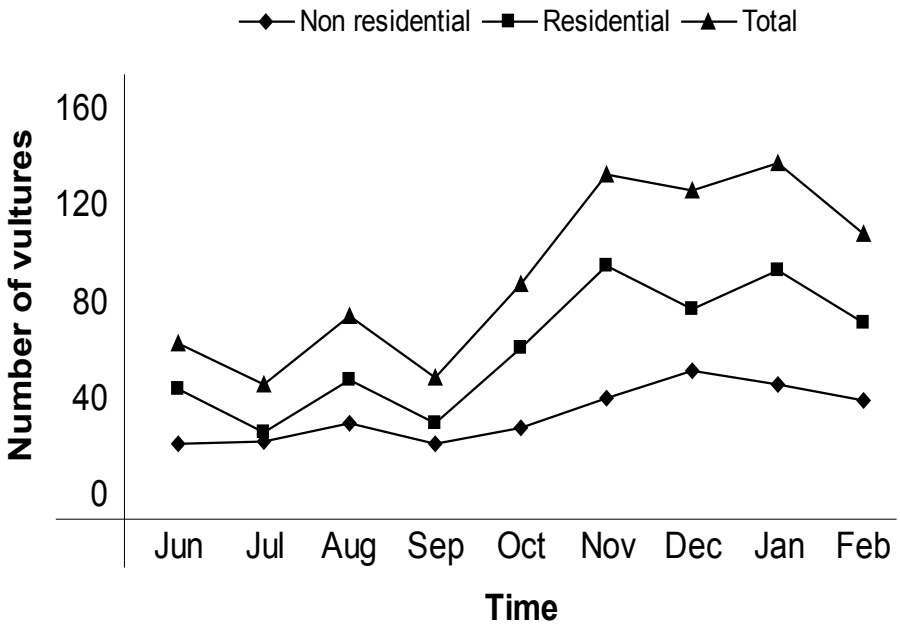


Figure 1. Variation in the mean monthly number of Hooded Vultures recorded in two demarcated areas on the University of Ghana's Legon Campus.

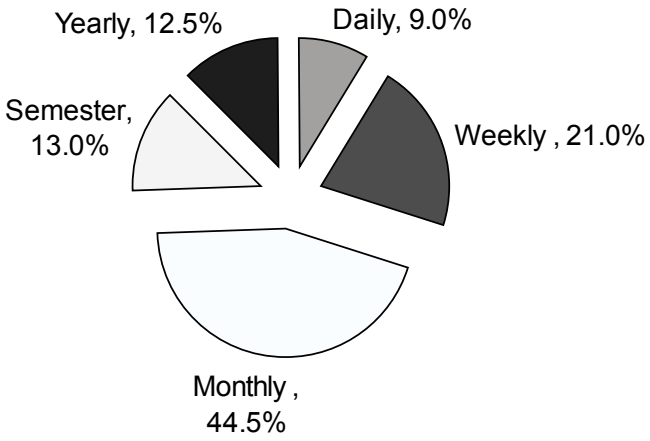


Figure 2. Frequency of soiling of campus users by Hooded Vultures on the University of Ghana's Legon Campus.

Vultures (Grimes 1987), Barlow *et al.* (1999) reported that Hooded Vultures breed mainly in the dry season. In Ghana the dry season spans the period from November to March. However, Honoluluzoo (2007) states that the species has brooding period of 46 days, and that a newly hatched Hooded Vulture fledges at about 120 days. This means that a period of about five months is required for a significant increase to occur in the number of vultures. The increased numbers observed from October to February (Figure 1) cannot therefore be attributed to recruitment.

The fact that a significant positive correlation exists between the number of vultures and the academic calendar implies that some of the vultures are not permanent residents on the campus but migrate from elsewhere to the campus when school is in session, and in direct response to the large quantity of waste generated and dumped on the campus. According to Kwasi Acheampong (pers. comm.), the amount of waste collected and disposed off daily by the sanitation unit on the campus represents only 35% of the total waste generated on campus, while the quantity deposited on unauthorized refuse dumps represents 40%. Thus, a large quantity of waste is available for the vultures to feed on.

With school in session, students move into residence and a lot more waste is generated. When school is out of session, students vacate their residences, inevitably resulting in the reduction of the amount of waste generated. The vultures' monthly abundance figures closely reflect this pattern. After all, the Legon campus which is located within the city of Accra is surrounded by a large number of human communities and vultures can easily shuttle

between the various communities, based on the availability of food.

Even though a number of unauthorized refuse dumps exist in both the residential and non-residential areas of the campus, the waste materials deposited in the non-residential areas are much less likely to contain food items on which vultures would feed. It was therefore not surprising that the vultures were more abundant in the residential areas, as compared to the non-residential areas.

With an increased number of vultures on the campus when school is session, the potential for defecation by roosting vultures on humans is also increased. Barlow *et al.* (1999) reported that the Hooded Vulture goes to roost well before dark. They roost in tall trees and in the mornings await thermals to assist their foraging activities; they return in late afternoon after feeding. The consequence of this is that people using the streets get themselves splashed with vulture faeces in early mornings, late afternoons and at night.

The majority of individuals who experienced daily soiling reported this to happen at night. However, this may simply reflect the fact that these respondents spent more time on the campus streets at night than during the day, and also that the vultures were more likely to be present at night, than during the day when they were out foraging. The observations reported in this paper are seen as a combination of the cost of the presence of tall trees (which provide shade, serve as a wind break and beautify the campus), increased human populations and inefficient waste management. These factors therefore need to be considered in urban and environmental planning.

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