Species Conservation Framework for the Endangered Flat-headed Cat (*Prionailurus planiceps*) in Brunei Darussalam



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(A) Introduction

Borneo's tropical rainforest is one of the most diverse ecosystems in the world, situated in the biogeographical zone of the Sundaland, a biodiversity hotspot (Whitmore, 1997). However these rainforests are threatened by growing needs for oil palm plantations (Thompson, 1996; WWF, 2005) and timber extraction (Geist & Lambin, 2002; Fuller et al. 2003; Curran et al. 2004). In 2005, WWF reported the forest cover of Borneo has declined to 50% from 75% in mid 1980s, with an average of 850,000ha of forest being lost annually for the last 20 years.

Recent studies conducted on the degree of forest clearance in Borneo using LANDSAT images provided an insight on the current state of the environment on the island (Bryan et al. 2013, Gaveau et al. 2014). The studies stated that about 54% of Brunei land area remained covered by primary forests, as opposed to the neighbouring countries where only 3-8% of the land area were left unlogged. As a result of the pristineness on the forest conditions, Brunei Darussalam has one of the most diverse wildlife biodiversity in Borneo as exhibited by research projects conducted in the Sungai Ingei Conservation Forest in Ulu Belait from 2010-2015 (Charles & Ang, in press).

Globally, the studies and conservation of wild cat species have always been a priority among scientists, wildlife managers and decision makers. Wild cats are considered as ecological keystone species as their presence and survival are instrumental in ensuring the health of an ecosystem. The primary forests of Brunei Darussalam is home to many Endangered and Vulnerable wildlife species, many of which are facing severe threats globally. Five wild cat species have been recorded in Borneo, and studies conducted in Brunei revealed the presence of all the five in various locations in Brunei. Apart from the Leopard Cat, the other four cat species are in the IUCN Vulnerable and Endangered categories, making their protection and conservation a vital mission for the country.

Wild cat species in general are elusive in nature, making them a difficult subject to gather data. In Borneo, much of the work was done on the Bornean Clouded Leopard in forests with various degree of disturbance. Other cat species were barely studied making their conservation and protection a challenging task.

The Globally Endangered Flat-headed Cat is one such species where there is hardly any field research being conducted. A preliminary study on the distribution of Flat headed Cat in Brunei Darussalam was conducted in 2016 (Ang & Charles, in press) and various locations have revealed the habitat of the Flat-headed Cat. Apart from that, no studies have been conducted on the movement patterns, food preference and habitat requirements of the Endangered Flat-headed Cat anywhere in the world. Hence, this proposal hopes to address such lack of information on this species.

(B) Project Overview

As part of the conservation initiative for endangered species, scientists in The Mesozoic Explorers Company, with the support from the Brunei Heart of Borneo Centre and the Forestry Department, Ministry of Primary Resources and Tourism initiated a long-term conservation project on the Endangered Cats of Brunei Darussalam. With the funding and support from the Mohamed bin Zayed Species Conservation Fund (Project Number 172516735), a one year study on the distribution of the Endangered Flat-headed Cat was initiated throughout Brunei, and simultaneously community perception of the conservation of the cat was investigated.

The objective of this one year project was as below:

- To determine the distribution of the Endangered Flat-headed Cat in Brunei Darussalam
- To determine conservation awareness of public in terms of the Cat status and protection
- To develop a Species Protection Action Plan

(C) Methodology

Surveys on the presence and distribution of the Flat headed Cat was conducted with ten infra-red camera traps and visual observations from a vehicle in lonely roads close to swamps.

Camera trap surveys and visual observations were carried out in 20 locations throughout Brunei, comprising of protected forest reserves and locations outside forest reserves (Table 1). Each site was sampled twice, each for a period of 1 month. Night observations from a vehicle were carried out in locations accessible by road. A search for road kills was carried out whenever possible. Habitats where the cats were phototrapped and/or observed were described and examined.

The team also conducted interview sessions with various local communities to determine the perception and awareness of poaching and conservation issues of the Flat headed Cat in the country. This is a rather sensitive issue to approach, and the communities were wary of the purpose of the interview, and only few agreed to be interviewed.

Photographs of the Flat-headed Cat were shown to the interviewees to ascertain the presence of the species in their private lands or as road encounters. Questions on direct and indirect catch or hunting, awareness of IUCN, Wildlife Protection Act and Wild Cats were also included and what do they would do with the species if it is caught as a result of indirect target of poaching.

(D) Results

(i) Scientific Results based on Camera trapping and Visual Observations

Out of the 20 sites surveyed, Flat-headed Cat was only recorded in 8 sites (Table 1).

Table 1 showing the presence of Flat headed Cat in various locations throughout Brunei Darussalam

Site	Method of study	Status of protection	Forest Type	Present or Absent
Ulu Temburong National Park Site 1 (46210 ha.)	Camera trapping	Forest Reserve	Mixed dipterocarp forest	Present
Ulu Temburong National Park Site 2 (46210 ha.)	Camera trapping	Forest Reserve	Mixed dipterocarp forest	Absent
Berakas Forest Reserve (348 ha.)	Camera trapping	Forest Reserve	Heath forest	Absent
Badas Conservation Forest Site 1 (76 ha.)	Camera trapping	Forest Reserve	Heath forest	Absent
Ulu Badas Forest Reserve (443 ha.)	Camera trapping	Forest Reserve	Heath forest	Absent
Anduki Conservation Forest (917 ha.)	Camera trapping	Forest Reserve	Disturbed swamp forest	Absent
Andulau Conservation Forest Site 1 (13392 ha.)	Camera trapping	Forest Reserve	Mixed dipterocarp forest	Absent
Andulau Conservation Forest Site 2 (13392 ha.)	Camera trapping	Forest Reserve	Mixed dipterocarp forest	Absent
Labi Forest Reserve Site 1 (previous study) (119880 ha.)	Camera trapping	Forest Reserve	Mixed dipterocarp forest	Present
Labi Forest Reserve Site 2 (previous study) (119880 ha.)	Camera trapping	Forest Reserve	Forest Mosaic	Present
Labi Forest Reserve Site 3 (previous study) (119880 ha.)	Camera trapping	Forest Reserve	Salt lick	Present
Belait Peatswamp Site 1 (7662 ha.)	Camera trapping	Outside Forest Reserve	Peatswamp	Present
Belait Peatswamp Site 2 (7662 ha.)	Camera trapping	Outside Forest Reserve	Peatswamp	Absent
Tutong Home Garden Site 1	Observation	Outside Forest Reserve	Mixture of swamp and matured secondary forests	Absent
Tutong Home Garden Site 2	Observation	Outside Forest Reserve	Mixture of swamp and mature secondary forest	Present
Tasek Merimbun ASEAN Heritage Park (220 ha.)	Observation	Outside Forest Reserve	Mixed dipterocarp forest	Absent
Belait Home Garden	Observation	Outside Forest Reserve	Mixed dipterocarp and matured	Absent

			secondary forest	
Sungai Tujoh	Observation	Outside Forest Reserve	Disturbed Peatswamp	Present
Tanjong Maya Site 1	Observation	Outside Forest Reserve	Peatswamp forest	Absent
Tanjong Maya Site 2	Observation	Outside Forest Reserve	Peatswamp forest	Present

(ii) Local Community Perception on Flat-headed Cat Conservation

58 persons from 4 rural areas were approached but only 23 (39%) agreed to be interviewed. Many were aware of wild cats (43.5%) but very few could identify a Flat-headed Cat (4.3%). Many have seen a Clouded Leopard (43.5%) and only 1 had seen a Flat-headed Cat (4.3%). Most were aware of hunting of wildlife in the country (73.9%). None of the interviewees were aware that the Flat-headed Cat is listed as Endangered in the IUCN Red List category and under the country's Wildlife Protection Act. Most interviewees (65%) stated that the Flat headed Cat is a 'cute' cat species and could be used as a house pet.

(E) Discussion and Conservation Recommendations

From this project, 4 ecological factors might be instrumental in determining the presence and distribution of the Flat-headed Cat in the wild. The 4 ecological factors are the size of the area concerned, type of habitat and vegetation, level of disturbance and occurrence of aquatic habitats such as streams and salt licks.

Out of the 7 Forest Reserves sampled, the Flat-headed Cat was recorded in the two largest Forest Reserves, namely the Ulu Temburong National Park and the Labi Forest Reserve. These two Forest Reserves are mainly pristine mixed dipterocarp forests and forest mosaics of various forest types such as swamp forests, streams and salt licks. The importance of pristine wetlands is primarily responsible for the occurrence of the Flat-headed Cat, as it is also found in peat swamp forests outside Forest Reserves such as in Tanjong Maya and Tutong Home Gardens.

More work will have to be conducted in the other areas as the study was impacted by heavy flooding and camera trap damage due to waterlogging. More study sites in other habitat types, with more time and camera traps have to be included in the next study to ascertain the presence/absence of the species in various habitats.

Anthropogenic threats such as forest clearance, wetland destruction, forest fires for land clearing and water pollution could affect the survival of the Flat-headed Cat in the country. Such activities could lead to a change in the water quality and the stream ecology, leading to a change in the prey availability for the Flat-headed Cat. Indirect target of poaching could also lead to the survival of the Cat in the wild.
These threats have a variety of future research and conservation implications for the Flat-headed Cat. Some of the ecological threats are being addressed at present namely, raising the water table in the peat swamps that had been previously drained. In other areas there are attempts at peat swamp forest restoration.

Strips of land near rivers and peat swamps need to be conserved and not cleared of the vegetation as the Flat-headed cat moves through the vegetation cover along the banks to gain access to the water. Fragmented riverine forests between Protected forests and outside areas have to be restored and conserved to act as corridors to facilitate movement of all wildlife including the Flat-headed Cat.

Lack of ecological information on this Endangered Cat emphasizes the urgent need for research on the aquatic life and water quality of the aquatic resources used by this felid, habitat use, response to anthropogenic disturbances and radio-telemetric studies to assess movement range in relation to water sources.

Publicising to the villagers the presence of the Endangered Cat, its identity, its habits, its biology and importance is crucial for local knowledge as most of the respondents appeared to be ignorant of this species which could be a by-catch of hunting especially for the Bearded Pig.

A conservation research on any wildlife especially Endangered ones is only meaningful if it involves and empowers local stakeholders to participate and become the custodians

of that resource. The long-term survival of the Flat-headed Cat can only be ensured both by the reduction and mitigation of threats and local stakeholders taking the lead in conserving and protecting the species with the assistance of scientists.

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