



RESPONSE TO PEER REVIEW COMMENTS

A draft *Tool for Estimation of Stocks in Carbon Pools and Emissions from Emissions Sources* has been developed by Winrock International for potential approval by the American Carbon Registry (ACR). This Tool is a required component of the draft ACR *Methodology for REDD – Avoiding Planned Deforestation* but also applicable to other methodologies.

All new methodologies and tools, whether developed internally or brought to ACR by external parties, undergo a process of public consultation and scientific peer review prior to approval.

This Tool was first posted for public comment from August 10 through September 7, 2010. The Tool was then submitted to three anonymous scientific peer reviewers, experts in the field of forest carbon and REDD. The reviewers’ comments are provided verbatim below, organized by section of the Tool, along with Winrock’s responses to each.

GENERAL	2
CARBON POOLS	4
A. ABOVE AND BELOW GROUND BIOMASS POOLS	4
B. DEAD WOOD POOLS	6
C. LITTER POOL	7
D. SOIL ORGANIC CARBON POOL	7
E. LONG-TERM WOOD PRODUCTS POOL	8
EMISSIONS SOURCES	9
F. EMISSIONS FROM BIOMASS BURNING	9
G. EMISSIONS FROM FOSSIL FUEL COMBUSTION	10
H. DIRECT N₂O EMISSIONS FROM NITROGEN APPLICATION	10
ANNEX 1: PARAMETERS	11

General

	First review	Response	Second review	Response
1	<p>These methods provide good guidance on the calculations for estimating C stocks, but they are short on explanations of how to organize proper sampling and on how to make measurements properly. In particular, some guidance should be given on the choice of the methods for sampling: Fixed Area Plots <i>versus</i> Point Sampling.</p>	<p>To our understanding methodologies are to provide requirements and calculations and not to give guidance. Guidance can be found elsewhere. A source of guidance on conducting measurements, the World Bank Biocarbon Fund Sourcebook, is now provided in the Introduction.</p>	<p>Addressed properly.</p> <p>However, we propose that should be some guidance on methods. ACR needs to take responsibility to raise the bar on how to measure C stocks. If there is a particular sources that are needed, please refer to them directly and explain why ACR recommends one sampling method over another.</p>	<p>[ACR response]: We do not feel it is practical in the context of ACR's overriding standards (e.g. Forest Carbon Project Standard) to provide guidance on carbon measurement SOPs or the advantages of particular sampling methods over others. We agree with the methodology author that methodologies can provide requirements and then, as here, cite a source to assist the Project Proponent in sampling and measurement methods.</p>
2	<p>Many of the concepts will be familiar to foresters, but the need for this type of guidance is the result of many non-foresters trying to undertake these types of measurements. In general the document does a great job of explaining how to calculate mean C stocks and total C stocks, but there is no guidance on calculating variance or standard errors, which</p>	<p>Same comment as above.</p>	<p>Addressed properly.</p> <p>However, we should not assume that those using these methods are familiar with forestry sampling methods (and the errors associated with</p>	<p>[ACR response]: Practically speaking we can only work on the assumption that Project Proponents who lack sufficient for us to expertise to conduct sampling on</p>

	First review	Response	Second review	Response
	will be needed for the uncertainty analyses. Uncertainty estimates are not provided here. This is perhaps deliberate and may be better left to the individual methodologies.		each method). ACR could provide more guidance.	their own will hire the necessary expertise.
3	It seems that some discussion of QA/QC procedures in measurement is warranted. Also, some discussion is warranted on the need for consistent time series and how to handle revisions to measurement methods.	Given in the parameter tables at the end of the CPES Tool.	There is more to QA/QC than estimating error of individual factors. Further guidance is required.	The following sentence was added in the parameters section. We believe this can be something left to PPs and subject to validation/verification. “For all monitored parameters quality assurance and quality control measures shall be designed, included, and maintained in the monitoring plan.”
4	Could this tool be applicable to other ACR methodologies, rather than REDD methodologies?	Yes. It is for this reason that we have published it as a tool, which is referenced in REDD-APD but could also be referenced in other methodologies.	Addressed properly.	No further comment
5	The procedure for re-estimate/re-employ the carbon stocks in different pools are the same and repeated in each pool section. Should this procedure be a general procedure stated only once in the beginning of the tool?	It could be. But we elect not to in this case for completeness.	Addressed properly.	No further comment

Carbon Pools

A. Above and Below Ground Biomass Pools

	First review	Response	Second review	Response
1	The guidance for inclusion of the pools should be part of the methodology and not the tool.	Note that the requirements are effectively there in the REDDD-APD methodology in the pools table. The choice here is to cut out completely or not. I don't think it harms anything to have here.	Addressed properly.	No further comment
2	Page 3, part A: Non-tree aboveground biomass is not included in the APD equations. Is there a need for consistency between the two documents on this element?	It is now.	Addressed properly.	No further comment
3	Change last sentence: Belowground (tree and non-tree) biomass are is not required for inclusion in the project boundary because omission is conservative, but projects may elect to include it.	Change made.	Addressed properly.	No further comment
4	Page 4: Do you want to provide a strategy for ensuring adequate sampling of a stratum based on the desired error rate and confidence interval? There	I think this is implicitly included rather than explicitly. PPs are required to meet defined precision levels and can do so by whatever method they choose. I have added the following text: Across the project a high level of precision is required ($\pm 10\%$ mean at 90% confidence level). To meet this it is important to plan for	Addressed properly.	No further comment

	First review	Response	Second review	Response
	are ways to calculate the required sample size <i>a priori</i> .	high precision in pools especially tree biomass. Tools exist for this purpose (e.g. CDM tool - http://cdm.unfccc.int/methodologies/ARmethodologies/tools/ar-am-tool-03-v2.1.0.pdf).		
5	Page 6: Do you want to explain the concept of variable radius plots for non-foresters who may not know how these measurements work?	No. I don't believe it is the purpose of methodologies to provide such explanations and guidance. A source of guidance on conducting measurements is now provided in the Introduction.	Addressed properly.	No further comment
6	It's a small detail, but π is 3.1416. This shows up elsewhere.	Corrected.	Addressed properly.	No further comment
7	Page 8: The text provides no guidance on how to develop root: shoot ratios, or what constitutes adequate sources. The method should indicate that Tier 1 default values from IPCC are not acceptable. It could also provide a source for root biomass measurement methods.	Root:shoot ratios are given in the parameter tables at the end of the CPES Tool, based on region-specific data collection or globally forest type-specific or eco-region-specific ratios from the IPCC Good Practice Guidance for LULUCF.	Addressed properly. Assuming that the IPCC Tier 1 estimates is good enough for ACR.	No further comment
8	Page 10: Is the intention of footnote 1 to suggest that herbaceous vegetation can also be considered insignificant in the context of REDD?	Yes.	Addressed properly.	No further comment

	First review	Response	Second review	Response
9	Page 11: Here you actually provide a method for implementing a measurement. Elsewhere you do not. I think it is useful to provide guidance like this throughout the text. It would be good to indicate that plant samples should not be dried at temperatures greater than 60°C.	Guidance is provided only where it constitutes a requirement.	Addressed properly.	No further comment
10	Page 13: Provide guidance on root:shoot ratios.	See parameter tables at the end of the CPES Tool.	Addressed properly.	No further comment

B. Dead Wood Pools

	First review	Response	Second review	Response
1	Page 16: Smalian's formula does not calculate the volume of a cylinder; it calculates volume of a parabolic frustum.	Corrected.	Addressed properly.	No further comment
2	Page 17, Eq. 18: Multiply the average diameters by π to convert to areas.	Corrected.	Addressed properly.	No further comment
3	Page 20: A little more explanation here would be useful. Does one measure the log where it intersects the transect, at the top or at the bottom?	Note made that measurement is at point of intersection.	Addressed properly.	No further comment
4	Page 21: Step 5 should be renamed, since is not a sequential step for the estimation of Lying Dead Wood (Part 2), but is the sum of Standing	Correct. New Part 3 added, "Summing Standing and Lying Dead Wood."	Addressed properly.	No further comment

	First review	Response	Second review	Response
	(Part 1) and Lying (Part 2) dead wood.			

C. Litter Pool

	First review	Response	Second review	Response
1	The guidance for inclusion of the pools should be part of the methodology and not the tool.	It is in the methodology. I see no harm repeating here.	Addressed properly.	No further comment
2	Page 22: Sec C2: This is not really a procedure. It would be good to describe how to make a measurement using a sampling frame.	Specific guidance comes not from the methodology but from other sources. One such source is referenced in the introduction.	Addressed properly.	No further comment
3	All previous sections provide stock measurement guidance; this section provides guidance for ' <i>ex ante</i> estimation'; no <i>ex-post</i> guidance is provided. Shouldn't this guide just provide measurement guidance?	Reference to <i>ex-ante</i> deleted.	Addressed properly.	No further comment
4	Eq. 26: Is the number 10 correct or should it be 1?	It is correct to convert to per ha.	Addressed properly.	No further comment

D. Soil Organic Carbon Pool

	First review	Response	Second review	Response
1	Page 24: This section also focuses on <i>ex ante</i> estimation of forest C stocks and post deforestation stocks. In particular it recommends a Tier 1 approach to the <i>ex ante</i> estimation of post deforestation	Reference to <i>ex-ante</i> removed. We allow Tier 1 here as measurement is expensive and almost impossible given that we are dealing with a counterfactual	Addressed properly.	No further comment

	First review	Response	Second review	Response
	stocks; there are no recommendations for a more rigorous <i>ex post</i> assessment. Shouldn't this guidance recommend a more rigorous approach and use Tier 1 only in extreme cases? If you choose to rely on Tier 1 factors, provide the IPCC table in this section.	situation. The full references are given in the parameter tables at the end of the CPES Tool.		
2	Section D2: There is not much of a procedure here. How should BD be sampled and reported? How do you ensure constant mass sampling between two time points to ensure you have comparable measurements that allow estimation of stock changes and account for soil compaction? More guidance is required here to set up a rigorous measurement approach.	Other sources exist to give guidance on measurement procedures e.g. Biocarbon Fund Sourcebook referenced in introduction.	Addressed properly.	No further comment
3	Here the measurement must be made within 5 years prior to the project. On page 22 it must be ± 5 years of the start of the project. For APD, the measurement within 5 years prior to the project makes sense since the crediting period is so short.	Agreed; previous reference corrected.	Addressed properly.	No further comment
4	Part 1: Please indicate the depth to which C stocks should be measured or some guidance on how to determine how deep measurements need to be made.	Users should consult other sources. 30 cm is typical but users may elect a different depth.	Addressed properly.	No further comment

E. Long-Term Wood Products Pool

	First review	Response	Second review	Response
1	Page 26: <i>Ex ante</i> methods only are provided,	Reference to ex-ante removed.	Addressed properly.	No further comment

	First review	Response	Second review	Response
	there are no <i>ex post</i> methods.			
2	Page 27: Again these procedures are for <i>ex ante</i> estimation and based on global default factors. It is not clear that Tier 1 estimation is desirable for this type of site specific activity.	Tier 1 is the best that can reasonably be done by projects. The methods are highly conservative in that the assumption is that 100 years of emissions occur immediately.	Addressed properly.	No further comment
3	Page 29: If you decide to use the Tier 1 approach, provide the values for WW, SLF and OF in a table as you have for other factors. Provide also the BCEF for Eq. 32.	Can be found in the parameter tables at the end of the CPES Tool.	Addressed properly.	No further comment
4	Page 30: Step 3: Provide practical guidance on how to determine what HWP are likely to be retained for at least 100 years.	See defaults in parameter tables.	Addressed properly.	No further comment
5	SLF and OF: How does one determine which HWP fall into each category?	PPs have to justify with evidence the common practice for similar forests. We believe that would be a verifier issue rather than a methodology issue.	Addressed properly.	No further comment

Emissions Sources

F. Emissions from Biomass Burning

	First review	Response	Second review	Response
1	Page 31: In this document this category is referred to as 'Emission Sources', in APD it is 'Greenhouse Gas Emissions'. The documents	Now "Greenhouse Gas Emission Sources."	Addressed properly.	No further comment

	First review	Response	Second review	Response
	should use consistent terminology.			
2	Page 32: Eq. 34 has a problem. In order to sum, all gases must be expressed in CO ₂ e. The output of the equation is t GHG _g ha ⁻¹ ; there is no conversion of each gas to CO ₂ e using GWP.	Agreed; now corrected.	Addressed properly.	No further comment
3	Page 33, Eq. 35: This is a convoluted way to calculate the biomass. Why not just sum up the different biomass components directly? You need to add a factor for non-tree biomass.	Non-tree now added.	Addressed properly.	No further comment

G. Emissions from Fossil Fuel Combustion

	First review	Response	Second review	Response
1	Page 37: Why is fossil fuel combustion an optional source in all cases? Why not subject this emission to the same significance tests as everything else?	Because it is believed that emissions from fossil fuels will always be higher in a deforested landscape than a forested landscape	Addressed properly.	No further comment
2	Eq. 36 and 37: Stylistically it would be consistent to use * rather than X and to use a denominator rather than use $\frac{?}{?}$	Agreed, this has been corrected.	Addressed properly.	No further comment

H. Direct N₂O Emissions from Nitrogen Application

	First review	Response	Second review	Response
1	The guidance for inclusion of the emission should be part of the methodology and not the tool.	It also exists in the methodology.	Addressed properly.	No further comment

Annex 1: Parameters

	First review	Response	Second review	Response
1	Page 40: At what point do you require a project to develop its own BCEF rather than use the global Tier 1 default?	Development of project-specific BCEFs is never required.	Addressed properly.	No further comment
2	Page 43: Why is there no procedure for measuring wood density? This is a relatively easy one.	Precisely because it is easy and can be found in other sources (e.g. the World Bank Biocarbon Fund Sourcebook now referenced in Introduction.)	Addressed properly.	No further comment
3	Page 53: Why are these values not validated as are those for aboveground biomass? This is potentially a very large pool and it is worth validating the chosen factors.	If you are referring to fossil fuel emission factors it is our belief that these will always be minor.	The reviewer is referring to R:S ratio, but maybe this is too complicated for a project.	Yes it would be very very costly to validate R:S ratios so in this case we have to rely on literature.
4	Page 57: The fine fraction of soil is not the part that is <2 mm; 'fine fraction' refers to clays. I suggest you delete the term 'fine fraction'.	Fine fraction here is a relative term rather than a scientific definition	To a soil scientist or someone trained in NRM, it means something else. It would be better to change it.	Fine fraction now removed
5	Page 59, $Dia_{n,i,t}$: This section should provide more details on the measurement procedure. Which diameter is measured? How is volume determined? Can you provide the url to the publication in the footnote?	A note added that measurement is at the point of intersection. Volume is calculated as defined in the methodology. Unfortunately can't post the url to the paper as it is not a publically available source. More guidance again can be found in other sources e.g. the Biocarbon Fund Sourcebook	Addressed properly.	No further comment

	First review	Response	Second review	Response
		referenced and linked to in the Introduction.		