

HORNBILLS (BUCEROTIDAE) IN ELEPHANT CONSERVATION CENTRE (ECC) FOREST, SEBLAT BENGKULU*

By:

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Abstract

Hornbills (bucerotidae) are important as indicators of forest condition and human disturbance because they need large homerange and tree hole for nesting. Hornbills were protected by Indonesian regulation to conserve their existence in the forest. Population study and food species are useful information to manage their habitat in the ECC (Pusat Latihan Gajah). The study was conducted in December 2009 to January 2010 with survey method. The results showed there were seven species of Bucerotidae found in the ECC Seblat: Helmeted Hornbill (*Rhinoplax vigil*), Wreathed Hornbill (*Aceros undulatus*), Wrinkled Hornbill (*Aceros corrugatus*), Bushy-crested Hornbill (*Anorrhinus galeritus*), White-crowned Hornbill (*Berenicornis comatus*), Asian Black Hornbill (*Anthracoceros malayanus*), and Rhinoceros Hornbill (*Buceros rhinoceros*). The White-crowned Hornbill has the highest density (6.413 ind/km²), and Wrinkled Hornbill and Helmeted Hornbill has the lowest density (1.466 ind/km²). Fruit plants are often eaten by hornbills in PLG Seblat forest are a member of family Moraceae (*Ficus* spp), Myristicaceae (*Myristica* sp), and Myrtaceae (*Eugenia polyantha*).

Keywords: *Hornbills, food species, and PLG Seblat.*

INTRODUCTION

Hornbill (Bucerotidae) is a large bird (Mudappa and Raman, 2009; MacKinnon, *et al.*, 2010), dominantly black or brown and white color. This bird is arboreal, with a long and big beak. Some species have casque which positioning above the beak. Hornbill is found throughout tropical Africa and Asia as well as throughout Indonesia to Papua. In the world has recorded 54 species (Kemp, 1993). In Indonesia there are 13 species: in Sumatra there are 9 species, 8 species of Borneo, Java and Bali three species, two species of Sulawesi, and one species in Papua (Sukmantoro, *et al.*, 2007). Meanwhile, according to MacKinnon, *et al.* (2010) in Sumatra there are 10 species hornbill, nine species at Borneo, and four species at Java.

Globally, the hornbills (Bucerotidae) including endangered birds. All species (13 species) in Indonesia were protected by Indonesian regulation i.e. UU No. 5/1990 and PP

No. 7/1999 (Sukmantoro, *et al.*, 2007). Six species of which include endangered species with vulnerable (VU) criteria and near threatened (NT) (Baillie, *et al.*, 2004). Based on the status of wildlife trade (CITES), 2 species (Great Hornbill *Buceros bicornis* and Helmeted Hornbill *Rhinoplax vigil*) belong to the category of Appendix I and 11 other species Appendix II (Sukmantoro, *et al.*, 2007). The extinction of these birds in nature was caused by two main factors, namely deforestation and poaching. Deforestation in Indonesia for 2000-2009 period reached 15.15 million ha (1.68 ha per year) (Sumargo, *et al.*, 2011).

The existence of Hornbills in nature is important. One of its function is as a component of the stability of ecosystem or ecosystem function. This bird is quite important for seeds dispersal any plants and could be controlling insect population. Hornbill eating fruits and insect (MacKinnon, *et al.*, 2010), and able to spread the seeds of plant with distance away from the it's tree (Trail 2007), and can be used as an ecological indicator, especially in tropical rain forest (Kinnaird and O'Brien, 2008). Hornbills able to disperse many seeds of fruit in tropical forest and generally as the main agent of seed disperser for many plant species of primary forest, especially large seeded plant (Kitamura, 2011). Hornbills consumed and estimated disperse plant seeds of at least 27%, 32%, and 39% of plant whose its seeds are covered with flesh in the Thailand forest, Sumatra, Sulawesi, and 22% in the forest of Cameroon (Whitney, *et al.*, 1998; Kitamura, *et al.*, 2002; Kinnaird & O'Brien, 2005, 2008). These birds contributed to the exotic plant seeds dispersal, indicating their flexibility to the new type of fruit (Viseshakul, *et al.*, 2011).

Hornbill population in the wild tend to decline, caused by decrease of habitat quality and quantity. Hornbills are hunted by traditional people to take some feather and other body part as an accessory material for traditional arts and food (Bennett, *et al.*, 1997). Poaching and habitat disturbance will effect to hornbills population. A small of the population will deliver of hornbill toward extinction which preceded by decline of genetic diversity. Population with a small number of individuals has a high risk such as reducing of genetic variability and increasing of cross-breeding. A high of cross-breeding will threat the survival of the population, because it will produce the poor shelf life generation, weight less, and sterile (Selander, 1983; Ralls, *et al.*, 1988, Haig & Nordstrom, 1991). However, information about the number of species, population and food plant species of bucerotidae in elephant conservation center (ECC) Seblat Bengkulu not yet available.

Forest of elephant conservation center Seblat is a secondary forest. This place was designated as conservation forest with special function by minister of forestry decision no.

658/Kpts-II 1995 (6865 hectares). In 2011 the PLG area was upgraded into a natural park (TWA) based on the Ministry of Forestry decision no. 643/Menhut-II/2011 (7737 hectares). Some species of other animals such as Sumatran tiger, Malayan tapir, gibbon, and many birds have been used the ECC as their habitat to get food, nesting place, etc.

METHODS

The study was conducted from December 2009 to January 2010 in the ECC Seblat, North Bengkulu, Bengkulu province. The study site located between 03°03'12" - 03°09'24" LS and 101°39'18" - 101°44'50" BT, 130 km northern of the Bengkulu city, and takes \pm 4 hours from Bengkulu. The topography is flat to slightly steep, and 56-113 masl. PLG forest fragmented from other forest around it.

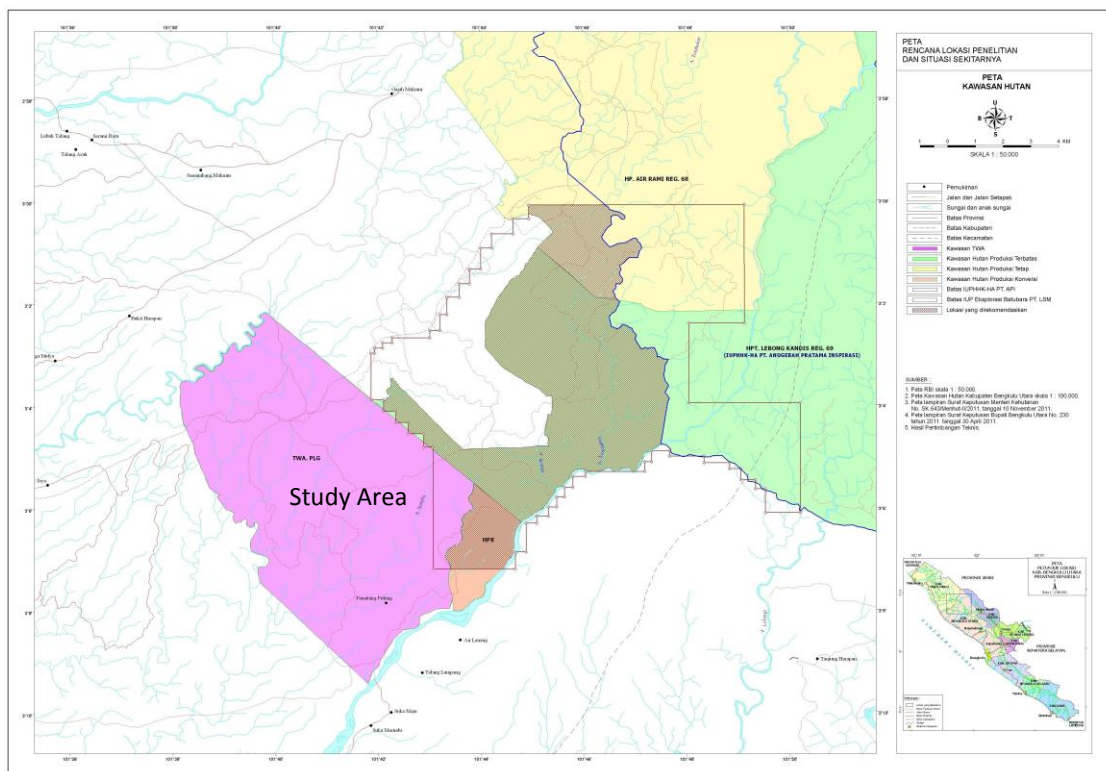


Figure 1. Map of study area at PLG Seblat, Bengkulu

Data collection was conducted using survey methods with line transect (Bibby, *et al.*, 2000). Four transect units were observed with a length ranging between 1500-4000 meters. Each line transect was observed at least 3 times. Observation carried out on road that already exist at 6:00-11:00 am and 15-18.00 pm. Data recorded during the observation are the species, number of individuals, and plant species which consumed by hornbill.

Hornbill who flight from behind the observer is not recorded on the observation table. Observation area was calculated based on the distance of observer to the object. Distance range of observation is setting up $\geq 25-75$ meters. The existence of hornbill is also identifying through of their sound.

Plant species data which consumed by hornbill were collected according to the herbarium standard. Samples of plants were identified in the laboratory of plant biosystematics Biological Department, University of Bengkulu. Hornbill population density is calculated by comparing the number of individuals of one species with research areas observed.

RESULT

Species and population density

Based on the research that has been done showed that there were seven species of Bucerotidae in the study area (Table 1). The result indicate that only two species of hornbills found in Sumatra was not found in PLG Seblat Bengkulu, namely *Anthracoseros albirostris* (Oriental Pied Hornbill) and *Buceros bicornis* (Great Hornbill).

Table 1. The species and population density of hornbills at PLG Seblat Bengkulu

No	Species	English	Density (ind/km ²)
1.	<i>Berenicornis comatus</i> Raffles, 1822	White-crowned Hornbill	6.413
2.	<i>Anorrhinus galeritus</i> Temminck, 1831	Bushy-crested Hornbill	6.046
3.	<i>Aceros corrugatus</i> Temminck, 1832	Wrinkled Hornbill	1.466
4.	<i>Rhyticeros undulatus</i> Shaw, 1811	Wreathed Hornbill	5.863
5.	<i>Anthracoseros malayanus</i> Raffles, 1822	Black Hornbill	5.863
6.	<i>Buceros rhinoceros</i> Linnaeus, 1758	Rhinoceros Hornbill	6.229
7.	<i>Rhinoplax vigil</i> J. R. Forster, 1781	Helmeted Hornbill	1.466

Anthracoseros albirostris (Oriental Pied Hornbill) scattered in primary forest and secondary lowland forest, preferring more open habitat such as the edge of the forest, logged forest, and secondary forest (MacKinnon, *et al.*, 2010). *Buceros bicornis* (Great Hornbill) is not common in lowland forest and hills (MacKinnon, *et al.*, 2010). Great and wreathed hornbill were recorded in the 20-25 year old logged forest, semi-disturbed forest, and unlogged primary forest, while Oriental pied hornbill only in the semi-disturbed forest and plantation of 20-25 year old logged forest, semi-disturbed forest, and unlogged

primary forest (Datta, 1998). Diversity of species in a habitat is determined by factors such as vegetation structure, plant species composition, and habitat history, the level of interference from predators and human, and size of the habitat area.

Table 1. showed that *Berenicornis comatus* (White-crowned Hornbill) is a species with the highest density. While, the species with the lowest density is *Aceros corrugatus* (Wrinkled Hornbill) and *Rhinoplax vigil* (Helmeted Hornbill). Hornbill species rarely found during the observation was Black-crested Hornbill *Aceros corrugatus* and *Rhinoplax vigil* (Helmeted Hornbill) with 1,466 ind/km² density. Roso (2008) reported a Black-crested Hornbill *Aceros corrugatus* not found in PLG Seblat and Helmeted Hornbill *Rhinoplax vigil* were found only three individuals. Monthly densities of hornbill were increased significantly with increasing fig-fruit biomass, but declined as biomass of unripe non fig-fruits increased. There was no significant impact of ripe nonfig-fruit biomass on monthly hornbill densities (Kinnaird, et al. 1996).

The large tree density and basal area in the forest was positively correlated with Great hornbill abundance. On the other hand, Treated hornbill abundance was not correlated with any vegetation variable, and Oriental pied hornbill abundance was negatively correlated with mean tree height (Data, 1998). Kinnaird, *et al.*, (1996) reported that Red-knobbed Hornbill densities in the Tangkoko Dua Sudara Nature Reserve was fluctuated dramatically over time and space. In Bukit Barisan Selatan National Park, Sumatra, density of Wreathed Hornbills *Aceros undulatus* (7.5 ind/km²), Bushy-crested Hornbills *Anorrhinus galeritus* (3.05 ind/km²), Rhinoceros Hornbills *Buceros rhinoceros* (2.6 ind/km²), and Helmeted Hornbills *Rhinoplax vigil* (1.9 ind/km²) (Anggraini, *et al.*, 2000). Abundance of *Buceros rhinoceros* in the forest block area and the riparian forest area PT. Kencana Sawit Indonesia are 24 individuals per km and 17 individuals per km respectively, and the *Rhinoplax vigil* 7 individuals per km and 1 individuals per km (Nur, *et al.*, 2006). Density of hornbills in forest habitats are affected by habitat fragmentation.

Forest fragmentation is negatively effect the hornbill population. In the fragmented forest blocks of the original forest has different species and number of plants, including the density of large-diameter trees as a potential nesting site hornbill. Oil palm plantation only able to support 0-20% of birds, reptiles and mammals are found in the primary rainforest (Laidlaw, 1998). Species richness and relative abundance is often positively correlated with habitat fragmentation (Hobson and Bayne, 2000). Habitat fragmentation may also increase the incidence of parasite nest so that in the long time will affect community structure of birds through bird chicks murder by other adults (Haas, 1998;

Bayne, 2000). The loss of nesting places and food species are effect of decline the population of hornbills. Another cause is poaching for sale or maintained. All hornbills, especially Rhinoceros Hornbills and Bushy-crested in Bukit Barisan Selatan National Park tended to avoid highly disturbed areas (Anggraini, *et al.*, 2000).

Plant species are eaten hornbill

Plant species were often eaten hornbill are a member of the family Moraceae (*Ficus* spp), Myristicaceae (*Myristica* sp), Myrtaceae (*Eugenia polyantha*). According to Kemp (1995), more than 50% of Bucerotidae food are figs (*Ficus* spp). Hadiprakarsa (2001) reported that hornbill who live in tropical rain forest generally frugivorous. Fig (*Ficus* sp) fruit throughout the year in Indonesia tropical forest is a very important food for hornbills. Besides figs, other types of fruits are also consumed by hornbills such as nutmeg forest (Myristicaceae) which is rich in proteins and lipids, walnut-kenarian (Burseraceae). The nutritional content of fruit believed to have been sufficient for birds, including hornbills (Kinnaird, 1992).

Hornbill plays a role as seed dispersal (Kinnaird, 1998; Whitney & Smith, 1998) and controlling insect population. Hornbill eating fruits and insects (MacKinnon, *et al.*, 2010), is able to spread the seed of plants with distance far from the tree origin (Trail 2007), and very well as ecological indicators, especially in forest habitats tropical rain (Kinnaird and O'Brien, 2008). Generally, Asian hornbill are frugivorous, but sometimes omnivorous especially in breeding season (Poonswad, *et al.*, 1998). Hornbills are the main agent of seed spread for many plant species of primary forests, especially large seeded group (Kitamura, 2011). Hornbills consumed and estimated disperse plant seed of at least 27%, 32%, and 39% of plant whose seeds are covered with flesh in the Thailand forest, Sumatra, Sulawesi, and 22% in the forest of Cameroon (Whitney, *et al.*, 1998; Kitamura, *et al.*, 2002; Kinnaird & O'Brien, 2005, 2008).

The wreathed hornbill is the most frugivorous than of all the hornbill species, even in the breeding season when other species take more animal material. The kind food is lipid-rich drupaceous fruits (Leighton and Leighton, 1983; Poonswad and Tsuji, 1994). Hornbills are known to exploit three main kinds of fruit-lipid-rich capsular fruits (Meliaceae, Myristicaceae), lipid-rich drupaceous fruits (Lauraceae, Annonaceae) and sugar-rich figs (*Ficus* spp). Hornbills also fruiting trees of *Dysoxylum binectariferum*, *Chisocheton paniculatus* and *Ficus* spp (Anggraini, *et al.*, 2000). Fig densities are reportedly an important determinant of hornbill abundance (Rijksen, 1978).

Frugivorous birds (including hornbill) and mammals spread more than 80% of woody plant species, mostly with large seed size which requiring special assistance (Morley, 2007). Besides eating fruits, hornbills also eat invertebrates and small vertebrates. These foods as a substitute when the availability of fruit thinning. In the tropics , the highest abundance of fruit found in the rainy season.

CONCLUSSIONS

Forest of ECC Seblat Bengkulu has an important role in the conservation of hornbills in Indonesia. Although fragmented from the surrounding forest PLG still able to accommodate seven species of hornbill: Helmeted Hornbill (*Rhinoplax vigil*), Wreathed Hornbill (*Aceros undulatus*), Wrinkled Hornbill (*Aceros corrugatus*), Bushy-crested Hornbill (*Anorrhinus galeritus*), White-crowned Hornbill (*Berenicornis comatus*), Asian Black Hornbill (*Anthracoceros malayanus*), and Rhinoceros Hornbill (*Buceros rhinoceros*). The White-crowned Hornbill has the highest density (6.413 ind/km²), and Wrinkled Hornbill and Helmeted Hornbill has the lowest density (1.466 ind/km²). Fruit plants are often eaten by hornbills in PLG Seblat forest are a member of family Moraceae (*Ficus* spp), Myristicaceae (*Myristica* sp) and Myrtaceae (*Eugenia polyantha*).

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