PESAMA TIMBER CORPORATION SDN BHD (PESAMA)

MANAGEMENT PLAN
FOR THE HIGH CONSERVATION VALUE FORESTS (HCVF) WITHIN CHERUL FOREST CONCESSION (CFC), TERENGGANU, MALAYSIA FOR THE PERIOD 2012 - 2017

Kemaman, Malaysia
September 2012
((updated September 2017)

Cherul Forest Concession
HCVF Management Plan Team Members

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Table of Contents:

Executive Summary

This document describes the High Conservation Value Forests (HCVFs) that had been identified and will be managed and documented by Pesama Timber Corporation Sdn Bhd (PESAMA) in conformity with the certification policy of the Forest Stewardship Council (FSC). It follows the general guidelines as laid out by the Forestry Department of Peninsular Malaysia (FDPM) as well as that of the WWF-Malaysia "National Toolkit" for HCVF, *i.e*. within the bounds of the company's existing available resources, capacity and capability. As a responsible company, PESAMA does acknowledge that the 20,243-ha rich and biologically-diverse mixed tropical rain forest (TRF) of Cherul Forest Concession (CFC) that it currently manages, surely contains many HCVs that are, and should be identified, studied, documented and sustainably managed for the service of mankind in perpetuity. PESAMA's long-standing policy in this regard is to continue to further explore, study and understand the said forest resources in a continuous effort to improve its professionalism and sustainably manage CFC. The management of CFC is being affected following the principle of sustainable forest management (SFM), using the Malaysian Selective Management System (SMS) and in accordance with the Forest Stewardship Council (FSC)'s standard of certification.

The HCVF areas that had been identified and set aside are to be managed separately, but in tandem with the rest of CFC, as laid out, *albeit* in generic terms, in this HCVF Management Plan document. The HCVF areas were identified based on records and data from surveys of the areas, as well as inputs received from relevant stakeholders and various sources. Based on the surveys conducted, and for reasons of practicality and managerial expediency – at least for this early stage - the following areas have been recommended to be set aside as new HCVF areas for CFC:

1. The Keruing neram (*Dipterocarpus oblongifolia*) trees and ecosystem that hug and protect the banks of Cherul River, within Compartment 35 involving an approximate total area of 140 ha,
2. The traditional Durian fruit orchard of the local Orang Asli community located within Compartment 35, involving a total area of 5 ha, and
3. The seasonal salt-lick along with the unique flora and fauna in its immediate vicinity, involving a total area of 1 ha, within Compartment 35.

Other HCVF areas will be accordingly added to the above list over time, as and when appropriate, so that the list can be expanded to cover as much as possible the six categories of HCVFs, and to eventually fulfil FSC's requirement that at least 10% of the area of CFC should be set aside and declared as HCVF. Concomittantly the HCVF Management Plan will also revised periodically from time to time on regular basis.

Acknowledgement

I would like to acknowledge and extend my heartful gratitude to the following for making the consultancy possible and for the supports and assistance rendered during the preparation of this HCVF Management Plan for Cherul Forest Concession:

- The Terengganu State Forestry Department (TSFD)
- The management and staff of Golden Pharos Berhad (GPB)
- The management and staff of Pesama Timber Corporation Sdn Bhd (PESAMA)
- The management and staff of Kumpulan Pengurusan Kayu Kayan Terengganu Sdn Bhd (KPKKT)
- The various reviewers and stakeholders who had generously contributed their comments and ideas toward this document
- Dr Borhan bin Mohd – Forestcare Sdn Bhd (FCSB) – Consultant
- To those who were involved either directly or indirectly in the project.

Dato' Haji Zakaria bin Awang
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Golden Pharos Berhad

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Abbreviations

CFC	Cherul Forest Concession
Compt., C	Compartment
DTC	Dungun Timber Complex
DTCP	Department of Town and Country Planning
EMP	Environmental Management Plan
EPU	Economic Planning Unit
FDPM	Forestry Department of Peninsular Malaysia (Hq)
FELDA	Federal Land Development Authority
FR	Forest Reserve
FRIM	Forest Research Institute Malaysia
FSC	Forest Stewardship Council, Asociación Civil
GPB	Golden Pharos Berhad
HCV	High Conservation Value
HCVF	High Conservation Value Forest
JaKOA	*Jabatan Kemajuan Orang Asli* (Orang Asli Development Department)
KPKKT	Kumpulan Pengurusan Kayu Kayan Terengganu Sdn Bhd (Terengganu Forest Management Group Pte Ltd)
LAC	Limits of Acceptable Change
MC&I	Malaysian Criteria and Indicators and Standard of Perfomance
MMD	Malaysian Meteorological Department
MY	Malaysia
NTFP	Non-Timber Forest Produce
PERHILITAN	Department of Wildlife and National Parks
PESAMA	Pesama Timber Corporation Sdn Bhd
P&C	Principles and Criteria
PRF	Permanent Reserved Forest
RISDA	Rubber Industry Smallholders Development Authority
SFM	Sustainable Forest Management
SMS	Selective Management System
SOP	Standard Operating Procedure
STD	Standard
TRF	Tropical Rain Forest
TSFD/ JPNT	Terengganu State Forestry Department
UPM	Universiti Putra Malaysia
WWF	World Wide Fund for Nature

MANAGEMENT PLAN
FOR THE HIGH CONSERVATION VALUE FORESTS (HCVF) WITHIN CHERUL FOREST CONCESSION (CFC), TERENGGANU, MALAYSIA FOR THE PERIOD 2012 - 2017

1.0 Introduction

The concept of High Conservation Value Forest (HCVF) which constitutes Principle 9 of the Forest Stewardship Council (FSC)'s certification protocol, focuses on the environmental, social and/or cultural values that make a particular forest area of outstanding significance. The intent of this Principle is to manage and conserve those forests in order to maintain or enhance the identified High Conservation Values (HCVs). By focusing on maintaining or enhancing the environmental or social values that make the forest significant, it is possible to make management decisions consistent with the protection or even enhancement of such values. According to FSC, the High Conservation Value Forests are those that possess one or more of the following attributes:

a. Forest areas containing globally, regionally or nationally significant :
    i. Concentrations of biodiversity values (e.g., endemism, endangered species, refugia); and/or
    ii. Large landscape level forests, contained within, or containing the management unit, where viable populations of most (if not all) naturally occurring species exist in natural patterns of distribution and abundance.
b. Forest areas that are in or contain rare, threatened or endangered ecosystems.
c. Forest areas that provide basic services of nature in critical situations (*e.g*., watershed protection, erosion control).

d. Forest areas fundamental to meeting basic needs of local communities (*e.g.*, subsistence, health) and/or critical to local communities' traditional cultural identity (areas of cultural, ecological, economic or religious significance identified in cooperation with such local communities).

By identifying these key values, it is possible to make rational management decisions that are consistent with the protection of a forest area's important environmental and social values.

Principle 9 requires that management activities in HCVFs "maintain and enhance the attributes which define such forests". Principle 9 contains four criteria:

- Criterion 9.1 requires an assessment to determine the presence of attributes consistent with HCVFs.
- Criterion 9.2 guides certifiers on the consultative portion of the certification process.
- Criterion 9.3 requires a precautionary level of management and activities that ensure the maintenance or enhancement of High Conservation Values.
- Criterion 9.4 requires monitoring the effectiveness of the management and activities implemented.

2.0 HCVs and HCVF Sites for CFC

For the case of CFC under the management of PESAMA, and for reasons of practicality, resource availability and managerial expediency, the following areas have been preliminarily recommended to be set aside as new HCVF areas:

1) **T**he unique Keruing neram (*Dipterocarpus oblongifolia*) trees and ecosystem that grow along and protect the banks of Cherul River (i.e.; Neram stream) within **Compartment 35** - Approximate area:140ha;

2) A small durian fruit orchard traditionally maintained and managed by the local Orang Asli (Aboriginal People) located within **Compartment 35** with a total area of 5.0 ha.

3) **A s**easonal animal salt-lick along with the unique flora in its immediate vicinity, located within **Compartment 35** and covering a total area of 1.0 ha.

3.0 Justification

The choice of the three areas as first HCVFs for CFC was technically justified through a selection process which involved field surveys conducted on the resource, stakeholder consultation, as well as based on information gathered from various other sources.

3.1 Methods of Survey And Data Collection

Surveys on the floral and faunal biodiversity within CFC were conducted in January and July 2012, focussing on Compartment nos. 29, 30, 32, 35, 39 and 40 of the forest concession area. The forest is generally characterised by undulating land and river valleys between 42-181m in altitudes lying on the eastern facing portion of the East Coast Mountain Range (See map in **Fig. 1** below; Pic 1). **Fig. 2** summarises the general process involved in HCV identification and delineation.

The surveys were conducted along existing logging roads, focussing on investigating two particular habitat types, namely hilly lands and river valleys (Pic 2). No forest sampling plots was established during the exercise and the walked routes were considered as line transects for the purpose of the study.

Table 1: Locations of reference points of survey

Survey points	GPS Reference	Elevation (asl)	Site Description
Point 1	N 04^0 08.779'; E 103^0 06.684'	42 m	**Compt. 30**; Base camp site located by Sg. Cherul.
Point 2	N 04^0 09.015'; E103^0 04.859'	47 m	End of **Compt 32**. Crossing Sg. Palas into Compt 35; re-opening of old logging road in progress.
Point 3	N 04^0 09.354; E 103^0 04.733'	58 m	**Compt. 35**: Old Orang Asli settlement – about one hectare area belonging to 3 or 4 family groups from Sg. Pergam & Sg Mas.
Point 4	N 04^0 08.067'; E 103^0 05.776'	55 m	Sg. Rambutan - furthest extend of survey within **Compt. 35**
Point 5	N 04^0 08.067'; E 103^0 05.776'	50 m	Entrance into **Compt. 29**; a private logging camp is located nearby.
Point 6	N 04^0 08.062'; E 103^0 05.089	181 m	Hill top – highest point of **Compt. 29**
Point 7	N4°8'20.179"; E105°2'12.433"	62m	**Compt. 40** - Seasonal animal salt lick

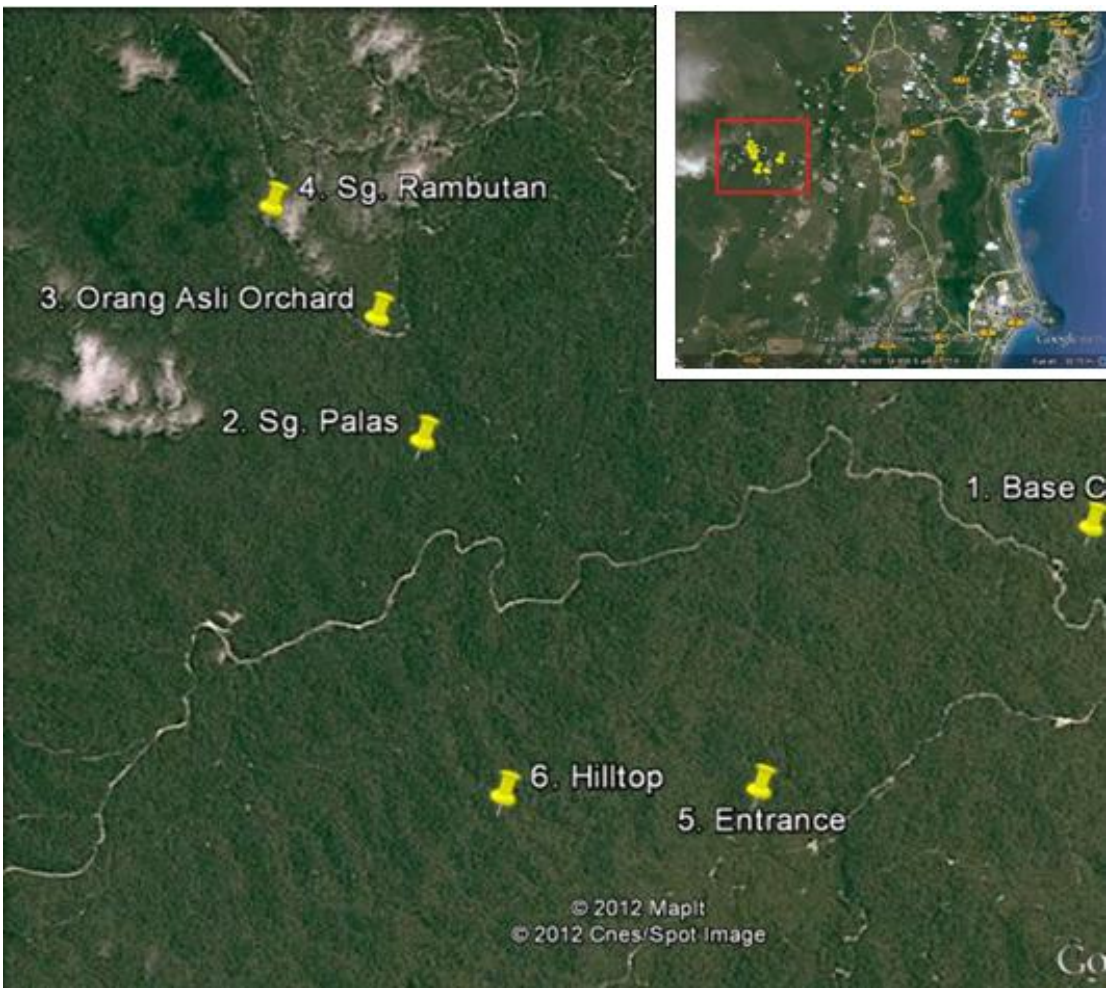


Fig. 1: Location of the study site with reference points corresponding to details in Table 1.

As these exercises were related to HCV assessment, all biodiversity elements present and/or encountered within the study site were recorded. Additionally data on Orang Asli traditional uses and/or cultural areas within Compartment 35 were also included. **Table 1** provides a summary of the locations that were visited during the surveys. These comprised areas on riparian habitats along Sungai Cherul, Sungai Palas and Sungai Rambutan (Pic 4) that sit on low lying lands of between 42–58 meters in altitude, drained by fast flowing river and covered by damp forests. Habitats lying on the more hilly and undulating grounds were also studied (Pic 5).

3.2 Results And Discussion: High Conservation Values

3.2.1 Forest Vegetation

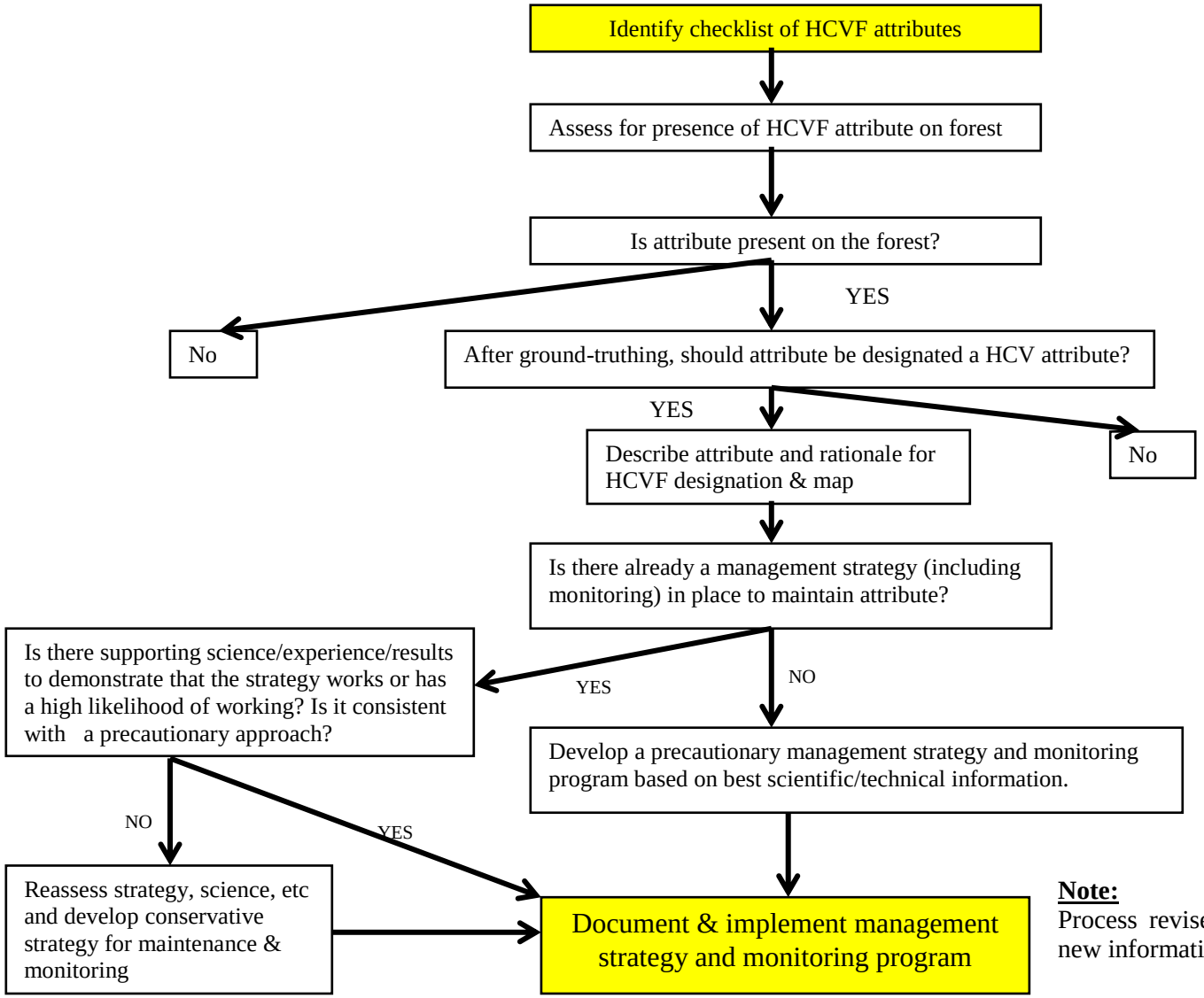
The general vegetation cover of the area is characteristic of the mixed Lowland Dipterocarp Forest, where two habitat types became very evident based on the topography *i.e*. the hill and the riparian forests, as apparent from the plant communities observed in the field - each with a distinct suite of plant species. These findings are summarised as **Appendix 1**.

Hill specific communities within the study area can be said as good representative of a high forest, *i.e*. high in plant species diversity and well developed into several canopy strata characterised by tall trees with large diameters (Pic 6). Amongst those noted include: (1) Keranji (*Dialium* sp.), (2) Meranti (*Shorea* spp.), (3) Keruing (*Dipterocarpus* spp.), (4) Kedondong (*Santiria sp*.), (5) Medang (*Cinnamomum* spp.), (6) Kelat (*Syzygium* spp.), (7) Bintangor (*Calophyllum* sp.) and (8) Mempening (*Lithocarpus* sp).

The ground flora is luxurious with forest palms such as *Oncospermum filamentosum, Johannesteysmannia* and *Licuala* spp; Pic 7), forest shrubs and herbs. Woody climbers including the rattans, *etc*. are common.

Figure 2:

Flow Chart for Establishing HCVF in CFC to Meet FSC's P9 Requirements



Note:
Process revised/reviewed annually or when new information on attributes are learned.

Hill top vegetation is similar to that on the ridge; comparatively smaller in stature and found to harbour trees uncommon to the lowland altitude including Penaga (*Mesua* sp.), Meranti seraya (*Shorea curtisii*) and Daun Serdang (*Livistona speciosa*; Pic 8). This is most probably because of local edaphic reasons.

In the river valleys, the tall forest gradually gives way to damp forest which is much smaller in stature. Examples of the kind of trees than can be found here include:

- *Aglaia* (river specialists),
- Simpoh (*Dillenia* sp.),
- Gapis (*Saraca* sp.) and
- Keruing neram (*Dipterocarpus oblongifolius*).

The torrential stream flowing through these river valleys is characteristic mostly by riparian vegetation, which consists of dense ground flora - facilitated mainly by canopy opening and ample light getting to the forest floor (Pic 9). Common plants include the Paku gajah (*Cyathia* sp.), Bemban (*Donax* sp) and the aquatic plants. The forest floor is also rich in herbal plants *e.g*. Hempedu Beruang (*Thottea* sp), Serapdi (*Mapania* sp), Belimbing buloh (*Tacca* sp; Pic 10), etc. known for its medical propertise. Climbers such as the rattans (*Calamus, Daemonorops, Korthalsia* spp) can be abundant and forms thickets in the forest canopy.

Although generally the floristic richness of the plant community here is low, there is higher proportion of ***HCV*** and ***endemic*** species restricted to this niche habitat. Examples include the forest ginger (*Globba corneri;* Pic 11), rattan (*Calamus corneri)* and riverine bamboo (*Dendrocalamus pendulus*). It was also found that both Sg. Rambutan and Sg. Palas are typical of ***Saraca Stream***, whilst Sg. Cherul is of ***Neram Stream*** (Pic 12). The latter is considered a ***very rare habitat*** type usually restricted to east coast states of Peninsular Malaysia and justified to be demarcated as a HCVF for CFC.

Common pioneer flora observed included Mahang (*Macaranga* sp), Terentang (*Campnosperma* sp.), etc.; shrubs and herbs; resam (*Dicranopteris* sp.), bamboo clumps (*Dendrocalamus* sp.), wild bananas (*Musa* sp.) and tall ginger. Within Compartment 35 (Point 3 within **Table 1**), we came across an old Orang Asli village; about 1-hectare in area consisting of 3-4 houses, plus an orchard planted with fruit trees such as Durian, Petai, Sentul, Mango and Kundang trees, etc. (Pic 14). It is apparent that the village has been left abandoned but subject to frequent visits by the houseowners from time to time. This area is also qualified to be included as HCVF.

3.2.2 Floristic Account

A complete listing of the plant species collected and observed during the brief field visits is provided in **Appendix 1**. The documentation reflects the general plant habits (trees, climbers, shrubs and herbs), including the representation of major systematic groupings within the vascular plant species (ferns, seed bearing and flowering plants). Species which are found as restricted in its distribution are highlighted as endemic and rare. Specific distribution of the plant species within the study area are represented with the followings; hill forest communities = **A**, riparian forest communities = **B** and secondary forest vegetation = **C**. This is followed by C29, C30, C32, C35 and C40 to account for the respective compartment in which they are present.

Systematically about 52 plant species had been recorded for the study area belonging to 47 genera and 30 families. The significance of these numbers goes to show that the forest community here is highly diverse. A more detailed survey through more organised research would almost certainly provide more data which would in turn reveal the true richness of the ecosystem. With more time and further in-depth study, it is expected that the number of species will quadruple. On the general outlook, however, big trees or timber trees is represented by 18 species. Smaller trees represented by 12 species, and shrubs and herbs by 22 species respectively. In this study only the common and most apperent and useful species were looked at carefully.

Endemic species to Peninsular Malaysia identified through this exercise totals 4 species. Two of them are local endemics to the area i.e. ***Licuala fractiflexa*** (Palmae; Pic 15) and ***Globba corneri*** (Zingerberaceae; Pic 11). The former is a common forest floor species within the study area; locally known as Palas which can grow to about 3 m tall and with leaf diameter to 1.5m across. *Globba corneri* is a small ginger commonly found along small river tributaries. Both the species has a very narrow range of distribution in Terengganu. The other two species, ***Calamus corneri*** (Palmae) and ***Dendrocalamus pendulus*** (Graminae; Pic 16), a rattan and bamboo species respectively are thicket forming tall shrubs usually found associated to riverine forest and/or open areas. A further 5 species can be considered as rare from the assessment. These are *Aglaia zyermannii* (Meliaceae) and *Dipterocarpus oblongifolius* (Dipterocarpaceae), which are trees characteristic along the Neram Stream, *Calophyllum flavoramulum* (Guttiferae), a tree of the hill forest, and *Johannesteijsmannia altifrons* (Palmae; Pic 17) *and Mapania caudate* (Cyperaceae), forest understory plants of the lowland forests.

It has also been noted that higher proportion of the endemics are riparian flora, whereby their locations tend to be restricted to the immediate area of the torential river valleys. Hill tops and ridges are other sites that need to be considered for protection, as it is the area that exhibits specialist species *e.g*. *Shorea curtisii* (Dipterocarpaceae) and *Livingstona speciosa* (Palmae), which would otherwise, not present at a very low elevation.

3.2.3 Fauna

Faunal species assessment did not follow any specific methodology but merely an exercise of documenting the temporal and spatial presence of wildlife within the forest compartments. Evidence in the form of photography was taken whenever a wildlife footprint was encountered (or present) and crosschecking was done with the CFC workers and contractors for consistency of identification. Identification of species through other means, *i.e.* observation and calls were only recorded when we were absolutely sure of the species presence. The list of faunal species encountered/ observed within the study area is given in **Table 2**. This can be compared with the

records of the PERHILITAN (Department of Wildlife and National Parks, Malaysia) on the wild animals present in Cherul Permanent Reserved Forest (PRF) (**Table 3**).

As observed the riverine/ riparian forest tend to be actively used by most ground dwelling animals (C30, C32, C35, C40). The arboreal animals, namely the gibbon and birds were more easily observed in the hill forest. Threatened animals within the list include the elephant, tiger, tapir, otter, porcupine, gibbon and hornbill. These animals are totally protected within the laws of Malaysia, and no hunting of them is permitted.

Among the common fishes caught and identified from the fast flowing streams and rivers include the *Kelah, Sebarau, Baung, Lampam and Kelisa putih*.

Table 2: List of Faunal Species Detected Within Cherul Forest Concession

No.	Faunal species	Observed evidence	Distribution within Forest Compartments	Notes
1.	Elephant – *Elephas maximus*	Animal trails, footprint and dung	C32, C35 & C29	Pic 18 & 19
2.	Tiger – *Panthera tigris*	Footprint	C32, C40	Pic 20
3.	Wild boar – *Sus barbatus*	Footprint, Wallowing mudhole	C30, C35, C40	Pic 21 & 22
4.	Tapir – *Tapirus indicus*	Animal trails, Footprint	C32, C35, C40	Pic 23 & 24
5.	Barking deer (Kijang) – *Muntiacus muntjak*	Footprint	C35, C40	Pic 25
6.	Otter civet (*Cynogale benetti*)	Footprint	C35, C40	Pic 26
7.	Jungle fowl	Call	C35	-
8.	White handed gibbon	Call	C29	-
9.	Helmetted Hornbill	Direct observation & calls	C29	-
10.	Racket tailed Drongo	Direct observation	C29	-
11	Murai	Direct observation	C40	-
12	Anteater (Tenggiling)	Direct observation	C35	

Table 3:

Records of PERHILITAN On The Presence of Wilidlife in Cherul PRF

No.	Species
1	Elephant (*Elephas maximus*)
2	Tiger (*Panthera tigris*)
3	*Sun Bear (Helarctus malayanus)*
4	*Tapir (Tapirus indicus)*
5	Barking Deer (*Muntiacus muntjak*)
6	Sambar Deer (*Rusa unicolor*)
7	Mouse Deer – minor (Pelandok)
8	Mouse Deer – major (Napuh)
9	Porcupine (*Hystrix brachyura)*
10	Anteater (Tenggiling) (*Manis javanica*)
11	Ungka Tangan Putih
12	Harimau Dahan (*Neofelis nebulosa/ diardi*)
13	Harimau Kumbang
14	Binturong
15	Kongkang (*Nycticebus caocang*)
16	Musang Tengalung
17	Musang Pulut
18	Tupai Gading
19	Tupai Kerawak
20	Babun
21	Biawak (*Varanus salvator*)
22	Lotong Cenekah
23	Kelawar (Bat)
24	Kera (*Presbytis melalophos*)
25	Beruk
26	Wild boar – (*Sus barbatus*)
27	Memerang
28	Snakes (Various species)
29	Birds (Various species)

Source: PERHILITAN Kemaman Office, Terengganu (2012).

3.2.4 Other Conservation Areas (i.e. HCVF Database) In The State of Terengganu

In considering on the choice of HCVF areas for CFC, consideration was also made on the availability and existence of other conservation areas within the State of Terengganu, and these are summarised in **Table 4**. They are also considered within the larger context of Peninsular Malaysia (**Fig.3**).

Table 4: Conservation Areas Within The State of Terengganu

No.	Conservation Area	Classi-fication	Habitat/ Forest Type	Area, ha
1	Bukit Bauk PRF	VJR	LDF: *Dacryodes breviracemosa*, *Pseuduvaria cerina*	27.9
2	Gunung Tebu PRF	VJR	LDF & HDF	50.0
3	Hulu Besut PRF	SRP	LDF	10.0
4	Hulu Terengganu	SRP	HDF	2.0
5	Jambu Bongkok PRF	VJR	THF	115.7
6	Jerangau PRF	VJR	LDF: *Dipterocarpus sarawakensis*	81.0
7	Pasir Raja PRF	SRP	HDF	0.8
8	Rasau Kertih PRF	VJR	LDF	32.0
9	Taman Negara	NP	MDF & MF*: Adinandra angulate, Agathis flavescens, Aquilaria rostrata, Ardisia biniflora, Ar. cardiophylla, Ar. retinervia, Bridelia whitmorei, Dacryodes multijuga, Eugenia clypeolata, E. cyrtophylloides, E. pseudoclaviflora, E. tahanensis, E. tekuensis, Garcinia clusiaefolia, Lindera montana, Polyosma robusta, Talauma peninsularis, Terminthodia viridiflora, Tristania fruticosa*	85,300.0
10	Ulu Cukai PRF,	VJR	LDF	40.8
11	Kemaman	n.a	*Ardisia tumida, Cleistanthus major, Eugenia rostadonis*	n.a
12	Ulu Brang-Tersat	n.a	Pseuduvaria nervosa	n.a
13	**SUB-TOTAL (Terengganu)**			**85,660.0**
14	**PENINSULAR MALAYSIA TOTAL**			**1,563,180.0.9**

Note: VJR = Virgin Jungle Reserve; NP = National Park; SRP = Species Reserve Plot; LDF = Lowland Dipterocarp Forest; HDF = Hill Dipterocarp Forest; THF = Tropical Heath Forest; MDF = Mixed Dipterocarp Forest; MF = Montane Forest; n.a = data not available.
Source: (1) DWNP 1992: Wildlife Plan for Peninsular Malaysia. (2) WWF-Malaysia (2009)

3.2.5 HCVs In Cherul Forest Concession In The Context Of FSC's Definitions

From the perspective of HCV as defined by FSC, the areas surveyed in CFC were of significance in the following sense:

HCV1 – The sites being a biodiversity hotspot (plant species count more than 52 species), existence of threatened and endangered fauna species (5 species identified); presence of endemic (4 species) and rare (5 species) floral species and the site being of critical temporal use for big mammals (elephants, tiger and tapir) and large birds (hornbill) and freshwater fishes (**Kelah** and **Kelisa** spawning areas).

HCV2 – CFC consists of 59 compartments and covers a total area of 20,243 hectares. It is part of the East Coast Mountain Range and forms the headwater catchments for the Kemaman River. It is part and parcel of a larger landscape that is important to maintain the biodiversity values.

HCV3 – Parts of the CFC area surveyed form part of the Lowland Dipterocarp Forest which is considered the richest of forest ecosystems in terms of productivity (including socio-economically) and support the different forms of biological diversity. It is also a threatened ecosystem in Peninsular Malaysia. Other interesting habitat types encountered include the **Neram (Stream) Forest**, plus unique hilltop/ summit vegetation of Seraya-Livistona associated forest.

HCV4 – As mentioned above, Cherul PRF constitutes part of the East Coast Mountain Range and forms the headwater catchments for the many rivers that drain to the east coasts (*e.g*. Kemaman River) and eventually into the South China Sea. Any degradation of the forested areas due to unsustainable forestry practices, *etc*. would have dire consequences to the people and industries downstream, who depend on the good supply of clean water.

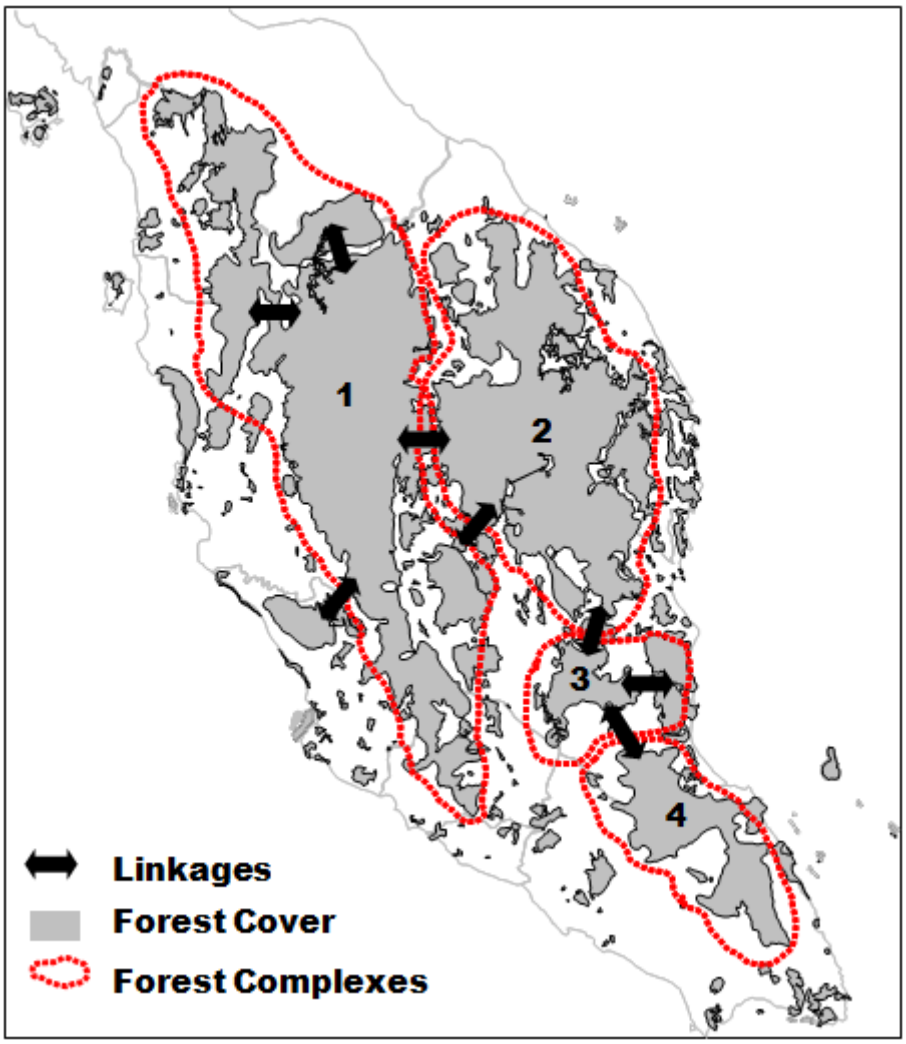


Figure 3. Forest Complexes and Linkages identified by the National Physical Plan (DTCP, 2005: 5-38)

HCV5 – The **Orang Asli traditional huts and orchard** found within Compartment 35 indicate that the forest area is still very much a home and utilised by local communities for NTFP, although very sporadically. The study have identified and recorded some of the plant species that have potential socio-economic value and utilised by the local populace, *e.g.*. rattans, bamboos, forest palms, fruits trees, medicinal plants, *etc*. The forest is also frequented by locals for honeybee and freshwater fishes.

HCV6 – Existence of Orang Asli orchards and frequent visits by them to collect NTFP from Sg. Pergam and Sg Mas indicate that the area is very much culturally attached to maintain/ sustain their livelihood.

3.2.6 Stakeholders Consultation On HCV

Inputs and ideas on the HCVFs and approach in their management were solicited from various stakeholders, as follows:

- The Terengganu State Forestry Department (TSFD)
- World Widlife Fund (WWF) Malaysia
- Forest Research Institute of Malaysia (FRIM)
- Malaysian Nature Society (MNS)
- Universiti Putra Malaysia (UPM) – Forestry Faculty
- Local villagers, the local Orang Asli (Aboriginal People)
- Staff of PESAMA, PESAMA's Contractors and their workers.
- Local major land users, such as FELDA, Ladang Rakyat, RISDA.
- Etc.

Table 5 summarises inputs received from some of the stakeholders consulted by PESAMA concerning its HCVF initatives

Table 5: Summary of Inputs Received From Stakeholders Consulted Concerning Pesama's Initiative On HCVF Within CFC.

No	Stakeholder	Status	Stakeholder's Comment/ Input
1	Dept of Forestry, State of Terengganu (JPNT) – Director **Date received**: 20 Sept. 2012	Government Agency	1. Basically JPNT has no objection to the HCVF initiative. 2. JPNT is of the opinion that the area of Keruing neram recommended as HCVF might be unnecessarily too large. 3. The width of Keruing neram strip should be at a minimum of 20 metres along both sides of Sg Cherul. 4. But JPNT leaves it to the wisdom of Pesama for as long as it does not jeopardize Pesama's short and long term business operations. 5. For the Orang Asli's durian plot, the

			initiative is welcome on the condition that the Orang Asli should not take advantage of the situation and breach the 5ha limit allocated for them, neither can they create any new planting or orchard within CFC area.
2	District Forest Office, South Terengganu – DFO. **Date received**: 16 Aug. 2012	Government Agency	1. No objection. 2. Pesama will be required to place appropriate signs on the ground, as well as to conduct maintenance & monitoring on the ground. 3. HCVF areas which fall inside timber harvesting areas must be delineated and excluded from such activity.
3	Dept of Environment (DOE), State of Terengganu – Director. **Date received**: 10 Sept. 2012	Government Agency	DOE takes note but has no comment on the HCVF.
4	Forest Research Institute, Malaysia (FRIM) – Director of Forestry & Environment. **Date received**: 10 Sept. 2012	Semi- Government Agency	1. Supports the HCVF initiatives by Pesama. 2. Proposes that a comprehensive "assessment of potential HCVF sites" be conducted within CFC for the purpose of identifying other HCVs and salt licks therein, by involving other government agencies and NGOs. 3. Proposes the development of appropriate management prescriptions for individual HCVFs.
5	WWF-Malaysia. **Date received**: 20 Sept. 2012	Local Environmental NGO	1. Comments focus on presentation style, methodologies and depth of coverage of HCVs in the HCVF Management Plan. 2. Requires more comprehensive assessment of fauna. 3. Requires more/wider stakeholder consultation. 4. Need more data on extent and use of NTFP by local communities. 5. Acknowledges the best management practices conducted by Pesama in managing CFC.
6	FELDA Cherul 1 – Manager. **Date received**: 28 Aug. 2012.	1. Semi- Government Agency, 2. Neighbouring land users	1. No objection. 2. Confident that Pesama can manage the whole of CFC and HCVF well.

7	FELDA Cherul 2 – Chairman of JKKK (Village Committee). **Date received**: 3 Sept. 2012	1. Local community. 2. Neighbouring land users	1. Appreciates Pesama's invitation to give input. 2. Acknowledges that Pesama initiative does yield some positive aspects to the life of the local people. 3. Has no objection, supports the HCVF initiative. 4. Looks forward to a better understanding between both sides.
8	Orang Asli Village of Sungai Pergam - Chairman of JKKK. **Date received**: 3 Sept. 2012	1. Local community. 2. "Custodian" of one of the HCVFs described in this report (Ocassional land users, i.e. only during fruting seasons).	1. Have no objection to the HCVF initiative of Pesama. 2. In total support of Pesama's and government's policy on sustainable forest management and forest conservation.
9	Forestry Faculty, University Putra Malaysia	Public University – Academic and Research Institution	No comment
10	Malaysian Nature Society (MNS)	Local Environmental NGO	No response
11	Ladang Rakyat	Neighbouring land users	No response

4.0 The HCVF Management Plan

4.1 Management Objectives

(1) To establish a network of HCVFs in identified spots/areas within CFC and to manage and protect such HCVs/ HCVFs within the framework of sustainable forest management (SFM) of CFC as a whole, and in the wider contexts of HCVF management in Terengganu and Malaysia.

(2) To make sure that the management of PESAMA adheres to FSC's protocols on the identification, maintenance and long–term management, monitoring and protection of such HCVFs within CFC.

(2) To develop and refine in-house expertise within PESAMA in the area of HCVF management through continuous training and skill upgrading of the relevant staff.

(3) To extend the concept and practice of HCVF management to as wide an audience as possible.

(4) Over the long term, to continue to keep the existing HCVFs and to expand it so as to achieve and fulfil FSC specification that at least 10 percent of the whole forest concession be declared and set aside as HCVF.

(5) To collaborate with relevant agencies, NGOs and other stakeholders on the management and research on HCVFs.

(6) To identify areas of research and management which have the potential to contribute to add value to the existing HCVFs initiative.

4.2 General Line of Actions

In managing its present and future HCVFs PESAMA will adopt the following general line of actions, which are subject to further modifications and refinements as and when required depending on the dictate of the particular situation and the resources at hands, as well as in the light of new findings.

(1) HCV and HCVF Screening Procedure

a. Fresh data and information on any new HCV or potential HCVF within CFC will be sourced from any of the following means:
   - Pre- and Post-Felling Inventories and research plots conducted by, either PESAMA or its contractors
   - Communications with local communities: KETENGAH, FELDA, RISDA and Ladang Rakyat settlers, villagers, Orang Asli
   - Personal encounters and experience of staff of PESAMA, PERHILITAN, TSFD/ JPNT, enforcement agencies, etc
   - Expert advice from various organisations/ agencies/ NGOs: FRIM, MNS, WWF-Malaysia, academics, etc
   - Published and unpublished reports.

b. PESAMA will take initiative to archive the data and information on its dossiers of HCVs and HCVFs, and compare them with the national registry on HCVFs.

c. PESAMA (with the help of other agencies, (e.g. PERHILITAN, TSFD, etc) to despatch teams to conduct verification exercise on the ground (ground

truthing). Study teams to take photographs and samples and, if necessary set camera traps – continuous data collection

d. PESAMA to hold Stakeholder Consultation on new HCV findings and plans for new HCVFs
e. PESAMA to liaise with TSFD, FDPM, PERHILITAN and FRIM to verify and confirm the conservation status of any new HCV within CFC vis-à-vis the national registry of HCVFs.
f. TSFD to issue appropriate written instructions to PESAMA to take any of the following courses of action:
    - Delineate and exclude the species its habitat from any future logging or road construction or other violations
    - Demarcate on the ground, appropriate size of area for conservation of the species/ habitat, mark the boundary and install signboard with appropriate information.
    - Regularly identify potential threats to the HCV
    - Formulate strategies for conservation and protection, alleviation of threats and possible non-consumptive utilisation of the species and habitats.
    - Conduct detailed surveys on the resources therein and document the results
g. PESAMA to implement TSFD insructions on the ground
h. PESAMA to conduct continuous monitoring and data collection on HCVF attributes and values.

(2) Management Guidelines

a. Identification of HCVF

In line with FSC Indicator 6.4.2, PESAMA will analyse protected areas within the regional landscape, including those listed in **section 3.2.4 (Table 4**) above, as well as PESAMA's own protected areas, to determine if existing ecosystems are adequately represented, either at local, regional or national level. Where ecosystems are not adequately represented, and opportunities

exist for PESAMA to fill these gaps, PESAMA will contribute to the regional network of representative areas.

b. Preparation of Maps showing details of

- Topography, terrain, roads and access, rivers, human settlements, land use patterns
- Forest types and habitats
- Soil types and geology
- Physical and biological resources

c. Determination of attributes to be used in considering HCVF

d. Development of time scheduling for Plan of Actions

e. Training and skill upgrading of staff and contractors in relevant fields

f. Allocation of appropriate budget for commission of compliance activities

g. Coordination and Staffing:

- PESAMA to establish a dedicated HCVF Team which will meet regularly, collate its findings and report to the management of PESAMA, KPKKT and GPB, *i.e*. internal coordination
- Coordination with external agencies: governmental and NGOs, as well as other stakeholders
- Documentation and packaging of information

h. Stakeholder Consultation

i. Protection (incl. identification of threats):

- Protection from encroachment and theft
- Protection from fire, landslides, floods, wind damages and other natural catastrophes
- Protection from diseases and pollution
- Protection from site modification
- Protection from intrusion by foreign materials and exotic species
- Area protection: regular patrol, inspection and maintenance of boundaries, closure of unused/ inactive roads and bridges, warning signboards

j. R & D including breeding programme – scientific expeditions, *in situ* and *ex situ* conservations, rescue harvesting, permanent sample plots, nursery

research, herbarium and taxidermy collections. Data will be collected on the following basic parameters:

- History of forest compartment
- Climate
- Forest management system
- Presence of wildlife
- Incidence of damage and injuries due to biological and non-biological elements, as well as environmental factors
- Phenological behaviours (incl. flushing, flowering, fruiting & seed dispersal, *etc*)
- Standing stock: Tree distribution, standing volume, basal area, *etc*
- Market value
- Target & key stone species
- Costing

k. Monitoring, Evaluation and Control (MEC). To evaluate and review from time to time, the status of HCVF and the need to re-define direction

l. Eco-tourism & Other Non-Destructive Pursuits.

m. Documentation and maps, dissemination, publication and publicity. PESAMA to package the latest information and knowledge on HCVF and present in relevant meetings/ seminars/ exhibitions, etc.

4.3 Immediate Management Recommendations On The Plan of Actions And Measures To Reduce and Mitigate The Impact Of Logging And Enhancing HCV Areas Within CFC.

- The second rotation logging activities within CFC needs to maintain high minimum diameter cutting limits for the harvested trees and should embrace the RIL methodology to minimise the impacts to the environmentally (biodiversity) sensitive areas.
- Ground cutting of the side/ slip roads on the ridges to get excess to the timber trees must be minimised or if possible totally avoided. The same also should apply to road cuttings along rivers or bridges across rivers.

- As far as possible try to make use of old first-rotation logging roads, and avoid from having to cut and open new logging roads. No logging road should be permitted or allowed in high ridge/ summit areas termed as hilltops for they may harbour unique forest habitat types.
- All logging roads are to be constructed by strictly following the most recent FDPM specifications and guideline on forest roads.
- It is recommended that strict river buffer areas be observed at all times. In saying this, the full impact of the logging work can be seen in the flow of the river and the water quality itself. Increasing the flow of water and sedimention build-up in the rivers must be avoided at any cost, as it would have undesirable impact on the endemic riparian species.
- Environmental sensitive (including HCV) areas within CFC need to be identified, reserved and protected from future logging activities. This can be in the form of river reserves, catchment protection, areas reserved for biodiversity and enhancement of cultural value (Orang Asli village/ orchard), and these HCVFs could eventually sum-up to ***no less than 10%*** of the total area of CFC.
- Biodiversity corridors for wildlife movement need to be identified (*e.g* elephant and tapir trails) and created for all compartments that will be subjected to logging exercise (*i.e.* as part of the Environmental Management Plan (EMP) for the area concerned). There will be a need for wildlife management plan for the forest concession, which, among others, addresses hunting by local communities and specific research study on flagship wildlife species *e.g*. tiger, gibbon, hornbill, etc.
- Plant species rescue operation should be considered before and after logging operation. The target groups, amongst others should include the endemic and rare species, also herbal plants with ornamental and medicinal properties. If possible a dedicated nursery need to be established to nurture these plants or small areas within the undisturbed forests patches demarcated as species conservation area. No point of trying to raise the highland plant species elsewhere (*ex-situ*) because it may not survive the change in environment.

- Some species of the Dipterocarpaceae are listed in the IUCN Red Data List; hence some tree species need to be identified and conserved within the logging concession. For endangered and rare flora species, the viable population needs to be estimated before cutting limits and/or qouta can be determined. In some instances, specially targeted species management plan would be needed. For highest endemic species protection – it is recommended to consider conserving the compartment in part or full. In the case of *Licuala fractiflexa it is* suggested that a population study of the species be conducted for Cherul FR before considering adopting the latter suggestion.
- Logging operators should take extreme care that the forest area is not excessively opened up.
- The management of PESAMA to allow continued use of forest for the identified forest-dependent communities (*e.g*. Orang Asli community) by identifying and designating reserved areas within the concession. It is suggested for PESAMA to allow co-management by local community for extraction of NTFP and in the management of buffer areas. If possible to also provide employment opportunities to local people in order to reduce the dependence on forest resources. At the same time, PESAMA will take the initiative to also prevent unauthorised outsiders from encroaching into CFC, and local communities should be engaged in the effort.
- SOPs will be critical to address the HCV values identified for CFC. It must be rolled out in collaboration with all stakeholders (including the local communities) in appropriate form. This SOPs will have to be monitored twice a year to ensure that FR's value are maintained and continuously being enhanced.

4.4 Training Needs And Capacity Building

The following will be some of the areas in which training and capacity building on HCVF might be relevant to PESAMA:

1) Plant and tree identification within HCVF area;
2) Fauna and faunal habitat identification and conservation;

3) Multi-resource Survey methodologies;
4) Monitoring of environmental parameters within HCVF areas;

4.5 Review Of The HCVF Management Plan

The HCVF Management Plan will be reviewed and updated on an **annual basis** with the following objectives:

1) To consider new inputs and proposals for the possibility of establishing new HCVF areas based on the evidence presented before the HCVF Committee, or to drop or adjust existing HCVF areas;
2) To apprise the progress during the preceding year, with emphasis on complying with the relevant Principle and Criteria of the Forest Stewardship Council (FSC);
3) To assess and consider the need for new research;
4) To evaluate the relevance of existing HCVFs and, if necessary reinforce them;
5) To collate relevant findings from surveys and research and, if deemed appropriate, publish such findings;
6) To evaluate existing and new collaborations on HCVF research and management with external parties/ agencies.

4.6 HCVF Committee

It is proposed that the management of HCVF within CFC is overseen by a high level committee whose members should comprise representatives of the following:

- Golden Pharos Berhad, PESAMA & KPKKT
- Forestry Department (TSFD and/or FDPM)
- WWF-Malaysia
- FRIM
- UPM
- Malaysian Nature Society (MNS)
- JaKOA
- Local Forest-Dependent Community
- Relevant International agencies and donors, etc.

5.0 Plan Implementation

Based on the foregoing, the implementation of this HCVF Management Plan for CFC over the period 2012 – 2017 is anticipated to take place along the following time line (**Table 6**):

Table 6: Summary of Plan of Actions for Implementing HCVF Management Plan in CFC the Period During 2012 – 2017.

No	ACTIVITY	YEAR					
		2012	2013	2014	2015	2016	2017
1	Start of HCVF Management Plan	√					
2	***Documentation***						
2a	HCVF Management Plan prepared and approved	√					
2b	HCVF Management Plan updating		√		√		√
2c	HCVF Management Plan review			√		√	
3	***HCV/ HCVF Establishment and Maintenance***						
3a	Neram stream in C35 (H1)	√					
3b	Orang Asli Fruit Orchard in C35 (H2)	√					
4	Stakeholder Consultation	√	√	√	√	√	√
5	Training, Capacity Building & FSC Mentoring	√	√	√	√	√	√
6	Multi-resource Inventory		√		√		√
7	Patrolling (Routine) (Incl. monitoring of impacts of management activities)	√	√	√	√	√	√
8	Evaluation of impacts of management activities on HCVF	√	√	√	√	√	√
9	Adaptation to management activities						
10	R & D (incollaboration with relevant R & D institutions and NGOs	√	√	√	√	√	√
11	HCVF Committee Meeting & presentation of findings			√	√	√	√
12	***FSC Auditing***						
12a	Certification Audit	√					
12b	Surveillance Audit		√	√	√	√	

6.0 Summary And Recommendations

According to WWF-Malaysia (2009), the identification and management of HCVFs at the Forest Management Unit (FMU) level requires the following steps:

(1) Interpret the global definition
(2) Identify potential HCVF
(3) Identify specific HCVF components in the field and through consultation
(4) Zone HCVF areas, buffer zones and note compartments
(5) Identify Limits of Acceptable Change (LAC) for maintaining HCVF
(6) Plan precautionary management prescriptions for HCVF compartments
(7) Implement management activities
(8) Monitor impacts of management activities
(9) Evaluate impacts of management activities
(10) Adapt management where appropriate.

For the case of CFC, it is recommended for PESAMA to adopt the approach of management as propounded in early sections of this HCVF Managament Plan document while at the same time adapting wherever possible, the above conceptual approach of WWF-Malaysia.

7.0 References

Dept. of Town And Country Planning (2005). National Physical Plan. DTCP Malaysia, Kuala Lumpur.

PERHILITAN Kemaman Office (2012). *Rekod Hidupan Liar Di Hutan Simpan Cherul, Kemaman, Terengganu*. Unpub,

PERHILITAN (1992). Wildlife Plan for Peninsular Malaysia. DWNP, Kuala Lumpur.

WWF-Malaysia (2009). High Conservation Value Forest (HCVF) Toolkit For Malaysia: A national guide for identifying, managing and monitoring High Conservation Value Forests. First Ed. 20p.

Photos referred to in the text:

1- General View

2 – Logging Road

3 – Base Camp

4 - Palas River

5 – Hill top

6 – Tall trees

7- Forest Palm

8- Livingstona speciosa

9 – Riverine Forest

10- Tacca

11- Globba cornerii

12 – Neram Stream

13- Secondary Forest

14-Orang Asli Fruit Orchard

15-Licuala fractiflexa

16 – Dendrocalamus pendulus

17-Johannesteynmannia altifrons

18-Elephant's dung

19-Elephant's trail

20- Tiger's Footprint

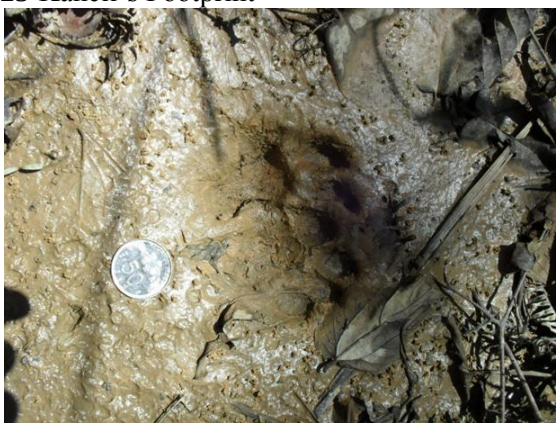
21 – Wild Boar's Footprint

22 – Wollowing Mudhole

23 – Tapir's Footprint

24-Kijang's Footprint

25-Kancil's Footprint



26-Otter's Footprint

18-Elephant's dung

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Appendix 1:

Recorded Taxa from Cherul Forest Concession (CFC), Kemaman, Terengganu
(Compt. nos. 29, 30, 32, 35 and 40)

1. *Aglaia yzermannii* Boerl. & Koord. [Meliaceae]; rheophytic tree to 5m tall; on riverbanks; distribution: Kl, Tg, Pk, Ph; rare. Distribution of the plant species within the study area: B – C30.
2. *Agrostistachys longifolia* (Wight) Benth. var. *leptostachya* (Pax & K. Hoffm.) Whitmore [Euphorbiaceae]; small tree to 9m tall; lowland and hill forest; distribution: Kd, Tg, Pk, Ph. Distribution of the plant species within the study area: A – C29.
3. *Alpinia scabra* (Blume) Baker [Zingiberaceae; Tepus]; herb to 3m tall; lowlands and hills; distribution: commonest at 300-900 m, widespread. Distribution of the plant species within the study area: C – C35.
4. *Arenga westerhoutii* Griff. [Palmae; Langkap]; feather palm to 10m or more tall; locally gregarious in hillside forest including on limestone; distribution: widespread. Distribution of the plant species within the study area: A – C29 & B-C35.
5. *Asplenium nidus* L. [Aspleniaceae; Paku langsuyar]; common epiphytic fern; lowlands and mountains; distribution: throughout. Distribution of the plant species within the study area: A – C29 & B – C32.
6. *Bouea oppositifolia* (Roxb.) Meisn. [Anacardiaceae; Kundang]; tree to 33m tall; lowland forest to 700m; distribution: widfespread. Distribution of the plant species within the study area: A – C35.
7. *Calamus corneri* Furtado [Palmae; Rotan perut ayam]; clustering rattan climbing to 20m; lowland forest; distribution: Ulu Kemaman, Tg, and near Kuantan, Ph, endemic to Malaya. Distribution of the plant species within the study area: A – C29 & B – C35.
8. *Calamus diepenhorstii* Miq. [Palmae; Rotan kerai]; distribution: Kl, Tg, Pn, Pk, Ph, Sl, NS, Ml, Jh, Sp. Distribution of the plant species within the study area: B - C35 & C – C35.

9. *Calophyllum flavoramulum* M.R. Hend. & Wyatt-Sm. [Guttiferae; Bintangor]; tree to 38m tall; lowland forest; distribution: Tg, Ph, Jh; rare. Distribution of the plant species within the study area: A – C29.
10. *Campnosperma auriculatum* (Blume) Hook. f. [Anacardiaceae; Terentang]; big tree to 33m tall; lowland and montane forest to 1,600m, often in swampy places; distribution: widespread. Distribution of the plant species within the study area: B – C35 & C - 35.
11. *Cinnamomum porrectum* (Roxb.) Kosterm. [Lauraceae; Medang teja]; tree to 45m tall; lowlands to mountains; distribution: Ml and Ph northward. Distribution of the plant species within the study area: A-C29.
12. *Cyathea latebrosa* (Wall. ex Hook.) Copel. [Cyatheaceae; Paku gajah]; tree fern to 3-m; open forest in lowlands and hills to 2,000m; widespread. Distribution of the plant species within the study area: B-C30 & C-C35.
13. *Cycas rumphii* Miq. [Cycadaceae]; cycad to 6m tall; mostly rocky shores; distribution: widespread. Distribution of the plant species within the study area: A – C29.
14. *Daemonorops angustifolia* (Griff.) Mart. [Palmae; Rotan semelus]; thicket forming rattan to 40m tall; damp lowland forests, riverbanks; distribution: Kd, Kl, Tg, Pk, Ph, Sl, NS, Ml, Jh, Sp. Distribution of the plant species within the study area: B – C35.
15. *Dendrocalamus pendulus* Ridl. [Gramineae; Buloh akar]; bamboo to 25m tall; opening in lowland forest to 800m; distribution: Ps, Kd, Pn, Kl, Tg, Pk, Ph, Sl, NS, Ml, Jh, endemic to Malaya. Distribution of the plant species within the study area: B-C35 & C-C35.
16. *Dialium indum* L. var. *indum* [Leguminosae; Keranji]; tree to 35m tall; scattered in lowland forest; distribution: widespread. Distribution of the plant species within the study area: A-C29.
17. *Dicranopteris linearis* (Burm. f.) Underw. var. *linearis* [Gleicheniaceae; Resam]; very common thicket; lowlands to mountains to 1,400m; distribution: throughout. Distribution of the plant species within the study area: C-C35.

18. *Dillenia indica* L. [Dilleniaceae; Simpoh]; tree to 20m tall; often on stream banks; distribution: Kl, Tg, Pk, Ph, Sl, Jh. Distribution of the plant species within the study area: B-C30.
19. *Dipterocarpus oblongifolius* Blume [Dipterocarpaceae; Keruing neram]; large tree; banks of fast-flowing rivers; distribution: mostly east of Main Range; rare. Distribution of the plant species within the study area: B-C30.
20. *Dipterocarpus rigidus* Ridl. [Dipterocarpaceae; Keruing cogan]; tree sometimes exceeding 3m girth; coastal hill forest; distribution: Tg southward, Malay Peninsular; the Riau and Lingga archipelagos, Borneo and the Anamba Islands. Distribution of the plant species within the study area: A-C29.
21. *Donax grandis* (Miq.) Ridl. [Marantaceae; Bemban]; lowland forest herb to 5m tall; distribution: widespread. Distribution of the plant species within the study area: B-C30 & C-C35.
22. *Durio zibethinus* Murray [Bombacaceae; Durian]; large tree over 30m tall; distribution: widespread in cultivation in the Asian tropics; possibly wild in Sumatra anb Borneo. Distribution of the plant species within the study area: C-C35.
23. *Elateriospermum tapos* Blume [Euphorbiaceae; Perah]; tree to 27m tall; lowland and hill forest to 600m; distribution: throughout. Distribution of the plant species within the study area: A-C29 & C-32.
24. *Endospermum diadenum* (Miq.) Airy Shaw [Euphorbiaceae; Sesenduk]; tree to 40m tall; lowland to lower montane forest at 1,000m; distribution: common throughout Peninsular Malaysia, Thailand, Sumatra and Borneo. Distribution of the plant species within the study area: B-C35 & C-C32.
25. *Eurycoma longifolia* Jack [Simaroubaceae; Tongkat ali]; treelet to 5m tall; lowlands and hills; distribution: throughout. Distribution of the plant species within the study area: A-C29.
26. *Globba corneri* A. Weber [Zingiberaceae; Tepus]; herb to 30cm tall; lowland and hill forest; distribution: ?Kl, Tg, endemic to Malaya. Distribution of the plant species within the study area: B-C35.
27. *Goniothalamus macrophyllus* (Blume) Hook. f. & Thomson [Annonaceae; Gajah beranak]; shrub to 5m tall; common in lowland forest; distribution: Kd,

Kl, Tg, Pk, Ph, Sl, NS, Ml, Jh, Sp. Distribution of the plant species within the study area: A-C29 & B-C35.

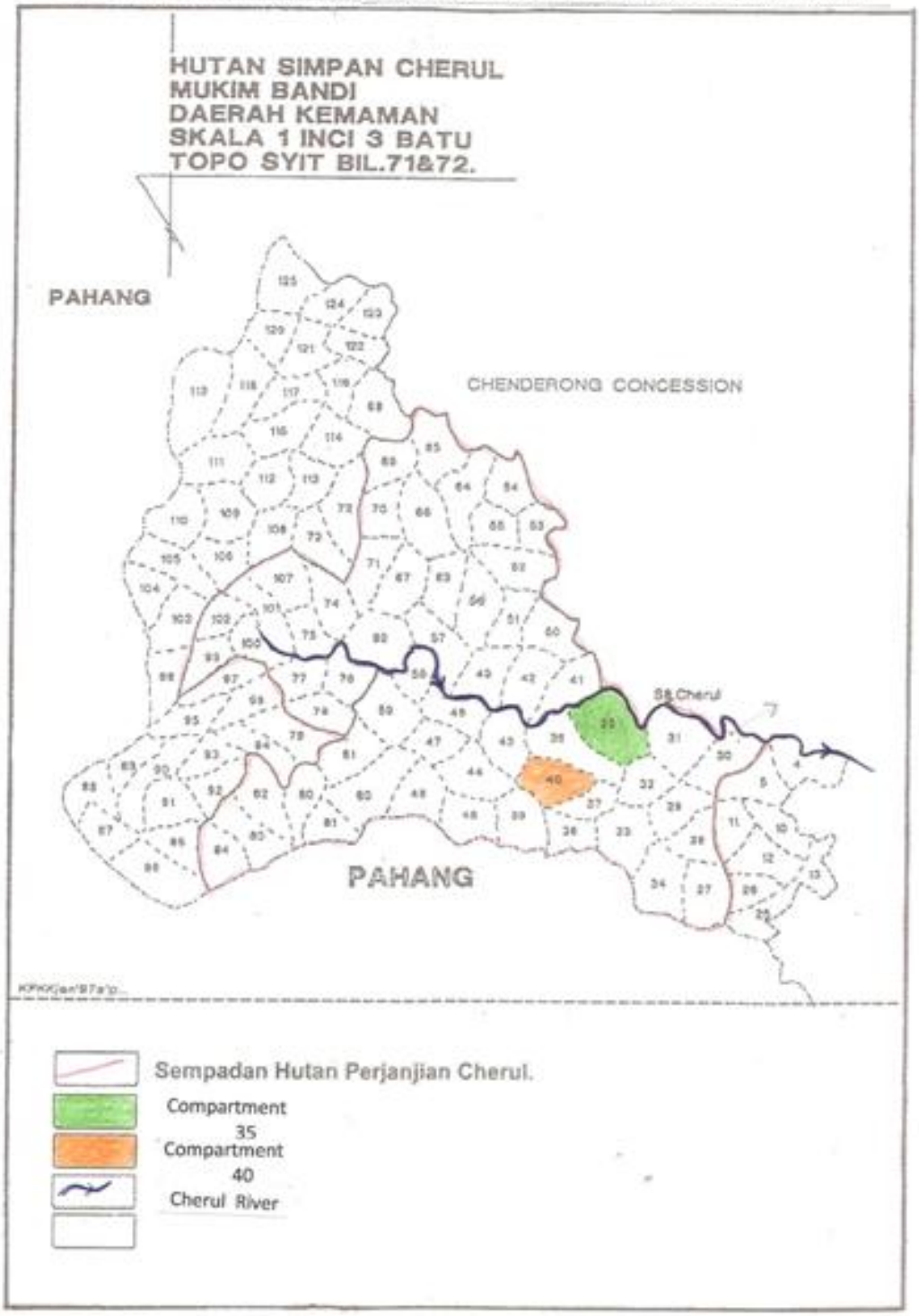
28. *Hanguana malayana* (Jack) Merr. [Hanguanaceae; Lobak]; herb to 2m tall; terrestrial or aquatic; in lowland and hill forest to 1,500m or in lowland ponds and rivers; distribution: widespread. Distribution of the plant species within the study area: A-C29 & B-C35.
29. *Hydnocarpus woodii* Merr. [Flacourtiaceae; Setum,pol]; tree to 36m tall; lowland and hill forest to 1,000m; distribution: Ps, Tg, Pk, Ph, Sl, NS, Jh. Distribution of the plant species within the study area: A-C29.
30. *Ixora javanica* (Blume) DC. var. *javanica* [Rubiaceae; Jejarum hutan]; shrub to 4m tall; lowland and hill forest, often cultivared; distribution: widespread. Distribution of the plant species within the study area: B-C29.
31. *Johannesteijsmanni altifrons* (Rchb. f. & Zoll.) H.E. Moore [Palmae; Pok lah]; solitary stemless simple-leafed palm to 6m tall; primary lowland forest; distribution: Kl, Ph, Sl, Jh; rare. Distribution of the plant species within the study area: A-C29.
32. *Korthalsia echinometra* Becc. [Palmae; Rotan udang]; clustering ant-inhabited rattan to 30m tall; lowland and hill forest; distribution: Tg, Ph, Sl, Jh, Sp. Distribution of the plant species within the study area: A-C29, B-C35 & C-C35.
33. *Licuala fractiflexa* L.G. Saw [Palmae; Palas gajah]; solitary, stemless or stout stemmed palm to 3.3m tall; leaves peltate orbicular to 1.5m wide; forest understory, lowland dipterocarp forest, on undulating slopes and well drained soils; distribution: endemic to Tg, Peninsular Malaysia. Distribution of the plant species within the study area: A-C29, C32.
34. *Licuala glabra* Griff. var. *glabra* [Palmae; Palas]; stemless or stout stemmed palm to 3m tall; forest understory, lowlands and mountains; distribution: Kl, Tg, Pk, Ph, Sl, Ml, Jh. Distribution of the plant species within the study area: A-C29.
35. *Lithocarpus ewyckii* (Korth.) Rehder [Fagaceae; Mempening]; tree to 30m tall; common in the lowlands, rarer in the mountains; distribution: Kl, Tg, Pk, Ph, Sl, NS, Ml, Jh, Sp. Distribution of the plant species within the study area: A-C29.

36. *Livistona speciosa* Kurz [Palmae; Daun Sal]; fan palm to 20m tall; lower montane forest 600-1,000m; distribution: Kd, Kl, Pk, Ph, Sl. Distribution of the plant species within the study area: A-C29.
37. *Macaranga hypoleuca* (Rchb. f. & Zoll.) Mull. Arg. [Euphorbiaceae; Mahang]; tree to 30m tall; secondary forest; distribution: throughout. Distribution of the plant species within the study area: C-C35.
38. *Mapania caudata* K• k. [Cyperaceae; Serapdi]; small herb; lowland forest; distribution: Tg; rare. Distribution of the plant species within the study area: B-C35.
39. *Mesua lepidota* T. Anderson var. *lepidota* [Guttiferae; Penaga tikus]; tree to 21m tall; lowland forest; distribution: Tg, Pk, Ph, Sl, NS, Ml, Jh. Distribution of the plant species within the study area: A-C29.
40. *Oncosperma horridum* (Griff.) Scheff. [Palmae; Bayas]; ferociously spiny, clustered feather palm to 20m tall; lowland and hill forest to 500m; distribution: throughout. Distribution of the plant species within the study area: A-C29 & B-C32.
41. *Pandanus militaris* Parkinson var. militaris [Pandanaceae; Pandan]; erect, sparsely branched shrub 3-4m tall; in swamps; distribution: Tg, Sl, ?Sp. Distribution of the plant species within the study area: B-C29.
42. *Parkia speciosa* Hassk. [Leguminosae; Petai]; tree to 35m tall, sometimes bigger; lowland and hill forest to 900m, often planted; distribution: widespread. Distribution of the plant species within the study area: C-C35.
43. *Pinanga malaiana* (Mart.) Scheff. [Palmae; Pinang]; clumping feather palm occasionally to 6m tall; lowland and hill forest to 900m; distribution: widespread. Distribution of the plant species within the study area: A-C32 & B-C32.
44. *Sandoricum koetjape* (Burm. f.) Merr. [Meliaceae; Sentul]; tree to 45m tall; lowland and hill forest, often cultivated; distribution: widespread. Distribution of the plant species within the study area: Distribution of the plant species within the study area: C-C35.

45. *Santiria laevigata* Blume [Burseraceae; Kedongdong]; tree 15-30m tall; lowland to montane forest; distribution: Kd, Kl, Tg, Pn, Pk, Ph, Sl, NS, Ml, Jh, Sp. Distribution of the plant species within the study area: A-C29.
46. *Saraca cauliflora* Baker [Leguminosae; Gapis]; tree to 15m tall; lowland and hill forest, often riverine; distribution: Ml and Ph northward. Distribution of the plant species within the study area: B-C32, C35.
47. *Shorea curtisii* Dyer ex King ssp. *curtisii* [Dipterocarpaceae; Seraya]; large tree; ridges to 850m; distribution: throughout. Distribution of the plant species within the study area: A-C29.
48. *Shorea lepidota* (Korth.) Blume [Dipterocarpaceae; Meranti langgong]; large buttressed tree; lowland forest; distribution: Kd, Pn, Tg, Pk, Ph, NS, Ml, Jh. Distribution of the plant species within the study area: A-C29.
49. *Syzygium polyanthum* (Wight) Walp. var. *polyanthum* [Myrtaceae; Daun Salom]; tree to 30m tall; lowland forest; distribution: P. Langkawi & Kl to Sp. Distribution of the plant species within the study area: B-C35.
50. *Tacca integrifolia* Ker Gawl. [Taccaceae; Belimbing hutan]; herb to 1m tall; lowland and hill forest; distribution: widespread. Distribution of the plant species within the study area: B-C35 & C-C35.
51. *Thottea grandiflora* Rottb. [Aristolochiaceae; Hempedu beruang]; shrub to 2m tall; lowland and hill forest to 600m; distribution: Tg, Pk, Ph, NS, Ml, Jh, Sp. Distribution of the plant species within the study area: B-C35.
52. *Zingiber grifithii* Baker [Zingiberaceae; Tepus]; herb to 70cm tall; lowland forest; distribution: common in the south of the Peninsular. Distribution of the plant species within the study area: A-C29.

Note: The following codes are utilized for Malayan states: Ps=Perlis, Kd=Kedah, Pn=Pulau Pinang(Penang), Kl=Kelantan, Tg=Trengganu, Pk=Perak, Ph=Pahang, Sl=Selangor, NS=Negeri Sembilan, Ml=Melaka (Malacca), Jh=Johor, Sp=Singapura (Singapore)

Appendix 2 - Map 1: Cherul Forest Concession (CFC) Showing Compartments 35 & 40 In Which The High Conservation Value Forests (HCVFs) Are Found.



Appendix 2: Map 2 showing location of HCVF areas within Compartmentno. 35, Cherul PRF.