

High Conservation Value Forest (HCVF) Assessment of Sabah Forest Industries (SFI) Sipitang, Sabah



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LIST OF TERMS AND ABBREVIATIONS

CE	Common Endemic
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CLE	Common Lowland Endemic
CLR	Common Lowland Resident
CM	Common Migrant
CME	Common Montane Endemic
CMR	Common Montane Resident
CNR	Common Nomadic Resident
CR	Critically Endangered
CR	Common Resident
CSMR	Common Submontane Resident
CSR	Corporate Social Responsibility
CSR	Common Sub Race
CWV	Common Winter Visitor
DID	Department of Irrigation and Drainage
EIA	Environmental Impact Assessment
EN	Endangered
FMP	Forest Management Plan
FMU	Forest Management Unit
FR	Forest Reserve
FRIM	Forest Research Institute Malaysia
FSC	Forest Stewardship Council
GPS	Global Positioning System
ha	Hectare
HCV	High Conservation Value
HCVF	High Conservation Value Forest
HME	High Montane Endemic
ITP	Industrial Tree Plantation
IUCN	International Union for Conservation of Nature and Natural Resources
JKR	Jabatan Kerja Raya
JKKK	Jawatankuasa Kemajuan dan Keselamatan Kampung
Kg.	Kampung
km	Kilometre
KMNP	Kayan Mentarang National Park
LA	Land Application
LC	Least Concern
LCE	Local Common Endemic
LCES	Locally Common Endemic Sabah
LCR	Locally Common Resident
LME	Local Montane Endemic
LMR	Local Montane Resident

LR	Local Resident
m	Metre
ME	Montane Endemic
NCS	National Conservation Strategy
NFM	Natural Forest Management
NT	Nearly Threatened
NTFP	Non-Timber Forest Products
PERHILITAN	Perlindungan Hidupan Liar dan Hutan
R	Resident
RIL	Reduced Impact Logging
RTE	Rare, Threatened and Endangered species
RWV	Resident and Winter Visitor
SCFR	Scarce Coastal Forest Resident
SE	Submontane Endemic
SFC	Sustainable Forest Certification
SFD	Sabah Forestry Department
SFI	Sabah Forest Industries Sdn. Bhd.
SFM	Sustainable Forest Management
Sg.	Sungai (river)
SME	Scarce Montane Endemic
SOP	Standard Operational Procedure
sp.	Species
SR	Scarce Resident
SWE	Sabah Wildlife Enactment
SWV	Scarce Winter Visitor
Tg.	Tanjung (Cove)
TPA	Totally Protected Area
UMS	Universiti Malaysia Sabah
UR	Uncommon Resident
VES	Visual Encounting Survey
VJR	Virgin Jungle Reserve
VU	Vulnerable
WCE	Wildlife Conservation Enactment
WWF	World Wide Fund for Nature

NOTE FROM SFI

For a better understanding of the management of the SFI Estate, including the measures to identify and protect areas with high conservation values, this “HCVF Assessment of Sabah Forest Industries (SFI)” report should be read in conjunction with the relevant forest management plans which are:

1. Forest Management Plan 2011-20 (FMP) which refers to the 104,822 ha of the Natural Forest Management (NFM) Licence Area.
2. Plantation Development Plan 2011-20 (PDP) which refers to the 171,471 ha of the Industrial Tree Plantation (ITP) Licence Area.
3. Plantation Development Plan for Titled Land 2011-20 (PDP-TL) which refers to the 11,845 ha of SFI’s Titled Land

(See Figure 1 for the location of these areas)

These plans give details of the legal framework including the legal minimum requirements for soil and water protection as required by the Sabah Forestry Department (SFD), the Sabah Environmental Protection Department (EPD) and the Sabah Department of Irrigation and Drainage (DID) together with descriptions of systems to identify and protect areas with conservation and social values. They also give details of the neighbouring communities and programmes to engage with them to foster mutual understanding and to explore ways of developing partnerships.

It should also be noted that SFI has current certificates from the Rainforest Alliance confirming compliance with the Verified Legal Compliance (VLC) standard for the NFM Area and for existing plantations in the ITP Licence Area and the Titled Land and with the FSC Controlled Wood Standard for the NFM Area. Both these standards require compliance with applicable laws relating to environmental protection; wildlife, water and soil conservation; harvesting rules and practices; worker health and safety; and fairness to communities. In addition SFI holds compliance certificates from SFD for every year in the recent past. These are issued after audits by SFD staff themselves and by independent auditors using the Timber Legality Assurance System standards established by SFD in conjunction with other government agencies.

After reviewing the draft of this *HCVF Assessment of SFI* report, SFI managers met with representatives of WWF Malaysia and looked at the actions that SFI should take to put into effect the Key Findings detailed in this report (see Section 8). These deliberations were recorded in a document entitled *Key Findings and Management Actions by SFI to Protect High Conservation Values* which is included as Appendix C to this report. These actions have now been incorporated in SFI’s Standard Operating Practices (SOP).

The next step is to prepare a conservation management plan, in collaboration with stakeholders, which amongst other things, will outline a programme of actions, including research, to identify and protect conservation values and particularly high conservation values. It will take into account the findings of this report and its Peer Review conducted by the HCVF Resource Network.

Sabah Forest Industries
July, 2012

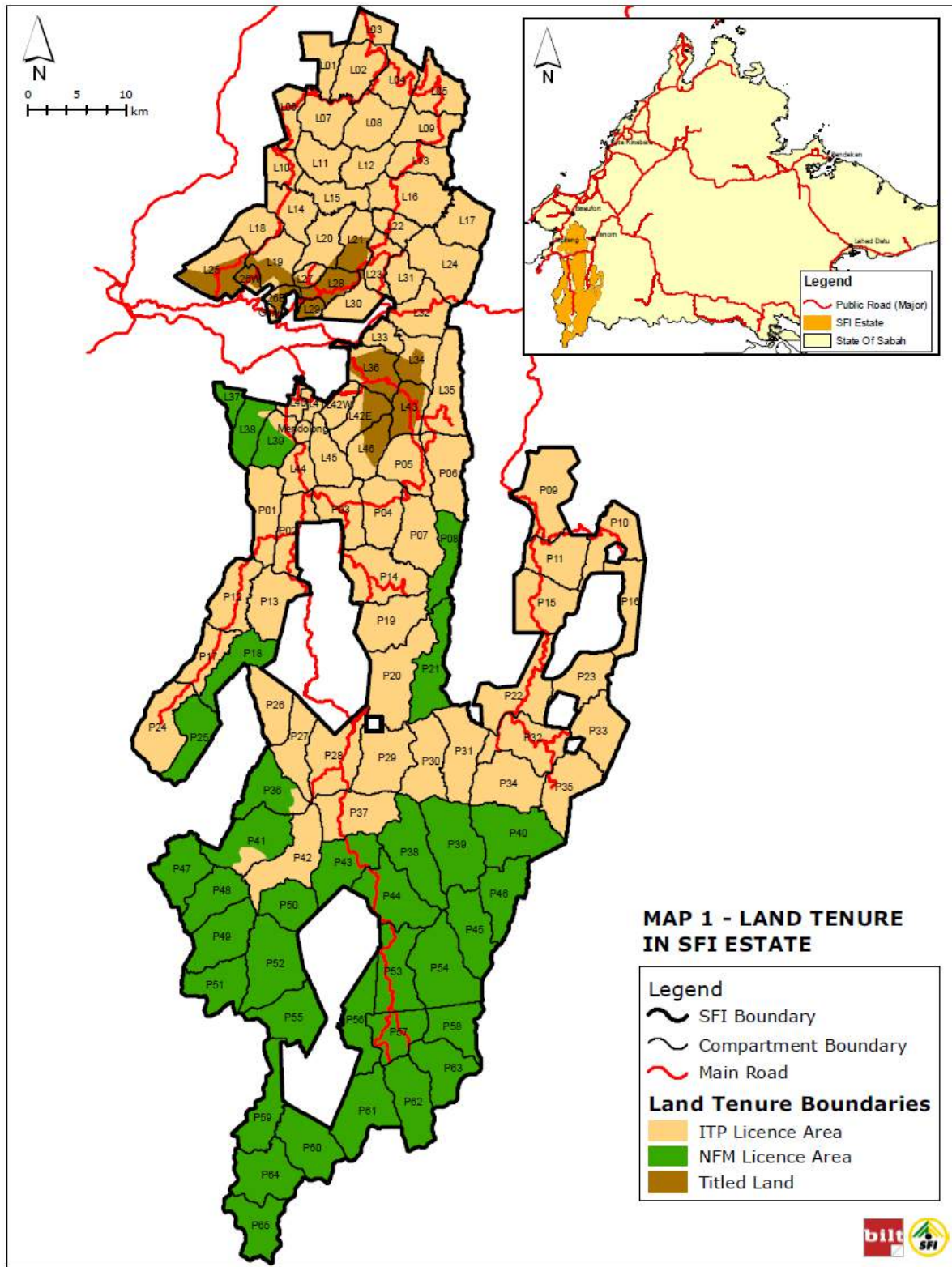


Figure 1. Land Tenure in the SFI Estate

EXECUTIVE SUMMARY

Sabah Forest Industries Sdn Bhd (SFI) manages 276,293 ha of forest reserves. A total of 104,882 hectares are managed under a Natural Forest Management (NFM) Licence and 171,471 under an Industrial Tree Plantation (ITP) Licence. SFI also manages 11,845 ha of land for which it holds titles, and this makes up a total of 288,168 ha of forests under its management.

In the ITP area, 46,000 hectares have been established as plantations and about 65,000 hectares of secondary forest are ear-marked for conversion to plantations. Of the total 288,138ha of forest managed by SFI, 178,138ha (61%) will remain as permanent natural forest and more than 100,000ha (33%) will be totally undisturbed and reserved for conservation purposes.

From 7th July 2010 to 31st August 2010 a multi-disciplinary team conducted a High Conservation Value Forest (HCVF) assessment in a sample of five compartments within the SFI area, encompassing Sipitang, Beaufort and Tenom districts in south-western Sabah, Malaysia. Sub-teams assessed biodiversity, ecosystem service values, social and cultural values and found that the six major values listed in the HCVF Malaysia Toolkit (2009), are present. The SFI area is located within the Sipitang Forest Reserve and Ulu Sungai Padas Forest Reserve. These forest reserves are Class II Commercial Forest Reserves leased to SFI by the Sabah Forestry Department (SFD). The SFI Licence area shares its boundaries with five Protected Areas (PAs): Gunung Lumaku Forest Reserve (Class I) and Kayan Mentarang National Park (Indonesia) which are located adjacent to the SFI area; and Agathis, Sungai Basio and Meligan Virgin Jungle Reserves (Class VI) which are located within the SFI area (HCV 1.1 present).

A significant number of HCV biodiversity species were found present in the study compartments and surrounding areas. Critically endangered (CR), endangered (E), vulnerable (V) and nearly threatened (NT) flora and fauna (HCV 1.2 present) were also found during the assessment. 55 endemic fauna species and 60 flora species were found in the study sites (HCV 1.3 present). Areas for critical temporal use were also identified to be present (HCV 1.4). The SFI area borders four protected areas which can be classified as water catchment areas (HCV4.1 present). In addition, several rivers or streams in the SFI area were identified as providing critical ecosystem services, especially in the forest reserve (HCV 4.1 present). To ensure that this value is maintained or enhanced, a river buffer prohibiting logging operations is required, and the size of the buffer depends on the size of the river or stream. The surveys also found that most of the trees along the river or stream were not logged, with the riparian reserves remaining intact (HCV 4.1). Also, there are steep forest areas with more than 35° slope covering more than 2 ha in the study site (HCV 4.2 present). The SFI forest is a fire-prone area and the forest managers are aware of the hazard of forest fires and this has led to the development of guidelines for Fire Prevention and Control Plan (HCV 4.3 present).

Results of the assessment for social and cultural values suggested that majority of the communities still depended on the forests (HCV 5 present) to some degree. The various communities within the SFI area used the forest for hunting and collecting Non-Timber Forest Products (NTFP). Most of the communities hunted, fished and were also involved in agricultural activities. Cultural sites such as burial grounds were identified in the SFI area (HCV 6 present).

In order to meet the FSC requirements for forest certification, the most important recommendations for SFI are as follows:

1. Maintain existing connectivity or corridors for flora and fauna within the SFI area and extend it/them into the protected area system and VJRs surrounding the SFI area.

2. Maintain a larger landscape to conserve the flora and fauna by connecting the north-eastern part of SFI area to Gunung Lumaku Forest Reserve (Class I), which connects to the Crocker Range Park, the biggest terrestrial protected national park in Sabah. In the southern part of SFI area this is already evident, as the compartments bordering Kayan Mantarang National Park are already connected and function as transboundary protection for wildlife.
3. Establish buffer zones of 100 metres in width along all the protected areas that are within and adjacent to SFI area so that impact from logging, forest conversion or any infrastructure construction adjacent to the protected areas is reduced.
4. Conserve threatened ecosystems such as the lowland dipterocarp, montane and kerangas forests.
5. Develop and implement a plan that ensures the sustainability of future harvests of the plantation near to the Class I Forest Reserve and riparian areas. Reduce harvesting to minimise damage to the soil and species within protected areas. SFI must continue to practice Reduced Impact Logging (RIL) techniques when harvesting in the NFM area and conduct well planned harvesting operations which minimise soil disturbance in the ITP Areas.
6. Map out boundaries of the protected areas (to be executed by SFD). The mapping within the SFI area should identify sensitive areas, and areas that should be excluded from harvesting. The boundaries are to be physically demarcated on the ground. Updating the forest land-use map using the latest satellite imagery to monitor the changes is important.
7. Conserve some of the forested areas for sustainable use by the local communities as these communities depend heavily on forest produce from the SFI area. For example, some areas within the NFM area can be designated for the use of local communities from Kg. Long Pasia and Kg. Long Mio.
8. Modify SFI maps of HCV Area (HCVA) to incorporate those areas with high biodiversity value such as compartment P42 which has high concentrations of HCV 1.2 (threatened, endangered species) and HCV 1.3 (high endemism species).

ACKNOWLEDGEMENTS

We wholeheartedly thank the management and staff of SFI for their cooperation during the assessment. The commitment to improving their forest management is commendable. The staff of Sabah Forestry Department (SFD), Sipitang District Office, village heads, the Jawatankuasa Kemajuan dan Keselamatan Kampung (JKKK) and villagers within the SFI area played an important role in this assessment. Previous social baseline reports provided valuable secondary information. We would like to acknowledge the continuous support of Mr. Wayne Wooff, General Manager (Plantations), Ms. Angelica Suimin, the Corporate Social Responsibility (CSR) Manager and Ms. Suziyanti Salapan of the CSR Department. We also thank Ms. Ivy Wong Ling Ling for providing a copy of HCVF Malaysia Toolkit and other HCVF assessment reports as references. A special thank you goes to Ms. Josil Murray of WWF-Malaysia for coordinating this project. Without her this project would not have been successful. Last but not least, the initiative and support from WWF-Malaysia in carrying out this HCVF study are much appreciated.

HIGH CONSERVATION VALUE FOREST (HCVF) ASSESSMENT OF SABAH FOREST INDUSTRIES (SFI), SIPITANG, SABAH

1.0 INTRODUCTION

In the early 1980s, the first and largest integrated pulp and paper company in the country, Sabah Forest Industries Sdn. Bhd. (SFI) was formed. It is located at the south-western part of Sabah in the districts of Sipitang, Beaufort and Tenom. Originally owned by the Sabah Forestry Department (SFD), the company was sold to the Lion Group in the early 1990s. In March of 2007, the Lion Group sold the SFI to Ballarpur Industries Ltd. of India. Sabah Forest Industries has a pulp capacity of 120,000 tons/year and a paper capacity of 144,000 tons/year with plans to increase its pulp production to 220,000 tons/year in the near future.

The Class II Forest Reserves within the SFI area are the Sipitang Forest Reserve (in the north) and the Ulu Sungai Padas Forest Reserve (in the south). Class II Forest Reserve is a production forest (also referred to as Commercial Forest), allocated for logging to supply timber and other products that have significant economic value. A license has been issued to SFI for the management of the NFM area for 99-years. The rationale for issuing this type of license is to enable the private sector (SFI) to participate in the sustainable forest development and to provide stewardship for the area. SFI has also been issued an Industrial Tree Plantation (ITP) Licence to convert secondary forest to forest plantations (see Figure 1).

SFI manages NFM areas particularly in Ulu Sungai Padas Forest Reserve, and ITP areas in Sipitang, Tenom and Beaufort districts. A total of 288,138 ha of land is under SFI management which includes 183,316 ha of ITP Area (171,471 ha under licence and 11,845 ha of titled land) of which approximately 46,000 hectares are planted with *Acacia mangium*, and other *Acacia/Eucalyptus* species and hybrids, managed under sustainable forest principles. In the ITP areas, SFI implements detailed forest harvesting plans for each compartment. The remaining 104,822 ha, is the NFM area which is managed using Reduced Impact Logging (RIL) methods.

Sabah Forest Industries (SFI) is committed to pursuing independent third party certification of its forest following the Forest Stewardship Council's (FSC's) Principles and Criteria (P&C). SFI is in the process of developing a long-term Forest Management Plan (FMP), which must consider aspects of wildlife protection and management in accordance with the provisions outlined in FSC Principle Six (Environmental Impact) and Principle Nine (High Conservation Value Forest, HCVF). High Conservation Values (HCVs) include environmental and social values that are considered to be of outstanding significance or critical importance.

In view of cost and time constraints, the HCVF study was implemented at a reconnaissance level. Selected compartments in the NFM and ITP areas were sampled: compartments L10, P35, P42, P60 and P61. The assessment reviewed existing information about HCVF and also collected new data on HCV (e.g. occurrence of rare, threatened and endangered species (RTE) relevant to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), International Union for Conservation of Nature and Natural Resources (IUCN) Red List Book, Wildlife Conservation

Enactment (SWD) 1997 Schedule I, II and III, Sabah Forestry Enactment 1968, sensitive forest ecosystems, sites of cultural or religious importance).

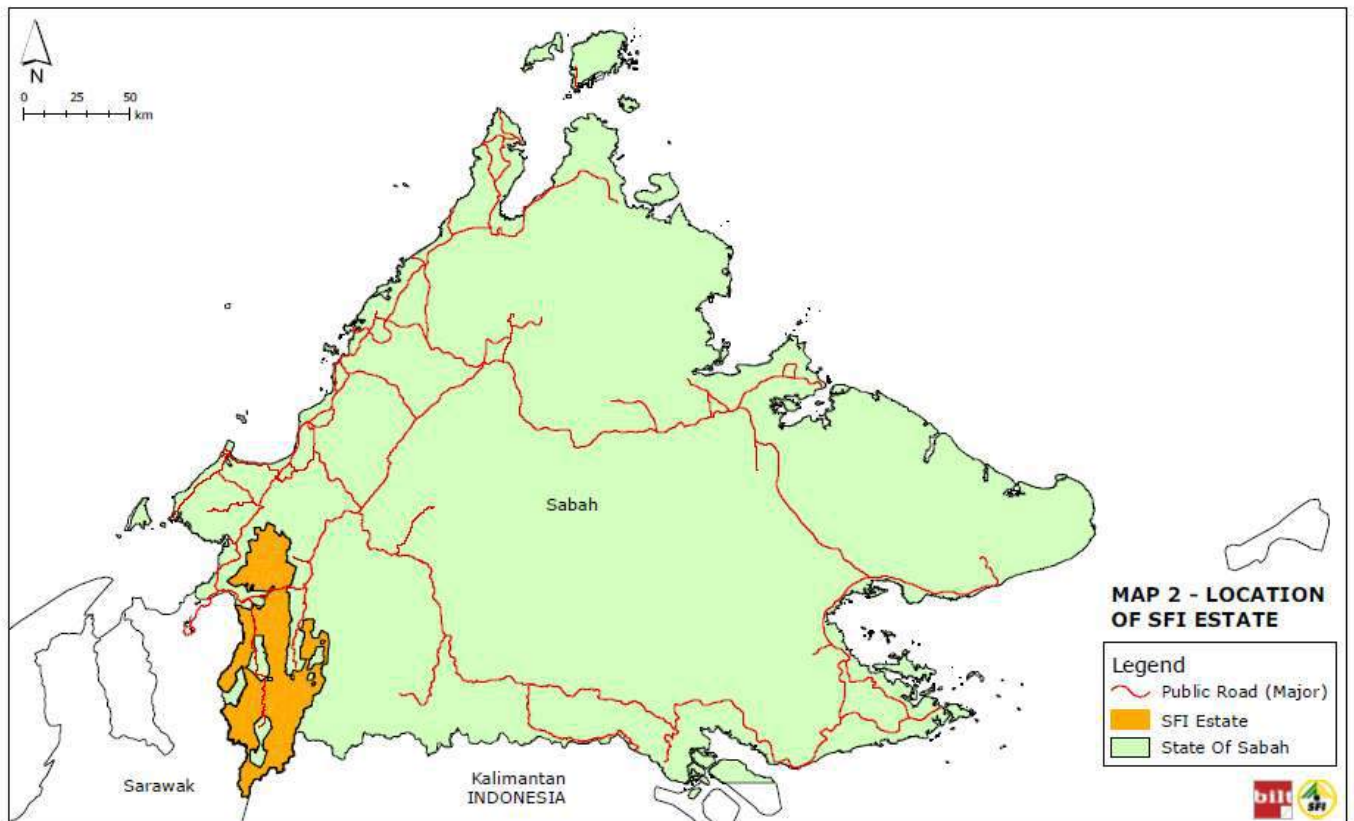


Figure 2. Location of SFI Estate

HCVF assessments should be seen as part of a dynamic on-going process that provides a framework for managing and monitoring key biodiversity and social values. The identified HCVs could change over time, either increasing or decreasing in importance, hence making monitoring of these biodiversity and social values crucial. It should be noted that this report summarises the findings collected over a relatively short time of assessment in the field. Certainly, with more data and monitoring efforts over time, some additional areas may be recommended for inclusion as having HCV. In any case, the survey team has clearly and scientifically documented the field activities leading to the recommendations presented in this report.

The consultant was engaged by WWF-Malaysia to carry out a HCVF assessment by conducting field surveys in the five compartments in SFI (namely compartments L10, P35, P42, P60 and P61) for a period of 17 days which was divided into three phases. It was followed by data analysis, literature review, stakeholder discussions and report writing within an overall period of not more than 7 months.

1.1 Objectives

The main objective of this study was to carry out HCVF assessment (covering HCV 1 to HCV6) in accordance with the requirements of the HCVF Toolkit for Malaysia. The assessment involved a group of experts from different fields of interest and was led by a team leader.

Scope of Work

The full HCVF assessment was carried out in five compartments which were jointly agreed to by SFI forest managers and WWF-Malaysia. The compartments assessed were L10, P35, P42, P60 and P61 (see Map 3). Compartments P60 and P61 are in the NFM area and only riparian areas and slopes were assessed. The other compartments surveyed were in ITP areas where conversion to plantations (both acacia and eucalyptus) is planned.

The scope of work included:

1. Flora and fauna assessments in predetermined parts of compartments L10, P35 and P42. Compartments P60 and P61 were not included for the flora and fauna study as they had been surveyed by Sabah Museum as part of the HCVF preliminary findings for SFI area in 2009.
2. Social surveys on HCV 5 (dependence on the forest) and HCV 6 (cultural and archaeological sites) in and around the villages relevant to compartments L10, P35, P42, P60 and P61.
3. Identification of HCV 3 and HCV 4 in compartments L10, P35, P42, P60 and P61.
4. Compilation of data of all HCVs identified during the ground surveys.
5. Analysis of data obtained during ground surveys as required by the HCVF Toolkit for Malaysia.

1.2 Approach

The Forest Stewardship Council (FSC) developed the concept of High Conservation Value Forest HCVF in 1999 and incorporated it into its Principles and Criteria for forest certification. HCVs include environmental and social values that are considered to be of outstanding significance or critical importance. HCVF are forests that contain or are essential to maintaining HCVs.

The HCVF Toolkit for Malaysia is based on the Global HCVF Toolkit (Jennings *et. al*, 2003). The HCVF Toolkit for Malaysia aims to provide practical guidance to forest managers and other stakeholders to identify, manage, and monitor HCVFs in Malaysia as specified by various national and international standards of forest management.

1.3 HCVF Assessment Team

Twelve field technicians from Sabah Parks, University Malaysia Sabah (UMS), Forest Research Centre (FRC) in Sandakan, Sabah Museum, Jabatan Pertanian Sabah and the Malaysian Nature Society (MNS) - Sabah Branch were involved in the field surveys. The team leader coordinated the field work and data collection. A botanist, Ms. Luiza Majuakim of the Institute for Tropical Biology and Conservation (ITBC) - UMS analysed the flora data and produced flora component of this report.

Team members who participated in the assessment and their specialties and roles

Name	Affiliation	Speciality / Role
Anna Wong	UMS	Wildlife Management Expert and Team Leader
Luiza Majuakim	UMS	Botanist / Plant Ecologist
Paul Imbun	Sabah Parks	Wildlife Expert
David Sumpengel	Sabah Parks	Bird Expert
Benedict Butit	Sabah Parks	Mammal Expert
Martinah Latim	Sabah Parks	Slope and Riparian Assistant
Bonny Jurunin	Self employed	Slope and Riparian Assistant
Johny Gisil	UMS	Plant Taxonomist
Diwol Sundaling	FRC, Sepilok	Higher Plant Expert
Halmelda Magit	UMS	Lower Plant Expert
Monica Gualin	Sabah Museum	Social Expert
Yong Huai Mei	UMS	Social Assistant
Harnitta Sulaiman	Jabatan Pertanian Sabah	Social Assistant
Mariajoy Rowan	Malaysian Nature Society – Sabah Branch	Social Assistant

2 HCV ASSESSMENT METHODS

2.1 HCV Definitions

The HCV assessment described in this report makes reference to the HCV definitions, criteria and methods outlined in the HCVF Toolkit for Malaysia (WWF-Malaysia, 2009). The six HCVs and associated sub-values are shown in Table 1.

Table 1. The types of HCVF areas defined by FSC

HCV	Element
1	Forest areas containing globally, regionally or nationally significant concentrations of bio-diversity values
1.1	Protected areas
1.2	Threatened and endangered species
1.3	Endemic species
1.4	Critical temporal use
2	Globally, regionally or nationally significant large landscape-level forests
3	Forest areas that are in or contain rare, threatened or endangered ecosystems
4	Forest areas that provide basic services of nature in critical situations
4.1	Forests critical to water catchments
4.2	Forests critical to erosion control
4.3	Forests providing barriers to destructive fire
5	Forest areas fundamental to meeting basic needs of local communities (e.g. subsistence, health)
6	Forest areas critical to local communities' traditional cultural identity

The HCV 1-6 numbering system used by the Global HCVF Toolkit (Jennings *et al.*, 2003) is generally accepted and is the basis for the Malaysian toolkit.

The key steps involved in a HCVF assessment include:

1. Preparation for field assessments (questionnaires, data sheets, field timetables)
2. Field assessments – Data collection:
 - Flora surveys
 - Fauna surveys and salt lick Surveys
 - Riparian and slope study
 - Social and cultural Surveys
3. Report writing
4. Report consolidation
5. Management and monitoring recommendations
6. Final HCVF report

2.2 Compilation of Secondary Data

The first two weeks of the project was used to conduct a literature review on the potential HCVs present at the assessment site. This was based on reports of past assessments carried out in this study area, SFI's EIA report (EIA/SFI, 2002; EIA/SFI, 2008), SFI's Forest Management Plan (FMP) and other relevant reports.

2.3 Meetings and Stakeholder Consultations

In line with FPIC/PIC (Free, Prior, Informed Consent/Prior, and Informed Consent) principles, WWF-Malaysia partnered with Sabah Forest Industries (SFI) to convene consultations with the relevant stakeholders to share the findings from the HCVF Assessments conducted for the SFI area in 2010. This followed earlier discussions and meetings that had been held with relevant community groups informing them about the reasons and objectives of the HCV assessment.

The HCV consultations took place on the 13th and 14th June 2011. The consultations were held at two separate venues, i.e in the Tenom Forestry Department and Sipitang District Office. The consultation in Tenom was hosted by the District Forest Officer (DFO) of Tenom and the Sipitang consultation was hosted by the District Officer (DO) of Sipitang. Presentations to stakeholders were made by the project team leader and a member of her team, with an introduction presented by WWF-Malaysia.

The consultations were attended by the community representatives (including Ketua Kampung and JKKK), District Office, Forestry Department, Wildlife department and SFI representatives, the HCVF Assessment Team Leader and relevant staff from WWF-Malaysia. The attendance lists are presented in Appendix A.

Some issues and requests were raised during the consultations. Some of the issues/requests are:

1. Concerns of the community in relation to the SFI area. These include questions related to land titles, boundary demarcation and NCR issues.
2. Encroachment by outsiders who come to poach both animals and plants that are important to the local community. Suggestions to have barriers constructed at access points or monitoring posts put up were made.
3. Functioning Gravity Feed System for the community.
4. Logging activities that have an impact on rivers, water catchment and key species. These will in turn impact eco-tourism activities in the area.
5. Impact of forest activities on NTFPs. The communities have requested that the concessionaire discuss with the community first before logging activities take place in areas where local communities harvest these NTFPS.
6. Request to have concessionaire, relevant government agency and community delineate and map specific areas (e.g. water catchment) together.
7. Translation of the HCVF report into Malay and distributed to the communities so that they know what the contents of the report are, and what key actions the concessionaire has agreed to implement.

Generally, the stakeholders especially the local community leaders and representatives were happy that the findings from the HCV assessment were shared with them and brought to their attention. They were also grateful for the awareness created on Forest Certification and the role local communities played as stakeholders to the certification process.

2.4 Methodology of Study

2.4.1 Fauna

The wildlife surveys covered the whole range of vertebrates from small mammals to big mammals, as well as birds, reptiles (snakes, lizards, tortoises and crocodiles) and amphibians (mainly frogs and toads).

Fauna surveys were carried out during these two periods of time: 17th-25th July and the 7th-13th August 2010. The first visit was to compartments L10 and P35 to assess their biodiversity. The second visit was to P42 and it involved a rapid survey of riparian areas and slopes in P60 and P61.

The surveys involved the use of line transects at randomly selected sites in each compartment. Each line transect was for a distance of 3-5 km. The team looked out for mammal footprints, the presence of dung or crawl marks on tree trunks, and direct sightings of mammals. The team also searched for reptiles. Bird-watching was done during early mornings and late afternoons using binoculars. The team set up 15 mist nets in each study site and made observations at the borders of the compartments. Frog surveys were done at night using headlamps and walking along line transects using the Visual Encountering Survey (VES) method (Hayer, *et.al.*, 1994), while mammal, bird and reptile surveys were mostly done during the day. Direct and indirect sightings of most of the vertebrates were recorded with GPS readings at each locality. The wildlife surveys were done by hearing calls, direct sightings, trapping or catching specimens. Also, some equally useful information was obtained by interviewing staff of SFI or workers in the SFI area.

Wildlife was identified by referring to the keys of each animal class with descriptions, and cross-referencing with museum collections. Analysing the field data and some morphological characteristics were very useful in reconfirming the presence of some species, especially birds, small mammals, snakes, lizards and frogs. The following guides were used to identify species in the field; Heyer *et al.*, 1994, Inger & Chin, 2002; Inger & Stuebing, 2005; Myers, 2009; Payne *et al.*, 1985; Phillips & Phillips, 2009; Smythies, 1999 and Stuebing & Inger, 1999.

At the end of the assessment, management recommendations were put forward for the endangered, threatened or endemic species that need to be protected during conversion of the forest to plantation.

2.4.2 Flora

Flora surveys were carried out using the line transect method in all study sites to estimate the species diversity. Transects were set up randomly within the study sites and all species observed along the transects were recorded. Lower plant groups such as mosses and fungi were excluded from this survey. Therefore, plant species recorded therein refer to the angiosperms (commonly known as flowering plants) and gymnosperms (non-flowering plants). Pteridophytes were recorded in several surveys but

higher plant groups remained the main focus of the assessment. A listing of plant species encountered during the survey was developed to determine the species composition in this area. GPS readings were also taken whenever threatened, endangered and endemic plant species were encountered. In addition, the locality of plants with other important conservation value such as medicinal plants, were recorded. Plant species identification was carried out in the field whenever possible. Specimens were collected if identification was not possible in the field and further evaluation of the specimens was conducted based on cross-referencing with herbarium specimens. All plants were identified to species level, different plant specimens belonging to the same genus level were treated as different species until further confirmation. The surveys also included consultation with local communities for traditional ecological knowledge on plant use such as for medicinal purposes.

2.4.3 Riparian Buffer Zones and Slopes

Study sites were surveyed based on topography, with steep areas given high priority. GPS locality of areas surveyed for steep slopes was recorded. At least five random GPS points were recorded at each of the sites surveyed. Absence, presence or abundance of *Acacia* trees was noted. Survey of the riparian areas to determine buffer zones and boundaries was also carried out. An approximate measure of riparian width was determined for each study site. Stream transects were used for the riparian assessments. Native plant species encountered during the survey of the riparian areas were recorded and added to the list of plant species recorded during the line transect for the floristic survey.

2.4.4 Social Survey

Social surveys were carried out with the assistance of the Corporate Social Responsibility (CSR) Department of SFI. The department liaised with the relevant district offices to obtain the permission needed to carry out surveys in the villages and to obtain relevant information, e.g. lists of villages and villagers who still reside in them. The CSR Department also provided the contact numbers of the Ketua Kampung and JKKK for the interviews. Questionnaires were designed and used to get the feedback from the villagers on their dependency on the forest produces, native customary rights on land issues and on their cultural, archaeological sites and burial grounds. The team then proceeded to the villages and randomly selected villagers for interviews. Recommendations to resolve existing and potential conflicts in relation to HCV attributes were also developed to provide the basis for future management actions. In addition, the study took into consideration the results of the social baseline studies commissioned by SFI and conducted by PACOS Trust (Pacos, 2007, 2008 and 2009).

The social surveys were conducted in three phases. In the first phase, information from three villages at the southern part of SFI (i.e. Long Pasia, Long Mio and Kg Meligan) was collected from 26th-31st July 2010. In the second phase, a total of seven villages of Ulu Tomani area were visited from 16th to 21st August 2010. In the third phase, 6 villages of Sipitang area nearer to L10 were visited from 27th to 31st August 2010. Altogether people from 16 villages were interviewed and photographs taken during the process of interview (See appendices).

3 LOCATION, SITE DESCRIPTION and LANDSCAPE AND DEMOGRAPHIC CHARACTERISTICS

The study sites are located in the SFI area in the Sipitang district of Sabah. The SFI area is located southwest of Sabah, bordering Sarawak and Kalimantan in the south (see Figure 2). It is approximately 200km southwest of Kota Kinabalu. It can be accessed by a JKR road but most of the villages and forest areas can only be accessed by logging roads. The weather conditions in the area are strongly influenced by the periodic monsoon seasons which bring occasional heavy rains. The area receives an average of 3,250mm of precipitation annually, with daily mean temperatures ranging from 25°C to 31°C. The wet season generally occurs during the periods of May to June and December to January. The weather conditions are rather extreme for both wet and dry seasons. Prolonged drought is not uncommon in this area.

Various forest ecosystems are found within and adjacent to the SFI area. These systems differ in coastal and montane habitats. At lower altitudes to around 800m asl, the vegetation is predominantly lowland mixed dipterocarp forest. Heath or kerangas forests are found at higher altitudes of above 1000m asl. This forest type is unique and characterized by infertile soil and low decomposition rate which influences the composition of the plant species in the area. This forest type is also significant for conservation as it contains plant species which have adapted to naturally infertile soil conditions. Any drastic disturbance to the ecosystem may result in further degradation of the soil and cause the ecosystem to be unable to sustain its ecological functions.

Five main study sites within the ITP area were selected for the flora and fauna assessment. The selection of the five study sites was not based on ecosystem nor landscape considerations but on the justification that these areas were going to be converted to plantations in the near future. Nonetheless, the survey sites selected represented the different ecosystems in the SFI area; for example L10 represented the lowland ecosystem, P35, P42, P60 and P61 represented the lower montane ecosystem while the upland Kerangas ecosystem was represented by compartments P42 and P60. Overall, approximately 25-30% of each compartment was covered in the study. Refer to Map 3 for the location of these compartments.

The vegetation at L10 is categorised as predominantly lowland forest. The sites surveyed were located at 500 m asl. The compartment was logged from 1985 until 1990 and this is the only compartment which has not been converted to a plantation (Map 4).

Compartment P35 is an ITP area and planting of *Acacia mangium* and *Eucalyptus grandis* will commence after the harvesting of timber is completed (Map 5). Some parts of P35 are still covered with natural forests and surveys were carried out in these parts of the forests. The terrain of the sites surveyed at P35 is rather steep, with altitudes ranging from 1000 m asl to 1200 m asl. Flora surveys were conducted mainly in patches of natural forests which were left untouched due to their altitude and slopes.

Compartment P42 is an ITP area with half of the compartment in the process of being planted with *Acacia mangium* at areas of lower altitude and *Eucalyptus* sp. at higher altitude. (Map 6).

Compartments P60 and P61 in the southern part of the SFI area near Long Pasia and Long Mio and are NFM areas. These areas are steep, with altitudes ranging from 1300 m asl to 1600 m asl. (Maps 7 & 8).

The vegetation at the lowlands of the study sites comprise secondary forests mixed with remnants of dipterocarp trees from previous logging activities. At higher altitudes in compartments P42, P60 and P61, the vegetation is upland kerangas forest. The logged forests in L10 are dominated by lower canopy species with small to medium diameter trunks. Forest contiguity existed in most areas but gaps and imbalance of forest stature especially at the forest edges affect the landscape of the area. The plantations in surrounding areas at several study sites contributed to the fragmented landscape. The forests surveyed in P60 and P61 are largely still intact and the patchiness is not so obvious. The forest structure is typical of that of a lower montane forest with medium-sized trees and a paucity of dipterocarp species. However, in these forests, species from the Podocarpaceae, Fagaceae, Myrtaceae and Araucariaceae families are dominant.

Social surveys: In the first phase, villagers in Kg Long Pasia, Kg Long Mio and Kg Meligan were interviewed. There are about 60 households in Kg. Long Pasia, 20 households in Kg. Long Mio and 120 households in Kg. Meligan. The main ethnic group in Kg. Long Pasia and Kg. Long Mio is the Lundayeh, while that in Kg. Meligan is the Murut. The communities in these villages are relatively small and rural, and have an older demographic pattern compared to those in Sipitang town. Most of the villagers engage in agricultural activities, while a small number is employed by private and government organisations.

In the second phase, seven other villages, namely Kg Kaang, Kg Lalang, Kg Alutok, K. Bakuku, Kg Malutut, Kg Tinura and Kg Magunsop, were visited. They are located in the eastern part of SFI area, under the Ulu Tomani and Tenom district. Tenom is a multi-racial district. The principal racial groups are Murut (60%), followed by Chinese (20%), Malay (10%), Dusun/Kadazan (8%), and others (2%) which include Indonesian and Filipino.

In the third phase, six villages, namely Kg Melalia, Kg Tanah Karit, Kg Naluyan, Kg Katipor, Kg Sungai Tiga and Kg Pepolor were visited. They are located in the Sipitang district at the northern part of the SFI area. These villages are near to Sipitang town and some are located along the main road leading to it. The population in this area is about 56,000 (Department of Statistics Malaysia, Sabah, 2007). According to Sidik (2004), Kedayan (60%) is the main ethnic group in the Sipitang district, followed by Murut and Lundayeh (30%), and Malay and Chinese (10%). Most of the villagers are subsistence farmers. Only a small group of the villagers work in the private and government sectors.

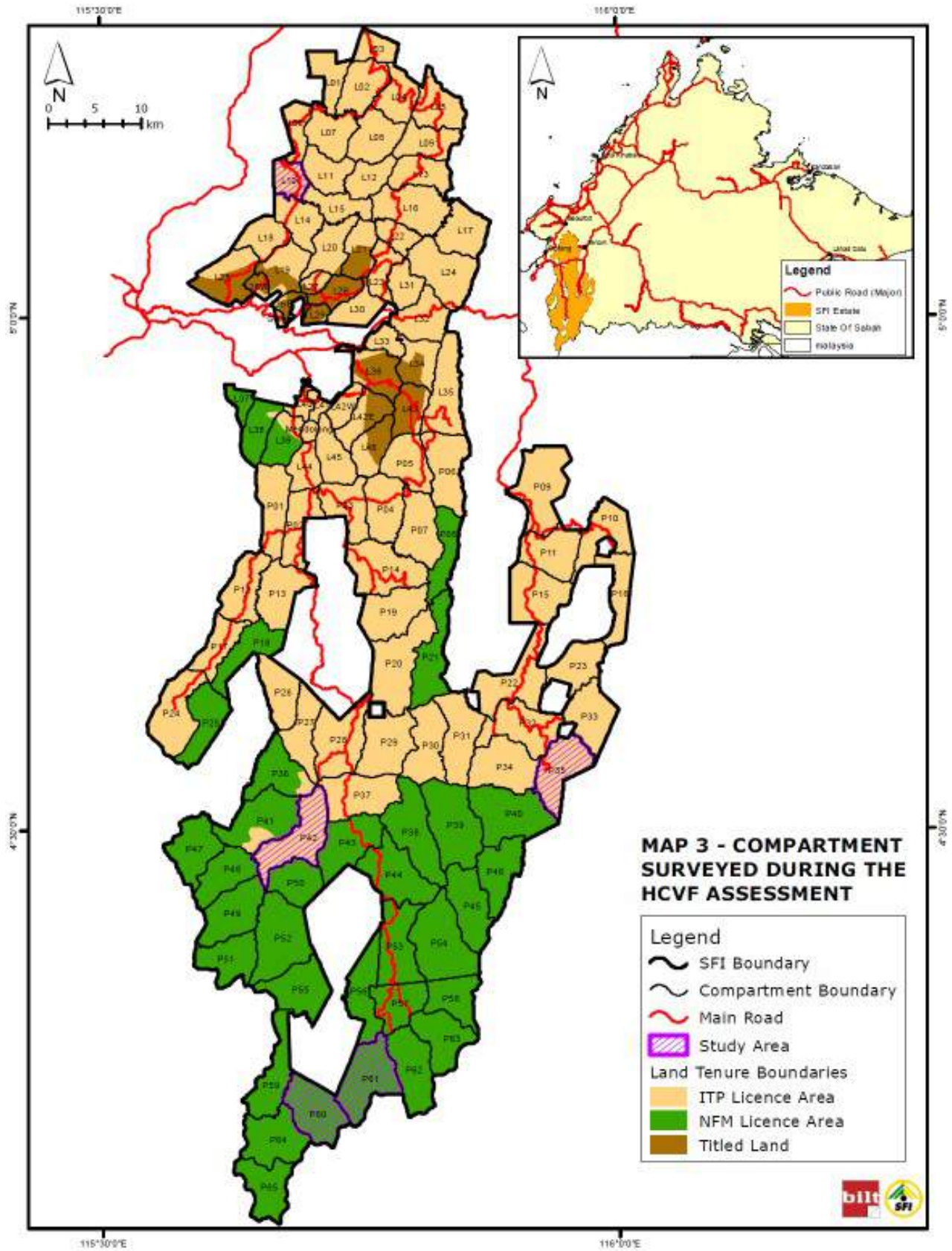


Figure 3. Compartments surveyed during the HCVF assessment

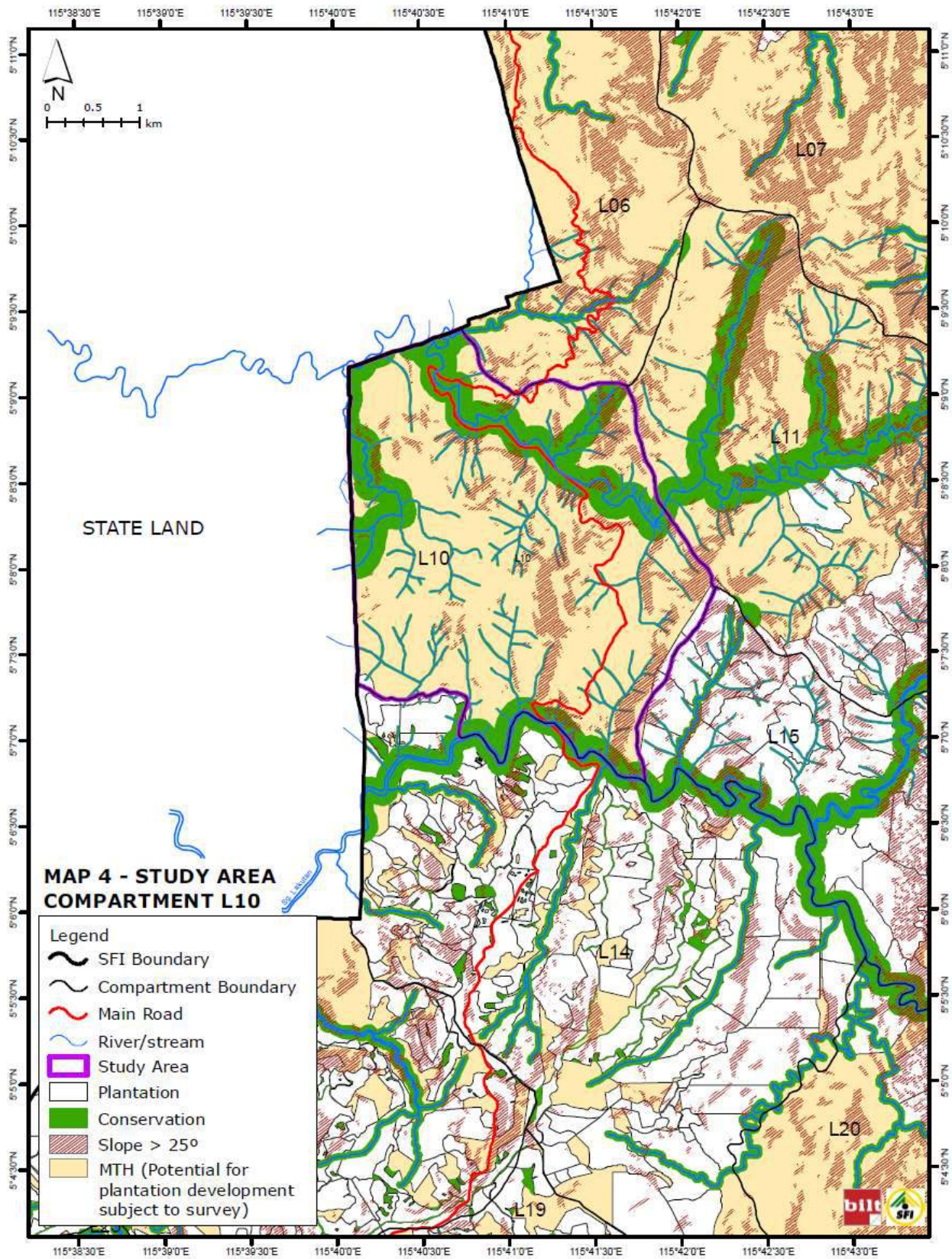


Figure 4. Study Area. Compartment L10

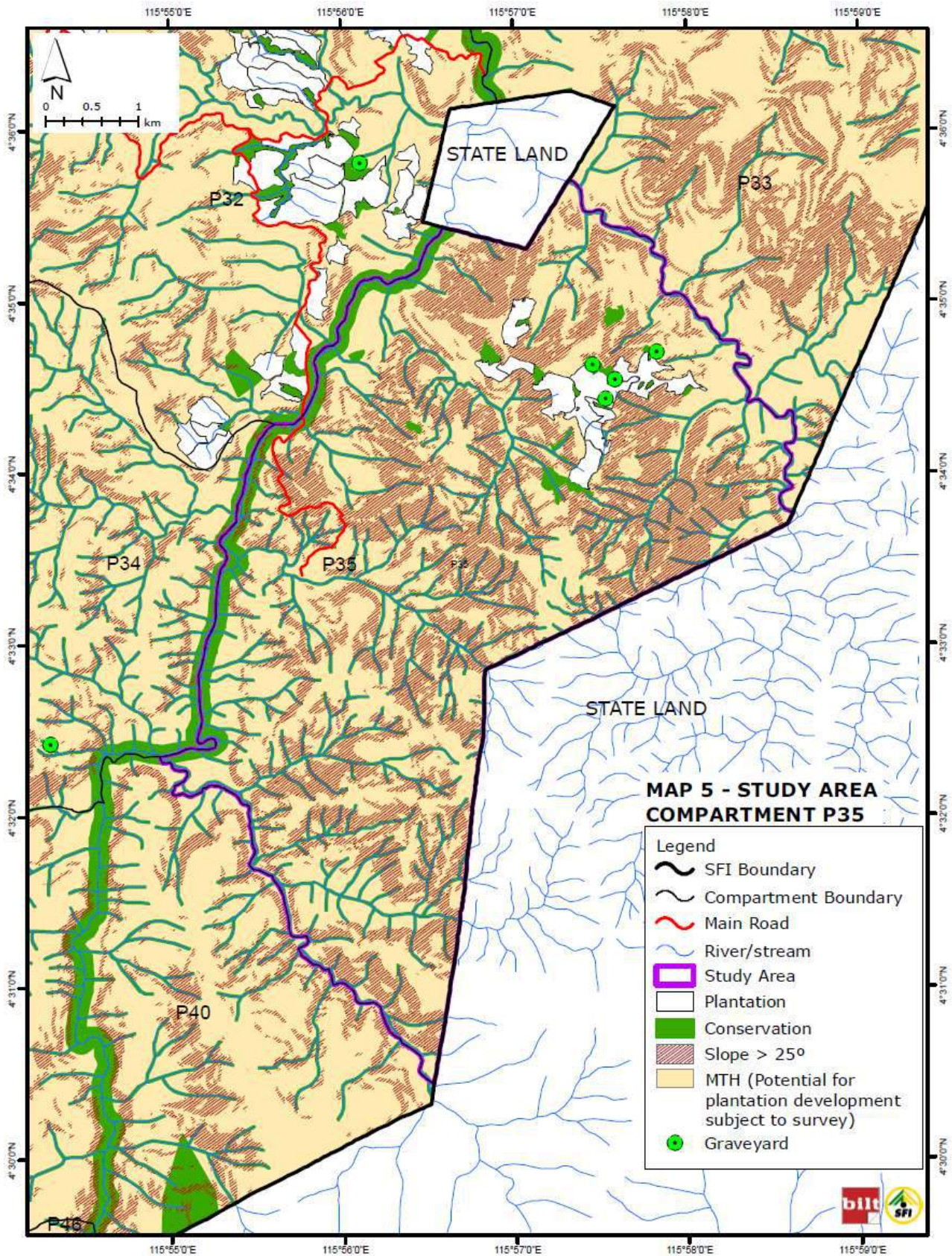


Figure 5. Study Area. Compartment P35

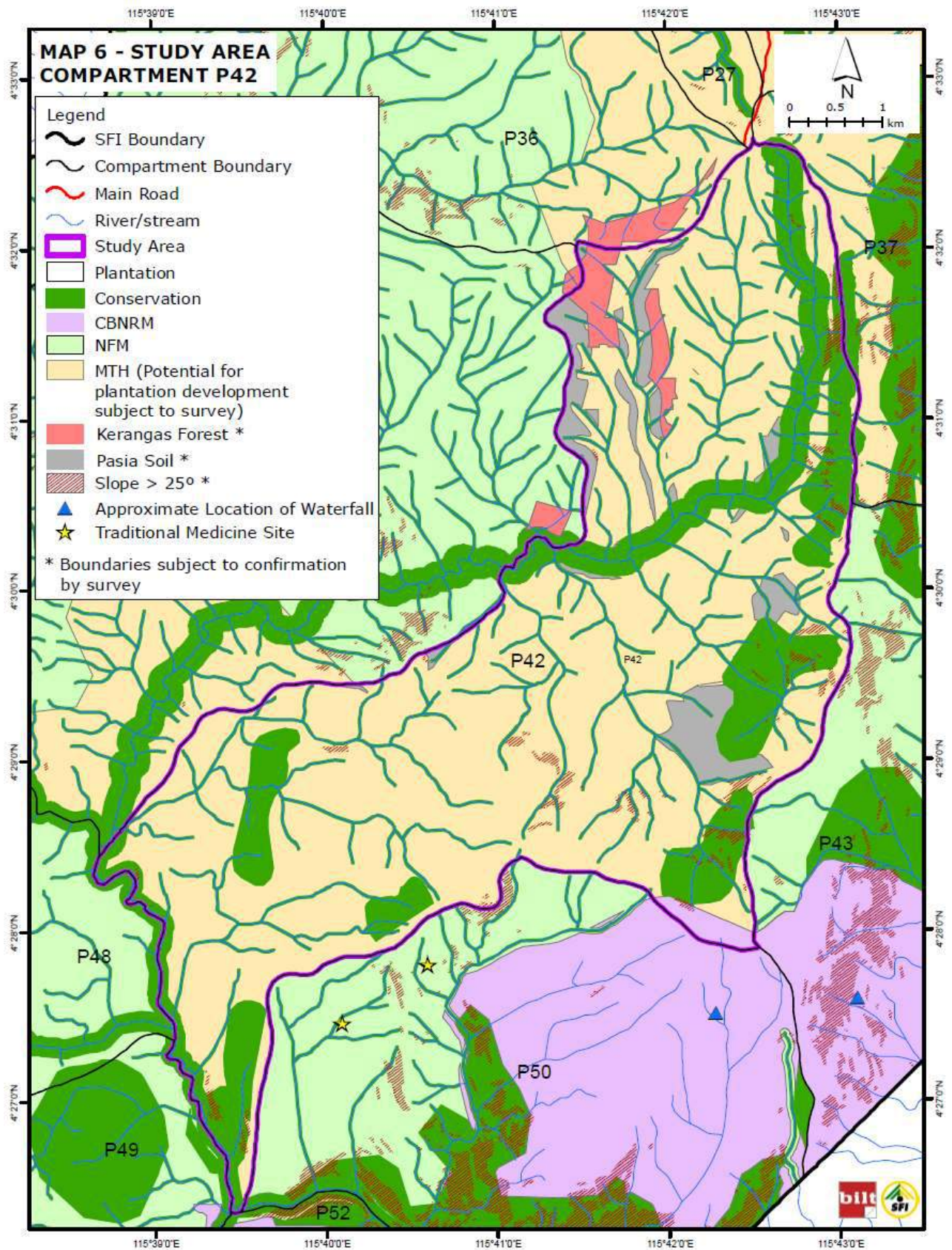


Figure 6. Study Area. Compartment P42
(Note CBNRM – Community Based Natural Resource Management)

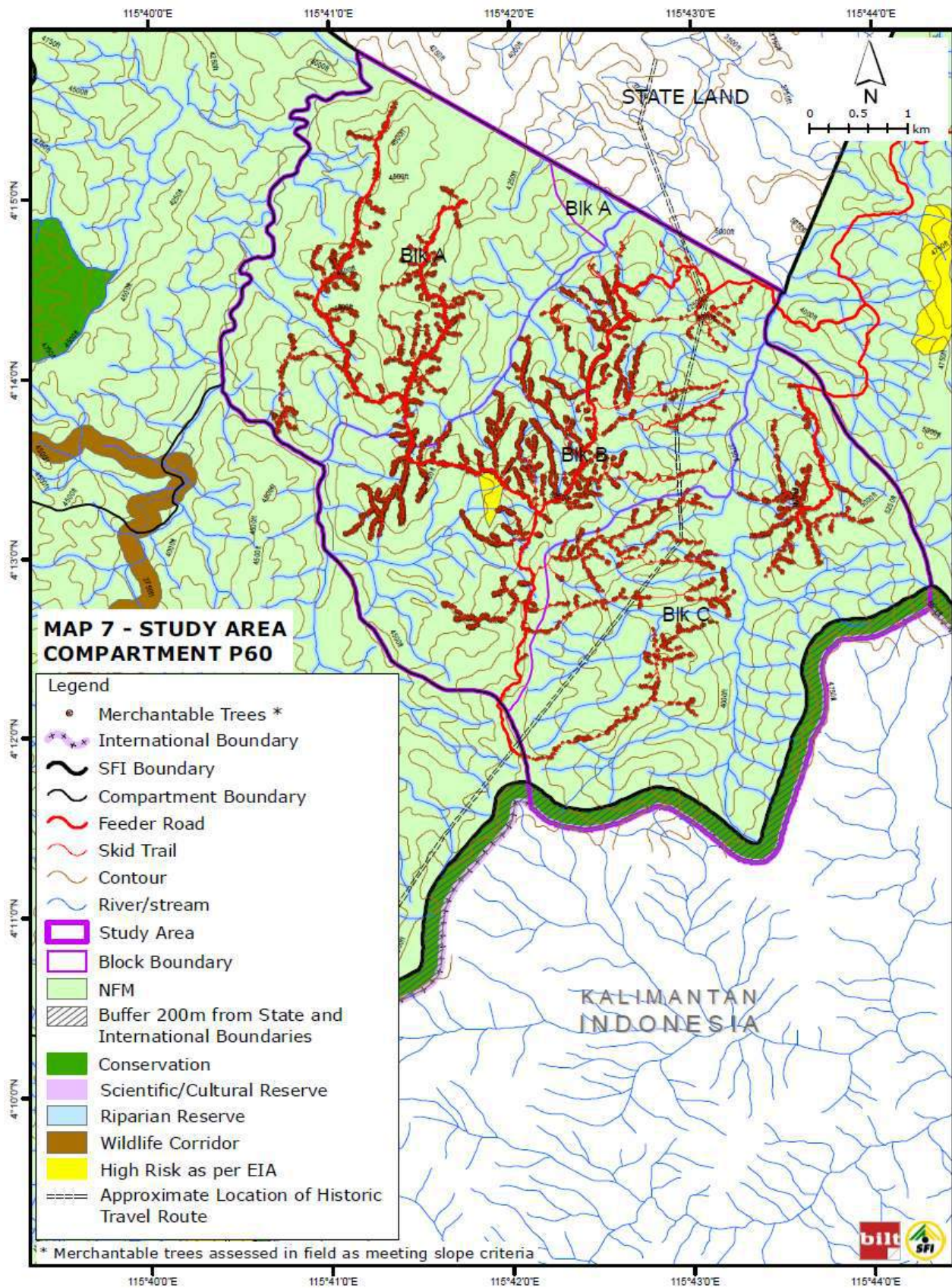


Figure 7. Study Area. Compartment P60

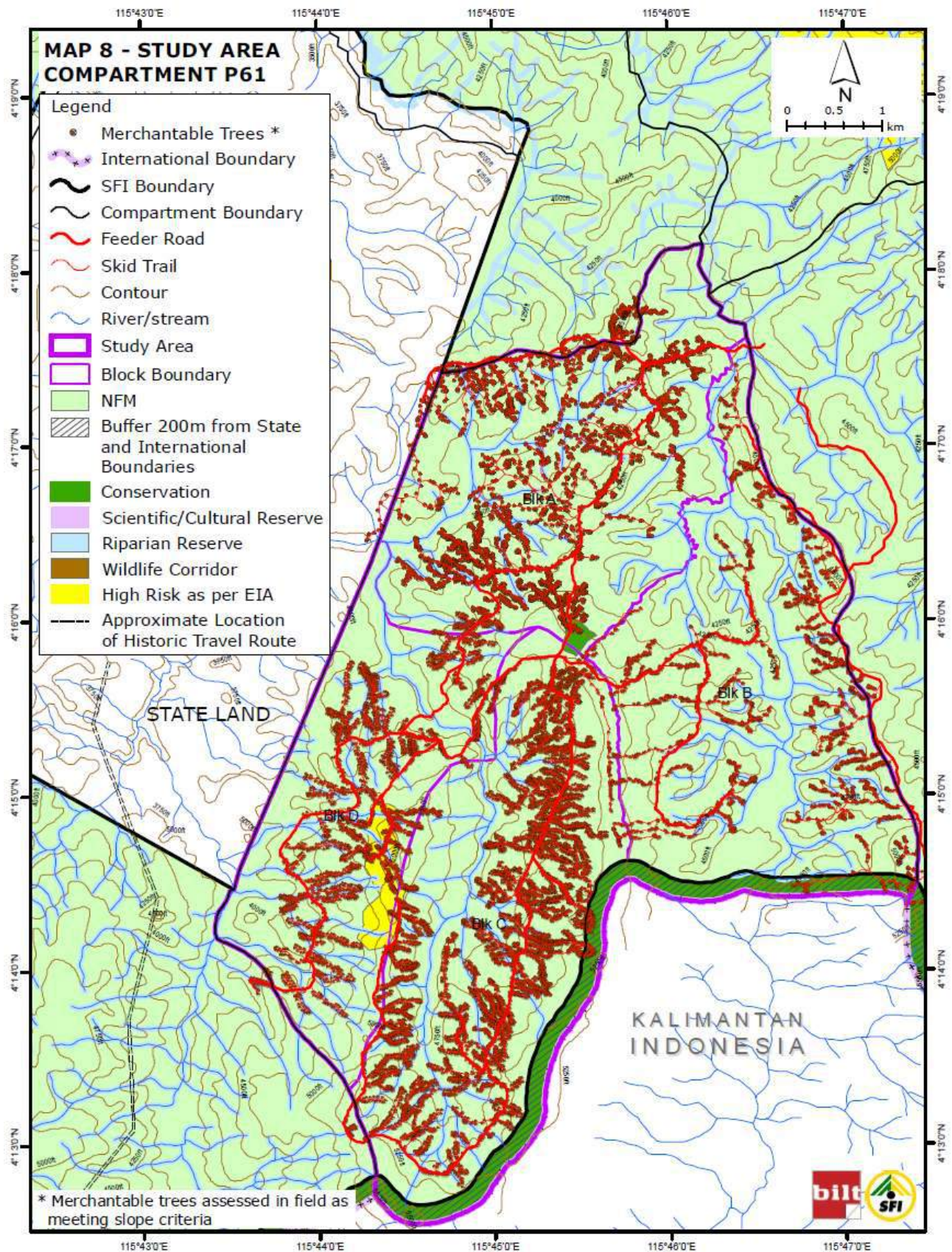


Figure 8. Study Area. Compartment P61

During the study 16 villages (see Figure 9) were visited and their socio-economic, cultural, archeological site and burial ground data were recorded based on discussions with villagers. (See Table 2)

Table 2: Villages surveyed

Villages	Respondents
Long Pasia	37
Long Mio	11
Meligan	36
Kaang	8
Alutok	17
Lalang	16
Malutut	20
Bakuku	26
Tinura	2
Magunsop	2
Melalia	20
Tanah Karit	2
Naluyan	22
Katipor	4
Sungai Tiga	14
Pepolor	11
Total	248

Most of the villages surveyed can be reached by gravel roads, but during the rainy season, many villages become inaccessible due to poor road conditions and flash floods. The bridge at Kg Meligan is quite low and not usable during heavy rains.

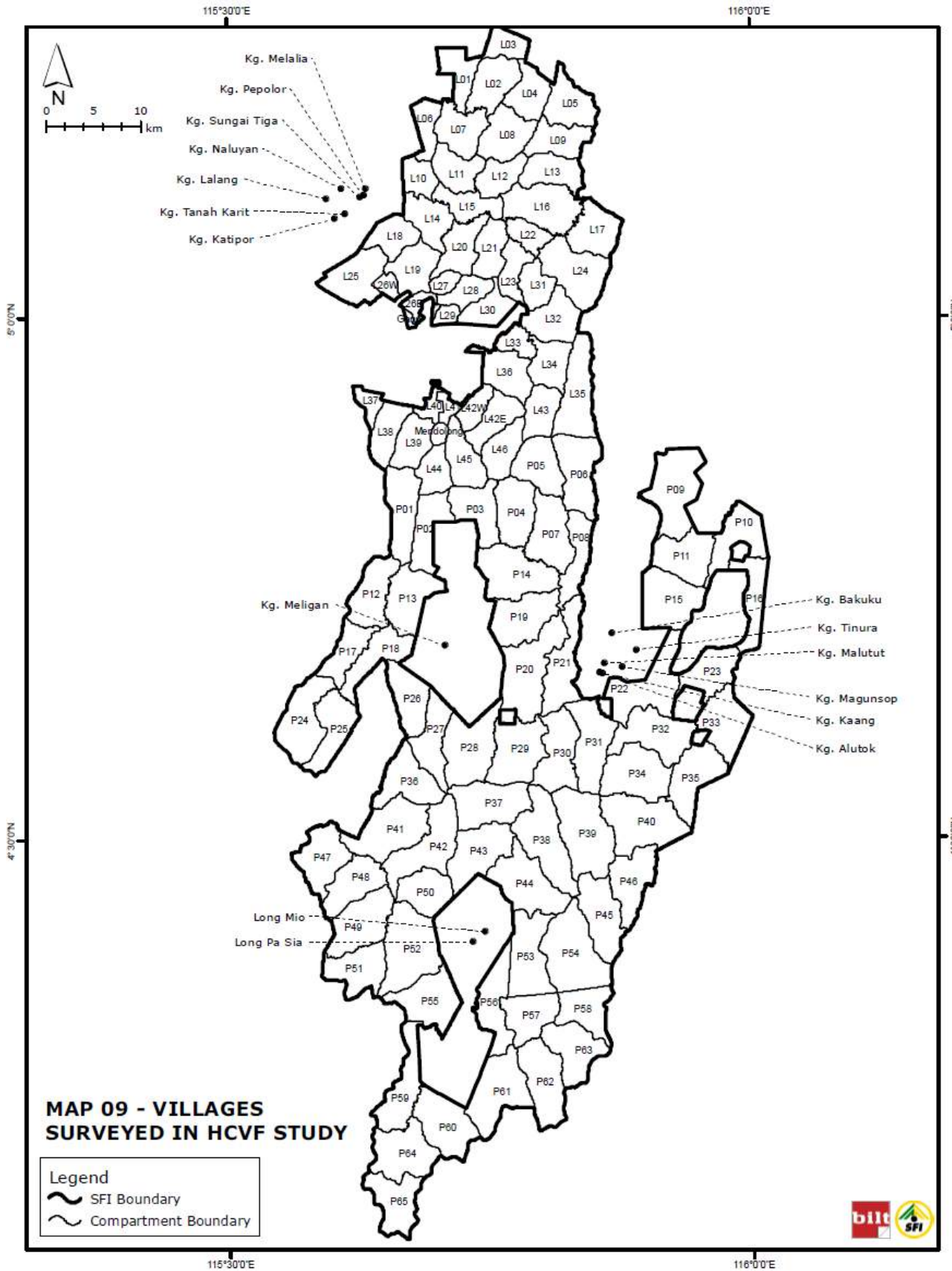


Figure 9. Villages surveyed during the assessment

4 HCVF FULL ASSESSMENT FINDINGS, MANAGEMENT AND MONITORING RECOMMENDATIONS

4.1 HCV 1 Biodiversity Values

Global Toolkit definition: Forest area contains globally, regionally or nationally significant biodiversity values (e.g. endemism, endangered species, and sites of critical temporal use).

There are five Protected Areas (PAs) located adjacent to the SFI Area. They are Gunung Lumaku Forest Reserve (Class I) in the northeast, two small patches of Virgin Jungle Reserves namely Agathis and Sg. Basio, Meligan VJR (Class VI) and Kayan Mentarang National Park in Indonesia.

One species of mammal found in P42 of the SFI area is listed under Schedule I of the Wildlife Conservation Enactment (1997) and it is a fully protected species. This species is the Clouded Leopard (*Neofelis diardii*) classified as vulnerable (IUCN Red List) and listed in the CITES Appendix I (HCV 1.2 present). The Bornean Gibbon was found in P35 and P42. It is categorised as Endangered in IUCN Red list and Schedule II of Wildlife Conservation Enactment, 1997. One species of frog namely *Philautus aurantium* found in P35 is categorised as Endangered under the IUCN Red List.

Most of the bird species found are common residents, local residents, migratory species or winter visitors. Some are endemics while others are threatened species.

Endemism is considered very high in the study sites with 55 endemic fauna and 60 endemic flora species (HCV 1.3 present). Not all NFM areas are cleared. Some areas are conserved, for example, compartments such as P60 and P61. This is so that the natural habitat for fully protected mammal species is protected. However, in other areas, changes to the overall forest structure have resulted in changes to the composition of bird species from closed canopy species to that of more disturbed/open canopy species.

Some areas (such as P60 and P61) are managed under NFM which has minimal effect on their flora and fauna. In terms of biodiversity value, HCVF 1.1 (Protected areas) HCV 1.2 (Threatened and Endangered Species), HCVF 1.3 (Endemic species) and HCV 1.4 (Critical temporal use) were all present. Management recommendations and monitoring recommendations are given in each sub-value.

4.1.1 HCV 1.1 Protected Areas

All forest areas that have been legally gazetted as Protected Areas under Malaysian legislation (either federal or state), are HCV 1.1. The Master List of Protected Areas in Malaysia, commissioned by the Ministry of Natural Resources and Environment, has listed all areas that fall under this category, and should therefore be the first point of reference. However, it is noted that in Sarawak there is no overlap between FMUs and TPAs (HCVF Toolkits for Malaysia, 2009).

Findings

HCV	Key Questions	Findings
1.1	Does the SFI concession area contain any legally gazetted Protected Areas in or adjacent to its forest?	Present

SFI area is adjacent to five legally gazetted protected areas. These include Gunung Lumaku Forest Reserve (Class I), Agathis, Sg. Basio and Meligan VJR (Class VI) and the Kayan Mentarang National Park (Indonesia) (Figure 10). These five protected areas have significant biodiversity value due to their status as fully protected area. They also provide refuges for the wildlife in this area.

Gunung Lumaku Forest Reserve consists of two parts: Gunung Lumaku upper (in Forestry Department Map No. 84/36B) gazetted in 1984, covering 5180 ha; and Gunung Lumaku lower (in Forestry Department Map No. 69/73) gazetted in 1992, covering 6666 ha.

Meligan VJR covers 9240 ha and does not have a management plan in place yet. The VJR is surrounded by the SFI area, except for the south-western part that is bordering the state of Sarawak. The closest settlements are located about 4 km northeast of the VJR. They are Kg. Meligan, Kg. Antarulan and Kg. Mankabang.

The VJR area that is classified under Maliau Association is well-drained. However, the area classified as Sipitang Association on the southern part which is within the Meligan range basin is poorly drained due to its swampy conditions. Three tributaries flow from this VJR into the MeliganMeligan River.

The vegetation within the MeliganFR is undisturbed and is largely classified as a lower montane forest. Based on the geomorphology of the area, various forest types are recognized in relation to distinct edaphic conditions. There are five forest types, which are:

1. Lower montane ericaceous kerangas forest
2. Lower montane kerangas forest
3. Lower montane oak-chestnut forest
4. Lower montane alluvial forest
5. Lower montane peat swamp forest

The lower montane peat swamp forest is found in the Meligan range basin. It has been suggested that the basin was inundated with water in the past, and the succession of vegetation in the area prompted

the accumulation of organic matter from the remaining poorly decomposed plants and formed peat. There are five phases of plant communities, with zonation of sub-forest types being influenced by the depth of the peat. The forest on the shallow and drier peat area is structurally greater in size and possesses higher species number compared to that on the deep and wetter peat area.

In terms of species composition, most species found in Meligan FR belong to the lower montane forest species that are common in highland areas like Kinabalu, Crocker and Trusmadi. Many of the species encountered are new records for Meligan, previously recorded only in other highland areas. For example, the epiphytic orchid, *Dendrobium spectatissimum*, so far only recorded in the Kinabalu area, is now found in Meligan. There are two un-described species, i.e. *Rothmannia* sp. nov and *Porterandia* sp. nov identified in the SFI area during the HCV assessments.

Sg Basio (213ha) and Agathis (200ha) are small VJRs (Table 3), but they also can provide refuge for wildlife from the adjacent compartments of SFI.

Table 3. Protection Forest Reserves according to the Forest Enactment, 1968

Class	Forest Reserve	F.D. Map	L.S. Plan	Latitude	Size (ha)	Gazetted/ Re-gazetted	District	IUCN
Class I	Gn. Lumaku	84/36B	99194489	5°07'N/115°52'E	5,180	14.03.1984	Tenom	IV
Class VI	Agathis	98/7B	99194607	4°38'N/115°51'E	200	14.03.1984	Tenom	Ia
Class VI	Sg. Basio	98/6B	99194571	4°37'N/115°46'E	213	14.03.1984	Sipitang	Ia
Class VI	Meligan	97/11A	99194583	4°34'N/115°38'E	9,240	14.03.1984	Sipitang	III

Note: Class I – Protection Forest Reserves
Class VI – Virgin Jungle Reserves (VJR)

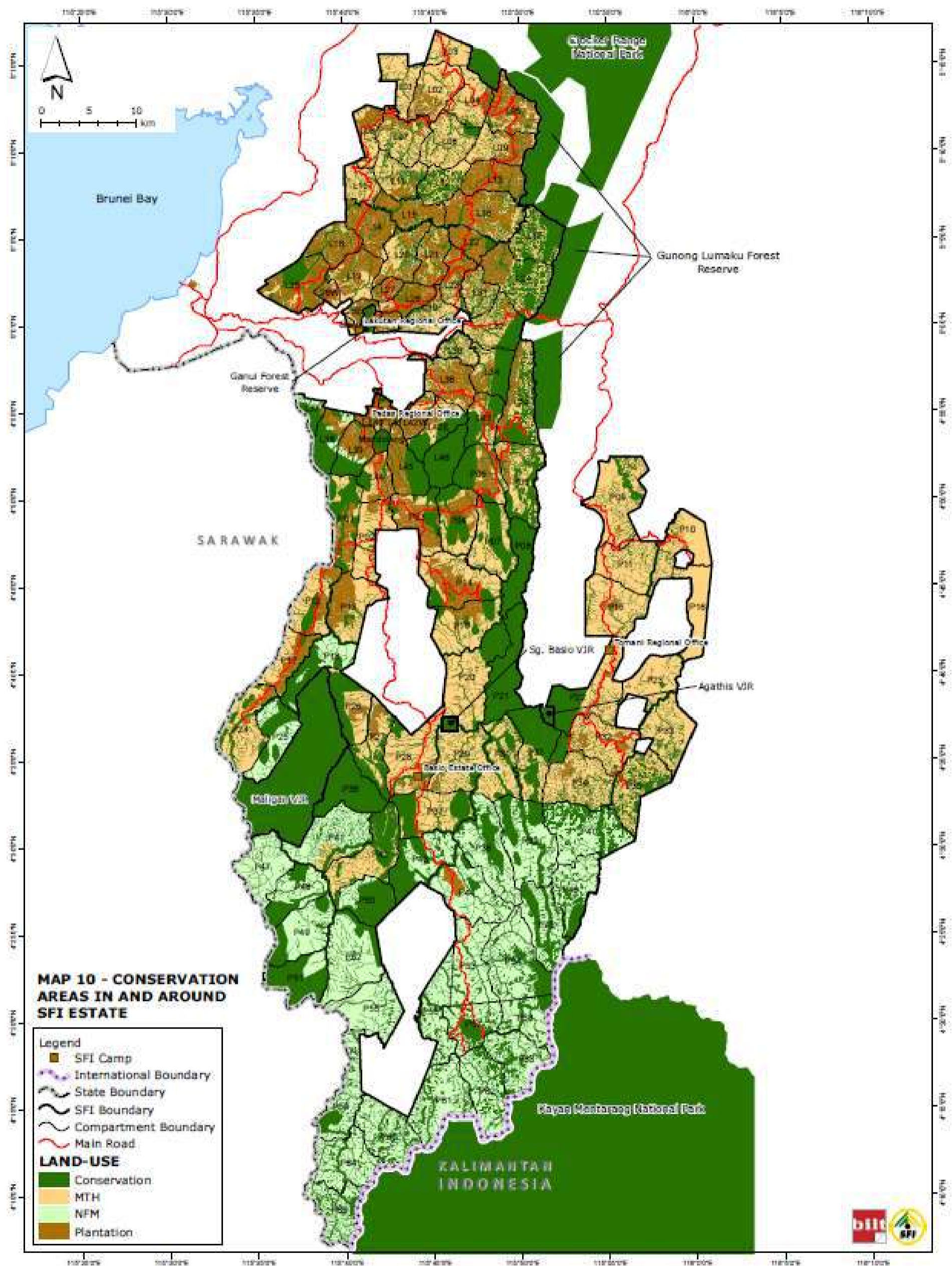


Figure 10.

Protected areas in and adjacent to the SFI Estate

(NFM - Natural Forest Management areas which will be maintained as natural forest
MTH Mixed Tropical Hardwoods. These are areas of secondary forest which will be evaluated for conversion to plantations)

Management Recommendations for HCV 1.1

1. The boundaries of the protected areas should be identified and demarcated clearly.
2. All rules and regulations governing activities inside the protected areas should be enforced by Sabah Forestry Department. Class I Forest Reserves, like Gunung Lumaku, are fully protected and as such no activity can be carried out there. The same consideration should be given for Virgin Jungle Reserves such as Agathis, Sg. Basio and Meligan VJR (Class VI) which are also fully protected. Even though most of Meligan VJR is surrounded by the SFI concession except the south-western part, there should be regular patrolling and strict enforcement to ensure there is no encroachment into the VJR either for hunting purposes or to extract forest timbers and/or NFTP. Since there are villages near this VJR, the SWD and SFD should conduct regular patrols. Efforts should also be made to check the boundaries and access roads to the VJR
3. A 100-metre wide buffer zone on either side of all fully protected areas should be set aside. This will ensure there is increased protection for the protected areas as only very limited types of activities are allowed within these buffer zones. Activities such as infrastructure development, logging, hunting or fishing activities should be prohibited.
4. Connectivity using wildlife corridors or pathways of at least a 100m width within the compartments of the licensed areas and between the SFI Area and Protected Areas to allow movement of wildlife should be maintained. This continuity will ensure that there is sufficient genetic exchange among the plants and animals of the areas concerned and those of the surrounding forests.

Monitoring Recommendations for HCV 1.1

1. A long-term monitoring plan should be developed so that any encroachment into the protected areas can be recorded. Any weaknesses on the enforcement can then be highlighted and improvements can be made accordingly.
2. The long-term monitoring of the flora and fauna in the protected area is crucial. This will also help in the tracking of the migration of fauna into the protected areas.

4.1.2 HCV 1.2 Threatened and Endangered Species

Any species categorised as either Critically Endangered (CR), Endangered (EN) or Vulnerable (VU) on the IUCN Red List, Appendix I of CITES or listed as protected under Malaysian legislation (federal or state), is HCV 1.2. However, for practical reasons forest managers may want to limit field surveys of fauna to mammals (particularly large ones, over 20kg in weight), birds and herpetofauna, unless literature indicates that there are other species in the area which require specific attention. This does not mean that other taxa are unimportant, and wherever possible, if the expertise and survey protocols are available, these should be covered too. It is also recommended that cross-checks be done between the IUCN Red List and the Malaysian Red Data Book, once that is available. Where there may be differences between the Malaysian Red Data Book and the IUCN Red List, the Malaysian Red Data Book should always take precedence (HCVF Toolkits for Malaysia, 2009).

Findings

HCV	Key Question	Findings
1.2	Does the SFI area contain any flora/fauna species categorised by the IUCN as CE, E or VU; CITES Appendix 1 or protected under the Malaysian legislation?	Present

Flora

Results from the flora surveys show that P42 has the highest number of species recorded (257 sp) while L10 has 61 species and P35 has 62 species (Figure 11). Orchids were recorded only in P42 and this may explain why there is higher diversity of plant species in the area. The species composition includes all identified species and morphospecies. Certain species could not be identified down to the species level due to their infertile state (fruits or fruits were absent). However, all infertile specimens were successfully identified to genus level.

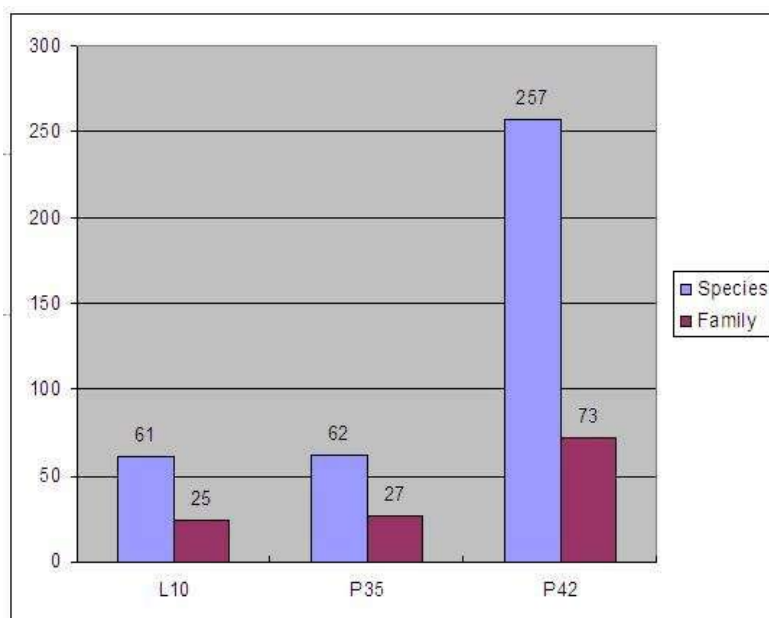


Figure 11. Plant diversity at study sites

L10

61 species from 25 families are recorded in L10 (Appendix B, Table 1). A mixture of secondary plant species interspersed with *Shorea* spp. and other dipterocarp species are observed in this area. *Macaranga* species, an indicator of disturbed forests, is commonly found in L10, suggesting a lower quality in terms of the forest value. This can probably be attested by the fact that this compartment had been logged over before and some parts had been converted to plantations. However, dipterocarp trees such as *Dryobalanops lanceolata*, *Shorea parvifolia* and others are frequently encountered within the forest implying that the remnants of the species of the original forest are regenerating well despite being logged over previously. Several species of common pitcher plants are also found in L10, namely, *Nepenthes mirabilis*, *N. gracilis* and *N. rafflesiana*. These species of pitcher plants have a wide distribution in Sabah and other areas of the Malesian region. A list of plant species found in L10 is provided in Appendix B, Table 1.

P35

This site is an Industrial Tree Plantation (ITP) area with current operations of timber extraction. The floristic survey in the patches of the natural forest in this area reveals that it still contains natural species of the original vegetation. 62 species from 27 families were found in P35 (Appendix B, Table 2). The species in this area are predominantly lower montane or sub-montane species with *Agathis* spp, *Lithocarpus* spp. and *Elaeocarpus* spp. commonly encountered. Several economically important species are found, namely *Agathis dammara*, *Aquilaria malaccensis*, *Vatica* sp, *Palaquium gutta* and *Shorea* spp. Secondary plant species are less abundant in P35 except in several open areas where *Melastoma malabathricum* has successfully invaded the areas. The plant species encountered in P35 are listed in Appendix B, Table 2.

P42

A total of 257 species from 73 families are recorded in the forest surveyed in P42 (Appendix B, Table 3). The forest is of montane kerangas/heath vegetation with *Agathis*, *Dacrydium*,

Dacrycarpus, *Litsea* and *Eugenia* being the dominant species. One of the *Agathis* species, *Agathis dammara*, is an important economic tree species, harvested for its high quality timber. It is observed that *Agathis dammara* trees are not as abundant as *A. borneensis*, and only small diameter trees were found. The low abundance of this tree species is attributed to the harvesting of mature trees for commercial purpose. The species in this area are listed in Appendix B, Table 3.

It was found that an important plant species listed under CITES Appendix II is present in P35. The species is the *Aquilaria malaccensis* (Thymelaeaceae - agar wood, known in Malay as *gaharu*). The species is also listed as endangered in the IUCN Red List. *A. malaccensis* is protected due to its diminishing abundance in the wild as a result of over-exploitation (i.e. illegally extraction of the trees) and habitat loss. The extremely high prices paid for high quality agar wood, the essential oil extracted from this wood and the indiscriminate felling of diseased and healthy trees threaten the natural stands of *Aquilaria* including *A. malaccensis* towards extinction. High market prices for agar wood and the essential oil extracted from it, as well as the indiscriminate felling of these trees are driving this species towards extinction.

Another species that is listed under CITES Appendix II is *Gonystylus keithii* of the same family as *A. malaccensis*. The listing subjects the species to limited commercial use and stringent monitoring through a permit system.

A *Tetrastigma* sp, a host plant for *Rafflesia* is found in P42. All species of *Tetrastigma* are legally protected as stated in Schedule I of the Wildlife Conservation Enactment 1997 (HCV 1.2 present). A majority of the plant species are timber species of the Dipterocarpaceae family. Six dipterocarp species are listed as CR in the IUCN Red List. These species are *Hopea ferruginea*, *Dipterocarpus validus*, *Shorea smithiana*, *S. johorensis*, *S. gibbosa* and *S. superb*. Most of the species which were listed as VU, EN, or CR are found to be quite common in the study sites. However their distribution is local and restricted to scattered forest patches. They will face extinction if threats to their survival are not removed. Human intervention may be deemed necessary to increase the chances of survival of these species.

Plants species categorised as critically endangered (CR), endangered (EN) and vulnerable (VU) by the IUCN Red List are presented in Table 4-6.

Table 4. Globally significant plant species occurring in P35

Species	Family	GPS location	Status
<i>Hopea ferruginea</i>	Dipterocarpaceae	N04°33'00.9" E115°57'16.1" (Alt:1195m)	CR
<i>Shorea platyclados</i>	Dipterocarpaceae	N04°33'09.1" E115°57'20.7" (Alt:1262m);	EN
		N04°32'42.0" E115°56'55.5"	
<i>Aquilaria malaccensis</i>	Thymelaeaceae	N04°32'42.0" E115°56'55.5" (Alt:1051m)	VU, CITES Appendix II
<i>Shorea ovate</i>	Dipterocarpaceae	N04°32'42.2" E115°56'18.0", (Alt.1059m)	EN
<i>Durio acutifolius</i>	Bombacaceae	N04°32'42.0" E115°56'55.5" (Alt:1051m)	VU

Table 5. Globally significant plant species occurring in L10

Species	Family	GPS location	Status
<i>Shorea macrophylla</i>	Dipterocarpaceae	N05°08'50.8"E115°40'54.2"	VU
<i>Dipterocarpus validus</i>	Dipterocarpaceae	N05°08'46.9" E115°40'59.6"	CR

<i>Shorea smithiana</i>	Dipterocarpaceae	N05°08'50.1" E115°41'08"	CR
<i>Shorea johorensis</i>	Dipterocarpaceae	N05°08'26.0" E115°41'33.3"	CR
<i>Shorea gibbosa</i>	Dipterocarpaceae	N05°08'59.9"E115°41'00.7"	CR
<i>Shorea superb</i>	Dipterocarpaceae	N05°08'12.6" E115°41'37.2"	CR
<i>Dryobalanops lanceolata</i>	Dipterocarpaceae	N05°07'12.1"E115°41'38.0"; N05°08'59.5" E115°41'05.0"	EN
<i>Shorea ovata</i>	Dipterocarpaceae	N05°08'57.0"E115°41'06.7"	EN

Table 6. Globally significant plant species occurring in P42

Species	Family	GPS location	Status
<i>Agathis dammara</i>	Araucariaceae	N 04° 29.134', E 115° 39.914'	VU
<i>Bulbophyllum jolandae</i>	Orchidaceae	N 04° 29.058', E 115° 39.979'	Endemic to Borneo(Ulu Padas)
<i>Coelogyne gibbifera</i>	Orchidaceae	N 04° 29.196', E 115° 39.908'	Endemic to Borneo
<i>Cotylelobium melanoxylon</i>	Dipterocarpaceae	N 04° 29.075', E 115° 39.858'	VU
<i>Gonystylus keithii</i>	Thymelaeaceae	N 04° 29.027', E 115° 40.081'	VU/CITES Appendix II
<i>Podocarpus brevifolius</i>	Podocarpaceae	N 04° 29.063', E 115° 40.182'	VU
<i>Shorea platyclados</i>	Dipterocarpaceae	N 04° 29.197', E 115° 39.880'	EN
<i>Tetrastigma diepenhostii</i>	Vitaceae	N 04° 28.935', E 115° 39.988'	Schedule I Wildlife Conservation Enactment 1997
<i>Hopea ferruginea</i>	Dipterocarpaceae	N04°33'00.9" E115°57'16.1"(Alt:1195m)	CR
<i>Shorea platyclados</i>	Dipterocarpaceae	N04°33'09.1" E115°57'20.7" (Alt:1262m); N04°32'42.0" E115°56'55.5"	EN
<i>Aquilaria malaccensis</i>	Thymelaeaceae	N04°32'42.0" E115°56'55.5" (Alt:1051m)	VU, CITES Appendix II
<i>Shorea ovate</i>	Dipterocarpaceae	N04°32'42.2" E115°56'18.0", (Alt:1059m)	EN
<i>Durio acutifolius</i>	Bombacaceae	N04°32'42.0" E115°56'55.5" (Alt:1051m)	VU

Fauna

Mammals

Overall, 30 mammal species from 13 families were recorded in all study sites. Eight mammal species (including large mammals, non-volant small mammals and bat) from seven families were found in compartment L10 (Appendix B, Table 4). Common large mammals which are classified as Vulnerable (VU) in IUCN Red List and Wildlife Conservation Enactment or WCE 1997 (SWD, 1997) Schedule III, such as Bearded Pig (*Sus barbatus*), and Sambar Deer (*Cervus unicolor*) were found here. The Long-tailed Macaque (*Macaca fascicularis*), which is protected under WCE 1997 Schedule II, was found in this compartment as well (HCV 1.2, Table 7).

In compartment P35, 17 species of mammals from nine families were identified (Appendix B, Table 5). The Bornean Gibbon (*Hylobates muelleri*), which is classified as Endangered (EN) in IUCN Red List, protected under WCE 1997 Schedule II and CITES Appendix I, was found here (Table 8). The Hose's Langur (*Presbytis hosei*) and Binturong (*Arctictis binturong*), which are classified as VU in the IUCN Red List and protected under WCE 1997 Schedule II, were also present. The Giant Squirrel (*Ratufa affinis*) and Long-tailed Macaque (*Macaca fascicularis*) protected under WCE 1997 Schedule II were present in P35 (Table 8). Vulnerable species such as the Bearded Pig and Sambar Deer were also present (Table 8).

A higher diversity of wildlife was recorded in compartment P42 with 18 species from 10 families (Appendix B, Table 6). The largest cat in Borneo, the Clouded Leopard (*Neofelis diardi*), which is classified as VU in IUCN Red List, protected under WCE 1997 Schedule I and CITES Appendix I, was found in this compartment. The Bornean Gibbon was also recorded in P42. An otter (*Lutra sp.*), classified as NT in the IUCN Red List, protected under WCE 1997 Schedule II and CITES Appendix II was also found (Table 9). Vulnerable species such as Bearded Pig and Sambar Deer were present here as well.

Foot prints of the Clouded Leopard (*Neofelis diardi*) were seen, and Bornean Gibbons were seen and heard almost every morning in P42. The Clouded Leopard is mainly nocturnal and arboreal, but sometimes active during the day. It is usually found in logged forest and often travels on the ground. Their numbers are believed to have decreased due to deforestation and forest conversion to plantation (Payne *et. al.*, 1985, IUCN Red List of Threatened Species, Version 2010.4).

Sambar Deer and Bearded Pigs were commonly found in all survey sites. Although classified as Vulnerable in the IUCN Red List, they are commonly found in Sabah (Figure 12). As they are protected under schedule III of WCE 1997, the hunting of these species is regulated by the issuance of licences by the Sabah Wildlife Department (Figure 13). In order to conserve these species poaching needs to be prevented by SFI.

Table 7. List of mammals with HCV1.2 found in L10

Family	No	Common Name	Species	WCE (SWD)	Status CITES	IUCN
CERCOPITHECIDAE	1	Long-tailed Macaque	<i>Macaca fascicularis</i>	II		LC
CERVIDAE	2	Sambar Deer	<i>Cervus unicolor</i>	III		VU
SUIDAE	3	Bearded Pig	<i>Sus barbatus</i>	III		VU

3F, 3sp

Table 8. List of mammals with HCV 1.2 found in P35

Family	No	Common Name	Scientific Name	WCE (SWD)	Status CITES	IUCN
CERCOPITHECIDAE	1	Long-tailed Macaque	<i>Macaca fascicularis</i>	II		LC
	2	Hose's Langur	<i>Presbytis hosei</i>	II		VU
CERVIDAE	3	Sambar Deer	<i>Cervus unicolor</i>	III		VU
	4	Muntjac	<i>Muntiacus sp</i>	III	II	LC
FELIDAE	5	Leopard Cat	<i>Felis bengalensis</i>	II		
HYLOBATIDAE	6	Bornean Gibbon	<i>Hylobates muelleri</i>	II	I	EN
	7	Giant Squirrel	<i>Ratufa affinis</i>	II		NT
VIVERRIDAE	8	Binturong	<i>Arctictis binturong</i>	II	II	VU
	9	Small-toothed Palm Civet	<i>Arctogalidia trivirgata</i>	II		LC

5F, 9sp

Table 9. List of mammals with HCV 1.2 found in P42

Family	No	Common Name	Species	WCE (SWD)	Status CITES	IUCN
CERVIDAE	1	Sambar Deer	<i>Cervus unicolor</i>	III		VU
	2	Barking Deer	<i>Muntiacus sp</i>	III	II	LC
FELIDAE	3	Clouded Leopard	<i>Neofelis diardi</i>	I	I	VU
HYLOBATIDAE	4	Bornean Gibbon	<i>Hylobates muelleri</i>	II	I	EN
	5	Giant Squirrel	<i>Ratufa affinis</i>	II		NT
MUSTELIDAE	6	Otters	<i>Lutra sp</i>	II	II	NT
SCIURIDAE	7	Kinabalu Squirrel	<i>Callosciurus baluensis</i>	II		LC
SUIDAE	8	Bearded Pig	<i>Sus barbatus</i>	III		VU

6F, 8sp

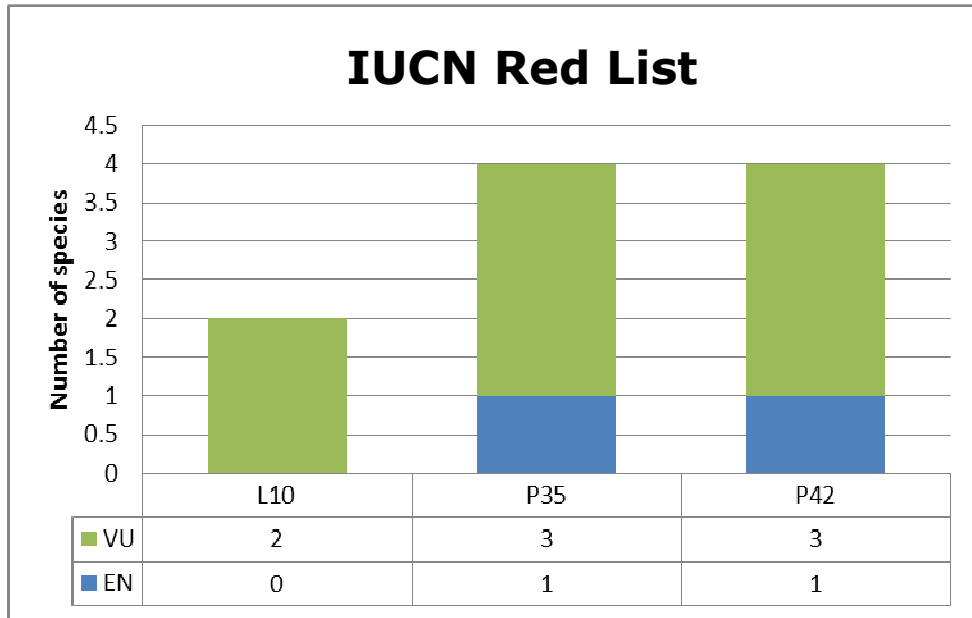


Figure 12. IUCN Red List mammals in Compartments L10, P35 & P42

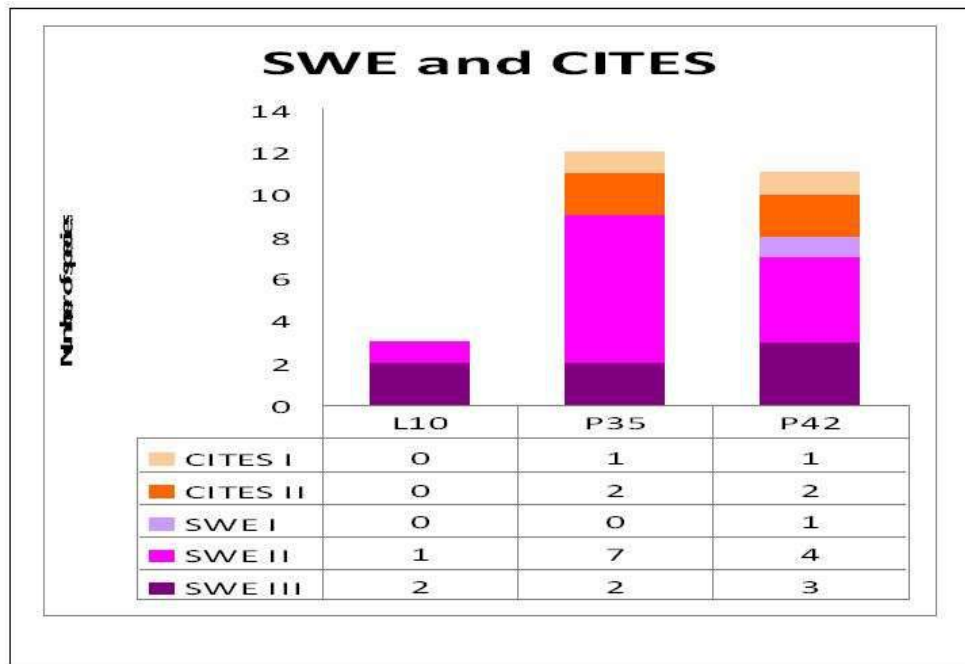


Figure 13. WCE (SWD) and CITES listed mammals in Compartments L10, P35 and P42

Birds

Overall, 141 species of birds from 39 families were recorded throughout this survey. 25 species of birds that are classified as Near Threatened (NT) in the IUCN Red List were found in these compartments (Figure 14).

72 species of birds from 30 families were found in the SFI compartment L10 (Appendix B, Table 7). Out of them, 10 species (*Aegithina viridissima*, *Buceros rhinoceros*, *Pericrocotus igneus*, *Chloropsis cyanopogon*, *Eurylaimus ochromalus*, *Microheirex latifrons*, *Cyornis turcosus*, *Anthreptes rhodolaema*, *Malacopteron affine*, and *Trichastoma rostratum*) are classified as NT in the IUCN Red List and one species (*Mulleripicus pulverulentus*) is classified as VU (Table 10). The rest of the species are mainly classified as LC in the IUCN Red List and they are also common residents, winter visitors, montane residents, lowland residents and nomadic residents throughout Borneo. 10 bird species are protected under WCE 1997 Schedule II (Figure 15). They are *Spilornis cheela*, *Aerodramus fusiphagus*, *Buceros rhinoceros*, *Chalcophaps indica*, *Chrysococcyx xanthorhynchus*, *Microheirex latifrons*, *Cyornis turcosus*, *Loriculus galgulus*, *Gracula religiosa* and *Trichastoma rostratum* (Table 10).

Compartment P35 is reported to have 74 species from 29 families (Appendix B, Table 8). Of those, 10 species are classified as NT in the IUCN Red List (Table 11). These are *Buceros rhinoceros*, *Buceros vigil*, *Platylophus galericulatus*, *Phaenicophaeus diardi*, *Eurylaimus ochromalus*, *Anthreptes rhodolaema*, *Ixos malaccensis*, *Alcippe brunneicauda*, *Malacopteron affine* and *Trichastoma rostratum*. Five bird species found in this compartment are protected under WCE 1997 Schedule II. They are *Spilornis cheela*, *Buceros rhinoceros*, *Rhyticeros undulates*, *Chalcophaps indica* and *Trichastoma rostratum* (Table 11). Others are classified as LC in the IUCN Red List and they are common residents in Borneo.

50 species from 27 families were recorded in compartment P42 (Appendix B, Table 9). Among the bird species, only two species (*Batrachostomus mixtus* and *Harpactes whiteheadi*) are classified as NT in the IUCN Red List and another two species (*Spilornis cheela* and *Haematortyx sanguiniceps*) are protected under WCE 1997 Schedule II (Table 12).

31 species from 20 families were recorded in compartment P60 (Appendix B, Table 10). Three bird species (*Buceros rhinoceros*, *Eurylaimus ochromalus* and *Trichastoma rostratum*) are classified as NT in the IUCN Red List and four bird species (*Spilornis cheela*, *Buceros rhinoceros*, *Haematortyx sanguiniceps* and *Trichastoma rostratum*) are protected under WCE 1997 Schedule II (Table 13). The others are classified as LC in IUCN Red List and common residents to Borneo.

Compartment P35 was found to have the highest number of bird species (74), followed by compartment L10 with 72 species and 50 species in P42. Common residents, local residents, common lowland residents endemic to Borneo, common highland or sub-montane bird species, highland endemic species to Borneo, migratory birds or winter visitors, and high canopy birds were present in the plantation and surrounding areas. A few species of kingfishers usually found in mangrove forests and coastal areas were also recorded in the compartments. Raptors such as Blyth's Hawk Eagle (in P35) and Crested Serpent Eagle (in L10, P35, and P42 and P60) were also recorded. Four species of Hornbills namely Rhinoceros Hornbill, Bushy-Crested Hornbill, Helmeted Hornbill, and Wreathed Hornbill were recorded in compartment P35. The Rhinoceros Hornbill was found in compartments L10 and P60. Some Bulbuls and Babblers were also recorded in the study sites. Other common species were Swiftlets, Doves, Pigeons, Flowerpeckers, Spiderhunters, Sunbirds, Flycatcher, Broadbills and Barbets.

Note: Nearly threatened (NT) for birds in the IUCN Red List can be treated as part of the threatened (T) category, due to the reason that most of the birds are categorised in NT and it should be included in HCV 1.2.

Table 10. List of birds with HCV 1.2 found in L10

Family	No	Common Name	Scientific Name	WCE (SWD)	CITES	IUCN
ACCIPITRIDAE	1	Crested Serpent Eagle	<i>Spilornis cheela</i>	II		LC
AEGITHINIDAE	2	Green Iora	<i>Aegithina viridissima</i>			NT
	3	Edible-Nest Swiftlet	<i>Aerodramus fuciphagus</i>	II		LC
BUCEROTIDAE	4	Rhinoceros Hornbill	<i>Buceros rhinoceros</i>	II		NT
CAMPEPHAGIDAE	5	Fairy Minivet	<i>Pericrocotus igneus</i>			NT
CHLOROPSEIDAE	6	Lesser Green Leafbird	<i>Chloropsis cyanopogon</i>			NT
COLUMBIDAE	7	Emerald Dove	<i>Chalcophaps indica</i>	II		LC
	8	Violet Cuckoo	<i>Chrysococcyx xanthorhynchus</i>	II		LC
EURYLAIMIDAE	9	Black-and-Yellow Broadbill	<i>Eurylaimus ochromalus</i>			NT
FALCONIDAE	10	Bornean Falconet	<i>Microhircus latifrons</i>		II	NT
MUSCIPALIDAE	11	Malaysian Blue-Flycatcher	<i>Cyornis turcosus</i>	II		NT
NECTARINIIDAE	12	Red-throated Sunbird	<i>Anthreptes rhodolaema</i>			NT
PICIDAE	13	Great Slaty Woodpecker	<i>Mulleripicus pulverulentus</i>			VU
PSITTACIDAE	14	Blue-crowned Hanging Parrot	<i>Loriculus galgulus</i>	II		LC
STURNIDAE	15	Hill Myna	<i>Gracula religiosa</i>	II		LC
TIMALIIDAE	16	Sooty-capped Babbler	<i>Malacopteron affine</i>			NT
	17	White-chested Babbler	<i>Trichastoma rostratum</i>	II		NT

15F, 17sp

Table 11. List of birds with HCV 1.2 found in P35

Family	No	Common Name	Scientific Name	WCE (SWD)	CITES	IUCN
Accipiteridae	1	Crested Serpent-Eagle	<i>Spilornis cheela</i>	II		LC
Bucerotidae	2	Rhinoceros Hornbill	<i>Buceros rhinoceros</i>	II		NT
	3	Helmeted Hornbill	<i>Buceros vigil</i>			NT
	4	Wreathed Hornbill	<i>Rhyticeros undulates</i>	II		
Columbidae	5	Emerald Dove	<i>Chalcophaps indica</i>	II		LC
Corvidae	6	Crested Jay	<i>Platylophus galericulatus</i>			NT
Cuculidae	7	Black-bellied Malkoha	<i>Phaenicophaeus diardi</i>			NT
Eurylaimidae	8	Black-and-Yellow Broadbill	<i>Eurylaimus ochromalus</i>			NT
Nectariniidae	9	Red-throated Sunbird	<i>Anthreptes rhodolaema</i>			NT
Pycnonotidae	10	Streaked Bulbul	<i>Ixos malaccensis</i>			NT
Timaliidae	11	Brown Fulvetta	<i>Alcippe brunneicauda</i>			NT
	12	Sooty-capped Babbler	<i>Malacopteron affine</i>			NT
	13	White-chested Babbler	<i>Trichastoma rostratum</i>	II		NT

10F, 13sp

Table 12. List of birds with HCV 1.2 found in P42

Family	No	Common Name	Scientific Name	WCE (SWD)	CITES	IUCN
Accipiteridae	1	Crested Serpent-Eagle	<i>Spilornis cheela</i>	II		LC
Phasianidae	2	Crimson-Headed Partridge	<i>Haematortyx sanguiniceps</i>	II		LC
Podargidae	3	Bornean Frogmouth	<i>Batrachostomus mixtus</i>			NT
Trogonidae	4	Whitehead's Trogon	<i>Harpactes whiteheadi</i>			NT

4F, 4sp

Table 13. List of birds with HCV 1.2 found in P60

Family	No	Common Name	Scientific Name	WCE (SWD)	CITES	IUCN
Accipiteridae	1	Crested Serpent-Eagle	<i>Spilornis cheela</i>	II		LC
Bucerotidae	2	Rhinoceros Hornbill	<i>Buceros rhinoceros</i>	II		NT
Eurylaimidae	3	Black-and-Yellow Broadbill	<i>Eurylaimus ochromalus</i>			NT
Phasianidae	4	Crimson-Headed Partridge	<i>Haematortyx sanguiniceps</i>	II		LC
Timaliidae	5	White-Chested Babbler	<i>Trichastoma rostratum</i>	II		NT

5F, 5sp

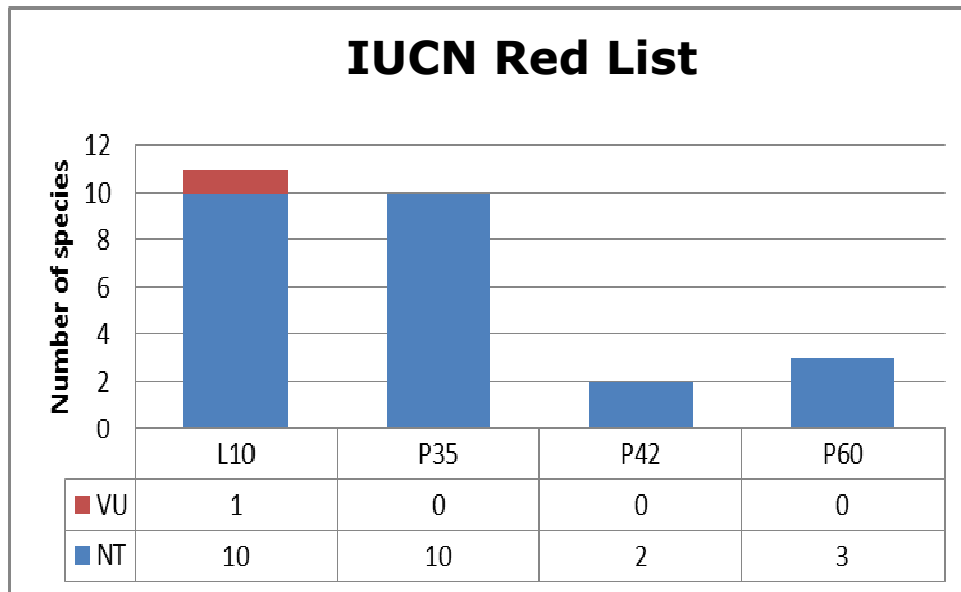


Figure 14. IUCN Red List birds found in the study sites

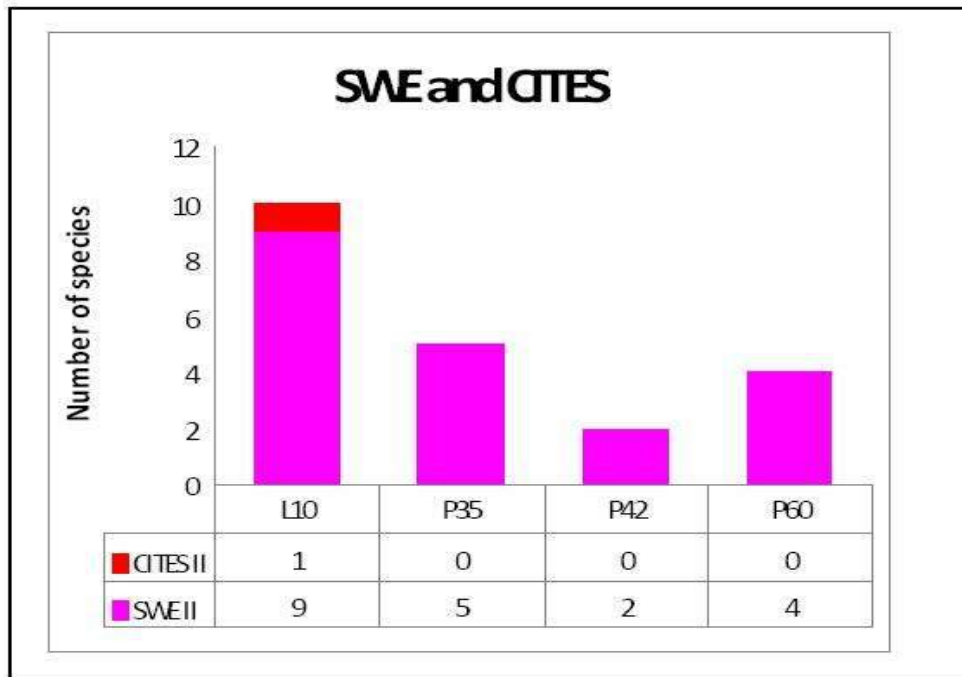


Figure 15. WCE (SWE) and CITES listings for birds in study sites

Reptiles

A total of 10 species of reptiles from five families was recorded during the survey.

Four lizards and one turtle were recorded in compartment L10 (Appendix B, Table 11). They include the Monitor Lizard (*Varanus salvator*), Black-banded Skink (*Mabuya rudis*), *Mabuya multifasciata* from the family of Scincidae and the Malayan Flat-shelled Turtle (*Notochelys platynonta*).

Five lizards and two snakes were recorded in compartment P35 (Appendix B, Table 12). They include two species of python, i.e the short python (*Python curtus*) and reticulate python (*Python reticulatus*). Photographic evidence of their eggs is available. These two species are protected under the Wildlife Conservation Enactment 1997, Schedule II (Table 14). Gecko calls were recorded in compartment P35.

Two species of lizards namely *Draco* sp. and *Lamprolephis vinery* were recorded in compartment P42 (Appendix B, Table 13).

Table 14. List of reptiles with HCV 1.2 found in P35

Family	No	Common Name	Genus	Species	WCE (SWD)	Status CITES	IUCN
PYTHONIDAE	1	Blood Python	<i>Python</i>	<i>curtus</i>	II		LC
	2	Reticulated Python	<i>Python</i>	<i>reticulatus</i>	II		LC

1F, 2sp

Amphibians

Overall, 33 species of amphibians from five families were recorded throughout the survey.

15 species of frogs from four families were recorded in compartment L10 (Appendix B, Table 14). Three frog species are classified as NT in the IUCN Red List. They are *Ansonia longidigita*, *Limnonectes ingeri* and *Rhacophorus gauni*.

13 species of frogs from five families were recorded in compartment P35 (Appendix B, Table 15). These include *Philautus aurantium* which is classified as Endangered (EN) and another four frog species (*Leptolalax dringi*, *Pedostibes rugosus*, *Occidozyga baluensis* and *Philautus mjobergi*) classified as NT in the IUCN Red List (Table 15). Rhacophoridae was the most common frog family in compartment P35. It is almost an exclusively Asian family. Almost all the species live above ground in bushes or trees and are usually known as Tree Frogs (Inger and Stuebing, 2005).

16 species of frogs from five families were recorded in compartment P42 (Appendix B, Table 16). Six species are classified as Near Threatened (NT) and two are classified as Vulnerable (VU) in the IUCN Red List (Table 16). The six NT frog species are *Leptolalax dringi*, *Ansonia hanitschi*, *Staurois tuberilinguis*, *Philautus mjobergi*, *Rhacophorus everetti* and *Rhacophorus baluensis* whereas the two VU species are *Leptolalax arayai* and *Philautus bunitus*.

Table 15. List of frogs with HCV 1.2 found in P35

Family	No	Common Name	Genus	Species	WCE (SWD)	Status CITES	IUCN
RHACOPHORIDAE	1	Golden-legged Bush Frog	<i>Philautus</i>	<i>aurantium</i>			EN

1F, 1sp

Table 16. List of frogs with HCV 1.2 found in P42

Family	No	Common Name	Genus	Species	WCE (SWD)	Status CITES	IUCN
MEGOPHRYIDAE	1		<i>Leptolalax</i>	<i>cf. arayai</i>			VU
RHACOPHORIDAE	2	Green Bush Frog	<i>Philautus</i>	<i>bunitus</i>			VU

2F, 2sp



Figure 16. IUCN Red List frogs in the study sites

A list of reptiles, amphibians, birds and mammals in each compartment with their GPS readings are shown in Appendix B and Tables 7-16.

One species of wildlife found in the SFI compartments is protected under schedule I of Wildlife Conservation Enactment 1997, Vulnerable in the IUCN Red List and CITES Appendix I is the Clouded Leopard (*Neofelis diardi*). This species is classified as fully protected and not to be hunted or traded.

The prominent calls of Bornean Gibbon (*Hylobates muelleri*) in the compartments were heard in P42 and P35. It is classified as Endangered in the IUCN Red List and CITES Appendix I. It is found in the forests of these compartments even though logging was on-going. This means that some parts of the forest within the compartment were still providing a suitable habitat and food resources for this species.

The bird population was more diverse in compartment P35, followed L10 and P42, P60 and P61. The presence of large trees for roosting and nesting is important in providing a habitat for larger birds, most notably the Hornbills, Eagles, Pheasants and Pigeons. Some migratory birds like the Indian Cuckoos and Himalayan Cuckoos were plentiful in the newly opened up areas, possibly due to more conducive living conditions of the forest in P35 and P42 after harvesting.

The change in land use, i.e the opening up of forested areas to plantations, has given way to new communities of bird species that occur in open spaces. In addition, those common residents and disturbed species were insectivorous, frugivores and nectarivorous species. The lists of bird species found in this area (Tables 10-13) show that the number of birds that are rare or endangered is not significant though there were a large number of Near Threatened (NT) species.

The presence of Bulbuls indicates that the SFI forest is disturbed while Babblers prefer good forest areas. Both Bulbuls and Babblers were found in P35 and P42. The Red-Eyed Bulbul (*Pycnonotus brunnes*) is a common resident. Yellow-Vented Bulbuls (*P. goiavier*) are also commonly found here.

Management Recommendations for HCV 1.2 (Flora)

1. Plants listed in the IUCN Red List as Critically Endangered (CR), Endangered (E), Nearly Threatened (NT) and Vulnerable (V) should be marked on the ground based on the GPS.
2. Protection of the plants should be given priority during logging activities or forest conversion in the ITP area. This will mean that these plants are either excluded from being harvested or representative samples and healthy populations of the species are found in the NFM area or protected portions of the ITP area.
3. When an area is to be converted to a plantation, such as compartments P35 and P42, the company needs to reserve 10% of the total concession area to be untouched for strict protection of flora and fauna (Blockhus *et al*, 1992; Bennett & Gumal, 2001). The next step is to identify the areas within these reserved areas that have high value trees based on the findings of this study and previous HCVF studies (WWF, 2009).
4. There is a need to carry out a floristic inventory to cover the whole SFI area including all primary and secondary forest areas to incorporate all floral aspects into the Forest Management Plan. This is important as herbivorous wildlife depend on plants as their food resources.
5. The deforested areas should be mapped out and this can be a good baseline for future monitoring.
6. Information on floristic data needs to be updated, not only in terms of species composition but also with regards to forest dynamics such as phenology. Phenology is a study of the flowering and fruiting pattern of plants. It is important for seed collection and identification. Phenology studies are recommended for Dipterocarp species. Other potential research topics may include studies on the carrying capacity of the forest area for sustaining wildlife in its optimum state, and studies on the diet of certain animals. Mapping of certain plant communities that provide food resources to wildlife may be necessary as baseline data for future monitoring.

Management Recommendations for HCV 1.2 (Fauna)

1. The forest managers should work closely with the Sabah Wildlife Department (SWD) to increase awareness on the consequences of hunting among the local communities.
2. More enforcement should be carried out on the ground. This includes periodic patrolling of the SFI boundaries as well as its conservation areas and the Protected Areas surrounding the SFI area.
3. Creation of wildlife corridors will allow movement of wildlife to other compartments and into the Protected Areas. The width of the wildlife pathway should be at least 100m. (Note: Even though wildlife pathways exist, not all compartments have wildlife corridors.)
4. Remnant forests from areas that have been logged are important and need to be conserved. It is also important that these areas are connected to other fragmented forests in order to provide habitat for HCV 1.2 species.
5. SFI needs to boost its anti-poaching campaign activities by monitoring its border and buffer zones continuously. This can also help in maintaining viable populations of HCV 1.2 species.

6. P42 has the highest number of mammal and frog species found in the IUCN Red List. It is recommended that this compartment be conserved.
7. It is recommended that a thorough study of endangered species such as the Bornean Gibbon be carried out in SFI and its adjacent areas to determine their localities other than those in the two compartments, P35 and P42. Further scientific field surveys are recommended to better understand the Bornean Gibbon habitat. These potential sites include compartments P35 and P42. After the abundance and population density of Bornean Gibbon within these areas are determined, a study on the habitat and food resources of the species should follow.
8. A research study should be carried out to determine the abundance and distribution of the Clouded Leopard in the SFI area. This study will be crucial for the management of the Clouded Leopard species in the SFI area in particular and in Sabah as a whole.

Monitoring Recommendations for HCV 1.2 (Flora)

1. Long term monitoring should be carried out for wild plants found in the SFI area taking note of Critically Endangered (CR) as well as protected species. It is recommended that the data on wild plants be updated yearly.
2. Monitoring to ensure successful management of HCV 1.2 should focus on primary threats to this value such as over-harvesting of Critically Endangered (CR) plant species that produce valuable timber.
3. For monitoring purposes, SFI will need to obtain current satellite imagery and conduct a land-use change analysis to identify areas that are either deforested or degraded. This should be done yearly.

Monitoring Recommendations for HCV 1.2 (Fauna)

1. To ensure successful management of HCV 1.2, monitoring should focus on the primary threats to this value such as habitat loss and over-hunting of rare, threatened and endangered fauna.
2. Long term monitoring needs to be carried out for wildlife encompassing all the vertebrate classes in the SFI area since it contains endangered species such as the Bornean Gibbon (*Hylobates muelleri*) and Golden-legged Bush Frog (*Philautus aurantium*); as well as 15 Near Threatened (NT) species of birds. It is suggested that a scientific expedition be carried out yearly to update the wildlife data, and to ascertain if the population trend is reducing or increasing.
3. A monitoring plan should be developed for the endangered Bornean Gibbon and Clouded Leopard to determine their existing population size, their distribution in the SFI area and their movement patterns.
4. Monitoring is to be conducted by an SFI research team. Opportunistic sightings of wildlife by local villagers as well as SFI's staff and contractors could also contribute to the monitoring data and be added to the database.

4.1.3 HCV 1.3 Endemism

Any forest containing endemic species as identified by FRIM, MNS, SFC, Forestry Departments and published literature, particularly in high concentrations or highly restricted distribution, can be considered HCV 1.3 (HCVF Toolkits for Malaysia, 2009).

Findings

HCV	Key Question	Findings
1.3	Does the SFI concession area contain any endemic species (flora and fauna)?	Present

Flora

Two endemic orchid species were found in P42, i.e *Bulbophyllum jolandae* and *Coelogyne gibbifera* (Table 19). *B. jolandae* was previously recorded in two localities in the Long Pasia area. The species is a Bornean endemic, restricted to the Ulu Padas area in Sabah. The other orchid species include *C. gibbifera*, which can be found in other parts of Borneo such as in Kalimantan and Sarawak.

P42 has the highest record of endemic species with 39 species, 19 families (Table 19), followed by P35 with 16 species, 10 families (Table 18) and L10 with 10 species, 4 families (Table 17). Also refer to Figure 17. In total, 65 endemic flora species were recorded in the three compartments surveyed.

Table 17. Plant Species Endemic to Borneo found in L10

No	Species	Family	Locality (GPS)
1	<i>Dipterocarpus pachyphyllus</i>	Dipterocarpaceae	N05°08'50.8" E115°40'54.2"; N05°09'06.9" E115°40'42.9"
2	<i>Dryobalanops lanceolata</i>	Dipterocarpaceae	N05°08'59.5" E115°41'05.0"; N05°07'12.1" E115°41'38.0"
3	<i>Parashorea smythiesii</i>	Dipterocarpaceae	N05°07'37.5" E115°41'53.4"
4	<i>Shorea beccariana</i>	Dipterocarpaceae	N05°08'59.5" E115°41'05.0"
5	<i>Shorea macrophylla</i>	Dipterocarpaceae	N05°08'50.8" E115°40'54.2"
6	<i>Shorea smithiana</i>	Dipterocarpaceae	N05°08'50.1" E115°41'08"
7	<i>Shorea superba</i>	Dipterocarpaceae	N05°08'12.6" E115°41'37.2"
8	<i>Macaranga beccariana</i>	Euphorbiaceae	N05°09'04.8" E115°40'45.7"; N05°07'26.2" E115°41'44.6"
9	<i>Artocarpus odoratissimus</i>	Moraceae	N05°08'56.2" E115°40'54.6"
10	<i>Neonauclea artocarpoides</i>	Rubiaceae	N05°07'12.1" E115°41'38.0"

Total: 10 sp, 4 F

Table 18: Plants Species Endemic to Borneo found in P35

No.	Species name	Family	Locality (GPS)
1	<i>Durio acutifolius</i>	Bombacaceae	N04°32'42.0" E115°56'55.5"
2	<i>Dillenia borneensis</i>	Dilleniaceae	N04°32'42.2" E115°56'18.0"
3	<i>Shorea smithiana</i>	Dipterocarpaceae	N04°32'42.2" E115°56'18.0"
4	<i>Shorea symingtonii</i>	Dipterocarpaceae	N04°32'42.2" E115°56'18.0"
5	<i>Vatica umbonata</i>	Dipterocarpaceae	N04°32'42.0" E115°56'55.5"
6	<i>Macaranga kinabaluensis</i>	Euphorbiaceae	N04°33'00.9" E115°57'16.1"
7	<i>Castanopsis hypophoenicea</i>	Fagaceae	N04°32'42.0" E115°56'55.5"
8	<i>Lithocarpus bullatus</i>	Fagaceae	N04°32'42.0" E115°56'55.5"
9	<i>Artocarpus odoratissimus</i>	Moraceae	N04°33'09.1" E115°57'20.7"
10	<i>Ficus megaleia</i>	Moraceae	N04°33'00.9" E115°57'16.1"
11	<i>Ficus subterranean</i>	Moraceae	N04°33'00.9" E115°57'16.1"
12	<i>Syzygium elopurae</i>	Myrtaceae	N04°32'42.0" E115°56'55.5"
13	<i>Tristaniopsis bilocularis</i>	Myrtaceae	N04°33'00.9" E115°57'16.1"
14	<i>Chionanthus pluriflorus</i>	Oleaceae	N04°32'42.2" E115°56'18.0"
15	<i>Neonauclea artocarpoides</i>	Rubiaceae	N04°33'00.9" E115°57'16.1"
16	<i>Alpinia ligulata</i>	Zingiberaceae	N04°32'42.0" E115°56'55.5"

Total: 16 sp, 10 F

Table 19. Plants Species Endemic to Borneo found in P42

No.	Species name	Family	Locality (GPS)
1	<i>Melanochyla beccariana</i>	Anacardiaceae	N04° 29.127', E115° 40.042'
2	<i>Goniothalamus fasciculatus</i>	Annonaceae	N04° 29.016', E115° 40.147'
3	<i>Goniothalamus roseus</i>	Annonaceae	N04° 29.029', E115° 39.886'
4	<i>Calamus convallium</i>	Arecaceae (Palmae)	N04° 29.082', E115° 40.129'
5	<i>Calamus gonospermus</i>	Arecaceae (Palmae)	N04° 29.036', E115° 40.055'
6	<i>Calamus hepburnii</i>	Arecaceae (Palmae)	N04° 28.923', E115° 39.996'
7	<i>Calamus pogonacanthus</i>	Arecaceae (Palmae)	N04° 29.075', E115° 39.858'
8	<i>Calamus scabrifolius</i>	Arecaceae (Palmae)	N04° 28' 41", E115° 40' 10"
9	<i>Calamus tenompokense</i>	Arecaceae (Palmae)	N04° 29.029', E115° 39.886'
10	<i>Daemonorops korthalsii</i>	Arecaceae (Palmae)	N04° 29.037', E115° 39.935'
11	<i>Daemonorops longistipes</i>	Arecaceae (Palmae)	N04° 29.057', E115° 39.949'
12	<i>Pinanga aristata</i>	Arecaceae (Palmae)	N04° 29.014', E115° 40.119'
13	<i>Chloranthus erectus</i>	Chloranthaceae	N04° 29.197', E115° 39.880'
14	<i>Shorea ferruginea</i>	Dipterocarpaceae	N04° 29.183', E115° 39.917'
15	<i>Shorea monticola</i>	Dipterocarpaceae	N04° 29.068', E115° 39.910'
16	<i>Shorea venulosa</i>	Dipterocarpaceae	N04° 29.103', E115° 40.172'
17	<i>Vatica albiramis</i>	Dipterocarpaceae	N04° 29.069', E115° 39.857'
18	<i>Vatica micrantha</i>	Dipterocarpaceae	N04° 29.053', E115° 39.969'
19	<i>Aporosa grandistipula</i>	Euphorbiaceae	N04° 29.057', E115° 39.850'
20	<i>Macaranga kinabaluensis</i>	Euphorbiaceae	N04° 29.009', E115° 39.972'

21	<i>Castanopsis clemensii</i>	Fagaceae	N04° 29.134', E115° 39.914'
22	<i>Lithorcarpus luteus</i>	Fagaceae	N04° 29.147', E115° 39.946'
23	<i>Lithorcarpus revolutus</i>	Fagaceae	N04° 29.096', E115° 39.885'
24	<i>Barringtonia lanceolata</i>	Lecythidaceae	N04° 28.923', E115° 39.996'
25	<i>Astronia cumingiana</i>	Melastomataceae	N04° 29.153', E115° 39.930'
26	<i>Ficus endospermifolia</i>	Moraceae	N04° 29.103', E115° 40.172'
27	<i>Knema galeata</i>	Myristicaceae	N04° 29.043', E115° 40.036'
28	<i>Ardisia obovatifolia</i>	Myrsinaceae	N04° 29.072', E115° 40.181'
29	<i>Syzygium caudatilimbun</i>	Myrtaceae	N04° 29.082', E115° 39.870'
30	<i>Syzygium punctilimba</i>	Myrtaceae	N04° 29.074', E115° 39.913'
31	<i>Chionanthus pluriflorus</i>	Oleaceae	N04° 29.043', E115° 40.036'
32	<i>Chionanthus porcatus</i>	Oleaceae	N04° 29.134', E115° 40.054'
33	<i>Bulbophyllum jolandae</i>	Orchidaceae	N04° 29.058', E115° 39.979'
34	<i>Coelogyne gibbifera</i>	Orchidaceae	N04° 29.196', E115° 39.908'
35	<i>Peristylus hallieri</i>	Orchidaceae	N04° 28.952', E115° 40.002'
36	<i>Timonius mutabilis</i>	Rubiaceae	N04° 29.215', E115° 39.955'
37	<i>Schima brevifolia</i>	Theaceae	N04° 29.403', E115° 40.031'
38	<i>Gonystylus keithii</i>	Thymelaeaceae	N04° 29.027', E115° 40.081'
39	<i>Tetrastigma diepenhostii</i>	Vitaceae	N04° 28.935', E115° 39.988'

Total: 39 sp, 19 F

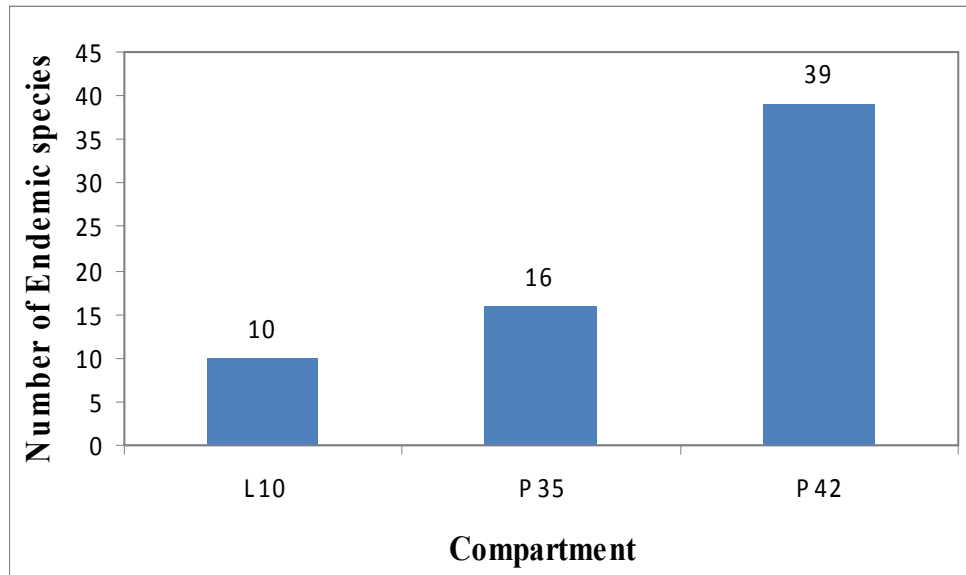


Figure 17. Number of plant species endemic to Borneo in study area

Fauna

Mammals

No mammal species endemic to Borneo was recorded in compartment L10 during the survey. Eight mammal species were encountered in compartment P35 and seven mammal species in P42 (Table 20).

Hose's Langur (*Presbytis hosei*) was recorded in P35. This primate species belongs to the subfamily *Colobinae* and is endemic to Borneo. Apart from that, the Bornean Gibbon, found in both P35 and P42, is also endemic to Borneo. The Clouded Leopard, also found during this survey, is one of the species endemic to Borneo and Sumatra.

The Small Spiny Rat (*Maxomys baeodon*) and Chestnut-bellied Spiny Rat (*Maxomys ochraceiventer*) were recorded in compartment P35. Both are endemic to Borneo.

Four Borneo endemic squirrels were also recorded, i.e the Bornean Black-banded Squirrel (*Callosciurus orestes*) found in P35 and P42, Jentink's squirrel (*Sundasciurus jentinki*) found in P35 and P42, Whitehead's Pigmy squirrel (*Exilisciurus whiteheadi*) found in P42 and Kinabalu Squirrel (*Callosciurus baluensis*) found in P42. They are confined to Borneo only.

Two species of tree shrews endemic to Borneo were recorded in compartment P35. They are the Smooth-tailed Treeshrew (*Dendrogale melanura*); a montane form with a long, thin tail, and Mountain Treeshrew (*Tupaia Montana*) found in P35 and P42.

Table 20. Mammal Species Endemic to Borneo found in the Study Sites

Family	No	Common Name	Scientific Name	Compartment		
				L10	P35	P42
CERCOPITHECIDAE	1	Hose's Langur	<i>Presbytis hosei</i>		X	
FELIDAE	2	Clouded Leopard	<i>Neofelis diardii</i>			X
HYLOBATIDAE	3	Bornean Gibbon	<i>Hylobates muelleri</i>		X	X
MURIDAE	4	Small Spiny Rat	<i>Maxomys baeodon</i>		X	
	5	Chestnut-bellied Spiny Rat	<i>Maxomys ochraceiventer</i>		X	
SCIURIDAE	6	Bornean Black-banded Squirrel	<i>Callosciurus orestes</i>		X	
	7	Jentink's Squirrel	<i>Sundasciurus jentinki</i>		X	X
	8	Kinabalu Squirrel	<i>Callosciurus baluensis</i>			X
	9	Whitehead's Pigmy Squirrel	<i>Exilisciurus whiteheadi</i>			X
	10	Bornean Black-banded Squirrel	<i>Callosciurus orestes</i>			X
TUPAIDAE	11	Smooth-tailed Treshrew	<i>Dendrogale melanura</i>		X	
	12	Mountain Treshrew	<i>Tupaia Montana</i>		X	X

Total: 12 sp, 6 F

0 8 7

Birds

Twenty species of birds endemic to Borneo were recorded in these study areas. 19 species were found in P42, 11 species in P35, 10 species in P60 and 4 species in L10 (Table 21).

Whitehead's Trogon (*Harpactes whiteheadi*) is the only scarce montane endemic species out of the six species from the family *Trogonidae* in Borneo. This species is the only truly montane trogon, confined to undisturbed mountain forests above 900m. It specially favours the understorey in damp gloomy valleys. This species was found in compartment P42. It is uncommon from Kinabalu south to Kayan Mentarang.

Table 21. Bird Species endemic to Borneo found in the study sites

Family	No	Common Name	Scientific Name	Compartment			
				L10	P35	P42	P60
Chloropseidae	1	Bornean Leafbird	<i>Chloropsis kinabaluensis</i>		X	X	X
Corvidae	2	Bornean Treepie	<i>Dendrocitta cinerascens</i>		X	X	X
Dicaeidae	3	Yellow-rumped Flowerpecker	<i>Prionochilus xanthopygius</i>	X	X		
	4	Bornean Flowerpecker	<i>Dicaeum monticolum</i>			X	
Estrildidae	5	Dusky Munia	<i>Lonchura fuscans</i>	X	X		
Eurylaimidae	6	Whitehead's Broadbill	<i>Calyptomena whiteheadi</i>			X	X
Falconidae	7	Bornean Falconet	<i>Microheirex latifrons</i>	X			
Muscicapidae	8	Eye-Browed Jungle-Flycatcher	<i>Rhinomyias gularis</i>			X	
Nectariniidae	9	Whitehead's Spiderhunter	<i>Arachnothera juliae</i>			X	
Pachycephalidae	10	Bornean Whistler	<i>Pachycephala hypoxantha</i>			X	X
Phasianidae	11	Red-breasted Hill Partridge	<i>Arborophila hyperythra erytrophrys</i>		X		X
	12	Crimson-Headed Partridge	<i>Haematoryx sanguiniceps</i>			X	X
Podargidae	13	Bornean Frogmouth	<i>Batrachostomus mixtus</i>			X	
Pycnonotidae	14	Bornean Bulbul	<i>Pycnonotus montis</i>		X	X	
	15	Pale-Faced Bulbul	<i>Pycnonotus leucops</i>			X	
Ramphastidae	16	Bornean Barbet	<i>Megalaima eximia</i>		X		
	17	Mountain Barbet	<i>Megalaima monticola</i>		X	X	X
	18	Golden-Naped Barbet	<i>Megalaima pulcherrima</i>			X	
Timaliidae	19	Chestnut-hooded Laughing Thrush	<i>Rhinocichla treacheri</i>		X		
	20	Chestnut-crested Yuhina	<i>Yuhina everetti</i>		X	X	X
	21	Chestnut-hooded Laughing Thrush	<i>Rhinocichla treacheri</i>			X	X
	22	Bornean Laughing-Thrush	<i>Melanocichla calva</i>			X	
Trogonidae	23	Whitehead's Trogon	<i>Harpactes whiteheadi</i>			X	
Turdidae	24	White-browed Shama	<i>Copsychus stricklandi</i>	X			
	25	Bornean Forktail	<i>Enicurus borneensis</i>				X
Zosteropidae	26	Bornean Ibon	<i>Oculocincta squamifrons</i>		X	X	
Total: 26 sp, 17 F				4	11	19	10

Reptiles

Only one reptile species endemic to Borneo was recorded in the study area. This is the Tree Gecko (*Cyrtodactylus baluensis*) found in L10. It inhabits dipterocarp rainforests to montane oak forests. Its diet comprises insects and other arthropods.

Amphibians

17 species of frogs endemic to Borneo were recorded in this study area. The highest number was found in P42 (eight species), followed by P35 (seven species), and L10 (five species) (Table 22).

Table 22. Frog Species Endemic to Borneo found in the Study Sites

Family	No	Common Name	Genus	Species	Compartment		
					L10	P35	P42
BUFONIDAE	1	Long-fingered Slender Toad	<i>Ansonia</i>	<i>longidigita</i>	X		
	2	Marbled Tree Toad	<i>Pedostibes</i>	<i>rogusus</i>		X	
	3	Kinabalu Slender Toad	<i>Ansonia</i>	<i>hanitschi</i>			X
MEGOPHRYIDAE	4	Montane Litter Frog	<i>Leptobrachium</i>	<i>montanum</i>		X	X
	5	Dring's Slender Litter Frog	<i>Leptotalax</i>	<i>dringi</i>		X	X
	6		<i>Leptotalax</i>	<i>cf. arayi</i>			X
RANIDAE	7	Inger's Dwarf Frog	<i>Ingerana</i>	<i>baluensis</i>	X	X	
	8	Greater Swamp Frog	<i>Limnonectes</i>	<i>ingeri</i>	X		
	9	Giant River Frog	<i>Limnonectes</i>	<i>leporinus</i>	X		
	10	Rough Guardian Frog	<i>Limnonectes</i>	<i>finchi</i>		X	
	11	Green-spotted Rock Frog	<i>Staurois</i>	<i>tuberilinguis</i>			X
	12	Seep Frog	<i>Occidogyga</i>	<i>baluensis</i>		X	
RHACOPHORIDAE	13	Short-nosed Tree Frog	<i>Rhacophorus</i>	<i>gauni</i>	X		
	14	Golden-legged Bush Frog	<i>Philautus</i>	<i>aurantium</i>		X	
	15		<i>Philautus</i>	<i>mjobergi</i>		X	X
	16	Green Bush Frog	<i>Philautus</i>	<i>bunitus</i>			X
	17	Kinabalu Tree Frog	<i>Rhacophorus</i>	<i>baluensis</i>			X
Total: 17 sp, 4 F					5	7	8

Overall, 80 endemic vertebrate species were found in all the study sites. P42 had the highest endemic species (34 species), followed by P35 (26 species), P60 (10 species) and L10 (10 species), as shown in Figure 18.

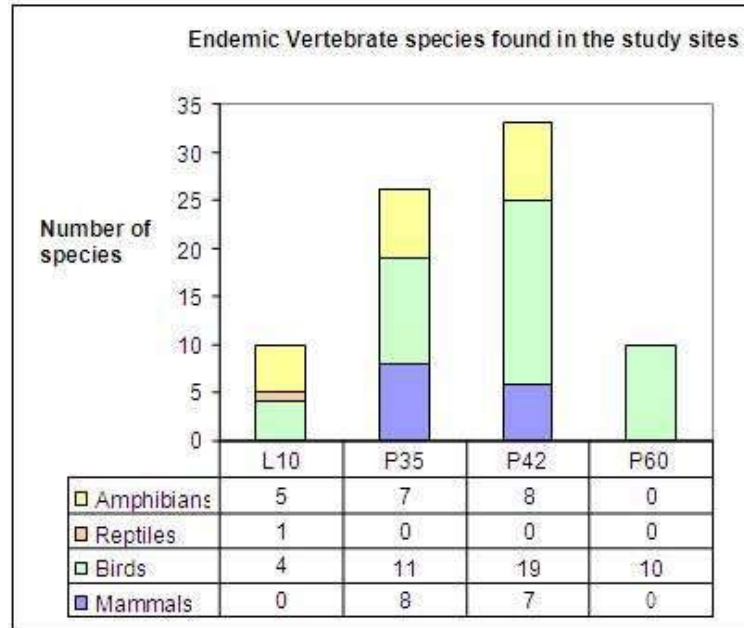


Figure 18. Number of endemic vertebrate species found in study area

Management Recommendations for HCV 1.3 (Flora)

1. All endemic plant species should be protected, especially those only found in the Ulu Padas area. Before forest conversion to plantation is carried out, all endemic plant species should be marked with conspicuous signs so that these species will not be felled. Smaller trees such as seedlings and plants like orchids can be translocated to other parts of Ulu Padas or protected areas. Another option is to crosscheck whether these endemic species are also found in the NFM area or in protected areas within the ITP area. If yes, then the same species should be protected in the NFM area of SFI but not in ITP area which is to be converted.
2. Strict enforcement needs to be carried out to protect endemic species from collectors. These might be tourists or outsiders interested in endemic wild orchids.

Management Recommendations for HCV 1.3 (Fauna)

1. Corridors or pathways of 100 m in width need to be maintained to allow endemic fauna to move to safer places or refuge such as nearby virgin jungle reserves or protected areas.
2. Strict enforcement must be in place to curb illegal hunting (either from company workers or outsiders) within the SFI area.
3. P42 has the highest endemic species of flora and fauna among all the compartments surveyed. It is recommended that this compartment be conserved.
4. HCV 1.3 shall be managed in close coordination with HCV 3 (rare or endangered ecosystems), where maintaining the largest possible areas of intact remnant forest and mature secondary forest, as well as connectivity among them, will be the over-riding goal.

Monitoring Recommendations for HCV 1.3 (Flora and Fauna)

1. There should be long term monitoring of endemic species in these compartments on a yearly basis in order to understand trends in their numbers, which will lead to better management and conservation of the species.

4.1.4 HCV 1.4 Critical Temporal Use

Any forest area which is important to wildlife for feeding, nesting, roosting, and migration or contains saltlicks is HCV 1.4. Limestone hills, although important as habitat, are captured under HCV 3-Ecosystems (HCVF Toolkits for Malaysia, 2009).

Findings

HCV	Key Question	Findings
1.4	Does the SFI Area contain or is part of an important forest area for temporary use to wildlife?	PRESENT

Forests serve as the feeding, breeding, and resting spots for wildlife. This fact is supported by the fact that four northern winter visitor bird species (*Accipiter gularis*, *Cuculus micropterus*, *Cuculus saturatus*, and *Ficedula narcissina*) and three common nomadic resident bird species (*Chalcophaps indica*, *Merops viridis* and *Treron olax*) were spotted in the SFI compartments during the survey.

According to Phillipps and Phillipps (2009), *Accipiter gularis*, the Japanese Sparrowhawk, is a winter visitor that reaches Borneo via the Philippines, directly across the South China Sea. This species is also recorded on migration on islands in the Java Sea en route from Borneo to Java in mid October. Obviously, L10 serves as a one-stop point for this species before its travel to the south.

Two other migrant birds that belong to the family *Cuculidae* are the Himalayan Cuckoo (*Cuculus saturatus*) and Indian Cuckoo (*Cuculus micropterus*). The Himalayan Cuckoo, found in compartment P42, is a passage migrant and winter visitor to all parts of Borneo, mainly in the lowlands but also in montane forest, including offshore at Labuan and other coastal sites, and Brunei. The Indian Cuckoo was recorded in compartments P35 and P42; and is a common resident in and scarce migrant to lowland and hill forests. A northern race breeds in China and winters south to Australia. They pass through Borneo, including the SFI area as well; thus making it a critical temporal site for Cuckoos.

The scarce winter visitor *Ficedula narcissina* which was spotted in L10 is believed to breed in Borneo even though they are uncommon to all other parts of Borneo (Phillipps and Phillipps, 2009).

The Blue-throated Bee-eater (*Merops viridis*) was found in compartment L10. This species is resident in coastal and cultivated inland districts of Borneo from sea level to about 750m, from sandy coastal plains to mangroves, secondary scrub, kerangas and oil palm plantations. To some extent, it is also a local migrant that breeds in sandy areas and disperses widely afterwards. There

are Kerangas forests in the SFI area which are important breeding grounds for this species. Sabah has been identified as a large winter roosting area for this species. Their population is increasing but there are no local breeding records yet. They look for breeding patches on arrival from and before departure to northern breeding grounds (Phillipps and Phillipps, 2009).

Management Recommendations for HCV 1.4

1. Strict enforcement by SFI and Sabah Wildlife Department should be carried out in order to conserve the nesting and breeding sites for migratory birds.
2. Fruit trees should be conserved so that migratory birds can survive and the SFI area can serve as a migratory route for birds.

Monitoring Recommendations for HCV 1.4

1. Monitoring should be carried out to observe migratory birds, their breeding sites, their routes of migration and whether they are affected by conversion of forest to plantation or by logging activity.

Additional Recommendations for HCV 1

Establishment of *In-situ* and *Ex-situ* Conservation Programme

There is a need to carry out a floristic inventory to cover the whole SFI area including all primary and secondary forested areas. The findings should be incorporated into the forest management plan. This is important as all herbivorous wildlife depends on plants for their food. Floristic and faunal information are essential elements when designing a strategy for biodiversity conservation.

Even though SFI undertakes plantation development, it is strongly recommended that *in-situ* conservation programmes be implemented in sensitive sites. This could be done through the establishment of forest reserves under the management of Sabah Forestry Department or SFI. Inventory of the flora and fauna could be initiated and a genetic conservation programme established. These sites will be important as seed sources. With the clearing of large tracts of forest for plantation establishment, genetic resources and species could potentially be lost. To reduce this impact, an *ex-situ* conservation plan is strongly recommended. This approach will reduce the severe impact of localised loss of species and genetic traits of these plants. Planting stocks could be established through seedlings sourced from the protection and conservation areas mentioned above. From the surveys carried out, some forest areas still contain timber species such as *Shorea*, *Parashorea*, and *Dryobalanops*. During gregarious flowering of the Dipterocarp trees, large amount of seeds could be procured from the residual trees in these sites in order to establish nurseries.

In addition, the existing connectivity from P42 to other compartments should be maintained considering that it contains high concentrations of biodiversity (Figure 33).

The SFI Map on HCV Area (Figure 33) needs to be rectified in order to incorporate those areas with high biodiversity values such as compartment P42, which contains HCV 1.2 (threatened, endangered species) and HCV 1.3 (high endemic species).

4.2 HCV 2 Landscape-level Forest

Global Toolkit definition: *Forest area contains or is part of a globally, regionally or nationally significant large landscape level forest where significant populations of most if not all naturally occurring wildlife species exist in natural patterns of distribution and abundance.*

Any forest area that forms or is part of a linkage between larger forest complexes, and can thus provide connectivity between fragments or act as a wildlife corridor for the movement of animals from one complex to another, is considered HCV 2. This HCVF can serve as a buffer zone to protected areas. Its identification and management should be tailored towards the needs of umbrella species i.e. sensitive, wide-ranging wildlife that are particularly susceptible to forest fragmentation and human population pressures (WWF-Malaysia, 2009).

Findings

HCV	Key Question	Findings
2	Does any part of the SFI Area exist within or next to a large natural landscape or is part of a critical link between larger forest complexes?	Present

1. SFI Area comprises the Sipitang Forest Reserve and Ulu Padas Forest Reserve which form part of the mountain ranges of Borneo joining Kalimantan and Sarawak.
2. There are five forest reserves located within or adjacent to the SFI concession area. These forest reserves are:
 - i. Gunung Lumaku Forest Reserve - 5,180 ha (northeast border)
 - ii. Meligan VJR – 9,240 (west border)
 - iii. Sg. Basio VJR – 213 ha (surrounded by SFI concession area)
 - iv. Agathis VJR - 200 ha (surrounded by SFI concession area)
 - v. Kayan Mentarang National Park - 1,360,500 ha (southeast border)
3. The SFI area borders the Kayan Mentarang National Park in Kalimantan. The Kayan Mentarang National Park is located at the southeast border of the SFI NFM Licence Area bordering compartments P45, P58, P63, P62, P61, P60, P64 and P65.

Management recommendations for HCV 2:

1. A buffer zone of 100m width along the boundaries bordering the VJR of Meligan, Agathis, Sungai Basio and Gunung Lumaku Forest Reserve needs to be maintained.
2. Buffer zones of 200m should also be maintained between the NFM Lease Area and Kayan Mentarang NP.
3. Buffer zones should be clearly marked on the ground and on the map.
4. It is important to maintain linkage in the form of wildlife corridors or pathways of 100m width within the compartments of the licence area, and between SFI and forest reserves to allow for

movement of wildlife species should be maintained. This continuity will also ensure that there will be sufficient genetic exchange of the flora and fauna between the SFI forest area and the surrounding forests.

5. A trans-bornean / international linkage should be created to form a larger landscape among the compartments in the southern parts of the SFI area with the Kayan Mentarang National Park in Kalimantan for conservation of flora and fauna in Borneo.
6. In the northeastern part of SFI, there is a need to create connectivity between the Sipitang Forest Reserve, Gunung Lumaku Forest Reserve and Crocker Range Park. Crocker Range Park is the largest terrestrial park and protected area gazetted in Sabah comprising 139,919 ha and stretching over eight administrative districts. One of its substations is Ulu Senagang located in Tenom district, which is adjacent to Gunung Lumaku FR. Such connectivity can create a larger landscape of forest for conserving the biodiversity.

* SFI needs to seek further advice on the establishment of connectivity and this has to be science-based.

Monitoring recommendations for HCV 2:

1. Periodic monitoring should be carried out jointly by SFI, Sabah Forest Department and Sabah Parks at the boundaries of these areas to ensure that forest connectivity remains intact.
2. Monitoring should be carried out by SFI especially in areas where buffer zones and wildlife pathways have been created.
3. Monitoring in the form of aerial as well as ground surveys can be carried out.
4. Monitoring changes in the diversity and health of the forest ecosystems through floristic surveys are vital and should be carried out periodically. Changes in the landscape identified via satellite should be incorporated into the FMU maps.

4.3 HCV 3 Ecosystems

Global Toolkit definition: *Forest area that is in or contains rare, threatened or endangered ecosystem.*

Any forest area that contains an ecosystem/habitat type identified as a priority for protection by the National Conservation Strategy (NCS), PERHILITAN Ecosystem Assessment report, Forestry Departments, FRIM, or SFC, and/or is confirmed as such by current expert opinion, is HCV 3. Some ecosystems are naturally rare, but some others are becoming increasingly threatened by pressure from human activities. Due to rapid changes, existing data may be outdated and some particularly threatened ecosystems may already need to be considered Priority 1. A good example of this would be Lowland Dipterocarp Forests, Peat Swamp Forests and Limestone Habitats. Always refer to current expert opinion for confirmation (HCVF Toolkits for Malaysia, 2009).

Findings

HCV	Key Question	Findings
3	Does the SFI license area contain or is part of a threatened or endangered ecosystem?	Present

Based on the floristic survey, three types of HCV 3 were identified. These include lowland dipterocarp forest, montane forest and upland kerangas forest. Compartment L10 is a lowland dipterocarp forest, whereas compartment P35 is a hill dipterocarp forest in transition to lower montane forest and compartment P42 is an upland kerangas forest.

The National Conservation Strategy (NCS) listed these forest types as having medium priority for conservation. With the current rate of deforestation and degradation of forest ecosystem imposed on these forests, destruction is inevitable. Lowland dipterocarp forests are becoming rare and endangered as a result of the threats. Montane forests and upland kerangas forests are not excluded as their functionality as whole ecosystems are influenced by the change in landscape and climate.

Based on this HCVF assessment, it is concluded that HCV 3 pertaining to threatened or endangered ecosystem, is present in the SFI area and this ecosystem should be managed properly.

Management Recommendations for HCV 3

1. Kerangas forests need to be conserved properly. The actual extent of existing intact kerangas forests ecosystem needs to be verified and mapped out.
2. Boundaries of kerangas forests should be mapped by the Sabah Forestry Department. The boundaries are to be physically demarcated on the ground as well.

Monitoring Recommendations for HCV 3

Periodical updating of land-use maps through the acquisition of the latest satellite images in order to monitor changes in the SFI area.

4.4 HCV 4 Services of Nature

Global Toolkit definition: *Forest area provides basic services of nature in critical situations.*

4.4.1 HCV 4.1 Watershed Protection

HCV 4.1 includes dam catchment areas and any forest area legally gazetted as a Protection Forest for water catchment under the National Forestry Act 1984, water protection area under the Sabah Water Resources Enactment 1998 or Class I Protection Forest Reserve under the Sabah Forest Enactment 1968 (HCVF Toolkits for Malaysia, 2009).

Findings

HCV	Key Question	Findings
4.1	Does SFI area contain area legally gazetted as watershed protection or dam catchment area under federal/state law?	Present

The Malaysian HCVF Toolkit description for HCV 4.1 states that any forests which are legally gazetted as Class I Protection Forest Reserve also serve as water catchment areas and are HCV 4.1. Based on this description, areas for water catchment are indirectly present due to the reason that the SFI area shares its borders with four Protected Areas (PA) - Gunung Lumaku Forest Reserve (Class I), Meligan VJR, Sg Basio VJR and Agathis VJR - all of which are classified as forest protection for water catchment areas. The SFI area also serves as the rain shade (with heavy rainfall annually) for most of the upstream areas. SFI itself may not be a legally gazetted Protection Forest for water catchments but it has been well documented as an important water area (Sinun, 1997; SBCP, 1997; DID, 1997).

Riparian buffer zones offer an important mitigation measure against soil erosion due to land clearing or harvesting of timber. Riparian buffers are important to ensure that the health of the aquatic ecosystems, which is crucial to the socio-economy of the local communities, is maintained. It was observed that riparian buffer zones that existed along streams in the study sites and boundaries were clearly marked. Based on this study, the width of the existing riparian buffer zones was in compliance with the SFI Riparian Reserve Policy. The status of riparian areas surveyed is given in Table 23.

From the sociological survey, it was found that water resources are available at each village where 99.6% of respondents had gravity pipe systems at home. However, rain water and river water were their main sources of water (66.9% and 8.5% respectively).

Table 23. The results of riparian area assessments carried out at study sites

Compartment/ Block	Locality (GPS) and Altitude	River/ stream size	Notes
P 60 Block A, B	N 04 15' 05.1" E 115 42' 56.7" 1,119 m	5 - 10 m	Riparian buffer zones > 50 m exist in the areas surveyed.
P 60 Block A, B	N 04 14' 56.3" E 115 42' 52.8" 1,113 m	5 - 10 m	Intact forests were observed in the riparian areas with native species still in abundance
	N 04 14' 53.1" E 115 42' 43.9" 1,130 m	5 - 10 m	
P 60 Block A, B	N 04 14' 58.7" E 115 43' 03.7" 1,127 m	3 - 5 m	
P 60 Block B (Sg. Pilong)	N 04 14.616 E 115 43.580 1,164 m	4 - 10 m	
P 61 Block A (Sg. Palanuk)	N 04 15.570' E 115 44.859' 1,213 m	10 - 15 m	Riparian buffer zones exist
L10	N 05°09'04.8" E 115°40'45.7"	6 m	5 - 20 trees (DBH 3-15 cm) Buffer <30m Flat area, <i>Acacia</i> present 10m from river
L10	N05°09'00.4" E115°40'54.2"	7 m	Buffer <30m, <i>Acacia</i> <DBH 3-10cm
L10	N05°08'50.8" E115°40'54.2"	8 m	Buffer >50m; <i>Acacia</i> <5 trees DBH 5-18cm, Secondary forest-30m
L10	N05°08'47.2" E115°40'59.1"	6 m	Buffer >50m, <i>Acacia</i> 1 tree (DBH 18cm) Secondary forest <50m
L10	N05°08'50.1" E115°41'08.9"	8 m	Buffer >50 m, No <i>Acacia</i> found Primary forest >50m
P35	N04°32'42.2" E115°56'18.0" 1059m		Riparian buffer zones exist ~ 100 m
P42	N 04 29.224' E 115 39.993' 1,522 m	1 - 4 m	Riparian buffer zones exist
P42	N 04 29.093' E 115 40.170' 1,518 m	0.5 - 4 m	Riparian buffer zones exist

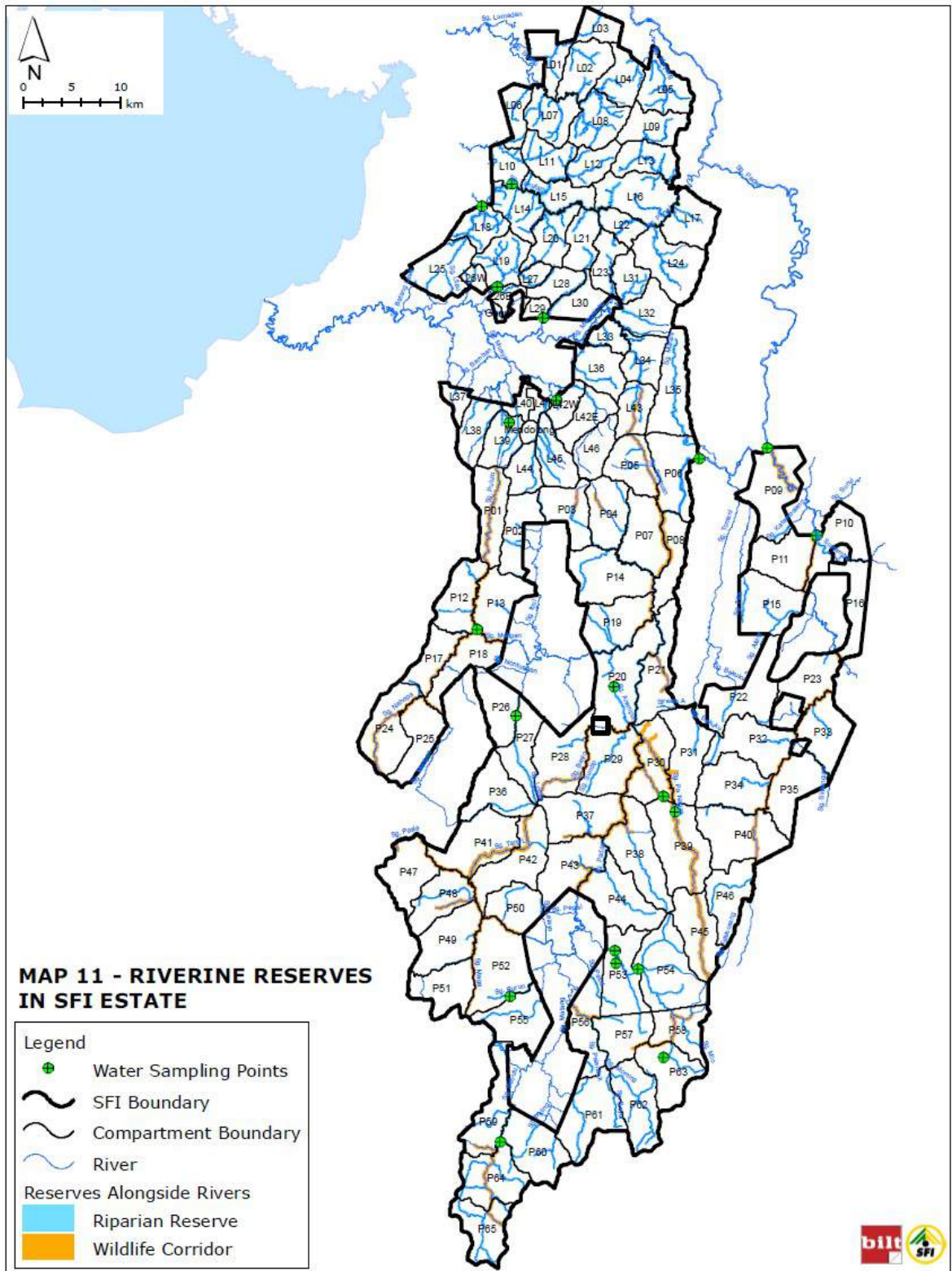


Figure 19. HCV 4.1 Riverine reserves in the SFI Area

Management Recommendations for HCV 4.1

1. Class I forest reserves and VJRs are gazetted for forest protection (mainly for biodiversity) but not legally gazetted as water protection areas. However, they can be classified as protection for water catchment. For the legal gazettement of water catchments, the Sabah Forest Department would have to request for amendments with the Drainage and Irrigation Department.
2. For the protection of water quality and quantity, riverbanks and biodiversity riparian reserves are to be established.
3. Depending on the stream width, a riparian buffer zone adjacent to the stream must be maintained. Refer to Table 24 for the Reduced Impact Logging (RIL) requirements for riparian reserves (SFD, 2009). The buffer should be contiguous along the river and its tributaries. The RIL specifications indicate that the larger the size of the stream, the wider the buffer should be because larger streams require larger intact forested area adjacent to the stream to reduce the degree of sediment runoff. For plantations, it is proposed that riparian reserves for permanent streams with sizes up to 3 m should be at least 5m.

Table 24. Riparian reserve and stream buffer zones under RIL specification

	River/Stream width (m)	Distance from each bank (m)
Stream Buffer Zone	< 5	None
	5 – 10	10
	11 – 20	25
	21 – 40	30

4. Based on Sabah DID guidelines, riparian reserves should be 100 m wide for first order streams, 50 m wide for second order streams and 30 m for third order streams. First order streams are usually more than 20 m wide.
5. However, SFI Riparian Reserves Policy requires that all permanent rivers and streams less than 5 m in width must have a riparian strip of 5 m width on either side of the stream; and all rivers greater than 5 m in width must have a riparian reserve of 30 m on either side of the river.
6. Riparian buffer belts should be clearly marked with paint on the trees at 1.5 m height to provide indication of the buffer.

Monitoring Recommendations for HCV 4.1

1. Monitoring of stream water quality, especially those flowing through plantation areas should be carried out periodically.
2. Periodic monitoring of rivers in the Protected Areas serving as water catchment should be carried out to monitor water quality.

4.4.2 HCV 4.2 Erosion Control

HCV 4.2 includes forest areas that have been legally gazetted for soil protection or conservation under federal and state laws e.g. the National Forestry Act 1984 (Peninsular Malaysia), forest areas, situated on slopes over 25 degrees (Sabah), areas classified as Terrain Class 4 in First Schedule: Forest Management Plan, Forest Timber License, and riparian areas covered under the DID (Department of Irrigation and Drainage) guidelines (WWF-Malaysia, 2009).

Findings

HCV	Key Question	Findings
4.2	Is the forest area on a slope over 35 degrees (it has been agreed that in the ITP Area, SFI can operate up to 35°) and covers an area of more than 2 ha?	Present

Forests on slopes above 35° covering more than 2 ha are considered HCV 4.2 areas. These areas should be mapped out on harvesting plans. Refer to Table 25 for areas in L10, P35 and P42 with slopes of more than 25° covering more than 2 ha. Sabah Forest Industries implements RIL techniques in the NFM area whereby high risk areas are mapped out on harvesting plans. Refer to SFI's SOP on *Proposed Harvesting and Plantation Development Based On Slope Classification* (SFI, 2009a).

SFI obtained approval from the Director of Sabah Forestry Department (dated 6th October 2009) stipulating that for harvesting and plantation development based on slope classification, the company can utilise excavators for areas with slopes below 25° gradient; whereas for areas with slopes between 25° and 35° gradient, the airborne system, which is the skyline transportation of felling trees to the landing, may be used.

The results of the surveys on steep terrain in the study sites are given in Table 25. It was found that that *Acacia mangium* have been planted at slopes between 25° and 35° only in one site in compartment L10. In compartments P35, P42 and P60, no *Acacia* trees were found on steep areas and the forests were still intact with native plant species. Generally, *Acacia* trees were not found in steep terrain with slopes greater than 35° within the study sites throughout the survey. That means most sloping areas were undisturbed.

Table 25. The results of slope assessment from the study sites

Compartment/Block	Locality (GPS) and Altitude	Gradient/slope	Presence of <i>Acacia</i>
L10	N05°09'06.9" E115°40'42.9"	25°-35°	Flat area, <i>Acacia</i> present 10m from river, area
	N05°09'00.4" E115°40'54.2"	25°-35°	No <i>Acacia</i> found, Primary forest width >50m
	N05°08'50.8" E115°40'54.2"	25°-35°	No <i>Acacia</i> found, Primary forest width >50m
	N05°08'56.2" E115°40'54.6	25°-35°	No <i>Acacia</i> found, Primary forest width >50m
	N05°08'46.9" E115°40'59.6"	25°-35°	No <i>Acacia</i> found, Primary forest width >50m
	N05°08'50.1" E115°41'08.9"	25°-35°	No <i>Acacia</i> found Primary forest width >100 m
P 60 Block A, B	N 04 15' 05.1" E 115 42' 56.7" 1,119 m	10°–15°	No <i>Acacia</i> found. Native species in abundance.
P35	N 04°32'42.2" E115°56'18.0" 1059 m	35°-45°	No <i>Acacia</i> found
P42	N 04 29.072' E 115 40. 181' 1,569 m	10° - 35°	No <i>Acacia</i> found
	N 04 29.134' E 115 39.914' 1,512 m	20°-35°	No <i>Acacia</i> found

Management Recommendations for HCV 4.2

Soil Damage/Erosion and Slope Stability

1. To minimise soil damage and erosion in the SFI area, all steep areas with gradient over 35° must be maintained as forested areas or shall be excluded from harvesting if they are already planted with plantation species.
2. Steep areas should be shown on the harvesting map and marked clearly on the ground.
3. Steep areas which have already been harvested should be replanted with indigenous tree species. It is advisable that opened up areas with gradient over 25° and other degraded areas be

rehabilitated instead of letting natural regeneration to take place. Rehabilitating the areas with indigenous plant species such as Laran and other timber species may prevent *Acacia mangium* trees from invading the areas first. *Acacia mangium* are aggressive invader species which can colonise open areas quickly before other native pioneer plant species have the opportunity to do so.

4. The SFI steep terrain map (Figure 20) is inconsistent with the results of this study where it is found that P35 and P42 have steep terrains which are not reflected in the map. A thorough check on steep areas needs to be carried out by SFI.

Monitoring Recommendations for HCV 4.2

1. Periodical monitoring of steep areas to ensure no erosion occurs (Figure 20). Sedimentation in the stream is an indicator of erosion and pollution.
2. Long-term monitoring and rehabilitation of degraded steep areas (areas that have been opened up for harvesting or any open areas devoid of vegetation) should be carried out. This could be through enrichment planting of indigenous plant species as mentioned above.

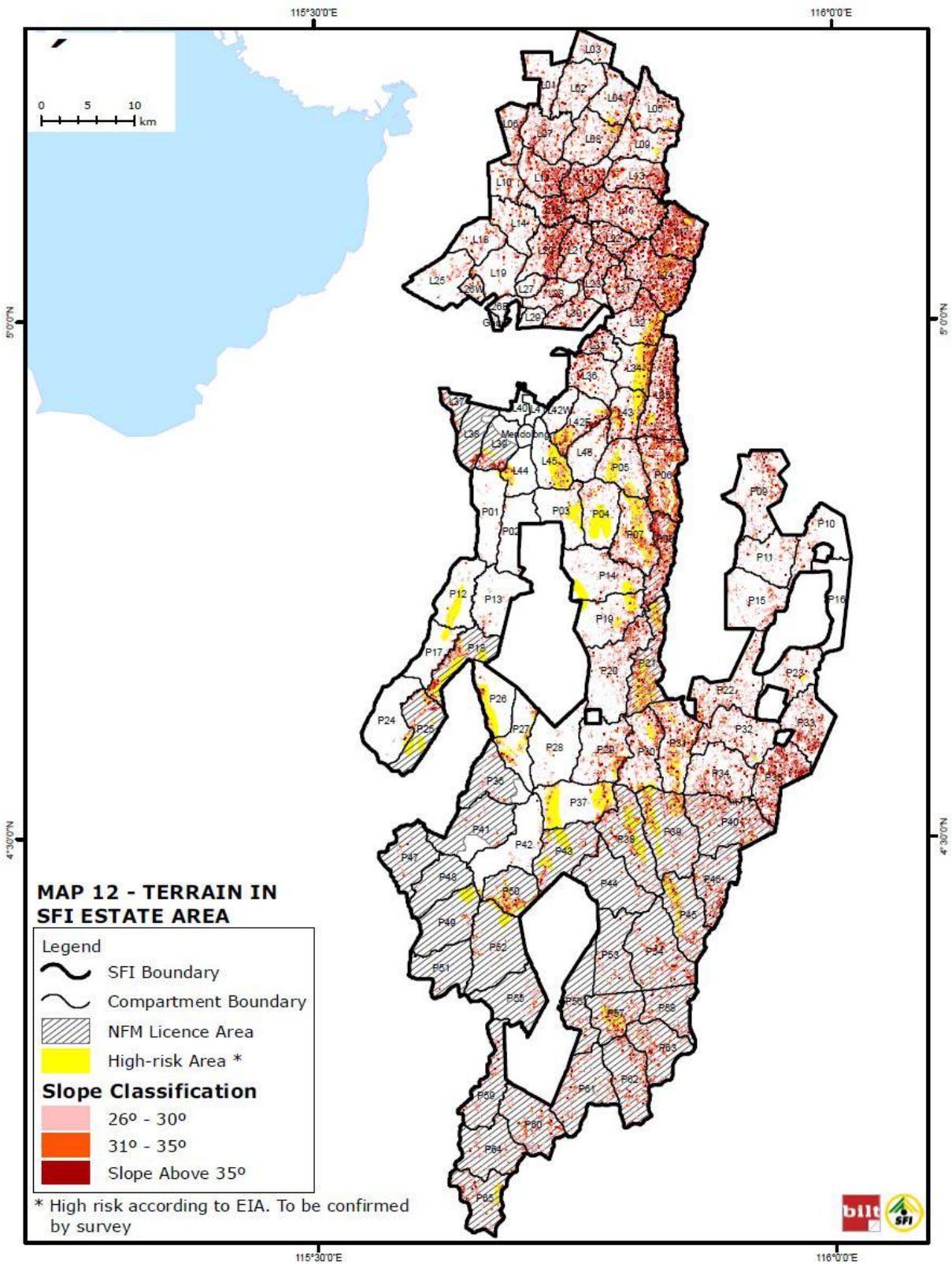


Figure 20. HCV 4.2 - Areas with steep terrain in SFI

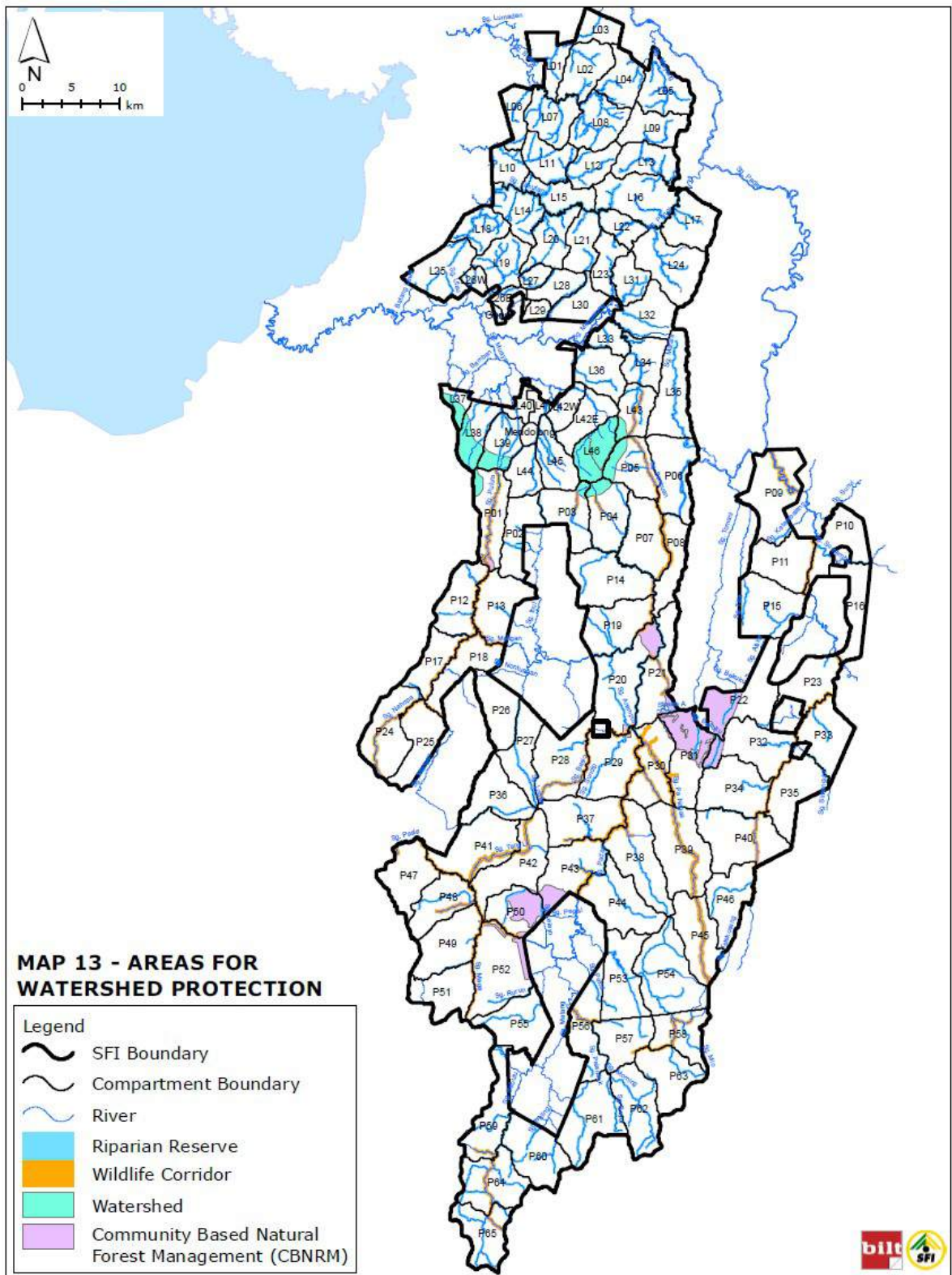


Figure 21. HCV 4.1 and 4.2 - Areas critical for watershed protection

4.4.3 HCV 4.3 Barriers to Destructive Fire

Any specific areas that can act as barriers to provide protection of forests, especially forests with high conservation values, from fire, in areas that are generally fire-prone and where the consequences are potentially severe, can be considered HCV 4.3 (WWF-Malaysia, 2009).

Findings

HCV	Key Question	Findings
4.3	i) Are there forest areas in SFI which are prone to fire or has the area been prone to fire in the past?	Yes
	ii) Are there other HCVs located in or adjacent to the fire prone areas?	Unknown
	iii) Are there any fire prone plantations or settlements located adjacent to the SFI concession area?	Yes

Fire is a common occurrence in the SFI plantation area. The SFI area was affected by the 1997/98 fire due to prolonged drought (El-Nino) (Figures 22 and 23). According to the WWF-Malaysia (2009), areas which have been burned in the past are particularly vulnerable to fires.

L10 was one of the sites burned in the last fire. The rest of the compartments were in the process of being cleared, hence it is difficult to assess the effect of past fires on them.

Acacia mangium and *Eucalyptus* spp. planted in the plantation areas are very susceptible to fire between 1 and 3 years' of growth. In the event of fire, natural barriers within the areas affected, i.e. gullies, ridges, water courses (streams) and even strips of secondary forest vegetation are important physical barriers that prevent the fire from spreading. Forest edges adjacent to plantation areas are most susceptible to burning particularly during the dry season.

SFI has a good Fire Prevention and Control Plan in place. The framework was developed with the assistance of the Sabah Forest Department's consultant, the British Columbia Forest Protection Program, Canada.

1. The whole fire protection plan has been adopted and incorporated into the management of the concession area. Two documents are available:
 - a) Forest Fire Prevention and Control Plan Framework for the SFI Concession
 - b) Forest Fire Prevention and Control Plan in the SFI Concession, Sabah
2. Among the systems in place in SFI for the prevention of destructive fires are:
 - a) Fire reporting procedure
 - b) SFI Fire Action Plan (updated 15 May 2009)

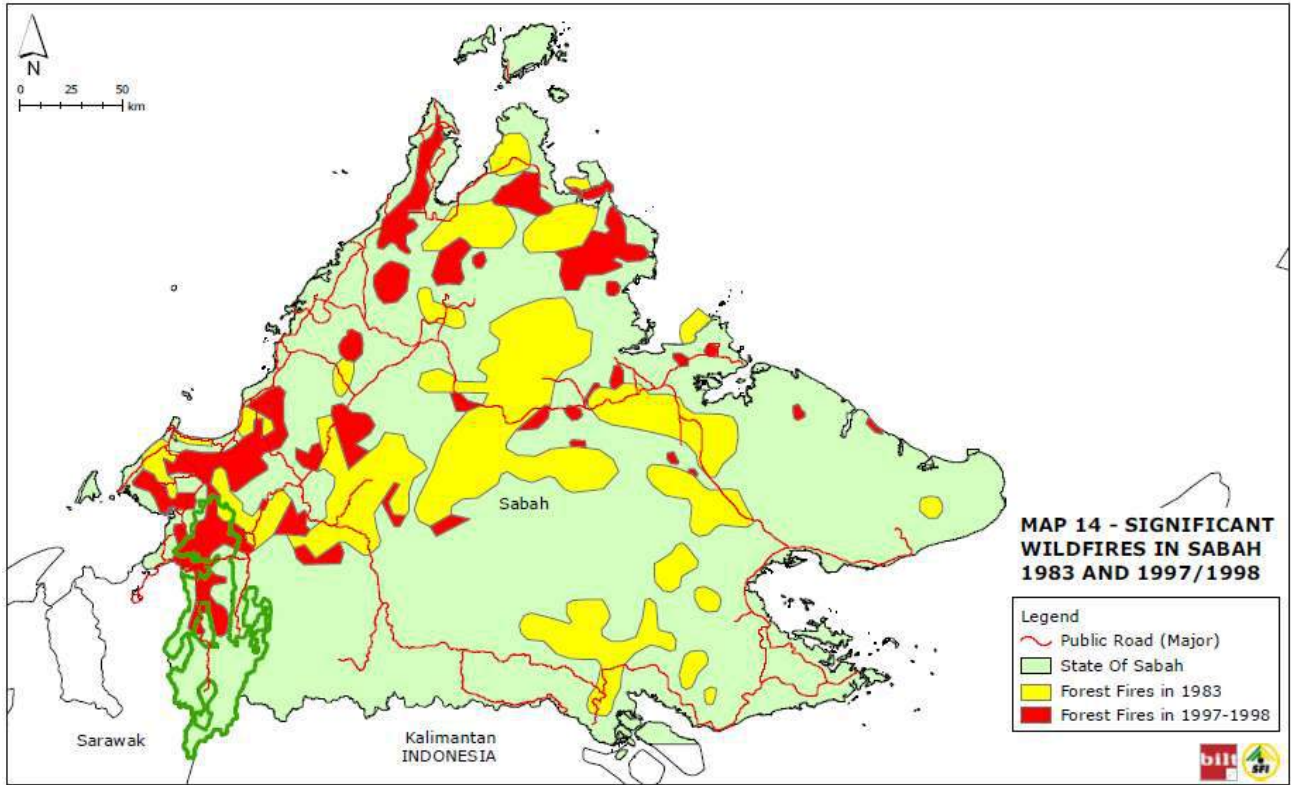


Figure 22. HCV 4.3 - Forest fires in Sabah in 1983 (yellow) and 1997/98 (red)

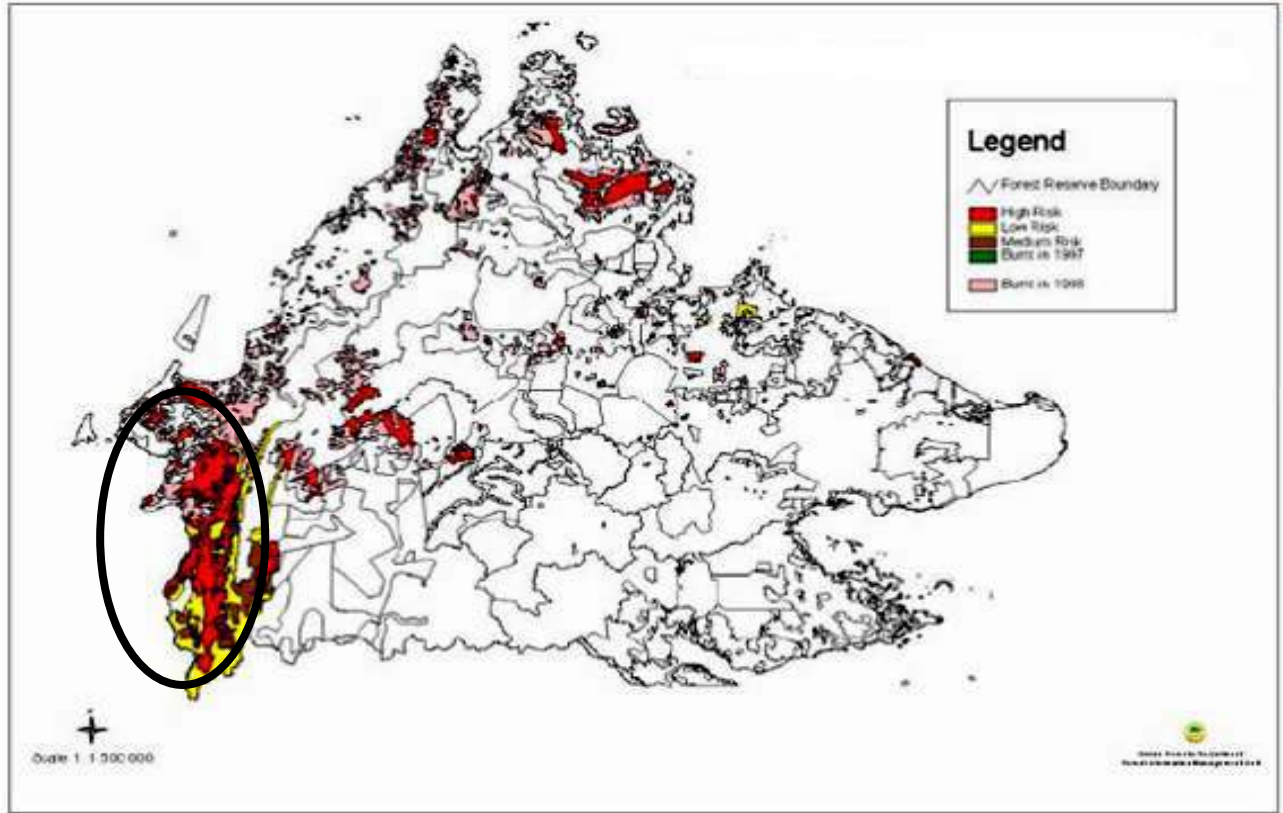


Figure 23. Fire risk (from "Forest Fire Management in Sabah" SFD)

Management Recommendations for HCV 4.3:

1. “*Forest Fire Prevention and Control Plan Framework for the SFI Concession*” should be fully implemented and the plan should be updated regularly.
2. Maintain all water tanks, mobile water tankers vehicles and fire towers.
3. Ensure that firebreaks with a width of 5 to 10 m are constructed on high risk areas such as plantation edge bordering human settlement. Firebreaks should at least be double the height of the vegetation and they should follow the natural topographic features (ridge-top, stream), or forest roads to prevent the spread of fires from one cluster of planting blocks to another. Firebreaks should be accessible by firefighting equipment and personnel. These firebreaks should also be extended to areas bordering NFM as well as HCVPs.
4. SFI staff, as well as local community leaders, should be made aware of their responsibilities related to fire safety by participating in regular training exercises and demonstrations. Besides, it is advisable to conduct regular public awareness campaigns in settlements within and adjacent to the area.
5. Strictly prohibit open burning to comply with the bylaws of the Environmental Department.

Monitoring recommendations for HCV 4.3:

1. Refer to the Forest Fire Prevention and Control Plan for SFI on monitoring procedures as well as the Danger Rating and Prevention Activities proposed by SFI in their Management Plan.
2. Forest fire prevention procedures must be carried out regularly and scheduled into the duty rosters for monitoring forest fires. This should be carried out frequently especially during prolonged drought.

4.5 HCV 5 Basic Needs of Local Communities

Global Toolkit definition: *Forest area is fundamental to meeting basic needs of local communities.*

A forest area may be considered HCV 5 if it contains or is adjacent to settlements which depend on produce from that forest for basic subsistence or health needs. Examples include hunting grounds or areas from which minor forest products such as bamboo, rattan and medicinal plants are collected, and which are regularly visited by community members for this purpose. The community may be living either in or adjacent to the forest. However, identification and management of this HCV must always involve participation of the communities themselves (WWF-Malaysia, 2009).

Findings

HCV	Key Question	Findings
5	<ol style="list-style-type: none"> 1. Are there any settlements (communities) in or adjacent to SFI forest area? 2. Are there communities which depend on the forest area for basic subsistence or health needs? 	Present

Demographics

A total of 16 villages (Figure 9) were visited during the survey and 248 respondents were interviewed. 73% of the respondents were male and 27% were female (Appendix B, Table 17). The ages of the respondents ranged from late teens to over 60 (Appendix B, Table 18). Majority of the respondents were Murut (51.2%) followed by Lundayeh (21%). The rest were Kedayan (10.1%), Bisaya (8.5%), Dusun (3.6%), Chinese (2.8%), Melayu (0.8%), Brunei (0.8%), Bajau (0.4%), Jawi (0.4%) and Kadazan (0.4%) (Appendix B, Table 19). Majority of the respondents were Christian (74.6%) followed by Muslim (22.6%), Taoist (1.6%) and Buddhist (1.2%).

In the villages around the SFI area, 42.3% of the respondents held land under Native Titles (NT), 39.5% had submitted Land Applications (LA) and 18.2% said none of the above applied. (Appendix B, Table 20)

The major source of household income came from farming (82.3%) (Appendix B, Table 21). Other sources of income came from employment in government or private sectors (13.7%), tourism (2.4%) and plantation cultivation (1.2%). Only one respondent's source of income came from hunting.

As shown in Appendix B, Table 22, the majority of the respondents (91.9%) were involved in agricultural activities. Results show that 86% of the respondents (Appendix B, Table 23) planted garden produce such as vegetables, chili and pumpkin, and 84.2% planted fruit trees including rambutan, durian, mango, banana, papaya, coconut, jackfruit, 'tarap', and 'langsap'. This indicates that they were not fully dependent on forest fruits. Apart from that, more than half of the respondents (59.2%) planted cash crops such as oil palm, cocoa and rubber. Almost all the villagers (94.7%)

reared livestock such as chicken and pigs. Those who did not rear livestock normally hunted or fished to supplement their diet.

Dependence on Forest Produce

Figure 24 shows that the villagers are still heavily dependent on forest resources for their livelihood. 68% of the respondents depend on forest resources such as rattan, timber, medicinal plants, and firewood for their daily livelihood. Firewood is collected from the Forest Reserves as well as stateland.

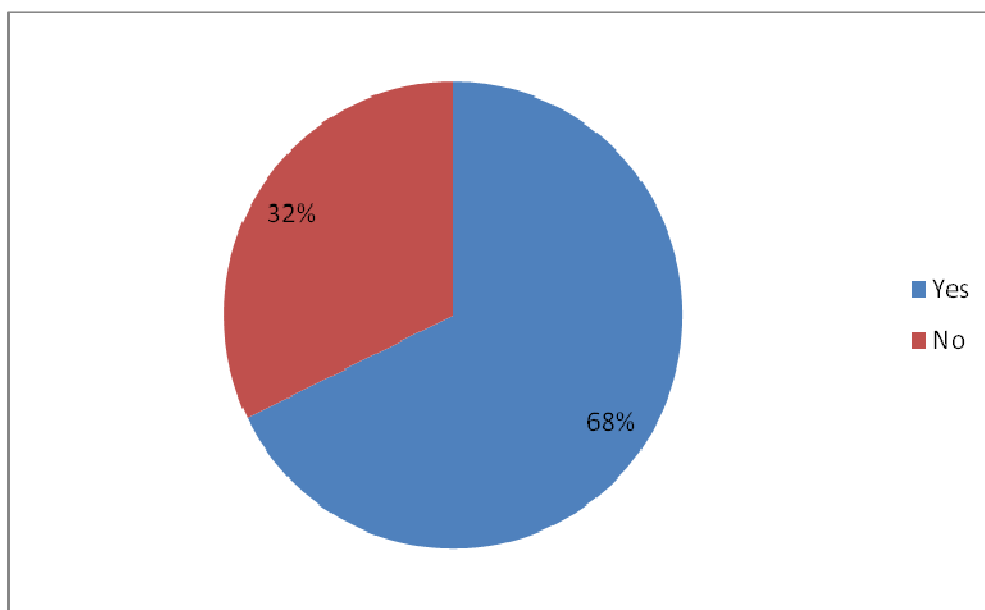


Figure 24. Percentage of respondents who still depend on resources from the forest

1. Hunting

Hunting provides an important source of protein for the villagers, especially for those with low income. As indicated in Appendix B, Table 24, majority of the respondents (71.8%) still hunted while those who did not bought meat from the nearest market or tamu. According to those who still hunted, most of them hunted in the nearby forest (98.9%) while 6.7% of them hunted in the SFI compartments. It was also found that people from Long Pasia and Long Mio used to go into the SFI compartments such as P60 and P61 to hunt for wild animals. It was noted that there were also several areas for hunting, fishing and extraction of medicinal plants within the stateland.

The means used to reach hunting areas can provide a rough assessment of the severity of damage caused to the forest by access. Survey results show that 98.3% of the respondents walked to the hunting grounds (Appendix B, Table 25). The rest of the respondents mentioned the use of vehicles such as boats, land cruisers and motorcycles to access the targeted hunting area. Surveys on hunting activities also indicated that the majority of hunters still preferred traditional hunting methods such as spears, traditional traps and blow pipes (51.7%, 14.6%, and 6.7% respectively). A total of 39.9% of the respondents used hunting weapons such as self-made guns and bullets.

This social survey indicated that the most preferred target species is wild boar (*Sus barbatatus*). Majority of the respondents (84.3%) hunted this species. Other species hunted are Sambar Deer and mousedeer (56.2% and 55.6% respectively), monkeys (8%) and pangolins (10%). A minority hunted barking deer, flying lemur and flying fox. Appendix B, Table 26 indicates that 75.8% hunted an average of two animals per hunting trip while 24.2% hunted more than two animals per hunting trip.

Hunting details such as frequencies of hunting trips and number of persons involved in each hunting trip were also recorded (Appendix B, Table 27). A total of 47.2% of the respondents hunted more than twice weekly, 31.5% hunted once a month, 12.9% hunted once a week and 8.4% hunted about twice yearly. The survey indicates that most of the hunters (60.1%) preferred hunting in a group of three or four persons in each hunting trip. Teamwork needed in pursuing the wild animals might be the reason. About 22.5% hunted alone and 17.4% hunted in groups of two to three persons in each trip.

The results also indicate that almost all hunting yields were for private consumption. Only one of the respondents sold his hunting yields. Moreover, 75% of the respondents claimed that there was no traditional hunting taboo.

2. Fishing

The information shown in Appendix B, Table 28 indicates that majority of the respondents practised fishing (75%). All their fishing yields are for their own consumption. 65.1% of the respondents used drift nets to catch fish, 59.7% used fishing rods and 47.3% used casting nets. Interestingly, 33.9% of the respondents mentioned that they still used traditional methods to fish.

3. Handicraft

Handicraft-making is one of the main activities in the daily routine of the villagers. 79% of the respondents still made traditional handicraft (Figure 25). However, the majority claimed that the handicraft made was for personal use or as decorative items in their own homes. According to these handicraft makers, the raw materials used were rattan, bamboos, lianas, and “sier” collected from the nearest forest. Information on the exact locations of the raw materials was not gathered; however, it is not known if they were collected from stateland or the SFI area.

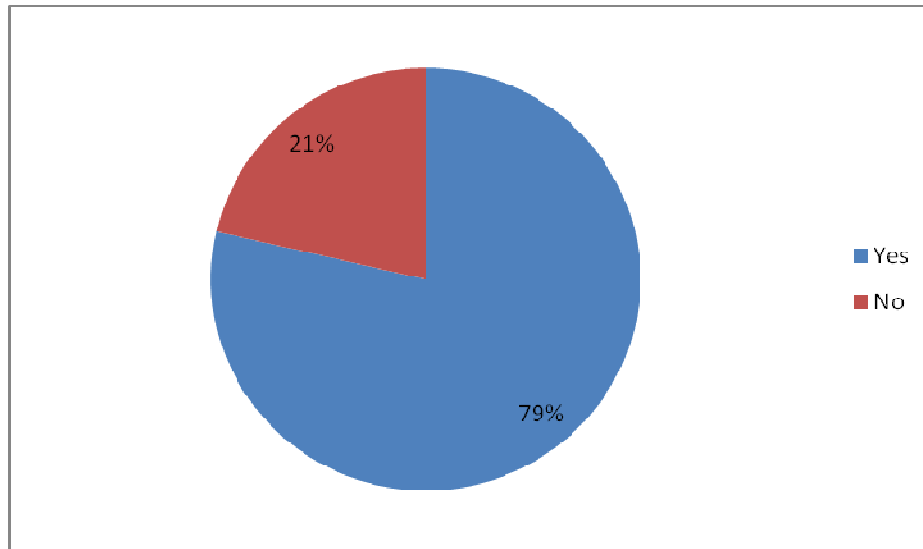


Figure 25. Percentage of respondents who still practice the making of traditional handicrafts

Firewood

Figure 26 indicates that 82% of the respondents depended on both firewood and gas for cooking, 14% depended solely on firewood while 4% depended solely on gas. Although gas could be purchased from the shops, it was considered unaffordable to the respondents in view of their low income. Only one respondent used electricity to cook. Firewood is gathered from the nearby forest.

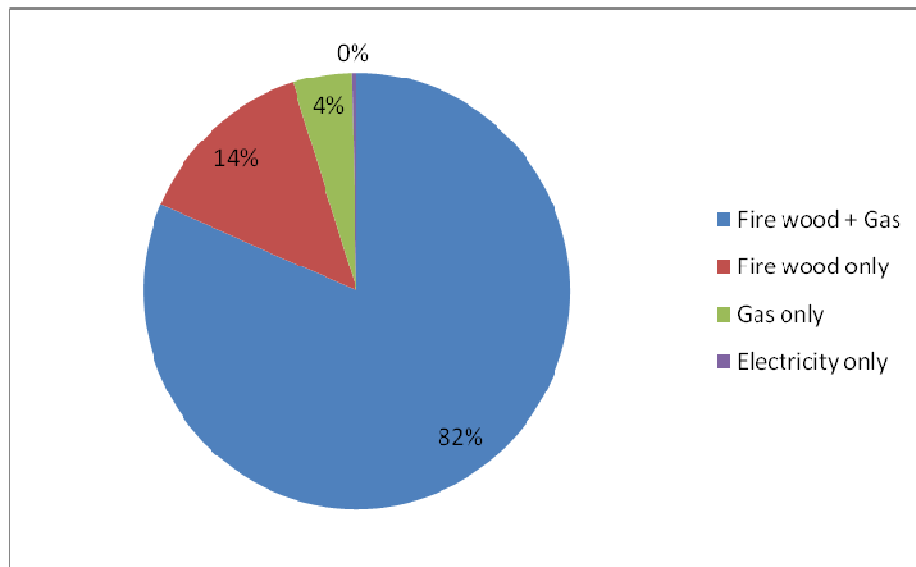


Figure 26. Type of cooking fuel used by respondents

4. Medicinal Plants

Medicinal plants are some of the important resources collected from the forests. As indicated from this survey, 77% of the respondents still possessed some knowledge about traditional medicinal plants and collected them from the forests to cure minor illnesses (Figure 27). In all cases, the

medicinal plants are used to treat minor ailments such as diarrhea, skin problems and fever for children. These plants were collected in small quantities.

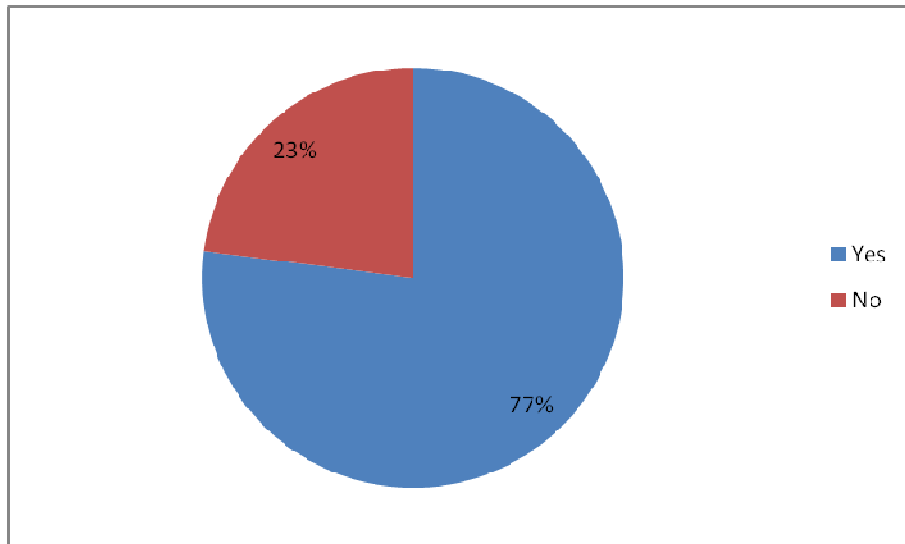


Figure 27. Percentage of respondents who collect medicinal plants from the forest

5. Knowledge about Forest Products

During the interview session with villagers, it was found that the majority of them (67%) had good knowledge about the use of forest products. Only 33% of them did not possess this knowledge (Figure 28).

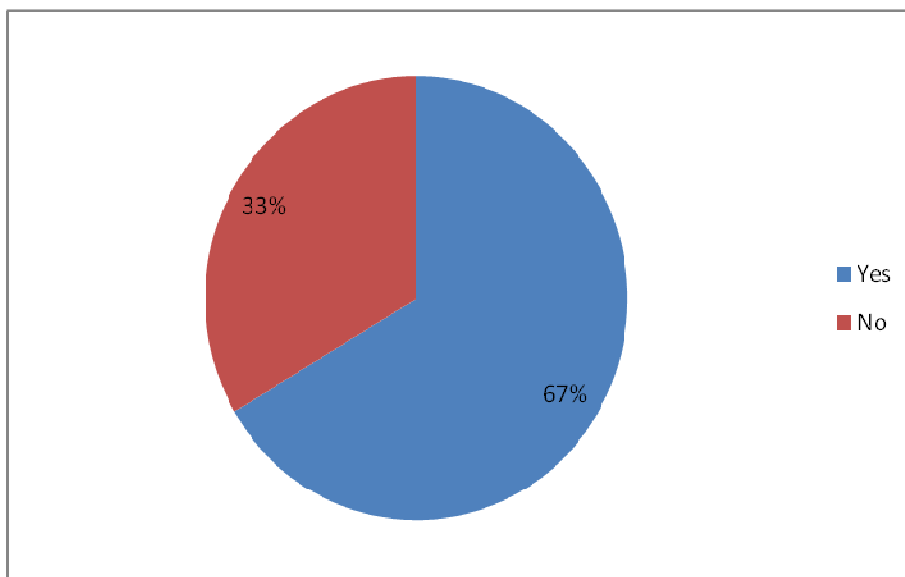


Figure 28. Percentage of respondents who have knowledge of the use of forest produce

6. Awareness of legal hunting

The study also shows that 66% of the respondents were aware of the proper legal procedures for hunting, i.e. requirement of hunting licences. About 34% were unaware of the laws involved in hunting (Figure 29).

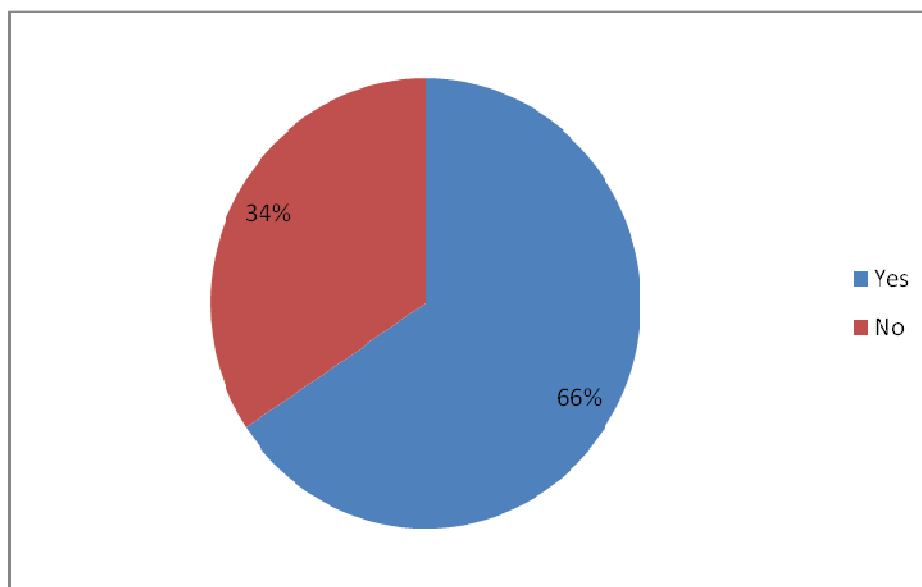


Figure 29. Percentage of respondents who have knowledge of legal hunting procedures

Main concerns from respondents

The results show that 44% of the respondents were in conflict with the other stakeholders (Figure 30). One of the concerns of the community interviewed was the unresolved conflict among the community, SFI and Sabah Forestry Department. They claimed that the land title applications submitted a long time back had not been granted. New land title applications for areas such as those along the main road to Kg. Meligan were also not entertained. The respondents from Meligan and Ulu Tomani area had the most land claims while those from Sipitang area had the least issues with regards to land claims.

The accessibility to these remote villages was another concern to the villagers. More than three quarters of the respondents complained about poor road conditions in the stateland or villages due to the lack of maintenance (Appendix B, Table 29). The road within the stateland leading towards the kampungs fall under the government rural development scheme, with allocated government funds to repair or upgrade roads in the villages. SFI is tasked to maintain and upgrade the main road or public road as long as they are carrying out operations nearby.

During this study, the survey team managed to get in touch with three JKKK personnel, from Kg. Bakuku, Kg. Tinura, and Kg. Mahunsop and also six headmen from Kg. Meligan, Kg. Malutut, Kg. Tinura, Kg. Mahunsop, Kg Long Pasia and Kg. Long Mio. All of them were concerned about land issues that needed to be addressed through participatory approach among the government authorities, community and SFI management. The villagers claimed that SFI had encroached on state or village land. However, this may not be true and might have come about due to a misunderstanding among

villagers on the Land Application (LA) process. They thought that any roads constructed nearby the villages were an opportunity to apply for more land in the forest reserve.

The villagers were not aware that the LA process would take several years and that it might never be approved if the piece of land concerned fell within the Forest Reserve. However, having paid for the land application forms and having the areas marked on the ground (close to their village, especially along the roads) the villagers felt that the land belonged to them. It was observed that new road construction along the logging road to compartment P35 had signboards claiming ownership of land on the left and right side of the road. On the other hand, 18.2% of the respondents said they did not own native land nor had they applied for land (Appendix B and Table 20). This could be due to many factors and one of the factors could be the fact that they were newcomers to the villages or immigrants.

Another main concern was water pollution (12%), as shown in Appendix B, Table 29. Some of villagers from Kg. Meligan claimed that they had difficulty obtaining clean water because of logging activities going on in the nearby compartment (P27) that caused sedimentation downstream of Sungai Lougon and Sungai Nahupu. For the time being, the villagers of Kg. Meligan had to use water from Sg. Nantungan and Sg. Sinabung while the villagers of Kg. Rundulang used water from Sg. Rundulang (P13), which was unpolluted.

Rain water and river water are the villagers' main sources of water supply. It is therefore important to ensure that unpolluted water goes downstream from the concession area to the villages so that they can have clean water supply and food source through fishing.

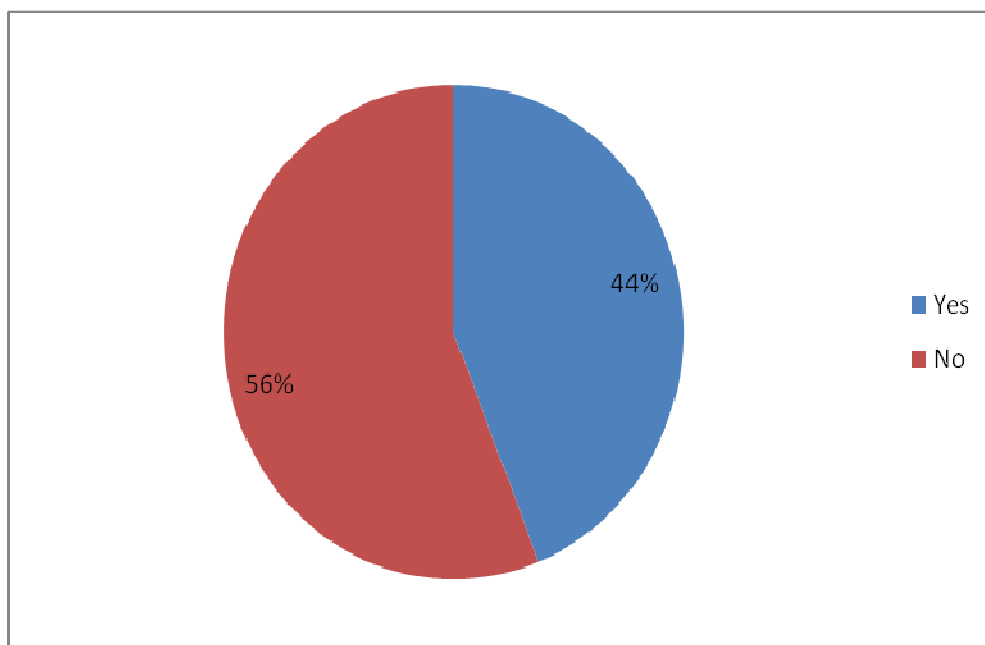


Figure 30. Percentage of respondents in conflict with other stakeholders

Management Recommendations for HCV 5

1. Allow the local communities to collect medicinal plants and NFTP for their own consumption or subsistence use from the SFI area.
2. Allow the local communities to practise sustainable hunting to obtain major sources of protein such as wild boar, deer, fishes and fresh water crabs from a designated area in the SFI area. Only wildlife under schedule II and III of Wildlife Conservation Enactment (1997) are allowed to be hunted and communities must be well informed about this.
3. Prevent outsiders from encroaching into the SFI area by getting existing local communities to co-manage the area, e.g. setting up patrol teams among the locals. This can help reduce further pressure placed on existing wildlife populations. A programme is being developed by CSR for community-based resource management (CBRNM), comprising honorary wildlife wardens, a game management plan and others to prevent encroachment into the SFI area and to enhance rapport and support from the communities.
4. While most of the major catchment areas within the NFM and ITP areas have been demarcated, SFI will need to ensure that buffer zones are established. Field operation teams should continue to ensure that proper buffer zones are established prior to harvesting or planting activities through the SFI area.
5. There should be clear demarcation on areas designated as kampung lands, stateland and SFI areas to resolve conflicts involving encroachment issues. Even though the government has clearly defined stateland and kampung land on maps, it is common to find unclear boundaries on the ground. SFI has commissioned two private surveyors approved by the Sabah Forestry Department to carry out boundary demarcation around the stateland and the task is on-going at the time this report is submitted.
6. SFI shall continue to maintain public roads used for forest operations.
7. SFI will continue to provide employment opportunities for the local communities in order to uplift their socio-economic status, to improve livelihood and enhance rapport with the surrounding communities. Note: SFI has about 2,111 employees and 68% of these are locals from Sipitang, Tenom and Beaufort. It has been the company's policy to employ workers from the local communities.

Monitoring Recommendations for HCV 5

1. The CSR department should continue its CSR programmes to improve the livelihood of the communities via a participatory approach that involves the government sectors, local government authorities, communities and SFI in any of the agreed development projects, mainly in capacity building and entrepreneurship opportunities towards self-reliance.
2. The CSR department is to play its role as a catalyst to the development and coordination between the villagers and the government authorities, as well as one that seeks amicable solutions to conflicts in all areas of operation.

3. SFI should initiate steps that enhance cooperation among government authorities such as the Sabah Forestry Department, Sabah Wildlife Department, Land and Survey Department and NGO's. It should also promote sustainable joint resource management with communities surrounding the SFI area through capacity building, technology, linkages to the global market and expertise support to allow communities to improve skills in agro-forestry innovation, commercial bio-prospecting and eco-tourism to promote income generating activities.

4.6 HCV 6 Cultural Identity of Local Communities

Global Toolkit definition: *Forest area is critical to local communities' traditional cultural identity.*

A forest is considered HCVF 6 if it has been important for a local (particularly indigenous) community's cultural, ecological, or religious activities. The community may be living either in or adjacent to the forest. Examples of such sites within a forest include burial grounds or sacred areas, which cannot be replaced with alternatives and/or would cause drastic cultural change within the community. Identification and management of this HCV must always involve participation of the communities themselves (HCVF Toolkits for Malaysia, 2009).

Findings:

HCV	Key Question	Findings
6	Does SFI concession area contain sites important to a local community's cultural, ecological or religious activity?	Present

Long Pasia and Long Mio

In this study, we found that Kg. Long Pasia is one of the famous tourist spots in Sabah. Several archeological sites such as Tapak Ulung Buayeh, Batu Berukir, Batu Angan, Lengayan and the old burial site or "Tanem" are the main places of attractions in Long Pasia. Most of the archeological sites are within the stateland and not in the SFI area.

The Lundayeh believe that Batu Berukir is a stone carved by Upai Semaring (believed to be a local folk hero) with his bare hands and supernatural abilities, while Batu Angan are the stones used by Upai Semaring to cook. Lengayan are believed to be the footprints left by Upai Semaring. "Tanem" is the burial site of Upai Semaring's daughter, who was believed to have passed away when Upai Semaring was on his way to Kuala Maga (Topp, 2002). According to the villagers, many beads were found at the burial site. This is the reason why beads are used in Lundayeh traditional costumes and beauty accessories nowadays. Apart from that, Maga waterfall, located about an hour's walk from Kg. Long Pasia, is also another popular tourist spot (Figure 31).

In the Ulu Padas area today, several crocodile and snake mounds are still visible in the forest (Figure 31). It is quite normal for villagers to prepare a big crocodile-shaped rice presentation at a wedding party wherein the newly married couple will cut the throat of the crocodile and be bestowed with its strength.

There are sites serving as burial grounds for the villagers upstream of Ulu Padas. These sites, which are well protected, are located in stateland and no disturbances have been reported. No burial ground from this village is found within the SFI compartment.

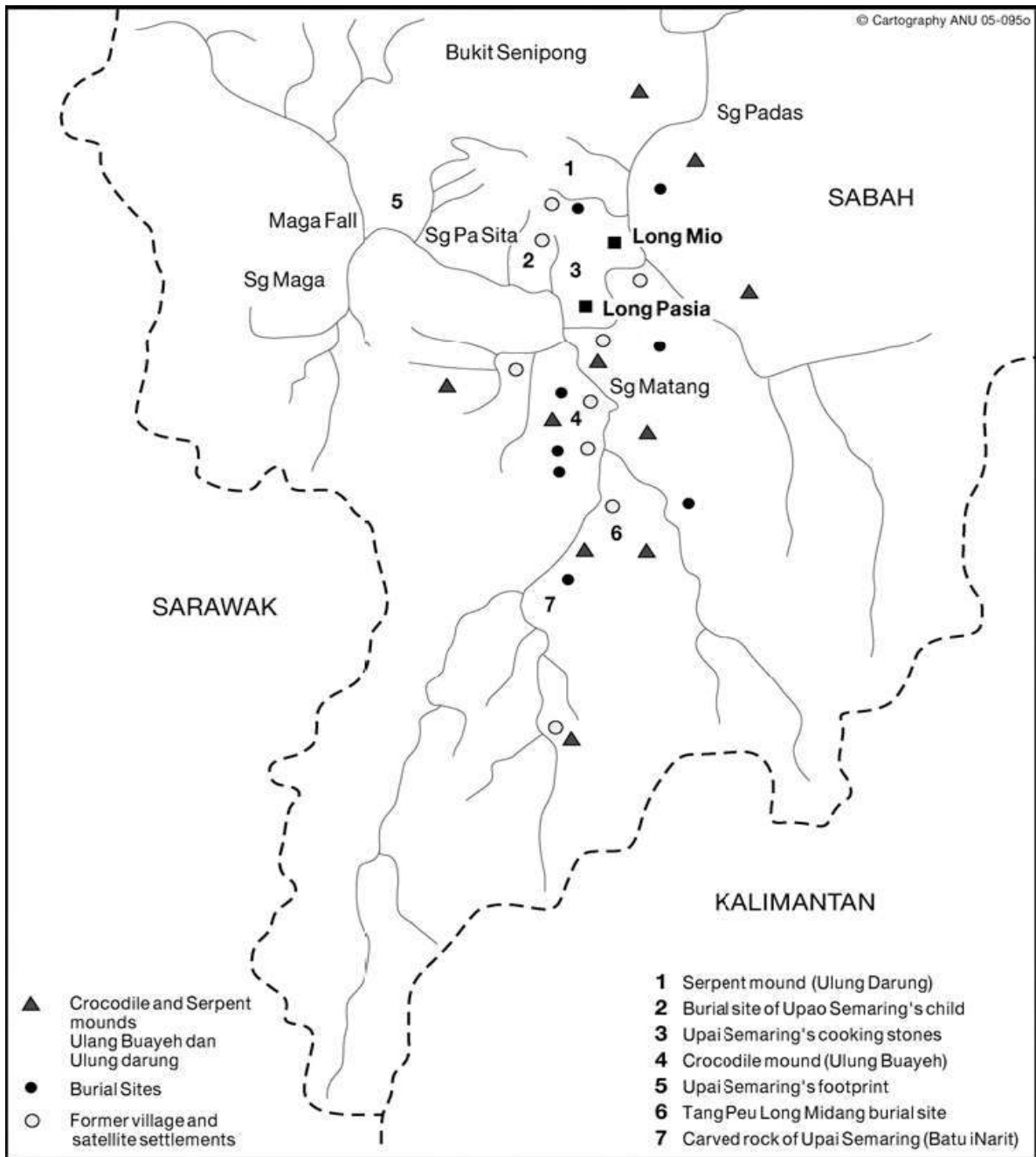


Figure 31. Cultural sites in Ulu Padas State Land (Source: Vaz 1997 in Vaz 2006)

Kg. Meligan

Several archeological sites at Kg. Meligan such as the carved stones are believed to have been carved by seven men using supernatural powers. One of the known carved stones, named Batu Binatikan, is located about one kilometre from the village. Batu Tinundob (footprints from the seven brothers) is located within the village area and is also one of the archeological sites. Batu Tinara is another legendary stone believed to have been broken up by the seven brothers.

Several sites located within the SFI compartments served as burial grounds for the villagers from this village (Figure 32). These burial sites are located at Sg. Bubuluh, Sg. Mangkop, Tinudop, Napairon and Kuala Sg. Laogon. The villagers claimed that the old burial sites at Kuala Sg. Laogon (P27) have existed for over 100 years, but were severely disturbed by the logging activity there. Another site at Sg. Tipulon (P13) was also reported to have been disturbed by logging activity.*

However, the villagers also mentioned that the burial ground situated in P26 have been clearly demarcated on the ground by SFI prior to logging. This was carried out in line with the SFI's Standard Operating Procedure (SOP) (SFI, 2009c and SFI, 2009b) in compliance with ILO Convention, 169.

*Note: P13 or P27 have been logged before Ballapur Industries took over and the CSR SOP was not applicable then. CSR existed only since July 2007 after Ballapur Industries took over SFI in March 2007.

Kg. Alutok, Kg. Kaang and Kg. Malutut

According to the villagers of Kg. Alutok, Kg. Kaang and Kg. Malutut, legend has it that the remains of the seven brothers formed the carved stone called 'Batu Berukir'. Some said it was located on the hill between Kg. Malutut and Kg. Bakuku. We found this legend very similar to the legend spread among the community of Kg. Meligan (as mentioned above). This is not unusual as the largest ethnic group in Kg. Alutok, Kg. Kaang and Kg. Malutut is also Murut who originated from Meligan/Basio.

The carving could be in the shape of a human showing the hands and feet or in the form of animals or flora and fauna. It takes about half an hour to walk from the main road of Malutut Village to reach the carved stone.

The burial ground for villagers from Kg. Alutok and Kg. Kaang is found within the stateland upstream of Sg. Segamut. Villagers from Kg. Malutut have their own burial site within the village far away from SFI operations.

Kg. Tinura and Kg. Lalang

According to the villagers from Kg. Tinura, three stones would give them signs before any death occurred among the villagers. The three stones are called Batu Marak, Batu Gong and Batu Teriak.

Batu Marak is located on the hill in the village. It is believed that the stone would look bright before any death occurred in the village.

Batu Gong is believed to be located somewhere in the jungle and people could only hear the sound it made, which is similar to the sound made by a gong used by the Murut or Dusun during a wedding ceremony. Like the brightness of Batu Marak, the sound of Batu Gong was a bad omen. Whenever the 'gong' was heard, it was a sign that someone from the village would die. This belief is also practised among the villagers in Kg. Lalang.

Batu Teriak is believed to be located somewhere in the jungle. The villagers would hear a sound like people screaming, indicating that there would be death in the immediate future. However no one has ever seen the stone.

According to the village head of Kg. Tinura, there is a site in the village compound that serves as their burial ground. For villagers from Kg. Lalang, an area near to Sg. Titindakon is their burial site and this is located within the stateland.

Kg. Magunsop

The archeological site in Kg. Magunsop is a big cave from which the water flows into Sg. Magunsop. This is unique for the village and is located about half a kilometre from the house of the village headman.

Within the village compound, there is a site that has served as their burial ground for generations and no disturbances have been reported.

Kg. Melalia, Kg. Tanah Karit, Kg. Naluyan, Kg. Katipor, Kg. Sungai Tiga and Kg. Pepolor

No archeological sites have been reported by the villagers from Kg. Melalia, Kg. Tanah Karit, Kg. Naluyan, Kg. Katipor, Kg. Sungai Tiga and Kg. Pepolor. However, they share the same burial site which is located near to Kg. Tanjung Ubi within the stateland. Villagers said that although this is the new burial site, it has existed for more than 30 years.

Management Recommendations for HCV 6

1. Field operation staff should continue to communicate with the local communities prior to logging activities to ensure that burial sites and other cultural heritage sites are demarcated clearly on the ground based on the provision in the licence agreement, SFI SOPs and continuous site monitoring during operation..
2. SFI is to continuously respect the cultural and customary heritage of the communities, their archeological sites and the village areas where communities have inhabited for generations.
3. Maintain traditional use rights of communities in and around the SFI area, especially concerning burial grounds, heritage and ancestral home sites.
4. Any encroachment of communal land should be resolved using conflict resolution procedures (CSR/SOC.C4) and the Native Court, Land and Survey Department, Sabah Forestry Department and Sabah Agriculture Department should be referred to for guidelines.

Monitoring Recommendations for HCV 6

1. Cultural, archeological sites and burial grounds, which are identified and demarcated in the concession area, should be monitored by field operation and regional managers periodically, (preferably prior to harvesting activities) both in the plantation and the NFM areas.

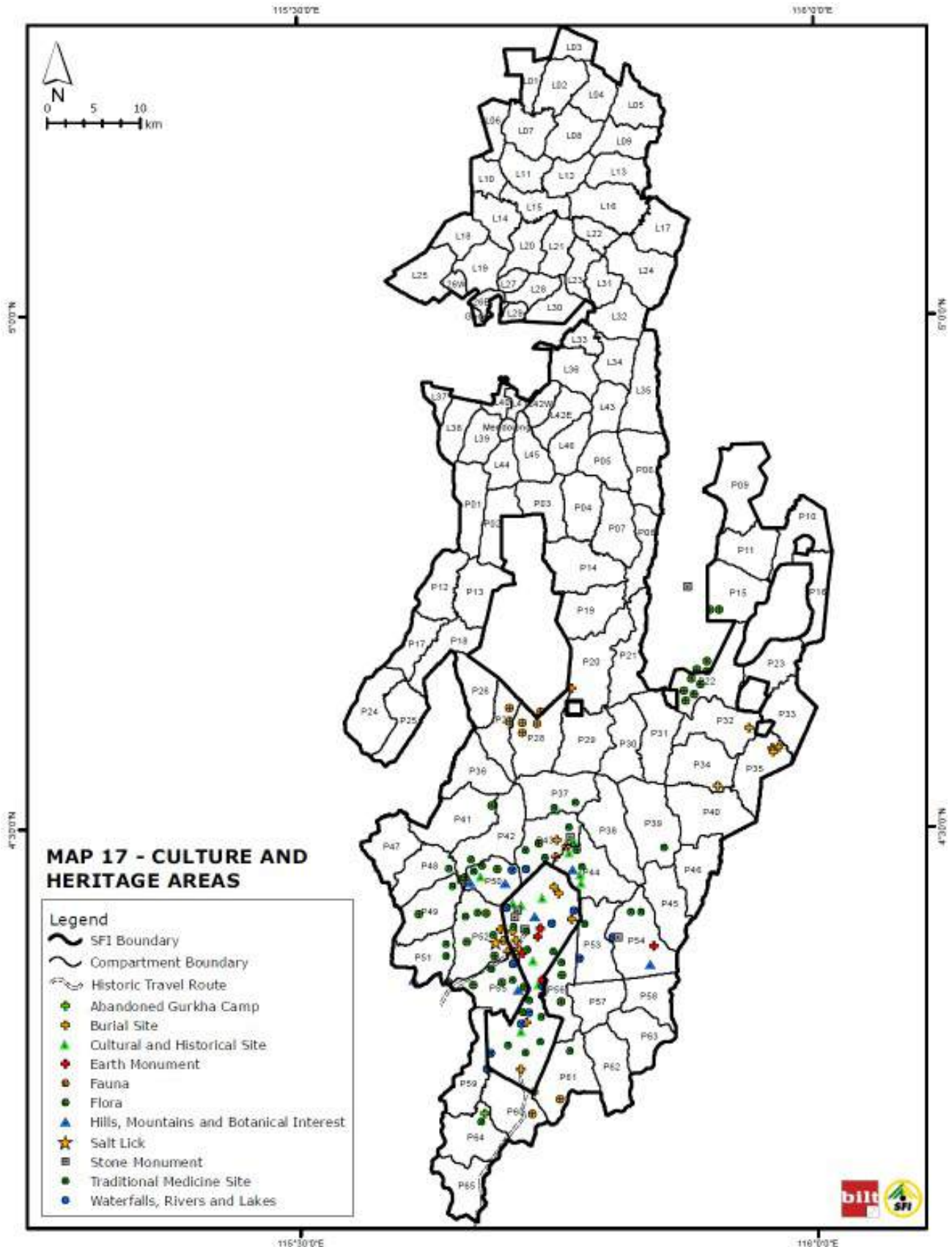


Figure 32. HCV 6 - Archeological and historical sites in and near the SFI Area

5 CONSTRAINTS, CHALLENGES AND OTHER RECOMMENDATIONS

The HCV assessment was only confined to five compartments, i.e. L10, P35, P42, P60 and P61. It is recommended that SFI conduct HCV assessments in stages in other parts of the SFI area also in order to get a better picture of the HCVs in the concession.

The biodiversity survey was conducted for a duration of only 17 days (including travelling time) in the field. Data collection, especially on HCV 1.4 (critical temporal use) would ideally require more time. The field assessment team could do little with the limited time spent in the field. It would have been better to have local communities provide more information in the field, especially with regards to HCV 1.4.

Due to the limited study duration and manpower, the team did not demarcate any flora related to HCV 1.2 and HCV 1.3 species on the ground. The company staff will have to mark them individually on the ground using the data (GPS readings for those plants) provided in this study. With regards to connectivity, SFI needs to seek further advice on the establishment of connectivity and this has to be science-based.

6 SUMMARY OF HCV FINDINGS FOR THE SFI AREA

HCV	HCVF Toolkit for Malaysia (Definition)	Findings	
		Present	Not or Unlikely Present
HCV 1.1	Protected Areas: All forests legally gazetted as a Protected Area (PA) under Malaysian legislation (federal/state).	Present	
HCV 1.2	Threatened and Endangered species: Any species categorised as either Critically Endangered (CR), Endangered (EN) or Vulnerable (VU) in the IUCN Red List, Appendix I of CITES or listed as protected under Malaysian legislation (federal/state)	Present	
HCV 1.3	Endemism: Forest containing endemic species particularly in high concentrations or highly restricted distribution.	Present	
HCV 1.4	Critical Temporal Use: Forest area important to wildlife for feeding, nesting, roosting, migration or containing saltlicks.	Present	
HCV 2	Landscape-level Forest: Forest area containing or is part of a globally, regionally or nationally significant large landscape-level forest where significant populations of most if not all naturally occurring wildlife species exist in natural patterns of distribution and abundance.	Present	
HCV 3	Ecosystems: Forest area containing or is part of a threatened or endangered ecosystem.	Present	
HCV 4.1	Watershed Protection: Dam catchment area and any forest area legally gazetted as a Protection Forest for water catchment under any federal or state legislation.	Present	
HCV 4.2	Erosion Control: Forest areas that have been legally gazetted for soil protection or conservation under federal or state law.	Present	
HCV 4.3	Barriers to Destructive Fires: Areas that act as barriers to provide protection of forests, especially forests with HCVs, from fire in areas that are generally fire-prone.	Present	
HCV 5	Basic Needs of Local Communities: Forest area is fundamental to meeting basic needs of local communities.	Present	
HCV 6	Cultural Identity of Local Communities: Forest area is critical to local communities' traditional cultural identity.	Present	

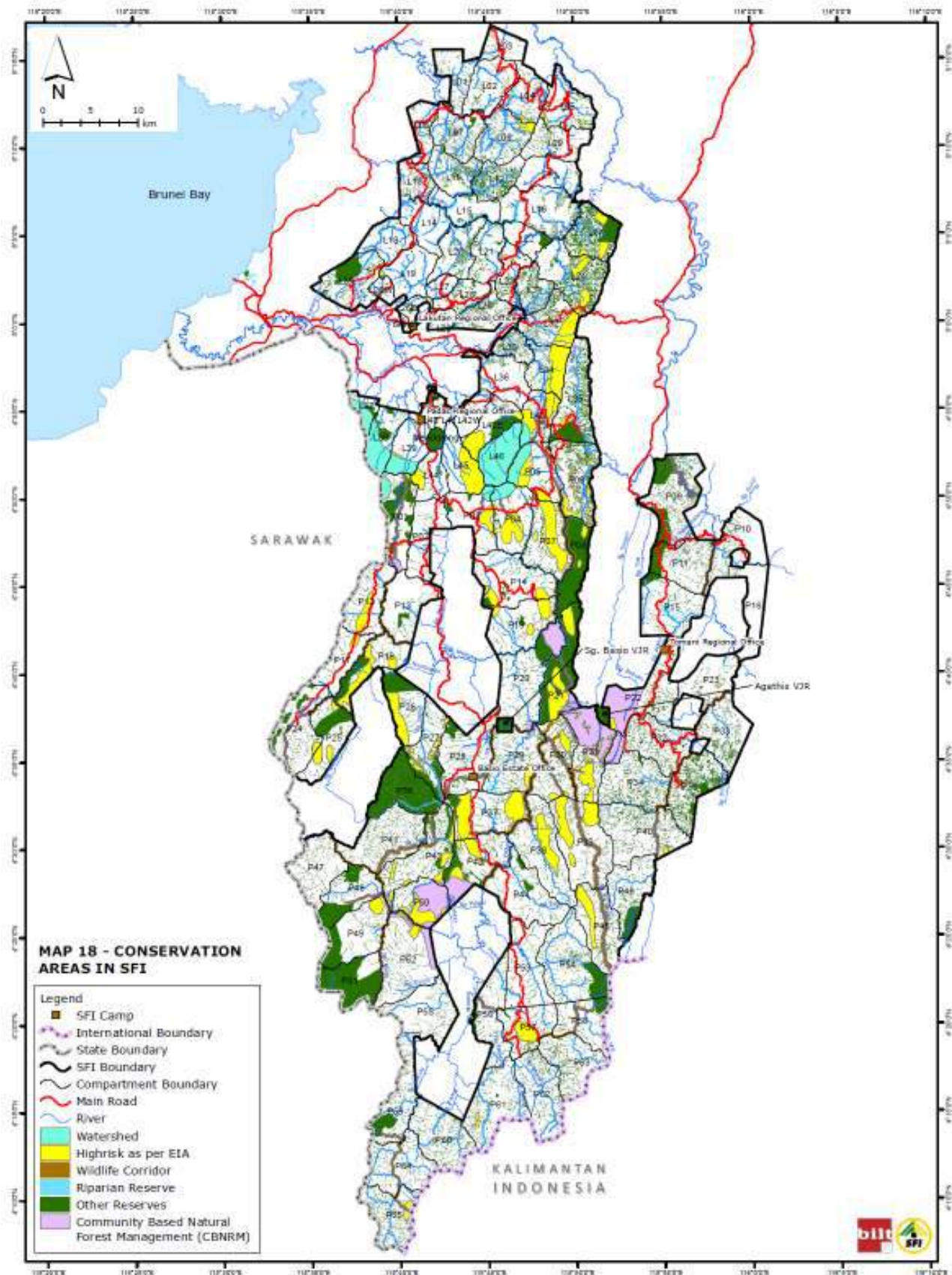


Figure 33. Areas, identified to date, to protect High Conservation Values (HCV)

7 GENERAL CONCLUSION

This HCV assessment concludes that all six High Conservation Values (HCVs) are present in the SFI area.

There is a need to integrate key elements of the management recommendations described in each HCV, to maintain and/or enhance HCVs in the SFI area in accordance with guidance provided in the HCVF Toolkit for Malaysia. There is substantial inter-dependence in management recommendations of certain HCVs, for example HCV 1.2, HCV1.3 and HCV3 for biodiversity; HCV 1.1 and HCV 2 for Protected Areas; HCV 4.1 and HCV 5 for provision of clean water to local communities and HCV 5 and HCV 6 for basic local community needs and their cultural identity. For such cases, management of these HCVs should be pursued jointly.

In order to meet the FSC principles and criteria for HCVF, the most important recommendations for SFI are as follows:

1. Maintain existing connectivity or wildlife pathways for flora and fauna within the SFI area and with surrounding forests such as the Protected Areas (Pas) and VJRs.
2. Connect the plantation area northeast of the SFI area to Gunung Lumaku Forest Reserve (Class I), which connects to Crocker Range Park. Maintain connectivity at the southern part of the SFI area at the compartments that border Kayan Mantarang National Park.
3. Have buffer zones of 100 m width in all the protected areas in and adjacent to the SFI area in order to reduce impact from logging activities, forest conversion or any infrastructure development on the Protected Areas (PAs).
4. Conserve threatened ecosystems identified, i.e the lowland dipterocarp forests, montane forests and Kerangas forests, with appropriate safeguards in place.
5. Develop and implement a strict plan that ensures future harvests of the plantations near the Class I Forest Reserves and riparian areas will reduce damage to soils and HCVs and Protected Areas (PAs). The forest managers must ensure that Reduced Impact Logging (RIL) techniques are adhered to when harvesting in the NFM area and conduct well planned harvesting operations which minimise soil disturbance in the ITP areas.
6. Carry out mapping of PA boundaries (to be done by the Sabah Forestry Department) and mapping within the SFI area (to be done by SFI). Identify sensitive areas and exclude them from harvesting. The boundaries are to be physically demarcated on the ground as well. Update forest land-use maps through the acquisition of the latest satellite imagery in order to monitor forest change.
7. Conserve forest areas for sustainable utilisation by the local communities which still rely heavily on the SFI forest area for subsistence. One example is to designate some areas within compartment P60 and P61 for the use of local communities from Kg. Long Pasia and Kg. Long Mio.
8. Rectify the SFI map on HCV areas in order to incorporate those areas with high biodiversity values such as compartment P42, which has both HCV 1.2 (threatened, endangered species) and HCV 1.3 (high endemism species).

8 MANAGEMENT ACTIONS BY SFI

On 24th February 2011, WWF-Malaysia held a discussion with key staff of the Sabah Forest Industries (SFI) to review the HCV assessment report prepared by the independent consultant and more importantly, to agree on the management prescriptions recommended by the consultant and to develop key actions that address the HCVs identified. The discussion was between WWF-Malaysia and SFI at both site level (compartment) and a larger landscape level (SFI area). Representatives from SFI and WWF-Malaysia present at the discussion were:

Present from :	Name:	Designation:
Sabah Forest Industries (SFI)	1. Mr. Sanjeev Chadha 2. Mr. Wayne Wooff 3. Mrs. Angelica Suimin 4. Mrs. Joan George 5. Mr. Edmund Gan	Joint CEO of SFI General Manager, Plantations CSR Manager Environmental Officer Forest Manager
WWF-Malaysia	1. Ivy Wong 2. Audrey Lee 3. Josil Murray	Forest Conservation Manager GFTN Acting Manager HCVF Officer

The product of the discussion between WWF-Malaysia and SFI was a concise document which highlights HCV findings; the management recommendations prescribed by the consultant and agreed actions by SFI. Please refer to Appendix C for the document entitled *Key Findings and Management Actions by SFI to Protect High Conservation Values as agreed by WWF and SFI*. The actions agreed by WWF-Malaysia and SFI go beyond the management of the HCVs identified in the 5 compartments sampled by the HCV consultant. They also address HCV safeguards at a larger landscape looking at the importance of the establishment and maintenance of healthy wildlife corridors and riverine buffers, and ensuring representative samples of rare, threatened and endangered species in the Natural Forest Management (NFM) area are present.

The document presented in Appendix C is the action plan which SFI will use to ensure that all HCVs in their concession will be managed and safeguarded, and the values enhanced over time.

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www.globalforestwatch.org

10 APPENDICES

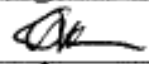



Appendix A: Stakeholder Consultation Attendance Lists from Tenom and Sipitang

PEMBENTANGAN DAN PERBINCANGAN
HASIL KAJI SELIDIK BERKENAAN HUTAN YANG MEMPUNYAI NILAI KONSERVASI TINGGI (HCVF)

TARIKH : 13 JUN 2011
TEMPAT : JABATAN PERHUTANAN TENOM
MASA : 10.00 am

KEHADIRAN :

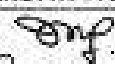















BIL.	NAMA	JAWATAN	ORGANISASI/KAMPUNG	TANDATANGAN
01	Wayne Wooff	Konsultant	SFI	
02	Angelica Sumia	USE	SFI	
03	Joan George	Conservation	SFI	
04	LAUWAS TINGKA LU	Pengerusi JKKK	KG. BAKUKU	
05	Monson Ampasa	W KAN	KG Bakuku	
06	AMPARAU TINGKALU	KAN	KG. BAKUKU	
07	Rejini Kunjippan	Manager WWF Malaya	WWF Malaysia	
08	JOSIL MURRAY	OFFICER	WWF - MALAYSIA	
09	LEIZA MAZUALIM	Konsultan	UMS	
10	Anna Wong.	Konsultan	UMS	
11	Undas Ukang	Jkkk	kg malutut	
12	ANTHONY ANABIT			
13	KADIR AGAU	PR/PO	KG. ALUTOK	
14	Marusin Peliten	PR/PO.	kg. Alutok	
15	Ampang Ahit	Tim Pengurusan	KG MAGUNGGAP	
16	Mr. David Lim	MAN Tenom (PRO)		
17	Kakawon Ambaki		KG Alutok	
18	Sauyang Angisah	KK	Kuala Tamari	

BIL.	NAMA	JAWATAN	ORGANISASI/KAMPUNG	TANDATANGAN
19	Ambun Angih	KR	Rg. Malulutut	AMBUN.
20	Bansuk Tampai	KIC	Kg Tinura	
21	Aman Saui	DFO/kenom	Forestry Dept	
22	Yusof Anwar	P. JKR	Kg. Tinura	
23	Lo Saui & Aya	J. KR	Kg. Mubalip	
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PEMBENTANGAN DAN PERBINCANGAN
HASIL KAJI SELIDIK BERKENAAN HUTAN YANG MEMPUYAI NILAI KONSERVASI TINGGI (HCVF)

TARIKH : 14 JUN 2011
TEMPAT : BILIK MESYUARAT, PEJABAT DAERAH, SIPITANG
MASA : 10.00 am

KEHADIRAN :

BIL.	NAMA	JAWATAN	ORGANISASI/KAMPUNG	TANDATANGAN
01	JOAN GEORGE	CONSERVATION	SFI	
02	ARIFFIN IBRUOT	A. D. O	Pej. Daerah Sipitang	
03	Muhammad Baharu	Pejabat Sipitang	Pejabat Pendidikan	
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05	ANGELICA EMMIN	CSR	SFI	
06	Lukas Wain	JUKM	L/Pasir	
07	ROST BIA	"	L/MU, Pasir	
08	Norsidah Aching		Pejabat Pendidikan	
09	YUNUS H. MUTALIP	PENGAS HUTAN	JABATAN PERHUTAN	
10	JOSE MANARA	Kelua kampung	Ug. Perleok	
11	Hi Harid Karim	Kelua kampung	Nalugan	
12	Ludin Jessin	Pejabat Melaka		
13	Zaidi Ibrahim	Ug. Melalia,		
14	MURANG @ MURUG RADA	Ug. dang mid	Kelua kampung	
15	KANCHOT @ GIBSON LAKSUS	KE- MELALIA	Kelua Kampung	
16	SARUDIN NIPAH	KELUA KAMPUNG NEGERI	MAN SIPITANG	
17	Rejani Kinyipon	Manager	WWF Malaysia	
18	Anna Wong.	Consultant.	UNUS	

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21	Abel, Haidi Bin	CSA	SFI	Abel
22	BRAS DAS PULAU	KETUA KAMPUNG	KG ACOTOKAN	BRAS
23	Uda: George Uda	orang tua	KG. MELAYU	George Uda
24	JOSIL MURRAY	OFFICER, HCUF	WWF-MALAYSIA	Josil Murray
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Appendix B

Table 1: List of native plant species in L10 (Altitude 500 – 800 m asl)

No.	Family	Species
1	Apocynaceae	<i>Alstonia macrophylla</i>
2	Apocynaceae	<i>Alstonia angustifolia</i>
3	Apocynaceae	<i>Dyera</i> sp
4	Aquifoliaceae	<i>Ilex cissoidea</i>
5	Asteraceae	<i>Vernonia arborea</i>
6	Bursersaceae	<i>Dacryodes</i> sp
7	Dilleniaceae	<i>Dillenia suffruticosa</i>
8	Dipterocarpaceae	<i>Dipterocarpus pachyphyllus</i>
9	Dipterocarpaceae	<i>Dipterocarpus validus</i>
10	Dipterocarpaceae	<i>Dryobalanops lanceolata</i>
11	Dipterocarpaceae	<i>Parashorea smythies</i>
12	Dipterocarpaceae	<i>Shorea atrinervosa</i>
13	Dipterocarpaceae	<i>Shorea beccariana</i>
14	Dipterocarpaceae	<i>Shorea gibbosa</i>
15	Dipterocarpaceae	<i>Shorea johorensis</i>
16	Dipterocarpaceae	<i>Shorea macrophylla</i>
17	Dipterocarpaceae	<i>Shorea macroptera</i>
18	Dipterocarpaceae	<i>Shorea ovalis</i>
19	Dipterocarpaceae	<i>Shorea ovata</i>
20	Dipterocarpaceae	<i>Shorea parvifolia</i>
21	Dipterocarpaceae	<i>Shorea smithiana</i>
22	Dipterocarpaceae	<i>Shorea superba</i>
23	Euphorbiaceae	<i>Excoecaria indica</i>
24	Euphorbiaceae	<i>Macaranga beccariana</i>
25	Euphorbiaceae	<i>Macaranga gigantea</i>
26	Euphorbiaceae	<i>Macaranga hypoleuca</i>
27	Euphorbiaceae	<i>Macaranga tanarius</i>
28	Euphorbiaceae	<i>Macaranga triloba</i>
29	Euphorbiaceae	<i>Mallotus mollissimus</i>
30	Fabaceae	<i>Koompassia</i> sp
31	Fabaceae	<i>Saraca declinata</i>
32	Fagaceae	<i>Lithocarpus gracilis</i>
33	Hypericaceae	<i>Cratoxylum arborescens</i>
34	Hypericaceae	<i>Cratoxylum formosum</i>
35	Ixonanthaceae	<i>Ixonanthes reticulata</i>

36	Loganiaceae	<i>Fagraea cuspidate</i>
37	Melastomataceae	<i>Melastoma malabathricum</i>
38	Meliaceae	<i>Aglaia</i> sp
39	Moraceae	<i>Artocarpus elasticus</i>
40	Moraceae	<i>Artocarpus indicus</i>
41	Moraceae	<i>Artocarpus odoratissimus</i>
42	Moraceae	<i>Artocarpus tamaran</i>
43	Moraceae	<i>Ficus beccarii</i>
44	Myrtaceae	<i>Tristaniopsis bilocularis</i>
45	Nepenthaceae	<i>Nepenthes gracilis</i>
46	Nepenthaceae	<i>Nepenthes mirabilis</i>
47	Nepenthaceae	<i>Nepenthes rafflesiana</i>
48	Rhamnaceae	<i>Alphitonia excelsa</i>
49	Rubiaceae	<i>Neolamarckia cadamba</i>
50	Rubiaceae	<i>Neonauclea artocorpoides</i>
51	Rubiaceae	<i>Neonauclea bernardi</i>
52	Rubiaceae	<i>Neonauclea gigantea</i>
53	Rubiaceae	<i>Neonauclea subdita</i>
54	Rubiaceae	<i>Porterandia</i> sp
55	Rubiaceae	<i>Porterandia</i> sp1
56	Rutaceae	<i>Melicope luna-akinda</i>
57	Sapindaceae	<i>Nephelium rambutan-ake</i>
58	Theaceae	<i>Adinandra dumosa</i>
59	Ulmaceae	<i>Trema orientale</i>
60	Verbenaceae	<i>Vitex pinnata</i>
61	Zingiberaceae	<i>Etlingera brevilabris</i>

25F, 61sp

Table 2: List of native plant species in P35 (Altitude 1000 – 1100 m asl)

No.	Family	Species name
1	Anacardiaceae	<i>Comptosperma auriculatum</i>
2	Annonaceae	<i>Popowia tomentosa</i>
3	Aquifoliaceae	<i>Ilex cissoidea</i>
4	Araucariaceae	<i>Agathis borneensis</i>
5	Asteraceae	<i>Vernonia arborea</i>
6	Bombacaceae	<i>Durio acutifolius</i>
7	Burseraceae	<i>Canarium odontophyllum</i>
8	Burseraceae	<i>Dacryodes rostratum</i>
9	Clusiaceae	<i>Calophyllum bursiculum</i>
10	Clusiaceae	<i>Calophyllum canum</i>
11	Clusiaceae	<i>Garcinia macrophylla</i>
12	Clusiaceae	<i>Garcinia parvifolia</i>
13	Clusiaceae	<i>Garcinia</i> sp.
14	Clusiaceae	<i>Mesua ferrea</i>
15	Dilleniaceae	<i>Dillenia borneensis</i>
16	Dipterocarpaceae	<i>Hopea ferruginea</i>
17	Dipterocarpaceae	<i>Shorea ovata</i>
18	Dipterocarpaceae	<i>Shorea parvifolia</i>
19	Dipterocarpaceae	<i>Shorea platyclados</i>
20	Dipterocarpaceae	<i>Shorea smithiana</i>
21	Dipterocarpaceae	<i>Shorea symingtonii</i>
22	Dipterocarpaceae	<i>Vatica umbonata</i>
23	Elaeocarpaceae	<i>Elaeocarpus griffithii</i>
24	Elaeocarpaceae	<i>Elaeocarpus pedunculatus</i>
25	Euphorbiaceae	<i>Aporosa elmerii</i>
26	Euphorbiaceae	<i>Macaranga hypoleuca</i>
27	Euphorbiaceae	<i>Macaranga kinabaluensis</i>
28	Euphorbiaceae	<i>Macaranga triloba</i>
29	Fagaceae	<i>Castanopsis hypophoenicea</i>
30	Fagaceae	<i>Lithocarpus bullatus</i>
31	Fagaceae	<i>Lithocarpus contyleyanus</i>
32	Fagaceae	<i>Lithocarpus gracilis</i>
33	Fagaceae	<i>Quercus elmerii</i>
34	Fagaceae	<i>Trigonobalanus verticillata</i>
35	Hypericaceae	<i>Cratoxylum arborescens</i>
36	Lauraceae	<i>Cinnamomum</i> sp.

37	Lauraceae	<i>Lindera pipericarpa</i>
38	Lauraceae	<i>Litsea chewii</i>
39	Lauraceae	<i>Litsea</i> sp.
40	Loganiaceae	<i>Fagraea</i> sp.
41	Magnoliaceae	<i>Magnolia maingayi</i>
42	Melastomataceae	<i>Melastoma malabathricum</i>
43	Melastomataceae	<i>Pternandra coeruleascens</i>
44	Meliaceae	<i>Aglaia</i> sp.
45	Meliaceae	<i>Sandoricum koetjape</i>
46	Moraceae	<i>Artocarpus dadah</i>
47	Moraceae	<i>Atrocarpus odoratissimus</i>
48	Moraceae	<i>Ficus megalaea</i>
49	Moraceae	<i>Ficus</i> sp.
50	Moraceae	<i>Ficus</i> sp.1
51	Moraceae	<i>Ficus subteriana</i>
52	Myristicaceae	<i>Knema laurina</i>
53	Myrsinaceae	<i>Maesa</i> sp.
54	Myrtaceae	<i>Syzygium bankensis</i>
55	Myrtaceae	<i>Syzygium elopura</i>
56	Myrtaceae	<i>Tristaniopsis bilocularis</i>
57	Oleaceae	<i>Chionanthus cordulatus</i>
58	Oleaceae	<i>Chionanthus pluriflorus</i>
59	Proteaceae	<i>Helicia</i> sp.
60	Rubiaceae	<i>Neolamarckia cadamba</i>
61	Rubiaceae	<i>Neonauclea artocopoides</i>
62	Rutaceae	<i>Melicope</i> sp.

27F, 62sp

Table 3: List of native plant species in P42 (Altitude 1400 – 1600 m asl)

No.	Family	Species name
1	Anacardiaceae	<i>Drimycarpus luridus</i>
2	Anacardiaceae	<i>Melanochylla beccariana</i>
3	Annonaceae	<i>Goniothalamus fasciculatus</i>
4	Annonaceae	<i>Goniothalamus roseus</i>
5	Apocynaceae	<i>Anondrendron candollemum</i>
6	Apocynaceae	<i>Tabermontana microcarpa</i>
7	Aquifoliaceae	<i>Illex clemensiae</i>
8	Araceae	<i>Allocasia longiloba</i>
9	Araliaceae	<i>Schefflera lineamentorum</i>
10	Araliaceae	<i>Schefflera</i> sp.
11	Araucariaceae	<i>Agathis borneensis</i>
12	Araucariaceae	<i>Agathis dammara</i>
13	Arecaceae	<i>Calamus gonospermus</i>
14	Arecaceae	<i>Calamus hepburnii</i>
15	Arecaceae	<i>Calamus marginatus</i>
16	Arecaceae	<i>Calamus pogonacanthus</i>
17	Arecaceae	<i>Calamus scabrifolius</i>
18	Arecaceae	<i>Calamus tenompokense</i>
19	Arecaceae	<i>Daemonorops korthalsii</i>
20	Arecaceae	<i>Daemonorops longistipes</i>
21	Arecaceae	<i>Pandanus epiphyticus</i>
22	Arecaceae	<i>Pinanga aristata</i>
23	Arecaceae	<i>Plectoconia mulleri</i>
24	Arecaceae	<i>Calamus convallium</i>
25	Aspleniaceae	<i>Asplenium nidus</i>
26	Asteraceae	<i>Vernonia arborea</i>
27	Begoniaceae	<i>Begonia bracteata</i>
28	Burseraceae	<i>Canarium asperum</i>
29	Burseraceae	<i>Canarium decumanum</i>
30	Burseraceae	<i>Canarium denticulatum</i>
31	Burseraceae	<i>Dacryodes incurvata</i>
32	Casuarinaceae	<i>Gymnostoma sumatranum</i>
33	Celastraceae	<i>Bhesa paniculata</i>
34	Chloranthaceae	<i>Chloranthus erectus</i>
35	Clethraceae	<i>Clethra canescens</i>
36	Clusiaceae	<i>Calophyllum canum</i>

37	Clusiaceae	<i>Calophyllum macrocarpum</i>
38	Clusiaceae	<i>Calophyllum nodosum</i>
39	Clusiaceae	<i>Calophyllum venulosum</i>
40	Clusiaceae	<i>Garcinia bancana</i>
41	Clusiaceae	<i>Garcinia coriacea</i>
42	Clusiaceae	<i>Garcinia gaudichaudii</i>
43	Clusiaceae	<i>Garcinia mangostana</i>
44	Clusiaceae	<i>Callophyllum venulosum</i>
45	Cornaceae	<i>Mastixia cuspidate</i>
46	Cornaceae	<i>Mastixia trichotoma</i>
47	Cunoniaceae	<i>Weinmannia blumei</i>
48	Cyatheaceae	<i>Cyathea havilandii</i>
49	Cyatheaceae	<i>Cyathea ramispina</i>
50	Cyperaceae	<i>Cladium mariscus</i>
51	Dipteridaceae	<i>Dipteris conjugate</i>
52	Dipterocarpaceae	<i>Cotylelobium melanoxyton</i>
53	Dipterocarpaceae	<i>Dipterocarpus echinifer</i>
54	Dipterocarpaceae	<i>Shorea ferruginea</i>
55	Dipterocarpaceae	<i>Shorea monticola</i>
56	Dipterocarpaceae	<i>Shorea platyclados</i>
57	Dipterocarpaceae	<i>Shorea venulosa</i>
58	Dipterocarpaceae	<i>Vatica albiramis</i>
59	Dipterocarpaceae	<i>Vatica micrantha</i>
60	Ebenaceae	<i>Diospyros borneensis</i>
61	Ebenaceae	<i>Diospyros cauliflora</i>
62	Ebenaceae	<i>Diospyros elliptifolia</i>
63	Elaeocarpaceae	<i>Elaeocarpus floribundus</i>
64	Ericaceae	<i>Rhododendron cuneifolium</i>
65	Ericaceae	<i>Rhododendron polyanthemum</i>
66	Ericaceae	<i>Vaccinium coriaceum</i>
67	Euphorbiaceae	<i>Antidesma neurocarpum</i>
68	Euphorbiaceae	<i>Aporosa grandistipula</i>
69	Euphorbiaceae	<i>Baccaurea macrocarpa</i>
70	Euphorbiaceae	<i>Baccaurea minor</i>
71	Euphorbiaceae	<i>Chaetocarpus castanocarpus</i>
72	Euphorbiaceae	<i>Glochidion angulatum</i>
73	Euphorbiaceae	<i>Glochidion griffithii</i>
74	Euphorbiaceae	<i>Ixora javanica</i>

75	Euphorbiaceae	<i>Macaranga hullettii</i>
76	Euphorbiaceae	<i>Macaranga kinabaluensis</i>
77	Fagaceae	<i>Castanopsis clemensii</i>
78	Fagaceae	<i>Castanopsis javanica</i>
79	Fagaceae	<i>Castanopsis motleyana</i>
80	Fagaceae	<i>Lithorcapus wieuwenhuisii</i>
81	Fagaceae	<i>Lithorcarpus cantheyanus</i>
82	Fagaceae	<i>Lithorcarpus gracilis</i>
83	Fagaceae	<i>Lithorcarpus havilandii</i>
84	Fagaceae	<i>Lithorcarpus lucidus</i>
85	Fagaceae	<i>Lithorcarpus luteus</i>
86	Fagaceae	<i>Lithorcarpus revolutus</i>
87	Fagaceae	<i>Litsea cylindrocarpa</i>
88	Fagaceae	<i>Quercus elmeri</i>
89	Fagaceae	<i>Quercus lineate</i>
90	Fagaceae	<i>Trigonobalanus verticillata</i>
91	Flacourtiaceae	<i>Casearia rugulosa</i>
92	Gleichenia	<i>Dicranopteris linearis</i>
93	Hanguanaceae	<i>Hanguana malayana</i>
94	Hypericaceae	<i>Cratoxylum arborescens</i>
95	Hypericaceae	<i>Cratoxylum sumatranum</i>
96	Icacinaceae	<i>Stemonurus grandifolius</i>
97	Icacinaceae	<i>Stemonurus malaccensis</i>
98	Illiciaceae	<i>Illicium kinabaluense</i>
99	Ixonanthaceae	<i>Ixonanthes reticulate</i>
100	Lauraceae	<i>Cinnamomum burmannii</i>
101	Lauraceae	<i>Cinnamomum griffithii</i>
102	Lauraceae	<i>Cinnamomum javanicum</i>
103	Lauraceae	<i>Cinnamomum parthenoxylon</i>
104	Lauraceae	<i>Cinnamomum racemosum</i>
105	Lauraceae	<i>Cryptocarya griffithiana</i>
106	Lauraceae	<i>Dehaaria caesia</i>
107	Lauraceae	<i>Litsea acedens</i>
108	Lauraceae	<i>Litsea artocarpifolia</i>
109	Lauraceae	<i>Litsea chewii</i>
110	Lauraceae	<i>Litsea cubeba</i>
111	Lauraceae	<i>Litsea grandis</i>
112	Lauraceae	<i>Neolitsea zeylanica</i>

113	Lecythidaceae	<i>Barringtonia lanceolata</i>
114	Loganiaceae	<i>Fagraea belukar</i>
115	Loganiaceae	<i>Fagraea fragrans</i>
116	Magnoliaceae	<i>Magnolia maingayi</i>
117	Melastomataceae	<i>Astronia cumingiana</i>
118	Melastomataceae	<i>Dissochaeta luisatoidea</i>
119	Melastomataceae	<i>Medinilla amplexens</i>
120	Melastomataceae	<i>Memecylon beccarianum</i>
121	Meliaceae	<i>Aglaia crassinervia</i>
122	Meliaceae	<i>Reinwardti dendron humile</i>
123	Menispermaceae	<i>Cyclea elegans</i>
124	Menispermaceae	<i>Stephania corymbosa</i>
125	Monimiaceae	<i>Kibara coriacea</i>
126	Moraceae	<i>Ficus caulocarpa</i>
127	Moraceae	<i>Ficus endospermifolia</i>
128	Moraceae	<i>Ficus uncinata</i>
129	Moraceae	<i>Paratrocarpus venenosus</i>
130	Myristicaceae	<i>Knema galeata</i>
131	Myristicaceae	<i>Myristica gigantea</i>
132	Myrsinaceae	<i>Ardisia colorata</i>
133	Myrsinaceae	<i>Ardisia oboratifolia</i>
134	Myrsinaceae	<i>Embelia coriacea</i>
135	Myrsinaceae	<i>Embelia myrtillus</i>
136	Myrsinaceae	<i>Labisia pumila</i>
137	Myrsinaceae	<i>Maesa striata</i>
138	Myrsinaceae	<i>Rapanea arenis</i>
139	Myrsinaceae	<i>Rapanea dasyphylla</i>
140	Myrtaceae	<i>Decaspermum microphyllum</i>
141	Myrtaceae	<i>Eugenia attenuata</i>
142	Myrtaceae	<i>Eugenia bankensis</i>
143	Myrtaceae	<i>Eugenia calabatum</i>
144	Myrtaceae	<i>Eugenia caudatilimbun</i>
145	Myrtaceae	<i>Eugenia creaghii</i>
146	Myrtaceae	<i>Eugenia hirtum</i>
147	Myrtaceae	<i>Eugenia javanica</i>
148	Myrtaceae	<i>Eugenia maingayi</i>
149	Myrtaceae	<i>Eugenia myrtillus</i>
150	Myrtaceae	<i>Eugenia punctilimba</i>

151	Myrtaceae	<i>Eugenia tetragonocladum</i>
152	Myrtaceae	<i>Knema laurina</i>
153	Myrtaceae	<i>Knema woodii</i>
154	Myrtaceae	<i>Rhodamnia cinerea</i>
155	Myrtaceae	<i>Tristaniopsis clementiana</i>
156	Myrtaceae	<i>Tristaniopsis merguensis</i>
157	Myrtaceae	<i>Tristaniopsis whitiana</i>
158	Nepenthaceae	<i>Nepenthes gracilis</i>
159	Nepenthaceae	<i>Nepenthes</i> sp.
160	Olacaceae	<i>Ochanostachys amentaceae</i>
161	Oleaceae	<i>Chionanthus phiriflorus</i>
162	Oleaceae	<i>Chionanthus porcatus</i>
163	Orchidaceae	<i>Agrostophyllum bicuspidatum</i>
164	Orchidaceae	<i>Agrostophyllum majus</i>
165	Orchidaceae	<i>Apostasia nuda</i>
166	Orchidaceae	<i>Appendicula</i> sp.
167	Orchidaceae	<i>Appendicula torta</i>
168	Orchidaceae	<i>Arundina graminifolia</i>
169	Orchidaceae	<i>Ascidieria longifolia</i>
170	Orchidaceae	<i>Bulbophyllum jolandae</i>
171	Orchidaceae	<i>Bulbophyllum</i> sp.1
172	Orchidaceae	<i>Bulbophyllum</i> sp.2
173	Orchidaceae	<i>Bulbophyllum</i> sp.3
174	Orchidaceae	<i>Bulbophyllum</i> sp.4
175	Orchidaceae	<i>Bulbophyllum</i> sp.5
176	Orchidaceae	<i>Bulbophyllum</i> sp.6
177	Orchidaceae	<i>Bulbophyllum</i> sp.7
178	Orchidaceae	<i>Bulbophyllum</i> sp.8
179	Orchidaceae	<i>Bulbophyllum</i> sp.9
180	Orchidaceae	<i>Calanthe sylvatica</i>
181	Orchidaceae	<i>Campanulorchis longirepens</i>
182	Orchidaceae	<i>Campanulorchis</i> sp.1
183	Orchidaceae	<i>Campanulorchis</i> sp.2
184	Orchidaceae	<i>Campanulorchis</i> sp.3
185	Orchidaceae	<i>Ceratostylis</i> sp.
186	Orchidaceae	<i>Coelogyne gibbifera</i>
187	Orchidaceae	<i>Coelogyne</i> sp.1
188	Orchidaceae	<i>Coelogyne</i> sp.2

189	Orchidaceae	<i>Coelogyne</i> sp.3
190	Orchidaceae	<i>Coelogyne</i> sp.4
191	Orchidaceae	<i>Coelogyne</i> sp.5
192	Orchidaceae	<i>Dendrobium leonis</i>
193	Orchidaceae	<i>Dendrobium</i> sp.1
194	Orchidaceae	<i>Dendrobium</i> sp.2
195	Orchidaceae	<i>Dendrobium</i> sp.3
196	Orchidaceae	<i>Dendrobium</i> sp.4
197	Orchidaceae	<i>Dendrobium</i> sp.5
198	Orchidaceae	<i>Dendrochilum</i> sp.1
199	Orchidaceae	<i>Dendrochilum</i> sp.2
200	Orchidaceae	<i>Dendrochilum</i> sp.3
201	Orchidaceae	<i>Diplocaulobium</i> sp.
202	Orchidaceae	<i>Oxystophyllum</i> sp.
203	Orchidaceae	<i>Peristylus hallieri</i>
204	Orchidaceae	<i>Pinalia</i> sp.1
205	Orchidaceae	<i>Pinalia</i> sp.2
206	Orchidaceae	<i>Thrixpermum</i> sp.
207	Orchidaceae	<i>Trichoglottis</i> sp.1
208	Orchidaceae	<i>Trichoglottis</i> sp.2
209	Orchidaceae	<i>Trichotosia microphylla</i>
210	Orchidaceae	<i>Trichotosia</i> sp.1
211	Orchidaceae	<i>Trichotosia</i> sp.2
212	Poaceae (Graminea)	<i>Schizostachyum latifolium</i>
213	Poaceae (Graminea)	<i>Thyrsauolaena latifolia</i>
214	Podocarpaceae	<i>Dacrycarpus imbricatus</i>
215	Podocarpaceae	<i>Dacrydium picnatum</i>
216	Podocarpaceae	<i>Falcatifolium falciforme</i>
217	Podocarpaceae	<i>Phyllocladus hypophyllus</i>
218	Podocarpaceae	<i>Podocarpus brevifolius</i>
219	Polygalaceae	<i>Xanthophyllum flavescens</i>
220	Proteaceae	<i>Heliciopsis Montana</i>
221	Rhamnaceae	<i>Zizyphus borneensis</i>
222	Rosaceae	<i>Prunus arborea</i>
223	Rosaceae	<i>Rubus lineatus</i>
224	Rubiaceae	<i>Gaertnera borneensis</i>
225	Rubiaceae	<i>Ixora grandifolia</i>
226	Rubiaceae	<i>Nauclea gigantean</i>

227	Rubiaceae	<i>Neonauclea calycina</i>
228	Rubiaceae	<i>Timonius mutabilis</i>
229	Rubiaceae	<i>Uncaria acida</i>
230	Rubiaceae	<i>Uncaria borneensis</i>
231	Rubiaceae	<i>Urophyllum glabrum</i>
232	Rutaceae	<i>Luvunga crassifolia</i>
233	Rutaceae	<i>Melicope denhamii</i>
234	Sapindaceae	<i>Nephelium uncinatum</i>
235	Sapotaceae	<i>Palaquim gluta</i>
236	Sapotaceae	<i>Palaquim rostratum</i>
237	Saurauiaceae	<i>Saurauia corneri</i>
238	Saxifragaceae	<i>Polyosma mutabilis</i>
239	Smilacaceae	<i>Smilax borneensis</i>
240	Smilacaceae	<i>Smilax myosotiflora</i>
241	Staphyleaceae	<i>Turpinia grandis</i>
242	Sterculiaceae	<i>Sterculia cordata</i>
243	Styracaceae	<i>Bruinsmia styracoides</i>
244	Symplocaceae	<i>Symplocos fasciculate</i>
245	Theaceae	<i>Adinandra dumosa</i>
246	Theaceae	<i>Eurya acuminate</i>
247	Theaceae	<i>Pyrenaria tawauensis</i>
248	Theaceae	<i>Schima brevifolia</i>
249	Theaceae	<i>Schima wallichii</i>
250	Theaceae	<i>Ternstroemia aneura</i>
251	Thymelaeaceae	<i>Gonystylus keithii</i>
252	Tiliaceae	<i>Microcos antidesmifolia</i>
253	Vitaceae	<i>Tetrastigma diepenhostii</i>
254	Winteraceae	<i>Drimys piperita</i>
255	Zingiberaceae	<i>Alpinia gabra</i>
256	Zingiberaceae	<i>Hedychium</i> sp.
257	Zingiberaceae	<i>Plagiostachys</i> sp.

73F, 257sp

Table 4: List of Mammals in Compartment L10

MAMMALS OF L10 (SG. LINGKUNGAN)

Base camp GPS reading N 05° 09' 07.1" , E 115° 40' 46.2"

Date	Family	Common Name	Scientific Name	Time	GPS (N)	GPS (E)	Elevation	Note	Status
18.07.2010	Tupaiaidae	Lesser Treeshrew	<i>Tupaia minor</i>					Seen	LC
	Tragulidae	Mouse Deer	<i>Tragulus sp</i>					Footprint	
	Felidae	Cat	<i>Felis sp</i>					Footprint	
	Suidae	Bearded Pig	<i>Sus barbatus</i>					Footprint	VU (SWE: iii)
	Cervidae	Sambar Deer	<i>Cervus unicolor</i>					Footprint	VU (SWE: iii)
	Pteropodidae	Short-nosed Fruit Bat	<i>Cynopterus brachyotis</i>					Photo taken	LC
		Dusky Fruit Bat	<i>Penthetor lucasii</i>					Photo taken	

GPS ending N 05° 08' 45.8" E 115° 40' 57.1"

Base camp GPS reading N 05° 09' 07.1" E 115° 40' 46.2"

Date	Family	Common Name	Scientific Name	Time	GPS (N)	GPS (E)	Elevation	Note	Status
20.07.2010	Suidae	Bearded Pig	<i>Sus barbatus</i>		N 05°08'36.1"	E 115°40'54.6"	142m	Footprint	VU (SWE: iii)
		Bearded Pig	<i>Sus barbatus</i>		N 05°08'36.1"	E 115°40'54.6"	142m	Footprint	VU (SWE: iii)
	Cervidae	Sambar Deer	<i>Cervus unicolor</i>		N 05°08'36.1"	E 115°40'54.6"	142m	Footprint	VU (SWE: iii)
		Sambar Deer	<i>Cervus unicolor</i>		N 05°08'26.8"	E 115°40'51.9"	276m	Seen	VU (SWE: iii)
	Cercopithecidae	Long-tailed Macaque	<i>Macaca fascicularis</i>		N 05°08'26.8"	E 115°40'51.9"	276m	Seen	LC

GPS ending N 05° 08' 26.8" E 115° 40' 51.9"

lr/lc - lower risk/least concern

vu - vulnerable

lr/nt - lower risk/near threatened

en - endangered

Table 5: List of Mammals in Compartment P35

MAMMALS OF P35 (SG. PADAS)

Base camp GPS reading N 04° 33' 00.7" E 115° 57' 16.6"

Date	Family	Common Name	Scientific Name	Time	GPS (N)	GPS (E)	Elevation	Remarks	Status	
22.07.2010	Sciuridae	Borneo Black-banded Squirrel	<i>Callosciurus orestes</i>					Photo taken	LC	
	Hylobatidae	Borneo Gibbon	<i>Hylobates muelleri</i>	0808am				Sound	EN (SWE:iii) (CITES:I)	
	Sciuridae	Jentink's Squirrel	<i>Sundasciurus jentinki</i>	0845am				Seen	LC	
	Viverridae	Binturong	<i>Arctictis binturong</i>		N 04°33'09.6"	E 115°57'20.5"	1236m	Footprint	VU (SWE:ii) (CITES:ii)	
	Cervidae	Muntjac	<i>Muntiacus sp</i>		N 04°33'09.6"	E 115°57'20.5"	1236m	Footprint	LC (SWE:iii) (CITES:ii)	
	Tupaidae	Smooth-tailed Treshrew	<i>Dendrogale melanura</i>						Photo taken	DD
		Slender Treshrew	<i>Tupaia grasilis</i>						Photo taken	DD
		Mountain Treshrew	<i>Tupaia montana</i>						Photo taken	LC

GPS ending N 04° 33' 09.6" E 115° 57' 20.5"

Base camp GPS reading N 04° 33' 00.7" E 115° 57' 16.6"

Date	Family	Common Name	Scientific Name	Time	GPS (N)	GPS (E)	Elevation	Note	Status
23.07.2010	Muridae	Small Spiny Rat	<i>Maxomys baeodon</i>					Photo taken	DD
		Chestnut-bellied Spiny Rat	<i>Maxomys ochraceiventris</i>					Photo taken	DD
	Pteropodidae	Grey Fruit Bat	<i>Aethalops alecto</i>						LC
	Hylobatidae	Borneo Gibbon	<i>Hylobates muelleri</i>	0845am				Sound	EN (SEW:ii) (CITES:i)
		Muntjac	<i>Muntiacus sp</i>	0950am	N 04°32'09.2"	E 115°56'59.6"	1346m	Footprint	LC (SWE:iii) (CITES:ii)
	Sciuridae	Borneo Black-banded Squirrel	<i>Callosciurus orestes</i>						LC
	Hylobatidae	Giant Squirrel	<i>Ratufa affinis</i>	1035am	N 04°32'17.9"	E 115°56'32.5"	1320m	Seen	NT (SWE:ii)
		Borneo Gibbon	<i>Hylobates muelleri</i>	1100am				Seen (11 individu)	EN (SWE:ii) (CITES:ii)
	Cercopithecidae	Long-tailed Macaque	<i>Macaca fascicularis</i>					Seen	LC (SWE:ii)
	Sciuridae	Jentink's Squirrel	<i>Sundasciurus jentinki</i>					Seen	LC
		Muntjac	<i>Muntiacus sp</i>	0330pm	N 04°32'51.3"	E 115°56'57.5"	1320m	Najis	LC (SWE:iii) (CITES:ii)

Family	Common Name	Scientific Name	Time	GPS (N)	GPS (E)	Elevation	Note	Status
Cercopithecidae	Hose's Langur	<i>Presbytis hosei</i>	0420pm	N 04°32'54.3"	E 115°57'02.0"	1032m	Seen (7 individu)	VU (SWE:ii)
Cervidae	Sambar Deer	<i>Cervus unicolor</i>	0530pm				Seen(Female)	VU (SWE:iii)
Viverridae	Small-toothed Palm Civet	<i>Arctogalidaa trivirgata</i>	0800pm				Seen	LC (SWE:ii)
Felidae	Leopard Cat	<i>Felis bengalensis</i>	0830pm				Seen	SWE:ii

GPS ending N 04° 32' 51.3" E 115° 56.7"

Base camp GPS reading N 04° 33' 00.7" E 115° 57' 16.6"

Date	Family	Common Name	Scientific Name	Time	GPS (N)	GPS (E)	Elevation	Note	Status
24.07.2010	Sciuridae	Borneo Black-banded Squirrel	<i>Callosciurus orestes</i>	1020am	N 04°32'42.2"	E 115°56'18.0"	1059m	Seen	LC

GPS ending N 04° 32' 57.8" E 115° 55' 55.5"

lr/lc - lower risk/least concern

vu - vulnerable

lr/nt - lower risk/near threatened

en - endangered

Table 6: List of Mammals in Compartment P42

MAMMALS OF P42 (ULU SG. MELIGAN)

Date	Family	Common Name	Scientific Name	Time	GPS (N)	GPS (E)	Elevation	Remarks	Status
08.08.2010	Cervidae	Sambar Deer	<i>Cervus unicolor</i>		N 04°29'04.6"	E 115°40'12.6"	1489m	Footprint	VU (SWE:iii)
	Hylobatidae	Borneo Gibbon	<i>Hylobates muelleri</i>	0600am	N 04°29'04.6"	E 115°40'12.6"	1489m	Sound	EN (SWE:ii) (CITES:i)
	Hylobatidae	Giant Squirrel	<i>Ratufa affinis</i>	0720am	N 04°29'04.6"	E 115°40'12.6"	1489m	Sound	NT (SWE:ii)
	Cervidae	Barking Deer	<i>Muntiacus sp</i>		N 04°29'04.6"	E 115°40'12.6"	1489m	Footprint	LC (SWE:iii) (CITES:ii)
	Suidae	Bearded Pig	<i>Sus barbatus</i>	1020am	N 04°29'01.1"	E 115°40'01.8"		Footprint	VU (SWE:iii)
		Bearded Pig	<i>Sus barbatus</i>	1506pm	N 04°29'04.3"	E 115°40'03.6"	1512m	Footprint	LC (SWE:iii) (CITES:ii)
	Cervidae	Barking Deer	<i>Muntiacus sp</i>	1506pm	N 04°29'04.3"	E 115°40'03.6"	1512m	Footprint	NT (SWE:ii) (CITES:ii)
	Mustelidae	Otters	<i>Lutra sp</i>	1547pm	N 04°29'05.8"	E 115°40'06.0"	1503m	Footprint	LC (SWE:ii) (CITES:ii)
	Sciuridae	Jentink's Squirrel	<i>Sundasciurus jentinki</i>	1626pm	N 04°29'06.0"	E 115°40'10.5"	1505m	Seen	LC

		Kinabalu Squirrel	<i>Callosciurus baltuensis</i>	1648pm		N 04°29'00.5"	E 115°40'07.7"	1525m	Seen	LC
	Tupaïidae	Mountain Treeshrew	<i>Tupaia montana</i>			N 04°29'01.4"	E 115°40'05.5"	1529m	Seen/photo	LC
09.08.2010	Pteropodidae	Grey-fruit Bat	<i>Aethalops alecto</i>			N 04°29'01.4"	E 115°40'05.5"	1529m	Seen	LC
		Dusky-fruit Bat	<i>Penthetor lucasii</i>			N 04°29'01.4"	E 115°40'05.5"	1529m	Seen/photo	LC
	Sciuridae	Whitehead's Pigmy Squirrel	<i>Exilisciurus whiteheadi</i>			N 04°29'01.4"	E 115°40'05.5"	1529m	Seen/photo	LC
	Suidae	Bearded Pig	<i>Sus barbatus</i>	0911am		N 04°28'59.2"	E 115°40'08.1"	1510m	Footprint	VU (SWE:iii)
	Cervidae	Sambar Deer	<i>Cervus unicolor</i>	0911am		N 04°28'59.2"	E 115°40'08.1"	1510m	Footprint	VU (SWE:iii)
	Felidae	Wild Cat		0943am		N 04°28'52.3"	E 115°40'09.3"	1524m	Footprint	
	Hystriidae	Porcupines		0943am		N 04°28'52.3"	E 115°40'09.3"	1524m	Footprint	
	Hylobatidae	Bornean Gibbon	<i>Hylobates muelleri</i>	0943am		N 04°28'52.3"	E 115°40'09.3"	1524m	Sound	EN (SEW:ii) (CITES:i)
10.08.2010	Pteropodidae	Short-nosed Fruit Bat	<i>Cynopterus brachyotis</i>			N 04°29'01.4"	E 115°40'05.5"	1529m	Seen/photo	LC
	Sciuridae	Bornean Black-banded Squirrel Jentink's Squirrel	<i>Callosciurus orestes</i> <i>Sundasciurus jentinki</i>	0435pm					Seen (3 individu) Seen	LC (SWE:ii) LC
11.08.2010	Felidae	Clouded Leopard	<i>Neofelis diardi</i>	0600am		N 04°29'04.7"	E 115°40'11.0"	1494m	Footprint	VU (SWE:i) (CITES:i)
	Cercopithecidae	Maroon Langur	<i>Presbytis rubicunda</i>	1600pm		N 04°29'01.4"	E 115°40'05.5"	1529m	Seen	LC
12.08.2010	Sciuridae	Whitehead's Pigmy Squirrel Whitehead's Pigmy Squirrel Jentink's Squirrel	<i>Exilisciurus whiteheadi</i> <i>Exilisciurus whiteheadi</i> <i>Sundasciurus jentinki</i>	0905am		N 04°28'54.7"	E 115°40'10.4"	1519m	Seen (2 individu) Seen Seen	LC LC LC
	Tupaïidae	Mountain Treeshrew	<i>Tupaia montana</i>						Seen	LC
	Hylobatidae	Bornean Gibbon	<i>Hylobates muelleri</i>			N 04°28'36.4"	E 115°40'09.3"		Sound	EN (SEW:ii) (CITES:i)

lr/lc - lower risk/least concern

vu - vulnerable

lr/nt - lower risk/near threatened

en - endangered

Table 7: List of Birds in Compartment L10

BIRDS OF L10

Family	No	Common Name	Scientific Name	Base camp GPS reading 18.07.2010	GPS ending 18.07.2010	GPS ending 19.07.2010	GPS ending 20.07.2010	Remark	Status
Accipitridae	1	Japanese Sparrowhawk	<i>Accipiter gularis</i>	N 05° 09' 07.1"	Observe				LC
	2	Crested Serpent Eagle	<i>Spilornis cheela</i>	E 115° 40' 46.2"	Observe	Observe			LC
Aegithinidae	3	Green Iora	<i>Aegithina viridisissima</i>		Observe	Observe	Observe		NT
Alcedinidae	4	Banded Kingfisher	<i>Lacedo pulchella</i>				Observe		LC
	5	Blue-eared Kingfisher	<i>Alcedo meninting</i>				Observe		LC
Apodidae	6	Glossy Swiftlet	<i>Collocalia esculenta</i>	Observe	Observe	Observe	Observe		LC
	7	Edible-Nest Swiftlet	<i>Aerodramus fuciphagus</i>	Observe	Observe	Observe	Observe		LC
Bucerotidae	8	Rhinoceros Hornbill	<i>Buceros rhinoceros</i>	Observe	Observe		Observe		NT
Campephagidae	9	Fairy Minivet	<i>Pericrocotus igneus</i>		Observe				NT
	10	Black-winged Flycatcher Shrike	<i>Hemipus hirundinaceus</i>	Call		Observe	Observe		LC
Chloropseidae	11	Greater Green Leafbird	<i>Chloropsis somnerati</i>	Observe	Observe	Observe			LC
	12	Lesser Green Leafbird	<i>Chloropsis cyanopogon</i>						NT
Columbidae	13	Emerald Dove	<i>Chalcophaps indica</i>	Observe	Observe	Observe	Observe	Photo	LC (SWE:ii)
	14	Little Green Pigeon	<i>Treron olax</i>	Observe	Observe				LC
Cuculidae	15	Plantive Cuckoo	<i>Cacomantis merulinus</i>	Call	Observe	Observe			LC
	16	Greater Coucal	<i>Centropus sinensis</i>	Call	Observe	Observe	Observe		LC
	17	Violet Cuckoo	<i>Chrysococyx xanthorhynchus</i>	Observe	Observe	Observe			LC
	18	Chestnut-breasted Malkoha	<i>Phaenicophaeus curvirostris</i>	Observe	Observe	Observe			LC
	19	Raffles Malkoha	<i>Phaenicophaeus chlorophaeus</i>				Observe		LC
Dicaeidae	20	Yellow-rumped Flowerpecker	<i>Priocichilus xanthopygius</i>	Observe	Observe	Observe	Observe		LC
	21	Orange-bellied Flowerpecker	<i>Dicaeum triogonostigma</i>	Observe	Observe	Observe	Observe		LC
Estrildidae	22	Dusky Munia	<i>Lonchura fuscans</i>	Observe	Observe		Observe		LC
	23	Chestnut munia	<i>Lonchura atricapilla</i>	Observe	Observe	Call		Photo	LC
Eurylaimidae	24	Black-and-Yellow Broadbill	<i>Eurylaimus ochromalus</i>	Call	Observe	Observe			NT
	25	Banded Broadbill	<i>Eurylaimus javanicus</i>				Observe		LC
Falconidae	26	Bornean Falconet	<i>Microhethetrix latifrons</i>				Observe		NT
Hemiprocidae	27	Whiskered Treeswiftlet	<i>Hemiprocne comata</i>	Observe	Observe				

Hirundinidae	28	Pacific Swallow	<i>Hirundo tahitica</i>	Observe	Observe	Observe	Observe	Observe	Observe	LC
Meropidae	29	Blue-throated Bee-Eater	<i>Merops viridis</i>	Observe	Observe	Observe	Observe	Observe	Observe	LC
	30	Red-bearded Bee-Eater	<i>Nyctornis amictus</i>	Observe	Observe	Observe	Observe	Observe	Observe	R
Monarchidae	31	Black-naped Monarch	<i>Hypothymis azurea</i>	Observe	Observe	Observe	Observe	Observe	Observe	LC
Muscicapidae	32	Narcissus Flycatcher	<i>Ficedula narcissina</i>	Observe	Observe	Observe	Observe	Observe	Observe	LC
	33	Malaysian Blue-Flycatcher	<i>Cyornis turcosus</i>	Observe	Observe	Observe	Observe	Observe	Observe	NT
Rhipiduridae	34	Peit Fantail	<i>Rhipidura javanica</i>	Observe	Observe	Observe	Observe	Observe	Observe	
Nectariniidae	35	Little Spiderhunter	<i>Arachnothera longirostra</i>	Observe	Observe	Observe	Observe	Observe	Observe	LC
	36	Purple-naped Sunbird	<i>Hypogramma hypogrammicum</i>	Observe	Observe	Observe	Observe	Observe	Observe	LC
	37	Red-throated Sunbird	<i>Anthreptes rhodolaema</i>	Observe	Observe	Observe	Observe	Observe	Observe	NT
	38	Olive-backed Sunbird	<i>Nectarinia jugularis</i>	Observe	Observe	Observe	Observe	Observe	Observe	LC
	39	Eastern Crimson Sunbird	<i>Aethopygia siparaja</i>	Observe	Observe	Observe	Observe	Observe	Observe	LC
	40	Streaky-breasted Spiderhunter	<i>Arachnothera affinis</i>	Observe	Observe	Observe	Observe	Observe	Observe	LC
	41	Spectacled Spiderhunter	<i>Arachnothera flavigaster</i>	Observe	Observe	Observe	Observe	Observe	Observe	LC
	42	Brown-throated Sunbird	<i>Anthreptes malaccensis</i>	Observe	Observe	Observe	Observe	Observe	Observe	LC
Oriolidae	43	Asian Fairy-Bluebird	<i>Irena puella</i>	Call	Call	Observe	Observe	Observe	Observe	LC
Picidae	44	Buff-rumped Woodpecker	<i>Meiglyptes tristis</i>	Observe	Observe	Observe	Observe	Observe	Observe	LC
	45	Maroon Woodpecker	<i>Blythipicus rubiginosus</i>	Observe	Observe	Observe	Observe	Observe	Observe	LC
	46	Rufous Piculet	<i>Sasia abnormis</i>	Observe	Observe	Observe	Observe	Observe	Observe	Photo
	47	Brown-capped Woodpecker	<i>Dendrocopos moluccensis</i>	Observe	Observe	Observe	Observe	Observe	Observe	Photo
	48	Great Slaty Woodpecker	<i>Mulleripicus pulverulentus</i>	Observe	Observe	Observe	Observe	Observe	Observe	VU
	49	Blue-crowned Hanging Parrot	<i>Loriculus galgulus</i>	Observe	Observe	Observe	Observe	Observe	Observe	LC (SWE:ii)
Pycnonotidae	50	Black-headed Bulbul	<i>Pycnonotus atriceps atriceps</i>	Observe	Observe	Observe	Observe	Observe	Observe	LC
	51	Yellow-vented Bulbul	<i>Pycnonotus goiavier</i>	Observe	Observe	Observe	Observe	Observe	Observe	LC
	52	Yellow-bellied Bulbul	<i>Criniger phaeocephalus</i>	Observe	Observe	Observe	Observe	Observe	Observe	LC
	53	Olive-winged Bulbul	<i>Pycnonotus plumosus</i>	Observe	Observe	Observe	Observe	Observe	Observe	LC
	54	Red-eyed Bulbul	<i>Pycnonotus brunneus</i>	Observe	Observe	Observe	Observe	Observe	Observe	LC
	55	Cream-vented Bulbul	<i>Pycnonotus simplex</i>	Observe	Observe	Observe	Observe	Observe	Observe	LC
	56	Hairy-backed Bulbul	<i>Tricholestes criniger</i>	Observe	Observe	Observe	Observe	Observe	Observe	LC
57	Spectacled Bulbul	<i>Pycnonotus erythrophthalmos</i>	Observe	Observe	Observe	Observe	Observe	Observe	LC	
Ramphastidae	58	Blue-eared Barbet	<i>Megalaima australis</i>	Call	Call	Call	Call	Call	Call	LC
	59	Gold-whiskered Barbet	<i>Megalaima chrysopogon</i>	Call	Call	Call	Call	Call	Call	LC
	60	Brown Barbet	<i>Calorhamphus fuliginosus</i>	Call	Call	Call	Call	Call	Call	LC
Sturnidae	61	Hill Myna	<i>Gracula religiosa</i>	Observe	Observe	Observe	Observe	Observe	Observe	LC (SWE:ii)
Sylviidae	62	Yellow-bellied Prinia	<i>Prinia flaviventris</i>	Observe	Observe	Observe	Observe	Observe	Observe	LC
	63	Rufous-tailed Tailorbird	<i>Orthotomus sericeus</i>	Observe	Observe	Observe	Observe	Observe	Observe	LC

	64	Red-headed Tailorbird	<i>Orthotomus ruficeps</i>	Observe			Observe	LC
Timaliidae	65	Bold-Striped Tit-Babbler	<i>Macronous bornensis montanus</i>	Call	Observe	Observe	Observe	LC
	66	Chestnut-winged Babbler	<i>Stachyris erythroptera</i>	Call	Observe	Observe	Observe	LC
	67	Sooty-capped Babbler	<i>Malacopteron affine</i>				Observe	NT
	68	Grey-headed Babbler	<i>Stachyris poliocephala</i>				Observe	LC
	69	White-chested Babbler	<i>Trichastoma rostratum</i>				Observe	NT
	70	Chestnut-backed Scimitar Babbler	<i>Pomatorhinus montanus</i>				Observe	LC
	71	White-browed Shama	<i>Copsychus stricklandi</i>	Call	Call			
Zosteropidae	72	Oriental White-Eye	<i>Zosterops palpebrosus</i>				Observe	LC

By Paul, Benedict, Martinah & David

Note – LC: Least concern, NT: Nearly threatened, YU: Vulnerable, SWE: Sabah Wildlife Conservation Enactment 1997

Table 8: List of Birds in Compartment P35

BIRDS OF P35									
Family	No	Common Name	Scientific Name	Base camp GPS reading 22.07.2010	GPS ending 22.07.2010	GPS ending 23.07.2010	GPS ending 24.07.2010	Remark	Status
Accipiteridae	1	Blyth's Hawk-Eagle	<i>Spizaetus alboniger</i>	Observe	Observe				LC
	2	Crested Serpent-Eagle	<i>Spilornis cheela</i>	Call	Observe				
Apodidae	3	Glossy Swiftlet	<i>Collocalia esculenta</i>	Observe	Observe				NT
	4	Silver-rumped Spinetail	<i>Rhipidura leucopygialis</i>	Observe	Observe				LC
Bucerotidae	5	Rhinoceros Hornbill	<i>Buceros rhinoceros</i>	Observe	Observe				NT (SWE:ii)
	6	Bushy-crested Hornbill	<i>Anorrhinus galeritus</i>			Observe		Photo	LC
	7	Helmeted Hornbill	<i>Buceros vigil</i>	Call		Call			LC
	8	Wreathed Hornbill	<i>Rhyticeros undulatus</i>	Observe			Observe		SWE:ii
Campephagidae	9	Black-winged Flycatcher Shrike	<i>Hemipus hirundinaceus</i>	Observe	Observe				LC
	10	Sunda Cuckoo-Shrike	<i>Coracina larvata</i>	Observe	Observe	Observe	Observe		LC
Chloropseidae	11	Bornean Leafbird	<i>Chloropsis kinabaluensis</i>	Observe	Observe	Observe	Observe	Photo	NT
Columbidae	12	Little Cuckoo-Dove	<i>Macropygia ruficeps</i>	Observe	Observe			Photo	NT
	13	Mountain Imperial Pigeon	<i>Ducula badia</i>	Observe	Observe		Observe		LC
	14	Emerald Dove	<i>Chalcophaps indica</i>	Observe	Observe	Observe	Observe		LC (SWE:ii)

	15	Ruddy Cuckoo-Dove	<i>Macropygia emiliana</i>	Observe	Observe	Observe	Observe	Observe	Observe	LC	
Corvidae	16	Bornean Treepie	<i>Dendrocyitta cinerascens</i>	Observe	Observe	Observe	Observe	Observe	Observe	Photo	LC
	17	Crested Jay	<i>Platylophus galericalatus</i>	Call	Call	Call	Call	Call	Call		LC
Cuculidae	18	Lesser Coucal	<i>Centropus bengalensis</i>	Call	Observe	Observe	Observe	Observe	Observe		LC
	19	Square-tailed Drongo Cuckoo	<i>Surniculus lugubris</i>	Observe	Observe	Observe	Observe	Observe	Observe		LC
	20	Black-bellied Malkoha	<i>Phaenicophaeus diardi</i>	Call	Observe	Observe	Observe	Observe	Observe		LC
	21	Indian Cuckoo	<i>Cuculus micropterus</i>	Observe	Observe	Observe	Observe	Observe	Observe		LC
	22	Orange-bellied Flowerpecker	<i>Dicaeum trigonostigma</i>	Observe	Observe	Observe	Observe	Observe	Observe		LC
Dicaeidae	23	Yellow-rumped Flowerpecker	<i>Pritonochilus xanthopygius</i>	Observe	Observe	Observe	Observe	Observe	Observe		LC
	24	Ashy Drongo	<i>Dicrurus leucophaeus</i>	Observe	Observe	Observe	Observe	Observe	Observe		LC
	25	Hair-crested Drongo	<i>Dicrurus hottentottus</i>	Observe	Observe	Observe	Observe	Observe	Observe		LC
Emberizidae	26	Eurasian Tree Sparrow	<i>Passer Montanus</i>								LC
	27	Dusky Munia	<i>Lonchura fuscans</i>	Observe	Observe	Observe	Observe	Observe	Observe		LC
Eurylaimidae	28	Banded Broadbill	<i>Eurylaimus javanicus</i>	Observe	Observe	Observe	Observe	Observe	Observe	Photo	LC
	29	Black-and-Yellow Broadbill	<i>Eurylaimus ochromalus</i>	Observe	Observe	Observe	Observe	Observe	Observe		NT
Hirundinidae	30	Pacific Swallow	<i>Hirundo tahitica</i>	Observe	Observe	Observe	Observe	Observe	Observe		LC
Meropidae	31	Red-bearded Bee-Eater	<i>Nyctornis amictus</i>								LC
	33	Verditer Flycatcher	<i>Eumyias thalassina</i>								LC
Monarchidae	34	Black-naped Monarch	<i>Hypothymis azurea</i>	Observe	Observe	Observe	Observe	Observe	Observe	Photo	LC
	35	Asian Paradise Flycatcher	<i>Terpsiphone paradisi</i>	Observe	Observe	Observe	Observe	Observe	Observe		LC
Rhipiduridae	36	Spotted Fantail	<i>Rhipidura perlata</i>	Observe	Observe	Observe	Observe	Observe	Observe		LC
	37	Pied Fantail	<i>Rhipidura javanica</i>	Observe	Observe	Observe	Observe	Observe	Observe		LC
Nectariniidae	38	Little Spiderhunter	<i>Arachnothera longirostra</i>	Call	Observe	Observe	Observe	Observe	Observe	Photo	LC
	39	Temminck's Sunbird	<i>Aethopygia temminckii</i>	Observe	Observe	Observe	Observe	Observe	Observe		NT
	40	Purple-naped Sunbird	<i>Hypogramma hypogrammicum</i>	Observe	Observe	Observe	Observe	Observe	Observe		LC
	41	Brown-throated Sunbird	<i>Anthreptes rhodolaema</i>	Observe	Observe	Observe	Observe	Observe	Observe	Photo	LC
	42	Streaky-breasted Spiderhunter	<i>Arachnothera affinis</i>							Photo	LC
Oriolidae	43	Black-and-Crimson Oriole	<i>Oriolus cruentus</i>	Observe	Observe	Observe	Observe	Observe	Observe		LC
Phasianidae	44	Red-breasted Hill Partridge	<i>Arborophila hyperythra erythropterys</i>	Call	Call	Call	Call	Call	Call		NT
	45	Maroon Woodpecker	<i>Blythipicus rubiginosus</i>	Observe	Observe	Observe	Observe	Observe	Observe		LC
Picidae	46	Rufous Piculet	<i>Sasai abnormis</i>	Observe	Observe	Observe	Observe	Observe	Observe		LC
	47	Buff-rumped Woodpecker	<i>Meiglyptes tristis</i>	Observe	Observe	Observe	Observe	Observe	Observe		LC
	48	Banded Woodpecker	<i>Picus miniaceus</i>	Observe	Observe	Observe	Observe	Observe	Observe		LC
Pycnonotidae	49	Yellow-vented Bulbul	<i>Pycnonotus goiavier</i>	Observe	Observe	Observe	Observe	Observe	Observe	Photo	LC
	50	Ashy Bulbul	<i>Hemixos flavala</i>	Observe	Observe	Observe	Observe	Observe	Observe		LC
	51	Bornean Bulbul	<i>Pycnonotus montis</i>	Observe	Observe	Observe	Observe	Observe	Observe	Photo	LC

	52	Ochraceous Bulbul	<i>Criniger ochraceus</i>			Observe	Observe	Observe	Observe	Photo	LC
	53	Streaked Bulbul	<i>Ixos malaccensis</i>			Observe	Observe	Observe	Observe	Photo	LC
Ramphastidae	54	Bornean Barbet	<i>Megalaima eximia</i>			Observe	Observe	Observe	Observe	Photo	LC
	55	Gold-whiskered Barbet	<i>Megalaima chrysopogon</i>			Observe	Observe	Observe	Observe	Photo	NT
	56	Blue-eared Barbet	<i>Megalaima australis</i>			Observe	Observe	Observe	Observe	Photo	NT
	57	Mountain Barbet	<i>Megalaima monticola</i>		Observe	Call	Observe	Observe	Observe	Photo	NT
		Grey-headed Canary Flycatcher	<i>Culicicapa ceylonensis</i>		Observe	Observe	Observe	Observe	Observe	Photo	LC
Sylviidae	58	Mountain Tailorbird	<i>Orthotomus cuculatus</i>			Observe	Observe	Observe	Observe		LC
	59	Yellow-bellied Prinia	<i>Prinia flaviventris</i>		Call	Observe	Observe	Observe	Observe		LC
	60	Yellow-bellied Warbler	<i>Abroscopus superciliosus</i>			Observe	Observe	Observe	Observe		
Timaliidae	61	Grey-throated Babbler	<i>Stachyris nigriceps</i>		Observe	Observe	Observe	Observe	Observe	Call	
	62	Chestnut-hooded Laughing Thrush	<i>Rhinocichla treacheri</i>		Observe	Observe	Observe	Observe	Observe	Photo	LC
	63	Brown Fulvetta	<i>Aleippe brunneicauda</i>								LC
	64	Chestnut-winged Babbler	<i>Stachyris erythroptera</i>		Call						
	65	Sooty-caped Babbler	<i>Malacopteron affine</i>								
	66	Chestnut-backed Scimitar Babbler	<i>Pomatorhinus montanus</i>		Call					Observe	
	67	Bold-Striped Tit-Babbler	<i>Macronous bormensis montanus</i>		Call					Observe	LC
	68	Chestnut-crested Yuhina	<i>Yuhina everetti</i>		Observe	Observe	Observe	Observe	Observe	Observe	LC
	69	White-chested Babbler	<i>Trichastoma rostratum</i>		Observe	Observe	Observe	Observe	Observe	Observe	LC
					Call					Call	LC
Turdidae	70	White-browed Shortwing	<i>Brachypteryx montana</i>		Call	Call	Call	Call	Call	Call	LC
	71	Oriental Magpie Robin	<i>Copsychus saularis adamsi</i>			Observe	Observe	Observe	Observe	Observe	LC
Vireonidae	72	White-Bellied Epornis	<i>Epornis zantholeuca</i>								LC
	73	White-browed Shrike Babbler	<i>Pteruthius flaviscapris</i>		Call	Call	Call	Call	Call	Call	NT
Zosteropidae	74	Bornean Ibon	<i>Oculocincta squamifrons</i>			Observe	Observe	Observe	Observe	Observe	LC

By Paul, Benedict, Martinah & David

Note – LC: Least concern, NT: Nearly threatened, SWE: Sabah Wildlife Conservation
Enactment 1997

Table 9: List of Birds in Compartment P42

BIRDS OF P42

Family	No	Common Name	Scientific Name	Base camp GPS reading 08.08.2010	GPS ending 08.08.2010	GPS ending 09.08.2010	GPS ending 10.08.2010	Remark	Status
Accipiteridae	1	Crested Serpent-Eagle	<i>Spilornis cheela</i>				Observe		SWE:ii
Apodidae	2	Glossy Swiftlet	<i>Collocalia esculenta</i>	Observe	Observe	Observe	Observe		LC
Campephagidae	3	Grey-Chinned Minivet	<i>Pericrocotus solaris</i>	Call			Observe		LC
Chloropseidae	4	Bornean Leafbird	<i>Chloropsis kinabaluensis</i>	Observe	Observe	Observe	Observe		LC
Columbidae	5	Little Cuckoo-Dove	<i>Macropygia ruficeps</i>	Observe	Observe	Observe	Observe		NT
	6	Mountain Imperial Pigeon	<i>Ducula badia</i>	Observe	Observe	Observe	Observe		LC
Corvidae	7	Bornean Treepie	<i>Dendrocitta cinerascens</i>	Observe	Observe	Observe	Observe		LC
Cuculidae	8	Indian Cuckoo	<i>Cuculus micropterus</i>		Call				LC
	9	Himalayan Cuckoo	<i>Cuculus saturatus</i>				Call		LC
Dicaeidae	10	Bornean Flowerpecker	<i>Dicaeum monticolum</i>		Observe	Observe	Observe		LC
Dicruridae	11	Hair-Crested Drongo	<i>Dicrurus hottentottus</i>		Observe	Observe	Observe		Observe
	12	Ashy Drongo	<i>Dicrurus leucophaeus</i>	Observe	Observe	Observe	Observe	Photo taken	Observe
Eurylaimidae	13	Whitehead's Broadbill	<i>Calypomena whiteheadi</i>	Observe	Observe	Observe	Observe		LC
Muscicapidae	14	Little Pied Flycatcher	<i>Ficedula westermanni</i>	Call	Observe	Call	Call		LC
	15	Snowy-Browed Flycatcher	<i>Ficedula hyperythra</i>	Call	Observe	Observe	Observe	Photo taken	LC
	16	Eye-Browed Jungle-Flycatcher	<i>Rhinomyias gularis</i>		Observe	Observe	Observe	Photo taken	LC
Nectariniidae	17	Whitehead's Spiderhunter	<i>Arachnothera juliae</i>	Observe	Call	Call	Call		LC
	18	Little Spiderhunter	<i>Arachnothera longirostra</i>	Observe	Observe	Observe	Observe		LC
	19	Streaky-Breasted Spiderhunter	<i>Arachnothera affinis</i>	Observe	Observe	Call	Observe		LC
	20	Temminck's Sunbird	<i>Aethopygia temminckii</i>	Call	Call	Observe	Observe		LC
Oriolidae	21	Black-and-Crimson Oriole	<i>Oriolus cruentus</i>	Observe		Observe	Call		LC
Pachycephalidae	22	Bornean Whistler	<i>Pachycephala hypoxantha</i>	Observe	Observe	Observe	Observe		Observe
Phasianidae	23	Crimson-Headed Partridge	<i>Haematoryx sanguiniceps</i>	Call	Call	Call	Observe		LC
Picidae	24	Maroon Woodpecker	<i>Blythipicus rubiginosus</i>			Call	Observe		Observe
Podargidae	25	Bornean Frogmouth	<i>Batrachostomus mixtus</i>		Observe				Observe
Pycnonotidae	26	Ochraceous Bulbul	<i>Criniger ochraceus</i>	Observe	Observe	Observe	Observe		Observe
	27	Bornean Bulbul	<i>Pycnonotus montis</i>	Observe	Observe	Observe	Observe		NT
	28	Ashy Bulbul	<i>Hemixos flava</i>	Observe	Observe	Observe	Observe		LC

Table 10: List of Birds in Compartment P60

BIRDS OF P60

Family	No	Common Name	Scientific Name	GPS start and ending N 04° 14' 33.5" E 115° 43' 45.4" N 04° 14' 57.8" E 115° 44' 20.6"	Remarks	Status
Accipiteridae	1	Crested Serpent-Eagle	<i>Spilornis cheela</i>		Observe	LC
Bucerotidae	2	Rhinoceros Hornbill	<i>Buceros rhinoceros</i>		Observe	NT
Campephagidae	3	Black-Winged Flycatcher Shrike	<i>Hemipus hirundinaceus</i>		Observe	NT
	4	Sunda Cuckoo-Shrike	<i>Coracina larvata</i>		Observe	
Chloropseidae	5	Bornean Leafbird	<i>Chloropsis kinabaluensis</i>		Observe	LC
Columbidae	6	Little Cuckoo-Dove	<i>Macropygia ruficeps</i>		Observe	LC
Corvidae	7	Bornean Treepie	<i>Dendrocitta cinerascens</i>		Observe	LC
Cuculidae	8	Square-Tailed Drongo Cuckoo	<i>Surniculus lugubris</i>		Observe	LC
Dicruridae	9	Ashy Drongo	<i>Dicrurus leucophaeus</i>		Observe	
Eurylaimidae	10	Whitehead's Broadbill	<i>Calyptomena whiteheadi</i>		Observe	LC
	11	Banded Broadbill	<i>Eurylaimus javanicus</i>		Observe	LC
	12	Black-and-Yellow Broadbill	<i>Eurylaimus ochromalus</i>		Call	
Nectariniidae	13	Little Spiderhunter	<i>Arachnothera longirostra</i>		Observe	
Oriolidae	14	Black-and-Crimson Oriole	<i>Oriolus cruentus</i>		Observe	LC
Pachycephalidae	15	Bornean Whistler	<i>Pachycephala hypoxantha</i>		Observe & Call	LC
Phasianidae	16	Red-Breasted Hill Partridge	<i>Arborophila hyperythra erythroprys</i>		Observe & Call	NT
	17	Crimson-Headed Partridge	<i>Haematortyx sanguiniceps</i>		Call	LC
Pycnonotidae	18	Ochraceous Bulbul	<i>Criniger ochraceus</i>		Observe & Call	LC
	19	Ashy Bulbul	<i>Hemixos flavala</i>		Observe	LC
Ramphastidae	20	Mountain Barbet	<i>Megalaima monticola</i>		Call	LC
Stenostiridae	21	Grey-Headed Canary Flycatcher	<i>Culicicapa ceylonensis</i>		Observe	LC
Sylviidae	22	Yellow-Tellied Warbler	<i>Abroscopus superciliosus</i>		Observe	LC
	23	Rufous-Tailed Tailorbird	<i>Orthotomus sericeus</i>		Observe	LC
Timaliidae	24	Chestnut-Winged Babbler	<i>Stachyris erythroptera</i>		Observe	LC
	25	White-Browed Shrike Babbler	<i>Pteruthius flaviscapis</i>		Call	LC
	26	Chestnut-Crested Yuhina	<i>Yuhina everetti</i>		Observe & Call	LC
	27	White-Chested Babbler	<i>Trichastoma rostratum</i>		Observe	LC (SWE:ii)
	28	Chestnut-Hooded Laughing Thrush	<i>Rhinocichla tracheri</i>		Observe	LC
Turdidae	29	Oriental Magpie Robin	<i>Copsychus saularis adamsi</i>		Observe	LC

	30	Bornean Forktail	<i>Enicurus borneensis</i>	Observe	NT
Vireonidae	31	White-Bellied Epornis	<i>Erpornis zantholeuca</i>	Observe & Call	LC

By Paul Imbun, Benedict Butit & Martinah Latim

Note - R : Resident, R/m: Resident and migratory, R/E: Resident endemic

Table 11: List of Reptiles in Compartment L10

REPTILES OF L10

Family	No	Common Name	Species	Base Camp GPS Reading				Remarks (179m)	Status
				17/07/2010 N05° 09' 07.1" E115° 40' 46.2"	18/07/2010 N05° 08' 45.8" E115° 40' 57.1"	20/07/2010 N 05° 08' 34.5" E115° 40' 54.5"			
SCINCIDAE	1	Terrestrial forest skink	<i>Mabuya multifasciata</i>	x			ob		
	2	Terrestrial forest skink	<i>Mabuya rudis</i>	x		X	ob		
GEKKONIDAE	3	Tree gecko	<i>Cyrtodactylus baluensis</i>		x	X	photo		
	4	Monitor lizard	<i>Varanus salvator</i>				ob	LC	
TURTLE	5	Malayan Flat-Shelled Turtle	<i>Notocheilus platynota</i>	x			photo		

Table 12: List of Reptiles in Compartment P35

REPTILES OF P35

Family	No	Common Name	Species	Base Camp GPS Reading				Remarks	Status
				21/07/2010 N 04° 33' 00.7" E115° 57' 16.6"	22/07/2010 N 04° 33' 09.6" E115° 57' 20.6"	23/07/2010 N 04° 33' 00.7" E115° 57' 16.6"	24/10/2010 N 04° 33' 09.6" E115° 57' 20.6"		
SCINCIDAE	1	Tree-dwelling lizard	<i>Lamprolepis vineri</i>		x		Photo		
	2	Terrestrial forest skink	<i>Mabuya rudis</i>				Photo		
GEKKONIDAE	3	Large forest gecko	<i>Gekko smithii</i>			X	call	LC	
PYTHONIDAE	4	Blood Python	<i>Python curtus</i>		x		Eggs	LC	
	5	Reticulated Python	<i>Python reticulatus</i>				Photo	LC	

Table 13: List of Reptiles in Compartment P42

REPTILES OF P42

Family	No	Common Name	Species	Base Camp GPS Reading				Remarks	Status
				7/8/2010 N 04° 29' 04.7" E 115° 40' 11.0"	8/8/2010 N 04° 29' 03.3" E 115° 40' 20.1"	9/8/2010 N 04° 28' 53.6" E 115° 40' 09.4"	10/8/2010 Raining		
AGAMIDAE	1		<i>Draco sp</i>		ob				LC
SCINCIDAE	2	Tree-dwelling lizard	<i>Lamprolephis vineri</i>		ob			Photo	

Table 14: List of Frogs in Compartment L10

AMPHIBIANS OF L10

Family	No	Common Name	Species	Base Camp GPS Reading				Remarks (179m)	Status	
				17/07/2010 N05° 09' 07.1" E115° 40' 46.2"	18/07/2010 N05° 08' 45.8" E115° 40' 57.1"	20/07/2010 N 05° 08' 34.5" E115° 40' 54.5"				
MEGOPHYRIDAE	1	Borneon Horned Frog	<i>Megophrys nasuta</i>				x	call	LC	
BUFONIDAE	2	Long-fingered Slender Toad	<i>Ansonia longidigita</i>				x	photo	NT	
RANIDAE	3	Grass Frog	<i>Fejervarya limnocharis</i>	x				photo	LC	
	4	Inger's Dwarf Frog	<i>Ingerana baluensis</i>		x		x	photo	LC	
	5	Greater Swamp Frog	<i>Limnonectes ingeri</i>		x		x	photo	NT	
	6	Kuhl's Creek Frog	<i>Limnonectes kuhli</i>				x	photo	LC	
	7	Giant River Frog	<i>Limnonectes leporinus</i>		x			photo	LC	
	8	Yellow-bellied Puddle Frog	<i>Meristogenus sp</i>				x	call		
	9	Yellow-bellied Puddle Frog	<i>Occidozyga leavis</i>		x			photo		
	10	Mahogany Frog	<i>Rana luctuosa</i>		x		x	call	LC	
	11	White-lipped Frog	<i>Rana chalconota</i>				x	photo	LC	
	RHACOPHORIDAE	1	Four-lined Tree Frog	<i>Polypedates leucomystax</i>	x				photo	LC
		2	Four-lined Tree Frog	<i>Polypedates leucomystax</i>						
3		Dark-eared Tree Frog	<i>Polypedates macrotis</i>	x				photo	LC	
4		File-eared Tree Frog	<i>Polypedates otitophus</i>	x				photo	LC	
5		Short-nosed Tree Frog	<i>Rhacophorus ganui</i>				x	call	NT	

Table 15: List of Frogs in Compartment P35

AMPHIBIANS OF P35

Family	No	Common Name	Species	Base Camp GPS Reading				Remarks	Status
				21/07/2010 N 04°33' 00.7" E115°57' 16.6"	22/07/2010	23/07/2010 N 04°33' 00.7" E115°57' 16.6"	24/10/2010 N 04°33' 09.6" E115°57' 20.6"		
MEGOPHYRIDAE	1	Montane Litter Frog	<i>Leptobrachium montanum</i>		X			Photo	LC
	2	Dring's Slender Litter Frog	<i>Leptolalax dringi</i>		X	X		Photo	NT
	3	Borneon Horned Frog	<i>Megophrys nasuta</i>		X			call	LC
BUFONIDAE	4	Marbled Tree Toad	<i>Pedostibes rogustus</i>					Photo	NT
MICROHYLIDAE	5		<i>Katophrynus sp</i>		X			call	
RANIDAE	6	Rough Guardian Frog	<i>Limnonectes finchi</i>				X	Photo	LC
	7	Kuhl's Creek Frog	<i>Limnonectes kuhli</i>		X	X		Photo	NT
	8	Seep Frog	<i>Occidozygabaluensis</i>		X	X		ob	NT
	9	Mahogany Frog	<i>Rana luctuosa</i>				X	Photo	LC
RHACOPHORIDA	10	Golden-legged Bush Frog	<i>Phyllautus aurantium</i>		x	X		Photo	EN
	11		<i>Phyllautus njobergi</i>		x	X		call	NT
	12	Four-lined Tree Frog	<i>Polypedates leucomystax</i>			X	X	Photo	LC
	13	Dark-eared Tree Frog	<i>Polypedates macrotis</i>			X	X	Photo	LC

Table 16: List of Frogs in Compartment P42

AMPHIBIANS OF P42

Family	No	Common Name	Species	Base Camp GPS Reading				Remarks	Status
				7/8/2010 N 04° 29' 04.7" E 115° 40' 11.0"	8/8/2010 N 04° 29' 03.3" E 115° 40' 20.1"	9/8/2010 N 04° 28' 53.6" E 115° 40' 09.4"	10/8/2010 Raining		
MEGOPHYRIDA	1	Montane Litter Frog	<i>Lepobrachium montanum</i>		photo	photo			LC
	2	Dring's Slender Litter Frog	<i>Leptolalax dringi</i>		photo	photo			NT
	3		<i>Leptolalax cf. arayi</i>		photo				VU
BUFONIDAE	4	Kinabalu Slender Toad	<i>Ansonia hanitschi</i>		photo	ob			NT
MICROHYLIDAE	5	Tree Hole Frog	<i>Metaphrynella sundana</i>		call	call			LC
	6	Kuhl's Creek Frog	<i>Limnonectes cf. kuhli</i>		photo				

	7	Kuhl's Creek Frog	<i>Limnonectes kuhli</i>		photo	ob		
	8	Smooth Guardian Frog	<i>Limnonectes palavenensis</i>		photo			
	9	Smooth Guardian Frog	<i>Limnonectes cf. palavenensis</i>		photo	photo		NT
	10	Green-spotted Rock Frog	<i>Staurois tuberinguis</i>		photo	ob		LC
	11	Striped Stream Frog	<i>Rana signata</i>		photo			LC
	12	Spotted Stream Frog	<i>Rana picturata</i>		call			
RHACOPHORID AE	13	Green Bush Frog	<i>Philautus bunitus</i>	call	call	call		VU
	14		<i>Philautus mjobergi</i>			photo		NT
	15	Mossy Tree Frog	<i>Rhacophorus everetti</i>	call	call			NT
	16	Kinabalu Tree Frog	<i>Rhacophorus kinabaluensis</i>			call		NT

Table 17: Gender breakdown of the respondents

Respondents	Gender		Total
	Male	Female	
Long Pasia	28	9	37
Long Mio	6	5	11
Malingan	32	4	36
Kaang	3	5	8
Alutok	12	5	17
Lalang	16	0	16
Malutut	11	9	20
Bakuku	24	2	26
Tinura	2	0	2
Mahunsop	2	0	2
Melalia	11	9	20
Tanah Karit	1	1	2
Naluyan	12	10	22
Katipor	3	1	4

Respondents	Gender		Total
	Male	Female	
Sungai Tiga	10	4	14
Pepolor	8	3	11
Total	181	67	248
Percentage (%)	73.0	27.0	100

Table 18: Age range of the respondents

Respondents	Age range						Total
	≤ 20	21-30	31-40	41-50	51-60	>60	
Long Pasia	0	7	5	7	12	6	37
Long Mio	0	2	2	4	2	1	11
Malingan	3	8	7	11	6	1	36
Kaang	0	3	2	1	0	2	8
Alutok	0	0	6	3	3	5	17
Lalang	4	4	3	4	1	0	16
Malutut	4	6	2	4	1	3	20
Bakuku	2	6	3	8	3	4	26
Tinura	0	0	0	1	0	1	2
Mahunsop	0	0	1	0	1	0	2
Melalia	1	3	1	4	7	4	20
Tanah Karit	0	2	0	0	0	0	2
Naluyan	2	2	3	10	1	4	22
Katipor	0	1	0	0	0	3	4
Sungai Tiga	0	5	3	3	1	2	14
Pepolor	1	3	1	3	1	2	11
Total	17	52	39	63	39	38	248
Percentage (%)	6.9	21.0	15.7	25.4	15.7	15.3	100

Table 19: Ethnic composition of the respondents

Respondents	Ethnic											Total
	Bajau	Bisaya	Brunei	Chinese	Dusun	Jawi	Kadazan	Kedayan	Lundayeh	Melayu	Murut	
Long Pasia	0	0	0	0	0	0	0	0	37	0	0	37
Long Mio	0	0	0	0	0	0	0	0	11	0	0	11
Malingan	0	0	0	0	0	0	0	0	0	36	0	36
Kaang	0	0	0	0	0	0	0	0	0	8	0	8
Alutok	0	0	0	0	0	0	0	0	0	17	0	17
Lalang	0	0	0	0	0	0	0	0	0	16	0	16
Malutut	0	0	0	0	0	0	0	0	0	20	0	20
Bakuku	0	0	0	0	0	0	0	0	0	26	0	26
Tinura	0	0	0	0	0	0	0	0	0	2	0	2
Mahunsop	0	0	0	0	0	0	0	0	0	2	0	2
Melalia	1	5	0	0	1	0	1	7	3	0	0	20
Tanah Karit	0	2	0	0	0	0	0	0	0	0	0	2
Naluyan	0	4	1	0	0	1	0	16	0	0	0	22
Katipor	0	0	0	4	0	0	0	0	0	0	0	4
Sungai Tiga	0	10	1	0	0	0	0	2	1	0	0	14
Pepolor	0	0	0	3	8	0	0	0	0	0	0	11
Total	1	21	2	7	9	1	1	25	52	2	127	248
Percentage (%)	0.4	8.5	0.8	2.8	3.6	0.4	0.4	10.1	21.0	0.8	51.2	100

Table 20: Landownership status reported by the respondents

Respondents	Landownership (type)			Total
	N/A	LA	NT	
Long Pasia	3	8	26	37
Long Mio	0	6	5	11

Respondents	Landownership (type)			Total
	N/A	LA	NT	
Malingan	4	12	20	36
Kaang	0	8	0	8
Alutok	1	16	0	17
Lalang	3	13	0	16
Malutut	11	9	0	20
Bakuku	9	17	0	26
Tinura	0	2	0	2
Mahunsop	0	0	2	2
Melalia	0	1	19	20
Tanah Karit	0	0	2	2
Naluyan	5	2	15	22
Katipor	0	0	4	4
Sungai Tiga	6	3	5	14
Pepolor	3	1	7	11
Total	45	98	105	248
Percentage (%)	18.2	39.5	42.3	100

Note: N/A = Not Applicable, LA = Land Application, NT = Native Title

Table 21: Households' source of income

Respondents	Household's source of income						Total
	Farming	Hunting	Tourism	Plantation	Government servant	Labor	
Long Pasia	26	1	6	0	4	0	37
Long Mio	10	0	0	0	1	0	11
Malingan	31	0	0	0	5	0	36
Kaang	8	0	0	0	0	0	8

Respondents	Household's source of income							Total
	Farming	Hunting	Tourism	Plantation	Government servant	Labor	Total	
Alutok	16	0	0	0	0	1	17	
Lalang	16	0	0	0	0	0	16	
Malutut	20	0	0	0	0	0	20	
Bakuku	26	0	0	0	0	0	26	
Tinura	2	0	0	0	0	0	2	
Mahunsop	2	0	0	0	0	0	2	
Melalia	18	0	0	0	1	1	20	
Tanah Karit	2	0	0	0	0	0	2	
Naluyan	12	0	0	0	5	5	22	
Katipor	1	0	0	3	0	0	4	
Sungai Tiga	7	0	0	0	3	4	14	
Pepolor	7	0	0	0	1	3	11	
Total	204	1	6	3	20	14	248	
Percentage (%)	82.3	0.4	2.4	1.2	8.1	5.6	100	

Table 22: Respondents' involvement in agricultural activities

Respondents	Agriculture involvement		Total
	Yes	No	
Long Pasia	31	6	37
Long Mio	11	0	11
Malingan	35	1	36
Kaang	8	0	8
Alutok	17	0	17
Lalang	16	0	16
Malutut	20	0	20
Bakuku	26	0	26

Tinura	2	0	2
Mahunsop	2	0	2
Melalia	18	2	20
Tanah Karit	2	0	2
Naluyan	16	6	22
Katipor	4	0	4
Sungai Tiga	10	4	14
Pepolor	10	1	11
Total	228	20	248
Percentage (%)	91.9	8.1	100

Table 23: Other agriculture products cultivated by the respondents

Respondents	Agriculture			
	Garden produce	Fruit trees	Cash crop	Live stock
Long Pasia	28	27	6	29
Long Mio	10	10	5	10
Malingan	30	30	19	30
Kaang	7	8	8	8
Alutok	10	16	17	17
Lalang	7	10	10	16
Malutut	20	20	19	20
Bakuku	26	14	25	26
Tinura	2	2	2	2
Mahunsop	0	2	2	2
Melalia	18	17	6	17
Tanah Karit	2	2	0	2
Naluyan	14	12	6	15
Katipor	4	4	1	4

Respondents	Agriculture			
	Garden produce	Fruit trees	Cash crop	Live stock
Sungai Tiga	9	9	4	9
Pepolor	9	9	5	9
Total	196	192	135	216
Percentage (%)	86.0	84.2	59.2	94.7

Table 24: Respondents who practice hunting and their target areas

Respondents	Hunting practice		Target area for hunting		
	Yes	No	Nearby Forest	SFI compartment	
Long Pasia	21	16	21	2	
Long Mio	9	2	9	2	
Malingan	25	11	25	3	
Kaang	8	0	8	1	
Alutok	17	0	17	1	
Lalang	15	1	15	0	
Malutut	18	2	18	0	
Bakuku	23	3	23	0	
Tinura	2	0	2	0	
Mahunsop	2	0	0	2	
Melalia	10	10	10	0	
Tanah Karit	0	2	0	0	
Naluyan	10	12	10	0	
Katipor	2	2	2	0	
Sungai Tiga	9	5	9	1	
Pepolor	7	4	7	0	
Total	178	70	176	12	
Percentage (%)	71.8	28.2	98.9	6.7	

Table 25: Mode of transportation and hunting methods preferred by the respondents

Respondents	Means of transportation				Methods of hunting				
	Feet	Boat	Landcruiser	Motor	Fire weapon	Spear	Traditional traps	Blow pipe	
	Long Pasia	21	5	0	0	7	15	0	0
Long Mio	9	2	0	0	1	9	0	0	
Malingan	25	1	0	0	3	22	0	0	
Kaang	8	0	1	0	2	3	5	0	
Alutok	17	0	0	0	13	3	1	0	
Lalang	15	0	0	0	8	0	8	0	
Malutut	15	0	0	4	11	2	3	2	
Bakuku	23	0	0	0	13	9	7	7	
Tinura	2	0	0	0	1	0	0	1	
Mahunsop	2	0	0	0	0	2	2	2	
Melalia	10	0	0	0	2	8	0	0	
Tanah Karit	0	0	0	0	0	0	0	0	
Naluyan	10	0	1	1	5	7	0	0	
Katipor	2	0	0	0	1	1	0	0	
Sungai Tiga	9	1	0	0	2	7	0	0	
Pepolor	7	1	0	0	2	4	0	0	
Total	175	10	2	5	71	92	26	12	
Percentage (%)	98.3	5.6	1.1	2.8	39.9	51.7	14.6	6.7	

Table 26: Preferred animals and average number of animals taken per hunting trip

Respondents	Target species							
	Deer	Pig	Mouse deer	Pangolin	Monkey	Barking deer	Flying lemur	Flying fox
	Number of animals taken		1 to 2	3 to 4	>4			
Long Pasia	18	18	14	2	0	0	0	0
Long Mio	8	7	3	2	0	0	0	0

Respondents	Target species										Number of animals taken			
	Deer	Pig	Mouse deer	Pangolin	Monkey	Barking deer	Flying lemur	Flying fox	1 to 2	3 to 4	>4			
Malingan	21	25	10	2	0	0	0	0	24	1	0			
Melalia	9	10	5	0	0	0	0	0	9	1	0			
Tanah Karit	0	0	0	0	0	0	0	0	0	0	0			
Naluyan	0	9	8	2	0	0	0	0	8	2	0			
Katipor	2	2	1	0	0	0	0	0	1	1	0			
Sungai Tiga	9	8	5	1	0	0	0	0	8	1	0			
Pepolor	7	7	4	1	0	0	0	0	6	1	0			
Kaang	5	8	5	0	5	2	0	0	4	3	1			
Alutok	7	12	9	1	4	0	1	1	5	10	2			
Lalang	0	8	14	0	7	7	0	0	15	0	0			
Malutut	3	11	4	0	3	3	0	0	12	1	5			
Bakuku	9	21	13	7	11	0	0	0	18	5	0			
Tinura	0	2	2	0	2	0	0	0	1	1	0			
Mahunsop	2	2	2	0	0	0	0	0	0	0	2			
Total	100	150	99	18	32	12	1	1	135	32	11			
Percentage (%)	56.2	84.3	55.6	10.1	18.0	6.7	0.6	0.6	75.8	18.0	6.2			

Table 27: Frequency of hunting trips and number of persons involved during each hunting trip

Respondents	Frequency of hunting trip						Number of person			Total
	≥2/ week	1/ week	1/ month	2/ year	1	2 - 3 ppl	3 - 4 ppl			
Long Pasia	14	3	4	0	6	4	11	21		
Long Mio	3	2	4	0	2	1	6	9		
Malingan	9	7	9	0	6	3	16	25		
Kaang	5	0	2	1	2	1	5	8		
Alutok	3	1	9	4	4	5	8	17		
Lalang	15	0	0	0	8	0	7	15		
Malutut	6	2	7	3	1	6	11	18		

Respondents	Frequency of hunting trip				Number of person				Total
	≥ 2/ week	1/ week	1/ month	2/ year	1	2 - 3 ppl	3 - 4 ppl		
Bakuku	4	0	12	7	0	7	16	23	
Tinura	2	0	0	0	1	0	1	2	
Mahunsop	0	2	0	0	0	0	2	2	
Melalia	5	3	2	0	3	1	6	10	
Tanah Karit	0	0	0	0	0	0	0	0	
Naluyan	6	2	2	0	5	1	4	10	
Katipor	2	0	0	0	1	0	1	2	
Sungai Tiga	5	1	3	0	1	1	7	9	
Pepolor	5	0	2	0	0	1	6	7	
Total	84	23	56	15	40	31	107	178	
Percentage (%)	47.2	12.9	31.5	8.4	22.5	17.4	60.1	100	

Table 28: Fishing activity involvement and methods of fishing employed by the respondents

Respondents	Fishing activities involvement		Fishing methods			
	Yes	No	Casting net	Drifting net	Fishing rod	Tra. Trap
Long Pasia	31	6	11	17	22	6
Long Mio	11	0	0	7	11	1
Malingan	27	9	13	13	21	2
Kaang	8	0	7	8	1	1
Alutok	0	17	0	0	0	0
Lalang	16	0	16	15	8	16
Malutut	20	0	8	13	1	15
Bakuku	16	10	12	16	7	14
Tinura	2	0	2	2	2	2
Mahunsop	2	0	2	2	2	0
Melalia	14	6	5	7	11	1
Tanah Karit	2	0	0	1	0	1

Respondents	Fishing activities involvement		Fishing methods				
	Yes	No	Casting net	Drifting net	Fishing rod	Tra. Trap	
Naluyan	15	7	4	8	11	1	
Katipor	2	2	1	2	1	0	
Sungai Tiga	12	2	3	6	7	3	
Pepolor	8	3	4	4	6	0	
Total	186	62	88	121	111	63	
Percentage (%)	75	25	47.3	65.1	59.7	33.9	

Table 29: Issues of complaint

Respondents	Issues									
	Road condition	Tele-communication	Electricity	School	Pollution	Land issue	Logging	Encroachment to the plantation	Plantation	
Long Pasia	10	5	5	0	3	1	0	0	0	
Long Mio	3	2	2	1	2	1	0	0	0	
Malingan	11	7	7	0	4	4	0	8	0	
Kaang	1	1	0	0	0	1	6	1	0	
Alutok	11	13	0	0	0	9	2	0	0	
Lalang	14	14	0	0	0	13	0	0	0	
Malutut	9	9	0	0	0	8	0	0	6	
Bakuku	14	14	0	0	0	12	2	0	0	
Tinura	2	2	0	0	0	2	2	0	0	
Mahunsop	2	2	0	0	0	2	2	0	0	
Melalia	3	2	2	0	1	0	0	0	0	
Tanah Karit	0	0	0	0	0	0	0	0	0	
Naluyan	3	2	2	0	0	0	0	0	0	
Katipor	0	0	0	0	0	0	0	0	0	
Sungai Tiga	2	1	0	0	2	1	0	0	0	
Pepolor	2	2	2	0	1	0	0	0	0	
Total	87	76	20	1	13	54	14	9	6	
Percentage (%)	79.8	69.7	18.3	0.9	11.9	49.5	12.8	8.3	5.5	

Appendix C: Summary Findings and Management Actions

High Conservation Value Forest (HCVF) Assessment in SFI Key Findings and Management Actions by SFI to Protect High Conservation Values as agreed by WWF and SFI, 24 February 2011

HCVs	Summary of Key findings	Recommended Management Actions by HCV Consultant
HCV 1.1 – Protected Areas (PAs)	<p>Findings:</p> <ul style="list-style-type: none"> - Four PAs were identified: 1. Gunung Lumaku Forest Reserve 2. Agathis VJR, 3. Sungai Basio VJR 4. Meligan VJR 	<p>Management:</p> <ol style="list-style-type: none"> 1. PA boundaries to be clearly identified and demarcated on the ground 2. Buffer zones for all borders with PAs – 100m – no logging in buffers. 3. Enforcement - Patrolling to ensure no encroachment into PAs
<p><u>Key Actions by SFI:</u></p> <ol style="list-style-type: none"> 1. Mark the boundaries with Gunung Lumaku Forest Reserve; the Agathis, Sungai Basio and Meligan Virgin Jungle Reserves and the Kayan Mentarang National Park (Indonesia) and the 100m buffer strips associated with them on the primary layer of the SFI Geographical Information System (GIS) and clearly show them on all operational maps. 2. Clearly mark the buffer boundaries on the ground when these areas are threatened by the activities SFI or third parties including neighbouring communities. 3. Protect and maintain the existing network of riparian reserves and wildlife corridors that connect these PAs to other areas of natural forest to allow the passage of wildlife. 		
HCV 1.2 – Threatened and Endangered Species	<p>Findings:</p> <ul style="list-style-type: none"> - P42: HCV 1.2 hotspot - HCV plants identified in the ITP area = 18 IUCN Red List species (Dipterocarps and fruit trees) - HCV Animals: <ol style="list-style-type: none"> 1. Mammals – 8 IUCN Red List Species (7 VU & 1 EN) 2. Avifauna – 18 IUCN Red List 	<p>Management:</p> <ol style="list-style-type: none"> 1. Mark the GPS locations of all plants listed in the IUCN Red List as CR, EN & VU and exclude them from harvesting. 2. No logging of all HCV 1.2 & 1.3 Dipterocarp species and fruit trees or translocate 3. Minimise impact of logging –apply RIL 4. Reserve 10% of the total concession area to be untouched for protection of plants and animals – ITP

Species (17 NT & 1 VU)
 3. Hepertifauna – 3 IUCN Red List Species (2 VU & 1 EN)

5. Biodiversity corridors to be created for all compartments to be converted to ITP – 100
 6. Conserve P42
 7. Need to address hunting by local communities
 8. Species specific research and study of Bornean Gibbons and Clouded Leopards

Key Actions by SFI:

1. **Identify all plants and animals in the SFI area listed as Critically Endangered, Endangered or Vulnerable in the IUCN Red List and ensure that the timber production activities of the company do not adversely affect the long term survival of these species in Sabah. Existing SOPs requiring HCV surveys prior to carrying out any forestry operation will ensure that this information is collected over time.**
2. **Protect and maintain the existing network of riparian reserves and wildlife corridors and other conservation areas and ensure that these include representative populations of HCV 1.2 plants that occur in the areas which are to be converted to plantations. Protecting and maintaining healthy riparian reserves and wildlife corridors will ensure that HCV 1.2 animals can seek refuge and move to other forested areas.**
3. **Employ Reduced Impact Logging (RIL) techniques as set out in the SFD RIL Guidelines when harvesting in the NFM Area.**
4. **Train employees and community members how to identify RTE species and get them to report any sighting or evidence of their presence to develop a better understanding of their numbers and distribution.**
5. **Encourage and support research of RTE species by universities and scientific institutions with special emphasis on critically endangered dipterocarp species, Bornean Gibbon and Clouded Leopard.**
6. **Work to reduce hunting pressure on HCV 1.2 wildlife through existing engagement with communities and through collaboration with the Sabah Wildlife Department to educate the local communities on the effects of hunting on wildlife. SFI will also improve its systems to control access to SFI land to curb hunting.**

Note:

a) **Banning the logging of all HCV1.2 timber species in the ITP Area or trans-locating individuals is not practical or even feasible. SFI will ensure that all HCV 1.2 species are well represented in areas managed for timber production and in the network of reserves, riparian strips and wildlife corridors.**

<p>HCV 1.3: Endemism</p>	<p>Findings:</p> <ul style="list-style-type: none"> - P42 – highest endemism - 60 Endemic Plants - 14 Endemic mammal - 25 Endemic Avifauna - 18 Endemic Amphibian/reptiles 	<p>Management:</p> <ol style="list-style-type: none"> 1. Corridors or pathways of 100m to be maintained. 2. Strict enforcement to curb illegal hunting within the SFI plantation. 3. P42 - highest in numbers of endemic species of plants and animals. Recommend conserving this compartment. 4. HCV 1.3 shall be managed in close coordination with HCV 3 by maintaining the largest possible areas of intact remnant forest and mature secondary forest, as well as connectivity among them.
<p><u>Key Actions by SFI:</u></p> <ol style="list-style-type: none"> 1. Carry out similar management actions as detailed for HCV 1.2 in the management of species identified as HCV 1.3. 2. Encourage and support research into endemic species by universities and scientific institutions in order to provide information on which to base more informed management of HCV 1.3 species. <p><u>Note:</u></p> <ol style="list-style-type: none"> a) While many endemic species were identified in the SFI area, it is still not clear if these species are (i) restricted but widespread or (ii) restricted and endangered in the SFI area and further research is needed. 		
<p>HCV 1.4: Critical Temporal Use</p>	<p>Findings:</p> <ul style="list-style-type: none"> - Only CTU areas identified by consultant were for birds 	<p>Management:</p> <ol style="list-style-type: none"> 1. Retain all hollow trees, trees with nests, fruit trees (especially fig trees). This is especially crucial in ITP area.
<p><u>Key Actions by SFI:</u></p> <ol style="list-style-type: none"> 1. Protect and maintain the existing network of riparian reserves and wildlife corridors and other conservation areas 2. Identify and protect salt licks or wallows as detailed in SOPs. <p><u>Note:</u></p> <ol style="list-style-type: none"> a) Retaining individual hollow trees, trees with nests, fruit trees (esp fig trees) in the ITP areas will not be feasible. All trees important for birds and other wildlife will be retained in the NFM area under the RIL requirements. Areas of critical temporal use for birds in the ITP areas will be ensured through the protection and maintenance of the existing network of riparian reserves, wildlife corridors and PAs to provide roosting sites and pathways for migratory species and wildlife that require large ranges. 		

<p>HCV 2: Landscape Level forest</p>	<p>Findings:</p> <ol style="list-style-type: none"> 1. SFI area comprises Sipitang Forest Reserve and Ulu Padas Forest Reserve which form part of the mountain ranges of Borneo joining up with Kalimantan and Sarawak. 2. There are 4 forest reserves found surrounded by and bordering SFI area 3. SFI area borders the Kayan Mentarang National Park in Kalimantan at compartments P45, P58, P63, P62, P61, P60, P64, P65 	<p>Management:</p> <ol style="list-style-type: none"> 1. A buffer zone of 100m width along the boundaries bordering the Meligan, Agathis, Sungai Basio VJRs, and Gunung Lumaku Forest Reserve and Kayan Mentarang National Park to be established. 2. Buffer zones should be clearly marked on the ground and on the map. 3. It is important to create linkages such as wildlife corridors or pathways of 100m width for movement of wildlife species and genetic exchange. 4. There is a need to create corridor/connectivity between the Sipitang Forest Reserve, Gunung Lumaku Forest Reserve and the Crocker Range Park.
<p><u>Key Actions by SFI:</u></p> <ol style="list-style-type: none"> 1. Mark the boundaries with Gunung Lumaku Forest Reserve; the Agathis, Sungai Basio and Meligan Virgin Jungle Reserves; and the Kayan Mentarang National Park (Indonesia) and the 100m buffer strips associated with them on the primary layer of the SFI Geographical Information System (GIS) and clearly show on all operational maps. Clearly mark buffer boundaries on the ground when these areas are threatened by the activities of the company (especially in the ITP areas) or third parties including neighbouring communities. 2. Protect and maintain the existing network of riparian reserves and wildlife corridors and buffers that connect the SFI concession to other large tracts of natural forests to allow movement of wildlife from one forest block to another. 3. Ensure that HCV 2 is preserved by: <ul style="list-style-type: none"> • working with Government agencies to educate members of the SFI staff, communities and the public at large about the need to conserve nature • controlling access in and out of SFI • erecting signs to discourage encroachment or illegal entry • monitoring boundaries using patrols, aerial surveillance and satellite imagery. 		

<p>HCV 3: Ecosystems</p>	<p>Findings: The only HCV3 ecosystems identified by the consultant were:</p> <ol style="list-style-type: none"> 1. lowland dipterocarp forest 2. montane forest 3. kerangas forest 	<p>Management:</p> <ol style="list-style-type: none"> 1. Actual extent of the existing intact kerangas forests ecosystems needs to be verified and delineated on the ground and on harvesting maps.
<p><u>Key Actions by SFI:</u></p> <ol style="list-style-type: none"> 1. Protect and maintain the existing network of riparian reserves, wildlife corridors and other conservation areas. 2. Apply RIL where logging is to take place in kerangas forest and reduce the density of skid trails to ensure that the forest will be able to regenerate naturally. <p><u>Notes:</u></p> <ol style="list-style-type: none"> a) Kerangas forests are particularly sensitive to damage by logging. b) The Meligan FR was set aside to protect kerangas (or small crowned) forest. There are substantial areas of small crowned forest reserves established by SFI. <u>Currently there are no plans to harvest any kerangas forest in the SFI Area.</u> c) The EIA does not identify any other potentially threatened or endangered ecosystems in the SFI Area. d) Montane forests are important in their own right but also play an important role in protecting soil and water values and are therefore are closely linked to HCV 4.1 (water catchments) and also HCV 5 (dependence on water by local communities). 		

<p>HCV 4.1 - Watershed Protection</p>	<p>Findings:</p> <ol style="list-style-type: none"> HCV 4.1 was not comprehensively addressed in the report and a lot of estimation was involved <p>Note: This HCV can be easily mapped out by SFI. This is required by DID laws and SFD's RIL regulations and is being done by SFI.</p>	<p>Management:</p> <ol style="list-style-type: none"> River banks and biodiversity riparian reserves are recommended. Depending on the stream width, a riparian buffer zone adjacent to the stream must be maintained. Sabah DID guidelines, riparian reserves should be 100 m wide for first order streams, 50 m wide for second order streams and 30 m for third order streams. First order streams are usually more than 20 m wide. Riparian buffer belts should be clearly marked with paint on the trees at 1.5 m height to provide the indication of protected area.
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Key Actions by SFI:

- Apply Reduced Impact Logging (RIL) techniques as set out the SFD RIL Guidelines when harvesting natural timbers in the NEM Area.**
- Ensure that operations conducted in the ITP Area are restricted to slopes less than 35°. Use cable harvesting and manual land preparation methods when operating on slopes between 25 and 35°.**
- Establish riparian reserves on all rivers and streams in accordance with the SFI Policy on Riparian Reserves as agreed by the Forestry Department.**
- Comply with all requirements set out in the EIA and Sabah DID guidelines with respect river and stream protection.**
- Mark all riparian reserves and areas greater than 35° and larger than 2 ha on the primary layer of the SFI Geographical Information System (GIS) and clearly show on all operational maps. Clearly mark these boundaries on the ground when areas are being developed or logged.**
- Carry out water monitoring programme at 4 monthly intervals at sampling points agreed to by EPD**

Notes:

- Conversion activities upstream have the potential of adverse impact on HCV 4.1 and also HCV 5. SFI shall ensure that its protocols and SOPs restrict impacts to agreed levels.**

<p>HCV 4.2 - Erosion Control</p>	<p>Findings:</p> <ol style="list-style-type: none"> HCV 4.2 was not comprehensively assessed in the report and a lot of estimation was involved <p>Note: SFI to map out HCV 4.2 as it is a requirement under SFD’s regulations for logging on steep areas.</p>	<p>Management:</p> <ol style="list-style-type: none"> SFI to identify and map out all areas >25 degrees Steep areas which have already been harvested must be replanted with indigenous tree species. Opened areas with slope over 25° and other degraded areas must be rehabilitated rather than letting natural regeneration occur.
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Key Actions by SFI:

- Prior to harvesting and/or land preparation, SFI will map all areas >25 degrees (NFM) and >35 degrees (ITP) and more than 2 ha in extent, on the primary layer of the SFI Geographical Information System (GIS) and clearly show on all operational maps.**
- Ensure that when natural timbers are harvested in the NFM Area that Reduced Impact Logging (RIL) techniques are used as set out in the SFD RIL Guidelines.**
- Restrict operations to slopes less than 35° in the ITP Area. When operating on slopes between 25 -35° harvesting must be done using cable methods and land preparation using manual methods.**
- Ensure that logging on steep areas will not affect the rivers and catchments.**

<p>HCV 4.3 - Barriers to Destructive Fire</p>	<p>Findings:</p> <ol style="list-style-type: none"> 1. Fire is a common and serious threat in SFI especially in ITP areas & areas near villages. 2. Assessment was not comprehensive in the HCV report – hard to do that at the compartment level. <p>Note: Because SFI already has a good (and successful) Fire Management plan</p>	<p>Management:</p> <ol style="list-style-type: none"> 1. Map out all previously burnt areas 2. “<i>Forest Fire Prevention and Control Plan Framework for the SFI Concession</i>” should be fully implemented and the plan should be updated regularly. 3. Maintain all water tanks, mobile water tankers vehicles, and fire towers. 4. Ensure that fire breaks with a width of 5 to 10 m are constructed on high risk areas such as plantation edge bordering human settlement. Fire breaks should be at least double the height of the vegetation. Firebreaks should follow natural topographic features (ridge-top, stream), or forest roads, to stop the spread of fires from one cluster of planting blocks to another. Firebreaks should be accessible to facilitate access by fire fighting equipment and personnel. These fire breaks should also be extended to area bordering NFM as well as HCVMs.
<p><u>Key Actions by SFI:</u></p> <ol style="list-style-type: none"> 1. Protect and maintain a healthy network of riparian reserves that will act as effective fire breaks throughout the SFI area. 2. Prepare and review annually the Fire Prevention and Control Plan and train staff members and others to carry out the functions detailed in it. 3. Carry out fire awareness programmes with its staff members, contractors, neighbours and members of the general public, advising them that open fires are illegal, alerting them to the dangers of fire and asking them to report all fires immediately. <p><u>Note:</u></p> <ol style="list-style-type: none"> a) Building fire breaks throughout the concession as suggested by the Consultant in point 4 is not practical. SFI has, from past experience, identified newly established plantations (< 1 year) as the most fire prone and noted that the hazard level reduces as the plantation matures. Therefore riparian reserves and roads are the most effective barriers to fire and SFI will protect and maintain riparian reserves and roads in good condition. 		

<p>HCV 5 - Basic Needs of Local Communities</p>	<p>Findings:</p> <ol style="list-style-type: none"> Top Dependence on forest: <ul style="list-style-type: none"> Hunting (>90%) Fishing (>75%) NTFP - crafts Firewood (>80%) Medicine (>70%) Water <p>Conflicts</p> <p>44% reported conflict with SFI – land claims, roads</p> <p>12% report on water pollution</p>	<p>Management:</p> <ol style="list-style-type: none"> SFI to allow continued use of forest for the identified dependences. Prevent outsiders from encroaching into SFI area by utilising the existing local community in co-managing SFI area. This can help in reducing further pressure to existing wildlife populations. Ensure that logging upstream does not pollute community's water catchments. Identify any Land Application (LA) issues still outstanding and find a solution to solve these issues with the regulatory body concerned. Recommend that Communal titles outside SFI plantation be given to local people. SFI to allocate funds for the maintenance of roads including government and public roads damaged by logging trucks. Provide employment opportunities to local people to reduce hardship and dependence on forest resources.
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Key Actions by SFI:

1. Allow communities to continue to use forest resources for subsistence in the SFI Area.
2. Mark all critical HCV 5 areas (eg: areas for hunting and fishing; collecting bamboo/ rattan, firewood etc; water catchments and the like) on operational maps.
3. Develop a programme of community based resource management (CBRNM) and organise courses to train Honorary Wildlife Wardens. These activities will reduce encroachment in the SFI Area and enhance rapport with communities. A preliminary study will be carried out jointly with the community elders, CSR Department, SFI Conservation Executive and Assistant Manager NFM.
4. Protect major catchment areas which have been identified. Create additional protection areas as required. Field staff will ensure that conservation areas are marked prior to harvesting or planting activities as stated in SOPs.

5. Complete boundary survey

- 6. Provide programmes for the local people to improve their quality of life, to promote livelihoods, and enhance rapport with the surrounding communities using a participatory approach involving central government and local government authorities, NGOs and the communities.**
- 7. Address current and potential conflict between SFI and the communities and work with third party mediators such as social NGOS in order to understand and resolve conflict.**

Notes:

- a) SFI has commissioned two private surveyors, approved by Sabah Forestry Department, to carry out boundary demarcation between the SFI Areas and State Land. This will be completed in 2011.**
- b) Many HCV 5 areas have been indentified (IPPA, 2002).**
- c) With regards to Point 4 and 5 (of the Consultant's recommendations). SFI is a lessee and not the land owner. Issues of land ownership lie with the Government and must be dealt with by them. The status of this will be clearer after the boundary demarcation has been completed and the authorities will then be able to decide how to proceed.**
- d) With regards to Point 7. SFI has about more than 2,000 employees and 68% are locals from Sipitang, Tenom and Beaufort. It is SFI policy to give preference to local community members when recruiting. There are active programmes to recruit community members.**

<p>HCV 6 - Cultural Identity of Local Communities</p>	<p>Findings:</p> <ol style="list-style-type: none"> 1. The survey by the consultant was not a comprehensive assessment of HCV 6 – data was based on word of mouth only due to time constrain. 2. Most areas already identified by SFI’s CSR team but more needs to be done to involve the communities in this and document these findings. 	<p>Management:</p> <ol style="list-style-type: none"> 1. Areas designated for burial ground and graveyards should be conserved before any logging activity is carried out in collaboration with the community 2. SOPs are very critical to address this HCV and current SOPs in place are good but must be rolled out in collaboration with the community. 3. Monitor the sites twice a year to ensure that their values are maintained / enhanced
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Key Actions by SFI:

1. Field operations staff will continue to engage with local communities prior to the commencement of logging and/development activities to ensure that burial sites and other cultural heritage sites are identified and demarcated clearly on the ground. This will be done as set out in the Licence agreements and SOPs.
2. Identify, map, demarcate and provide a buffer for all HCV 6 areas as detailed in the Licence Agreement and CHP SOP. Buffers of 50 m will be established around the identified sites.

Notes:

- a) With regards Point 3 – the monitoring recommendation is not deemed practical and perhaps even culturally unacceptable. The harvesting cycle in plantations is every 6 years and in the NFM Area every 30 years, therefore these areas are in no way threatened by production activities. Local communities would prefer that their sacred ancestral grounds are not visited by outsiders. SFI will ensure that Key Actions 1 & 2 are implemented in order to protect HCV 6 in its Licence and other areas.

Appendix D: Photographs of fauna

Amphibians & Reptiles in Compartment L10



Photo 1: *Ansonia longidigita*
Long-fingered Slender Toad



Photo 2: *Cyrtodactylus baluensis*
Tree gecko



Photo 3: *Fejervarya limnochari*
Grass Frog



Photo 4: *Ingerana baluensis*
Inger's Dwarf frog



Photo 5: *Limnonectes ingeri*
Greater Swamp Frog



Photo 6: *Limnonectes kuhli*
Kuhl's Creek Frog



Photo 7: *Limnonectes leporinus*
Giant River Frog



Photo 8: *Notochelys platynota*
Malayan Flat-Shelled Turtle



Photo 9: *Occidozyga leavis*
Yellow-bellied Puddle Frog



Photo 10: *Polypedates leucomystax*
Four-lined Tree Frog



Photo 11: *Polypedates macrotis*
Dark-eared Tree Frog



Photo 12: *Polypedates otlophus*
File-eared Tree Frog



Photo 13: *Rana chalconota*
White-lipped Frog

Amphibians & Reptiles in Compartment P35



Photo 14 : *Lamprolephis vineri*
Tree-dwelling lizard



Photo 15 : *Leptolalax dringi*
Dring's Slender Litter Frog



Photo 16 : *Mabuya rudis*
Terrestrial Forest Skink



Photo 17 : *Philautus aurantium*
Golden-legged Bush Frog



Photo 18 : *Rana luctuosa*
Mahogany Frog



Photo 19 : *Python sp.* Egg



Photo 20 : *Limnonectes finchi*
Rough Guardian Frog



Photo 21 : *Rana luctuosa*
Mahogany Frog



Photo 22 : *Occidozyga baluensis*
Seep Frog

Amphibians in Compartment P42



Photo 23 : *Ansonia hanitschi*
Kinabalu Slender Toad



Photo 24 : *Leptobrachium montanum*
Montane Litter Frog



Photo 25 : *Leptolalax cf. arayai*



Photo 26 : *Leptolalax dringi*
Dring's Slender Litter Frog



Photo 27 : *Limnonectes cf. palavanensis*
Smooth Guardian Frog



Photo 28 : *Limnonectes palavanensis*
Smooth Guardian Frog



Photo 29 : *Philautus mjobergi*



Photo 30 : *Staurois tuberilinguis*
Green-spotted Rock Frog



Photo 31 : *Rana signata*
Striped Stream Frog

Birds in Compartment L10



Photo 32: Setting up Mist Net



Photo 33: Blackheaded bulbul
Pycnonotus articeps atriceps



Photo 34: Bold Striped Tit-Babbler
Macronous bornensis montanus



Photo 35: Chestnut Munia
Lonchura atricapilla



Photo 36: Emerald Dove
Chalcophaps indica



Photo 37: Little Spiderhunter
Arachnothera longirostra



Photo 38 : Malaysian blue flycatcher
Cyornis turcosus



Photo 39: Olive-backed sunbird
Nectarinia jugularis



Photo 40: Olive-winged Bulbul
Pycnonotus plumosus



Photo 41: Orange-bellied Flowerpecker
Dicaeum trigonostigma



Photo 42: Oriental Magpie Robin
Copsychus saularis adamsi



Photo 43: Rufous Piculet
Sasia abnormis



Photo 44: Spectacled bulbul
Pycnonotus erythrophthalmos



Photo 45: White-chested Babbler
Trichastoma rostratum

Birds in Compartment P35



Photo 46: Ashy Drongo
Dicrurus leucophaeus



Photo 47: Ashy Drongo
Dicrurus leucophaeus



Photo 48: Black-and-yellow Broadbill
Eurylaimus ochromalus



Photo 49: Black-crested Bulbul
(Bornean Bulbul) *Pycnonotus montis*



Photo 50: Black-Naped Monarch
Hypothymis azurea



Photo 51: Bold-Striped Tit-Babbler
Macronous bornensis montanus



Photo 52: Bornean Barbet (female)
Megalaima eximia



Photo 53: Bornean Barbet (male)
Megalaima eximia



Photo 54: Bornean Barbet (male)
Megalaima eximia



Photo 55: Bornean Bulbul
Pycnonotus montis



Photo 56: Bornean treepie
Dendrocitta cinerascens



Photo 57: Brown-Throated Sunbird
Anthreptes rhodolaema



Photo 58: Chestnut-Backed Scimitar-Babbler
Pomatorhinus montanus



Photo 59: Chestnut-Crested Yuhina
Yuhina everetti



Photo 60: Chestnut-Hooded Laughing-Thrush
Rhinocichla treacheri



Photo 61: Chestnut winged Babbler
Stachyris erythroptera



Photo 62: Grey-Throated Babbler
Stachyris nigriceps



Photo 63: Little Cuckoo-Dove
Macropygia ruficeps



Photo 64: Ochraceous bulbul
Criniger ochraceus



Photo 65: Pygmy White-eye
(Bornean ibon)
Oculocinta squamifrons



Photo 66: Streaky-Breasted Spiderhunter
Arachnothera affinis



Photo 67: Wreathed Hornbill
Rhyticeros undulatus



Photo 68: Yellow-vented bulbul
Pycnonotus goiavier

Birds in Compartment P42



Photo 69: Bornean frogmouth
Batrachostomus mixtus



Photo 70: Bornean Laughing Thrush
Melanocichla calva



Photo 71: Eye-browed Jungle Flycatcher
Rhinomyias gularis



Photo 72: Mountain Tailorbird
Orthotomus cuculatus



Photo 73: Nest of White-throated Fantail



Photo 74: Snowy-browed flycatcher (F)
Ficedula hyperythra



Photo 75: Snowy-browed flycatcher (M)
Ficedula hyperythra



Photo 76: Sunda Laughing Thrush
Garrulax paliatus



Photo 77: White-throated
Rhipidura albicollis

Mammals in Compartment L10



Photo 78: Sambar Deer footprint
Cervus unicolor footprint



Photo 79: Short-nosed Fruit Bat
Cynopterus brachyotis



Photo 80: Dusky Fruit Bat
Pteropus lucasii



Photo 81: Bearded Pig footprint
Sus barbatus footprint



Photo 82: Bearded Pig footprint
Sus barbatus footprint

Mammals in Compartment P35

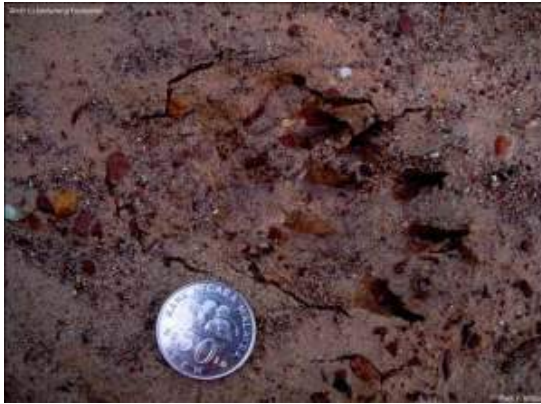


Photo 83: Binturong footprint
Arctictis binturong footprint



Photo 84: Bornean Black-banded Squirrel
Callosciurus orestes



Photo 85: Small Spiny rat
Maxomys baedon



Photo 86: Chestnut-bellied Spiny Rat
Maxomys ochraceiventer



Photo 87: Barking Deer footprint
Muntiacus sp. footprint

Mammals in Compartment P42



Photo 88: Grey Fruit bat
Aethalops alecto



Photo 89: Sambar Deer footprint
Cervus unicolor footprint



Photo 90: Short-nosed Fruit Bat
Cynopterus brachyotis



Photo 91: Whitehead's Pigmy Squirrel
Exilisciurus whiteheadi



Photo 92: Cat faeces
Felis sp



Photo 93: Barking Deer footprint
Muntiacus sp footprint



Photo 94: Clouded Leopard footprint
Neofelis nebulosa footprint



Photo 95: Otter footprint
Lutra sp. Footprint



Photo 96: Dusky-Fruit Bat
Penthetor lucacii



Photo 97: Bearded Pig footprint
Sus barbatus footprint



Photo 98: Sambar Deer faeces
Cervus unicolor faeces



Photo 99: Cat faeces
Felis sp faeces



Photo 100: Cat footprint
Felis sp footprint



Photo 101: Porcupine footprint
Hystrix brachyura footprint



Photo 102: Bearded Pig footprint
Sus barbatus footprint



Photo 103: Mountain Treeshrew
Tupaia Montana

Appendix E: Photographs of communities

Kg. Long Pasia



Photo 1: Views of the Long Pasia village



Photo 2: Picture with one of the elders in Long Pasia



Photo 3: The village head of Long Pasia



Photo 4: Long Pasia Government Clinic



Photo 5: Long Pasia Pre-school



Photo 6: Long Pasia Primary School



Photo 7: Long Pasia Primary School hostel



Photo 8: Long Pasia teachers quarters



Photo 9: Long Pasia Library



Photo 10: Interview session in Long Pasia



Photo 11: Interview session in Long Pasia



Photo 12: Gathering in Head man house of Long Pasia



Photo 13: Interview session in Long Pasia



Photo 14: Interview session in Long Pasia



Photo 15: Interview session in Long Pasia



Photo 16: Interview session in Long Pasia



Photo 17: Interview session in Long Pasia



Photo 18: Handicraft made by the villagers



Photo 19: Handicraft made by the villager

Kg. Long Mio



Photo 20: Views along the way to Long Mio



Photo 21: Views along the way to Long Mio



Photo 22: Views of the Long Mio village



Photo 23: Views of the Long Mio village



Photo 24: The Village Head of Long Mio



Photo 25: Long Mio SIB Church

Kg. Meligan



Photo 26: Village Head of Meligan with members of the local community



Photo 27: Meligan Pre-school



Photo 28: Meligan Primary School



Photo 29: Meligan Library



Photo 30: Archeological site in Meligan



Photo 31: Interview session in Meligan



Photo 32: Interview session in Meligan

Kg. Alutok, Ulu Tomani, Tenom



Photo 33: Views of the Ulu Tomani village



Photo 34: Views of the paddy fields in Kg Alutok



Photo 35: Gathering with members of the local community in Alutok

Kg. Lalang, Ulu Tomani, Tenom



Photo 36: Interview session in Lalang



Photo 37: Gathering with members of the community in Lalang

Kg. Tinura, Ulu Tomani, Tenom



Photo 43: Views of the Tinura village

Kg. Bakuku, Ulu Tomani, Tenom



Photo 44: Interview session in Bakuku



Photo 45: Gathering with members of the community in Bakuku

Kg. Mahunsop, Ulu Tomani, Tenom



Photo 46: The village head and the JKKK of Mahunsop village

Kg. Katipoh, Sipitang



Photo 47: Interview session in Katipoh



Photo 48: One of the houses in Katipoh

Kg. Melalia, Sipitang



Photo 49: Views of the Katipoh village



Photo 50: Interview session in Katipoh



Photo 51: One of the houses in Katipoh



Photo 52: The villagers

Kg. Naluyan, Sipitang



Photo 53: Interview session in Naluyan



Photo 54: Interview session in Naluyan

Kg. Sungai Tiga, Sipitang



Photo 55: Interview session in Sungai Tiga