

23rd Pro Natura Fund Overseas Grant

## Responses of non-human primate community to forest loss, degradation and fragmentation based on habitat quality analysis in Sabah, Malaysia

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During the reporting period between January to September 2013, logging activities has only just begun at some sites in May 2013 in Kalabakan Forest Reserve in central Sabah. Field data collections were made at these sites to gather information on primate species presence-absence data. The main problem encountered during the fieldwork was the rather low encounter rates of primates. Therefore, most information gathered was based on indirect signs of animals' presence, such as through vocalization (Bornean gibbon) and nest (orang utan).

### PROJECT BACKGROUND

One of the fundamental matters in conservation biology is determining animal abundance. Knowledge on animal abundance has direct conservation management implications. Such information is vital as a gauge to determine the health or conservation status of an animal population. When assessed repeatedly over the long run, population abundance data can provide information on long term population trends. This is very useful for evaluating the effectiveness of conservation management regimes adopted to manage an animal population. Traditional methods of assessing population abundance in primates have almost always involved repeated field census surveys, counting animals directly or indirectly via their signs, that are typically labour intensive or require large financial resources in addition to time

consuming (Ancrenaz et al. 2005, Sha et al. 2008). They can also be difficult to carry out in dense forest in remote areas due to logistical reasons and especially when large areas need to be covered in difficult terrain such as swampy or mountainous habitats. Yet, it is in these forest types where most primates are commonly found in the tropical rainforests.

Davies (1994) found that, if easily digestible mature leaves are plentiful in an area during periods of drought or during a long dry spell event when other more preferred foods are lacking (such as young leaves, fruits, seeds or flowers), the site can support a relatively large population of leaf eating primates. This indicates that in the absence of preferred food items, mature leaves can be a vital food source for primates. By measuring the overall mature leaves quality, measured in the form of

protein-to-fiber ratio, several studies have shown positive correlations between primate biomass and this index of leaf quality (Davies 1994, Oates et al., 1990, Waterman et al. 1988). These results suggest that primate biomass, and therefore their abundance, at a site may be predicted based on the analysis of protein-to-fiber ratios of mature leaves. This analysis has several advantages over the traditional field census surveys in that it can be done relatively rapidly and hence more cost effective.

The present project is a continuation of an earlier research project with the title “The distribution and persistence of primate species in fragmented and converted forest landscape in Sabah, Malaysia” (see Appendix 1). A new component on habitat quality analysis based on protein-to-fiber ratio of leave samples is included. It is a collaborative research project between the Institute for Tropical Biology and Conservation’s Unit for Primate Studies Borneo, Universiti Malaysia Sabah and Primate Research Institute of Kyoto University, Japan.

### **STUDY OBJECTIVES**

The objective of the extended research project is to quantify the habitat quality at the different sampling sites based on the leaf quality index measured as protein-to-fiber ratios of mature leaves to clarify the relationship of folivores primate abundance and leaf quality index. In doing so, this study will provide a new dimension to assess the effect of logging on the abundance and persistence primate community.

### **PROJECT PLAN AND ACHIEVEMENTS**

In Phase 1 of the earlier project (2011/2012) - based on direct and indirect sightings of primates across a gradient of habitat disturbance, which captured the “before” treatment effects (i.e., prior to logging

and fragmentation of habitat), we have confirmed the presence of nine out of the total of 10 species of non-human primates found in Sabah in all of the surveyed sites within the SAFE (Stability of Altered Forest Ecosystem) project area (see <http://www.safeproject.net>). In our initial analysis using occupancy probability of primates presence/absence data collected over a period of 12 months (Nov. 2011-Oct. 2012), we found no evidence of differential habitat disturbance effects on the primate community. We also found no evidence supporting differential habitat disturbance effects on the primate community based on animal body size or feeding habit. The lack of such evidence is rather surprising and it is likely due to the artifact of small data set of our study. Further analyses will be carried out with more data collected. Interestingly, however, the presence of eight species of primates within the heavily logged forest sampling sites, which included Bornean endemic species and species of high conservation concern such as the orangutan, proboscis monkey and Bornean gibbon, showed that even highly disturbed forests are still valuable for primate conservation. The project is ongoing and is now in its early stage of Phase 2 where the “during” treatment effects (i.e. the initial stage of logging and clear felling activities) will be investigated. In this phase, data collection will take place following exactly the same procedure and research protocol as those in Phase 1. Phase 2 will run for a period of 12 months from May 2013 to April 2014.

For the new component of the project, collections of leaf samples and chemical analyses will be conducted following procedure described by Hanya and Bernard (2013). The principal investigator has collected mature leaves samples of 16-20 dominant tree species from 10 sampling sites, namely

Kalabakan FR (8 sites), Maliau Basin Conservation Area (1 site) and Klias (1 site), respectively. Samples were collected in the months of June to August 2013. A total of 196 mature leave samples were successfully collected, dried and are now being kept at the Institute for Tropical Biology and Conservation, Universiti Malaysia Sabah (UMS). Analyses are being carried out on the nutritional contents of the plants namely, crude protein, crude lipid, fiber and ash. Chemical analysis for all plant samples are carried out at the lab of the Institute for Tropical Biology and Conservation in UMS as permission to take large number of leave samples out from Sabah is difficult and time consuming. Crude lipid analyses have been completed for leave samples from Klias. All samples are now analysed for crude protein and fiber.

In connection with leaf samples analysis, the principal investigator is spending a three month period, from 2nd September to 30th November 2013 at the Primate Research Institute in Kyoto University, Japan. In Japan, the main activities to be carried out are discussion on pooling results of chemical analyses from different sampling sites in Sabah and Kalimantan, preparing a draft concept research manuscript and finalizing the draft of other research papers. Due to the unforeseen delay in getting chemicals for running the analyses, much of the data needed are yet to be obtained. Though discussion on pooling the results from the chemical analyses is ongoing, the actual data pooling will only take place after November 2013.

While the principal investigator is in Japan, three draft manuscripts entitled “The distribution and persistence of primate species in a disturbed forest landscape in Sabah, Malaysia”, “The feeding ecology of the proboscis monkey in Klias Peninsula,

Sabah, Malaysia”, “Terrestrial mammal species richness and composition in small forest patches within an oil palm landscape in Sabah, North Borneo” have been produced. These papers are going to be finalized and submitted for publications.

#### **FUTURE PLAN**

While phase 2 of this project will continue, further collection of leaf samples from the field, if necessary, will be conducted from December 2013 to November 2014. Chemical analysis will be conducted at ITBC in UMS during the same period. The drafts of the main papers produced in Japan will be finalized during this period, and submitted for possible publication. During this period also, the principal investigator will make field visits to assist research assistants and students to do field census surveys for Phase 2 of the ongoing project and to prepare for data collection of Phase 3 which will take place beyond the current proposed research project. All future plan and activities of this project will have no new financial obligation from ProNatura Foundation, as the balance of the grant awarded by ProNatura are sufficient to sustain the research activities of the project.

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## マレーシアサバ州での生息地の質の評価に基づく森林の喪失、劣化、断片化に対する霊長類の反応

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2013年1月から9月までの間に、カラバガン森林保護区のいくつかの場所で、2013年5月に伐採が開始された。調査では、おもに各種霊長類の在・不在について資料を収集した。調査中の問題は、霊長類との遭遇頻度が低いことだった。そのため、生息状況についての分析は、間接的な資料（テナガザルの音声、オランウータンのネスト）によった。直接霊長類を目撃した事例は少なかった。（半谷吾郎訳）