

# CONSERVATION OF THE ORANGUTAN AND FOREST MANAGEMENT UNITS: THE DERAMAKOT MODEL

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## ABSTRACT

*Deramakot Forest Reserve, remains the sole forest reserve area that has been certified under both the Forest Stewardship Council (FSC) and the Malaysian Criteria and Indicators Standards, in Sabah.*

*This paper expounds on the experiences gathered and lessons learnt from managing the reserve. The Deramakot Model has shown that, sustainable forest management (SFM) with a logging component, is compatible with wildlife management, the Orangutan being seen as an example of a species, that can adapt and thrive under such a management regime.*

*The expansion of the Deramakot Model to other forest reserves augurs well for wildlife management in Sabah.*

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## 1. INTRODUCTION

***“.....Sustainable forest management must address 3 main issues: it must be environmentally acceptable, it must be socially acceptable and it must be economically viable.....”***

(Datuk Daniel K.S. Khiong – Director of Forestry, Sabah)

***“.....Thank God, I have done my duty.....”***

(Horatio Nelson – Battle of Trafalgar)

This paper expounds on the experiences gained in managing Deramakot Forest Reserve, based on the concept of sustainable forest management (SFM). It also provides some insights into the compatibility of SFM with wildlife management, with the Orangutan chosen as the key species that appears to have adapted well under the management regime of Deramakot.

In the final analysis, it is also about quality management under “real” world conditions. This paper shall attempt to demonstrate the successes and failures of managing a commercial forest reserve with the respectability of being labelled as “well managed”.

### 1.2 Background

As part of the Permanent Forest Estate of commercial status, the Deramakot Forest Reserve covers 55,083 hectares of mixed Dipterocarp forest in the east of central Sabah. With the adjacent Segaliud-Lokan Forest Reserve in the northeast, it forms the Forest Management Unit (FMU) Number 19.

The earliest known logging began in the southern part, along the Kinabatangan River in the 1950s'. The area was licensed for logging from 1955 to 1989. The minimum diameter for harvesting was 60cm and the felling cycle, 60 years. Loggers ignored the rule when it was more convenient, attractive and profitable. Variable cutting intensities of past management practices have resulted in an extremely heterogeneous condition of the residual forests. Only 20% of the area is considered well stocked with harvesting trees and more than 30% is covered by very poor forest with virtually no mature growing stock left.

#### 1.2.1 Infrastructure

To facilitate management and field operations, the Deramakot Sustainable Forest Management (SFM) Project area is equipped with the following infrastructure:

- 40km of all weather roads;
- Office;
- First Aid Room;
- Conference Room;
- Workshop;
- 2 Guesthouses;
- 10 detached houses (living quarters); and
- 1 outpost for boundary control.
- Bridges.

### 1.2.2 Project Area

Deramakot Forest Reserve was chosen in 1989 as the project site for the Malaysian-German Sustainable Forest Management Project (M-GSFMP) for **two reasons**:

- a) it was the only logged natural forest which was neither licensed nor threatened by shifting cultivators, thus avoiding problems from these directions for the project and,
- b) the policy of the German Ministry of Economic Cooperation and Development (BMZ) prohibiting projects in pristine forests which involve timber harvesting.

## 2. THE MALAYSIAN-GERMAN SUSTAINABLE FOREST MANAGEMENT PROJECT (MGSFMP)

For the period 1989 – 2000, the Sabah Forestry Department (SFD), in collaboration with the German technical agency, GTZ, implemented the MGSFMP, which was made up of 4 phases. These are:

- 1989 – 1992: a strong research emphasis with a component for management planning.
- 1992 – 1994: management planning, training and consolidation.
- 1995 – 1998: institution building, human resource and development, consolidation/implementation and extension
- 1999 – 2000: consolidation, planning and human resource development.

A medium-term (10 years) Forest Management Plan (FMP) for Deramakot Forest Reserve (DFR), covering the period, 1.1.1995 – 31.12.2004, was developed over a period of 5 years (1990 – 1994) through the project and was ready for implementation in 1995. This FMP is the blueprint for operational work in Deramakot up to today.

### 2.1 The Gists Of The Forest Management Plan

Deramakot Forest Reserve is to be managed in accordance with sustainable forest management (SFM) principles and a multiple-use approach to natural forest management (NFM). Amongst other things, the plan specifies **that**:

- not more than 20,000 m<sup>3</sup> are to be harvested each year (the annual allowable cut or AAC);
- 1000 hectares are to be silviculturally treated each year;
- 200 hectares of rehabilitation planting per annum is to be carried out on degraded sites;
- harvesting shall follow RIL (reduced impact logging) guidelines;
- research and development will be conducted; and
- training and human resource development shall be part of the plan implementation (Deramakot FMP – 1995).

The FMP is available from the Forestry Department (FD) for those interested in procuring a copy.

## 2.2 The Organizational Set Up Of Deramakot Forest Reserve.

The management of Deramakot is staffed as illustrated in **Table 1**. Basically, it is a classical governmental hierarchal organization with the corresponding rules, regulations and procedures.

**Table 1. Staffing**

<b>CATEGORY</b>	<b>NO. OF PERSONNEL</b>
District Forest Officer	1
Assistant District Forest Officer	1
Forest Ranger	4
Forester (Forest Guards)	3
Driver	6
Labourer	32
Mechanic	2
Boatman	4
<b>TOTAL:</b>	<b>53</b>

Deramakot is manned by 53 field personnel deployed over six major management activities, which are:

- i. Harvesting
  - Opening (compartment harvest plan preparation)
  - Monitoring (harvesting)
  - Closing inspection (post-harvest)
- ii. Road Construction and Maintenance
- iii. Silviculture
  - Tending (climber cutting and liberation thinning)
- iv. Rehabilitation (planting)
- v. Administration
- vi. Protection
  - Boundary control
  - Fire Prevention and Control

## 2.3 How The FMP Is Implemented?

Plan implementation for the 3 major activities (harvesting, silviculture tending and rehabilitation planting) is contracted out through the award of service contracts, with supervision by SFD.

Planning, infrastructure development, protection and other work are executed by SFD itself.

## 2.4 Budget For Forest Management Plan Implementation

This is procured through the development vote under the various Malaysia Plans starting in 1991, with approximately RM30 million allocated for each plan period of 5 years or approximately RM6 million per annum. For the Eight Malaysia Plan, the allocation is RM25 million.

## **2.5 The Certification Of Deramakot Forest Reserve, The Quality Of Management Standard Obtained**

“Certified” as defined by the Collin’s pocket dictionary of the English language means: ***guaranteed, attested to by a certificate or officially declared insane***”

In the context of Deramakot, it has not yet been certified as ***mad*** but “well managed” in accordance with the Forest Stewardship Council (FSC) principles.

In 1997, SFD engaged SGS to audit the management of Deramakot under the QUALIFOR standard and the Malaysian Criteria and Indicators standard. The certification was successfully obtained covering a period of 5 years (July 1997 to July 2002).

A major reassessment was carried out in Deramakot by SGS upon the expiration of the certificate in July of 2002. As a result, in April of 2003, Deramakot was re-certified as a “Well-managed Forest” for a certification period of another 5 years (2003-2008).

This paper will elaborate further on the subject of certification in subsequent sections. However, for those interested in knowing the cost of the certification, SFD paid SGS RM105,000.00 for the first 5 - year period, which included the surveillance component, carried out at approximately 6 – monthly intervals. For the second certification exercise, the contract sum is RM207,704.20

## **3. WHAT HAS BEEN ACHIEVED IN DERAMAKOT OVER THE LAST 5 YEARS (1997 – 2002)?**

***“Not by thoughts alone. Good intentions put into action “  
(ITTO Slogan)***

This section elaborates in some detail, the work done in Deramakot Forest Reserve, over the last 5 years. The intention is not to cram or “sex up” the facts, but on the contrary, to highlight the operational achievements, that will not be lost in briefness.

### **3.1 Forest Management Plan (FMP) and Annual Work Plan (AWP)**

The DFR model owes its success to proper planning, concept development and in the implementation of the FMP. The objective is to manage the forest in a way that mimics natural processes for production of low volume, high quality and high priced timber. The main purpose of drawing up the FMP is to define the 10-year planning objectives, which serve as guiding principles to plan ahead and operationalise the AWP. The main task of the Sabah Forestry Department (SFD) is to prepare the AWP, which covers harvesting, silviculture, rehabilitation and other forest management activities. The responsibilities to supervise and monitor all operations undertaken by the contractors, lay with SFD. Both SFD and the appointed contractors are jointly responsible in carrying out these operations, to ensure compliance.

Implementation of the annual plan requires skills and competencies as well as entrepreneurship. SFD staff training is tailored to specific work requirements and likewise, with the contractors's supervisors, technicians and forest workers.

### 3.2 Harvesting

Sustainability of timber harvesting means harvesting not more than the annual growth. It is a measure of the economic viability, and a criterion to ensure self-sufficiency and profitable returns. The annual allowable cut (AAC) of 20,000m<sup>3</sup> was based on the individual tree growth simulation model, *DIPSIM or Dipterocarp Forest Growth Simulation Model*. However, after 5 years in operation, a Mid-Term Review, conducted in 1999, recommended, on the basis of sustainability, to lower the production volume to 15,000m<sup>3</sup>. Another reason was, the AAC target was never met. This can be attributed to:

- The FMP allows a harvest of 30m<sup>3</sup>/ha but what has been achieved thus far, is only 21m<sup>3</sup>/ha. This is because:
  - Hollow trees constitute 30 percent of all trees marked for harvesting. The tree thus is not felled for safety reasons. In some cases only 4-5 m of the tree is hollow and the rest is solid.
  - Trees marked for harvesting are not harvested due to their distance from the skid trail and the tractor's winching limitation (30m winching distance). It is also uneconomic to harvest when trees marked for felling are sparsely distributed.
- Volume estimation is based on the Forestry Department's circular, CF 1/81, the FD handbook on estimating standing tree volume during licence clearance inspection, which tends to over estimate volumes by 30%.
- Precipitation in Deramakot is high (2,400mm – 2,500mm), hampering the performance of harvesting operations.
- Earlier there were delays in the extension of the harvest contract (renewal on yearly basis). This problem has been addressed and contracts are now approved for 4 years.
- Logging residue in the form of stumps, top ends, etc. that can be salvaged.

**Table 2** compares the AAC and actual volume harvested. With the exception of 2002, where the AAC target was exceeded, the yield has always been lower than what had been planned.

**Table 2. Actual Production versus the Annual Allowable Cut (AAC)**

YEAR	COMPARTMENTS	AAC (M <sup>3</sup> ) FMP	** Actual Volume Harvested (M <sup>3</sup> )
1995	73, 60	20,000	188.61
1996	73, 60, 49, 55	20,000	15,463.40
1997	73, 60, 49, 55, 68	20,000	13,794.16
1998	73, 43	20,000	12,235.95
1999	43, 63	20,000	914.80
*2000	43, 29, 44, 63	15,000	12,928.43
2001	44, 34, 37	15,000	10,741.83
2002	25, 37, 33	15,000	17,196.44
***2003	12, 40	15,000	9,770.77
<b>TOTAL</b>		<b>145,000</b>	<b>93,234.39</b>

\* Mid-term review

\*\* Actual volume includes rejected logs, harvesting residue and logs used for bridge construction

\*\*\* As of August 2003 (Compartment 12 and partly Compartment 40)

In **Table 3**, it is glaring that, on average, the actual harvested volume is almost always lower than the planned volume. For example, taking the 1<sup>st</sup> 14 compartments as listed, actual volume harvested is only 89,410m<sup>3</sup> as against a planned volume of 132,993m<sup>3</sup>, or a deficit of 33 percent approximately.

**Table 3. Planned and Actual Harvestable Volume By Compartment**

COMPARTMENT NO.	GROSS AREA (ha)	NET AREA (ha)	CHP PLANNED VOLUME (m <sup>3</sup> )	ACTUAL VOLUME (m <sup>3</sup> )	YIELD PER HECTARE (m <sup>3</sup> )
60	661	581	25,500	13,695.96	23.57
73	380	380	7,322	7,792.86	20.51
49	592	412	12,342	6,615.92	16.06
68	251	185	5,621	3,086.21	16.68
55	315	315	7,710	4,698.42	14.92
43	384	384	8,516	6,080.78	15.84
29	440	283	8,796	5,125.24	18.11
44	429	217	6,055	4,175.78	19.24
34	431	223	10,507	5,747.01	25.77
37	410	211	8,533	6,652.24	31.53
25	732	248	10,878	9,053.66	36.51
63	329	180	7,168	4,530.14	25.17
33	701	248	7,234	6,209.40	25.04
12	769	198	6,811	*5,947.37	30.03
40	770	770	25,977.66	**3,823.40	0
<b>TOTAL</b>	<b>7,594</b>	<b>4,835</b>	<b>158,970.66</b>	<b>93,234.39</b>	<b>22.78</b>

\* volume of harvesting residue (437.51m<sup>3</sup>) utilized by mobile sawmill included.

\*\* volume produced as of August 2003.

In 2002, the actual volume harvested (17,196.44m<sup>3</sup>) exceeded the planned production, setting a record for Deramakot's management. It is envisaged that for 2003, the harvest volume will be between 17,000m<sup>3</sup> to 18,000m<sup>3</sup>, maintaining the production momentum.



### 3.3 Expenditure and Revenue

*“It is not great wealth that makes a nation ... sometimes what counts cannot be counted ..... and what can be counted doesn’t count .....” (Albert Einstein)*

**Table 4** depicts that DFR was not making any profit at the beginning. However, looking at **Table 5**, DFR shows a positive income only if direct costs are taken into account. Being the pioneer model for SFM in the region, everything had to start from scratch (training, research, infrastructure development, etc.), and this is where the expenditure is mostly used up. The pioneering cost of Deramakot therefore makes it difficult to be assessed as a “stand alone” business enterprise. Furthermore, cross subsidies blur the cost accountability and one can never get the true costs, especially where SFD’s own personnel are involved in doing a particular job.

**Table 4. Annual Expenditure and Revenue**

YEAR	EXPENDITURE (RM)	REVENUE (RM)
1991	Data not available	0
1992	Date not available	0
1993	2,150,385.57	0
1994	3,988,835.77	0
1995	4,623,000.00	50,924.70
1996	5,300,000.00	3,468,392.40
1997	5,200,000.00	3,385,354.58
1998	6,600,000.00	4,841,866.97
1999	5,029,970.00	918,459.20
2000	8,393,828.32	5,820,059.73
2001	5,768,100.00	3,610,665.03
2002	5,115,000.00	*7,730,603.04
2003	5,916,040.00	**10,500,000.00
<b>TOTAL</b>	<b>58,085,159.68</b>	<b>40,326,325.65</b>

\* revenue exceeded expenditure for the first time in 2002 and this is forecasted to continue for the years ahead.

\*\* the 2003 forecast

### 3.4 Harvesting: Cost and Revenue

The cost of administration, road construction and maintenance, protection and vehicles is taken into account in **Table 6**. Proceeds from sales of logs by auction can still bear the costs of harvesting. Most of the expenditure was absorbed by the other management activities such as, rehabilitation, silviculture, training and infrastructure.

**Table 5. Harvesting costs and benefits**

YEAR	PRODUCTION (M3)	HARVESTING FEE CONTRACTOR (RM)	SFD COST (RM)	TOTAL COST (RM)	TIMBER SALES (RM)	VOLUME SOLD (M3)	AVERAGE PRICE (RM/M <sup>3</sup> )
1995	188.61	23,576.25	1,386,900.00	1,410,476.25	50,924.70	188.61	270
1996	15,463.40	1,659,632.50	1,590,000.00	3,249,632.50	3,468,392.40	12,998.31	267
1997	13,794.16	1,558,740.00	1,560,000.00	3,118,740.00	3,385,354.58	13,794.16	245
1998	12,235.95	1,357,701.00	1,980,000.00	3,337,701.00	4,841,866.97	12,236.04	396
1999	914.80	101,506.20	1,508,991.00	1,610,497.20	918,459.20	914.80	1,004
2000	12,928.43	1,434,538.50	2,518,148.50	3,952,687.00	5,820,059.73	12,424.32	468
2001	10,741.83	1,180,359.10	1,730,430.00	2,910,789.10	3,610,665.03	10,660.74	339
2002	17,196.44	1,908,116.90	1,534,500.00	3,442,616.90	7,901,208.28	16,882.43	468
*2003	9,333.26	1,035,618.53	1,786,261.14	2,821,879.67	5,385,043.10	9,333.26	577
<b>TOTAL</b>	<b>92,796.88</b>	<b>10,259,788.98</b>	<b>15,595,230.64</b>	<b>25,855,019.62</b>	<b>35,381,973.99</b>	<b>89,432.67</b>	<b>396</b>

\* for Compartment 12 and part of Compartment 40.

### 3.5 Production by Harvesting Methods

Table 6 summarizes the volume of timber produced by production method.

**Table 6 Harvested Volume by Tractor, Skyline and the Combine System**

YEAR	TRACTOR (m <sup>3</sup> )	SKYLINE (m <sup>3</sup> )	COMBINE SYSTEM (m <sup>3</sup> )	TOTAL (m <sup>3</sup> )
1995	0	188.61	0	188.61
1996 -1997	28,386.56	871	0	29,257.56
1998	12,204.56	31.39	0	12,235.95
1999	914.80	0	0	914.80
2000	8,144.85	569.15	4,214.43	12,928.43
2001	10,345.12	157.07	239.64	10,741.83
2002	17,196.44	0	0	17,196.44
*2003	9,333.26	0	0	9,770.77
<b>TOTAL</b>	<b>86,525.59</b>	<b>1,817.22</b>	<b>4,454.07</b>	<b>93,234.39</b>

\* for Compartment 12 and part of Compartment 40.

Extraction methods chosen for a compartment depends solely on the topography and as prescribed in the Comprehensive Harvest Plan (CHP). Ground skidding is confined to slopes with gradients of 15° and below, and skyline from 16° – 25°. The combined system involves using tractors to feed the skyline corridor where feeder roads are not economically viable to be constructed (too many bridges, terrain, etc).

### 3.6 Cost of Preparing a Comprehensive Harvesting Plan (CHP) In Accordance With RIL Guidelines

Such costs have only just recently been properly assessed. Based on the experience for compartments 25 and 37, this worked out to about **RM84.00/hectare with:**

- a crew of (6) skilled workers attaining 5ha per day;
- costs of vehicles and survey equipments excluded.

This of course, will vary depending on the remoteness and accessibility of the compartments and the work quality and performance of the personnel concerned.

### 3.7 Silviculture

This is essential because:

- the overall stocking of desirable commercial tree species is relatively low;
- infestation of climbing bamboos is high; and
- it promotes growth and assists in natural vegetation.

The achievement is relatively high as shown in **Table 7**.

**Table 7. Costs of Silviculture Treatment and Achievement**

YEAR	COMPARTMENT NO	AREA TREATED (ha)	CONTRACT FEE (RM)	SFD SUPERVISION COST (RM)	ACTUAL COST (RM)
1996	60	138.80	5,126.00	110,459.00	155,585.00
1997	60	294.40	96,268.00	124,174.00	220,442.00
1998	60	721.00	52,350.00	138,775.00	391,125.00
1999	49	721.80	252,630.00	92,880.00	345,510.00
2000	43, 55, 73	1,033.53	361,735.50	102,130.00	463,865.50
2001	58, 44	1,013.64	354,774.00	95,040.00	449,814.00
2002	29, 34	1,000.00	391,933.50	129,684.16	521,617.66
<b>TOTAL</b>		<b>4,923.17</b>	<b>1,514,817.00</b>	<b>793,142.16</b>	<b>2,547,959.16</b>

For 2003, the treated areas may reach 1,500 hectares, a record achievement.

### 3.8 Rehabilitation Planting and Achievement

Please refer to **Table 8**. From 1996 – 2001, some 1,146 hectares were planted or 95.50% of the target at 200 ha per annum.

**Table 8. Rehabilitation Planting & Maintenance – The Cost and Achievement**

YEAR	AREA PLANTED (ha)	COST (RM)
1996	189	222,150.00
1997	154	248,468.00
1998	143	258,444.00
1999	232	558,266.00
2000	228	691,653.80
2001	200	733,547.60
2002	*	341,455.20
<b>TOTAL</b>	<b>1,146</b>	<b>3,053,984.60</b>

\* No planting in 2002 but only maintenance of planted trees.

A crucial decision was made in late 2001 to stop the rehabilitation planting and instead, concentrate on maintaining planted seedlings on the following grounds:

- escalating costs which are beyond the financial capacity of Deramakot, with the high cost and the growing component of maintenance;

- many areas considered “degraded” or understocked actually have available mother trees and sufficient regeneration;
- improper planting in the beginning following the “blanket” concept, whereby even wet areas and swamps were planted with inappropriate species, resulting in high mortality; and
- it may be more cost effective to do silvicultural treatment rather than rehabilitation planting in the long run.

However, those seedlings that have been properly planted, site-species matching planned before hand, and regularly maintained, are doing quite well.

### 3.9 Protection

The boundary of Deramakot, particularly those bordering alienated lands, was demarcated under the Eight Malaysian Plan, at a cost of RM196,000.00, commencing in 2002. This work is now completed. Properly demarcated boundaries will facilitate enforcement work.

Illegal felling has occurred over the years, with the most serious ones, involving tractors. By and large this has subsided (**Table 9**), and if it occurs, will most probably be confined to small time riverine felling, a form of *cultural harvesting*, peculiar to the riverine communities along the Kinabatangan River.

**Table 9. Illegal Felling, 1995 – 2002**

YEAR	VOLUME (m <sup>3</sup> )
1995-1999	4,353
2000	3,027
2001	214
2002	15
<b>TOTAL</b>	<b>7,609m<sup>3</sup></b>

### 3.10 SGS Surveillance

Somebody has to “keep an eye” on us to ensure we are on the straight and narrow as promised in the FMP. This close scrutiny ensures compliance on our part and provides an independent third party assessment to maintain Deramakot’s credibility.

So far, 6 major and 36 minor Corrective Action Requests (CARS) have been meted out. Please see **Table 10**.

**Table 10. CARs issued by SGS from 1997 to 2003**

Components	Correction Action Request		Observation
	Major	Minor	
FMP		2	
Harvesting	2	14	3
Silviculture		3	
Rehabilitation			1
Wildlife		3	1
Social		2	
Training		4	
Water Monitoring		2	
Fire Monitoring		2	
Forest Roads	1	3	
Illegal Felling	3	1	
<b>TOTAL</b>	<b>6</b>	<b>36</b>	<b>5</b>

As would have been expected, timber extraction presents the greatest challenge.

### **3.11 Research, Development and Scientific Studies**

At least (7) scientific papers covering various fields (ecology, entomology, hydrology, silviculture, harvesting etc.) have been written based on research conducted in Deramakot and many more are expected to be published in time to come.

Under the Eight Malaysia Plan, a harvesting research component is being implemented, whereby, various parameters (diameter limits, slope limitations, CHP preparation etc.) will be looked into with a budget allocation of RM4.40 million from the Federal Government.

### **3.12 Practical Attachment and Training Ground for University Students**

Deramakot attracts a fair number of students each year, who conduct practical pre-requisites in the reserve. At the same time, a number of dissertations and thesis prepared are based on data collected in Deramakot.

## 4. WILDLIFE CONSERVATION

An integral part of the forests is its fauna resources. Wildlife resources in Deramakot Forest Reserve (DFR) have received little attention in the past as the primary objective was timber management. Timber production will remain the dominant factor in planning land use in DFR. But as of late, and in having to meet the requirements under Principle # 9 (identification of High Conservation Value Forest) of the FSC's Principle and Criteria to ensure continued certification, a simple, practical guide to monitor and document wildlife resources and their habitat in DFR, has been developed by Dr. Isabelle Lackman-Ancrenaz and Marc Ancrenaz (1999). It was not until the year 2001 that this system was put into use.

### 4.1 High Conservation Value Forest (HCVF)

DFR has all the attributes of a High conservation Value Forest and is a key **habitat for five globally threatened large mammals**, namely the ***Orangutan, Asian Elephant, Tembadau (Banteng), Proboscis Monkey*** and the ***Clouded Leopard***. Large mammals need large areas to forage, and taking measures to conserve these areas would certainly help in protecting other smaller animals that occupy the same habitat. HCVF as defined in this plan, are forest entities that possess one or more of the following attributes:

- a) forest areas having high bio-diversity values (e.g. areas of high endemism, areas known to support endangered species, areas rich in wildlife, etc.);
- b) forest areas that are in or contain rare, threatened or endangered ecosystem;
- c) forest areas that may provide representative samples of natural population in their undisturbed form (e.g. pristine forest);
- d) forest areas that provide basic services of nature in critical situations (e.g. watershed protection, erosion control); and
- e) forest areas fundamental in meeting the basic needs of local communities (e.g. subsistence, proteins, medicines, building materials and clean water) and/or critical to local communities's cultural integrity (e.g. areas of cultural and ecological significance).

#### 4.1.1 HCVFs in Deramakot Forest Reserve

About 4,000 hectares of forests (compartments) within DFR which are steeply dissected (with slope gradient above 25<sup>0</sup>) are permanently set aside for conservation. This means no management is undertaken in these compartments and their main functions are primarily for conservation of the forest eco-systems (forest resources, soil, water and bio-diversity of both flora and fauna).

However, areas (51,000ha) that are zoned for natural forest management in DFR but do exhibit attributes of HCVFs, are also mapped out and protected. The identified HCVF attributes are:

- (a) areas high in biological and ecological values;
- (b) watersheds and areas with steeply dissected slopes; and
- (c) areas of ecological and economic significance to local communities.

Attributes in (a) and (b) are mapped out and documented during the preparation of the Comprehensive Harvest Plan (CHP), whilst (c) requires close consultation (3 monthly

community meetings) with the local communities living in or adjacent to DFR. The mapped HCVMs provide a focus for monitoring.

## 4.2 Wildlife Monitoring

Based on the Wildlife Monitoring System guidelines in DFR, only five of the seven monitoring components that was recommended were adhered to. These are:

- Riverside (four times a year);
- Salt Lick (once a month);
- Orangutan aerial nest count (twice a year);
- Elephant (once a month); and
- Opportunistic Sightings (daily).

### 4.2.1 Orangutan

Orangutans (Pongo pygmaeus) are exceptionally shy animals which contribute to the fact that their population and distribution cannot be readily assessed by direct sightings. The aerial census methodology by counting Orangutan nests along pre-determined transects, is being used in DFR. This exercise is carried out twice a year and the results are shown in **Table 11**.

**Table 11. Orangutan density**

Date of Census	Number of Individuals/km <sup>2</sup>
December 1999	1.40
July 2002	1.78
December 2002	1.71

It is estimated that a minimum of 900 Orangutans are currently residing in DFR. The recent survey indicates that there are more nest building activities in the central and eastern part as compared to the west of DFR. The focus of the various forest management activities (harvesting, rehabilitation and silviculture tending) which are now currently concentrated in the west, could be the reason for this.

### 4.2.2 Asian Elephants

Elephants (Elephas maximus) have been sighted almost everywhere in DFR. Recent surveys conducted by the Asian Rhino and Elephant Action Strategy Programme (AREAS) WWF, maintains that the elephants tend to keep to corridors established by them in the flatter areas of the northern, western and southern part of DFR. A population of approximately 100 individuals exists in DFR. One sighting of a herd of 30 elephants was recorded (Takyo, Ragang, 2002) at Main Road 2, KM 29, between compartments 72 and 90, south of DFR.

### 4.2.3 Tembadau/Banteng

A small population of less than 50 (1999), Tembadau (Bos javanicus) still occur in DFR. This figure could be less due to poaching. A herd of 10 individuals was observed (Ahmad, Azny, 2001) along Main Road 1, in compartments 12 and 27, DFR. Like the elephants, Tembadaus tend to keep to the same corridor to forage.

#### **4.2.4 Clouded Leopard**

The Clouded Leopard (*Neofelis nebulosa*) are elusive creatures and are rare in DFR. They exist in DFR, but their population and distribution cannot be determined. Sightings of 1-3 individuals were recorded (Lagan, Peter, 2001-2002) and also captured on celluloid (see **Appendix 2. Animals caught by camera traps in DFR, April, 2003**).

#### **4.2.5 Of birds, fishes and crocodiles**

Globally and locally threatened bird species occurring in DFR are the Helmeted Hornbills, Storm Stork, Malaysian Peacock-Pheasant and the Crested Fireback. The avifauna in DFR is very rich and diverse. A complete inventory of birds is beyond the scope of wildlife management in DFR (see **Appendix 2. Animals caught by camera traps in DFR, April, 2003**).

The Upper Rawog Besar River which meanders through compartments 13, 14, 16, 19, 21 and 21 in DFR, supports a high concentration of fresh water fishes, particularly *Polian* and *Kaloi*. Their abundance has also attracted crocodiles (*Crocodylus porosus*) into this river. There has also been a sharp increase of crocodile sightings along the Kinabatangan River south of DFR.

#### **4.2.6 Proboscis Monkeys (*Nasalis larvatus*)**

Until recently, the presence of this species was largely ignored. It is now evident that a small population exists along the banks of the Kinabatangan River and are usually seen during low water levels in April to June.

They forage in small groups at some common points from Sungai Arawon to Batu Api (15-18 per group), at Kalang Badan (6-7 per group) and from Sungai Liningkong to Sungai Bangan (about 30 per group).

#### **4.2.7 Opportunistic Sightings**

Observations are based on daily opportunistic encounters and calls. Refer to **Appendix 1, Opportunistic sightings (1997 – 2002)**

### **4.3 Mitigating the Impacts of Forest Management Activities on Wildlife**

As planned in the FMP, approximately three quarters of DFR remains undisturbed or closed to forest management activities at any given time. This means all forest management activities (silviculture, enrichment planting and harvesting) is focused on a small portion (10,000 ha) of DFR staggered over a period of ten years, which translates to a management cycle of about 40 years. This is planned primarily to encourage plant succession without disturbance, and at the same time they act as a sanctuary for wildlife that thrives in DFR.

Wildlife and their habitat contiguity is ensured simply because DFR is a well managed forest and hopefully, it will stay that way in perpetuity. Regardless of this, mitigating measures (**Table 12**) are emplaced to minimize the impact of human presence and interference to the eco-system.



**Table 12. Mitigating the impacts of forest management activities on wildlife in Deramakot Forest Reserve**

ACTIVITY	IMPACTS	CURRENT MANAGEMENT PRACTICE (MITIGATION)
1. Road construction and maintenance	<ul style="list-style-type: none"> <li>○ soil erosion.</li> <li>○ river/stream sedimentation.</li> <li>○ noise.</li> </ul>	<ul style="list-style-type: none"> <li>○ Riparian reserves are demarcated (buffers) to protect water ways.</li> <li>○ Bridges and culverts are installed to cross rivers/streams.</li> <li>○ Road width and canopy openings are minimized.</li> <li>○ Gravels are left in stream beds (spawning).</li> <li>○ RIL guidelines are strictly adhered to.</li> </ul>
2. Harvesting	<ul style="list-style-type: none"> <li>○ alteration of natural forest stand structure.</li> <li>○ noise.</li> <li>○ displaces animals from their natural habitat.</li> <li>○ tree fall and shock.</li> <li>○ loss of food supply.</li> <li>○ habitat disturbance.</li> </ul>	<ul style="list-style-type: none"> <li>○ Tree marking.</li> <li>○ Directional felling.</li> <li>○ Trees for seed source, food source and breeding niches for birds (trees 120cm dbh) are not felled or harvested.</li> <li>○ Roads are pre-aligned.</li> <li>○ Riparian reserves and buffer strips are maintained.</li> <li>○ Pockets of areas (&gt;2ha) above 25<sup>o</sup> within the compartment are mapped and excluded from harvesting.</li> <li>○ RIL guidelines are strictly adhered to.</li> </ul>
3. Silviculture	<ul style="list-style-type: none"> <li>○ Elimination of woody vines which are a food source for some animals, especially birds and also ladders for Orangutans.</li> </ul>	<ul style="list-style-type: none"> <li>○ Removing immediate competitors only (non-commercial trees).</li> <li>○ Maintain structural diversity to encourage natural regeneration.</li> <li>○ Avoid use of chemical defoliators.</li> </ul>
4. Land clearing for agriculture using fire by villagers outside the reserve along common boundaries.	<ul style="list-style-type: none"> <li>○ Forest Fire. Complete annihilation of forest.</li> </ul>	<ul style="list-style-type: none"> <li>○ Fire management plan.</li> <li>○ Fire crews.</li> <li>○ Fire fighting equipment.</li> <li>○ Fire preparedness plan.</li> <li>○ Fire prevention plan.</li> <li>○ Fire danger rating.</li> <li>○ Community services – awareness.</li> </ul>
5. Hunting	<ul style="list-style-type: none"> <li>○ Elimination of some endangered species</li> <li>○ Forest fires</li> </ul>	<p>Installation of barrier/gate at main access road.            Botching all known access leading into DFR.            Surveillance and patrols.</p>

## 5 DISCUSSIONS

***“Only after the last tree has been cut down,  
Only after the last river has been poisoned,  
Only after the last fish has been caught,  
Only then will you find that money cannot be eaten”***

- An old Cree Indian Saying -

***“You never actually own a Patek Phillippe, You merely look after it for the next generation”***

- Patek Phillippe, Geneve -

We are not asking you to make a choice between eating fish or owning a gold watch. Better still, have both. After some 13 years (1989 – 2002), of intensive management in Deramakot, with (5) years under certification, what are the basic lessons that we have learnt, to make things better and to make things happen? Let us now ponder over the matters and issues derived from this, over one decade of trial and error.

### 5.1 Does Certification Pay?

The most important certification is ***political endorsement***. The Deramakot project had the honour of a visit by the Right Honourable Prime Minister himself in 1997, who endorsed the project concept and directed that it be continued.

Without political commitment from state leaders, the concept of Deramakot could not have been expanded to other areas of Sabah, manifested in the long term Sustainable Forest Management License Agreement (SFMLA) policy launched in September 1997. Although the SFMLA arrangement is still in its infancy and dogged by slow implementation, amongst other things, it is a step in the right direction, far better than an “ad hoc” timber licensing system, that can cause severe damage to the forest resources, as what previously prevailed.

***Therefore, get politically certified first. It is the most important certificate, you will need***

Despite the general feeling that certification under whatever scheme, adds to unnecessary costs, we consider the “Qualifor” Certificate to be worth much more than what we have paid for it. At RM207,704.20 over a period of 5 years, and assuming a harvest volume of 15,000m<sup>3</sup>/annum (75,000m<sup>3</sup> over 5 years), this is only **RM2.77/m<sup>3</sup>**. As a contrast, FD spends not less than RM1.8 million per year on wages/salaries in Deramakot or RM9 million in 5 years at **RM120.00/m<sup>3</sup>**. This is a multiple of 43 times. Are we getting our money’s worth from our personnel, 43 times more beneficial that what is paid to SGS?

With a sense of perspective, we therefore consider the cost of certification as fair. The Qualifor program has brought the following ***benefits***:

- ***Prestige*** - it has been proven independently that in Sabah, natural forests can actually be well managed,
- ***It opens doors*** – market access particularly to sensitive markets, is easier.
- ***Focus*** – the “CARS” keep SFD’s management on its toes and therefore focused to the tasks and responsibilities, “promised” in the FMP, AWP etc.

- **Shield of credibility** – it ensures non-interference and SFD is left to do what it thinks is best.

## 5.2 But What About the Promised Green Premium for Certified Timber?

Please refer to **Table 13**. Based on the last auction of logs in August 2003, it would appear that there is a premium over domestic sales of logs for a similar quality.

However, there is no real premium compared to export prices of logs or log prices in Peninsular Malaysia, with the exception of one species, Selangan Batu. Ironically, the market that offers real premium is Vietnam, one of the poorest countries in the world. European buyers have not been present since 2000. It would appear the prices obtained in 1999 were highly speculative and non sustainable.

For the moment, therefore, the efforts of Deramakot have not yet translated into real dollars and cents, and if any, only for selected species of small quantities. ***The “eco-dividend” is therefore, still elusive.***

**TABLE 13. DERAMAKOT LOG PRICE AS COMPARED TO OTHER PRICES**

SPECIES	①DERAMAKOT LOG PRICE AUGUST 2003		①SANDAKAN EX MILL JULY 2003 RM/m <sup>3</sup>	①SABAH LOG EXPORT TAWAU AUGUST 2003 RM/m <sup>3</sup> FOB	②ITTO PRICE (1-15 JULY) 2003	
	EX. STUMPING RM/m <sup>3</sup>	EX SANDAKAN EQUIVALENT RM/m <sup>3</sup>			PEN. M'SIA- DOMESTIC RM(US)/m <sup>3</sup>	SARAWAK (EXPORT) RM(US)/m <sup>3</sup>
MERANTI SQ	407 E	467 ex port	319-390	391-483	646-665(170-175)	589-627(155-165)
RS/OS	342 L	376 ex mill	350-440	380-440	NA	NA
KERUING SQ	487 E	547 ex port	305-400	505-513	570-589(150-155)	494-532(130-140)
KAPUR SQ	490 E	547 ex port	380-390	437-505	NA	551-570(145-150)
SELANGAN BATU	645 E	705 ex port	388-402	600-730	627-665(165-175)	532-551(140-145)
OT	272 E	332 ex port	200-251	320-399	NA	NA

Note: Sandakan equivalent is = Ex stumping price + RM34/m<sup>3</sup> as transportation cost up to the mill in Seguntur and add RM60/m<sup>3</sup> for export.

L=Local sale

E=Export

Source: ①Sabah Forestry Department ②ITTO Market News service

If certification is to be accepted more widely and pursued by licencees, good forest management must be translated into financial gains.

As Alastair Sarre (ITTO 2002), put it:

***“ ..... But there is another group of stakeholders who cannot be left off so lightly; those of us in the richer countries who are calling for tropical forest conservation. Arguably, we are the most difficult stakeholders of all; we want to participate in decisions on the fate of tropical forests but bring little to the negotiating table apart from strongly held opinions. What we want is a service, tropical forest conservation. Our role as a stakeholder will be more influential when we pay our fair share for that service!! ”***

### **5.3 Was the Deramakot Project Initiated to Pursue Certification?**

When the project first started, the purpose was to attain good forest management and to have the project area as a model for other areas to be managed. The project did not “take off” at the outset, with certification as the goal.

It was to demonstrate good forest management and husbandry with certification, a logical conclusion, to attain credibility and impartiality, in the end. With or without certification, what has been carried out in Deramakot, would have taken place in any case.

### **5.4 Can a Classical Government Bureaucracy Run a Forest Enterprise Efficiently?**

Deramakot suffers from many non-technical and non-forestry problems such as:

- high turnover of staff;
- red-tapes: in procuring goods and services;
- disciplinary problems amongst staff including: truancy, low productivity, poor work ethics, “ 8.00 AM – 4.30 PM” work syndrome etc;
- lack of managerial skills in running an enterprise;
- the lack of entrepreneurial vigor; and
- rules and regulations bound management “ala” civil service.

Please see **Table 14** which illustrates the usage of time in Deramakot for field personnel for the year 2000.

**Table 14. Manpower Productivity and Costs (Year 2000)**

CATEGORY	NO. DAYS	SALARY (RM)	NO. OF DAYS	ALLOWANCES (RM)	TOTAL (RM)	%
<b>Wages (actual workingdays)</b>	8093	240,625	6400	211,066	451,691	65
<b>Leave</b>	359	10,909	319	446	11,355	2
<b>Weekend Off/Holiday</b>	2548	69,792	1477	42,813	112,605	16
<b>Sick Leave</b>	19	651	3.5	332	984	negligible
<b>Bad Weather</b>	118	3,319	116	1,222	4,541	1
<b>Payday S'kan</b>	2524	54,828	558	5,863	60,691	9
<b>Training &amp; Education</b>	742	23,032	653	26,353	49,38	7
<b>TOTAL</b>	<b>14,403</b>	<b>403,157</b>	<b>9528</b>	<b>288,098</b>	<b>691,255</b>	<b>100</b>

*Note: about 28% of time used unproductively assuming the other "65%" of the time is truly productively used. (If not, this will be more).*

This is only one example of the rigidity of a bureaucratic system and the wastes that are inherent, which the project has to pay for, adding to the cost of managing the reserve.

So long as Deramakot is run by a classical government department, it is unlikely that costs could be reduced significantly, even if drastic action was taken to sack non-performers, which in itself, is a time-consuming process, which may exhaust the "disciplinor" long before the one to be "disciplined".

To be fair, if there was a "productivity based" enumeration scheme in Deramakot (e.g. RMx/m<sup>3</sup> for FD staff or some other incentive scheme), efficiency may very well increase.

### **5.5 The Cost of Procuring Accurate Information**

In section 3.8, it was mentioned that one reason why rehabilitation planting was suspended is because of planting being unnecessarily carried out on, so called "degraded forests" (based on aerial photos stratification) when in fact, ground truthing showed sufficient regeneration.

However, the actual situation on the ground would only have been known if proper diagnostic sampling had been carried out prior to treatments. But this will only add to more costs and delay implementation. This is exacerbated if field decisions are left to unskilled and inexperienced personnel.

On the subject of actual yield versus estimates (**Table 3**), a more accurate assessment of the standing tree volume in the CHP preparation would have been obtained, by recording height estimates as well as diameter readings, and revising the volume tables, determined by CF Circular 1/81. But this will delay the CHP preparation further and add to more costs.

Therefore, some form of balance needs to be arrived at as it seems, cost is directly proportional to accuracy. In the re-inventory of Deramakot, currently conducted, inventory will

be done by compartment, taking both regeneration quality and commercial volume availability into account, in one assessment. This will reduce costs and provide more accurate multi-use information.

## 5.6 Is Foreign Participation Good For You?

**“ ..... Heavy reliance on international expertise for most conceptual and operational support weakens the potential contribution of the project to institutional learning and building”**

- James K. Gasana – (ITTO – Tropical Forest Update 12/2/2002) -

We have not suffered from the collaboration programme with GTZ but on the contrary, have benefitted tremendously particularly in the fields of: forest management planning, resource accounting, capacity building and human resource development.

If we were to rate the greatest benefit from the collaborative programme, it is the “building blocks” of trained personnel that we now have in the Department, who are capable of doing management planning and implementation with high technical competence. It is granted, discipline is that much harder to teach but on the balance of probabilities, Sabah has gained much.

However, it is strictly our own turf when it comes to policies, institution building and administration, without which, we will lose the self-esteem to chart our own destiny. **Learn from far and wide by all means, but do things yourself.**

## 5.7 Future Management Options For Deramakot Forest Reserve

**“ ..... And Indeed, there will be time to wonder, “Do I Dare? And Do I Dare? ..... Do I Dare, Disturb The Universe ....”**

- (T.S. ELIOT – “The Love Song Of J.A. Prufrock”) -

It is highly unlikely that Deramakot could reach a semblance of a self-accounting and become a self-paying enterprise, so long as it is run as a government bureaucracy. Government administration is usually too rigid and too inflexible and slow to react to changes. At most, Deramakot can only pay for itself, with a small surplus unless real premium prices are obtained.

But, complete privatization may not necessary be the better option because:

- there may not be players at present, with the financial capacity and managerial capability to maintain the forest management standards of Deramakot;
- the information gained over many years of experience will be “lost” to the private sector, and not shared for society to benefit from;

or **would you sell your mother for profit, so to speak ?**

Perhaps, a much better option would be to corporatise the Deramakot wing of the Sabah Forestry Department, along similar lines as when Syarikat Telekom Berhad or Tenaga Nasional was first corporatised.

In this manner, the government continues to retain ownership but allows the flexibility of the private sector in the management of the reserve and it can assign the best of the best to manage the reserve as a true business enterprise. At the same time, information can still be shared for the public good. This is a thought for the future.

## **1. WHAT HAS THIS PAPER GOT TO DO WITH ORANGUTAN CONSERVATION, SO FAR?**

***“Orangutan cannot survive independently of natural forests and cannot live within industrial tree plantations. Protection of lowland rainforests is therefore crucially essential to the long term survival of the species.”***

(Sabah Wildlife Department 2003)

Hitherto, we have not directly focused our attention in this paper, on the implications of our experiences and activities in Deramakot, to the conservation of Orangutans. We now unequivocally declare that SFM, as practiced in Deramakot, is compatible with the conservation of Orangutans. SFM as practiced therein, is a manifestation of the dictum, “having the cake and eating it too”.

How is this possible and achievable? Prove it.

### **6.1 Deramakot is About Natural Forest Management (NFM)**

NFM implies, as much as possible, the natural stand is retained, with modifications restricted to the loss of some big trees, primarily during harvesting.

Due to the low-intensity logging practices and strict compliance of RIL techniques, the forest structure remains, its landscape very little modified and there is no real danger of biodiversity loss or genetic erosion, particularly of the flora.

Any disturbance is therefore short-term and localized, thus providing an opportunity for the Orangutans to seek temporary shelter nearby and to re-invade the “disturbed” area thereafter. The crucial point is, the forest remains a natural forest, which Orangutans must have, to ensure their survival.

### **6.2 Wildlife Management is Part of SFM in Deramakot**

The Forestry Department (FD) has added value to its management in Deramakot by adopting the concept of HCVPs, as explained in section (4). This documentation on the distribution of various wildlife species, offers a focus for monitoring and subsequent actions in the operationalisation of the FMP.

For instance, in planning harvesting in compartments known to have a high Orangutan population, mitigating measures will be enhanced to ensure minimal disturbance of the habitat: e.g. leaving heavily populated Orangutan enclaves out of the CHPs, reducing the intensity of harvesting etc.



The twice-yearly aerial counts of Orangutan nests, also helps to monitor the “health” of the Orangutan population. For example, a sudden and significant drop in the nest counts implies some deleterious actions, have affected Orangutans and these need to be identified, and addressed immediately.

### **6.3 Silviculture and Rehabilitation Planting Improves The Forest Eco-system**

Silviculture seeks to eliminate weed species (climbers, creepers, bamboos, etc.) that smother and suppress re-growth, of desired species. The potential crop trees of the future, by and large, are the climax species, which have evolved with Orangutans over eons.

Re-habilitation planting covers a host of species including fruit trees that are food sources for Orangutans (Durians, Sengkuang, Mangifera family, etc).

These activities therefore improve the forest eco-system, which up the food-chain, will enhance the habitat and food sources that Orangutans depend on.

### **6.4 A Managed Forest Means a Protected Forest**

There has only been one recorded case of Orangutan poaching in Deramakot, some ten years ago. Since then, especially after the implementation of the FMP, there have been no further such reports.

The drastic drop in poaching is attributed to management in the field, focused on the annual work plan, that includes protection and surveillance.

Before FD made its presence felt in Deramakot, poaching was rampant especially of ungulates and perhaps even Orangutans.

By managing a forest, you stake your “claim”, thus minimizing intrusions or deterring them from happening.

### **6.5 Deramakot is Also About Wildlife Habitat Management**

It has been reported that, the Orangutan population of Sabah has suffered from: habitat loss, habitat fragmentation and habitat degradation. Some people have even argued that, it is not logging per se that will cause the demise of the Orangutans, but the loss of their habitat.

If habitat, particularly of the lowland variety, is what is most crucial to the survival of the Orangutan, then the focus in Deramakot on, amongst others: habitat sanctity, habitat improvement and habitat enhancement, will go a long way to ensure, at least in Deramakot, Orangutans can survive and procreate.

We have the Orangutan habitat and it is managed and protected.

### **6.6 Look Beyond The Tip of Your Nose**

In 1997, the State Government made a landmark decision in expanding the concept of Deramakot, by entering into long term forest management agreements, with the private sector, covering an area of approximately 1.8 million hectares. By and large, based on the

forest management plans received so far covering some 1.3 million hectares, including those from long term licences issued prior to 1997, the areas are mostly to be managed under NFM. Although some licences first started with ITPs (Industrial Tree Plantations) as a major component of their activities, many have since opted for natural forest restoration instead, for various reasons, financial outlays being one major constraint.

Deramakot, with an area of about 55,000 hectares, is only a small component of the 2.7 million hectares (approx.) of commercial forest reserves in Sabah. Therefore, given that the high Orangutan population areas are outside Deramakot, the concentration on Orangutan conservation should focus on those high conservation value forests with significant Orangutan populations.

The Deramakot example has proven that SFM and good forest management is compatible with Orangutan conservation.

The Forestry Department has therefore emphasized to the long term licences (LTL) that NFM is the preferred choice with ITPs, an option of the last resort.

Even if the LTL achieve only 50% of what has been achieved in Deramakot, this will go a long way towards Orangutan conservation.

FD is optimistic that with time many of the LTL will attain the performance of Deramakot. **But time is of the essence as SFM is a long term investment.** For example, Deramakot only managed a 1<sup>st</sup> surplus in 2002 after 11 straight years of deficits.

This investment in time, vis-à-vis, satisfactory performance, is also evident in the achievements of the LTL, whereby, **those who started earliest have made the most progress.**

## 7. CONCLUSIONS

***“I came, I saw, I conquered.”***

(Julius Ceasar)

***“Everything you know must be continually reassessed, critically reviewed. Abandoned if necessary.”***

(Robert Ludlum, 2002)

The experiences gained over 12 years of field experimenting in Deramakot have put FD in good stead, in managing forests for excellence. Although this has come about with considerable investments (RM52 million so far), we now have living proof that this is achievable.

A triumph for forest management is also a triumph for wildlife management, Orangutan conservation being a good example of SFM-wildlife compatibility.

For SFM to have significant influence on Orangutan conservation in Sabah, the SFM players in the state, must be given every assistance, particularly in financing and in the marketing of their products, so that SFM pays and is accepted as economically feasible. This necessitates a concerted effort by all stakeholders within Sabah or otherwise.

At the same time, there must also be flexibility in the implementation of SFM so that the long term SFM goals are achievable without jeopardizing the sustainability of the LTL themselves. Therein, lies the challenge.

**APPENDIX 1. Opportunistic Sightings (1997-2002)**

<b>SPECIES</b>	<b>YEAR/NUMBERS</b>					
	'97	'98	'99	'00	'01	'02
<b>LOCALLY THREATENED</b>						
Orangutan ( <i>Pongo pygmaeus</i> )	1	1	2	NO RECORD	3	3
Asian Elephant ( <i>Elephas maximus</i> )	21	15	17		79	101
Tembadau ( <i>Bos javanicus</i> )	10				10	7
Clouded Leopard ( <i>Neofelis nebulosa</i> )	3	1			2	4
Proboscis Monkey ( <i>Nasalis larvatus</i> )			9		15	25
Bornean Gibbon ( <i>Hylobates muelleri</i> )		6			6	5
Sun Bear ( <i>Helartos malayanus</i> )	6	8	3		4	3
Red Leaf Monkey ( <i>Presbytis rubicunda</i> )					3	4
Helmeted Hornbill ( <i>Rhinoplax vigil</i> )	6	10			7	9
<b>COMMON</b>						
Sambar deer ( <i>Cervus unicolor</i> )	8	9	2	NO RECORD	10	12
Bornean yellow muntiac ( <i>Muntiacus atherodes</i> )	1	6	5		8	9
Bearded pig ( <i>Sus barbatus</i> )	9	15	10		12	10
Lesser mouse-deer ( <i>Traulus javanicus</i> )	10	5	3		6	9
Greater mouse-deer ( <i>Tragulus napu</i> )	5	6	5		7	5
Flat-headed cat ( <i>Felis planiceps</i> )					1	2
Leopard cat ( <i>Felis bengalensis</i> )	3	5			3	2
Malay civet ( <i>Viverra zangalunga</i> )	12	18	5		7	13
Otter-civet ( <i>Cynogale bennettii</i> )	1	3			2	4
Common palm civet ( <i>Paradoxurus hermaphroditus</i> )	2	3			4	5
Banded palm civet ( <i>Hemigalus derbyanus</i> )	3	2			2	1
Short-tailed mongoose ( <i>Herpestes brachyurus</i> )			2		2	1
Malay badger ( <i>Mydaus javanensis</i> )	4	3			2	3
Oriental small-clawed otter ( <i>Aonyx (Amblonyx) cinerea</i> )			2		2	2
Long-tailed macaque ( <i>Macaca fascicularis</i> )	15	20	10		15	25
Pig-tailed macaque ( <i>Macaca nemestrina</i> )	4	10	12		10	15
Moonrat ( <i>Echinosorex gymnurus</i> )	3	2	1		2	4
Brown spiny rat ( <i>Maxomys rajah</i> )	6					2
Long-tailed giant rat ( <i>Leopoldamys sabanus</i> )	1					1
Thick-spined porcupine ( <i>Thecurus crassispinis</i> )	8	2	3		5	8
Pangolin ( <i>Manis javanica</i> )	5	1	2		4	6
Lesser treeshrew ( <i>Tupaia minor</i> )					2	1
Common treeshrew ( <i>Tupaia glis</i> )	4				9	10
Large treeshrew ( <i>Tupaia tana</i> )					1	2
Low's squirrel ( <i>Sundasciurus lowi</i> )						1
Horse-tailed squirrel ( <i>Sundasciurus hippurus</i> )						2
Four-striped ground squirrel ( <i>Lariscus hosei</i> )					1	1
Rhinoceros Hornbill ( <i>Buceros rhinoceros</i> )	4	2			2	4
Pied Hornbill ( <i>Anthracoceros coronatus</i> )	8	5			6	5
Crocodile ( <i>Crocodylus porosus</i> )	5		1		6	10
Malaysian Peacock – Jungle Pheasant	5	1			6	2

APPENDIX 2. Animals caught on camera traps in DFR



Crested Wood Partridge



Garnet Pitta



Pied Fantail



White-crowned Forktail



Bulbul



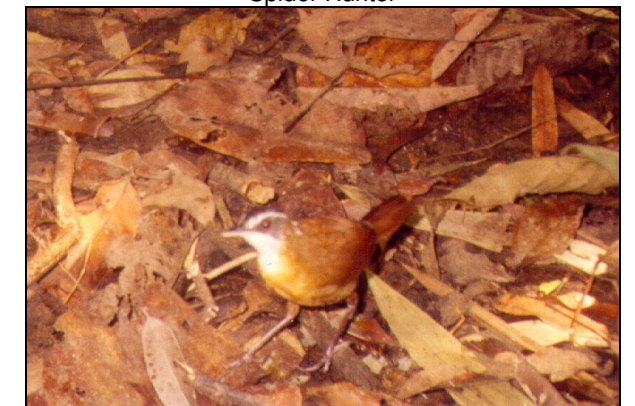
Spider Hunter



Green-winged Pigeon



Scaly-breasted Partridge



Black-capped Barbler

APPENDIX 2. Animals caught on camera traps in DFR



Banded Palm Civet



Malay Civet



Common Palm Civet



Otter Civet



Oriental small-clawed Otter



Short-tailed Mongoose



Otter Civet



Pangolin



Monitor Lizard

APPENDIX 2. Animals caught on camera traps in DFR



Brown Spiny Rat



Moon Rat



Large Treeshrew



Lesser Treeshrew



Low's Squirrel



Horse-tailed Squirrel



Four-striped Ground Squirrel



Bearded Pig



Flat Headed Cat

APPENDIX 2. Animals caught on camera traps in DFR



Lesser Mouse Deer



Greater Mouse Deer



Bats



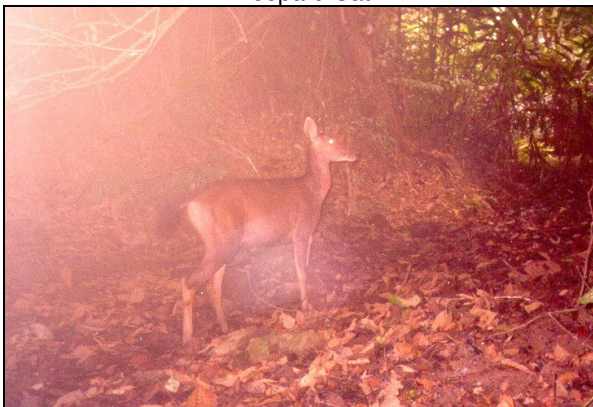
Clouded Leopard



Leopard Cat



Bornean Yellow Muntiac



Samba Deer



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