

VCS Monitoring Report for INFAPRO 2007 – 2010

Version 1.5, 29 August 2011



INFAPRO Rehabilitation of logged-over dipterocarp forest in Sabah, Malaysia

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1 Introduction

INFAPRO is a forest rehabilitation project in Sabah, Malaysia, aiming at the additional sequestration of CO₂ from the atmosphere, established by Face the Future and Yayasan Sabah. This Monitoring Report describes the results of project monitoring in the period from 1 January 2007 up to and including 31 December 2010 for the purpose of the verification of the GHG emission reductions and project implementation, in line with the requirements of the Verified Carbon Standard. The Monitoring Report is based on the Monitoring Plan provided in the VCS Project Document for INFAPRO version 1.0.

2 Net CO₂ equivalent emissions in the baseline scenario

The net emissions in the baseline scenario is calculated with equation (2) from the methodology:

$$\Delta C_{BSL} = \sum_{t=1}^{t^*} \sum_{i=1}^{M_{BSL}} (\Delta C_{REL,i,t} + \Delta C_{tree-exist,i,t}) + GHG_{BSL-E,t}$$

The parameter $\Delta C_{REL,i,t}$ is quantified in PD section 4.2. Relogging in the baseline scenario only occurs once in the Crediting Period, in year 2007.

The parameters $\Delta C_{tree-exist,i,t}$ is monitored, see section 2.1.

The parameter $GHG_{BSL-E,t}$ is quantified in PD section 4.2 and is only determined once, as it represents the emissions from relogging.

Table 2.1 presents the outcome of equation (2) for the monitoring period 2007 – 2010.

Table 2.1 Carbon stock changes and GHG emissions in the baseline scenario in 2007 – 2010.

Project Year (t)			2007	2008	2009	2010	Total
ΔC_{BSL}		tCO ₂ -e	- 875,767	165,051	165,051	165,051	-380,615
Open Canopy forest type	$\Delta C_{REL,i,t}$	tCO ₂ -e/yr	-	-	-	-	-
	$\Delta C_{tree-exist,i,t}$	tCO ₂ -e/yr	-	15,256	15,256	15,256	45,767
Pioneer dominated forest type	$\Delta C_{REL,i,t}$	tCO ₂ -e/yr	-47,335	-	-	-	-47,335
	$\Delta C_{tree-exist,i,t}$	tCO ₂ -e/yr	-	120,729	120,729	120,729	362,186
Remnant / Pioneer forest type	$\Delta C_{REL,i,t}$	tCO ₂ -e/yr	-113,853	-	-	-	-113,853
	$\Delta C_{tree-exist,i,t}$	tCO ₂ -e/yr	-	29,066	29,066	29,066	87,199
$GHG_{BSL-E,t}$		tCO ₂ -e/yr	-714,580	-	-	-	-714,580

2.1 Monitoring of carbon stock changes in existing vegetation in the baseline ($\Delta C_{tree-exist,i,t}$)

Regrowth of existing tree vegetation in the baseline ($\Delta C_{tree-exist,i,t}$) is conservatively estimated as the regrowth of the pre-logged residual forest applied to the entire area of the stratum, despite any relogging in the stratum. It is measured in plots established in the untreated areas (i.e. not treated with silvicultural techniques) within the Project Area or in areas adjacent to it. These plots have been measured in 2007 and 2010. The plots measured in 2007 were remeasured in 2010 and some additional

plots were measured to obtain a better estimate of the tree carbon stocks. In order to increase the precision level of the estimates for 2010 and also in order to obtain a better distribution of plots over the Project Area, an extra number of 18 plots was measured in 2011 in the untreated area. The data of these plots are conservatively included in the calculation of tree carbon stocks in year 2010. The trees measured in these new plots in 2011 are assumed to have grown larger than in 2010, because growth does take place in the baseline scenario. The corresponding higher carbons stocks result into an overestimation of the 2010 carbon stocks in the baseline.

Equation (21) of the methodology is applied to quantify the carbon stock changes due to regrowth in the baseline:

$$\Delta C_{tree-exist,i,t} = A_{i,t} \times \sum_{j=1}^S \Delta C_{tree-exist,j,i,t}$$

Following the methodology, the calculation of parameter $\Delta C_{tree-exist,j,i,t}$ is based on the same procedure as for $\Delta C_{AGB,i,t}$ in section 3.2.1 in the Monitoring Report. This does already include the calculation of carbon stock changes for the total area per stratum ($A_{i,t}$), in equation (37) and it will therefore not be repeated as in equation (21). The same procedure also already accounts for summing all the tree species j per stratum in equation (39). Therefore, the results of the carbon stock changes in existing tree vegetation in the baseline, as presented in table 2.1.2.3 in section 2.1.2, represent the values of parameter $\Delta C_{tree-exist,i,t}$.

2.1.1 Area of baseline strata ($A_{i,t}$)

The area ($A_{i,t}$) in which baseline regrowth takes place, is equal to the cumulative area that has been treated up to that year. This Monitoring Report only includes the stratum of rehabilitation period 1993 – 2000. The area per stratum is shown in table 3.2.1.2. The $A_{i,t}$ is based on the compartments surveyed in the field, which represents the total area across all strata in rehabilitation period 1993 – 2000. The strata of the forest types within this area are determined based on classification of an aerial photo – see section 4.2.2 of the PD.

2.1.2 Changes in the carbon stocks in existing tree vegetation in the baseline ($\Delta C_{tree-exist,j,i,t}$)

Both above-ground and below-ground carbon stocks are included in the calculation of $\Delta C_{tree-exist,j,i,t}$, as in equation (22) from the methodology:

$$\Delta C_{tree-exist,j,i,t} = \Delta C_{tree-exist-AB,j,i,t} + \Delta C_{tree-exist-BB,j,i,t}$$

The parameter $\Delta C_{tree-exist-AB,j,i,t}$ is determined following the method as for $\Delta C_{AGB,i,t}$ in section 3.2.1. Therefore the calculation of this parameter is provided in section 3.2.1 – see tables 3.2.1.1 and 3.2.1.2. The results of the final step of the calculation of $\Delta C_{tree-exist-AB,j,i,t}$ based on equation (37) from the methodology, are presented in the table 2.1.2.1.

Table 2.1.2.1 Net carbon stock changes in above-ground biomass of existing tree vegetation in the baseline scenario ($\Delta C_{\text{tree-exist-AB},j,i,t}$) in 2007 – 2010 of the rehabilitation area 1993 – 2000.

Project Year (t)	Open Canopy	Pioneer dominated	Remnant / Pioneer	Total
	tCO ₂ /yr	tCO ₂ /yr	tCO ₂ /yr	tCO ₂ /yr
2007	-	-	-	-
2008	13,039	103,187	24,843	141,069
2009	13,039	103,187	24,843	141,069
2010	13,039	103,187	24,843	141,069
Total	39,117	309,561	74,529	423,207

The parameter $\Delta C_{\text{tree-exist-BB},j,i,t}$ is determined following the method as for $\Delta C_{\text{BGB},i,t}$ in section 3.2.2. The results are presented in table 2.1.2.2.

Table 2.1.2.2 Net carbon stock changes in below-ground biomass of existing tree vegetation in the baseline scenario ($\Delta C_{\text{tree-exist-BB},j,i,t}$) in 2007 – 2010 of the rehabilitation area 1993 – 2000.

Project Year (t)	Open Canopy	Pioneer dominated	Remnant / Pioneer	Total
	tCO ₂ /yr	tCO ₂ /yr	tCO ₂ /yr	tCO ₂ /yr
2007	-	-	-	-
2008	2,217	17,542	4,223	23,982
2009	2,217	17,542	4,223	23,982
2010	2,217	17,542	4,223	23,982
Total	6,650	52,625	12,670	71,945

The sum of $\Delta C_{\text{tree-exist-AB},j,i,t}$ and $\Delta C_{\text{tree-exist-BB},j,i,t}$ following equation (22), is presented in table 2.1.2.3.

Table 2.1.2.3 Changes in the carbon stocks in existing tree vegetation in the baseline ($\Delta C_{\text{tree-exist},j,i,t}$) in 2007 – 2010 of the rehabilitation area 1993 – 2000.

Project Year (t)	Open Canopy	Pioneer dominated	Remnant / Pioneer	Total
	tCO ₂ /yr	tCO ₂ /yr	tCO ₂ /yr	tCO ₂ /yr
2007	-	-	-	-
2008	15,256	120,729	29,066	165,051
2009	15,256	120,729	29,066	165,051
2010	15,256	120,729	29,066	165,051
Total	45,767	362,186	87,199	495,152

3 Monitoring of project carbon stock changes and GHG emissions

3.1 Net CO₂ equivalent emissions in the with-project scenario (ΔC_{WPS})

The net CO₂ equivalent emissions in the with-project scenario is expressed in parameter ΔC_{WPS} and is determined following equation (35) from the methodology:

$$\Delta C_{\text{WPS}} = \sum_{t=1}^{t^*} \sum_{i=1}^{M_{\text{WPS}}} \Delta C_{P,i,t} + GHG_{\text{WPS-E},t}$$

The parameter $\Delta C_{P,i,t}$ representing the net carbon stock changes due to forest regrowth and silvicultural interventions, is quantified in section 3.2.

The parameter $GHG_{WPS-E,t}$ representing the GHG emissions relating to project implementation, is quantified in section 3.3.

The strata i included in this Monitoring Report are the forest types Open Canopy, Pioneer dominated and Remnant / Pioneer, combined with the rehabilitation period 1993 – 2000. The rehabilitation periods 2003 – 2004 and 2007 – 2009 are excluded from the Monitoring Report.

Table 3.1.1 Net CO₂ equivalent emissions in the with-project scenario for 2007 – 2010, summarized over all forest types of rehabilitation stratum 1993 – 2000.

Monitoring period	ΔC_{WPS}	$\Sigma \Delta C_{P,i,t}$	$GHG_{WPS-E,t}$
	tCO ₂ -e/yr	tCO ₂ -e/yr	tCO ₂ -e/yr
2007 – 2010	325,390	327,912	2,522

3.2 Net carbon stock changes due to forest regrowth and silvicultural interventions ($\Delta C_{P,i,t}$)

The net carbon stock change due to forest regrowth and silvicultural interventions in the with-project scenario is calculated based on equation (36) from the methodology:

$$\Delta C_{P,i,t} = \Delta C_{AGB,i,t} + \Delta C_{BGB,i,t} + \Delta C_{DW,i,t} + \Delta C_{WP,i,t} - E_{biomassloss,i,t}$$

The parameters $\Delta C_{DW,i,t}$, $\Delta C_{WP,i,t}$ and $E_{biomassloss,i,t}$ are not quantified (see PD section 4.3.1).

The parameter $\Delta C_{AGB,i,t}$ representing the net carbon stock changes in above-ground tree biomass, is quantified in section 3.2.1.

The parameter $\Delta C_{BGB,i,t}$ representing the net carbon stock changes in below-ground tree biomass, is quantified in section 3.2.2.

Table 3.2.1 Net carbon stock changes in the with-project scenario in 2007 – 2010, summarized over all forest types of rehabilitation stratum 1993 – 2000.

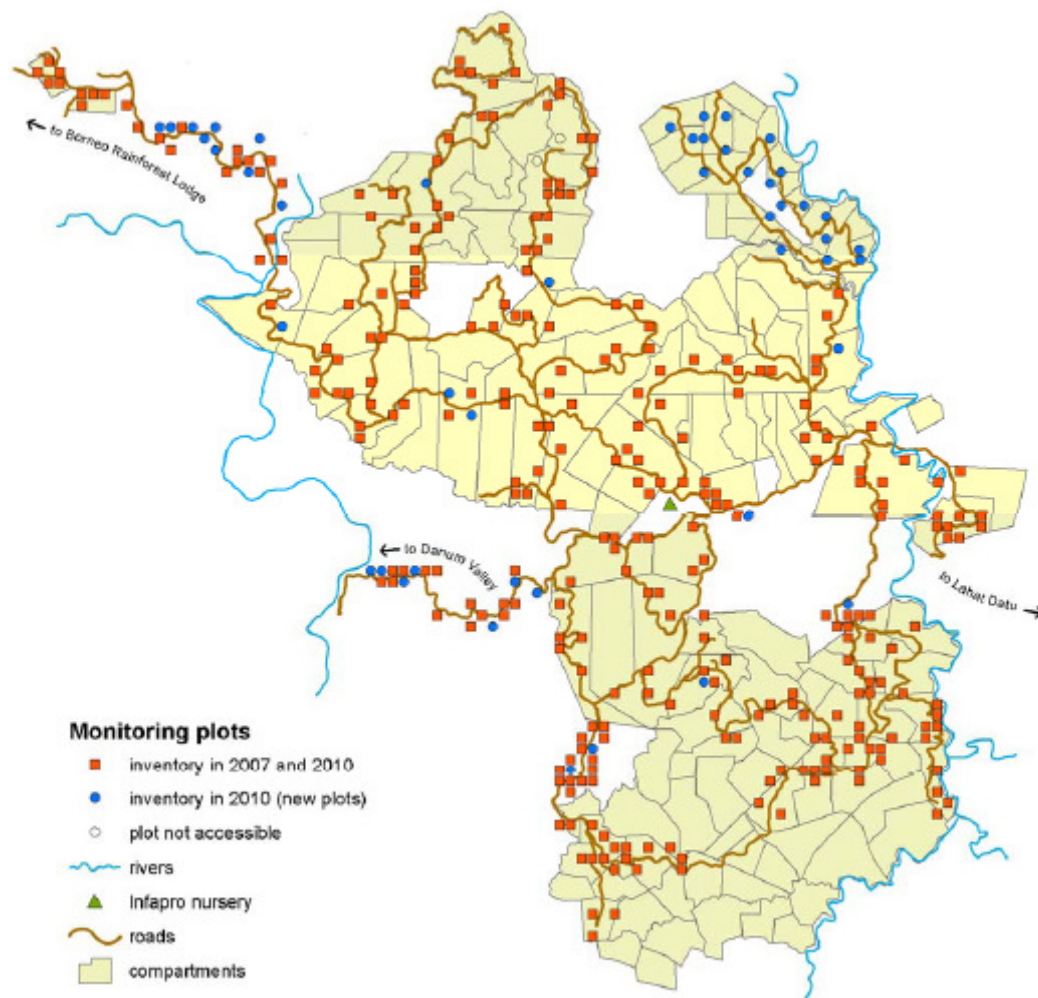
Project Year (t)	$\Delta C_{P,i,t}$	$\Delta C_{AGB,i,t}$	$\Delta C_{BGB,i,t}$
	tCO ₂ -e/yr	tCO ₂ /yr	tCO ₂ /yr
2007	-	-	-
2008	109,304	93,422	15,882
2009	109,304	93,422	15,882
2010	109,304	93,422	15,882
Total	327,912	280,266	47,645

3.2.1 Net carbon stock changes in above-ground tree biomass ($\Delta C_{AGB,i,t}$)

The quantification of the net carbon stock changes in above-ground tree biomass is based on sample plots measured in the strata of the treated Project Area – see the Monitoring Plan in the PD (sections 3.4.2.1 and 3.4.2.2 of the PD). An inventory of the plots, a so-called carbon monitoring campaign, was

carried out in 2007 and 2010. In order to increase the precision level of carbon stocks per stratum and to obtain a better distribution of plots over the Project Area, 18 additional plots were measured in 2011 in untreated parts of the Project Area. The map 3.2.1.1 shows the location of the monitoring plots in the Project Area – this includes plots measured in the treated and untreated area. The map also shows monitoring plots in the area rehabilitated after 2000, but the results of these plots are not included in this Monitoring Report. The plots measured in 2011 are not on the map. In this Monitoring Report only the stratum of rehabilitation period 1993 – 2000 is taken into account. This rehabilitation period consists of the three forest type strata Open Canopy, Pioneer dominated forest type and Remnant / Pioneer forest type. The relative size of the forest type strata is based on the aerial photo classification of the areas treated in the period 1993 – 2000 (see section 4.2.2 of the PD).

Map 3.2.1.1 Location of monitoring plots in the treated and untreated area in INFAPRO.



The determination of the carbon stocks in the strata of the with-project scenario is based on the step-wise approach in INFAPRO's Monitoring Plan (PD section 3.4.2.3). This approach combines the BEF method (for trees ≥ 10 cm DBH) and the allometric equation method (for trees ≤ 10 cm DBH). All the

data from the inventory plots referred to in the steps below, including all the calculations, are provided in separate spreadsheets: 'Infapro inventory data 2007 for Monitoring report 2010', 'Infapro inventory data 2010 for Monitoring report 2010' and 'Infapro monitoring report data 2007-2010 summarized'.

Step 1: The Diameter at Breast Height (DBH) is measured for trees with DBH ≥ 5 cm in monitoring plots.

Step 2: For trees with DBH ≥ 10 cm, the height and volume of each tree is calculated with volume equations that are specific for 15 species groups. The input variable is DBH in centimetres. For small trees (5-10 cm DBH) an equation from Pinard (1995) is used that has been specifically developed for small trees in a nearby area of the same forest type. See Monitoring Plan for the equations (PD section 3.4.2.3).

Step 3: For trees with DBH ≥ 10 cm a BEF of 1.895 is selected.

Step 4: For trees with DBH < 10 cm the dry weight of trees is converted to carbon stock based on the carbon fraction of 0.5. The stem volume of trees with DBH ≥ 10 cm is converted into carbon stocks of above-ground tree biomass via the basic wood density, the BEF and the carbon fraction, based on equation (38) from the methodology:

$$C_{AGB,l,j,i,sp,t} = V_{l,j,i,sp,t} \times D_j \times BEF_j \times CF_j$$

Step 5: The carbon stock in all trees per species and in all species is summed up to provide one single value per sample plot of the above-ground tree carbon stock, based on equation (39) from the methodology:

$$C_{AGB,i,sp,t} = \sum_{j=1}^{S_{WPS}} \sum_{l=1}^{N_{j,i,sp,t}} C_{AGB,l,j,i,sp,t}$$

Step 6: The mean carbon stock in above-ground tree biomass per stratum is calculated with an equation for weighted means. In addition to the initial sampling in a buffer area along the road, new plots have been measured in the core area (i.e. beyond the buffer area). In order to account for the difference in sampling intensity in the buffer area and the core area, the plots in these respective areas have been given a specific weight, for each stratum. The following equations are applied:

$$C_{AGB,i,t} = \frac{1}{W_i} \sum_{sp=1}^n C_{AGB,i,sp,t} W_{sp,i}$$

With:

$$W_i = \sum_{sp=1}^n W_{sp,i}$$

The parameter $w_{sp,i}$ represents the weight of plot sp in stratum i , and the parameter W_i is the sum of plot weights per stratum. In addition, the parameter $C_{AGB,i,t}$ is multiplied with a factor 5 in order to scale the plot value up to a per hectare value. The size of each plot is 0.2 ha and therefore the scaling factor is $1/0.2$, which is 5.

Table 3.2.1.1 shows the outcome of the calculation of parameter $C_{AGB,i,t}$.

Table 3.2.1.1 Above-ground carbon stock in trees in stratum i at year t .

	Stratum i	Year t	$C_{AGB,i,t}$ (tC/ha)	$A_{i,t}$ (ha)
Untreated area:	Open Canopy	2007	14.3	415
	Pioneer dominated	2007	65.4	5,160
	Remnant / Pioneer	2007	109.9	3,526
	Open Canopy	2010	40.0	415
	Pioneer dominated	2010	81.8	5,160
	Remnant / Pioneer	2010	115.7	3,526
Rehabilitation period 1993-2000	Open Canopy	2007	74.9	415
	Pioneer dominated	2007	117.2	5,160
	Remnant / Pioneer	2007	154.7	3,526
	Open Canopy	2010	67.3	415
	Pioneer dominated	2010	124.4	5,160
	Remnant / Pioneer	2010	166.7	3,526

Based on equation (37) from the methodology the net carbon stock change in above-ground tree biomass per stratum in year 2010 is calculated:

$$\Delta C_{AGB,i,t} = A_{i,t} \times (C_{AGB,i,t} - C_{AGB,i,t-T}) \times 44/12 / T$$

Where:

Parameter	Description	Unit
$\Delta C_{AGB,i,t}$	Net carbon stock change in above-ground tree biomass in stratum i at year t	t CO ₂ -e
$C_{AGB,i,t}$	Carbon stock in above-ground tree biomass in stratum i at year t	t C ha ⁻¹
t	1, 2, 3 ... t^* years elapsed since the start of the project activity	
I	1, 2, 3 ... M_{WPS} strata in the with-project scenario	
44/12	Ratio of molecular weights of CO ₂ and carbon	t CO ₂ -e t C ⁻¹
$A_{i,t}$	Area of stratum i at year t	ha
T	Number of years between monitoring times t_m and t_{m-1}	

The parameters $C_{AGB,i,t}$ and $A_{i,t}$ are provided in table 3.2.1.1. Excluded from $A_{i,t}$ are the 30 meter wide strips along each side of the roads within the strata of rehabilitation year 1993 – 2000. The number of years

between the monitoring campaigns in 2007 and 2010 is 3 years. The results of equation (37) are provided in table 3.2.1.2. The results for the untreated area are presented in section 2.1.2.

Table 3.2.1.2 Net carbon stock changes in above-ground tree biomass ($\Delta C_{AGB,i,t}$) in 2007 – 2010 for rehabilitation period 1993 – 2000.

Project Year (t)	Open Canopy	Pioneer dominated	Remnant / Pioneer	Total
	tCO ₂ /yr	tCO ₂ /yr	tCO ₂ /yr	tCO ₂ /yr
2007	-	-	-	-
2008	-3,871	45,713	51,580	93,422
2009	-3,871	45,713	51,580	93,422
2010	-3,871	45,713	51,580	93,422
Total	-11,613	137,139	154,741	280,266

3.2.2 Net carbon stock changes in below-ground tree biomass ($\Delta C_{BGB,i,t}$)

The net carbon stock change in below-ground tree biomass is based on the above-ground tree biomass multiplied with the root:shoot ratio, as in equation (42) of the methodology:

$$\Delta C_{BGB,i,t} = \Delta C_{AGB,i,t} \times R_j$$

The parameter $\Delta C_{AGB,i,t}$ is quantified in section 3.2.1 above.

The root:shoot ratio R_j selected for INAPRO is 1.17 – see section 3.3 of the PD.

Table 3.2.2.1 Net carbon stock changes in below-ground tree biomass ($\Delta C_{BGB,i,t}$) in 2007 – 2010 for rehabilitation period 1993 – 2000.

Project Year (t)	Open Canopy	Pioneer dominated	Remnant / Pioneer	Total
	tCO ₂ /yr	tCO ₂ /yr	tCO ₂ /yr	tCO ₂ /yr
2007	-	-	-	-
2008	-658	7,771	8,769	15,882
2009	-658	7,771	8,769	15,882
2010	-658	7,771	8,769	15,882
Total	-1,974	23,314	26,306	47,645

3.3 Project GHG emissions ($GHG_{WPS-E,t}$)

The emissions related to project implementation ($GHG_{WPS-E,t}$) involve the following sources:

1. Combustion of fuel for transport and electricity generation (section 3.3.1);
2. International and domestic flights of project staff, advisors and auditors (section 3.3.2);
3. Clearing of forest for the establishment of project infrastructure (section 3.3.3);
4. Felling of trees for road maintenance and associated GHG emissions for the use of machinery (section 3.3.4).

Table 3.3.1 Project GHG emissions ($GHG_{WPS-E,t}$) for 2007 – 2010.

Project year t	Trans./Electr.	Flights	$E_{clearing,t}$	$E_{clearing-roads,t}$	$GHG_{WPS-E,t}$
	tCO ₂ -e/yr	tCO ₂ /yr	tCO ₂ -e/yr	tCO ₂ -e/yr	tCO ₂ -e/yr
2007	364	10	-	233	607
2008	433	10	-	233	676
2009	364	10	-	233	607
2010	390	10	-	233	633
Total	1,551	40.1		931	2,522

3.3.1 Combustion of fuel for transport and electricity generating

The annual fuel consumption for transport and electricity generation is multiplied by the emission factor for fuel (EF_{fuel}), which is 2.9 tCO₂-e/kL. The table 3.3.1.1 presents the annual fuel consumption in the period 2007 – 2010 and the associated GHG emissions. The annual fuel consumption is based on records from the project.

Table 3.3.1.1 Combustion of fuel for transport and electricity generation.

Project year t	Fuel consumption	Fuel GHG emissions
	kL/yr	tCO ₂ -e/yr
2007	125.656	364
2008	149.346	433
2009	125.499	364
2010	134.439	390
Total	534.94	1,551

3.3.2 Flights

The emissions from flights related to project implementation are calculated with the help of the online International Civil Aviation Organization (ICAO) Carbon Emissions Calculator. As no records have been maintained for the number of flights for the period 2007 – 2010, a conservative estimation is made – see table 3.3.2.1.

Table 3.3.2.1 Flight emissions for 2007 – 2010.

Project year t	Domestic flights		International flights	
	Number	Emissions (tCO ₂ /yr)	Number	Emissions (tCO ₂ /yr)
2007	24	2.2	4	7.8
2008	24	2.2	4	7.8
2009	24	2.2	4	7.8
2010	24	2.2	4	7.8
Total	96	8.9	16	31.2

3.3.3 Clearing of forest for the establishment of project infrastructure

No forest has been cleared in the period 2007 – 2010 for the establishment of infrastructure.

3.3.4 Road maintenance

GHG emissions associated with road maintenance are from grading and the occasional felling of trees. Tree felling occurs at parts of roads that remain very wet after rains: trees along the road are felled to allow the sun to reach and dry the road surface. The GHG emissions from road maintenance are calculated with equation (24) of the methodology:

$$E_{clearing,t} = E_{biomass,t} + E_{felling,t} + E_{grading,t}$$

The emissions from road maintenance are presented in table 3.3.4.1. The individual parameters of equation (24) are quantified below.

Table 3.3.4.1 GHG emissions from road maintenance for the period 2007 – 2010.

Project year t	$E_{clearing,t}$	$E_{biomass,t}$	$E_{felling,t}$	$E_{grading,t}$
	tCO ₂ -e/yr	tCO ₂ -e/yr	tCO ₂ -e/yr	tCO ₂ -e/yr
2007	233	179.7	0.45	52.6
2008	233	179.7	0.45	52.6
2009	233	179.7	0.45	52.6
2010	233	179.7	0.45	52.6
Total	931	719	1.8	210.5

$E_{grading,t}$

The parameter $E_{grading,t}$ applies to road maintenance only – not taking into account tree felling. The GHG emissions from road maintenance are based on equation (27) of the methodology:

$$E_{grading,t} = FC_{grader} \times EF_{fuel} \times A_{infrastructure,t}$$

The fuel consumption for grading (FC_{grader}) is 2.52 kL/ha. The fuel emission factor (EF_{fuel}) is 2.9 tCO₂-e/kL. No records of the length of annual maintained roads are available for the period 2007 – 2010. Therefore, the annual length of roads to be maintained is conservatively estimated (i.e. overestimated) at 12,000 meter, with a width of 6 meter. The $A_{infrastructure,t}$ is 7.2 ha. $E_{grading,t}$ is then calculated as 52.6 tCO₂-e/yr for the period 2007 – 2010.

$E_{biomass,t}$

The parameter $E_{biomass,t}$ applies only to the felling of trees and is calculated based on equation (25) from the methodology:

$$E_{biomass,t} = C_{biomass} \times A_{infrastructure,t} \times (44/12)$$

$C_{biomass}$ is equal to the area weighted $C_{BSL,pre}$, which is 81.7 tC/ha (see section 4.2.3 of the PD). $A_{infrastructure,t}$ is determined based on the following conservative assumptions. Less than 5% of the roads require roadside felling up to 5 meter at each side of the road. As the annual length of maintained

roads is 12,000 meter, the $A_{infrastructure,t}$ is equal to 0.6 ha/yr. Therefore, $E_{biomass,t}$ is equal to 179.7 tCO₂-e/yr.

$E_{felling,t}$

The parameter $E_{felling,t}$ applies only to the felling of trees and is calculated based on equation (26) from the methodology:

$$E_{felling,t} = FC_{equip} \times EF_{fuel} \times V_{infrastructure,t}$$

EF_{fuel} is 2.9 tCO₂-e/kL and FC_{equip} is 0.00128 kL/m³. The $V_{infrastructure,t}$ is calculated as the average commercial wood volume per hectare of the cleared forest stands, multiplied with the $A_{infrastructure,t}$ of 0.6 ha/yr. The average commercial wood volume per hectare is 201.5 m³/ha, which is based on the inventory data used for the calculation of $C_{BSL,pre}$. Therefore, $V_{infrastructure,t}$ is 121 m³/yr. Then $E_{felling,t}$ is 0.45 tCO₂-e/yr.

4 Quantifying GHG emission reductions and removal enhancements

4.1 Total net GHG emission reductions

The total net benefits that result from the project activity is calculated with equation (48) from the methodology:

$$\Delta C_{IFM} = \Delta C_{BSL} - \Delta C_{WPS} - \Delta C_{LK}$$

ΔC_{BSL} and ΔC_{WPS} are quantified in chapters 2 and 3 of the Monitoring Report. ΔC_{LK} is quantified in the PD. Table 4.1.1 presents a summary of ΔC_{IFM} for the period 2007 – 2010. A more detailed overview is in Annex I.

Table 4.1.1 Summary of total net GHG emission reductions for 2007 – 2010 (ΔC_{IFM}).

Project Year	ΔC_{IFM}	
	Annual	Cumulative
	tCO ₂ -e	tCO ₂ -e
2007	810,686	810,686
2008	-56,423	754,263
2009	-56,354	697,909
2010	-56,380	641,529

4.2 Uncertainty assessment

The net GHG emissions reductions (ΔC_{IFM}) are corrected for uncertainty based on equation (49) of the methodology:

$$C_{IFM_ERROR} = \sqrt{Uncertainty_{BSL}^2 + Uncertainty_{WPS}^2}$$

Where $Uncertainty_{BSL}$ represents the total uncertainty in the baseline scenario and $Uncertainty_{WPS}$ represents the total uncertainty in the with-project scenario, which are quantified in the sections below. $Uncertainty_{BSL}$ is 16.1% and $Uncertainty_{WPS}$ is 7.4%. Therefore C_{IFM_ERROR} is 17.7%.

4.2.1 Total uncertainty in the baseline scenario

The uncertainty in the baseline scenario is expressed for parameter $C_{tree-exist,i,t}$. The uncertainty across combined strata for $C_{tree-exist,i,t}$ is calculated with the revised equation (2) from the tool VT0003:

$$Uncertainty_{BSL} = \frac{(U_{BSL,1} \times E_{BSL,1}) + (U_{BSL,2} \times E_{BSL,2}) + \dots + (U_{BSL,M_{BSL}} \times E_{BSL,M_{BSL}})}{E_{BSL,1} + E_{BSL,2} + \dots + E_{M_{BSL}}}$$

Where:

$Uncertainty_{BSL}$	Total uncertainty in baseline scenario; %
$U_{BSL,i}$	Uncertainty in baseline scenario in stratum i ; %
$E_{BSL,i}$	Sum of combined carbon stocks and GHG sources (e.g. trees, down dead wood, etc.) in stratum i (1,2...n represent different carbon pools and/or GHG sources) multiplied by the area of stratum i (A_i) in the baseline case; t CO ₂ -e
I	1, 2, 3 ... M_{WPS} strata in the baseline scenario

The parameter $E_{BSL,i}$ is calculated as the mean value of $C_{tree-exist,i,t}$ (in tC/plot) multiplied with a factor 5 to go to a per hectare value, and then multiplied with the area per stratum (A_i). The A_i follows from section 2.1.1. The parameter $U_{BSL,i}$ is calculated per stratum by dividing the 90% confidence interval by the mean value of $C_{tree-exist,i,t}$ (in tC/plot). The corresponding standard deviation is calculated over the measured plot values of $C_{tree-exist,i,t}$. The 90% confidence interval is calculated based on the standard deviation and the t-value for $n-1$ plots per stratum. Therefore, $Uncertainty_{BSL}$ is 17.7% for the inventory data from 2007 – see table 4.2.1.1. The $Uncertainty_{BSL}$ for the inventory data from 2010 is 14.5% – see table 4.2.1.2. Only one single value of C_{IFM_ERROR} can be used in the equation (51) for calculating the number of Verified Carbon Units. Therefore the average value of $Uncertainty_{BSL}$ for the monitoring events 2007 and 2010 is used as input to calculate C_{IFM_ERROR} in equation (49).

Table 4.2.1.1 Uncertainty in the baseline scenario for $C_{tree-exist,i,t}$ for the monitoring event in 2007.

		Open Canopy	Pioneer dominated	Remnant / Pioneer
A_i	Ha	415	5,160	3,526
$C_{tree-exist,i,t}$	tC/plot	2.9	13.1	22.0
$E_{BSL,i}$	t CO ₂ -e	5,955	337,556	387,480
Standard deviation	tC	3.2	6.0	10.1
Number of plots		5	17	28
90% confidence interval	tC	3.1	2.5	3.3
$U_{BSL,i}$	%	107	19	15

Table 4.2.1.2 Uncertainty in the baseline scenario for $C_{tree-exist,i,t}$ for the monitoring event in 2010.

		Open Canopy	Pioneer dominated	Remnant / Pioneer
A_i	ha	415	5,160	3,526
$C_{tree-exist,i,t}$	tC/plot	8.0	16.4	23.1
$E_{BSL,i}$	t CO ₂ -e	16,623	421,981	407,806
Standard deviation	tC	5.0	8.1	10.8
Number of plots		19	26	44
90% confidence interval	tC	2.0	2.7	2.7
$U_{BSL,i}$	%	25	17	12

4.2.2 Total uncertainty in the with-project scenario

The uncertainty in the with-project scenario concerns the parameters $C_{AGB,i,t}$ and $C_{BGB,i,t}$. No uncertainty is quantified for $E_{biomassloss,t}$ because the value of this parameter is zero within the monitoring period 2007 – 2010. $C_{BGB,i,t}$ is calculated as $C_{AGB,i,t}$ multiplied with the root:shoot ratio of 0.17, and is a function of $C_{AGB,i,t}$. The uncertainty for $C_{BGB,i,t}$ is therefore equal to the uncertainty for $C_{AGB,i,t}$ and can be omitted from the calculation of the total uncertainty in the with-project scenario ($Uncertainty_{WPS}$).

$Uncertainty_{WPS}$ is calculated for $C_{AGB,i,t}$ based on the revised equation (4) from the tool VT0003:

$$Uncertainty_{WPS} = \frac{(U_{WPS,1} \times E_{WPS,1}) + (U_{WPS,2} \times E_{WPS,2}) \dots + (U_{WPS,M_{WPS}} \times E_{WPS,M_{WPS}})}{E_{WPS,1} + E_{WPS,2} \dots + E_{M_{WPS}}}$$

Where:

$Uncertainty_{WPS}$	Total uncertainty in project scenario; %
$U_{WPS,i}$	Uncertainty in project scenario in stratum i ; %
$E_{WPS,i}$	Sum of combined carbon stocks, GHG sources and leakage emission types (e.g. trees, down dead wood, etc.) in stratum i (1,2...n represent different carbon pools and/or GHG sources) multiplied by the area of stratum i (A_i) in the with-project case; t CO ₂ -e
i	1, 2, 3 ... M_{WPS} strata in the project scenario

The parameter $E_{WPS,i}$ is calculated as the mean value of $C_{AGB,i,t}$ (in tC/plot) multiplied with a factor 5 to go to a per hectare value, and then multiplied with the area per stratum (A_i). The A_i follows from section 3.2.1. The parameter $U_{WPS,i}$ is calculated per stratum by dividing the 90% confidence interval by the mean value of $C_{AGB,i,t}$ (in tC/plot). The corresponding standard deviation is calculated over the measured plot values of $C_{AGB,i,t}$. The 90% confidence interval is calculated based on the standard

deviation and the t-value for n-1 plots per stratum. Therefore, $Uncertainty_{WPS}$ is 8.1% for the inventory data from 2007 – see table 4.2.2.1. The $Uncertainty_{WPS}$ for the inventory data from 2010 is 6.7%– see table 4.2.2.2. Only one single value of C_{IFM_ERROR} can be used in the equation (51) for calculating the number of Verified Carbon Units. Therefore the average value of $Uncertainty_{WPS}$ for the monitoring events 2007 and 2010 is used as input to calculate C_{IFM_ERROR} in equation (49), which is 7.4%.

Table 4.2.2.1 Uncertainty in the with-project scenario for $C_{AGB,i,t}$ for the monitoring event in 2007.

		Open Canopy	Pioneer dominated	Remnant / Pioneer
A_i	ha	415	5,160	3,526
$C_{AGB,i,t}$	tC/plot	15.0	23.4	30.9
$E_{WPS,i}$	t CO ₂ -e	31,119	604,593	545,649
Standard deviation	tC	9.2	10.4	15.6
Number of plots		26	81	132
90% confidence interval	tC	3.1	1.9	2.3
$U_{WPS,i}$	%	21	8	7

Table 4.2.2.2 Uncertainty in the with-project scenario for $C_{AGB,i,t}$ for the monitoring event in 2010.

		Open Canopy	Pioneer dominated	Remnant / Pioneer
A_i	ha	415	5,160	3,526
$C_{AGB,i,t}$	tC/plot	13.5	24.9	33.3
$E_{WPS,i}$	t CO ₂ -e	36,613	720,871	652,817
Standard deviation	tC	10.9	9.4	14.4
Number of plots		32	94	148
90% confidence interval	tC	3.3	1.6	2.0
$U_{WPS,i}$	%	24	6	6

4.3 Calculation of VCU's

The number of Verified Carbon Units is calculated for the monitoring period 1 January 2007 up to and including 31 December 2010 with the following equation (51):

$$VCU_{t2} = (\Delta C_{IFM,t2} - \Delta C_{IFM,t1}) \times \left(\frac{100 - C_{IFM_ERROR}}{100} \right) - Bufferwithholding_{\alpha_2}$$

C_{IFM_ERROR} is only included in the equation if it is larger than 10%. In this Monitoring Report C_{IFM_ERROR} is calculated as 17.7% in section 4.2. The uncertainty of 17.7% is related to data collected for assessing carbon stock changes in the with-project and baseline situation, which is applicable to the years 2008 – 2010. The number of VCU's for 2007 is not based on these data, because it represents the year of the first monitoring event. The VCU's in 2007 relate to emissions from relogging, for which no uncertainty

could be determined – instead a conservative approach has been applied. Therefore, the C_{IFM_ERROR} is applied to the years 2008 – 2010, and not 2007 – see table 4.3.1.

The parameter $Bufferwithholding_{t2}$ is calculated as the buffer percentage times the net change in the project's carbon stocks. The net change in carbon stocks is reflected in the following parameters:

- ΔC_P (net carbon stock change in the with-project scenario) minus the $\Delta C_{tree-exist}$ (changes in carbon stocks in existing tree vegetation in the baseline);
- ΔC_{REL} (net carbon stock change due to relogging in the baseline);
- $E_{biomassloss,t}$ (emissions due to the removal of biomass for relogging infrastructure) – this is the only parameter within $GHG_{BSL-E,t}$ (greenhouse gas emissions as a result of relogging) that reflects changes in carbon stocks.

The buffer percentage is determined at 10% in the report 'Non-Permanence Risk Assessment INFAPRO version 1.0'. The value of ΔC_P is 109,304 tCO₂-e/year for 2008 – 2010, minus $\Delta C_{tree-exist}$ of 165,051 tCO₂-e/year, resulting into a net value of -55,747. The value of ΔC_{REL} is 161,188 tCO₂-e in 2007 and for $E_{biomassloss,t}$ it is 691,999 tCO₂-e in 2007, which is 853,187 tCO₂-e in total. The size of $Bufferwithholding_{t2}$ is therefore 102,043 tCO₂-e for the period 2007 - 2010.

Table 4.3.1 Calculation of Verified Carbon Units for 2007 – 2010.

Project Year	ΔC_{IFM}		C_{IFM_ERROR}	$Bufferwithholding_t$		VCU_t
	Annual	Cumulative		%	tCO ₂ -e/yr	
	tCO ₂ -e/yr	tCO ₂ -e	%	%	tCO ₂ -e/yr	
2007	810,686	810,686	-	10%	85,319	725,367
2008	-56,423	754,263	17.7%	10%	5,575	-71,989
2009	-56,354	697,909	17.7%	10%	5,575	-71,904
2010	-56,380	641,529	17.7%	10%	5,575	-71,934
Total					102,043	509,540

In summary, the total amount of emission reductions within the monitoring period is 641,529 (i.e. ΔC_{IFM}). The number of emission reductions that need to be subtracted because of uncertainty (C_{IFM_ERROR}) is 29,946. The $Bufferwithholding$ in total is 102,043 VCU's (as explained above – NB the $Bufferwithholding$ is only calculated over changes in carbon stocks and not over emissions from sources). The total number of VCU's for the monitoring period 2007 – 2010 is therefore 509,540.

5. QA/QC procedures for monitoring carbon stock changes and GHG emissions

5.1 QA/QC general

Training

Training of monitoring staff for the campaign in 2007 took place from 9 – 13 July 2007. The Field-Map technology was already introduced to INFAPRO staff in 2002. Therefore, training included re-training of those who were already familiar with Field-Map and first-time training for those who had no experience with the measurement technology. Remeasurement of selected plots took place in the week of 23 – 30 July 2007. At the end of this week the staff was retrained based on the results of the measurement checks.

The monitoring staff was trained on the inventory procedures in the period 18 – 28 January 2010 prior to the start of the campaign in 2010. A new item in the training in 2010 was on repeated measurement of plots, because for the first time monitoring plots were remeasured. Extra focus in the training in 2010 was on DBH measurement in order to ensure a good standard of these type of measurements. DBH is a key input parameter for the calculation of carbon stocks. A training logbook for the campaign in 2010 is provided in IFER's report on the monitoring campaign (IFER, 2010).

SOP

Standard Operation Procedures for the carbon monitoring campaign have been written in 2010 by IFER in cooperation with INFAPRO (IFER, 2010b). The SOP include procedures for all monitoring steps. Specific procedures are provided for plots that are measured for the first time and for plots that are re-measured. The main items in the SOP are:

- Navigating to the plot centre
- Fixing (first measurement) or finding (re-measurement) the plot centre
- Measuring and describing trees
- Describing other parameters of the plot
- Checking the database
- Creating data back-up

The SOP contains rules for how DBH measurements are taken in specific circumstances, e.g. on steep slopes, for slanted trees and for trees with buttresses. The SOP is written in English and in Bahasa Malaysia to make sure that the inventory team members have a good understanding of the procedures. The procedures are described following a step-wise approach, where steps are accompanied with specific pictures or screenshots. The content of the SOP is in line with the content of the monitoring training sessions.

Software

Field-Map software is used for the collection of inventory data. The Field-Map project (i.e. database structure) that has been developed for INFAPRO works with look-up lists for field data entry. This helps in minimizing input errors and makes sure that input data is standardized. Other items in the design of the Field-Map project that contribute to the quality of the data collection are:

- a. Dependency checks are included: conditional lookup lists shorten the choice for subordinate variables.
- b. The species lookup list only contains species that occur in the Project Area.
- c. A warning is given by Field-Map if a value is out of reasonable bounds. The inventory team member is given the opportunity to check the value and correct it if applicable.
- d. Field-Map gives a warning if a tree is located outside of the plot boundary.
- e. After completion of each plot, an automatic software check is run to see whether any input variables are missing (e.g. DBH or species name).
- f. There is an option to switch on a measurement wizard that guides the operator of the field computer through the measurement steps.

During data processing data checks are performed with the help of SQL queries.

Quality control through plot remeasurement

In the monitoring campaign in 2007 a limited number of plots was remeasured. In the beginning of the campaign 6 plots were remeasured by the field campaign external supervisor. The purpose of the remeasurement was not to quantify the measurement error, but to improve the measurement skills of the team members in the beginning of the monitoring campaign.

Quality control measurements in 2010 were much more intensive: 10% of the plots measured in 2010 were remeasured. As reported by IFER (2010) the difference between data collected by field teams and checking teams expressed in tons of carbon per plot ranges from -18% up to +37%, where checking data are considered to be at 100%. The mean absolute difference is -0.01 tC/plot and mean relative difference is 1.38%.

5.2 Roles and responsibilities

The staff involved in the monitoring campaigns in 2007 and 2010 is presented in table 5.2.1. Per position the people involved in the campaign are mentioned. The responsibilities of each position are described in the Monitoring Plan of the PD. Sometimes the same person is mentioned in several positions, e.g. when someone is Equipment operator and Tree ID man and is able to combine those activities.

Table 5.2.1 Staff involved in the monitoring campaigns in 2007 and 2010.

Position	Staff	
	Campaign 2007	Campaign 2010
Carbon monitoring manager	Martijn Snoep (Face the Future)	Martijn Snoep (Face the Future)
Campaign leader	Dr. Martin Cerny (IFER)	Dr. Martin Cerny (IFER)
Field campaign leader	Dr. Yap Sau Wai (YS)	Dr. Yap Sau Wai (YS)
Field campaign external supervisor	Radek Russ (IFER)	Petr Vopenka (IFER)
Data analyst	Radek Russ (IFER)	Radek Russ (IFER)
Campaign local supervisor	Jaludin Abun (INFAPRO)	Jaludin Abun (INFAPRO)
QC officer	NA	María Belén Herrera (Profafor)
Field campaign leader assistant	Fairy Dasun (YS)	Jenifer Chua (YS)
Equipment operator	Asni bin Bulot (INFAPRO) Magat Japar (INFAPRO) Hasrin Parasin (INFAPRO) Rasit Abdul (INFAPRO) Dingley Baung (INFAPRO)	Asni bin Bulot (INFAPRO) Muhari Mujin (INFAPRO) Rasit Abdul (INFAPRO) Nazri Josip (INFAPRO)
Team leader	Asni bin Bulot (INFAPRO) Magat Japar (INFAPRO)	Asni bin Bulot (INFAPRO) Muhari Mujin (INFAPRO) Nazri Josip (Luasong)
Tree ID man	Rasit Abdul (INFAPRO) Muhammed Juhanis (INFAPRO) Madani Samad (INFAPRO) Jeffrey Amin (INFAPRO)	Asni bin Bulot (INFAPRO) Muhammed Juhanis (INFAPRO) Rasit Abdul (INFAPRO) Jeffrey Amin (INFAPRO) Mohd Yusuf Didin (INFAPRO) Ramsing Amdil (INFAPRO)

Poleman	Bennis Baring (INFAPRO) Ramsing Amdil (INFAPRO) Mohd Fakran Samsualam (INFAPRO) Mohd Yusuf Didin (INFAPRO) Roland Lawkan (INFAPRO) Robinson Rustin (INFAPRO)	Muhammed Juhanis (INFAPRO) Samad Gubin (INIKEA) Bennis Baring (INFAPRO) Suparsan M. Zanoil (INFAPRO) Hazalley Ali (Taliwas) Jeffrey Amin (INFAPRO) Denny Boy Jinol Lee (Taliwas) Rosli Meging (INIKEA) Wahirin Maris (INFAPRO) Mohd Yusuf Didin (INFAPRO) Ramsing Amdil (INFAPRO) Ahmad Satur (INFAPRO) Mohd Termimi Matusin (INIKEA)
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5.3 Monitoring equipment

Field-Map equipment was used for both the inventories in 2007 and 2010. Field-Map is a computer aided measurement technology, developed by the Czech company IFER. For more information on the technology used, see the report by IFER (2010) on the carbon monitoring campaign in 2010 in INFAPRO or the website www.ifer.cz. For INFAPRO the Antilope hardware set was used. This set is composed of a laser rangefinder Impulse or ForestPro, an electronic compass MapStar, a GPS (Garmin or Trimble), a Hammerhead computer and accessories. The main hardware parts used in the monitoring campaign in INFAPRO in 2010 are listed in table 5.3.1. Further details on hardware accessories are provided in IFER's monitoring campaign report (IFER, 2010).

Table 5.3.1 Main hardware parts of Field-Map monitoring equipment used in INFAPRO monitoring (Source: IFER, 2010).

Description	Manufacturer	SN	Note
Hammerhead HH3 monochrome	DRS	018196	water resistant (IP66), 10 inch display
Hammerhead Extreme	DRS	050952	water resistant (IP66), 10 inch display
Hammerhead HH3 monochrome	DRS	29236	water resistant (IP66), 10 inch display
Laser Rangefinder Impulse 200 LR	LaserTech	i07523	waterproof (IP67), typical distance accuracy 3-5cm, inclination accuracy 1°, range up to 575 m
Laser Forest Pro	LaserTech	109566	waterproof (IP67), typical distance accuracy 3-5cm, inclination accuracy 1°, range up to 575 m
Laser Rangefinder Impulse 200 LR	LaserTech	i07524	waterproof (IP67), typical distance accuracy 3-5cm, inclination accuracy 1°, range up to 575 m
Electronic compass MapStar	LaserTech	C002101	water resistant (IP54), azimuth accuracy 0.3°
Electronic compass MapStar	LaserTech	C001545	water resistant (IP54), azimuth accuracy 0.3°
Electronic compass MapStar	LaserTech	C001552	water resistant (IP54), azimuth accuracy 0.3°
Scope for measurement of remote diameters	IFER		typical accuracy 3%
Scope for measurement of remote diameters	IFER	30106	typical accuracy 3%
Scope for measurement of remote diameters	IFER	20039	typical accuracy 3%
GPS Pathfinder Power	Trimble	224048548	water resistant
GPS Garmin 60Cx	Garmin		waterproof (IPX7)
GPS Garmin 60CSx	Garmin		waterproof (IPX7)

The electronic compasses have been demagnetized before the start of the campaigns with a MapStar Field Degausser. The compasses were calibrated daily in the field during the campaign. Guidance for calibration is provided in the Standard Operation Procedures for the monitoring campaign. The other electronic devices did not need on site calibration. New diameter measurement tapes were used in the campaign in order to avoid errors from stretching due to frequent use.

5.4 Data archiving

During the monitoring campaign a daily back-up of the measurement data was stored on the field computers itself and if possible on the INFAPRO office computer. When measuring remote plots, the

monitoring teams had to camp in the field and were not able to return to the INFAPRO office on a daily basis for transferring a backup to the office computer. Data were further sent to the CEMD office in Kota Kinabalu each two weeks. Back-ups of the monitoring data were made at least twice during the monitoring campaign on the computer of the field campaign external advisor. The processed data are stored on the computer of the data analyst (IFER office, Czech Republic) and on the computer of the carbon monitoring manager at the Face the Future office in the Netherlands. A copy of the final database is with the field campaign leader, in the CEMD office in Kota Kinabalu.

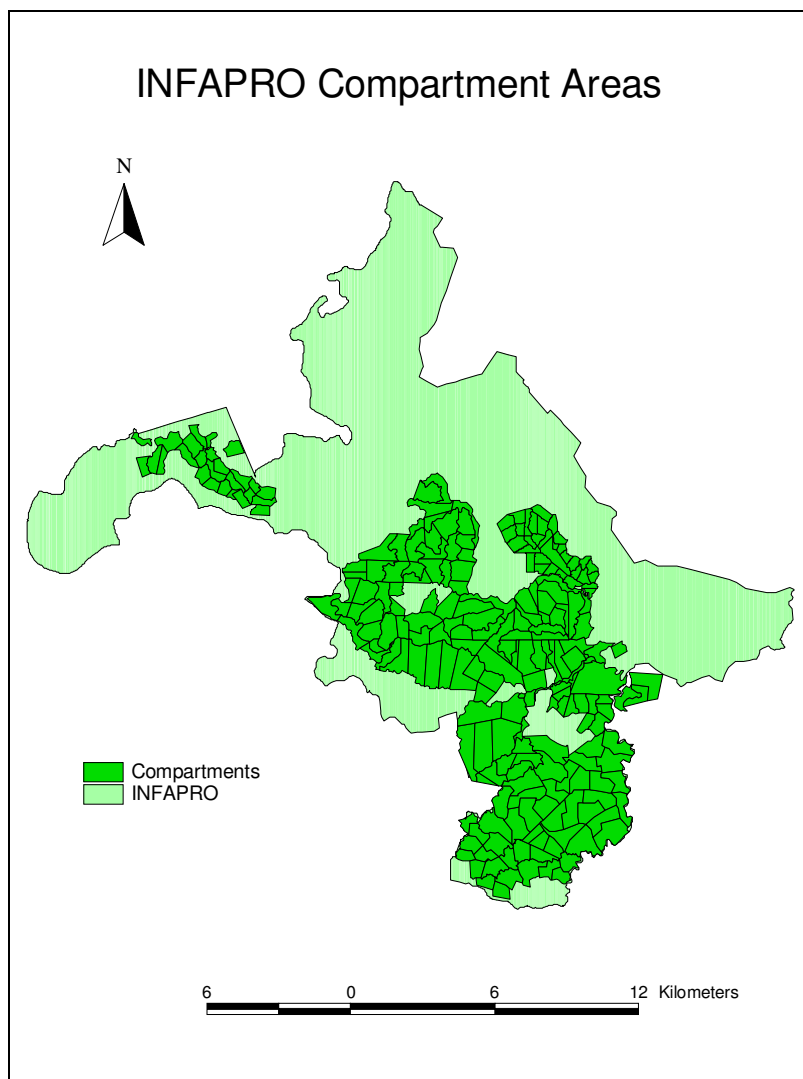
The spreadsheets for calculating the net carbon stock changes and GHG emissions and the Monitoring Plan are saved at the office of Face the Future in the Netherlands, at the CEMD office in Kota Kinabalu and the INFAPRO office.

Records related to project emissions (see section 3.3) are available at the INFAPRO office.

6 Monitoring of project implementation

6.1 Monitoring of project boundary

The procedure for mapping of the project boundary is described in section 3.4.5.1 of the PD. An overview of all the compartments within the Project Area that have been treated is provided in the spreadsheet 'Compartment list Infapro'. Areas that have been treated within the Project Area are divided in Contract Areas, that correspond to the rehabilitation contracts that have been concluded between Face the Future and Yayasan Sabah. The Contract Areas are further subdivided into compartments, that vary in size from about 10 to 200 hectare and have an average size of 50 hectares. In the initial phases the size of the compartments used to be larger than in the more recent phases of the project. The map below shows the compartment areas in INFAPRO that have been established until 2010.



6.2 Monitoring of rehabilitation and management

The progress of the Project Activity in terms of the rehabilitation activities that have been implemented are recorded in a general record book and in compartment-specific field record books and in INFAPRO's Quarterly Reports and Annual Reports. The records contain monitoring data on seedling survival and on the following activities:

- Nursery management
- Compassing
- Climber cutting
- Ground truthing
- Seedling despatch
- Enrichment planting
- Maintenance

Records on the monitoring period 2007 – 2010 are provided in the Annual Reports 2007 – 2010.

6.3 QA/QC procedures for monitoring of project implementation

A description of the units within INFAPRO responsible for monitoring the project boundaries and project implementation is in PD section 3.4.5. The casual rangers are supervised by team leaders, while the Head of Units are responsible for supervising the whole unit. The INFAPRO Manager is responsible for overall project implementation. To check the quality of the fieldwork activities, regular joint inspections are carried out with the INFAPRO Manager, the officers and the rangers. Standard Operation Guidelines are available for the rehabilitation activities, the survival census and the monitoring of the boundary.

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Annex I Total net GHG emission reductions for 2007 – 2010 (ΔC_{IFM}).

Project year		ΔC_{BSL}				ΔC_{WPS}				ΔC_{LK}				ΔC_{IFM}			
Nr	Calendar year	Carbon stock changes		GHG emissions		Carbon stock changes		GHG emissions		Carbon stock changes		GHG emissions		Carbon stocks		GHG emissions	
	yr	annual	cumulative	annual	cumulative	annual	cumulative	annual	cumulative	annual	cumulative	annual	cumulative	annual	cumulative	annual	cumulative
		tCO ₂ e	tCO ₂ e	tCO ₂ e	tCO ₂ e	tCO ₂ e	tCO ₂ e	tCO ₂ e	tCO ₂ e	tCO ₂ e	tCO ₂ e	tCO ₂ e	tCO ₂ e	tCO ₂ e	tCO ₂ e	tCO ₂ e	tCO ₂ e
1	2007	-161,188	-161,188	-714,580	-714,580	-	-	-607	-607	64,475	64,475	-	-	96,713	96,713	713,973	713,973
2	2008	165,051	3,863	-	-714,580	109,304	109,304	-676	-1,283	-	64,475	-	-	-55,747	40,966	-676	713,297
3	2009	165,051	168,913	-	-714,580	109,304	218,608	-607	-1,890	-	64,475	-	-	-55,747	-14,781	-607	712,690
4	2010	165,051	333,964	-	-714,580	109,304	327,912	-633	-2,522	-	64,475	-	-	-55,747	-70,528	-633	712,057