Advice Note 03: HCV – HCSA Assessments

About this HCSA Advice Note:

The purpose of this document is to respond to technical queries that arise from the implementation of the HCSA methodology and the evaluation of HCV-HCSA assessment reports. Queries are gathered through HCSA or HCVRN and centralised in a query tracker. Then, subject area experts propose a response. Next, the query and draft response are shared with the HCSA Quality Assurance Working Group for input. Finally, the advice note is updated accordingly and published.

If you have a technical query, please contact the HCSA Technical Manager: darren@highcarbonstock.org

If your query is related to an HCV-HCSA assessment currently under ALS evaluation, contact the ALS Quality Manager: qualitymanager@hcvnetwork.org

22 June 2020

NOTE-2020-03-01 Note: This is an update to Section 2.1 of Advice Note 1.	**Number of forest inventory plots**
Main Topic(s)	Forest inventory plots
Date published	22 June 2020
Date revised	-
Date(s) of applicability	Applies for new assessments from 22 June 2020 and to assessment reports undergoing ALS evaluation as of this date.
Document reference	HCSA Toolkit Module 4 (Version 2.0, May 2017): Section C, Sampling Design Guidelines, Forest Inventory Plots (p. 27)
Query / request for clarification	
Is it allowable to measure a smaller number of forest inventory plots than what is estimated using the equation provided in the HCSA Toolkit?	
Response by HCSA	
Yes, provided that the requirements for the analysis of the forest inventory results are met (see NOTE-2020-03-02, below) and a clear explanation for why less plots were measured is provided. The assessor should derive an estimate of the number of plots required using the equation provided (Module 4 p.27). The assessor has the option to measure more plots than the minimum and we recommend an extra 10% as a good safety margin. The minimum sample size for Forest (LDF/MDF/HDF), YRF and Scrub classes using the equation in the Toolkit is demonstrated in the box below.	

$$N = t^2 s^2 / E^2$$

where:

N = samples to estimate mean to ± E

t = t-value from students t-test table for 90% confidence interval

s = standard deviation estimated based on existing data sets from similar forest types. Government forestry departments often have relevant data.

E = probable error, expressed as a percentage of the estimated mean value

Example of sample size calculations				
Land Cover Type	t value	Variance (s2)	E	N
Forest	1.66	2000	120*10%	38
YRF	1.66	1000	70*10%	56
Scrub	1.66	200	25*10%	88

Note: Estimates of standard deviation and probable error are required to complete this equation. These should be sourced from pre-surveys or secondary data sets.

If the minimum number of plots (according to the formula) was not reached, then justification must be provided. The assessor must present a clear and logical sampling plan, and if targets were not met, the assessor must clearly explain why.

Common causes of not reaching minimum sampling size include:

- One of the sampled classes has a limited area (e.g. less than 100 ha) and / or consists of scattered small patches.
- Changes in forest classification as a result of field work, leading to a change in the numbers of plots in each class.
- Inability to visit areas in the field because of difficulties due to weather, access conditions (e.g. large natural forest areas with limited access roads) or community objections.
- The forest class has much greater levels of variation than expected or usual. Very small plots can be challenging in highly heterogenous tropical forests and in highly disturbed and degraded forests, leading to high variation between plots. In these cases, a larger plot size (with fewer total plots) may be more appropriate. The HCSA Toolkit's recommended forest inventory plot size in Module 4 is 500 m^2 (circular plot). The Indonesian government uses 100m x 100m (50m x50m for swamp forests and mangroves) clusters (with multiple circular plots for each vegetation strata within the cluster) for a generic forest inventory (for planning purposes). Production forests (natural forest) follow the 20m x 125 m plots for the periodical comprehensive inventory.

We note that not reaching the targets is particularly common for Scrub for several reasons including:

- The $\pm$ 10% of the mean C/ha confidence limit range is narrower for low stocked class
- Scrub may be small in total area and consist of small, scattered patches, making inventory planning difficult and field work time consuming.
- Scrub areas are often difficult to stratify during remote sensing, requiring changes in classification after field inspection. Land identified as Scrub in remote sensing work is frequently reallocated to farmland or YRF based on field work results.

The assessor must include the inventory sampling plan in the report with a step by step calculation of the target number of plots for each class. The calculation of sample size should use relevant sampling data, either from a reconnaissance survey in the area of interest or from inventory data from similar forest types. The Toolkit provides suggested sample sizes based on historical data as a last resort. As above, it is recommended that a safety margin of 10% is added to the theoretical sample size to ensure that enough plots are measured in the field. Combining the LDF/MDF/HDF class into a single forest class is acceptable if reasonable justification is provided. A smaller number of plots is only acceptable in small areas (less than 100 ha of potential HCS forest), or in forest classes higher than YRF.

NOTE-2020-03-02 Note: This is an update to Section 2.1 of Advice Note 1.	Analysis of the forest inventory results, above ground biomass and carbon stock estimation
Main Topic(s)	Landcover classification; Carbon stock estimation; Statistical analysis
Date published	22 June 2020
Date revised	-
Date(s) of applicability	22 June 2020
Document reference	Applies for new assessments from 22 June 2020 and to assessment reports undergoing ALS evaluation as of this date.
Query / request for clarification	
Which HCS classes must be differentiated in the analysis and what is required to justify the classification if significant differences between carbon estimates of the classes cannot be proven?	
Response by HCSA	
The key pass / fail factor for following the methods is proving a significant difference (using ANOVA and then the Scheffé test) among at least the following three land cover classes: at least one higher quality forest class (i.e. with HDF, MDF, LDF combined, or all left separate), YRF, and Scrub, or else providing adequate justification for why this could not be achieved. NOTE: The requirement to demonstrate a significant difference between three land cover classes is a change to the original version of this Advice Note. This new requirement applies to assessments initiated after the publication of this Advice Note.	

Insignificant difference under the Scheffé test is not necessarily a failure unless there is some other contributing factor such as poor stratification or sampling design.

When significant difference between the carbon estimates per class is not achieved, the land cover classification made can be justified based on differences in site conditions or ecological factors measured during field sampling (e.g. species, stems per hectare by DBH class, and canopy density - the forest inventory plot data shall be consistent with any justifications given) and/or the results of other statistical methods e.g. demonstration of a significant difference between the means of two strata using a T test.

Evidence and justification should show that YRF and above (denser forest classes) have been correctly identified for conservation, even if the plot data does not provide statistically significant distinctions between all forest classes. If any of these classes are not found in the landscape (and this is evidenced by landcover and field data), they do not have to be assessed and included in statistical analysis.

NOTE-2020-03-03	Determining core size and protection priority of HCS forest patches that extend beyond the boundary of proposed development areas
Main Topic(s)	HCS Forest Patch Analysis Decision Tree
Date published	22 June 2020
Date revised	-
Date(s) of applicability	August 2017 Note: This note serves to clarify existing written requirements of the HCSA Toolkit (published in August of 2017) and does not represent a change. However, any report that has already gone through ALS evaluation would not be expected to add/change anything.
Document reference	HCSA Toolkit Module 5 (Version 2.0, August 2017): Section B: HCS Forest Patch Analysis Decision Tree 2.0), Step 3 (Pages 27-28)
Query / request for clarification	
Can the methodology for calculating the core area of HCS forest patches that extend outside the boundaries of the proposed development area be clarified?	
Response by HCSA	

Step 3 of the HCS Forest Patch Analysis Decision Tree 2.0 involves determining the core area of identified patches of HCS forest that overlap the proposed development area and then assigning each patch a priority for conservation based on its size. High Priority Patches (HPP) have a core area of more than 100ha, Medium Priority Patches (MPP) have a core area of between 10 and 100ha, and Low Priority Patches (LPP) have a core area of less than 10ha.

When determining the core area of a patch, the complete boundary and area of the patch must be used, irrespective of whether the patch extends outside the boundary of the proposed development area. This is included in the description of HPP in the Decision Tree (Step 3a) but applies to determining core area of all patches: "HCS forest patches that extend outside the boundaries of the proposed development area are assessed for their full size irrespective of the development area boundary". This means that the internal (negative) buffer of 100 m must be

applied to the boundary of the whole patch itself, both within and outside of the boundary of the proposed development area[1]. Buffers shall never be applied to the boundary of the proposed development area. Written another way, the identification of patch core size shall not be limited by the boundary of the proposed development area.

While the text of the methodology is clear regarding this point in several places in the Toolkit, the HCSA Secretariat acknowledges that Figure 7 is not consistent with this. As published, the figure shows a buffer calculation that follows the boundary of the proposed development area where patches extend beyond it. The HCSA Secretariat will revise this to ensure that they are consistent with the text in the methodology of the Patch Analysis Decision Tree. The Toolkit text on determining the core area of a patch continues to the HCSA requirement, as well as the requirements for ensuring there is positive gain for conservation from any patch exchanges evidenced by an area calculation[2].

[1] If a core area of a patch that extends beyond the boundary of the proposed development area is shown to exceed 100 ha, the total core area for the whole contiguous forested landscape does not need to be calculated as the HPP threshold will have already been met.

[2] HCS Toolkit Chapter 5 p35: "These exchanges must provide demonstrable positive benefits for conservation – in other words, the 'give' areas must exceed the 'take' – as well as improve the optimisation of the development. A calculation will be made on an area basis for this exchange process."

NOTE-2020-03-04	Categorisation of areas containing introduced or invasive tree species
Main Topic(s)	Land cover classification
Date published	22 June 2020
Date revised	-
Date(s) of applicability	Applies for new assessments from 22 June 2020
Document reference	HCSA Toolkit Module 4 - Forest and vegetation stratification: Assigning the land cover classes to carbon stock classes (pages 20-23)
Query / request for clarification	
Can stands of introduced or invasive tree species be considered HCS Forest? For example, *Samanea saman* have been planted as shade trees for cattle in the Markham Valley of Papua New Guinea (PNG) and then spread by cattle to form a thick monoculture of these invasive trees.	
Response by HCSA	
Forest inventory plots with introduced or invasive species comprising 50% or more of the basal area can be categorized as 'Other' or 'SH' under the non-HCS land cover categories. Forest inventory plots with less than 50% of the basal area comprised by introduced or invasive species shall fall under the YRF category. The basal area percentages of introduced or invasive species shall be calculated and documented for applicable plots.	