

Carbon Project Tools

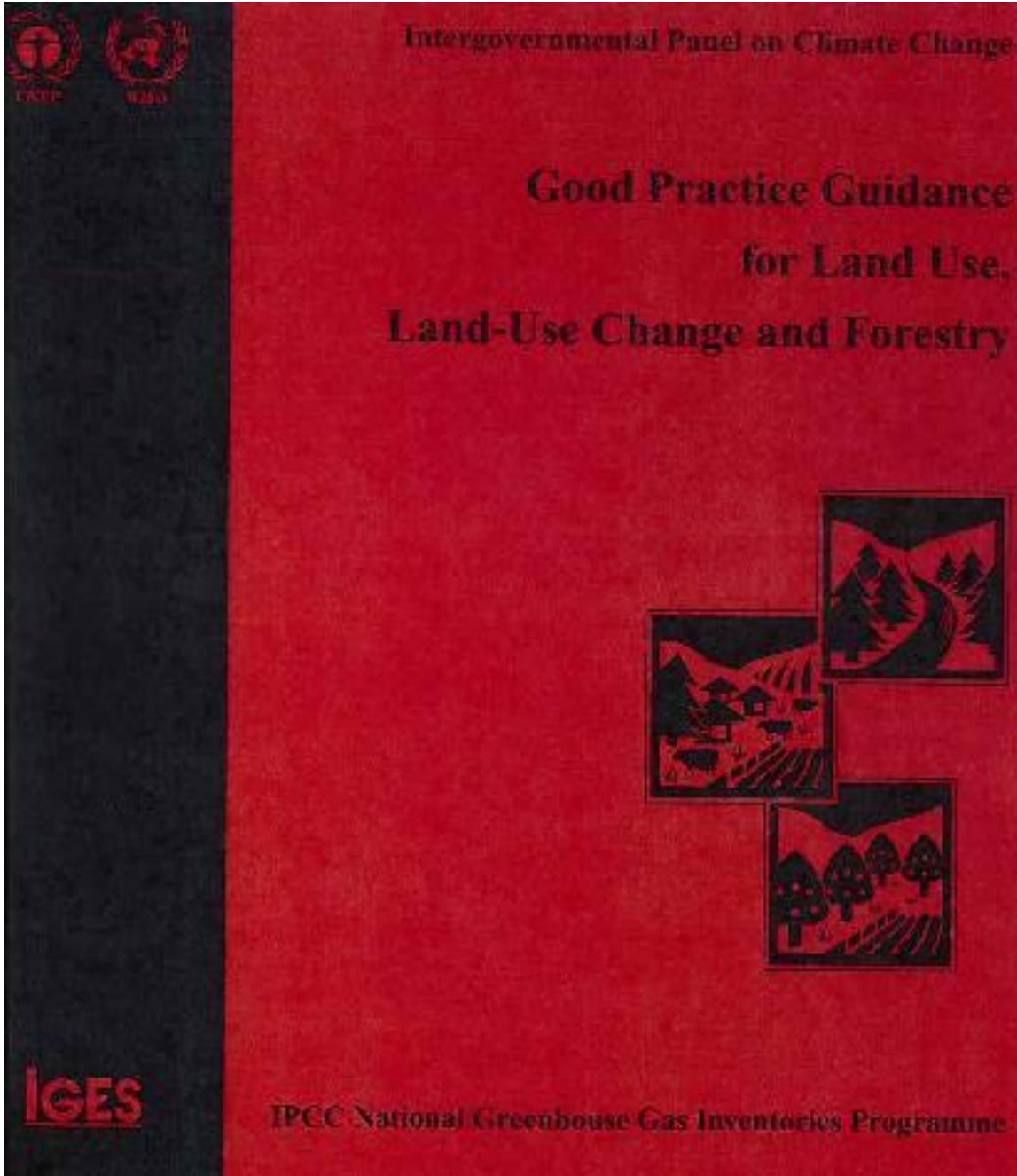
September 11th 2008

Timothy Pearson Winrock
International



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TRANSLINKS



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IPCC GPG Chapter 4.3

- Provides good practice guidance for JI and CDM projects and includes guidance on:
 - defining project boundaries
 - measuring, monitoring, and estimating changes in carbon stocks and non-CO₂ greenhouse gases
 - implementing plans to measure and monitor
 - developing quality assurance and quality control plans



SOURCEBOOK FOR LAND USE, LAND-USE CHANGE AND FORESTRY PROJECTS

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Foundation), Wolfram Kägi (BSS) and Ian
Noble, Benoit Bosquet and Lasse Ringius
(World Bank)



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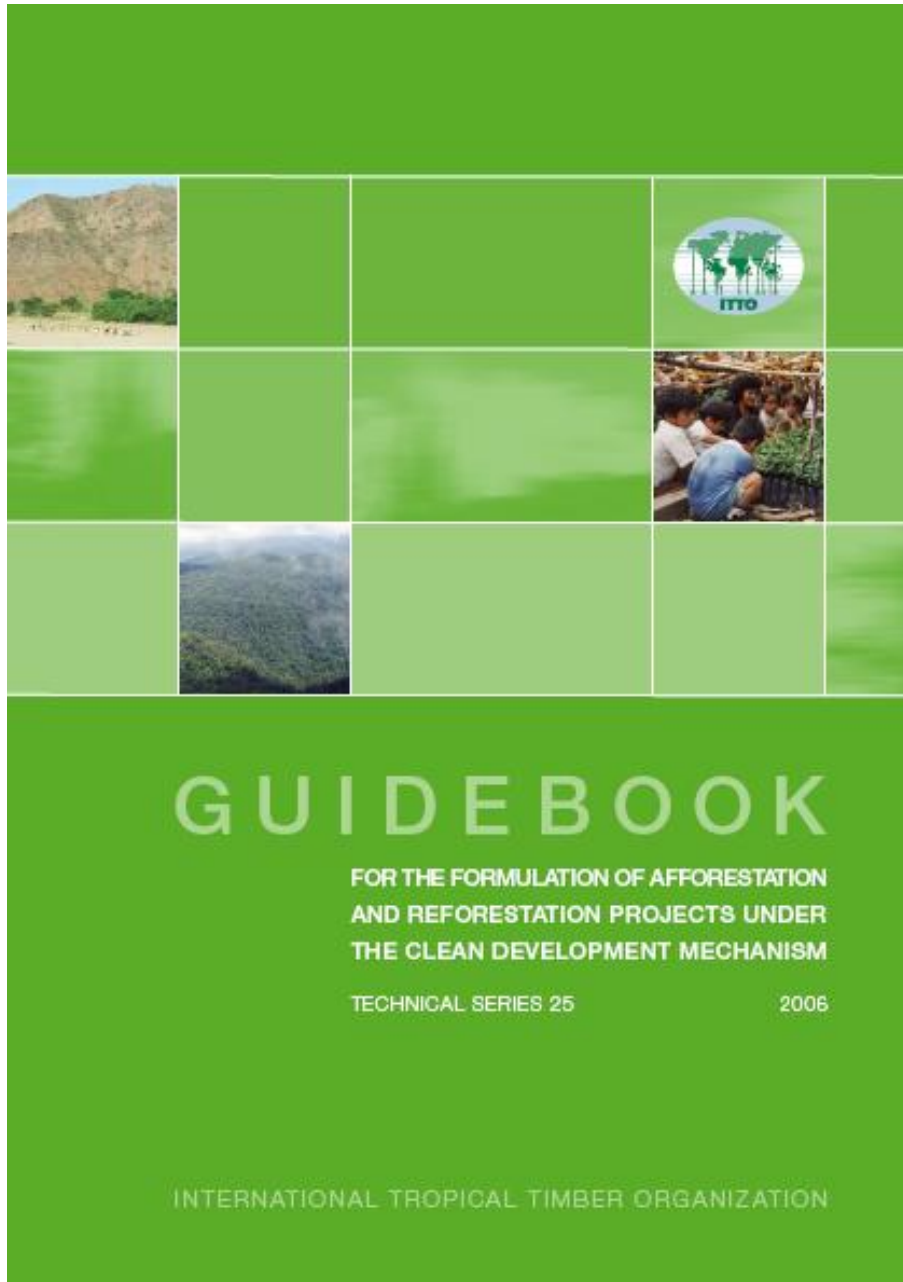


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Sourcebook for LULUCF

- Concepts
- Developing a measurement plan
- Field measurements
- Analysis
- QA/QC
- Appendices on:
 - Creating regression equations
 - Published equations





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Guidebook for project formulation

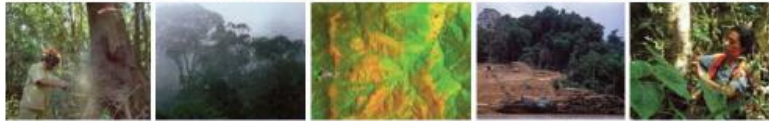
- PROJECT IDEA
 - Step 1: Identify goals of project
 - Step 2: Develop project idea note
- PROJECT DEVELOPMENT
 - Step 3: Secure project financing sources
 - Step 4: Design project management structure
 - Step 5: Determine local, regional and national requirements for project development
 - Step 6: Obtain letter of no objection



Guidebook for project formulation

- Step 7: Select appropriate methodology
- Step 8: Determine project location
- Step 9: Engage verifier
- PREPARATION OF PROJECT DOCUMENTS
 - Steps 10 - 22





GOFC-GOLD +++

Authors: Sandra Brown, Frederic Achard, Barbara Braatz, Sandro Federici, Ruth De Fries, Giacomo Grassi, Nancy Harris, Martin Herold, Danilo Mollicone, Devendra Pandey, Tim Pearson, David Shoch, Carlos Souza



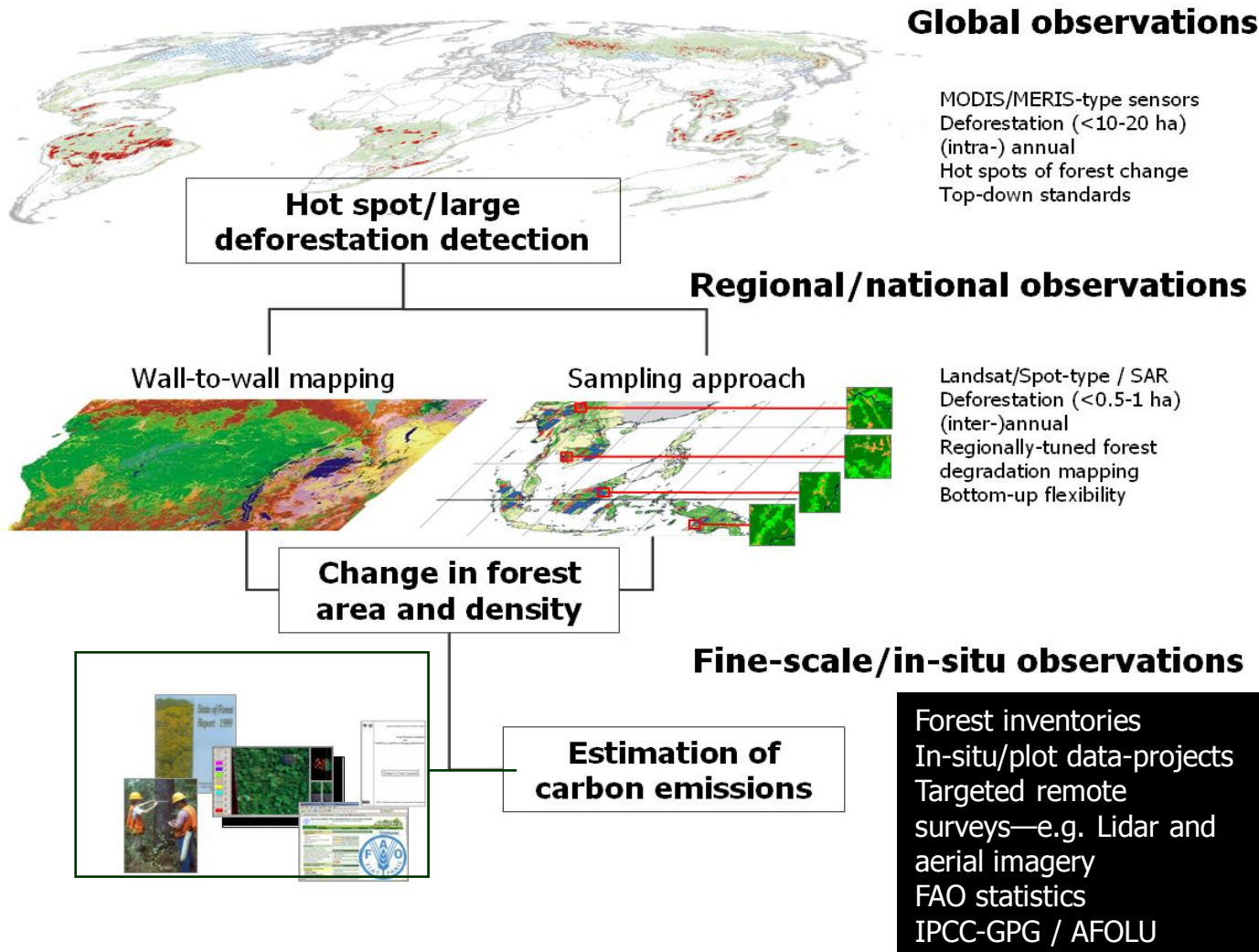
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Basic steps involved in a monitoring system for deforestation




Winrock Plot Calculator

- Available at:

[http://www.winrock.org/Ecosystems/files/
Winrock_Sampling_Calculator.xls](http://www.winrock.org/Ecosystems/files/Winrock_Sampling_Calculator.xls)



The screenshot shows a Windows Internet Explorer browser window displaying an Excel spreadsheet. The browser's address bar shows the URL: http://www.winrock.org/Ecosystems/files/Winrock_Sampling_Calculator.xls. The spreadsheet content is as follows:

	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
1	Winrock Terrestrial Sampling Calculator																		
2	Walker, S.M., Pearson, T., Brown, S. 2007																		
3																			
4	This excel file can be used to calculate sampling size for terrestrial sampling and estimate the costs of conducting sampling. It can be used for both baseline and monitoring measurements.																		
5																			
6	Instructions: Fill in required data into green shaded cells. Use 'tab' or 'enter' to move between cells. All other cells are locked and cannot be selected.																		
7	When finished with sheet, move to next sheet by clicking on worksheet tab																		
8	This excel file is to be used as a companion to:																		
9	 Sourcebook for Land Use, Land Use Change, and Forestry Projects^a																		
10																			
11	Please reference the above manual for methods to obtain information required for calculations in this excel file. This manual along with others can be found at: www.winrock.org																		
12																			
13																			
14	If you have obtained this file 'unlocked', e.g. cells other than green cells can be selected, do not use as changes in formulas may have inadvertently occurred. The most recent version of this file can be downloaded for free at: http://www.winrock.org/Ecosystems/tools.asp																		
15	Send an email to: carbonservices@winrock.org with any questions you may have.																		
16																			
17	a. Pearson, T., Walker, S.M., Brown, S., 2006 Sourcebook for Land Use, Land Use Change, and Forestry Projects. BioCarbonFund, Winrock International																		
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The spreadsheet has several tabs at the bottom: Intro, Aboveground C - Plots, Soil C - Plots, Unit Costs, Cost w. establishment, Cost wout. establishment, and PV cost over time. The Windows taskbar at the bottom shows the Start button and several open applications including Internet Explorer, WCS Tools, Plot Calcula..., and Microsoft Excel. The system clock shows 3:40 PM.



http://www.winrock.org/Ecosystems/files/Winrock_Sampling_Calculator.xls - Windows Internet Explorer provided by Yahoo!

File Edit View Insert Format Tools Data Simetar Go To Favorites Help

Web Search

http://www.winrock.org/Ecosystems/files/Winrock_Sa...

C5 10%

Plot Quantity - Aboveground Carbon

Enter values into the green cells. Use the "Tab" or "Enter" key to jump to the next green cell.

REQUIRED ERROR AND CONFIDENCE LEVEL

1. Level of error (E)	10.0%
2. Error level (E/2)	5.0%
3. Z(E/2) - Confidence level	1.645
4. Sample standard deviation (s)	5000 hectogram

Allowable relative error 99, 95 or 90 percent.

If no cart information exists, then leave Ch=1.

SIZE AND VARIANCE OF EACH STRATA

Stratum	Stratum Name	Area (ha)	Mean (t/ha)	Standard Deviation (t/ha)	Plot size (ha)	Plot Qty per Ch=1	Variance (t/ha) ²
19	stratum_1	3400	126.29	23.21	0.08	1	539.7041
18	stratum_2	900	35	24.21	0.08	1	529.6444
19	stratum_3	700	102.2	11.01	0.08	1	140.4594
16	stratum_4					1	0
17	stratum_5					1	0
18	stratum_6					1	0
19	stratum_7					1	0
20	stratum_8					1	0
21	stratum_9					1	0
22	stratum_10					1	0

INTERMEDIATE CALCULATIONS

Stratum	Area (ha)	Mean (t/ha)	Standard Deviation (t/ha)	Plot size (ha)	Plot Qty per Ch=1	Variance (t/ha) ²	Coefficient of Variation	N _h	W _h	W _h *s _h	W _h *s _h ²	N _h *s _h ²	N _h	N _h *s _h ²	N _h	N _h *s _h ²	N _h	N _h *s _h ²	
19	3400	126.29	23.21	0.08	1	539.7041	19%	###	0.68	19.703	19.703	99.425	2.3E+07	###	99.425	62500	1.32E+11	2E+07	99.425
18	900	35	24.21	0.08	1	529.6444	46%	###	0.18	6.2044	6.2044	391275	1.4E+07	62500	391275	1E+07	391275	6E+06	391275
19	700	102.2	11.01	0.08	1	140.4594	12%	###	0.14	1.4444	1.4444	103775	1.2E+07	62500	103775	1E+06	103775	1E+06	103775

INTERMEDIATE CALCULATIONS

23	N _{total} N _h	62500
24	Total Area	5000 hectogram
25	Weighted Mean (C)	10.1448 hectogram/ha
26	Weighted Plot Size	0.01 ha
27	Weighted SD	23.7028
28	Weighted Total Variance	600.7478

Results - Aboveground Carbon - Number of plots to be used

Stratum	Stratum Name	Plot Quantity	Rounded Plot Quantity	Plot Quantity	Rounded Plot Quantity	Plot Quantity	Rounded Plot Quantity
33	Total Sample Size	16.65	2	16.65	2	16.65	2
34	stratum_1	11.09	1	11.09	1	11.09	1
37	stratum_2	4.40	1	4.40	1	4.40	1
38	stratum_3	1.17	2	1.17	2	1.17	2
39	stratum_4						
40	stratum_5						
41	stratum_6						
42	stratum_7						
43	stratum_8						
44	stratum_9						
45	stratum_10						
46	TOTAL NUMBER OF PLOTS	21	21	21	21	21	21

AR-AM001, AM0005, AM0006 Equations:

$$n = \left(\frac{t}{E} \right) \left[\sum_{h=1}^H W_h \cdot s_h \cdot \sqrt{C_h} \right] \left[\sum_{h=1}^H W_h \cdot s_h / \sqrt{C_h} \right]$$

$$n_h = n \cdot \frac{W_h \cdot s_h / \sqrt{C_h}}{\sum_{h=1}^H W_h \cdot s_h / \sqrt{C_h}}$$

Sourcebook for Land Use, Land Use Change, and Forestry Projects:

$$n_h = n \cdot \frac{N_h \cdot s_h^2}{\sum_{h=1}^H N_h \cdot s_h^2} \quad n_h = \frac{\left(\sum_{h=1}^H N_h \cdot s_h^2 \right)}{\left(N \cdot \frac{E}{z_{\alpha/2}} \right) + \left(\sum_{h=1}^H N_h \cdot s_h^2 \right)}$$

E - allowable error or the desired half-width of the confidence interval. Calculated by multiplying the mean carbon stock by the desired precision (i.e., mean carbon stock * E). (For 95% precision) or C_h - Coefficient of plot of the stratum.

t - the sample statistic from the t-distribution for the 95% confidence level.

N_h - number of sample units for stratum h. Consider the stratum in hectares/area of the plot in N - number of sample units in the population (N = Σ N_h)

s_h - standard deviation of stratum h.

W_h = N_h/N

s. Winer, K.F. (ed.) 1984 Forestry handbook, (2nd edition), New York: John Wiley and Sons.

h. Borry T.E. and H.E. Burkhart (eds.) 1994. Forest Measurements, 4th edition. McGraw-Hill, New York.

AR-AM0003, AM0004, AM0007 Equations:

$$n = \left[\frac{\sum_{h=1}^H N_h \cdot st_h \cdot \sqrt{C_h}}{N \cdot \frac{E}{z_{\alpha/2}} + \sum_{h=1}^H N_h \cdot (st_h)^2} \right] \cdot \left[\sum_{h=1}^H N_h \cdot st_h \cdot \frac{1}{\sqrt{C_h}} \right]$$

$$n_h = \frac{\sum_{h=1}^H N_h \cdot st_h \cdot \sqrt{C_h}}{N \cdot \frac{E}{z_{\alpha/2}} + \sum_{h=1}^H N_h \cdot (st_h)^2} \cdot \frac{N_h \cdot st_h}{\sqrt{C_h}}$$
