

SPATIO-TEMPORAL DISTRIBUTION OF KALAW (*BUCEROS HYDROCORAX* L.) AT THE FOOTHILLS OF MT. PANGASUGAN, BAYBAY CITY, LEYTE, PHILIPPINES

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ABSTRACT

Mt. Pangasugan contains one of the few remaining intact lowland dipterocarp forests in Leyte which is home to many threatened avian species including the Kalaw. The study aimed to understand the spatial distribution and temporal activities of kalaw to provide information to support conservation program.

The preferred habitat of kalaw was characterized by the dominance of species belonging to family Dipterocarpaceae and gap species of Araliaceae and Moraceae. Kalaw occurred in stands where there were large trees with natural cavities which could be used for nesting and fig trees and other fruit bearing gap species as source of food. Specific perches were big tall trees which comprise the canopy and emergent layers.

The results of study suggest strengthening protection of the remaining secondary forest as habitat of kalaw and put a stop to current activities that may have affected the biological clock of Kalaw.

KEY WORDS: Mt. Panagasugan; Kalaw; Chronometric aptitude; Habitat

INTRODUCTION

The Philippines is one of the tropical countries that has a high level of avifaunal endemism in the world. There are 556 species of birds that have been recorded to breed in islands of the country of which at least 395 species are permanent resident in the area and about 172 (44%) species are endemic (Mallari 2001). But it is amongst the worlds most endangered and of great threat because of rapidly increasing human population in the country and continuing deforestation and capture of these species for trade and for food. In a recent review conducted by BirdLife International dated October 1994 of the distribution and conservation status of birds of the world, the Philippines ranks third highest in the world after Indonesia and Brazil for the number of globally threatened bird species.

One of the most extinction prone species is the Rufous Hornbill (*Buceros hydrocorax*) locally known as Kalaw. The Rufous hornbill is the largest Philippine hornbill. It has 3 races namely the *hydrocorax*, *semigaleatus* and *mindanensis*. Race *hydrocorax* is endemic in Luzon and Marinduque; race *semigaleatus* is endemic in Biliran, Bohol, Buad, Calicoan, Leyte, Panaon and Samar; and race *mindanensis* is endemic in Balut, Basilan, Bucas, Dinagat, Mindanao, Siargao and Talicud (Kennedy et al. 2000). Hornbills largely feed on fruits of numerous trees and carry seeds many miles away from their original location. Thus, they are considered to be as one of the major seed dispersers in the forest and, critically important species to the regeneration and survival of the rainforest ecosystem (Gonzales 1988).

Mt. Pangasugan, which lies within Central Cordillera of Leyte, contains one of the few remaining intact lowland dipterocarp forests in Leyte which is home to many threatened avian species including the Kalaw. The study aimed to understand the spatial distribution and temporal activities of kalaw to provide information to support conservation program.

MATERIALS AND METHODS

Description of the Study Area

Mt. Pangasugan, with an elevation of about 1,150 meters above sea level, lies at the western boundaries of an area of primary forest that is about 150 km² (Heaney et al. 1989). It is situated north (10°44' N/ 124°48' E) of the western coastal town of Baybay, Leyte. The western part side of the mountain is composed of parallel ridges, which descend to the narrow alluvial plane, the north and southern sides of the ridges are generally steep giving rise to the young rivers like Pangasugan, Lago-lago and Calbiga-a rivers (Asio, 1994). Its geology is dominated by andesite and basaltic pyroclastic ranging in age from Pliocene to recent. They commonly occur as volcanic agglomerates and pyroclastic breccia referred to as Pangasugan formation. It lies west of the Philippine fault line that passes approximately along center of Leyte.

The climate belongs to Type IV classification, which is characterized by more or less uniform distribution of rainfall throughout the year. The mean annual rainfall is 2,500mm. Heavy rains come in November to January (Corona, 1920).

The Sampling Sites

Sampling was done in three sites, which are covered mainly by secondary forests at different elevations along Panan-awan Range. Site 1 was established in the foot slope of Panan-awan Range with an elevation of about 132 masl. With a slope of about 20 degrees, this is close to Calbigaa River and adjacent to an actively cultivated abaca plantation. Site 2 was established in the middle slope with an elevation of 320 masl and slope of 42 degrees. Site 3 was established in the upper slope with an elevation of 600 masl and slope of 35 degrees.

Data Collection

Occurrence of Kalaw was assessed through point-count survey using a 25m radius circular plot. One plot was established in every site representing the lower, middle and upper slopes. All kalaw that were seen and heard inside the plot were recorded, including the time when it passed by, rested to branches up head and created a distinguishing sound. All kalaw seen and heard outside the plot were likewise recorded for the chronometric verification. Each plot was observed from 3am to 7pm. The observation was conducted 12 days for both dry and wet seasons (4 days in each plot). Observation was conducted in May for dry season and October for wet season.

Physical variables such as aspect were determined using staff-hand compass. Slope was measured using an Abney hand level while elevation was determined using an altimeter.

Habitat Preference

Tree density, basal area, total height and percent canopy cover was used to describe the structure of the different assemblages. Total area of the tree assemblages and their relative distance to clearings and agricultural farms was determined using steel tape. These variables were used to predict the spatial occurrence of kalaw.

RESULTS AND DISCUSSION

Chronometric Aptitude of Kalaw

Bird calls of Kalaw were heard in Panan-awan Range generally from 4:00 in the morning until 6:00 in the afternoon both during dry and wet seasons (Tables 1 and 2 and Figures 1 and 2). In the dry season, however

1 bird call was heard as early as 3:00 in the morning. Comparing the 2 seasons, more bird calls were heard during the dry season (463) than the wet season (274). More calls were observed in the morning than in the afternoon for both seasons. The higher number of bird calls observed during the dry season may demonstrate that Kalaw as with other species of birds, are more active during the dry season than the wet season. Aside from this, the result may also suggest that weather disturbances such rain may affect the biological activity of the animal.

Table 1. Frequency of bird calls of kalaw (*Buceros hydrocorax*) in the foothills of Mt. Pangasugan during the dry season.

TIME	SITE 1	SITE 2	SITE	TOTAL
3:00-4:00 AM	0	0	1	1
4:01-5:00 AM	4	1	10	15
5:01-6:00 AM	8	7	26	41
6:01-7:00 AM	5	9	20	34
7:01-8:00 AM	10	8	19	37
8:01-9:00 AM	9	11	20	40
9:01-10:00 AM	7	7	33	47
10:01-11:00 AM	16	4	22	42
11:01-12:00 AM	11	11	11	33
12:01-1:00 PM	12	5	20	37
1:01-2:00 PM	5	8	8	21
2:01-3:00 PM	5	5	10	20
3:01-4:00 PM	4	10	10	24
4:01-5:00 PM	7	10	16	33
5:01-6:00 PM	7	10	21	38
Total	110	106	147	463

Table 2. Frequency of bird calls of kalaw (*Buceros hydrocorax*) in the foothills of Mt. Pangasugan during the wet season.

TIME	SITE 1	SITE 2	SITE	TOTAL
3:00-4:00 AM	0	0	0	0
4:01-5:00 AM	9	4	3	16
5:01-6:00 AM	7	13	20	40
6:01-7:00 AM	15	16	10	41
7:01-8:00 AM	9	11	7	27
8:01-9:00 AM	4	6	2	12
9:01-10:00 AM	9	8	6	23
10:01-11:00 AM	8	3	?	13
11:01-12:00 AM	0	0	3	3
12:01-1:00 PM	6	5	1	12
1:01-2:00 PM	0	1	2	3
2:01-3:00 PM	6	9	4	19
3:01-4:00 PM	5	7	7	19
4:01-5:00 PM	12	6	7	25
5:01-6:00 PM	7	5	9	21
Total	97	94	83	274

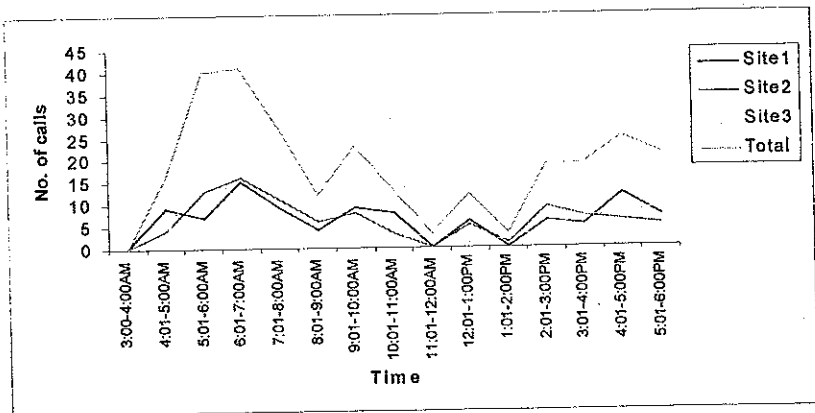


Figure 1. Chronometric aptitude of kalaw (*Buceros hydrocorax*) in the foothills of Mt. Pangasugan during the dry season.

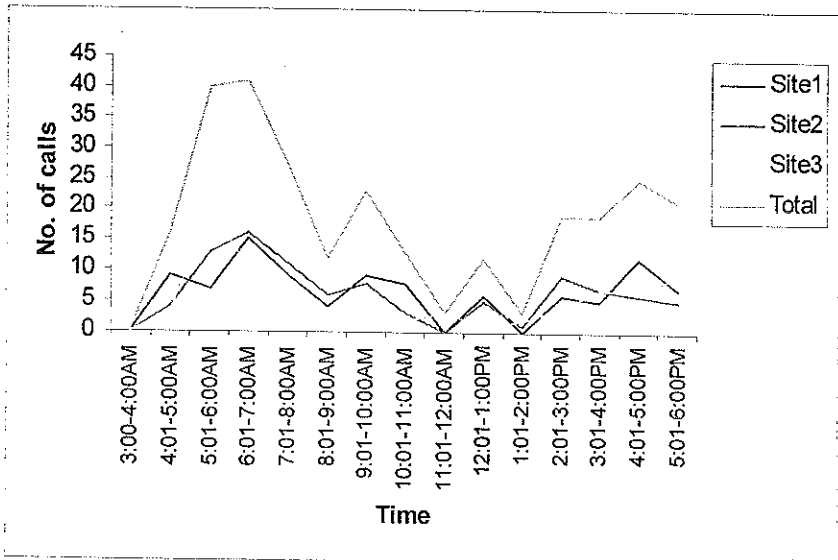


Figure 2. Chronometric aptitude of kalaw (*Buceros hydrocorax*) in the foothills of Mt. Pangasugan during the wet season.

In terms of the total number of bird calls by site, Site 3 (higher elevation) had the highest during the dry season with 147. Sites 1 and 2 had 110 and 106, respectively. But during the wet season, highest number bird call was observed in Site 1 (lower elevation) with 97. It is interesting to note that the number of bird calls decreased with elevation with 94 and 83 for Site 2 and Site 3, respectively.

During the dry season highest number of bird calls was observed between 9:00 and 10:00 in the morning. Next higher frequency of bird calls were observed between 5:00 and 6:00 in the morning and between 5:00 and 6:00 in the afternoon. In the wet season, highest frequency of bird calls was observed between 5:00 and 6:00 in the morning followed by 6:00 to 7:00 in the morning observation period (Figure 3).

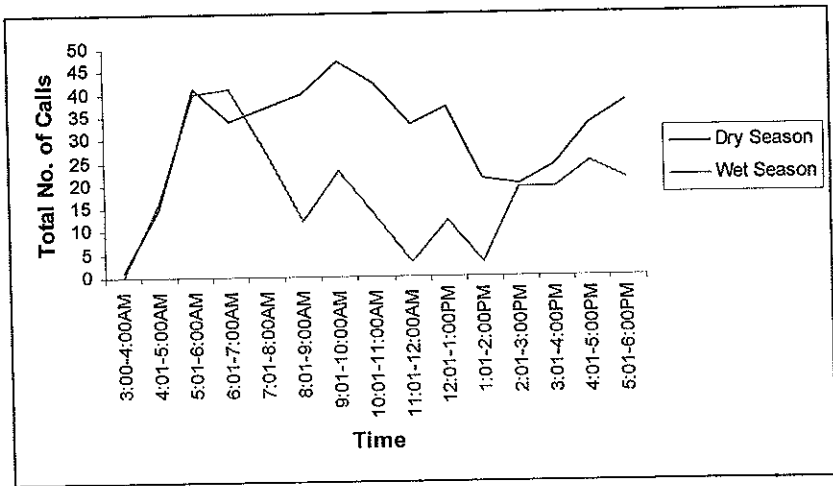


Figure 3. Total number of calls of kalaw (*Buceros hydrocorax*) in the foothills of Mt. Pangasugan during the dry and wet season.

The result of the study reveals that the chronometric behavior of Kalaw in Panan-awan Range generally does not exactly follow the long established local knowledge of various forest users that bird calls of Kalaw are heard every 10:00 o'clock in the morning and 3 o'clock in the afternoon, thus making kalaw as the clock of the mountain. There remains however a good sign of the accurate sense of chronometry of Kalaw as evidenced by the high frequency of bird calls encountered or recorded from 9:00 to 10:00 in the morning during dry season observation. There are factors that affect the chronometric aptitude of Kalaw on the foothills of Mt. Pangasugan. One most probable factor is the general climatic condition of the area. Being under the Type IV climatic type as with the rest of the mid-western Leyte, there is no distinct dry season in Mt. Pangasugan. This variable must have a tremendous effect on the biological clock of Kalaw as do most birds. It has been a common notion most birds are not active

during rainy days, thus difficult to establish an accurate biological pattern of activities for most wildlife species.

Another factor that may affect the chronometric aptitude of kalaw was the disturbance brought about human intrusion into the area in form of cultivation and hunting. The lower slopes of Pana-awan Range have been subjected to cultivation as evidenced by an active abaca plantation near Calbigaa River.

Hunting has been a common sight in the range and the adjacent areas of Mt. Pangasugan. Kalaw is one of the most sought hunting targets by the local hunters from neighboring villages because of its high mass per unit catch.

Habitat of Kalaw

Hornbills are found in tropical lowland evergreen rain forest dominated by trees in the family Dipterocarpaceae (Gonzales 1988). In Panan-awan Range, the vegetation was predominantly of the lowland Dipterocarp forest. The mean DBH and tree height of the tree layer were 20.69 cm and 12.91 meters, respectively (Table 3). This illustrates that most of the trees present in the site were medium-sized trees. This further explains the relatively high mean tree density (918 trees/ha) and relatively low basal area (48.54/m²/ha). The dominance of medium-sized trees could be attributed to the inherent adverse condition of the site being a ridge. Ridges are generally steep with shallow soils and are most often exposed to strong winds.

Medium-diameter ridge indicator species were observed in all the sites. They include *Anisoptera thurifera* (palosapis), *Hopea malibato* (yakal-kaliot), *Shorea guiso* (guijo), and *Shorea polysperma* (tanguile) of Dipterocarpaceae Family and other associated species such as *Lithocarpus lipacon* (lipacon), *Lithocarpus llanosii* (ulaian) and *Syzygium hutchinsonii* (malatambis). Some big-diameter economically important

timber species were also observed in the range but are more confined at lower elevations. These include 2 Dipterocarp species such as *Parashorea malaanonan* (bagtikan) and *Shorea contorta* (white lauan), and *Vitex parviflora* (molave) of family Verbenaceae. Other big diameter trees observed at lower elevations were *Pterospermum obliquim* (kulatingan) and *Pterocymbium tinctorium* (taloto) of Family Sterculiaceae and *Terminalia nitens* (sakat) and *Canarium asperum* (pagsahingin) of Family Combretaceae and Burseraceae, respectively. Their occurrence at the lower elevations could be due to the relatively thick topsoil and high moisture level.

Table 3. Vegetation structure of the preferred habitat of kalaw (*Buceros hydrocorax*) in the foothills of Mt. Pangasugan, c. 2007.

PLOT	MEAN DBH (cm)	MEAN TREE HEIGHT (m)	BASAL AREA (m ² /Ha.)	TREE DENSITY (Tree/Ha.)	NO. OF SPECIES
1	20.52	13.57	110.31	1,375	29
2	20.09	13.03	40.72	975	22
3	18.37	11.02	26.23	875	20
4	17.97	12.87	33.30	1,000	19
5	21.45	12.49	28.28	700	19
6	21.28	12.85	32.65	650	15
7	25.21	14.56	68.35	850	19
Mean	20.69	12.91	48.54	918	20

Some big-diameter gap species were also present along Panan-awan Range. These include *Alstonia macrophylla* (batino), *Arthrophyllu cenabrei* (bingliu), *Macaranga bicolor* (hamindang), *Ficus ulnifolia* (is-is) and *Ficus minahassae* (hagimit). Their presence in the site would remind of the past disturbance of the site most probably in the form of timber harvesting as

evidenced by rotten stumps. These pioneer trees especially the *Ficus* are the primary sources of food of Kalaw.

The disturbance in the past may have proved advantageous in this case. Gap formation by human disturbance initiated the growth of these pioneer trees thus providing substantial food materials for Kalaw and other associated species of wildlife.

At the middle elevation of the range, big-diameter non-diptercarp timber species were also common. These include *Knema mindanensis* (bunud), *Myristica philippinensis* (duguan) and *Myristica elliptica* (tanghas). At higher elevations, dominant big-diameter timer species include *Shorea guiso* (guijio), *Anisoptera thurifera* (palosapis), *Shorea polysperma* (tangiule) and *Lithocarpus llanosii* (ulaian). These species are all closely associated with ridges.

Tree Perches

Three observation points were established in the entire stretch of Mt. Panan-awan to determine occurrence of Kalaw and specific tree perches. Of the total point counts of 192, Kalaw were observed only in 7 point counts from 2 to 3 individuals per count. Kalaw were observed in 2 point counts in both Site 1 and 2 while 3 point counts in Site 3. In Site 1, Kalaw was observed to perch or rest in big and tall tress like *Shorea polysperma* (tanguile) and *Vitex parviflora* (molave). In Site 2, Kalaw were also observed in a *Shorea squamata* (mayapis) tree while in Site 3, in a *Shorea guiso* (guijo) and *Anisoptera thurifera* (palosapis). All these tree perches, except for Molave, belong to the Family Dipterocarpaceae. These trees being tall with large crown in most cases dominate the canopy layer if not the emergent layer in each plot.

The result of the study clearly illustrates the preference of Kalaw to tall trees as their perches. Such preference was demonstrated to take advantage of height in order detect intruders and escape from land

predators. This further underscores the need for the protection of the remaining forest in Panan-awan Range and adjacent areas in the foothills of Mt. Pangasugan for the conservation of Kalaw.

CONCLUSION AND RECOMMENDATION

Bird calls of Kalaw were heard from 4 o'clock in the morning up to 6 o'clock in the afternoon. More calls were observed during the dry season than the wet season. Chronometric aptitude of kalaw for the dry season was quite distinct however did not synchronize to long established chronometry of the bird based on the local knowledge of different forest users. The chronometric pattern for the wet season was difficult to establish.

The preferred habitat of Kalaw in Mt. Pangasugan is a relatively intact secondary Dipterocarp forest characterized by the dominance of medium-diameter trees. Important perches of Kalaw are those tall trees with wide spreading crowns of the Family Dipterocarpaceae. Big gap trees present previously disturbed sites serve as food sources for the bird. The results of study suggest strengthening protection of the remaining secondary forest as habitat of kalaw and put a stop to current activities that may have affected the biological clock of Kalaw.

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