

**KUMPULAN PENGURUSAN KAYU KAYAN
TERENGGANU SDN BHD (KPKKT)**

**FOREST MANAGEMENT PLAN
FOR DUNGUN TIMBER COMPLEX (DTC) & CHERUL
FOREST CONCESSION (CFC), TERENGGANU, MALAYSIA,
2008 – 2038
(Revised and Updated as of December 2022)**

By

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**Bukit Besi, Malaysia
10 December 2022**

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ACRONYMS AND ABBREVIATIONS

AWA	Annual Working Area
C, Compt.	(Forest) Compartment
CFC	Cherul Forest Concession
CITES	Convention on International Trade of Endangered Species
CSR	Corporate Social Responsibility
DBH, dbh	Diameter at breast height
DF	Directional Felling
DTC	Dungun Timber Complex
FRIM	Forest Research Institute of Malaysia
GLC	Government-Link Company
GPB	Golden Pharos Berhad
HCVF	High Conservation Value Forest
FMP	Forest Management Plan
FMU	Forest Management Unit
FSC	Forest Stewardship Council
JPNT	Jabatan Perhutanan Negeri Terengganu
IUCN	International Union for the Conservation of Nature
KPKKT	Kumpulan Pengurusan Kayu Kayan Terengganu Sdn Bhd
m.a.i.	mean annual increment
MEI	Measurable Effectiveness Indicator
MTCS	Malaysian Timber Certification System
NFA	National Forestry Act
NFP	National Forestry Policy
NGO	Non-Governmental Organization
OSH	Occupational Safety and Health
P&C	Principle and Criteria (of Forest Stewardship)
PCT	Potential Crop Tree
PERHILITAN	Jabatan Perlindungan Hidupan Liar dan Taman Negara (Department of Wildlife Conservation and National Parks)
PESAMA	Pesama Timber Corporation Sdn Bhd
PSP	Permanent Sample Plot
R&D	Research and Development
RBP	Riparian Buffer Protection
RIL	Reduced Impact Logging
SFM	Sustainable Forest Management
SIA	Social Impact Assessment
SMS	(Malaysian) Selective Management System
SOP	Standard Operating Procedure
TP	Timber Production
TPA	Totally Protected Area
TRF	Tropical Rain Forest
TSFD	Terengganu State Forest Department
VJR	Virgin Jungle Reserve
WWF	World Wildlife Fund

FOREST MANAGEMENT PLAN (FMP)
For Dungun Timber Complex (DTC) & Cherul Forest Concession
(CFC), Terengganu, Malaysia, 2008 – 2038
(Revised and Updated December 2022)

Executive Summary

This Forest Management Plan (FMP) has been prepared for the two forest concessions namely Dungun Timber Complex (DTC) and Cherul Forest Concession (CFC) that are now effectively under the management of KPKKT since 2020. This was following a landmark decision by Golden Pharos Berhad (GPB) the parent company for both KPKKT and Pesama Timber Corporation Sdn Bhd (Pesama) for the management of the two concessions be combined, streamlined and coordinated, in an effort to optimise costs, avoid duplication and achieve efficiency. While DTC has been all along under the management of KPKKT, CFC was under the management of Pesama. In other words, this was to enable the unique tropical forest resources and ecology in both areas to be professionally managed in a sustainable manner and conserved in perpetuity, i.e. in accordance with the prevailing prescribed local and international standards.

Under the circumstance since both concessions had had their beginning at around the same time, i.e. 1982/1983 whereas their current FMPs still remain valid and effective until around 2037/2038, all there remains to be done is for KPKKT to continue with all the relevant instructions and prescriptions as spelt out within both of the documents and implement them accordingly, *albeit* with some modifications as and when necessary. The latter is in keeping with the spirit and provision that any FMPs are subject to changes and modifications from time to time by incorporating new ideas and latest findings from reliable sources. Both FMPs cover a 30-year period: 2008 – 2037 for DTC and 2008-2038 for the case of CFC. This means that in both cases the timber stands in question are presently well into the second cycle of the Malaysian Selective Management System (SMS). All of the prescriptions contained in both FMPs were drawn in such a way as to

accommodate as much as possible the current as well as anticipated future changes in global attitudes and trends in the approaches towards sustainable forest resource management, biodiversity conservation, technical innovation, social acceptance, climate amelioration and environmental protection.

Consequently, all relevant activities and on-the-ground decisions concerning CFC particularly those that concern certifications under relevant processes are being progressively taken over by KPKKT including all key responsibilities and resources. These include, among others the official businesses and dealings with relevant authorities as well as the international certification of Cherul Forest Concession under the Forest Stewardship Council (FSC) which must now be combined with that of KPKKT.

It is to be noted that Pesama had had no issue at all as regards its FSC certification of CFC as a “well-managed forest” since its accession to that status in 2012.

KPKKT looks forwards to more exciting years ahead in managing the two forest concessions under the Sustainable Forest Management (SFM) principle and the precepts of the Malaysian Selective Management System (SMS), while meeting the standards of FSC and expectations of the various stakeholders.

CHAPTER ONE

1.0 Introduction

In a landmark decision made in 2019 by Golden Pharos Berhad (GPB), it was resolved that KPKKT was to take over and manage the Cherul Forest Concession (CFC) in addition to the existing Dungun Timber Complex (DTC) which it had been managing since 1983. CFC which has a total area of 24,423ha of rich natural mixed dipterocarp forest of Cherul Permanent Reserved Forest (PRF), was hitherto managed by Pesama Timber Corporation Sdn Bhd (Pesama) which is in turn also a GPB's subsidiary company besides KPKKT. This means the total area now under the direct responsibility of KPKKT stands as follows:

1. Six PRFs within Dungun Timber Complex (DTC):
 - (i) Jengai PRF (51,840 ha spread over a total of 127 forest compartments),
 - (ii) Besul PRF (6,270 ha in 19 compartments),
 - (iii) Jerangau PRF (9,810 ha in 55 compartments),
 - (iv) Pasir Raja Barat PRF (6,547 ha in 28 compartments),
 - (v) Pasir Raja Selatan PRF (31,712 ha in 78 compartments), and
 - (vi) Besul Tambahan PRF (518 ha in 2 compartments)

This means the total acreage of DTC currently stands at 106,697 ha. Of this total, approx.. 70,000ha (65.6%) falls under the "Production Forest" category (Figs. 1,2, 3).

2. Cherul Forest Concession (CFC) which covers a total of 20,243ha spread over a total of 59 forest compartments. Approx. 88.7% of CFC has been delineated for timber production purposes.

So, the grand total of the two concession areas now comes to **126,940ha**.

The decision by Golden Pharos Bhd (GPB) to combine the management of the two forest concessions of Dungun Timber Complex (DTC) and Cherul Forest Concession (CFC), and subsequently place them under one single management of KPKKT, was made in order to enable the unique tropical forest resources and

ecology in both areas to be professionally managed and rehabilitated in a sustainable manner and conserved in perpetuity, i.e. in accordance with the prevailing prescribed local and international standards. These include, among others the official businesses and dealings with relevant authorities as well as the international recognition of Cherul Forest Concession under the Forest Stewardship Council (FSC) which must now be combined with that of KPKKT.

The management of both DTC and CFC is based on the tenets of Sustainable Forest Management (SFM) principles as laid out in the Forest Management Plan (FMP) documents earlier prepared for each of the two forest concessions respectively. Both FMPs cover a 30-year period: 2008 – 2037 for DTC and 2008-2038 for the case of CFC. This means that in both cases the timber stands in question are presently well into the second cycle of the Malaysian Selective Management System (SMS). All of the prescriptions contained in both FMPs were drawn in such a way as to accommodate as much as possible the current as well as anticipated future changes in global attitudes and trends in the approaches towards sustainable forest resource management, biodiversity conservation, technical innovation, social acceptance, climate amelioration and environmental protection.

1.1 EIA-Compatibility and Compliance

The management of DTC and CFC continues to comply with the environmental management standards as laid out by the relevant authorities, namely the Department of Forestry as well as Department of Environment, Terengganu State. The Malaysian National Policy on the Environment aims at continued economic, social, and cultural progress of the country and enhancement of the quality of life of its people, through environmentally sound and sustainable development. In this context, appropriate environmentally-benign forest management standards and practices have been and will continue to be duly observed by KPKKT in all of its forest management planning and activities and field operations, as guided by the Forestry Department and FSC Principles and Criteria, in order to minimise potential negative impacts of such operations.

1.2 Compliance with Existing Laws and Legislations as well as FSC P&C

KPKKT continues to comply with **(1)** the National Forestry Policy 1997; **(2)** National Forestry Act 1984 (NFP & NFA), **(3)** the “Forest Concession Agreement of Dungun Timber Complex (DTC)” and “Cherul Forest Concession (CFC)” (SFD TERENGGANU 1982), and **(4)** other relevant legislation as well as standards prescribed by local and international certification bodies such as the Forest Stewardship Council (FSC). The State Government of Terengganu first signed the concession agreement with KPKKT for the long term management and development of the FMU, covering a period of 25 years, from 1983 to 2007, which had been renewed and extended to cover the present cycle of management, from 2008 to 2037. For the case of CFC, similar arrangements were made by the Terengganu State Government with Pesama Timber Corporation Sdn Bhd whereby the concession agreement was also extended to a further 30 years, from 2009 – 2038.

Both DTC and CFC were recognised and certified by FSC as “Well-Managed Forests”, DTC being in April 2008 and CFC in September 2012.

Fig. 1.1 Map of DTC and CFC Showing Main Forest Types.

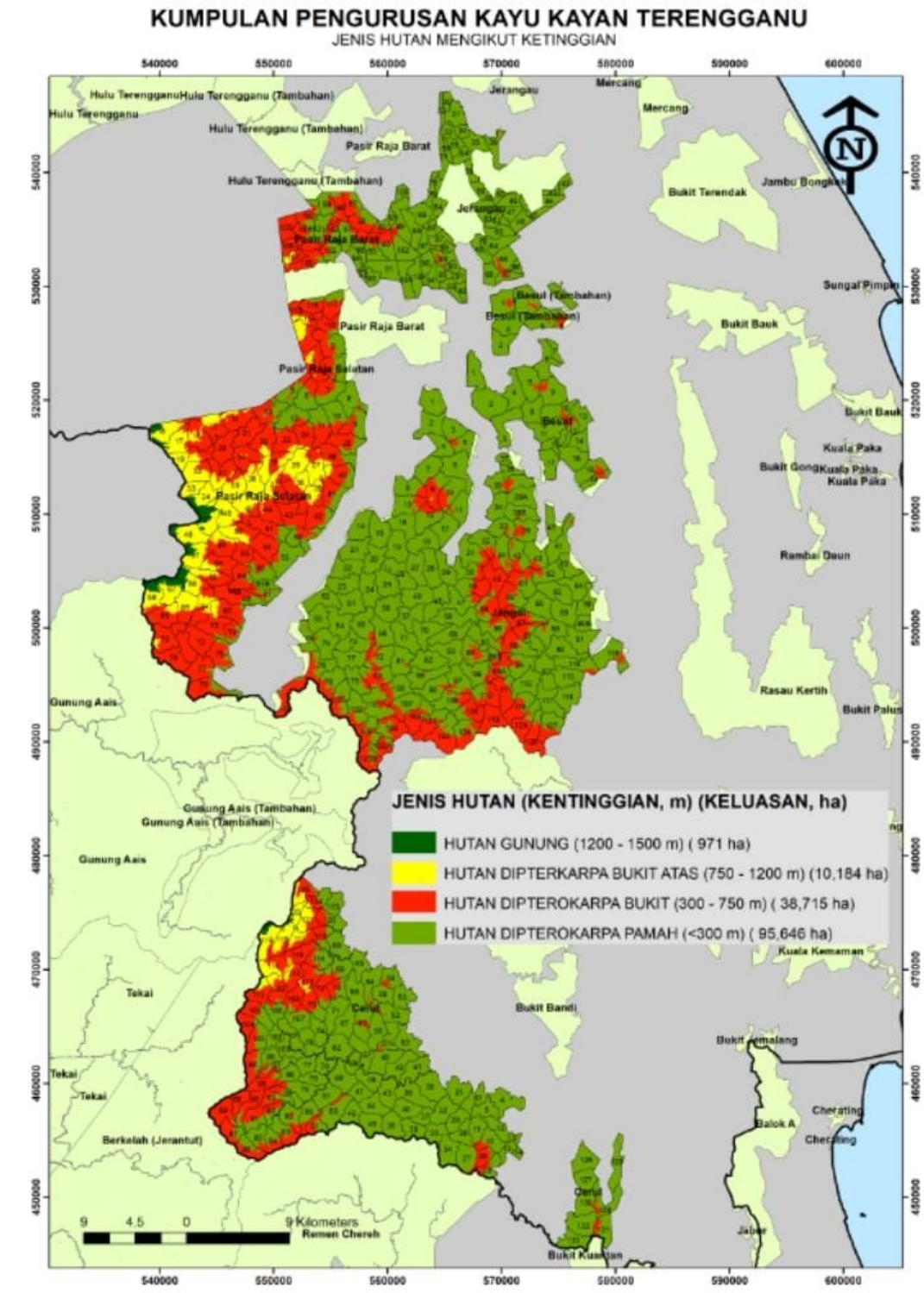


Fig. 1.2 Details of DTC Forests

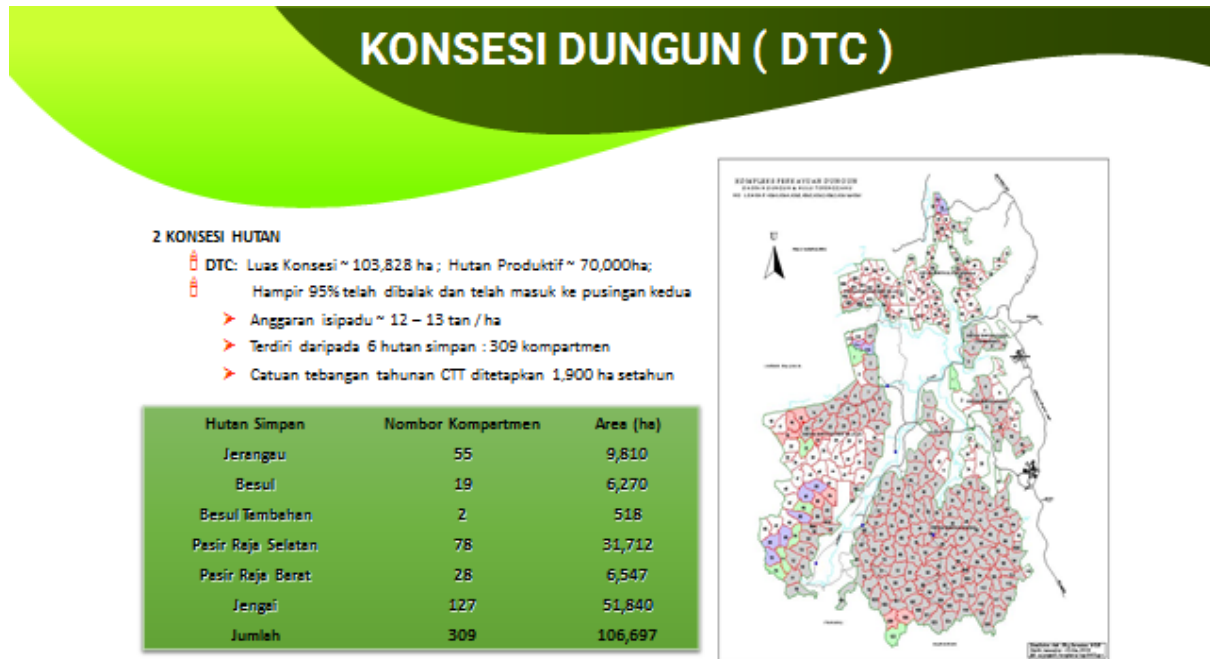
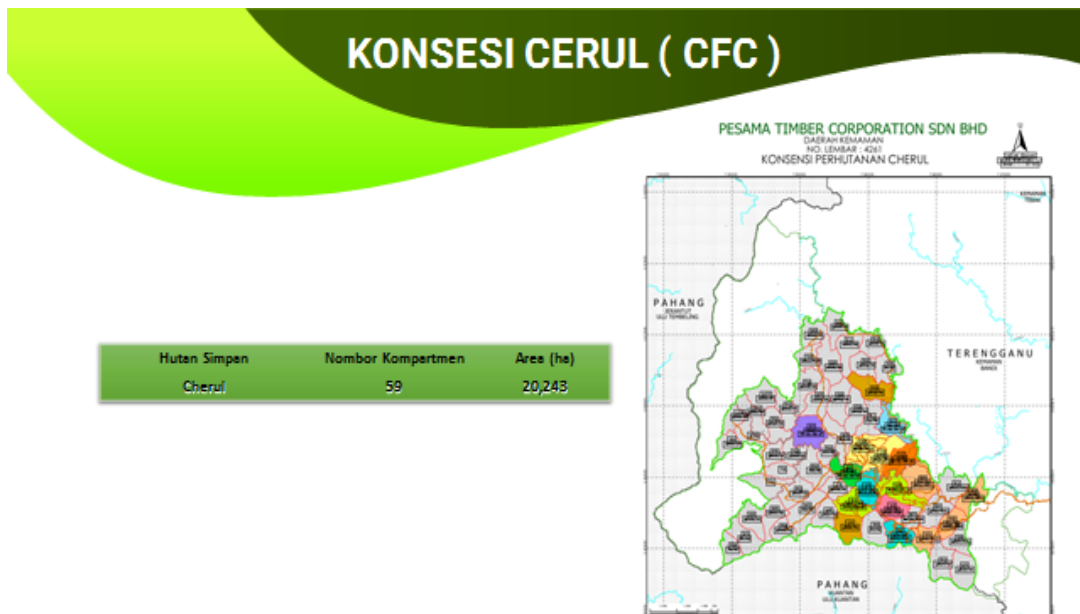


Fig. 1.3 Details of CFC Forests



1.3 Manpower Position

As of the end of 2021, KPKKT employs a total of 74 staff comprising 65 males and 9 females (Fig. 4). Of these, about 16.3% work at the management level (General Manager, Senior Forest Managers, Forest Manager, Assistant Managers and Forest Executives), and 83.7% at the technical level (Forest Supervisors, Foresters and Machine Operators). The high proportion of technical staff reflects the importance attached by KPKKT on field and R & D operations. For road construction, tree felling and timber extraction, KPKKT engages a total of 6 local contractors for various field operations including selective harvesting of the timber. On the other hand the management of CFC has always been “tricky” in that some staff can be assigned with more than one function, this being the case since Pesama conducts both upstream (forestry) and wood-based downstream (manufacturing) activities. For instance, personnel in the marketing section may be tasked with conducting forest compliance and certification, and staff in the administration may be required to perform other duties as well, etc. Under the circumstance, Pesama currently employs a total of 95 workers comprising 59 males (62%) and 36 females (38%). However, following the take-over of CFC by KPKKT only a skeletal number of these staff continues to assist KPKKT in managing CFC.

Training for staff on a wide range of topics and subjects particularly those related to their daily tasks and responsibilities continue to be arranged and conducted from time to time, both within and outside of KPKKT and Pesama as summarised in Tables 1a and 1b and Figs. 5 & 6). For the future, training in the following areas will need to be emphasised by the company:

1. Training of machine operators in environmentally benign and damage-limiting techniques
2. Training in forest resource inventory, silviculturally significant tree marking procedures, and stand treatment techniques
3. Training on nursery technology and planting stock production.
4. Training on occupational health and safety.
5. Mentoring programme on forest certification, including FSC.

Fig.1.4

Organisational Chart of KPKKT (Aug. 2021)

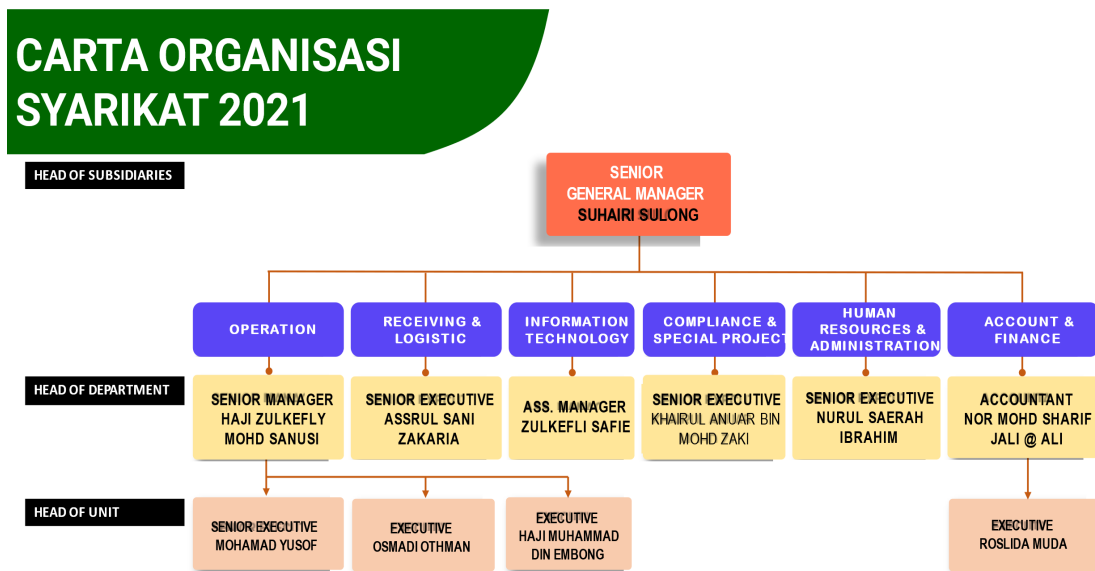


Table 1.1.**Selected Short Courses, Seminars and In-Service Field Visits Organised for KPKKT Staff During 2018 – 2020**

No	Date & Duration	Course Title	Venue	Participation
1	9 Oct 2018 (1 day)	Pengurusan Pekerja Asing	ILP, Kuala Terengganu	Selected Staff
2	2 Oct 2018 (1 day)	Disciplinary Procedure and Domestic Inquiry	Quinara Al Safir, Tok Jembal	Management Staff
3	22 Sept. 2018 (1 day)	Lawatan Ke Chengal Besar	Pasir Raja PRF	KPKKT Staff
4	22 Sept 2018 (1 day)	Golden Ride	KT	Management Staff
5	30 – 31 Jul 2018 (2 days)	MTR 2018	Darul Iman Training Centre, Kemaman	Management Staff
6	29 – 31 Jul 2018 (3 days)	Seminar For Emergency Response Team	Jab. Bomba & Penyelamat, Wakaf Tapai	Selected Staff
7	7 Sept 2018 (1 day)	EIA (Second Schedule)	Dept Environment, Putrajaya	Selected Management Staff
10	27 Sept 2018 (1 day)	World Tourism Day	KT	Selected Staff
11	19 Aug 2018 (1 day)	Stakeholder Consultation	UiTm Dungun	Management Staff, Supervisors & Contractors
12	20 Aug 2018 (1 day)	FSC Mentoring	UiTM Dungun	Staff & Contractors of KPKKT & Pesama
13	29 Jan 2019 (1 dsay)	Bengkel Pemantauan Pengeluaran Kayu Balak & Kursus Asas Pertolongan Cemas Serta Latihan Demonstrasi CPR	UiTM Dungun	All Staff & Logging Contractors
14	3 Apr. 2019 (1 day)	Bengkel Protokol & Sosial Etika	Wisma Terengganu, KT.	Management Staff
15	8 May 2019 (1 day)	Kursus Enterprise Risk Management (ERM)	Wisma Terengganu, KT.	Tuan Suhairi Sulong, Hj Zulkifli Sanusi, En Nor Mohd Sharif Jali, Pn Nurul Saerah Ibrahim, En Ab Basir Ali.
16	9-11 July 2019 (1 day)	International Conference on Tropical Science 2019	Kota Kinabalu, Sabah	Tuan Suhairi Sulong
17	24 July 2019 (1 day)	Workshop on FSC Malaysia National Forest Stewardship Std (NFSS)	FSC Malaysia, Petaling Jaya	Pn Armina Rahmad, En Osmadi Othman, En Khairil Nizam Jamaluddin.
18	26 Aug. 2019 (1 day)	Taklimat drp Lembaga Perkhidmatan Kewangan, Labuan.	Cendering, K.T.	Tuan Suhairi Sulong, En Nor Mohd Sharif Jali
19	5 Sep. 2019 (1 day)	Taklimat Mengenai Protes, Aduan, Rungutan, Chain of Custody (CoC)	KPKKT	All Staff
20	1 Oct 2019 (1 day)	Kursus Pemantapan Perlaksanaan R.I.L.	Pusat Edu-Ecotourism Sg Menyala, Port Dickson	En Musa Sulong, Tg Alias Tg Mat Rani (Kepala Hutan), En. Mohd Saifuddin Zainuddin.
21	8 Oct 2019 (1 day)	Kursus Keselamaan Dalam Pekerjaan dan Teknik Tebangan Berarah.	Compt 60, Jengai FR.	Staff of Contractors, Staff of KPKKT
22	14-15 Oct 2019 (2 days)	Kursus Financial Modelling in Excel	TDM, Bangunan UMNO, KT	En Nor Mohd Sharif Jali, Pn Roslida Muda
23	29 Oct 2019 (1 day)	Taklimat Mengenai Perjanjian Kontrak Bukan Perkhidmatan Kepada Kontraktor/ Majikan	KPKKT	Kontraktor Pengeluaran, Kontraktor Pengangkutan, Kontraktor Pembangunan, Kontraktor Tapak

				Semaian, Kontraktor Pembersihan, Staff of KPKKT.
24	2019	Forklift Operation and Safety Handling		
25	2019	Kursus Asas MGR		
26	2019	Seminar Pengurusan Kebakaran		
27	2019	Kursus Transformasi Diri From Good to Great"2019		
28	2020	Kursus Asas MGR		
29	2020	Pengurusan Hubungan Pelanggan		
30	2020	Global Talent Management Leader		
31	2020	Workshop For Sustainability Report (SR) 2020.		

Table 1.2 Training for Senior and Administrative Staff During 2020

No	Name	No.	Training Name	Date
1	Suhairi Bin Sulong (Senior GM)	1	TAKLIMAT PROSEDUR KERJA SELAMAT PENCEGAHAN COVID-19 DI TEMPAT KERJA	04/05/2020
		2	GPB POLICY ROADSHOW	05/08/2020
		3	KURSUS PEMANTAPAN PENGETAHUAN PEMBINAAN JALAN HUTAN MENGIKUT SPESIFIKASI JALAN HUTAN 2010 PINDAAN 2013	03/12/2020
		4	KURSUS GLOBAL TALENT MANAGEMENT LEADER	4-6/11/2020
		5	TAKLIMAT MENGENAI BURUNG BAGI TAHUN 2020	22/12/2020
		6	BENGGEL RANCANGAN PENGURUSAN LADANG HUTAN (RPLH)	11-12/10/2020
2	Nurul Saerah binti Ibrahim (Senior Executive HRA)	1	TAKLIMAT PEMATUHAN AKTA KESELAMATAN & KESIHATAN PEKERJAAN (AKPP) 994 BERKAITAN LANGKAH-LANGKAH PENCEGAHAN TERHADAP WABAK JANGKITAN CORONA VIRUS DISEASE 2019 (COVID)	12/03/2020
		2	TAKLIMAT PROSEDUR KERJA SELAMAT PENCEGAHAN COVID-19 DI TEMPAT KERJA	04/05/2020
		3	GPB POLICY ROADSHOW	05/08/2020
		4	IN HOUSE TRAINING - TERMINATION OF EMPLOYMENT	8/10/2020 - 10/10/2020
3	Azmi Bin Jusoh	1	TAKLIMAT PROSEDUR KERJA SELAMAT PENCEGAHAN COVID-19 DI TEMPAT KERJA	05/05/2020
		2	GPB POLICY ROADSHOW	05/08/2020
4	Amy Saipul Mizan bin Abd Wahab	1	TAKLIMAT PEMATUHAN AKTA KESELAMATAN & KESIHATAN PEKERJAAN (AKPP) 994 BERKAITAN LANGKAH-LANGKAH PENCEGAHAN TERHADAP WABAK JANGKITAN CORONA VIRUS DISEASE 2019 (COVID)	12/03/2020
		2	TAKLIMAT PROSEDUR KERJA SELAMAT PENCEGAHAN COVID-19 DI TEMPAT KERJA	05/05/2020
		3	GPB POLICY ROADSHOW	05/08/2020
5	Nghah bin Jusoh	1	TAKLIMAT PROSEDUR KERJA SELAMAT PENCEGAHAN COVID-19 DI TEMPAT KERJA	05/05/2020
		2	GPB POLICY ROADSHOW	05/08/2020
6	Siti Zainab Binti Awang	1	GPB POLICY ROADSHOW	05/08/2020
		2	SEMINAR ON BREAST CANCER AWARENESS	14/10/2020
		3	TAKLIMAT PEMATUHAN AKTA KESELAMATAN & KESIHATAN PEKERJAAN (AKPP) 994 BERKAITAN LANGKAH-LANGKAH PENCEGAHAN TERHADAP WABAK JANGKITAN CORONA VIRUS DISEASE 2019 (COVID)	12/03/2020
		4	TAKLIMAT PROSEDUR KERJA SELAMAT PENCEGAHAN COVID-19 DI TEMPAT KERJA	05/05/2020

Fig. 1.5 Examples of the Training Courses Conducted for KPKKT Staff.



Fig. 1.6 FSC Mentoring



CHAPTER TWO

2. Forest Resource Base And Management Strategy

2.1 Policy on Forest Resources Management and Forest Protection

In managing the biologically diverse and precious tropical rain forest resources and TRF ecosystems within DTC and CFC, KPKKT holds on to the three key tenets of the principle of Sustainable Forest Management (SFM), namely:

- (1) Business continuity and growth, which include aspects on the economics, profitability and sustainability of the operations, as well as technical competence and innovation;
- (2) Ecological and environmental integrity and protection; and
- (3) Social acceptability and co-existence with the local communities in the immediate vicinity of the two forest concessions, which takes into consideration the impacts of KPKKT's decisions and field operations in the context of the company's existence and the well-being of the environment, surrounding society and residents and forest-dependent communities.

These are encapsulated within KPKKT's Policy on Forest Protection (*Dasar Perlindungan Hutan*) as shown in Fig. 2.1.

The strategies towards achieving the SFM targets include, among others:

- (1) Strict adherence to locally and globally accepted professional best management practices (BMP) in forestry and environmental protection,
- (2) adoption of high level professional ethics and technical competence, and
- (3) seeking accreditation to locally as well as internationally – recognised certification standards as “well-managed forest” such as under the Forest Stewardship Council (FSC) and the Malaysian Criteria, Indicator and Standard of Performance of SFM (MC&I).

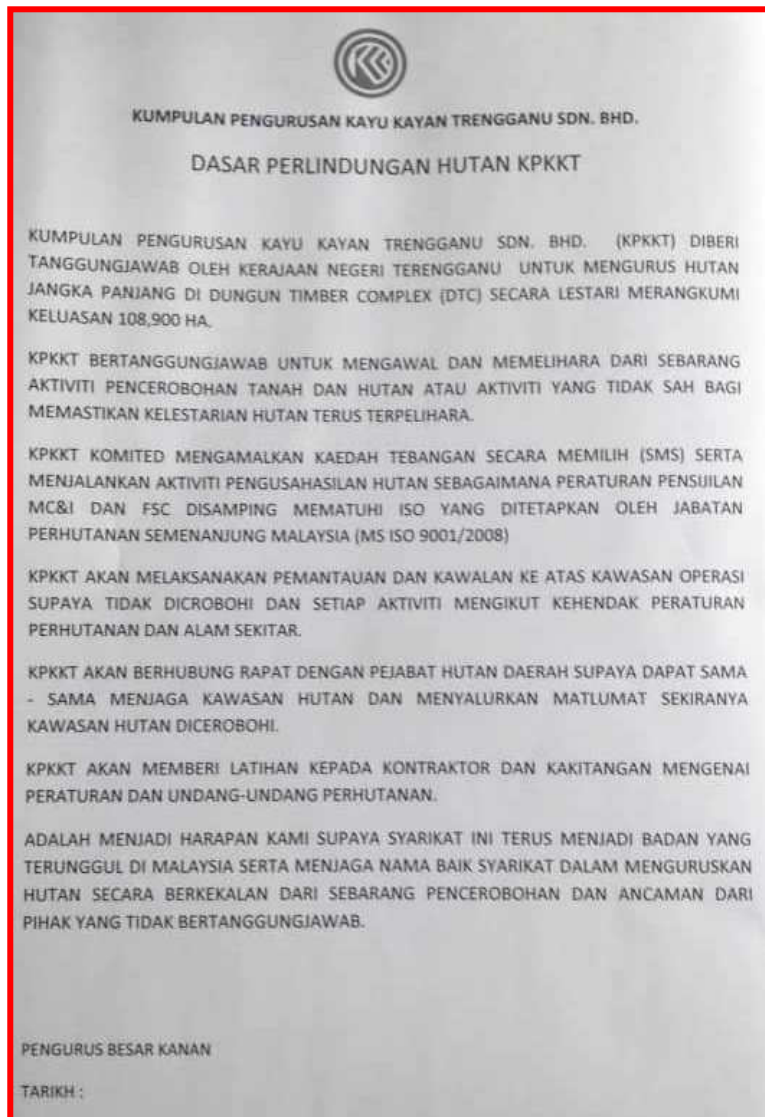


Fig. 2.1.
KPKKT's Policy Statement on Forest Protection and Conservation.

2.2 Management Strategy and Activities

Timber stands that fall under the “Production Forest” category within both DTC and CFC are identified, zoned out and managed in the second rotation of the Selective Management System (SMS) of 30 years and estimated to hold an average timber standing stock of 32 – 45m³/ha. Production records from the 7 year period of 2014 – 2020 of second round selective logging from a total area of 10,970ha yielded production figures that ranged widely from as low as 13.89m³/ha to as high as 64.70m³/ha giving an average of **25.45m³/ha** of quality round timber (please refer Tables 2.1 – 2.3). Under the circumstance, this finding opens a large avenue for improving the stocking of the poorer area through re-planting and rehabilitation with quality tropical timber species. Areas of the forest compartments which are inherently

rich and well-stocked must be handled with care so as not to result in over-cutting and over-exposure of the stand.

Notwithstanding, a general observation would easily point out that these forest stands are still rich in a wide array of quality tropical dipterocarp and non-dipterocarp timber species which include, among others;

(1) Balau, (2) Balau laut merah, (3) Balau membatu, (4) Chengal, (5) Keruing, (6) Kempas, (7) Merbau, (8) Meranti nemesu, (9) Meranti bukit, (10) Meranti seraya, (11) Meranti sengkawang merah, (12) Meranti rambai daun, (13) Meranti kepong, (14) Meranti tembaga, (15) Resak, (16) Damar hitam, (17) Damar minyak, (18) Kapur, (19) Keladan, (20) Mersawa, (21) Meranti sarang punai, (22) Meranti melantai, (23) Meranti langgong, (24) Gerutu, (25) Meranti paang, (26) Nyatoh, (27) Sepetir, (28) Bintangor, (29) Durian, (30) Jelutong, (31) Kedondong, (32) Kembang semangkok, (33) Giam, (34) Kulim, (35) Merawan, (36) Melunak, (37) Merpauh, (38) Medang, (39) Simpoh, (40) Mengkulang, (41) Meranti bumbong, (42) Meranti belang, (43) Kelat, as well as those classified as “miscellaneous species”.

In terms of its short and long term management strategies, KPKKT continues to embrace and practise the Malaysian Selective Management System (SMS) to manage the mixed dipterocarp stands within DTC and CFC. The company’s commitment to remain viable as it has successfully proven over the past 4 decades, while at the same time maintain the FSC-certified status for the forest concessions, remains unchanged. The strategies towards achieving these objectives can be summarised as follows, whereas the various activities involved are summarised in Figs. 8 - 10:

1. Strict adherence to and judicious implementation of all the prescriptions as laid out in this Forest Management Plan as well as other relevant documents and S.O.P.s and through the supervision and guidance of the Terengganu State Forestry Department.
2. Commitment to reducing the impact of selective logging on the natural environment by protecting residual Potential Crop Trees (PCTs), natural regeneration, biodiversity, soil, slopes, water resources, habitats and high conservation value forests

- (HCVFs) and the human environment, as well as through a judicious placement of forest infrastructure such as roads and skid trails and bridges, etc.
3. Maintenance of ecology and the optimum ratio of the dipterocarp vs non-dipterocarp species composition in the residual stands as in the original forest composition through accurate collection, analysis and interpretation of inventory data.
 4. Commitment towards maximum utilisation of timbers of all species and minimisation of wastes through provision of training of relevant staff and contractors.
 5. Continued investment in developing appropriate and cost-effective technologies in Reduced/Low Impact Logging (RIL) and forest and environmental protection,
 6. Provision of necessary training and mentoring programmes to staff and contractors along with close supervision on the ground on regular basis.
 7. Management of DTC and CFC areas as self-sustaining, multiple-use FMUs
 8. A full subscription to all FSC's Principles and Criteria for SFM.
 9. Commitment towards employing local citizens and contractors, particularly those coming from communities living in the surrounding areas.
 10. KPKKT as a globally-recognised model of a successful forestry enterprise.



Fig. 2.1 Sustainable Forest Management (SFM) Activities

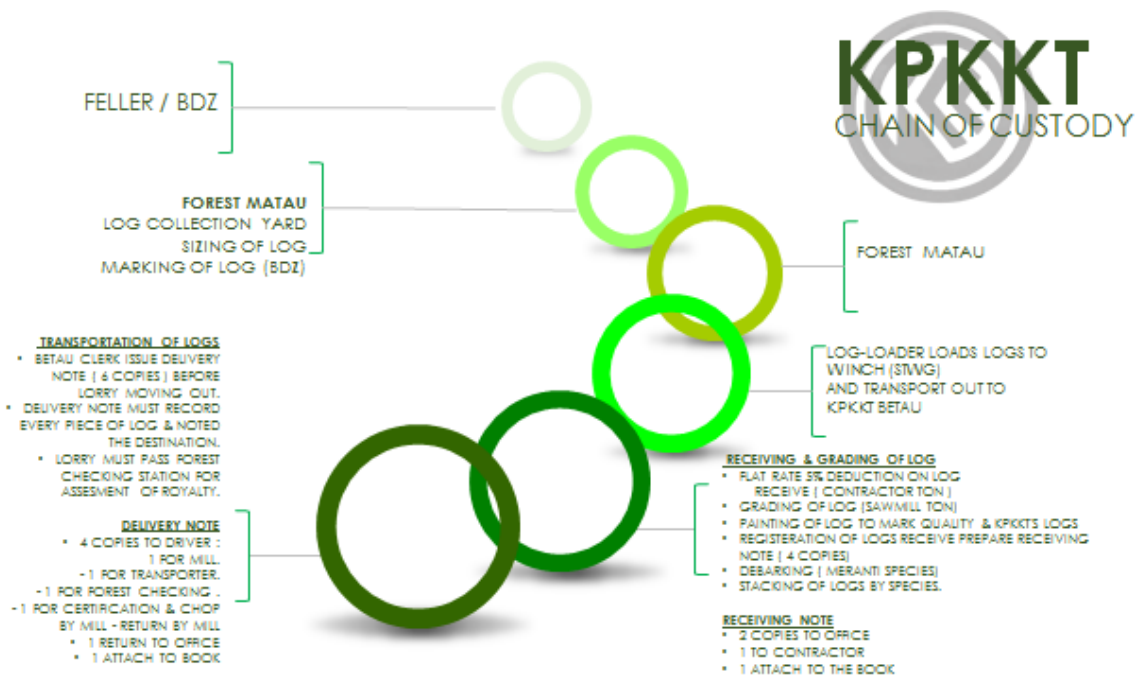


Fig. 2.2 KPKKT Chain of Custody



Fig. 2.3. Monitoring of Selective Logging Activities

Table 2.1 :
Round-Timber Production From Selective Logging in DTC During 2014 – 2020

Year	No. of Compart-ments	Luas (Ha)	Round-Timber Production			
			Σm3	m3/ha	ΣTonne	Tonne/ha
2014	6	1,897	58,009	30.58	32,014	16.88
2015	5	1,404	35,886	25.56	19,805	14.11
2016	5	1,948	27,064	13.89	14,936	7.67
2017	2	591	38,236	64.70	21,102	35.71
2018	4	1,632	41,404	25.37	25,109	15.39
2019	4	1,620	42,621	26.31	23,521	14.52
2020	5	1,878	35,929	19.13	19,828	10.56
Total	31	10,970	279,149	25.45	156,315	14.25
Annual Average, ha/yr	4.43 Forest Compt/yr	1,567.14 ha/yr	39,878.43	25.45m3/ha	22,330.71	14.25/ha

Table 2.2: Round-Timber Production From Selective Logging in CFC During 2016 – 2020

Year	No. of Compart-ment	Total Area (ha)	Round-Timber Produced, Tonnes	
			Total	Tons/ha
2016	2	563	5,276	9.37
2017	1	419	4,682	11.17
2018	1	248	3,031	12.22
2019	1	301	Tendered out	
2020	1	306	2,945	9.62
Total		1,837	15,934 (excluding year 2019)	
Annual Average		367.4ha	3,186.8 tonnes/yr (based on 5 years, excluding 2019)	

Table 2.3:
Financial Performance (i.e. Financial Yield) for DTC during the Period 2014 – 2020

Year	Profit and Loss (ΣRM)	Profit & Loss, RM/ha
2014	18,833,000	99,279.39
2015	(1,142,000)	(813.39)
2016	116,000	59.55
2017	2,065,000	3,494.08
2018	3,517,000	2,155.02
2019	2,898,000	1,788.89
2020	3,774,000	2,009.59
Annual Average, RM/yr	RM4,294,428.57/yr	RM2,740.30/ha

2.3 Forest Function Mapping and Forest Zoning

The natural forests within DTC and CFC have been generally and conveniently classified into functional classifications as defined in the National Forestry Act of 1993 as shown in Tables 2.4 & 2.5. As can be seen the production function in both concessions are less than the total gross area: 66% in DTC and 88.7% for the case of CFC. In other words about 34% of the forested land area in DTC has been set aside and dedicated for uses other than for selective logging (i.e. non-production) whereas in CFC the figure stands at almost 20%. These non-production functions include such uses as soil protection, flood control, water resources safeguards, preservation of species bio-diversity, rare ecosystem protection, climate amelioration, recreation, ecotourism, R & D, education, etc.

It is to be noted however that some of these forest areas/ zones may accommodate more than one function on any one area for reasons of compatibility, for example, soil protection function may be compatible with water resource safeguard and research, and they can all share one similar area/ site. The main point is that KPKKT always bear in mind the need to balance up the different forest functions so that the forest ecosystem would remain pristine and continue to be able to deliver its many services and produces as it normally does, in perpetuity.

Table 2.4. Forest Functions in Dungun Timber Complex (DTC) in relation to the Functions Defined in the NFA1993.

National Forest Policy 1992		National Forestry Act 1993	Forest Zonation in Dungun Timber Complex (DTC)	% DTC Area
Production Forest		Sustainable timber production	Timber Production (TP)	66%
Protection Forest	Soil protection	Soil protection	Soil Protection (SP)	14%
			Soil Conservation (SC)	37%
		Soil reclamation	-	-
	Flood control	Flood control	Flood Control Conservation (WFC)	-
	Safeguarding of water resources	Water catchment	Water Catchment Conservation (WCC)	37%
			Riparian Buffer Protection (WBP/HCVF)	18%
Preservation of biodiversity	Wildlife Sanctuary	Rare Ecosystem Protection (HCVF)	-	
		VJR	Protected Area Buffer (HCVF)	1%
Climate amelioration	-	-	-	
Amenity Forest	Recreation	Amenity	e.g. Chemerong Waterfall	<1%
	Ecotourism	-	e.g. Chemerong Waterfall	<1%
	Public awareness	-	-	-
Research and Education Forests (added in Rev. 1992)		Research	e.g Compts. 51 & 54 of Jengai FR.	<1%
		Education	e.g. Compartment 52 of Jengai FR.	<1%
		Forest for federal purposes	-	-

Table 2.5. Forest Functions In Cherul Forest Concession (CFC) In Relation To The Functions Defined In NFA1993.

National Forest Policy 1992 & Nat. Forestry Act 1993		Forest Zonation in CFC	Area (ha.) & % of total area	
Production Forest	(1) Sustainable Timber Production, (2) Safeguarding of Water Resource, (3) Preservation of Biodiversity	Timber Production (TP), Water Catchment, Conservation (HCVF) (Gross Area)	17,968 (88.7%) (Gross Area)	
Protection Forest	Soil Protection	Conditional zone Soil Protection	1,306 104 10	
	Safeguarding of Water Resources		Riparian Buffer Protection (RBP/ HCVF): (1) Sg. Cherul (2) Sg. Mas	72 24
	State Boundary		Kemaman – Kuantan	49
Amenity Forest	(1) Recreation; (2) Ecotourism; (3) Amenity, (4) Rare Ecosystem Protection	HOT SPRING IN C66, C69, C70	163	
Research & Education F.	ITTO/JPSM Research Forest in Compartment 39		380	
Mining concession		Parts of C28, C29, C43, C44	167	
TOTAL (ha)			20,243ha	

2.4 Human Resource Management & Development

Training and capacity building involving both KPKKT's personnel and those of KPKKT's contractors, are given very high emphasis in our effort to continue to grow and achieve SFM in the Concession Areas and maintain our FSC-certified status. As for the contractors and their staff, KPKKT provides the necessary support and incentives for training initiatives by, for instance, roping-in the contractors concerned into our training programmes aimed at enhancing knowledge and skills in field techniques, as mentioned above. The trainings, workshops and courses for staff of all levels are necessary in order to avail them to the latest thinking and development in areas related to their tasks and responsibilities. Apart from that, training for staff in the following areas are also considered and will continue to be arranged from time to time:

1. Training of machine operators in environmentally benign and damage-limiting techniques
2. Training in silviculturally significant tree marking procedures
3. Training in silviculturally relevant stand treatment techniques
4. Training on nursery technology and planting stock production.

KPKKT is committed to employing local Malaysian citizens into its workforce, regardless of origin, gender, ethnicity or beliefs, and appropriate policies to this effect have been finalised and enforced, including procedures for grievances and conflict resolution.

In addition in an effort to create a safe and healthy workplace environment in which workers would feel duly respected and protected in a spirit of co-existence and close cooperation with each other, KPKKT had formulated and declared appropriate policies on Occupational Safety and Health (OSH) along with policies against sexual discrimination and corrupt practices, etc. The same requirement and standards also applies to all contractors engaged by KPKKT to conduct various work within DTC and CFC, much in line with current policies of the Federal and State Governments.

2.5 Silviculture

KPKKT adopts a pragmatic policy with regard to the silviculture of the managed TRF stands, in line with the dictates of SMS and contemporary thinking on TRF resource management. Residual stands are regenerated through natural means as well as controlled artificial regeneration in the form of Open Area Planting (*Tanaman Kawasan Lapang* - TKL) while selective harvesting takes care of the larger sized regeneration and pole-sized trees.

2.5.1 Selective Harvesting as a Form of Silvicultural Treatment

KPKKT subscribes to the view that selective harvesting of trees combined with RIL and directional felling, judiciously planned and carried out in an environmentally-benign manner could pass as being equivalent to a silvicultural treatment in its own right. This is by virtue of the fact that such operations incorporate the following activities:

- (i) a network of well-constructed and uncompacted network of skid trails which forms a convenient and well-distributed network of fertile germination beds for wildings ideal for enrichment planting and open-area planting (TKL);
- (ii) the use of appropriate RIL methods and machines which would lead to controlled and minimal amount of damage and compaction to the soil and disturbance to the forest ecology,
- (iii) the practice of directional felling; and
- (iv) use of a well-trained and motivated workforce who ensures that harvesting activities are done professionally and to the desired specifications and standards.

2.5.2 Forest Regeneration and Mother Trees

The SMS considers a forest as being regenerated, if there was a sufficient number of individual PCT above the prescribed minimum SMS stocking standards in all size classes up to 45cm DBH. Our observation and surveys have shown that this requirement was well met and there were sufficient young regeneration and PCTs (up to the size 45.00cm DBH), as well as mother trees in residual stands of all ages.

2.5.3 Open/ Disturbed Area Planting (*Tanaman Kawasan Lapang (TKL)*)

Our records of the *Tanaman Kawasan Lapang* (TKL) activities conducted within DTC and CFC during 2019 – 2020 can be summarised in the following points:

- Total area subjected to TKL activities was spread over a total Felling Coupe of 12,807 ha.
- Total number of seedlings planted during 2019 to up till Dec. 2020 stood at 72,333 seedlings, or 5.6 seedlings/ha
- Total expenditure for planting was **RM290,149.81 or RM4.01/ seedling.**
- Species planted comprises the following:
(1) Meranti rambai daun, (2) Meranti tembaga, (3) Balau, (4) Gerutu, (5) Meranti sarang punai, (6) Keruing, (7) Balau bukit, (8) Meranti langgung, (9) Meranti melantai, (10) Meranti nemesu, etc..

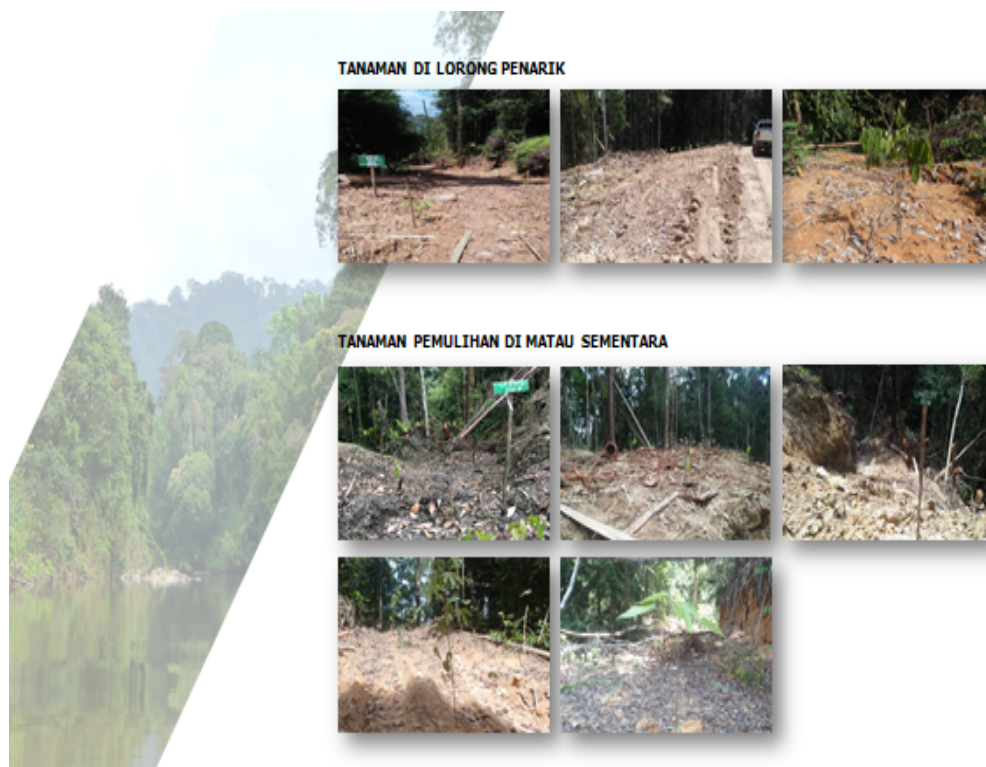


Fig. 2.4

Rehabilitation of Logged-Over Areas Through “Tanaman Kawasan Lapang” Initiatives

The different species were planted at different spacings depending on the degree of openness of the site and hardness of the soil; as well as the slope condition (Fig. 11). The seedlings were either produced in KPKKT’s nursery located in Compartment 52 of Jengai PRF, or procured through contract suppliers. These internally produced seedlings complement those supplied by the TSFD (i.e. JPNT). KPKKT keeps records on the areas planted as well as the tending treatments conducted up to 4 years after planting. Attempts will be made to update the records and monitor the growth performance of the plantings. Looking into the future, KPKKT would bear in mind the increasing costs of agricultural and forestry inputs such as fertilisers, fuels, labour, services, plastic netting, sheets and polybags and even topsoils and utilities, etc. as these could potentially contribute significantly towards the costs of replanting and resource replenishment.

2.6 Yield Regulation

The yield regulations for DTC and CFC are guided by the dictates of the Terengganu State Forest Department (JPNT) determined based on:

- ★ The present stocking and site conditions of the second growth timber stand
- ★ Data from Pre-Felling Inventory
- ★ Deductions according to the extent of logging damages on the remaining stand
- ★ Deductions for unproductive areas within production forest (*e.g.* infrastructure, buffer zones, etc).

For the period 2014-2020, the gross total area of forest stands within DTC that were subjected to selective logging stood at **10,970ha** or an average of **1,567 ha** per year which is well below the annual allowable harvesting quota of 1,900ha/yr as determined by the Terengganu State Forest Department (JPNT).

The volume of round timber produced during the 7-year period ranged from as high as 58,009 m³ in 2014 to as low as 27,064m³ during 2016 giving an average of **39,878.43** m³/year.

2.7 Growth and Yields

2.7.1 Permanent Sample Plots (PSPs)

Records show that a total of 70 Permanent Sample Ploys (PSPs) each with a size of 1.0 ha had been established in various parts of DTC area during September 1997. However, as of November 2016, it was discovered that only four (4) of these plots were managed to be traced and re-measured for the third time (*i.e.* over a space of 18 years).

Among the reasons for the difficulty to re-locate the PSPs were:

- The long lapse in time
- Difficulty to access due to damaged/ collapsed roads and bridges
- Improper recording of plot locations
- Change and/or retirement of staff directly involved in plot establishment

- Lack of maintenance over the years, resulting in severe damages to plots, loss of tree tags as well as defacement of paints and numbers on trees.
- High costs to revisit/re-measure/ maintain the plots.

Under the circumstance, the following line of actions are recommended:

- (1) Continue maintaining those PSPs that were able to be identified so far
- (2) Close/ terminate those PSPs that are found to be untraceable and/or severely damaged.
- (3) Establish new set of PSPs but using a design which is simpler and more efficient than the old one.
- (4) The new series of PSPs should be more manageable, and maintained through the use of the latest technology in mapping, GPS, digital recording and retrieval of data, and reporting.
- (5) The recommended number of new PSPs within the new network should be maintained at around 20, spread over every permanent reserved forest within DTC and CFC.

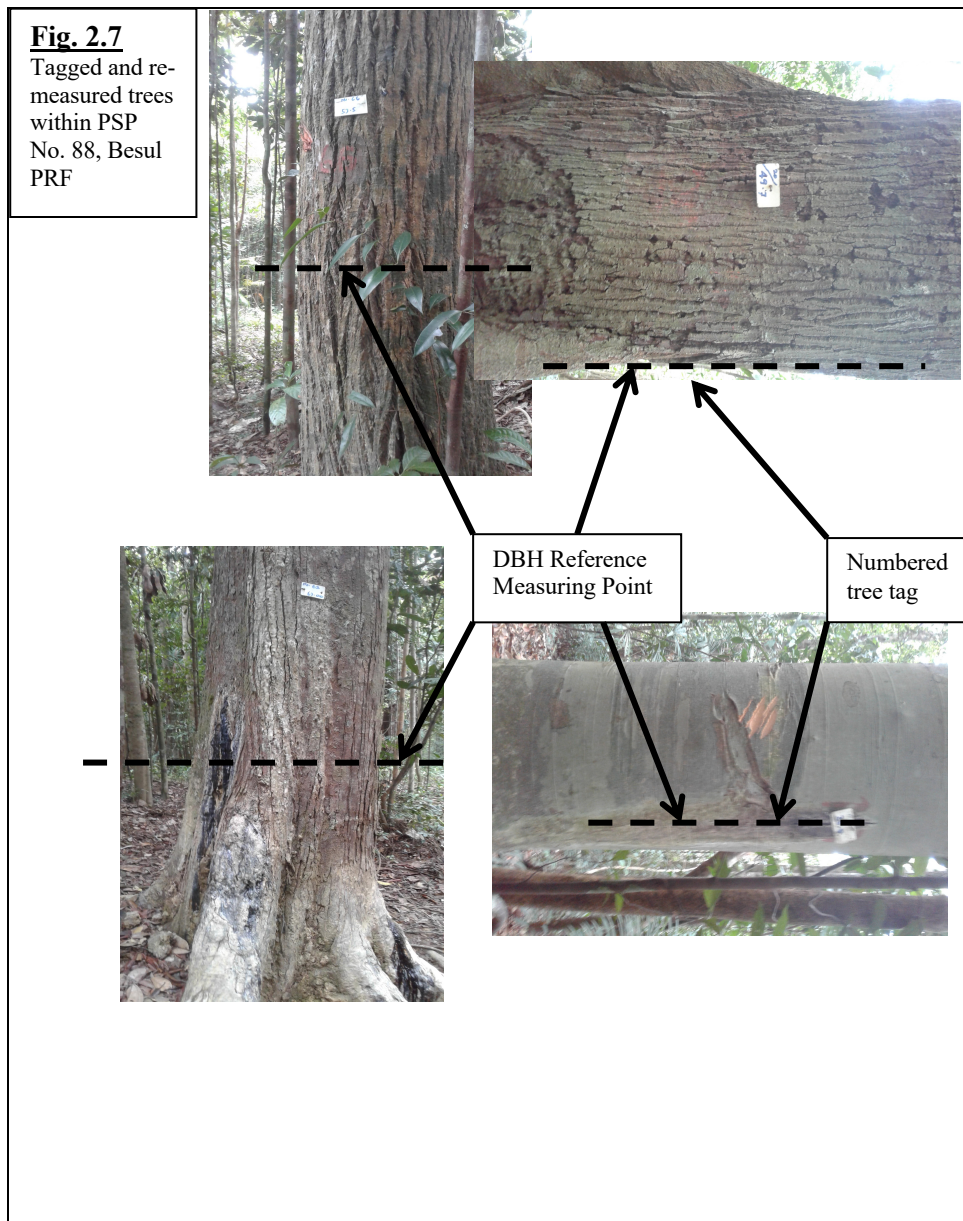
Figs. 2.5, 2.6, 2.7 and 2.8 show the PSPs identified and managed and the trees marked and measured within them.



Fig. 2.5
Marked and re-measured tree within Growth
and Yield PSP.



Fig. 2.6
Boundary marking at a Growth and Yield
PSP.



Figs. 2.8
Views of PSP88 showing tagged trees and successfully established wildings of dipterocarp species within the plot.



2.8 Conservation of Biodiversity and Genetic Resources

Biological diversity or biodiversity is the variety and variability among living organisms and the ecological complexes, in which they occur. The overall objective of SFM of the forest concession areas is to reduce the impact of forestry operations on biodiversity in general, and wildlife in particular.

2.8.1 Summary of Findings from Botanical Survey Conducted in DTC

Wherever possible and resource permitting, KPKKT would conduct on regular basis, botanical as well as zoological surveys within DTC and CFC in an effort to gather and update information on the multitude of resources in them. This was to enable a better understanding and appreciation of the resources in order that their sound and professional management and conservation could be affected. It is to be appreciated however, that the various flora and fauna react in various ways, either positively or negatively, to the different external stimuli engendered by the forestry operations and activities.

Nevertheless, based on field observations and actual surveys conducted, the following deductions could be made of the tropical forest ecosystems under management:

1. Majority of the concession area are located on areas lower than 200m asl. and falls within the lowland dipterocarp forest. This forest is rich in flora and fauna diversity with many identified threatened and endangered species. Management of the forest therefore would need to consider the long term impact on the biodiversity.
2. A combination of best management practices and scientific research on the resource base will be key to ensure the sustainability of the forest. Kapur (*Dryobalanops aromatica*) and peat swamp forest are unique vegetation types found in the DTC and CFC areas. These habitats need to be clearly identified and marked within the concession vegetation map. Management regimes for these forest types would have to be different by nature of its fragile and sensitive environment, and therefore more research activities will have to take place in these habitat types.

3. As most of the concession areas are already placed under the second rotation cycle of selective logging (SMS), it is pertinent that a strategy/ plan be prepared and put in place to monitor and reduce the impact of biodiversity loss and subsequent extinction of the tree species. In future, timber extraction should be species sensitive (especially for dipterocarp species) to minimize the possible extinction impact of ERT species. Nursery practices also need to be aligned to produce more of the ERT species for enrichment planting and/ or reforestation purposes.

5. Timber species listing from DTC with highlights on dipterocarp species listed under the Malaysian IUCN Red Data list

- (1) *Anisoptera curtisii* Dyer ex King; Mersawa Kuning (MA); LC
- (2) *Anisoptera laevis* Ridl.; Mersawa Durian (MADR); LC
- (3) *Dipterocarpus baudii* Korth.; Keruing Bulu (KRBL); LC
- (4) *Dipterocarpus costatus* Gaertn. f.; Keruing Bukit (KR); **VU**
- (5) *Dipterocarpus costulatus* Sloot; Keruing Kipas (KRKP); LC
- (6) *Dipterocarpus crinitus* Dyer; Meruing Mempelas (KRMP); LC
- (7) *Dipterocarpus eurhynchus* Miq.; Keruing Baran (KR); **VU**
- (8) *Dipterocarpus grandiflorus* (Blanco) Blanco; Keruing Belimbing (KRBG); LC
- (9) *Dipterocarpus kunstleri* King; Keruing Gombang Merah (KR); LC
- (10) *Dipterocarpus lowii* Hook. f.; Keruing Sol (KR); LC
- (11) *Dipterocarpus palembanicus* Sloot; Keruing Ternek (KR); **VU**
- (12) *Dipterocarpus rigidus* Ridl.; Keruing Chogan (KR); **EN**
- (13) *Dryobalanops aromatica* C.F. Gaertn.; Kapur (KPR); LC
- (14) *Hopea coriaceae* Burck.; Giam Hantu (GM); **EN**
- (15) *Hopea nervosa* King; Merawan Jangkang (MW); NT
- (16) *Neobalanocarpus heimii* (King) Ashton; Chengal (CGL); NT
- (17) *Parashorea stelata* Kurz; Gerutu-gerutu (GRGR); LC
- (18) *Shorea acuminata* Dyer.; Meranti Rambai Daun (MTRD); LC
- (19) *Shorea balanocarpoides* Sym.; Damar Hitam Katup (DHKP); LC
- (20) *Shorea brateolata* Dyer; Meranti Pa'ang (MTPA); LC
- (21) *Shorea collina* Ridl. ; Balau Merah (BLMH); **VU**
- (22) *Shorea curtisii* Dyer ex King ssp. *curtisii*; Meranti Seraya (MTSY); LC
- (23) *Shorea exelliptica* Meijer; Balau Tembaga (BLTB); **VU**

- (24) *Shorea foxworthyi* Sym.; Balau Bukit (BLBT); **VU**
- (25) *Shorea guiso* (Blanco) Blume; Balau Membatu (BLMM); LC
- (26) *Shorea laevis* Ridl.; Balau Kumus (BLKS); LC
- (27) *Shorea lepidota* (Korth.) Blume; Meranti Langgong (MTLG); LC
- (28) *Shorea leprosula* Miq.; Meranti Tembaga (MTTB); LC
- (29) *Shorea longisperma* Roxb.; Damar Hitam Bulu (DHBL); NT
- (30) *Shorea macroptera* Dyer ssp. *macroptera*; Meranti Melantai (MTML); LC
- (31) *Shorea multiflora* Sym.; Damar Hitam Pipit (DH); LC
- (32) *Shorea ochrophloia* Strugnell ex Symington; Seraya Batu (BLMJN); VU
- (33) *Shorea ovalis* (Korth.) Blume ssp. *ovalis*; Meranti Kepong (MTKP); LC
- (34) *Shorea ovata* Dyer; Meranti Sarang Punai Bukit (MTSBT); LC
- (35) *Shorea parvifolia* Dyer ssp. *parvifolia*; Meranti Sarang Punai (MTSP); LC
- (36) *Shorea pauciflora* King; Meranti Nemesu (MTNM); LC
- (37) *Shorea platyclados* Sloot ex Foxw.; Meranti Bukit (MTBT); LC
- (38) *Shorea resinosa* Foxw.; Meranti Belang (MTBE); NT
- (39) *Shorea singkawang* (Miq.) Burck. ssp. *singkawang*;
Meranti Sengkawang Merah (MTSMH); **EN**
- (40) *Vatica scortechinii* (King) Brandis; Resak Langgung (RK); **EN**
- (41) *Vatica umbonata* (Hook. f.) Burck; Resak Air (RK); LC

Note: *Dipterocarpus sarawakensis* F.G. Browne ex Slooten; Keruing Layang (KR); **CR.**

6. Other ERT and Endemic Species found within DTC.

Note: Species highlighted in blue are endemic to the State of Terengganu.

- (1) *Adinandra corneriana* Kobuski [Theaceae]; distribution: Tg, Ph, Jh.
- (2) *Antidesma pendulum* Hook. f. [Euphorbiaceae]; distribution: Tg, Pk, Ph, Sl.
- (3) *Breynia coronata* Hook. f. [Euphorbiaceae]; distribution: widespread.
- (4) *Dendrocalamus pendulus* Ridl. [Gramineae]; distribution: Ps, Kd, Pn, Kl, Tg, Pk, Ph, Sl, NS, Ml, Jh.
- (5) *Diospyros argentea* Griff. [Ebenaceae]; distribution: Tg, Pk, Ph, Sl, NS, Ml, Jh, Sp.
- (6) *Diospyros ismailii* Ng [Ebenaceae]; distribution: Kd, Tg, Ph, Sl, NS, Jh.
- (7) *Eugeissona tristis* Griff. [Palmae]; distribution: ?Ps, Kd, Kl, Tg, Pn, Pk, Ph, Sl, NS, Ml, Jh.

- (8) *Globba nawawii* H. Ibrahim & K. Larsen [Zingiberaceae]; distribution: Sg Pertang, Hulu Dugun, Tg.
- (9) *Knema oblongifolia* (King) Warb. [Myristicaceae]; distribution: Tg, Pk, Ph, Sl.
- (10) *Lasianthus filiformis* King & Gamble var. *bracteatus* King & Gamble [Rubiaceae]; distribution: Tg, Pk, Ph, Sl, NS.
- (11) *Morinda corneri* K.M. Wong [Rubiaceae]; distribution: Tg, Ph.
- (12) *Oxyspora bullata* (Griff.) J.F. Maxwell [Melastomataceae]; distribution: widespread.
- (13) *Pandanus dumetorum* Holttum & H. St.John [Pandanaceae]; distribution: Tg, Ph.
- (14) *Payena maingayi* C.B. Clarke [Sapotaceae]; distribution: Kd, Pn, Tg, Pk, Ph, Sl, NS, Ml, Jh, Sp.
- (15) *Pentaphragma ellipticum* Poulsen var. *flocculosum* (King & Gamble) Kiew [Pentaphragmataceae]; distribution: Kl, Tg, Ph, NS, Ml, Jh.
- (16) *Pinanga cleistantha* J. Dransf. [Palmae]; distribution: only known from Ulu Setiu F.R., Tg.
- (17) *Piper porphyrophyllum* N.E. Br. [Piperaceae]; distribution: widespread.
- (18) *Pothos peninsularis* Alderw. [Araceae]; distribution: widespread.
- (19) *Psychotria griffithii* Hook. f. [Rubiaceae]; distribution: Tg, Pk, Sl, NS, Ml, Jh, Sp.
- (20) *Psydrax maingayi* (Hook. f.) Bridson [Rubiaceae]; distribution: Tg, Ph, Pk, Sl, NS, Ml, Jh.
- (21) *Ptychopyxis caput-medusae* (Hook. f.) Ridl. [Euphorbiaceae]; distribution: Kl, Tg, Pk, Ph, Sl, NS, Ml, Sp.
- (22) *Rourea rugosa* Planch. [Connaraceae]; distribution: widespread.
- (23) *Saprosma pubescens* Ridl. var. *hirsuta* Ridl. [Rubiaceae]; distribution: Tg, Ml.
- (24) *Shorea collina* Ridl. [Dipterocarpaceae]; distribution: East Coast, Tg southwards.
- (25) *Shorea singkawang* (Miq.) Miq. ssp. *scabrosa* P.S. Ashton [Dipterocarpaceae]; distribution: Tg, Ph.
- (26) *Syzygium duthieanum* (King) Masam. [Myrtaceae]; distribution: Kd, Pn, Tg, Pk, Ph, Jh, Sp.
- (27) *Syzygium nemestrinum* (M.R. Hend.) I.M. Turner [Myrtaceae]; distribution: Tg, Ph, Sp.

- (28) *Tarenna glabra* Ridl. [Rubiaceae]; distribution: Kl, Tg, Pk.
- (29) *Thottea dependens* (Planch.) Klotzsch [Aristolochiaceae]; distribution: Pn, Tg, Pk, Ph, Sl, Sp.
- (30) *Timonius wrayi* King & Gamble [Rubiaceae]; distribution: Tg, Pk, Ph, Jh.
- (31) *Trigonostemon sinclairii* Jabl. [Euphorbiaceae]; distribution: Kd, Kl, Tg.

Other ERT species recorded from past studies include:-

- (1) *Agrostistachys leptostachya* (Euphorbiaceae)
- (2) *Barclaya moultoni* (Nymphaeaceae)
- (3) *Didymocarpus floribunda* (Gesneriaceae)
- (4) *Didymocarpus platypus* (Gesneriaceae)
- (5) *Didymocarpus puncticulata* (Gesneriaceae)
- (6) *Eleiodoxa conferta* (Palmae)
- (7) *Endospermum diadenum* (Euphorbiaceae)
- (8) *Epirhizanthus lowii* (Rafflesiaceae)
- (9) *Eugeissona brachystachys* (Palmae)
- (10) *Johannesteysmannia altifrons* (Palmae)
- (11) *Licuala bayana* (Palmae)
- (12) *Licuala fractiflexa* (Palmae)
- (13) *Licuala glabra* var. *selangorensis* (Palmae)
- (14) *Licuala khoonmengii* (Palmae)
- (15) *Licuala malajana* var. *malajana* (Palmae)
- (16) *Licuala mustapana* (Palmae)
- (17) *Lithocarpus erythrocarpus* (Fagaceae)
- (18) *Livistona kingiana* (Palmae)
- (19) *Macaranga curtisii* (Euphorbiaceae)
- (20) *Macaranga punctata* (Euphorbiaceae)
- (21) *Macaranga quadricornis* (Euphorbiaceae)

Table 2.6 Analysis of DTC's Pre-F Inventory Records

Dungun Timber Complex	Compt. No.	Dominant species (Dipterocarp species)	Dominant species (Non-dipterocarp species)
HSK Besul	8A	*Keruing – Balau – Meranti (Mt)	Kelat – Kempas - Rengas
	8B	Keruing – Damar Hitam (DH)	Kelat - Kempas
	10	*DH – *Keruing – *Mt Sarang Punai	*Kelat
	11	*Balau - Keladan	*Kelat
	15	Keruing – Meranti Rambai Daun	*Kelat – *Rengas - *Kempas
	16	*Keruing – *Damar Hitam	*Kelat
	18	*Balau – *Keruing – *Damar Hitam	*Kelat - *Nyatoh
HSK Jengai	39	*Kapur - Keruing	*Kelat - Kempas
	44	*Damar Minyak – *Meranti Nemesu – *Keruing – *Mt Sarang Punai – *Meranti Tembaga	*Kelat - Melunak
	45	*Meranti Sarang Punai – *Meranti Seraya – *Damar Hitam – *Meranti Nemesu	*Kelat - Medang
	60	*DH – *Mt Nemesu – *Balau – *Meranti Sarang Punai – *Meranti Tembaga	Kelat – Kembang Semangkok
	62	*Kapur - Keruing	N/A
	64	*Kapur - *Keruing	*Kelat - Kempas
	65	*Kapur – *Keruing – *Mt Rambai Daun	*Kelat - *Medang
HSK Jerangau	99	*Keruing – Damar Hitam	*Kelat
	101	Damar Hitam - Balau	Kelat
	102	*Keruing – Maranti Langgong	*Kelat – *Nyatoh – *Ajal - *Melunak
	103	*Keruing – Meranti Rambai Daun	Kelat – Kempas – Nyatoh

Note: * signifies significant dominance in terms of timber volume

The inventory exercise in Jerangau PRF within which the *D. sarawakensis* plot is located recorded at least 666 taxa of vascular plants from 123 families and 331 genera. Among them, 568 were Dicots, 58 Monocots, 37 Ferns and Lycophytes, and three Gymnosperms. As shown in **Tables 2.8** and **2.9**, the highest number of species came from the family Euphorbiaceae with 50 species from 24 genera, followed by Dipterocarpaceae (46 taxa), Rubiaceae (37 taxa), Annonaceae (27 taxa) and Palmae (24 taxa). The flora inventory found 59 species that are either endemic to Terengganu or Peninsular Malaysia. **Table 2.10** lists some of the flora species found to be rare and unique to DTC which have special conservation interest. Three endemic species *Scaphochlamys breviscapa* (Zingiberaceae), *Licuala fractilexa* (Palmae) and *Licuala bayana* (Palmae) are only confined to Terengganu with *L. bayana* being only known from its type locality, Jerangau PRF. **Table 2.11** shows the interesting endemic plants found in Jerangau during the flora survey.

Table 2.7 Endemic Plant Species in Jengai PRF.

Key: PM = Peninsular Malaysia; Trg = Terengganu; * = New finding in Terengganu;

A = Cpt 76,78,79 (11 years after logging); B = Cpt 63 (24 years after logging); C = Cpt 6 (27 years after logging).

No.	Species	Vernacular name	Family	Endemic to:	Locality
1	<i>Eugeissona verticillaris</i>	Rotan Sabong	Palmae	PM	B, C
2	<i>Pinanga scortechinii</i>	Pinang Hutan	Palmae	PM	B,C
3	<i>Scaphochlamys breviscarpa</i>	-	Zingiberaceae	PM, Trg	C
4	<i>Scaphochlamys laxa</i>	-	Zingiberaceae	PM	A,C
5	<i>Anisophyllea reticulata</i>	Delex	Anisophylleaceae	PM*	A, B
6	<i>Cyathocalyx pruniferus</i>	Antoi	Annonaceae	PM	A,C
7	<i>Enicosanthum fuscum</i>	Mempisang	Annonaceae	PM	A
8	<i>Vatica scortechinii</i>	Resak Langgong	Dipterocarpaceae	PM	A,B,C
9	<i>Diospyros argentea</i>	Kayu Arang	Ebenaceae	PM	C
10	<i>Diospyros nutans</i>	Kayu Arang	Ebenaceae	PM	B
11	<i>Diospyros penangiana</i>	Kayu Arang	Ebenaceae	PM*	B, C
12	<i>Ptychopyxis caput-medusae</i>	Rambai Hutan	Euphobiaceae	PM	B
13	<i>Ptychopyxis costata</i> var. <i>oblanceolata</i>	Mendaroh	Euphobiaceae*	PM*	A,B,C
14	<i>Lithocarpus curtisii</i>	Mempening	Fagaceae	PM	A
15	<i>Hydnocarpus filipes</i>	Setumpol	Flacourtiaceae	PM	A,B,C
16	<i>Hydnocarpus kunstleri</i> var. <i>tomentosa</i>	Setumpol	Flacourtiaceae	PM	C
17	<i>Henckelia miniata</i>	-	Gentianaceae	PM, Trg	A,B,C
18	<i>Henckelia puncticulata</i>	-	Gentianaceae	PM	A,B,C
19	<i>Kayea elegans</i>	Penaga	Guttiferae	PM*	B,C
20	<i>Callicarpa maingayi</i>	-	Labiatae	PM	A,C
21	<i>Bauhinia bidentata</i> subsp. <i>bidentata</i>	-	Leguminosae	PM	A,B,C
22	<i>Oxyspora bullata</i>	Senduduk	Melastomataceae	PM*	A,B,C
23	<i>Ficus deltoidea</i> var. <i>trenngganuensis</i>	Mas Cotek	Moraceae	PM	C
24	<i>Ficus mollissima</i>	Ara	MoOraceae	PM*	A,B
25	<i>Ardisia kunstleri</i>	-	Myrsinaceae	PM*	A,B
26	<i>Embelia canescens</i> var. <i>canescens</i>	-	Myrsinaceae	PM*	C
27	<i>Syzygium politum</i>	Kelat	Myrtaceae	PM*	C
28	<i>Aporosa globifera</i>	Sebasah	Phyllanthaceae	PM*	A,C
29	<i>Diplospora lasiantha</i>	-	Rosaceae	PM	B
30	<i>Hypobathrum venulosum</i>	-	Rubiaceae	PM	A,B
31	<i>Psychotria griffithii</i>	-	Rubiaceae	PM	A,B
32	<i>Saprosma glomerulata</i>	Sekentut	Rubiaceae	PM	C
33	<i>Tarenna maingayi</i>	-	Rubiaceae	PM*	A,B
34	<i>Timonius wrayi</i>	-	Rubiaceae	PM	A,B
35	<i>Pentace grandefolia</i>	Melunak	Tiliaceae	PM, Trg	C
36	<i>Pentace strychnoidea</i>	Melunak	Tiliaceae	PM	B

Table 2.8 Ten most diverse vascular plant families in Jerangau PRF.

No	Family	Genera	No. of Taxa
1	Euphorbiaceae	24	50
2	Dipterocarpaceae	8	46
3	Rubiaceae	24	37
4	Annonaceae	14	27
5	Palmae	12	24
6	Guttiferae	5	24
7	Ebenaceae	1	22
8	Anacardiaceae	11	20
9	Lauraceae	7	19
10	Moraceae	4	18

Table 2.9: Six most diverse genera recorded in Jerangau PRF

No	Genera	Family	Taxa
1	<i>Shorea</i>	Dipterocarpaceae	24
2	<i>Diospyros</i>	Ebenaceae	22
3	<i>Garcinia</i>	Guttiferae	12
4	<i>Ficus</i>	Moraceae	10
5	<i>Dipterocarpus</i>	Dipterocarpaceae	9
6	<i>Syzygium</i>	Myrtaceae	9

Table 2.10: List of Unique And Rare Flora Species Of Special Conservation Interest in DTC

No	Species	GPS Coordinates	Notes
1	<i>Scaphochlamys atroviridis</i>	4,478460 N, 103. 045930 E	Extremely rich in Jerangau PRF. Common in both primary and logged stands.
2	<i>Vatica havilandii</i>	4.551180N, 103.063339 E	A very rare species in Peninsular Malaysia and first time collected in fruit. It is also found in Borneo.
3	<i>Dipterocarpus sarawakensis</i>	4.554640 N, 103.051390 E	This species is only found in Sarawak and Terengganu. Measures are being taken to protect this species.
4	<i>Shorea collina</i>	4.478460 N, 103.045930 E	Possibly new species.
5	<i>Didymocarpus sp.</i>	4.478080 N, 103.045030 E	Possibly new species
6	<i>Barringtonia sp.</i>	4.478000 N, 103.045500 E	Possibly new species
7	<i>Neobalanocarpus heimii</i>	NA	Vulnerable (IUCN)

Table 2.11: Endemic Plants in Jerangau PRF (Combined lists of FRIM (2009) and WWF-Malaysia (1998))

No.	Species	Notes
1	Chengal – <i>Neobalanocarpus heimii</i>	Endemic to Peninsular Malaysia
2	Keruing Sarawak – <i>Dipterocarpus sarawakensis</i>	
3	Bunga Pakma – <i>Rafflesia spp.</i>	3 species endemic to Peninsular Malaysia
4	<i>Salacca flabellate</i> (Palmae)	Endemic to Terengganu
5	<i>Macaranga curtisii</i> (Euphorbiaceae)	Otherwise only endemic to the Main Range
6	<i>Macaranga punctatai</i> (Euphorbiaceae)	Otherwise only endemic to the Main Range
7	<i>Macaranga quadricornis</i> (Euphorbiaceae)	The only record east of Gunung Benom
8	<i>Agrostistachys leptostachya</i> (Euphorbiaceae)	A giant shrub of Taman Negara area
9	<i>Lithocarpus erythrocarpus</i> (Fagaceae)	Otherwise only known from the Main Range
10	<i>Eria atrovinosa</i>	
11	<i>Licuala bayana</i>	
12	<i>Licuala fractiflexa</i> (Palmae)	
13	<i>Pinanga beccariana</i> (Palmae)	

2.8.2 Findings from Fauna Surveys Conducted in DTC and CFC

The KPKKT – WWF Malaysia survey of 2009/ 2010 within DTC detected the presence of fauna species which are either on the IUCN Red List, CITES or the Wildlife Protection Act 2010 as threatened and endangered.

Out of these, 8 are listed by the Red List as Vulnerable (VU), 5 as Endangered (EN) and one as Critically Endangered (CR). Nine species are listed in Appendix I and II of CITES while 28 are listed either in Schedule 1 or Schedule 2 of the Malaysian Wildlife Protection Act 2010.

As for the fish fauna among the common species caught and identified from the streams and rivers included the *Kelah*, *Sebarau*, *Baung*, *Lampam* and *Kelisa putih*.

Table 2.12.
Mammal Species Identified in Jengai Permanent Reserved Forest (PRF)

Common name	Scientific Name	Protection Status	Status	
			IUCN	CITES
Large Indian civet	<i>Viverra zibetha</i>	TP	NT	III
Malay civet	<i>Viverra zangalunga</i>	TP	LC	NL
Malayan porcupine	<i>Hystrix brachyura</i>	P	LC	III
Pig-tailed macaque	<i>Macaca nemestrina</i>	P	VU	II
Long-tailed macaque	<i>Macaca fascicularis</i>	P	LC	II
Banded langur	<i>Presbytis femoralis</i>	P	NT	II
White handed gibbon	<i>Hylobates lar</i>	TP	EN	II
Common barking deer	<i>Muntiacus muntjak</i>	P	LC	NL
Lesser Mouse deer	<i>Tragulus javanicus</i>	P	DD	NL
Wild pig	<i>Sus scrofa</i>	P	LC	NL
Malayan tapir	<i>Tapirus indicus</i>	TP	EN	I
Asian elephant	<i>Elephas maximus</i>	P	EN	I
Smooth otter	<i>Lutra perspicillata</i>	TP	VU	NL
Malayan sun bear	<i>Helarctos malayanus</i>	P	VU	I
Asiatic wild dog	<i>Cuon alpinus</i>	TP	EN	I
Leopard cat	<i>Prionailurus bengalensis</i>	TP	LC	I
Leopard	<i>Panthera pardus</i>	TP	NT	I
Asiatic Golden cat	<i>Catopuma temminckii</i>	TP	NT	II
Malayan tiger	<i>Panthera tigris jacksoni</i>	TP	EN	I

Key:

EN – Endangered	VU- Vulnerable	TP- Totally Protected
VU – Vulnerable	LC – Least Concern	P- Protected
NT - Near threatened	DD - Data deficient	NL- Not listed

Table 2.13. Avifauna species within DTC.

[Key: Besul (T) = Besul (Tambahan) F.R., P = protected, IUCN = IUCN Red List of Threatened Spp 2010, VU = vulnerable spp, NT = Near Threatened spp. Appx. 1 = Appendix 1 (CITES). Refer to Appendix 1 for scientific name and spp. number. Relative density: 40-50 = fairly high, 20 - 30 = medium, 10-20 = fairly low, 5-10 = low, 1-5 = extremely low. Note: density estimate given as a general guide]

NO.	Species common Name/Family	P	IUCN	CITES	Forest reserve	Relative density
Phasianidae						
1	FERRUGINOUS PARTRIDGE	TP	NT		Jengai	1
2	Malaysian Peacock Pheasant	TP	VU		Jengai, Besul	3
3	Great Argus	TP	NT		Jengai	2
Accipitridae						
4	Lesser Fish Eagle	TP	NT		Jengai, Besul	7
5	Grey-headed Fish Eagle	TP	NT		Jengai	1
Psittacidae						
6	Blue-rumped Parrot	TP	NT		Jengai, Besul	27
Cuculidae						
7	Short-toed Coucal	TP	VU		Besul	1
8	Chestnut-bellied Malkoha	TP	NT		Jengai	3
9	Black-bellied Malkoha	TP	NT		Besul	1
Trogonidae						
10	Scarlet-rumped Trogon	TP	NT		Jengai	2
Alcedinidae						
11	Rufous-collared Kingfisher	TP	NT		Jengai	1
Bucerotidae						
12	Black Hornbill	TP	NT	Jengai, Besul, near Cp. J37/B3? (Sg. Jengai)		18
13	Great Hornbill	TP	NT	Appx. 1	Jengai	2
14	Rhinoceros Hornbill	TP	NT		Jengai	17
15	Helmeted Hornbill	TP	NT	Appx. 1	Jengai	2
16	White-crowned Hornbill	TP	NT		Jengai, Besul	5
17	Wrinkled Hornbill	TP	NT		Jengai	4
Megalaimidae						
18	Red-crowned Barbet	TP	NT		Jengai	5
19	Red-throated Barbet	TP	NT		Jengai	3
20	Yellow-crowned Barbet	TP	NT		Jengai, Besul	2
Picidae						
21	White-bellied Woodpecker			Appx.1	Jengai, Besul	5
22	Olive-backed Woodpecker	TP	NT		Near border of Cp. J37/B3?	1
23	Great Slaty Woodpecker	TP	VU		Jengai, Besul	7
Eurylaimidae						
24	Green Broadbill	TP	NT		Jengai, Besul	7
25	Black-and-yellow Broadbill	TP	NT		Jengai, Besul, Besul (T)	16
Pittidae						
26	Garnet Pitta	TP	NT		Jengai	2
Aegithinidae						
27	Green Iora	TP	NT		Jengai, Besul	32
Campephagidae						
28	Fiery Minivet	TP	NT		Jengai, Besul, Besul (T)	8
Corvidae						
29	Crested Jay	TP	NT		Jengai	1
30	Black Magpie	TP	NT		Jengai, Besul	14
Pycnonotidae						
31	Black-and-White Bulbul	TP	NT		Jengai	1
32	Grey-bellied Bulbul	TP	NT		Jengai, Besul, Besul (T)	7
33	Puff-backed Bulbul	TP	NT		Jengai, Besul	17
34	Buff-vented Bulbul	TP	NT		Jengai, Besul, Besul (T)	25
35	Streaked Bulbul	TP	NT		Jengai, Besul	10
Timaliidae						
36	Brown Fulvetta	TP	NT		Jengai, Besul	5
37	Black-throated Babbler	TP	NT		Jengai	2
38	Chestnut-rumped Babbler	TP	NT		Jengai, Besul	6
39	Fluffy-backed Tit-Babbler	TP	NT		Jengai, Besul, Besul (T)	27
40	Sooty-capped Babbler	TP	NT		Besul	2
41	White-chested Babbler	TP	NT	Jengai, near border of Cp. J37/B3 (Sg. Jengai)		3
42	Striped Wren-babbler/ Kenopia	TP	NT		Jengai	2
Chloropsidae						
43	Lesser Green Leafbird	TP	NT		Jengai, Besul	8

Table 2.14. Results from Wildlife Monitoring in CFC During 2015 - 2018

Date	Wildlife Species
10/2/2015	Oriental pied hornbill, Elephant, Tapir
13.4.2015	Barking deer, Otter, Jungle fowl
5/6/2015	White-handed gibbon, Helmeted hornbill
22/8/2015	Racket-tailed drongo, Brahminy kite, White-collared kingfisher
07/2/2016	Elephant,
11/2/2016	Tapir, Mousedeer, Tiger
15/5/2016	Elephant
15/8/2016	Gibbon, Wild boar,
15/12/2016	Wild boar, Malayan sun bear, Elephant, Porcupine, Birds, Tapir
15/2/2017	Wild boar, Elephant, Sambar deer, Barking deer, Mousedeer, Tapir, Civet cat
4/3/2017	Civet cat
23/7/2017	Mousedeer, Tapir
11/10/2017	Wild boar, Elephant, Barking deer, Varanus
15/3/2018	Kingfisher, Wild boar, Sambar deer
28/6/2018	Mousedeer
15/8/2018	Kingfisher, Wildboar
14/10/2018	Wild boar, Tapir

Records Of Freshwater Fishes In River In Cherul Forest Concession (CFC)

- Kelah
- Peras
- Haruan
- Bujuk
- Baung
- Lampam
- Tapah
- Kawan

Table 2.15 Record of Presence of Wildlife in Compartments within CFC

WILDLIFE SPECIES	COMPARTMENT Nos.
Elephant	35,36,37,42,62,43,48,40,50
Porcupine	30,35,36,37,42,43,48,50
Tapir	30,35,36,37,42,43,48,50
Tiger	30,35,37,42,50,48,62,
Otter	30,35,42,48,50,62,
Hornbill	30,35,36,37,42,43,40,50,
Gibbon	35,36,37,42,43,49,40,50,62
Mouse Deer, & Barking Deer	35,36,37,42,43,49,40,50,62
Mountain Goat	48
Malayan Sun Bear	30,31,42,43,48,35,40

Table 2.16. IUCN, CITES and PERHILITAN Threatened and Endangered Fauna Species in DTC.

No	Fauna Species	Common Name	IUCN	CITES	PERHILITAN	Data Source
1	<i>Arctictis binturong</i>	Binturong	VU	III	Jadual I	WWF-Malaysia 1998
2	<i>Bos gaurus</i>	Gaur	VU	I	Jadual I	WWF-Malaysia 2009, 1998
3	<i>Bucerotidae spp.</i>	Hornbills	VU/N T/LC			WWF-Malaysia 2009
4	<i>Callosciurus prevostii</i>	Prevost's Squirrel		II	Jadual I	WWF-Malaysia 1998
5		Deer			Jadual 2	WWF-Malaysia 1998
6	<i>Dicerorhinus sumatrensis</i>	Sumatran Rhinoceros	CR	I	Jadual 1	WWF-Malaysia 1998
7	<i>Elephas maximus</i>	Asian Elephant	EN	I	Jadual 2	WWF-Malaysia 1998, 2009, JPSM 2006
8	<i>Helarctos malayanus</i>	Malayan Sun Bear	VU	I	Jadual I	WWF-Malaysia 1998
9	<i>Herpestes brachyurus</i>	Short-tailed Mongoose			Jadual I	WWF-Malaysia 1998
10	<i>Hylabates lar</i>	White-handed Gibbon	EN	II	Jadual I	WWF-Malaysia 1998, 2009, JPSM 2006
11	<i>Macaca fascicularis</i>	Long-tailed Macaque		II	Jadual 2	WWF-Malaysia 1998
12	<i>Macaca nemestrina</i>	Pig-tailed Macaque		II	Jadual 2	WWF-Malaysia 1998
13	<i>Martes flavigula</i>	Yellow-throated Marten		III	Jadual I	WWF-Malaysia 1998
14	<i>Nycteris javanica</i>	Javan Slit-faced Bat	VU			WWF-Malaysia 1998
15	<i>Nycticebus caucang</i>	Slow Loris	VU	I	Jadual I	WWF-Malaysia 1998
16	<i>Paguma larvata</i>	Masked Palm Civet		III	Jadual 2	WWF-Malaysia 1998
17	<i>Panther tigris jacksonii</i>	Malayan Tiger	EN	I	Jadual I	WWF-Malaysia 1998, JPSM 2006
18	<i>Panther pardus</i>	Leopard, Panther		I	Jadual I	WWF-Malaysia 1998
19	<i>Petaurista petaurista</i>	Red Giant Flying Squirrel			Jadual I	WWF-Malaysia 1998
20		Porcupine		III	Jad. 2	WWF-Malaysia 1998
21	<i>Prionailurus bengalensis</i>	Leopard Cat		I	Jadual I	WWF-Malaysia 1998
22	<i>Presbytis melalophos</i>	Banded Leaf Monkey	EN			JPSM 2006
23	<i>Ratufa affinis</i>	Cream-coloured Gaint Squirrel		II	Jadual I	WWF-Malaysia 1998
24	<i>Ratufa bicolor</i>	Black Giant Squirrel		II	Jadual I	WWF-Malaysia 1998
25	<i>Cervus unicolor</i>	Sambar Deer	VU		Jad. 2	WWF-Malaysia 1998
26	<i>Sus scrofa</i>	Wild Pig			Jadual 2	WWF-Malaysia 1998, JPSM 2006
27	<i>Tadarida johorensis</i>	Northern Free-tailed Bat	VU			WWF-Malaysia 1998
28	<i>Tapirus indicus</i>	Malayan Tapir	EN	I	Jadual I	WWF-Malaysia 1998, 2009, JPSM 2006
29	<i>Trachypithecus obscurus</i>	Dusky Leaf Monkey		II	Jadual 2	WWF-Malaysia 1998
30	<i>Tragulus javanicus</i>	Lesser Mousedeer		III	Jadual 2	WWF-Malaysia 1998
31	<i>Tupaia glis</i>	Malayan Treeshrew		II		WWF-Malaysia 1998
32	<i>Tupaia minor</i>	Lesser Treeshrew		II	Jadual 2	WWF-Malaysia 1998
33	<i>Viverra zibetha</i>	Malayan Civet			Jadual 2	JPSM 2006.

Source: WWF-Malaysia 2009.

Table 2.16 summarizes the threatened and endangered mammal species found in DTC which are listed on the Red List, CITES and the Wildlife Protection Act 2010 (as required by the *HCVF Toolkit for Malaysia*). The Wildlife Plan for Peninsular Malaysia (DWNP, 1992) lists the Asian Elephant, Malayan Tiger, Sumatran Rhino, Malayan tapir and the Gaur (Seladang) as endangered in Malaysia. DTC contains all five species in its forests.

2.8.3 Prescriptions/ Actions Taken by KPKKT

1. Map and protect the following areas (strictly no logging): (i) Soil Protection areas; (ii) Riparian Buffers; (iii) Swamps (Flood Control and Conservation); (iv) Any other areas identified as having a special value (e.g., an area where a rare species occurs or is known to be especially abundant)
2. Employ RIL techniques, incl. directional felling, appropriate laying and construction of skid trails
3. Minimise soil erosion and loss from road construction.
3. Retain pockets of unlogged forest stand in the larger matrix of logged forest. Such patches of unlogged forest act as reservoirs of biological diversity.
5. Disrupt the tree canopy as little as possible to minimise fragmentation of wildlife habitats (e.g. during road construction).
 - (i) Maintain crossing points over roads, where tree crowns on the two sides of the road maintain close contact. This is easier on level ground than on hill slopes, and easier on straight stretches than on curved parts. WWF Malaysia recommends a crossing point every 100m of road.
 - (ii) Maintain downstream and upstream access for aquatic fauna by using bridges or open-bottom culverts to cross streams.
6. Map and protect saltlicks.

7. Protect trees important for biodiversity:
 - Over-mature trees (for birds; e.g. hornbills and woodpeckers)
 - Fruiting trees such as fig trees
 - Rare tree species
 - When replanting, include a small proportion of tree species that are important for wildlife, such as Petai (*Parkia speciosa*), Kerayong (*Parkia javanica*), Tampoi (*Baccaurea spp.*), Pulasan (*Nephelium spp.*), Figs (*Ficus spp.*), Macang (*Mangifera spp.*), Kerdas and Jering (*Pithecellobium spp.*), Durian (*Durio zibethinus*), Asam jawa (*Tamarindus javanica*) and Sesenduk (*Scaphium malaccensis*).

2.9 Recreation and Eco-tourism

The use of the forest concession for recreation and eco-tourism is set to increase in the future. The Chemerong Waterfall in the 418-ha Compt. 26 of Pasir Raja Selatan PRF, and located some 155 km from the airport in Kuala Terengganu and 77km from Dungun, the nearest major town; has attracted an estimated 1,000 tourists per year. This suggests a high potential for tourism development. In 1995 and early 1996 KPKKT spent RM110,000.00 to build access road and parking space at the site. For further improvement, the Tourism Committee of Terengganu has endorsed a RM1 million contribution from government funds to develop the waterfall area into an attractive eco-tourism spot.

2.10 Demarcation and Control of Boundaries

KPKKT continues to assist, to the extent possible, and facilitate the work done by the Terengganu SFD to mark and clean forest boundaries within the Project Area. The work on forest boundaries follow the guidelines as specified in the Malaysian Forestry Manual and MC & I on cutting of boundary lines, marking of boundary trees, sequence of boundary inspection, replacement of missing beacons, *etc.*

2.11 Road and Bridge Construction and Maintenance

Road construction continues to be undertaken by contractors with close supervision and control by KPKKT and following the specifications as laid out by the Terengganu State Forestry Department (See Attachment 1).

2.12 Forest Nursery

KPKKT's nursery is located within compartment 52 Jengai PRF covering an area of about 0.56 ha. The location is near the main road entrance to Jengai PRF. This nursery is able to accommodate a total of 40,000 tree seedlings at any one time. Species that are raised in this nursery include dipterocarp species such as *Neobalanocarpus heimii* (Chengal), *Shorea atrinervosa* (Balau), *Shorea multiflora* (Damar Hitam), *Parashorea* (Gerutu), *Hopea nutans* (Giam), *Dryobalanops aromatic* (Kapur), *Dipterocarpus spp* (Keruing), *Hopea pubescens* (Merawan bunga), *Hopea griffithii* (Merawan Siput Jantan), *Shorea platycaldos* (Meranti Bukit), *Shorea pauciflora* (Meranti Nemesu), *Shorea Acuminata* (Meranti Rambai Daun), *Shorea parvifolia* (Meranti Sarang Punai), *Shorea curtisii* (Meranti Seraya), *Shorea leprosula* (Meranti Tembaga) and Non Dipterocarp species such as *Callophylum biflorum* (Bintangor), *Agathis borneensis* (Damar Minyak), *Aquilaria malacensis* (Karas), and *Scophium macropodum* (Kembang Semangkok). The seedlings were used in our "open area planting programme" in Dungun Timber Complex (DTC) and Cherul Forest Concession (CFC) upon the seedlings concerned reaching a height of about 2 feet (60 cm)..

CHAPTER THREE

3.0 RESOURCE CONSERVATION MANAGEMENT

3.1 Biodiversity Management Strategies and Plan of Actions

Dungun Timber Complex (DTC) and Cherul Forest Concession (CFC) play an important role as parts of a larger forest landscape (**HCV 2**) in the northeastern region of Peninsular Malaysia. They protect the biodiversity by being part of the *Banjaran Taman Negara - Banjaran Timur* forest complex; and in close proximity to Taman Negara National Park and sharing boundary with Gunung Aais and Sg. Nipah FRs in the south as well as the western flank of Pasir Raja PRF (**HCV 1**).

A total of four endangered dipterocarp species were identified during the survey on flora (**HCV 1.2**). A total of thirty five new species were recorded for Terengganu, 11 of which are endemic to Malaysia (**HCV 1.3**). One potentially threatened and endangered ecosystem (**HCV 3**) identified in the PRFs was the Pandan Swamp.

DTC is listed as an important water stress area in Peninsular with five catchments legally gazette as *Hutan Tadahan Air* (**HCV 4**).

The social survey when looking at all the communities surrounding DTC and CFC on a whole suggested that, more than 80% do not depend on the DTC and CFC forest for subsistence or to supplement their income. For families that do depend on the forest they rely on the forest for 3 main products i.e. NTFP, medicinal plants and fish with fish being the most critical resource of the three (**HCV 5**).

Forest Management practice strictly adhering to Reduced Impact Logging (RIL) guidelines is the single most important action being undertaken by KPKKT in order to safeguard the HCVs identified in DTC and CFC. Retaining healthy, logging-free riparian buffers are also crucial for biodiversity, to protect rivers and avoid erosion.

3.1.1 Avifauna Conservation

The DTC and CFC areas are rich in bird diversity with 176 near threatened, threatened and endangered (IUCN Redlist) bird species recorded (**HCV 1.2**). Critical temporal use of areas for birds were identified (**HCV 1.4**) and sustainable forest management practices by KPKKT will be important to ensure that these areas are not degraded during logging operations. A further enhancement in wildlife protection, stricter enforcement and anti-poaching measures are the best management options to reduce threats to the HCV species.

Regular patrols along the roads near the borders of the forest reserves could deter hunting activities at the DTC and CFC and mitigate the loss of threatened birds. Patrols could ideally be carried out with cooperation of the Forestry Department and Department of Wildlife and National Parks (PERHILITAN). A community outreach programme including socio-economic improvement to educate surrounding communities on the importance biodiversity, could play a meaningful role in mitigating hunting activities and inculcate a sense of belonging for the forest and its wildlife.

3.1.2 Large Mammal Conservation

Survey indicate that Jengai FR still harbours iconic wildlife species such as the Malayan tiger, Asian elephant and Malayan Tapir. However, these HCVs are in serious threat and their survival is under pressure. A total of nineteen threatened and endangered (**HCV 1.2**) mammal species were recorded with the iconic Malayan Tiger, Asian Elephant, Malayan Tapir, Dhole and White-handed gibbon listed as Endangered under the IUCN Redlist.

In order to ensure the survival of these species, appropriate strategies will be developed aimed at reducing encroachment into KPKKT's concession area. Effective enforcement to stop poaching and encroachment should be immediately implemented through increased patrolling and security as well as community engagement and awareness campaigns with assistance from Perhilitan, TSFD, FDPM and WWF-Malaysia. The presence of browse vegetation along the roadsides; serves as important food source for deers and other herbivores. In term of primates and other frugivores, KPKKT will help by replanting fruit trees (e.g. *Ficus sp.*) as part of the company's silviculture treatment.

3.2 HCVF (High Conservation Value Forests)

With the merging in the management of DTC and CFC, KPKKT now bears the responsibility to maintain and manage a total of at least five (5) as follows:

1. The Keruing Sarawak (*Dipterocapus sarawakensis*) plot within Compt 31 Jerangau PRF, and
2. The community watershed forest within Compt 52 Jengai PRF.
3. Orang Asli Durian Orchard in Comp. 35 Cherul FR
4. Neram Stream in Compt 35 Cherul FR
5. Animal Saltlick in Compt 35 Cherul FR.

Detailed descriptions on the five HCVFs are embodied in a separate **HCVF Management Plan** document being prepared for the two forest concessions, which also outlines Future Activities & Plan of Actions to be undertaken within and around the HCVFs concerned.

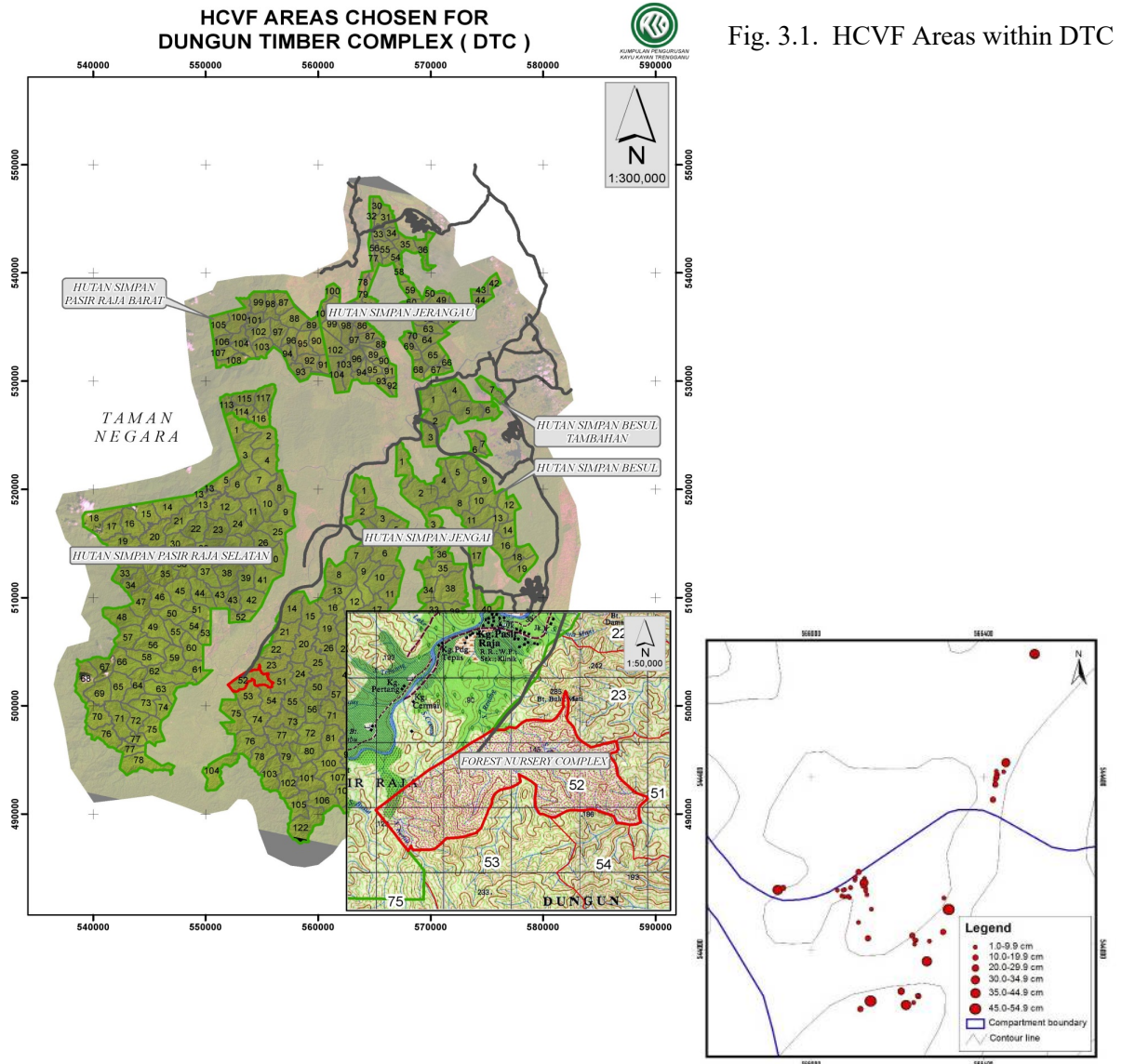


Fig. 3.1. HCVF Areas within DTC

Fig. 3.2. Cherul Forest Concession (CFC) Showing Forest Compartments, where three HCVFs are located within Comp. 35, i.e.

- (1) Orang Asli Durian Tree Orchard
- (2) Neram Stream
- (3) Wildlife saltlick

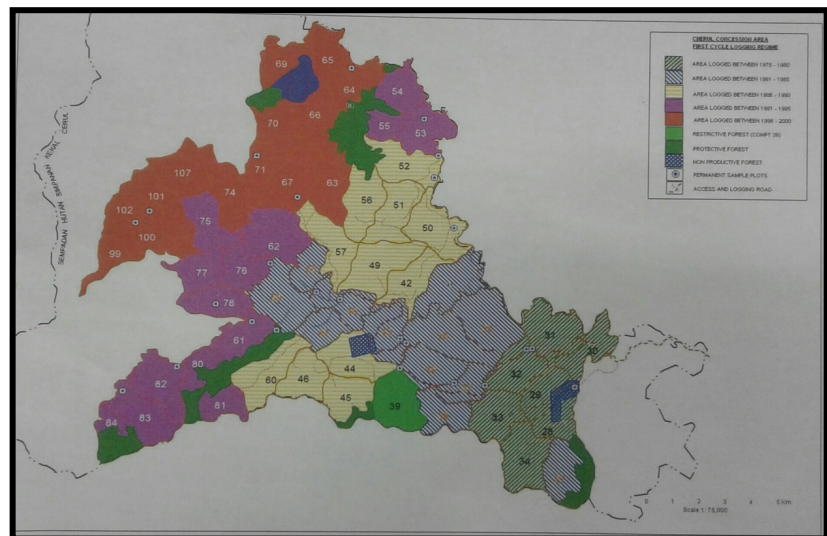




Fig. 3.3 Periodic Monitoring of HCVF Areas Within DTC and CFC.

3.3 Plan of Actions of Activities to Protect and Manage HCVF Areas

(a) Management activities

The following general line of actions will be followed by KPKKT to ensure the continued usefulness and relevance of all identified HCVFs under the new HCVF Management Plan Period 2022 – 2026.

- i) Demarcation and maintenance of the boundary of the areas
- ii) Conduct Multi-Resource Inventory on the HCVFs
- iii) Maintenance of database and documentation and marking on the ground of relevant features and resources
- iv) Regular Monitoring of flowering and fruiting and collection of seeds of identified species.
- v) For the Community Water Catchment (CWC) in C52 Jengai (DTC) monitoring activities will continue to be conducted on the water flow and quality in collaboration with the relevant agencies.
- vi) Tracking and collection of wildings.
- vii) Upgrading and maintenance of the nursery for planting stock propagation, improvement and production.
- viii) Re-census of trees and other resources to monitor growth rates, health condition and phenological behaviour.
- ix) Continuance and strengthening of the Collaborative Research and Development (R & D) with FRIM and other relevant agencies and NGOs on population biology, reproductive system, pests and diseases, breeding programme, as well as SIA and EIA.
- x) For the case of CWC, community engagement will be continued and strengthened from time to time especially with regard to the maintenance and upgrading of the HCV concerned.
- xi) To review and update the HCVF Management Plan on an annual basis with the view to, among others, apprise the progress during the preceding year, with emphasis on complying with the relevant P&C of forest stewardship.

(b) Training Needs and Capacity Building

Future training and capacity building needs would include the following:

- 1) Plant and tree identification within HCVF areas;
- 2) Fauna and faunal habitat identification and conservation;
- 3) Multi-resource Survey methodologies;
- 4) Monitoring of environmental parameters within HCVF areas;
- 5) Conflict resolution.

3.4 HCVF Committee/ Core Working Group (CWG)

It is proposed that the management of HCVF within DTC and CFC be overseen by a high level committee/ Core Working Group (CWG) whose members should comprise representatives of the following:

- 1) Golden Pharos Berhad, Pesama Timber Corporation Sdn Bhd & KPKKT
- 2) Forestry Department (TSFD and/or FDPM)
- 3) WWF-Malaysia
- 4) Research & academic institutions, e.g. FRIM, UPM, UMT, USM
- 5) Malaysian Nature Society (MNS)
- 6) JaKOA
- 7) Local Forest-Dependent Community
- 8) Relevant International agencies and donors, etc.
- 9) Independent Consultants.

CHAPTER FOUR

4.0 FOREST PROTECTION, MONITORING AND CONTROL

4.1 Forest Protection

The four main aspects of forest protection include:

(1) Protection from encroachment; (2) Protection from pest and disease; (3) Protection from fire; and (4) Protection from pollution.

4.1.1 Protection from Encroachment

KPKKT has taken appropriate steps to protect strategic parts of DTC and CFC by installing gates or berms that would reduce the potential for encroachment and wildlife harassment. These measures will be strengthened through regular patrols with the help rendered by the enforcement division of JPNT and relevant concerned authorities such as the police, army, PERHILITAN, etc.

4.1.2 Protection from Pests and Diseases

In KPKKT the line of action that was followed in this respect during the planning period focuses on the following:

- (1) Improvement in Nursery Practice
- (2) Improvement in Forest Hygiene

4.1.3 Protection from Fire

The control and protection of the concession forests from fire require several important steps that need to be clearly understood and followed by the management. These are:

- 1) demarcation of clear and well-defined boundaries;
- 2) establishment of permanent firebreaks;
- 3) provision of standing instructions to staff and workers;

- 4) establishment of communications channel;
- 5) provision of training in fire fighting skill for staff and workers.

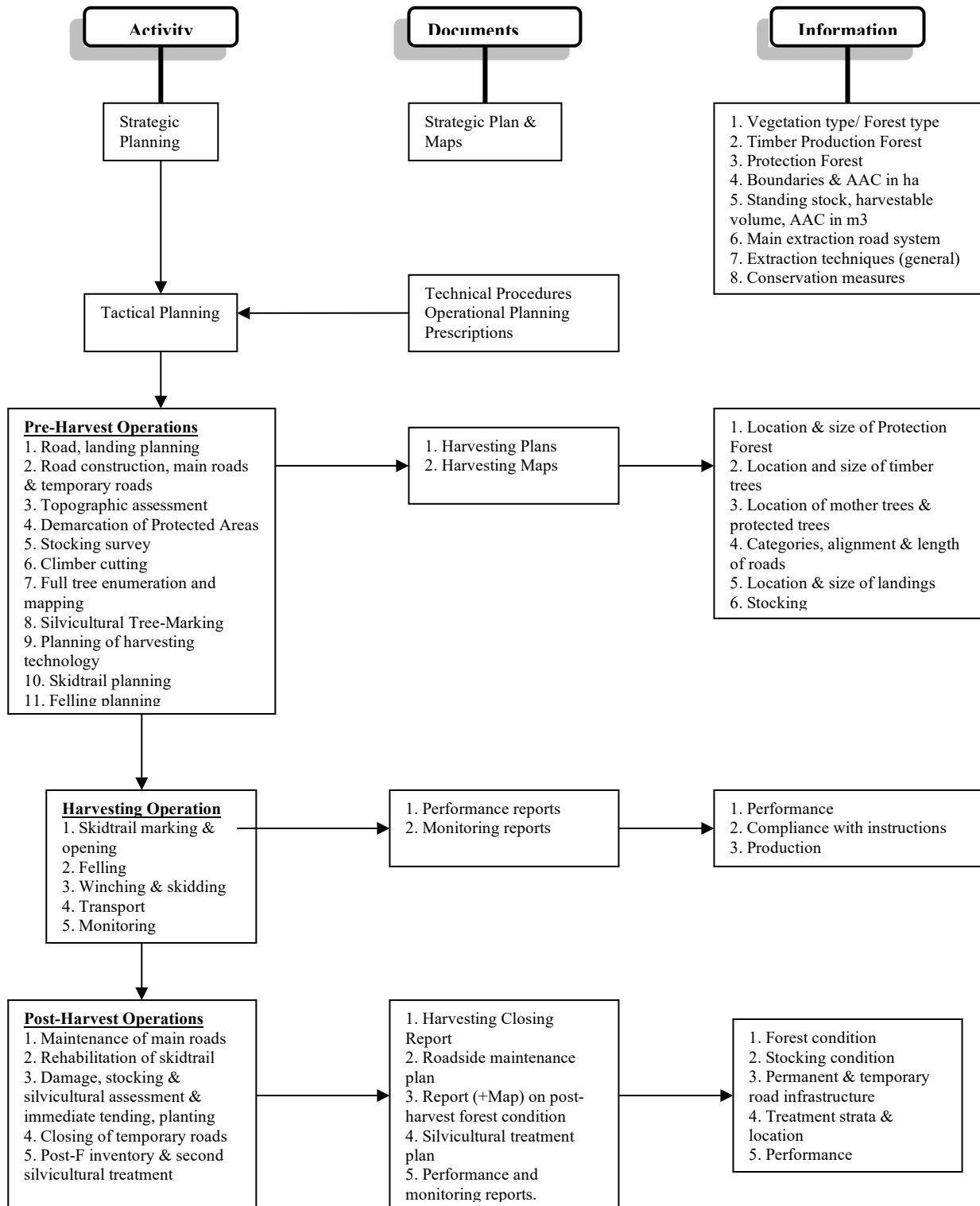
4.2 Monitoring and Control

Periodic reviews of the unified Forest Management Plan for the two concession areas will be undertaken to reassess the initially calculated AAC and, if necessary, adjusted. The periodic reviews will also take into consideration any over- or under-logging during the preceding 5 years, forest conversions, and transitions from untreated/ unsustainable to sustainably managed forest, costing, protection status of the forest etc.

An indispensable part of any professional monitoring, evaluation and control is the existence of proper documentation and records keeping. A good records management provides a recipe for what to do, how to do it, and where to begin. It has the following major components:

(i) records creation management, (ii) records retention development, (iii) vital records security, (iv) filing systems management, (v) records centres management, (vi) development of organising schemes, indexing, and knowledge of how and when to dispose of quality records.

Figure 4.1 Planning, implementation and monitoring of reduced-impact logging (RIL).



CHAPTER FIVE

5.0 TRAINING NEEDS AND CAPACITY BUILDING

5.1 The Need for Capacity Building and Human Resource Development

Capacity-building refers to the process of developing and strengthening the skills, instincts, abilities and competencies, processes and resources that are required by organizations and communities in order for them to survive, adapt, thrive and grow in a fast-changing world. An essential ingredient in capacity-building is the transformation that is generated and sustained over time from within the individuals and organization, i.e. transformation that goes beyond performing routine tasks into changing the mindsets and attitudes.

For the case of KPKKT and, for that matter all companies under GPB, training and capacity building are an on-going process and conducted regularly on all aspects of job-related activities and geared towards enhanced efficiency and increased productivity. KPKKT management holds views that both KPKKT's personnel of all levels and those of the company's contractors must be adequately exposed to the necessary training in order for them to work in tandem towards achieving the sustainable management of DTC and CFC and maintain their FSC-certified status as "well-managed forests". As for the contractors and their staff, KPKKT provides the necessary support and incentives for training initiatives by, for instance, roping-in the contractors concerned into KPKKT's training programmes aimed at enhancing knowledge and competencies in field techniques. Among the skills that need to be acquired include, but not necessarily limited to the following:

- (1) The business of natural tropical forest management, including planning for sustainability;
- (2) Aspects on forest certification and chain-of-custody;
- (3) Environmental, biological and social impacts of forest operations, and practical and cost-effective short and long-term measures to mitigate those impacts,
- (4) RIL concept and practice including aspects of forest road engineering and directional felling

- (5) Management of forest for NTFP and forest services;
- (6) Economic aspects of SFM in tropical rain forest,
- (7) Conservation and management of biodiversity.
- (8) Skills in operating logging machines/ tools,
- (9) Skill in forest inventory, basic survey, tree marking and tree & seedlings/ wildings identification (dendrology),
- (10) Basic ecology and environmental impacts.
- (11) The application of biotechnology in nursery management and planting stock production.
- (12) Fauna and faunal habitat identification and conservation;
- (13) Multi-resource Survey methodologies;
- (14) Monitoring of environmental parameters within HCVF areas;
- (15) Public relations and Conflict resolution.

Figs. 5.1 and 5.2 summarise some conceptual ideas on capacity building process and an example of capacity building template, which KPKKT could emulate after the necessary adjustment and modification.

Fig. 5.1. Capacity Building Process.
Source: www.sketchbubble.com

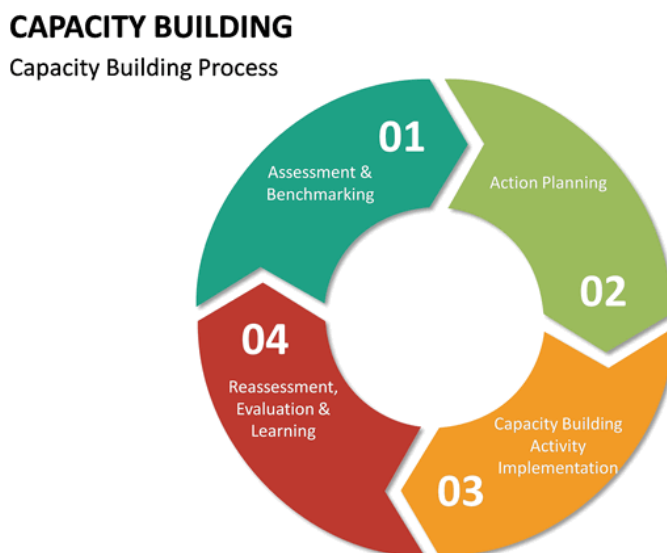


Fig. 5.2. Capacity Building Template.
Source: www.sketchbubble.com



CHAPTER SIX

6.0 SOCIO-ECONOMICS

6.1 General Context

Socio-economic factors are the social and economic experiences and realities that help shape an individual's and community's personality, attitudes, perception and lifestyle in the presence of some internal and/or external stimuli. The factors can also define regions and neighbourhoods such as the Kemaman and Dungun districts of South Terengganu in which KPKKT operates for almost 4 decades now. For a population which is largely rural and of low-income, the socioeconomic issues would range from lack of employment opportunities, poverty, low education attainment, human-wildlife conflicts, reduced harvests of NTFPs, lower environmental qualities to ethics of the forest management operations by KPKKT. As was shown in one of our survey, poverty is a major socioeconomic issue because lack of money for basic necessities is the source of many other socioeconomic concerns.

Besides the obvious services and environmental benefits of the natural forest, some of its produce are traditionally known to have high consumption and income values to certain segments of the communities living in DTC's and CFC's vicinity. KPKKT continues to ensure that all its activities, particularly harvesting operations, do not severely damage, and thereby reducing the values of these resources. In this context, KPKKT should attempt, to the extent possible, to engage with the local population and implement the necessary measures to enhance the quantity and quality of these resources.

6.2 Role of KPKKT and the Need for Community Engagement

On the other hand, the local communities on their part, should shoulder some of the responsibilities to safeguard the resources from being over-exploited while trying to gain economic benefits and services from them. In this respect, KPKKT will continue with the initiative to engage and empower the local communities for the purpose of creating and instilling awareness about the relevant laws and regulations which govern the collection, keeping and utilisation of these resources. This will be done in cooperation with the relevant

authorities at various levels: federal, state and district, such as the Forestry Department, Wildlife, Environment as well as the enforcement authorities who in turn have their respective areas of responsibility and jurisdictions.

Regular consultations between KPKKT, the relevant households and the authorities concerned (incl. TSFD) must continue to be held to deliberate on issues related to the collection and use of forest produce and services as well as measures to alleviate poverty. In this relation, KPKKT needs to continue to conduct Social Impact Assessment (SIA) on its SFM operations within DTC and CFC and identify and apprise their effects on the local communities. KPKKT should also maintain close relationship and rapport with other relevant interest groups, government agencies, academia, as well as non-governmental organisations (NGOs) to solicit their professional inputs on relevant issues raised by the affected local communities and act on them as appropriate. In this way, KPKKT hopes to be able to conduct its SFM activities in an informed and more-or-less transparent manner while at the same time carrying out the appropriate mitigative and corrective measures commensurate with the scale and intensity of the company's SFM operations.

Such SIA initiative also serves to fulfil one of the Forest Stewardship Council (FSC)'s Principles and Criteria for forest stewardship to which KPKKT subscribes. Since 2008 KPKKT had been committed to follow and abide by FSC P&C which form the basis of FSC certification standards.

Among others, findings from the latest SIA survey conducted in 2018 showed that most of the local villagers still live in poverty with about 50 per cent of them surviving on a level of income that is below national rural Poverty Line. This has subsequently forced a section of the local community to rely on DTC and CFC forests for supplies of forest produce such as freshwater fishes and other non-timber forest produce (NTFP) as well as timber for construction material. Approx. 73 per cent of the people harvested the various forest produce for their own consumption while some 27 per cent engaged in the business and trade of them. The villagers also had had mixed perceptions on the impacts of SFM activities on the forest and environment and generally showed deep concern on the natural resource, while others expressed their satisfaction and support to KPKKT for its sound and responsible management of DTC and CFC forests. A series of other recommendations are also outlined in the SIA

report which would enhance the positive values while mitigating the negative impacts of SFM operations within DTC's and CFC's forests.

6.3 Community Engagement Strategies

A community engagement strategy by KPKKT should be centered around:

- Encouraging the community to believe in KPKKT's and government's vision on relevant issues like the concept of Sustainable Forest Management (SFM), environmental protection, species preservation, forest certification and the continued contribution of KPKKT to the local economy and societal well-being.
- Building trust with the community by showing how KPKKT can help in the above-mentioned issues..
- Improving closer participation from the community towards each effort.

The above could be realized by KPKKT adopting the following strategies:

1. *Show the community what are the key issues facing them now and in the foreseeable future by giving research-backed data on the issues concerned.*

- Conduct SIA to identify what they think are the biggest problems.
- Invite community stakeholders for meetings (within smaller groups, if necessary) and listen to whether they agree with your assessment.

The community as a whole will agree that the issues are an urgent problem to be tackled and will be more receptive and willing to participate.

2. *Explain/Demonstrate how KPKKT as an organization can work with the community*

The vital goal behind this strategy is to encourage the community to believe in KPKKT. That is, it is more a trust and relationship building approach. Even if they recognize the threat (or problem), the community should believe that KPKKT always have their best interests in mind and can effectively execute it.

3. *Encouraging the community to participate through mutual consultation and act in gradual steps, particularly on issues involving conflict resolution.*

4 Provide impact numbers consistently, listen to feedback, and tweak efforts

The engagement strategies for this would be for KPKKT to actively listen to the community on the problems they face – as members, and as beneficiaries. It is also essential to consistently encourage them with how far they have come.

CHAPTER SEVEN

7.0 ENVIRONMENTAL MANAGEMENT AND MITIGATION MEASURES

7.1 General Context

Environmental management under SFM is concerned with understanding the structure and functioning of the TRF and the mixed dipterocarp forest ecosystem, and in what way do sound forest management decisions and field operations fit in them. In this context, being multifaceted, environmental management in DTC and CFC forests is about predicting immediate and future environmental changes that may result from our forest management activities for the benefit of the company whilst minimizing (or, avoiding, if possible) any negative environmental impacts.

The process of environmental management involves:

- Identifying the desired environmental outcomes
- Identifying the physical, economic, social, cultural, political and technological constraints against obtaining these outcomes
- Considering the most feasible options for achieving the desired outcomes
- Anticipating, avoiding, and solving environmental and conservation issues.

In regards to its multidisciplinary nature, environmental management includes a diverse set of expertise and stakeholders, for example forest managers and supervisors, contractors, local communities, researchers, academics, policy-makers, non-governmental organization (NGO) workers, company employees, and relevant government authorities.

7.2 Summary Of Environmental Management And Mitigation Measures Undertaken Within DTC And CFC

Table 7.1. provides a summary of the mitigation measures undertaken within DTC and CFC.

Table 7.1. Summary of Management and Mitigation Measures in DTC’s and CFC’s Project Areas

No.	Significant Aspect & Impacts	Mitigation Measures & Compliance
1	<u>Project Concept</u>	<ul style="list-style-type: none"> ➤ Selective Logging conducted in Logging Blocks (LBs) of 100- 150 ha. ➤ Tree felling and removal based on “RIL” and Directional Felling with the specific objective of reducing damage to the timber and residual regeneration, and soils and minimising waste in the context of achieving SFM.
2	<p>2.1 <u>Project Design</u> <u>Soils</u></p> <p>a) Erosion of soil surface b) Landslip c) Slope stability</p>	<ul style="list-style-type: none"> ➤ Appropriate engineering practices by installing culverts, side ditches, cross drains, diversion ditches, sediment basins, rip rap, silt traps or other facilities. Minimisation of total length of roads and skid trails and area of disturbance along with proper maintenance. Forest roads and forest tracks follow the specifications laid out by the Forestry Department. ➤ All forest roads and other forest infrastructure are closed when not in active use. ➤ Benching of slopes, diversion, dykes, retention of buffer strips, seeding of grass or cover vegetation. Minimisation of cutting and filling. ➤ Use and movement of heavy machinery are strictly controlled.
	<p>2.2 <u>Hydrology and Water Quality Control and Supervision</u></p> <p>a) Water yield, dry season flow and flood response b) Sediment load and turbidity c) Physical, chemical and biological qualities</p>	<ul style="list-style-type: none"> ➤ Conservation of catchment areas; density of roads and skid trails are kept to a minimum and below the specified limits. ➤ Proper engineering practices by dumping loose material at designated area; adequate compaction of permanent roads and provision of culverts, cross-drains; silt traps; buffer zones; revegetate slopes with fast growing indigenous species and bamboo. ➤ Efforts made to ensure that the total suspended solid (TSS) in surface water run-off from the project site is kept below 150 mg/l. ➤ Proper storage of gasoline or engine oil; proper waste disposal site. ➤ Prohibition to the use of poison. ➤ Control of the use of fire for open burning ➤ Appropriate and environmentally safe toilet facilities built for the forest workers at or near their kongsis. ➤ All sewage and kitchen sullage from the workers’ kongsis are appropriately handled before being released to any water courses.
	2.3 <u>Drainage</u>	<ul style="list-style-type: none"> ➤ Utilisation of natural drainage patterns to reduce sedimentation; maintain riparian vegetation. Facilitation of water flow by clearing streams and culverts from rubbish, waste timbers and silt. ➤ All river crossings only constructed upon the approval from TSFD. ➤ All natural water courses, rivers and their tributaries are not used as silt trap or sediment trap. ➤ No activity whatsoever is conducted within river reserve and buffer strips
	<p>2.4 <u>Groundwater</u></p> <p>a) Recharge, quality and aquifer characteristics b) Existing uses</p>	<ul style="list-style-type: none"> ➤ Conservation and maintenance of catchment areas; minimum disturbance to aquifer. ➤ Avoidance of spillage/ seepage of fuels, engine oil or other similar pollutants on soil. Proper disposal of unused fuels, engine oil, rubbish and sewage. Proper storage of fuel and engine oil. ➤ Disposal of Scheduled Wastes is undertaken in accordance with the Environmental Quality Regulations (Scheduled Wastes) 1989.
	<p>2.5 <u>Atmospheric Quality Control</u></p> <p>a) Climate b) Air pollution</p>	<ul style="list-style-type: none"> ➤ Logging operation conducted according to proper Forest Harvesting Plan and special care taken during rainy seasons. Usage of less polluting machines (bulldozers, excavators, trucks, 4-wheeled drives, chainsaws). These machines are regularly checked and maintained. ➤ Open burning is strictly controlled and supervised at all times ➤ Mechanisms instituted to slow down the speed of running vehicles going downhill by building bunds etc. Surface grade of main roads improved. ➤ Similar to air pollution – noise tends to be localized and temporary in nature. Sources of noise come from chainsaws, heavy machines (bulldozers, excavators, trucks, generators, pumps, etc) particularly those

	c)	Noise	<p>old machines which are not only extremely noisy and producing a lot of smoke but also a safe hazard and dangerous to use. Continued exposures to noises such as old generators, bulldozers and excavators may seriously impair hearing ability of workers and disturb hibernating animals.</p> <ul style="list-style-type: none"> ➤ Workers should wear safety gears such as ear plugs and machines and engines should not be allowed to run when not in use. New and well-serviced machines should be preferred whenever possible. ➤ No open burning was done on any combustible material or rubbish except those allowed under the Environmental Quality Order (Prescribed Activities) (Open Burning) 2000.
	2.6	<u>Land Use</u>	<ul style="list-style-type: none"> ➤ All boundaries for forest compartment and the whole logging block were clearly marked to the specification of TSFD. ➤ Erosion control measures were implemented.
	2.7	<u>Habitats, Species and Population</u>	<ul style="list-style-type: none"> ➤ A comprehensive survey was conducted with help from WWF-Malaysia and PERHILITAN to document the fauna in the forest area including those animal species which are thought be threatened, rare and endemic to the site.
	a)	Terrestrial/ Aquatic Habitat	<ul style="list-style-type: none"> ➤ Proper sustainable forest management practice; protection of catchment areas; proper erosion control measures.
	b)	Endangered, endemic or protected plant species	<ul style="list-style-type: none"> ➤ Avoidance of logging in areas identified as containing high conservation value (HCV) species.
	c)	Birds	<ul style="list-style-type: none"> ➤ Avoidance of felling of nesting trees or felling of timber trees on nesting trees. Avoidance of felling fruiting trees whose fruits are useful to birds and other wildlife.
	d)	Mammals, reptiles and amphibians	<ul style="list-style-type: none"> ➤ Construction and logging activities are done in stages (start from fringes of forest) to allow animals to move and migrate to other safer, forested areas.
	e)	Fish and other aquatic life	<ul style="list-style-type: none"> ➤ Erosion control measures implemented; catchment areas preserved. Never use poison and explosive to catch fish.
	f)	Fruit trees	<ul style="list-style-type: none"> ➤ Prohibition to workers from cutting down fruit trees and trees known to support animals and birdlife.
	2.8	<u>Human and Socio-Economic</u>	<ul style="list-style-type: none"> ➤ Proper erosion control measures; preservation of water catchment areas. Prohibition of use of poison. ➤ Enforcement of safety rules for all workers; safety of logging and transportation; maintenance of machines. ➤ Employment local residents as far as possible ➤ Avoidance from disturbing these areas; report findings to Museum Department or relevant agencies. ➤ Avoidance from operating near local kampung settlements. ➤ Prohibition to workers from hunting and poaching of wild animals as well as destroying nesting sites. ➤ Measures taken to prohibit/ limit access of public into forest area as this may only complicates safety arrangement: their own safety from falling trees and branches, running machines and passing vehicles; protection of the forest against fire, theft of forest produce, etc.
3	a)	Forest Protection	<p>Protection against Pests and Diseases.</p> <ul style="list-style-type: none"> ➤ Minimisation of use of chemicals but encouragement to use of biological means to control pests and diseases.

CHAPTER EIGHT

8.0 CONCLUSION

8.1 Compliance

KPKKT's compliance with FSC's set of P & C during the period subsequent to the first certification of DTC in 2008 up till now can be summarised as follows:

Principle 1: Compliance with Laws and FSC Principles (6 criteria)

- ✿ KPKKT has a track record of compliance and its business relationship with state and federal regulatory agencies appear to be in harmony.
- ✿ No incidence of illegal harvesting or poaching of wildlife so far.

Principle 2: Tenure and Land Use Rights and Responsibilities (3 criteria)

- ✿ KPKKT is a member of the Joint Consultative Committee (*Jawatankuasa Pembangunan and Tindakan Daerah*) at the district level to resolve any forestland ownership disputes, if any. There had never been any forestland dispute in DTC and CFC forest concession.
- ✿ Law establishes legal ownership and right to use the defined forest area.

Principle 3: Indigenous Peoples' Right (4 criteria)

- ✿ There is no indigenous community living inside the Project Area and no indigenous people working for KPKKT or any of KPKKT's contractors.
- ✿ However KPKKT is sensitive to the needs of these people and render appropriate assistance in the event they trespass through DTC and CFC areas. Staff and Contractors of KPKKT have been accordingly regularly briefed to this effect.

Principle 4: Community Relations and Workers' Rights (5 criteria)

- ✿ KPKKT's presence in the district is well received, and the company has been considered in a favourable sense by the local community. Local residents are given priority for services, job opportunities and labour contract.

- ❖ KPKKT has contributed positively to the economy of the state and the district of Dungun.
- ❖ A joint committee between employer and employee exists and operating.
- ❖ KPKKT has been a good paymaster and employer as well as a responsible neighbour.

Principle 5: Benefits from the Forest (6 criteria)

- ❖ As a member of Golden Pharos Berhad (GPB), KPKKT is financially sound and contributes to add value to its timber through various downstream processing under GPB: sawmilling and solid door manufacturing, etc.
- ❖ Favourable rate of growth of second growth forest ensures sustainability of operation into second, and subsequent rotations under SMS.

Principle 6: Environmental Impact (10 criteria)

- ❖ Landscape-level EIAs on both DTC and CFC had been conducted and the relevant EIS had been prepared.
- ❖ No usage of fire or open burning in all of KPKKT's forestry operations.
- ❖ Management of reserved and protected areas is addressed in the FMP
- ❖ Guidelines on measures to mitigate negative impacts of forest operations are being followed in earnest.
- ❖ Disposal of chemicals, containers, waste oils, etc is being done properly.

Principle 7: Management Plan (4 criteria)

- ❖ A new Forest Management Plan document that embraces and caters both DTC and CFC is being finalised and will be operationalized soon
- ❖ KPKKT management consists of well qualified and experienced team of professionals.
- ❖ Resource management is conducted in accordance with SFM which balances up the different needs of economic, social and environment sustainability and protection.

Principle 8: Monitoring and Assessment (5 criteria)

- ❖ Collaborative research projects have taken place with FRIM, JPSM, UPM, etc.

- ☀ Research and monitoring plots have been established and remeasured at specified intervals.
- ☀ R & D capability is being expanded.
- ☀ Appropriate training and exposure provided to relevant staff.

Principle 9: Maintenance of High Conservation Value Forests (HCVFs) (4 criteria)

- ☀ HCVF area have been identified and surveyed the ground with assistance from WWF-Malaysia
- ☀ Appropriate plans of action for the management of HCVFs are in place.

8.2 Moving Forward

In what follows, some basic issues are presented for KPKKT to critically address as part of the enabling conditions and critical success factors for the future:

- ☀ KPKKT to continue to build up standing timber inventory data to levels associated with optimal stocking, rather than being depleted over time.
- ☀ KPKKT to ensure financial stability of the organisation and anticipate the likelihood that financial exigencies may influence the stability of the timber harvesting regime and exceed the allocated AAC.
- ☀ KPKKT to embark into serious program to educate its staff at all levels as well as the contractors.
- ☀ KPKKT to continue to forge ahead and expand its capability in the fields of R & D and to continuous monitor of the forest conditions through in-house as well as collaborative research initiatives and to build up its own data bank for future planning and execution.
- ☀ KPKKT to make effort to move ahead and take pride in being a truly professional forest management company that subscribes to MC & I and FSC P & C both in spirit and action by adopting a more responsible image as a forest management firm which places due and balanced emphasis on all tangible and intangible aspects of SFM.

Attachment 1:
Specifications for Forest Roads and Bridges