

## ESA STUDY CONTRACT REPORT

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ESA Contract No:	SUBJECT:	CONTRACTOR: UPS (CESBIO), sub-contracted to: CMCC (Italy), UCL (UK), WUR (Netherlands),
* ESA CR( )No:	No. of Volumes:.... This is Volume No:....	CONTRACTOR'S REFERENCE:
<b>ABSTRACT:</b>		
<p>The document presents the final report of the AfriScat Ground field campaign 2016, conducted by teams from CMCC (Italy), Wageningen (Netherlands) and UCL (UK). The report includes a summary of measurements made for plot layout, botanical census and collection of Terrestrial Laser Scanning (TLS) data. The TLS data processing and analysis are also described.</p>		
<p>The work described in this report was done under ESA Contract. Responsibility for the contents resides in the author or organisation that prepared it.</p>		
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** NAME OF ESA STUDY MANAGER:	** ESA BUDGET HEADING:	
DIV:		
DIRECTORATE:		

# 1 Field data collection

## 1.1 Census data: Background

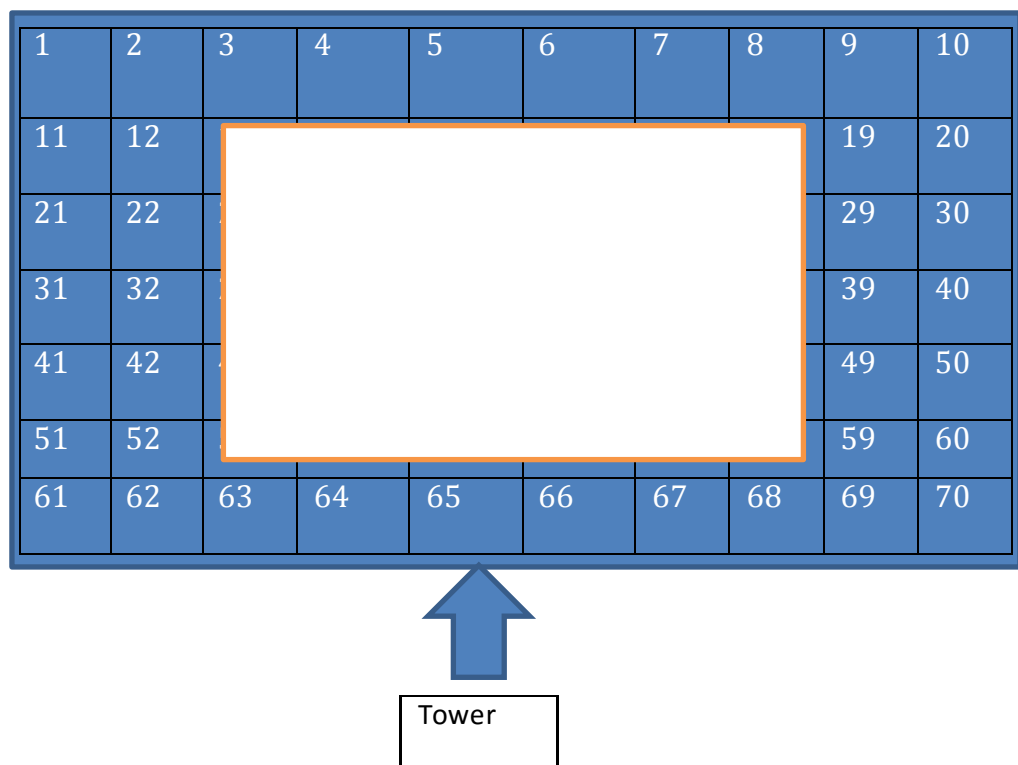
To allow the collection of TLS data, a number of field activities were previously conducted. These include the exact geolocation of the scatterometer footprint, its subdivision in a grid useful to organize TLS activities, the collection of tree data and the calculation of AGB, and the logistic support activities to the TLS mission.

### 1.1.1 Activities: report from botanical survey staff

A botanical survey in the Ankasa Forest Reserve, Ghana from February 25<sup>th</sup> to 6<sup>th</sup> March, 2016 was realized by Markfred Mensah and Jonathan Dabo, Botanists, and CMCC Italy staff.

The task was to permanently mark the 4 corners of field plot (0.7 ha), having rectangular shape, near the flux tower in Ankasa Forest Reserve; the 4 corner points were defined by the French Afriscat team. The distance from the tower to the plot boundary was 20 meters.

We realized that the plot superimposed on already established 1 ha plot near the flux tower so we have to differentiate our poles and tags by painting the top of our poles with red paint and our nails for the tags were also painted red for easy identification.



#### **KEY**

**White background - Old plot**

**Blue background – New plot**

Plot and Subplot layout

Geographical Position system (GPS), Diameter tape, Caliper, Linear tape, Cutlass, Transponder and Vertex meter, Data collection form and pencils were used for location, demarcation, enumeration and recording of the data on the field.

The 0.7ha was sub-divided into 10x10m subplots marked with poles and metals at each corner. We followed the sub-division of the plots with tagging of all the trees larger than 10 cm DBH in each subplot. The tag number starts from number six (6) and not one (1) because after dividing the plot into subplots we realized the French team had demarcated the plot into 0.77 ha (110m x 70m) with some few errors and we had already started the tagging in one subplot.

We then re-demarcated the plot to exclude some part of the plot, so the reason of the tag number starting from six (6) because tag 1 to 5 had already been used and were not in good shape to use again.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	23	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70

20meters



Tower

Height information was recorded for each tree above 10 cm DBH in each plot with transponder and vertex meter.

A total of three hundred and twenty nine (329) individual trees were recorded and identified and a total of One thousand four hundred eighty nine (1489) trees were counted for the number of trees which are below 10 cm DBH for seven (7) subplots namely subplot 1, 5, 10, 35, 61, 65 and 70 which represent the corners and centre of the plot.

The trees information including species name, family, diameter, height, coordinates of plots has been recorded in excel sheets, organized into separate sections corresponding to the 10x10 subplot.

Each tree recorded in excel sheets has been linked to its wood density value, according to the Global Wood Density Database (Dryad) and those of the species which were not present in the database, the genus or family averaged wood density value was adopted.

We could not find some few species such as *Tapura ivorensis*, *Dactyladenia hirsute*, *Salacia sp.*, *Hunteria umbellata*, *Pleiocarpa mutica*, *Hannoa klaineana*, *Aptandra zenkeri*, *Maesobotrya barteri*, *Greenwayodendron oliveri*, *Leptaulus daphnoides*, *Spathandra blakeoides* and *Microdesmis puberula* wood density in the data base

For AGB calculation:

$$AGB = F\rho \frac{\pi D^2}{4} H$$

In the measurement units (AGB, D in cm,  $\rho$ g/cm<sup>3</sup>, H in m), Dawkins (1961) and Gray (1966) predicted a constant form factor F across broadleaf species, with F=0.06 (Cannell 1984) where;

H = total tree height (m); D =Diameter (cm);  $\rho$  = wood density (cm<sup>3</sup>). Calculation of the above ground biomass at the 10x10 subplot level was successively done testing different allometric equations (Chave 2005, 2014) for moist-forest.

The forest is a very good example of the unusual Ankasa variant of Wet Evergreen forest, including many individuals of many otherwise little-studied globally rare species. There are many globally rare plant species in the plots, including lianas. In particular, the *Homalium cf dewevrei* is of uncertain taxonomic status.

The data are included in Appendix 1.

## 1.2 Lidar data collection: Background:

To determine the plot biomass and biomass of individual trees the footprint of the AfriScat Scatterometer has been measured using Terrestrial Laser Scanning (TLS). The 70x100 m footprint was marked in the field and subplots of 10x10m were established. All trees were labeled and the grid points were marked with stakes (result of WP 41).

### 1.2.1 Activities:

In the period from March 8 – March 15 2016, a team of 5 people of UCL and WUR, with local support of Justice John Mensah, scanned the footprint with two Riegl VZ-400 TLS instruments. Since the weather conditions were good (no rain, limited amount of wind) and the good plot preparation (part of WP41) the work could be done efficiently and well within the scheduled time-frame. Given the 10 x 10m grid size, this resulted in 88 scan positions, at which both a vertical and tilted scan have been done. This is needed since the Riegl VZ-400 scanner has a field of view of 100° i.e. 70° above and 30° below the horizontal.

Individual scans were initially aligned using cylindrical reflectors (10 cm high, 5.1 cm diameter) laid out during the scanning process. The alignment was next optimized using the Multi Station

Adjustment algorithm implemented in the Riegl processing software: RiScan. While in the field, this process could only be done on the subsampled point cloud data, due to computing power limitations on the laptops, and in terms of time available. However preliminary results showed that all scans could properly be aligned, with a good accuracy (Figure 2-4 illustrate this). This alignment will further be optimized in the processing phase after which the raw pointcloud data can be delivered.

### 1.2.2 Detailed activities:

1. Synchronizing the settings in both scanners:
  - Angular resolution: 0.04 mrad
  - Full waveform: off
  - No RGB pictures taken
  - Synchronized sensitivity for reflector search settings
2. Optimizing the sampling protocol and synchronizing the procedure between the teams operating both scanners.
  - Snake pattern, scanning line by line with one team starting in the origin of the plot, and the other team starting at the far end (Figure 1).
  - Use same cylindrical reflectors (10 cm high, 5 cm diameter) for alignment of the individual scans.

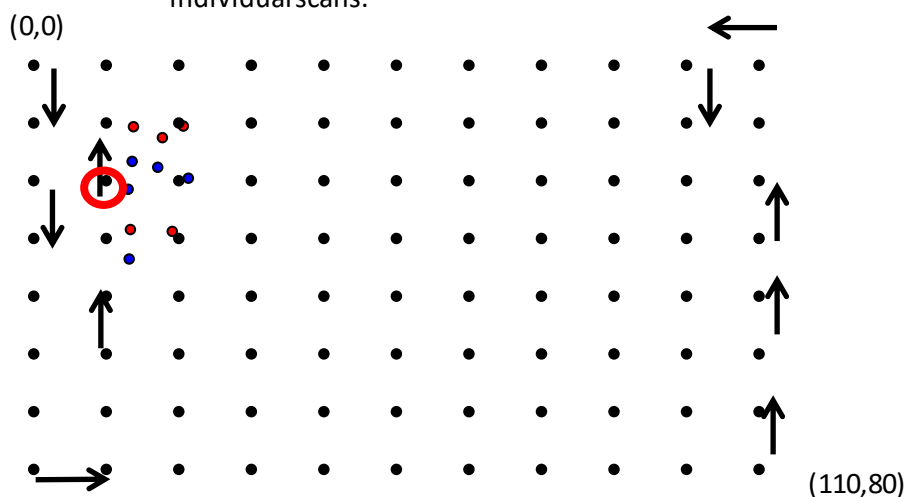


Figure 1 Schematic overview of the scanning protocol. The scanning was done according to a snake pattern, following the 10x10 m grid. One scanner started at (0,0), the other one at (110,80). Blue and orange circles represent trees within a 10 x 10m grid square.

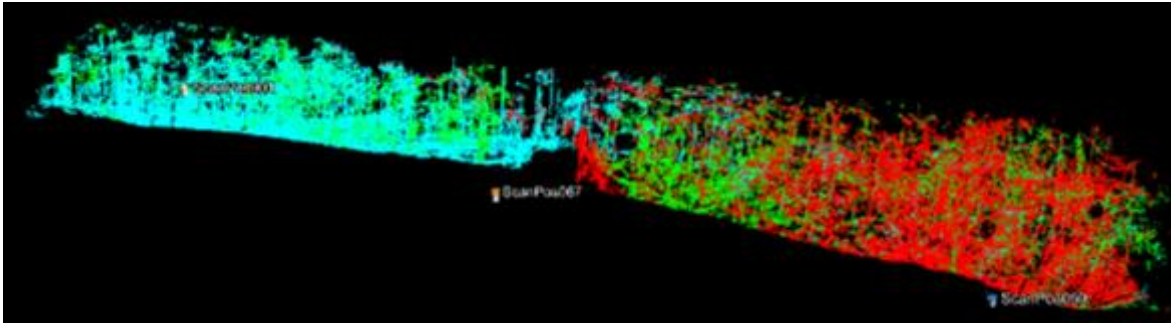
3. Pre-alignment of individual scans
  - Initial alignment of all scans in one line using the cylindrical reflectors
  - Improving the alignment and aligning subsequent lines using MSA
4. Evaluation of preliminary alignment by visual assessment of cross sections
5. Central row scanned partially with RGB camera to provide 'fly through' visualization

### 1.2.3 Results:

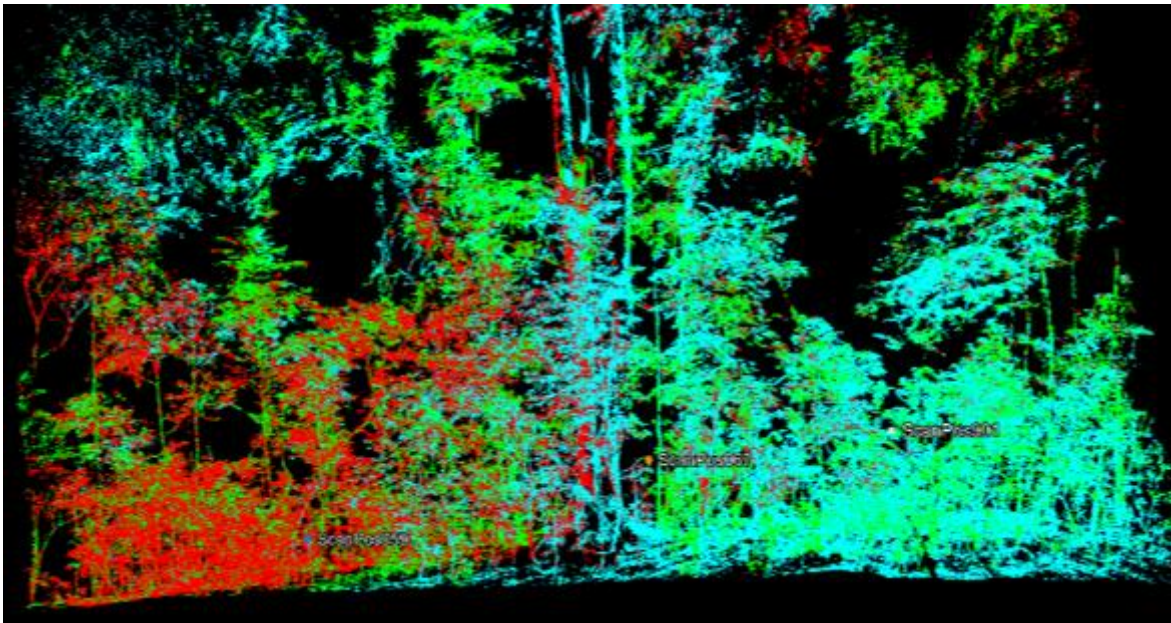
The scan procedure worked out very well in the field, despite the rather significant terrain (see figure below) and did not cause any problems with aligning the data afterwards. The 6 reflectors in front and behind each scan position were sufficient for the initial alignment and the MSA algorithm further improved the alignment. Joining the separate pointclouds together from the two scanners has

worked extremely well, to within a few mm. This is close as would be achieved using a single scanner, which was the aim.

The cross sections of the acquired pointcloud data are shown in Figure 7-Figure 9, where points acquired from different scan positions and with different scanners are shown with different colours. These figures show that the alignment worked out very well.



**Figure 2** Cross section through the plot. The points are colored according to the scan position from which they were acquired. These preliminary results show that the alignment protocol worked out as expected to within a few mm.



**Figure 3** part of this cross section in more detail, which shows that the alignment of the different scans worked out very well. Further, it gives a first impression of the level of detail of the acquired data set.

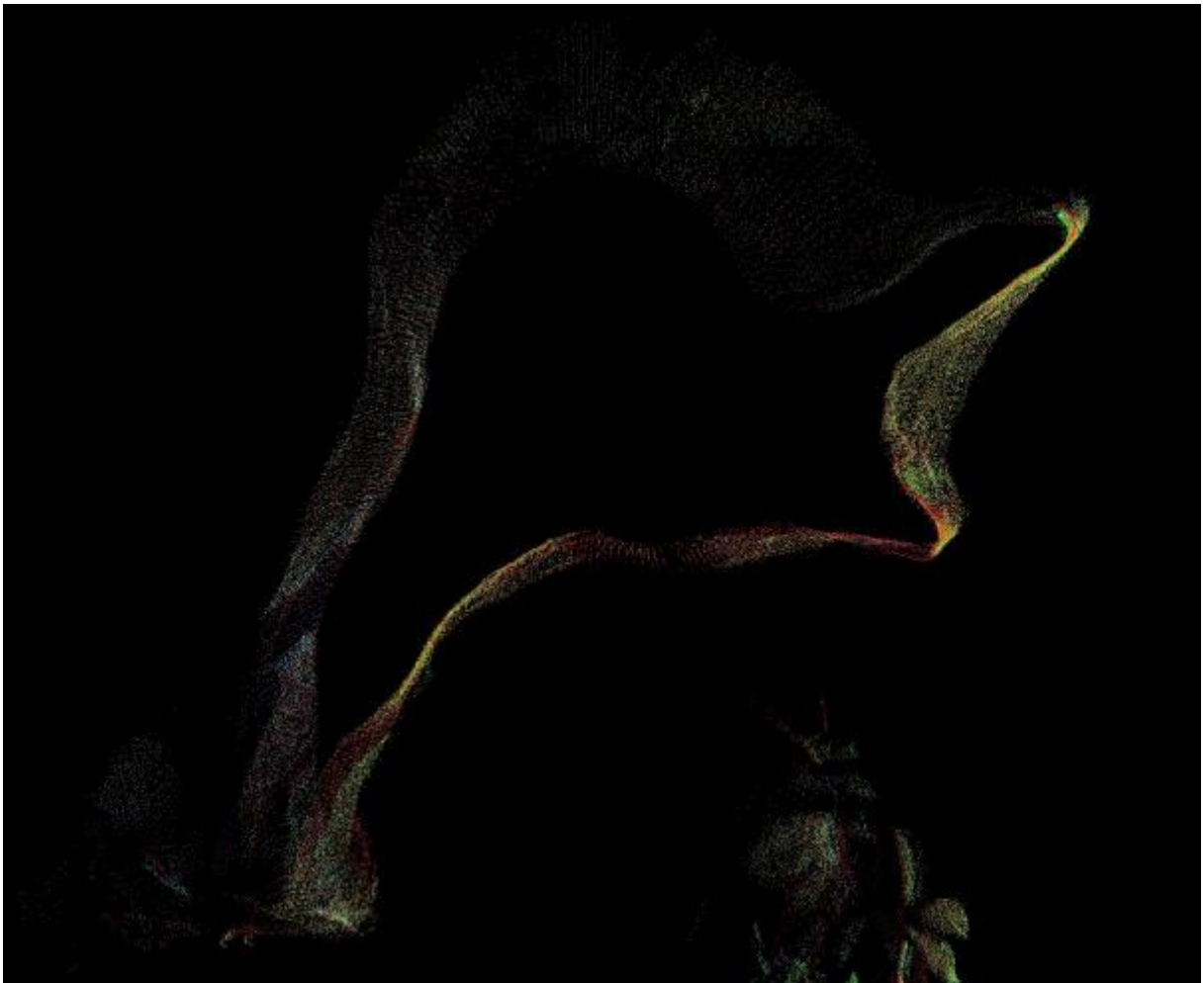
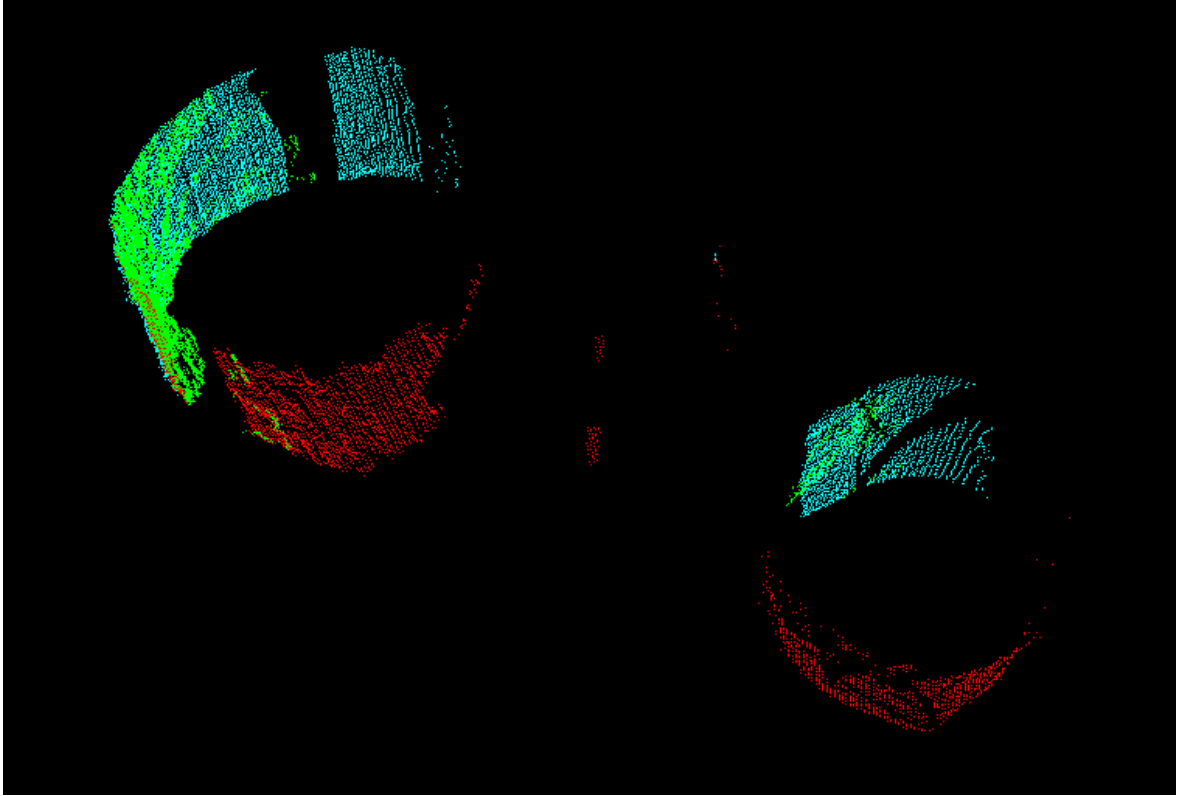


Figure 4: cross sections at stem level, showing that the alignment of the different scans is successful. The different colors in each panel represent points from different scan locations. Misalignment of scans leads to obvious offsets from different sides of the trunks, which is not the case here.

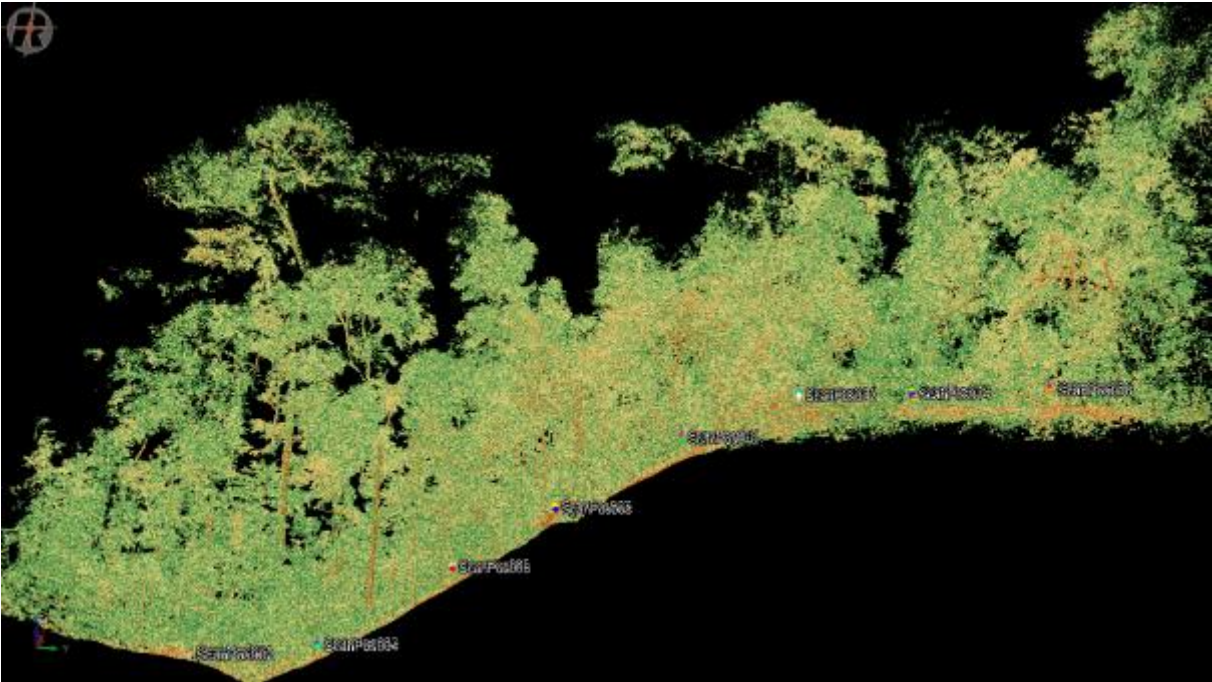
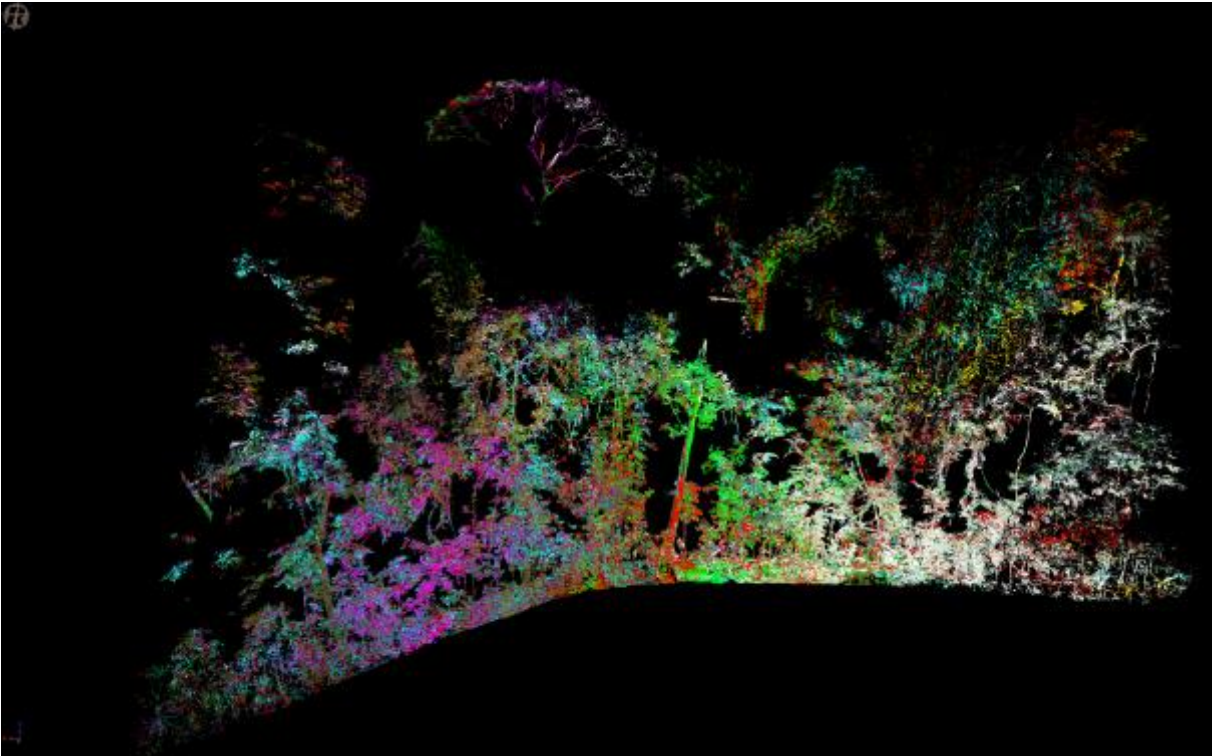


Figure 5 Point cloud from 2 neighbouring rows, showing the scan locations and the terrain, colored by top: scan location; bottom, return intensity.



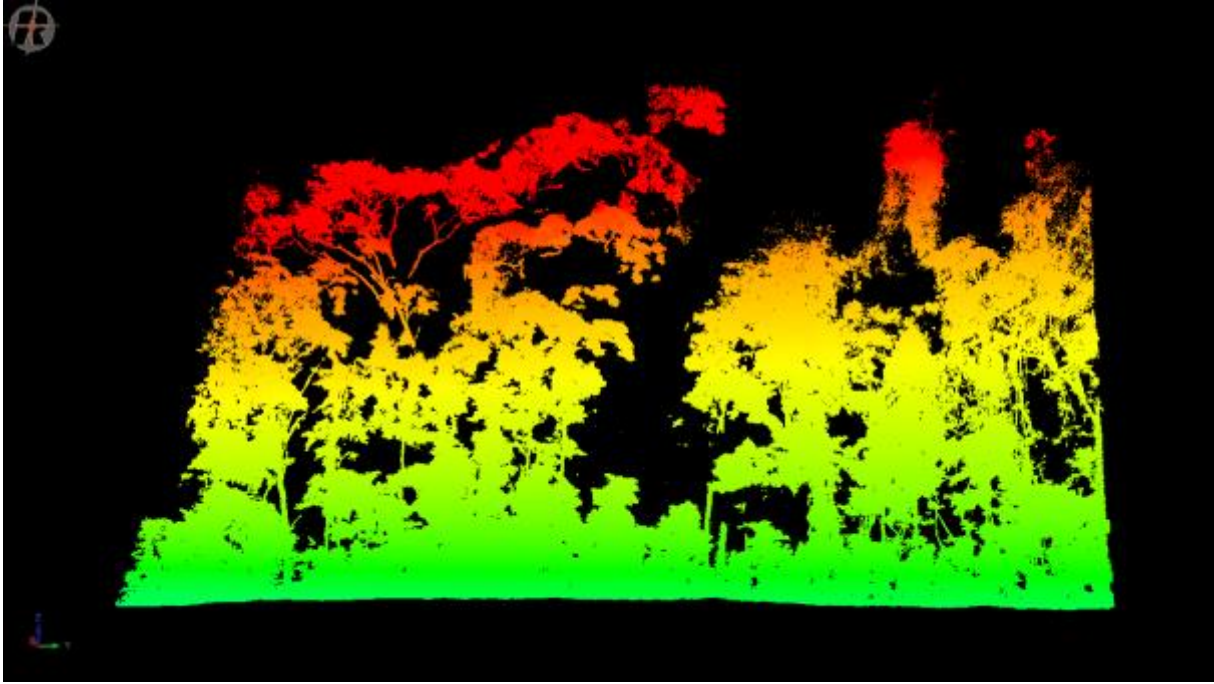


Figure 6 Cross section of scan (around 50 x 5m) colored by height to a maximum of 45m.

#### Next steps:

The alignment of the scan positions were iterated until they were as close as can be achieved, after which the raw pointcloud data the locations of the individual trees were automatically determined and linked to the tree-IDs and species data, where possible. This was not a requirement of the WP, but is something that the UCL and WU groups use to exploit the census data as fully as possible. Difficulty in matching census and TLS tree IDs arises due to lack of perfect location information (stem map); large numbers of trees of broadly similar size make this task hard to automate.

Lastly, once all point clouds were registered, individual trees were extracted from the point cloud and modeled (reconstructed via cylinder-fitting methods) to determine tree volume, with uncertainty assessed via multiple reconstruction instances for each tree. The resulting volume can be converted to biomass using the species data. These steps are described in detail below.

## 2 TLS processing: background

To allow the collection of TLS data, a number of field activities were previously conducted. These include the exact geolocation of the scatterometer footprint, its subdivision in a grid useful to organize TLS activities, the collection of tree data and the calculation of AGB, and the logistic support activities to the TLS mission.

### 2.1 Activities:

TLS processing, including co-registration of individual point clouds, from two separate TLS instruments (first time this has been done); tree point cloud extraction; quantitative structural model (QSM) fitting, including parameter sensitivity analysis to assess uncertainty in derived QSM volume estimates; AGB estimation from QSMs and wood density and from CHave et al. (2014) allometric

model, using TLS-derived dbh and height estimates; analysis of tree structural models and AGB estimates.

Following the field campaign carried out in March 2016, the resulting TLS data have been processed to produce per-tree and plot-level estimates of structure from the individual tree point clouds, using Quantitative Structural Model (QSM) fitting. These per-tree and plot-level estimates, and example processing/plotting Python code, are provided as the final deliverable for this work, along with this summary of key output properties. The processing steps were as follows:

#### **Activities:**

- **TLS point cloud registration**
- **Individual tree extraction**
- **Per-tree QSM cylinder model fitting**
- **Per-tree and plot-level estimation of structural and above ground biomass (AGB)**

#### **2.2 Detailed activities:**

Data collection resulted in 88 separate scan locations, with 2 scans from each (vertical and horizontal), collected simultaneously using the UCL and WU Riegl VZ-400 TLS instruments. The resulting 176 TLS point clouds from the two instruments were merged and co-registered using Riegl RiscanPro software, based on the rolling 10-12 calibration reflectance targets placed ahead and behind every scan. The registration process allows all scans to co-registered to a single point cloud, with an accuracy approaching the precision of the lidar measurements i.e. < 1 cm. This level of accuracy can be seen by identifying individual trees at various locations within the point cloud, each of which is seen from several separate scans. Any offset between the clouds results in slight but visible offsets at the boundaries between points originating from different scans, which is particularly obvious on tree trunks circumferences. The figure below shows examples of tree trunks seen from different scan locations within the plot, illustrating the registration accuracy. The resulting merged point cloud is 180 GB in ASCII format. The point cloud files contain, for every point:

**x y z range reflectance deviation return\_number scan\_number**

where *x y z* is the range-corrected return energy (dB) for each return; *deviation*: difference in fit of return pulse shape (unknown shape, internal), relative to a calibrated return pulse (unknown shape, internal) at the same distance i.e. a proxy for range accuracy. We disregard pulses with deviation > ~12-15 but this is somewhat arbitrary (values can range from near zero to 10s or 100s); *return number* refers to the return number from each outgoing pulse (1-4); *scan\_number* refers to the scan location (1-176) from which the point originated.

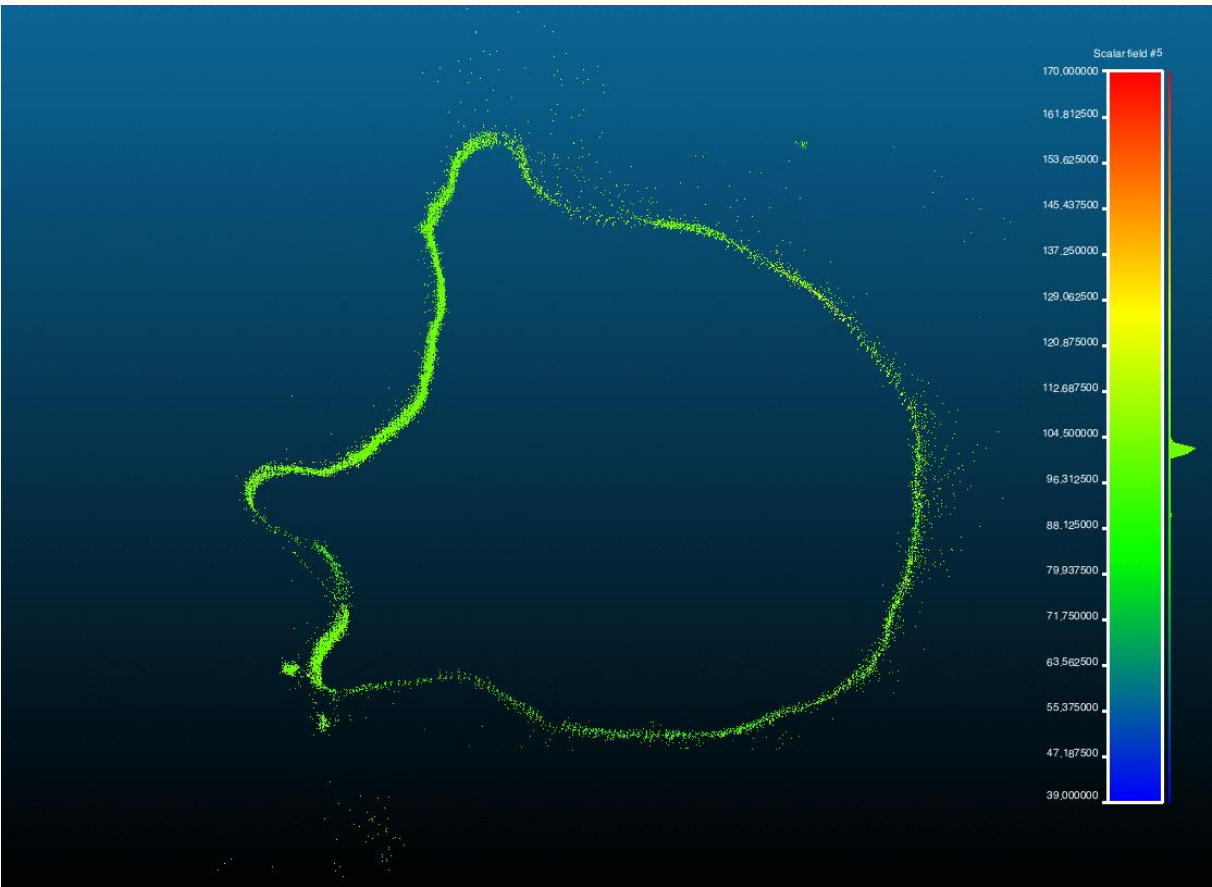
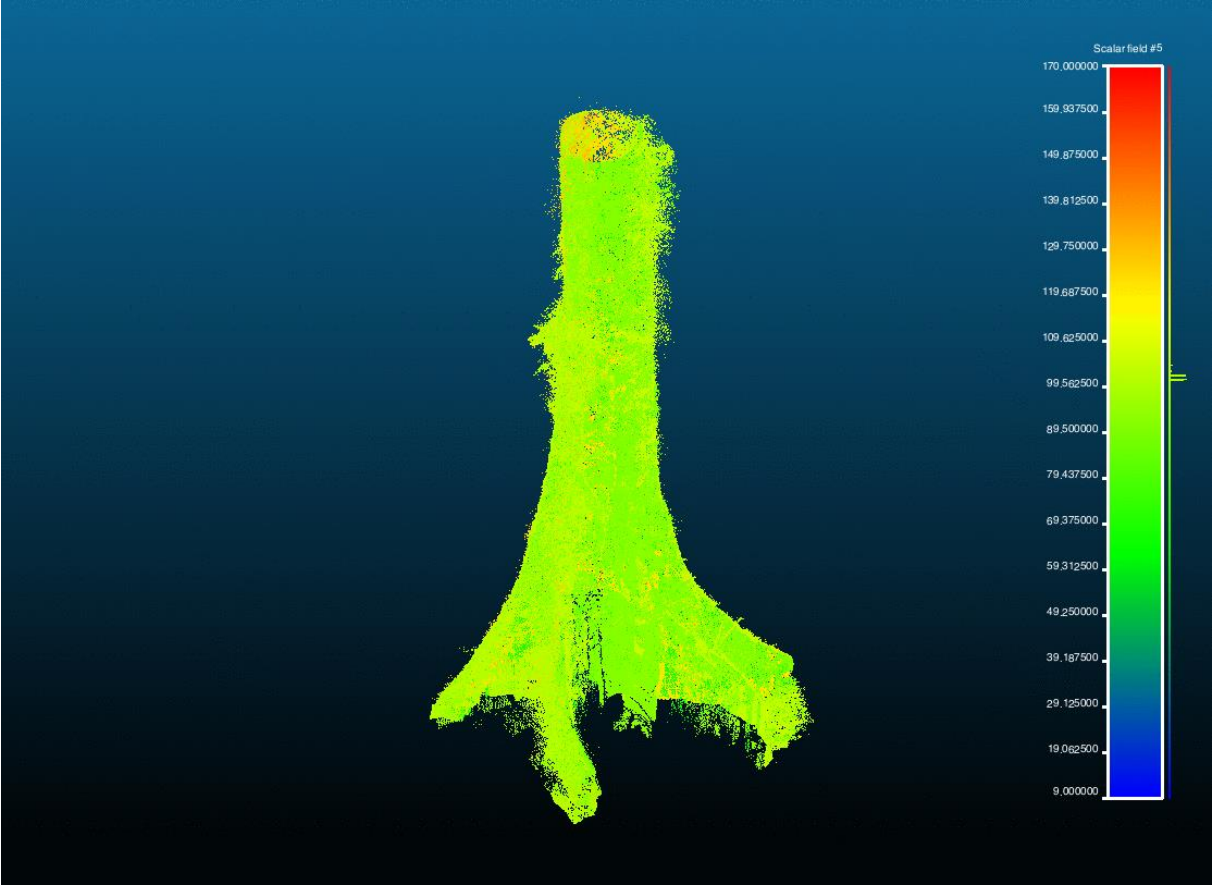


Figure 7 Example illustrating the accuracy of co-registration of the merged TLS point cloud (stem #1). Trunk section (top) is < 4m and slice taken from this is ~1m in diameter; colours represent points from different scan locations within the point cloud (1-125, full distribution shown in the histogram).

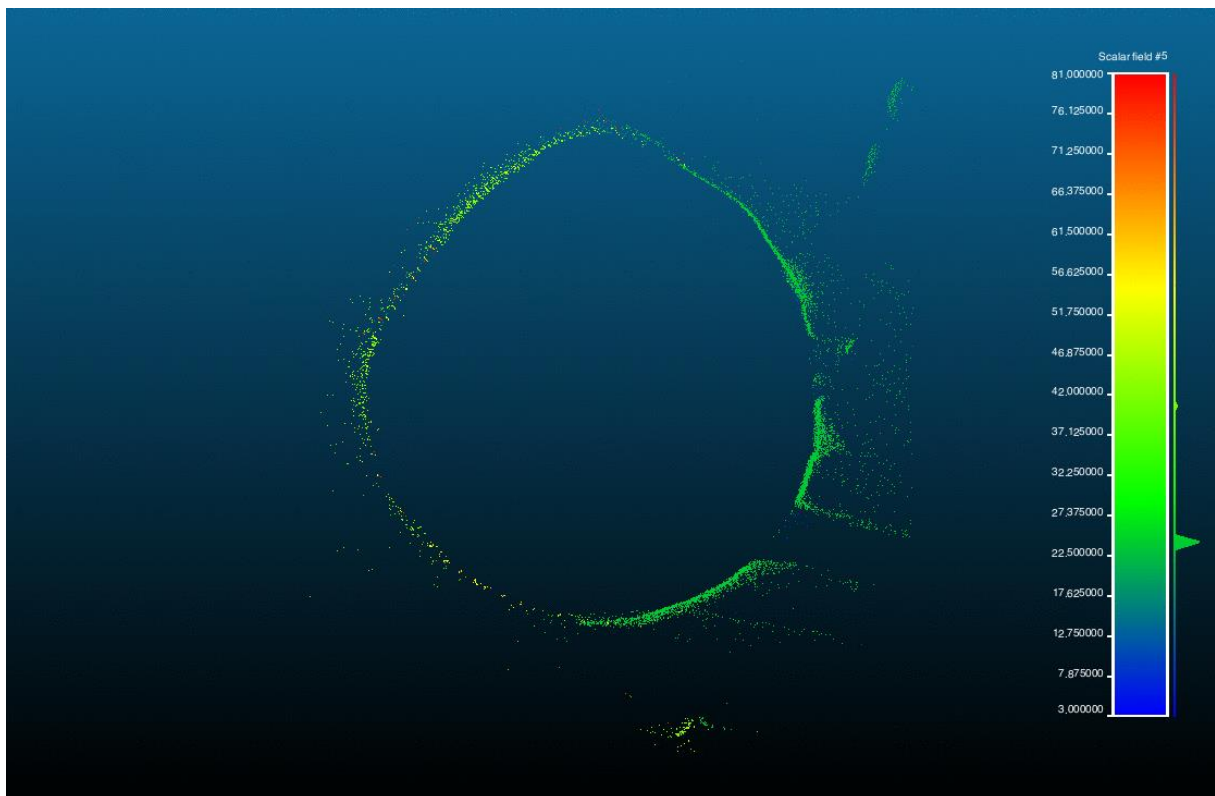
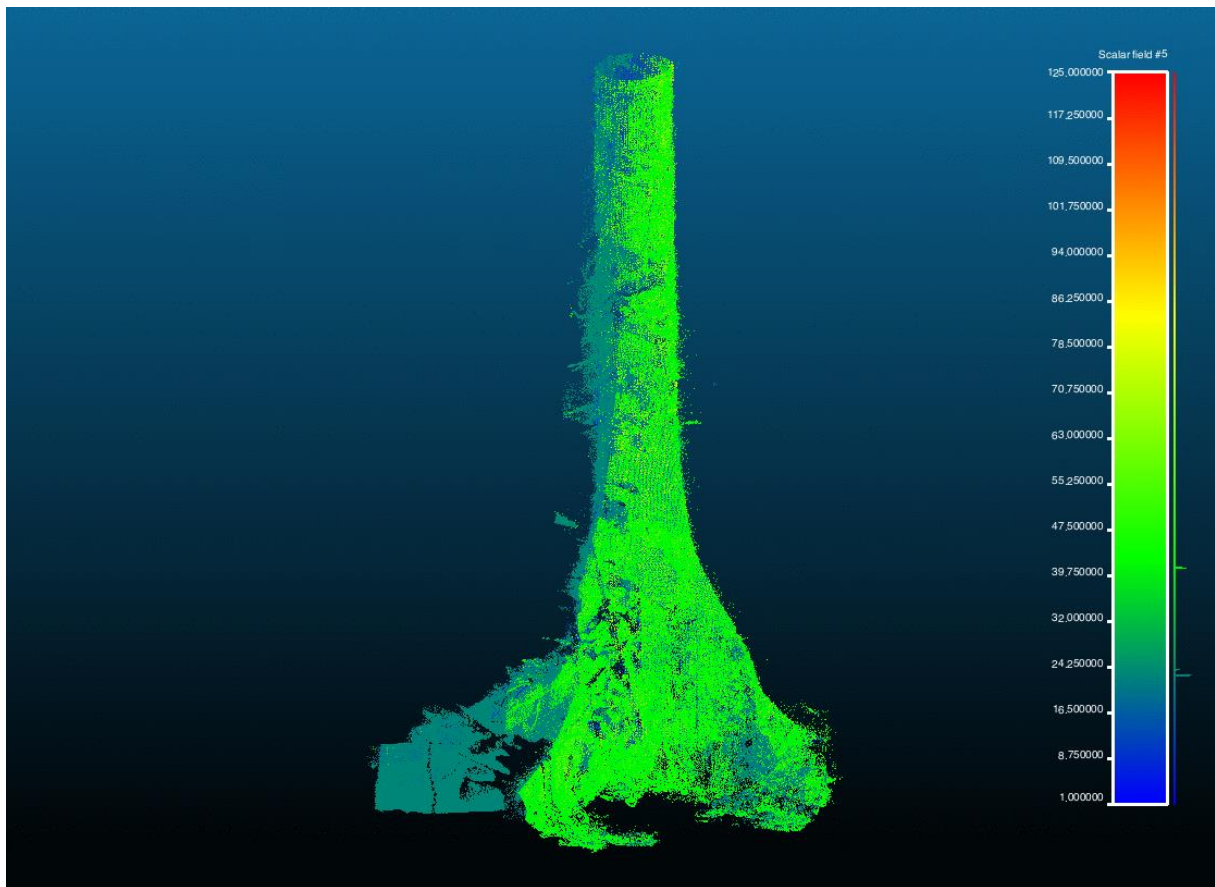
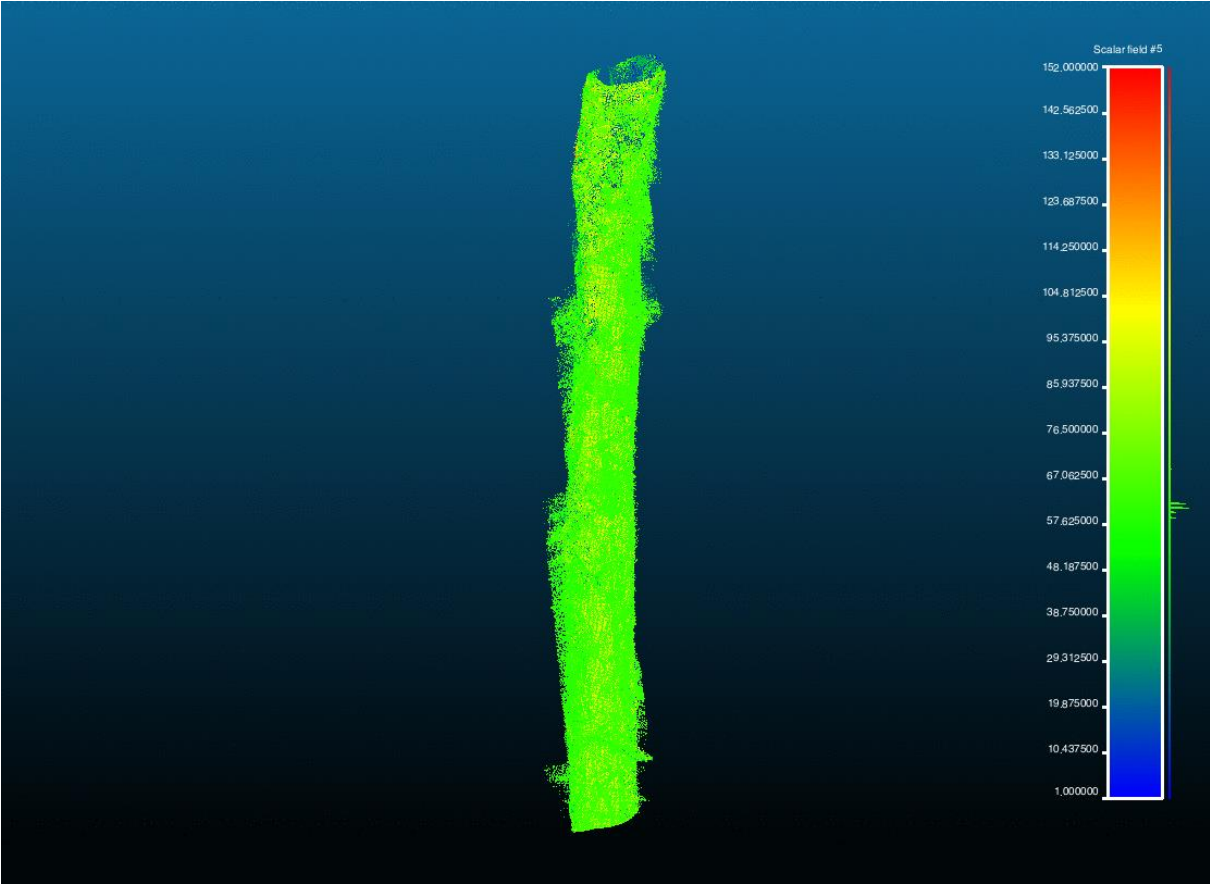


Figure 8 Example illustrating the accuracy of co-registration of the merged TLS point cloud. Colours represent points from different scan locations within the point cloud.





**Figure 9** Example illustrating the accuracy of co-registration of the merged TLS point cloud. Colours represent points from different scan locations within the point cloud.

Following registration, individual tree point clouds were extracted automatically from the plot point cloud using code developed by A. Burt (Burt et al., in prep; and [github](#)). Full trees were extracted for all trees with  $\text{dbh} \geq 20\text{cm}$ , and stems/trunks for all trees in with  $10\text{cm} \leq \text{dbh} < 20\text{cm}$ . The automated extraction process resulted in **209** trees in the  $10\text{cm} \leq \text{dbh} < 20\text{cm}$  class and **61** trees in with  $\text{dbh} \geq 20\text{cm}$ . The reason for separating these classes is that trees with  $10\text{cm} \leq \text{dbh} < 20\text{cm}$  have branches that are typically too small to resolve usefully in the TLS data beyond order 1 or 2. As a result, the QSM fitting procedure is unstable & highly uncertain for smaller branches (2-3cm diameter and smaller). These branches contribute very little in the way of AGB to the tree and, critically from the AfriSCAT/BIOMASS perspective, will be harder to see for RADAR with  $\lambda > \sim 1\text{cm}$ , unless they are of length  $\sim 1\text{m}$  or greater (and depending on orientation). These branches are ignored in the resulting analysis.

### 2.3 Results:

Figure 10 shows the stem map of the scanned plot, illustrating the 61 full trees and the 209 stems retrieved from the point clouds. Following this are examples of the tree point clouds and their resulting extracted QSM cylinder models, summary statistics are shown for all trees in the plot, and finally the per-tree and plot-level estimated biomass. The point clouds of the 61 trees with  $\text{DBH} > 20\text{cm}$  are shown in Figure 11 along with the resulting cylinder models from which volume (and AGB) are estimated.

## Stem map

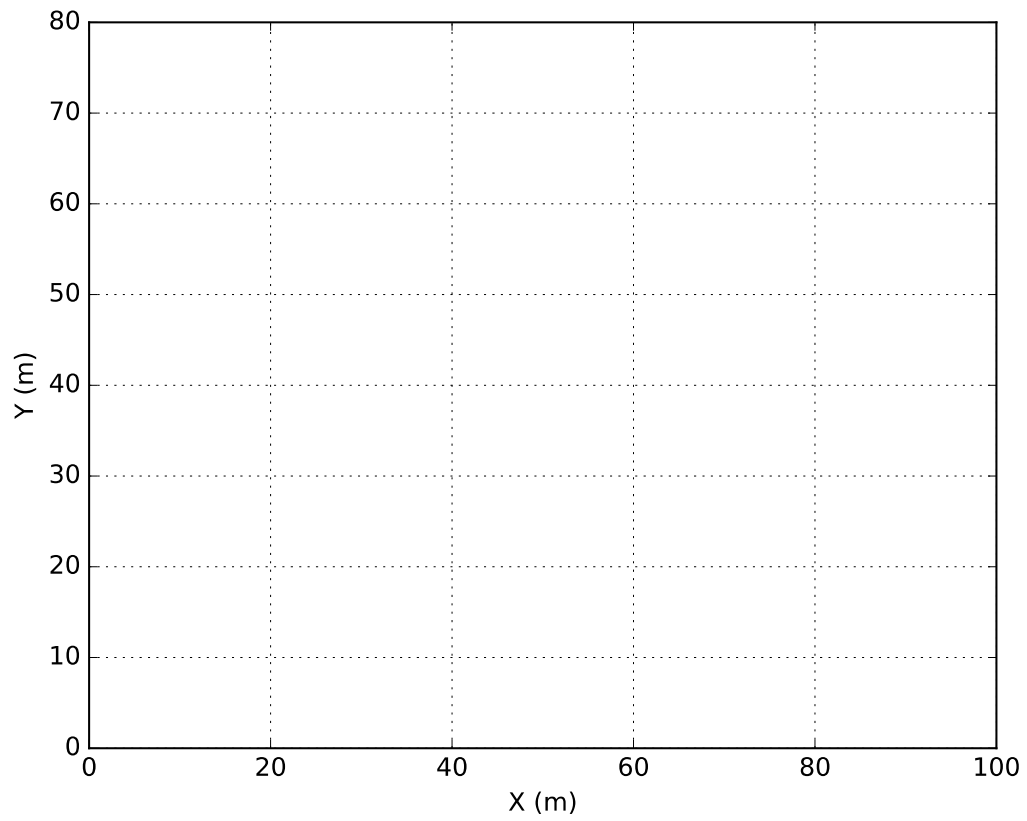
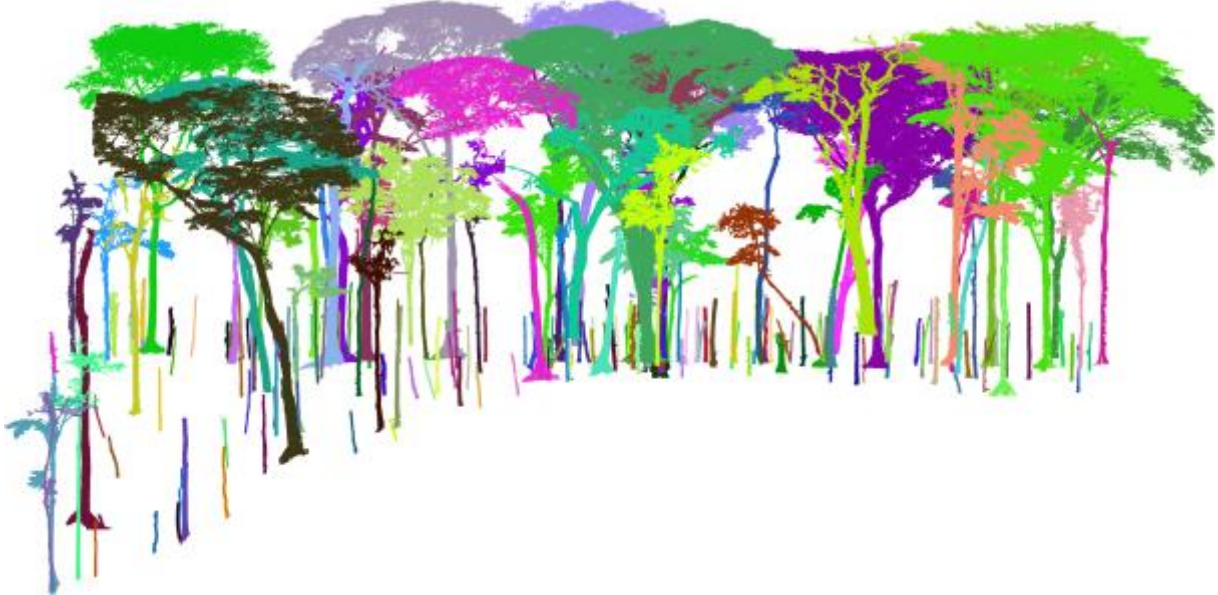


Figure 10 Stem map of the scanned plot showing the scanned and reconstructed trees. The size of the circles represents the DBH of the trees in each case.

## Point clouds of individual trees and corresponding QSM cylinder models





**Figure 11 Individual tree point clouds extracted from the AfriSCAT plot (top); the same trees reconstructed as cylinder models (bottom). Trees which are shown trunk-only are those with  $10\text{cm} \leq \text{dbh} < 20\text{cm}$ .**

## 2.4 Quantitative Structural Model (QSM) inputs, parameters and outputs

The extracted trees are provided as both .mat MATLAB files, resulting from the QSM model application, containing the full cylinder information and summary statistics, as well as .txt files which provide the simple x, y, z locations of the cylinders comprising each modeled tree. The contents of the .mat files are provided below, with the descriptions taken from the MATLAB code of Pasi Raumonen (see Raumonen et al. 2013 for description of algorithm). The input and parameters required to generate the .mat files are also described. The Jupyter python notebook **afriscat\_qsm.ipynb** is provided to give simple example python code for opening, reading and plotting the contents of these MATLAB files.

### Inputs

#### Data

- (Un)filtered point cloud, (m points x 3)-matrix, the rows give the coordinates of the points. The order of the points is not meaningful

#### Parameters

- **dmin** Minimum distance between centers of cover sets; i.e. the minimum diameter of a cover set
- **rcov** Radius of the balls used to generate the cover sets, these balls are also used to determine the neighbors and the cover set characteristics
- **nmin** Minimum number of points in a rcov-ball
- **lcyl** Cylinder length/radius ratio
- **NoGround** Logical value, true if no ground in the point cloud, in which case defines the base of the trunk as the lowest part the cloud
- **string** Name string for saving output files
- **rfil[1,2]** Radius of cover sets used in the 1<sup>st</sup>, 2<sup>nd</sup> filtering process
- **nfil[1,2]** Minimum number of points in the cover sets/components passing the 1<sup>st</sup>, 2<sup>nd</sup> filtering



**Outputs: QSM cylinder models (.mat files):**

- Sta Starting points of the cylinders, matrix
- Axe Axes of the cylinders, matrix
- Rad Radii of the cylinders, vector
- Len Lengths of the cylinders, vector
- CPar Parent cylinder of each cylinder, vector
- CExt Extension cylinder of each cylinder, vector
- BoC Branch of the cylinder, vector
- BOrd Branch order, vector
- BPar Parent branch, vector
- BVol Volumes of the branches, vector
- BLen Lengths of the branches, vector
- BAng Branching angles of the branches, vector
- FCB First cylinders of the branches, vector

**Additional outputs:**

- TreeData Vector containing basic tree attributes from the model
- BSeg Segment of the branch, vector (not every segment forms a branch)
- BChi Child branches, cell-array
- CiB Cylinders in the branches, cell-array
- CChi Children cylinders of each cylinder, cell array
- CiS Cylinders forming each segment, cell array
- Added Logical vector indicating cylinders that are added to fill gaps
- P Filtered point cloud, matrix
- Bal Cover sets, cell array
- Cen Center points of the cover sets, vector
- Nei Neighboring cover sets, cell array
- Segs Tree segments, cell array
- SPar Parent segment of each segment, vector
- SChi Child segments of each segment, cell array

***TreeData: per-tree summary information***

The TreeData vector contains the following 33 entries, with units. Volume is expressed in liters:

- Total volume of tree (l)
- Volume of trunk (l)
- Total volume of branches (l)
- Height of tree (m)
- Length of trunk (m)
- Total length of branches (m)
- Total number branches
- Max branch order
- Total area of cylinders (m<sup>2</sup>)
- DBH (m)
- DBH (m) from triangulation (fitting circle to cylinder surface)
- Trunk volume of over 33.3% diam part (cylinders) (l)
- Trunk volume of over 33.3% diam part (triangulation) (l)
- Trunk length of over 33.3% diam part (cylinders) (m)
- Trunk length of over 33.3% diam part (triangulation) (m)

- Number of %i order branches, up to order 6
- Volume of %i order branches, up to order 6
- Length of %i order branches, up to order 6

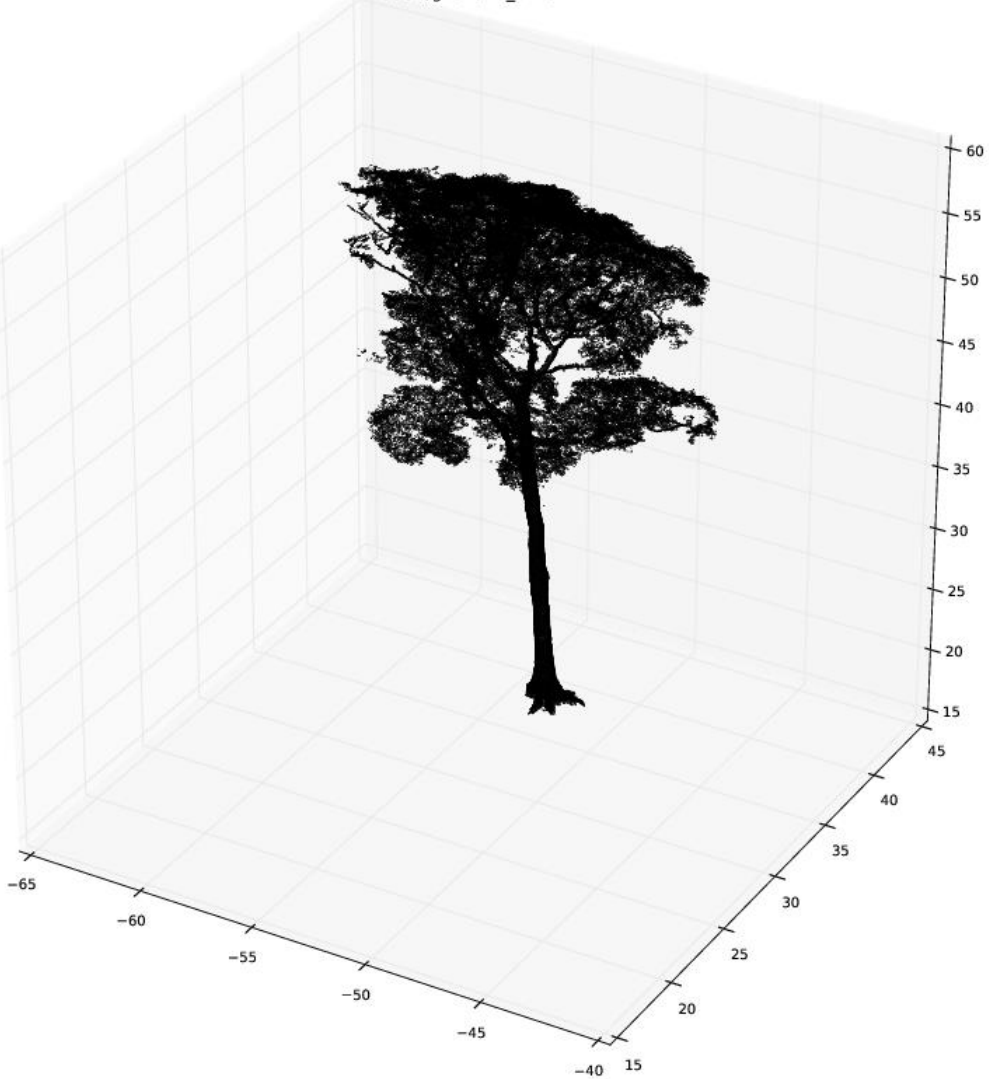
The **afriscat\_qsm.ipynb** Jupyter notebook demonstrates how to extract and print/save these values from the per tree .mat files. As an example, we take the first tree in the list ghanaAS\_0.mat, and the resulting contents generated by **afriscat\_qsm.ipynb** are as follows:

Total volume of tree (l): 13847.00  
 Volume of trunk (l): 8988.00  
 Total volume of branches (l): 4859.00  
 Height of tree (m): 38.10  
 Length of trunk (m): 42.10  
 Length of branches (m): 1401.00  
 Total number branches: 874.00  
 Max branch order: 7.00  
 Total area of cylinders (m-2): 248.00  
 DBH (cm): 111.00  
 DBH from triangulation (cm): 0.00  
 Trunk volume of over 33.3% diam part (cylinders) (l): 0.00  
 Trunk volume of over 33.3% diam part (triangulation) (l): 0.00  
 Trunk length of over 33.3% diam part (cylinders) (l): 0.00  
 Trunk length of over 33.3% diam part (triangulation) (l): 0.00  
 Number of 1 order branches: 23  
 Number of 2 order branches: 134  
 Number of 3 order branches: 310  
 Number of 4 order branches: 286  
 Number of 5 order branches: 109  
 Number of 6 order branches: 11  
 Volume of 1 order branches: 2413.00  
 Volume of 2 order branches: 1661.00  
 Volume of 3 order branches: 600.00  
 Volume of 4 order branches: 161.00  
 Volume of 5 order branches: 22.60  
 Volume of 6 order branches: 0.77  
 Length of 1 order branches: 141.00  
 Length of 2 order branches: 370.00  
 Length of 3 order branches: 477.00  
 Length of 4 order branches: 310.00  
 Length of 5 order branches: 94.60  
 Length of 6 order branches: 7.76

The triangulation returns are zero here as this feature is currently (deliberately) disabled in the QSM code (the triangulation approach is an alternative method of fitting facets to the extracted trees, particularly for the trunk and perhaps 1<sup>st</sup> and 2<sup>nd</sup> order branches, but is much less stable than the main cylinder fitting method). The plotted cylinder and point clouds for the first tree example are shown below.

point cloud

models/ghanaAS\_0.mat



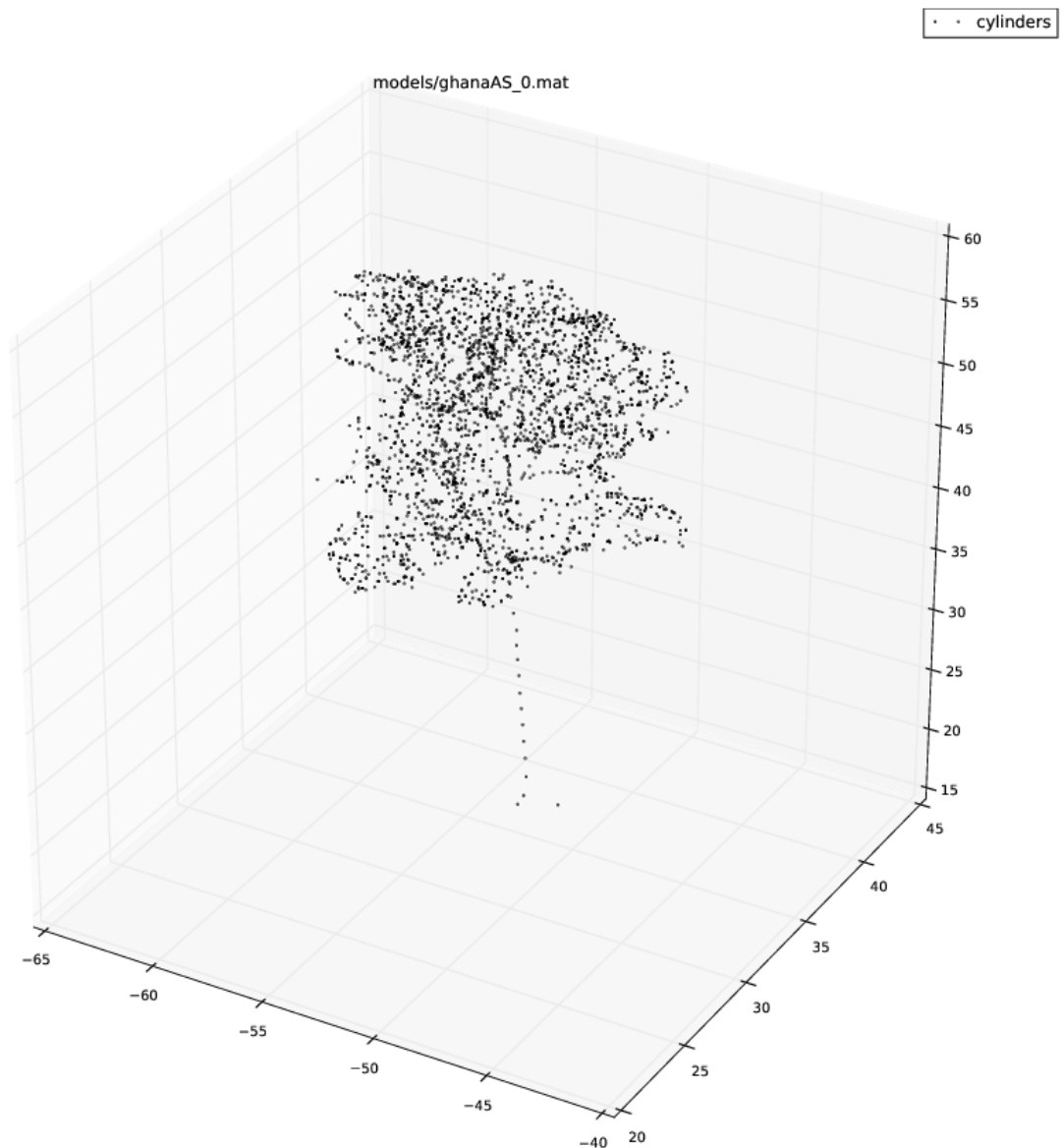


Figure 12 Example contents of MATLAB file, for tree ghanaAS\_0.mat. Top: the original lidar point cloud from which the QSM is derived. Bottom: base location of each cylinder in the QSM reconstruction of the tree.

Figure 12 shows an example of the output of the QSM reconstruction, from which the branch and tree size and volume are calculated. The upper panel shows the original point cloud, while the lower panel shows the start points of the resulting cylinders comprising the 874 branches of the whole tree (note that individual branches can be comprised of many cylinders).

## 2.5 Per tree summary stats for all trees with DBH > 20cm

All plots are generated using the supplied `afriscat_qsm.ipynb` Jupyter notebook. The following histograms show the distribution of the key tree structural parameters, namely DBH, height and volume.

## DBH and height

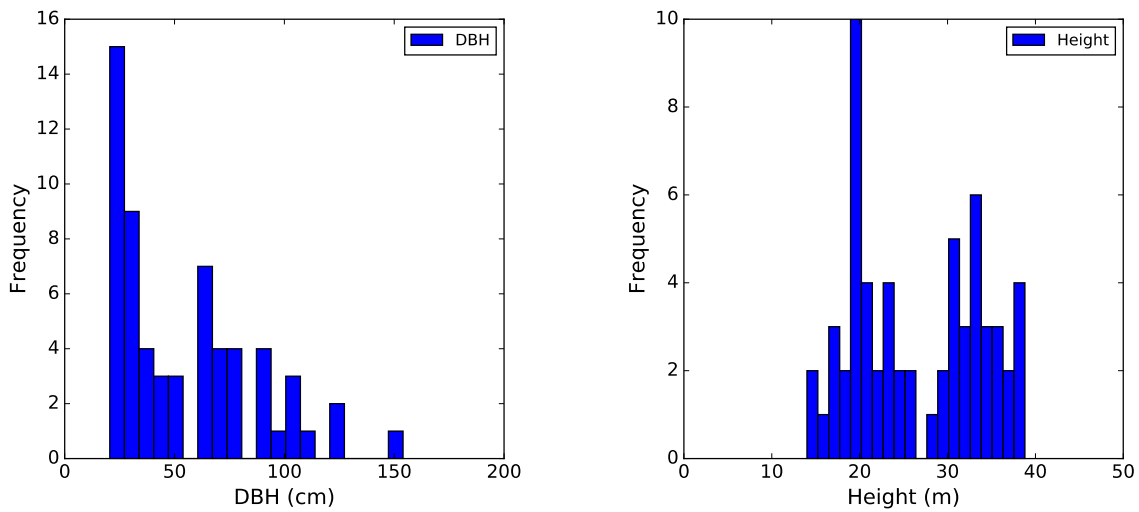


Figure 13 Histograms of the DBH (left) and height (right) of the 61 full tree QSMs.

Figure 13 shows the DBH and height distributions of the 61 full tree QSM reconstructions. The majority of the trees lie in the 20-50 cm DBH range, but with 18 having DBH > 70 cm, 7 with DBH > 100 cm and the largest being DBH 154 cm (tree ghanaAS\_7.mat, see below). For height, the trees lie between 14 and 39 m, with 10 exceeding 35m and the tallest being 39 m.

## Volume

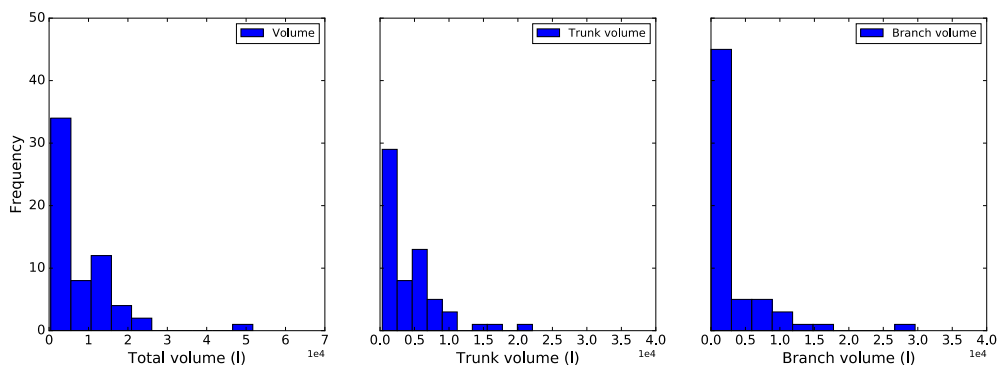
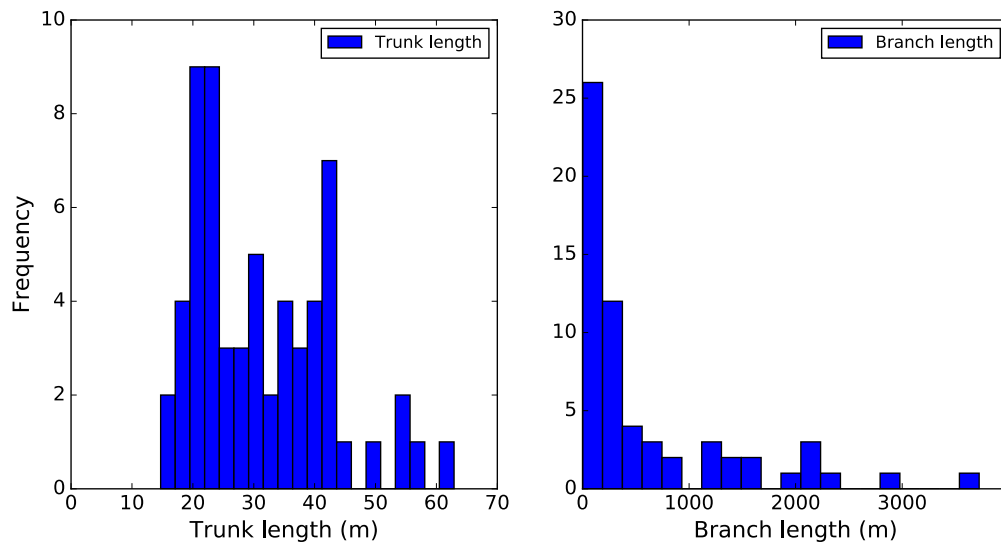


Figure 14 Histograms of the volume of the resulting QSMs: total per tree (left); trunk only (middle); and branch only (right). The y axes have the same scale and note the exponent for the x axes.

The distributions of total reconstructed tree volume, as well as distributions of the trunk and branch components making up the totals, are shown in Figure 14. The similarity between the total and trunk distributions demonstrates that the trunk volume (unsurprisingly) makes up a large component of the overall volume, from a minimum of ~20%, with the majority in the 40-70% range, but with some cases where the trunk makes up almost all the total volume (very few branches).

## Trunk and branch length



**Figure 15 Histograms of the per-tree trunk length (left); and branch length (right).**

The distributions of the lengths of the trunk sections and the 1<sup>st</sup> and higher order branches are shown in Figure 15. And while the branch lengths mostly lie in the sub-1000 m range, there are a few exceeding this, including two trees with 3km or more of branches (trees ghanaAS\_07.mat ghanaAS\_11.mat)! This is a tree of 35 m in height, with 102 cm DBH. These trees are shown in Figure 16.

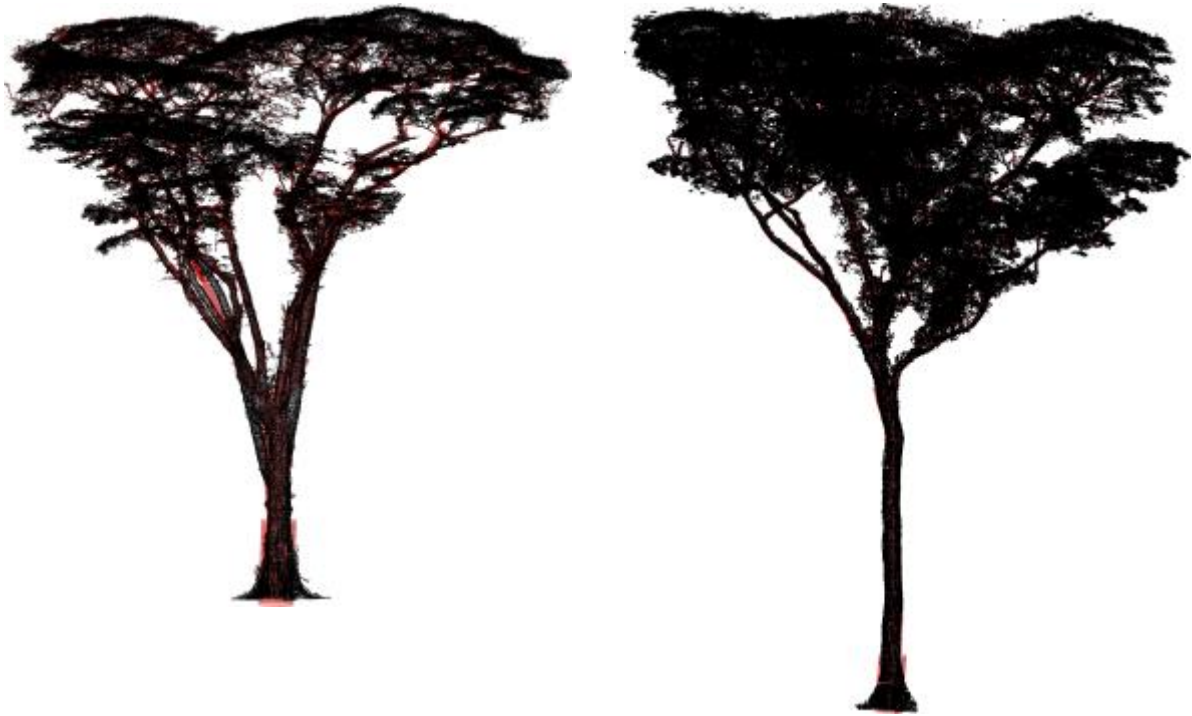
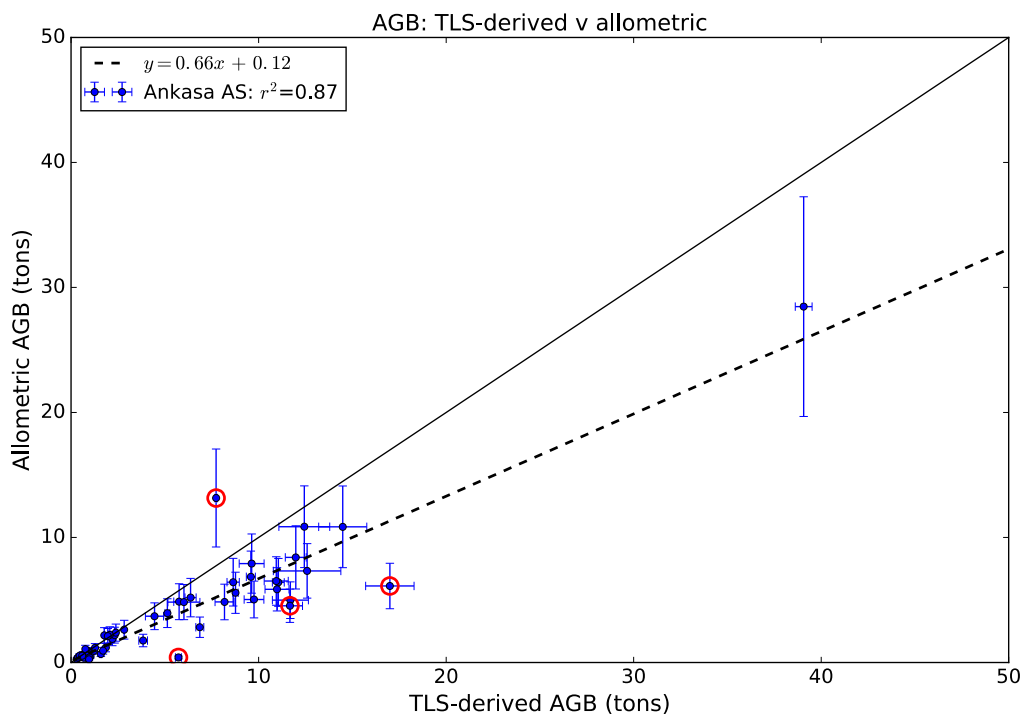


Figure 16 The two trees with the largest total length of branch: ghanaAS\_07.mat (left, 3 km of branch); ghanaAS\_11.mat (right, 3.7 km of branch). As for all single trees shown, the original TLS point cloud is shown in black, overlaid on the reconstructed cylinder model in red.

### Per-tree and plot-level above ground biomass estimates

The estimated total AGB contained in the plot is: **234 tons** estimated from the TLS-derived volume, and **165 tons** estimated from the standard allometric equations. Of this, the contribution of the trees in the size class  $10\text{cm} \leq \text{dbh} < 20\text{cm}$  is 6.6 tons i.e.  $\sim 2.8\%$  of total from the TLS-derived volume, and 4.9 tons  $\sim 3.0\%$  of total, from the standard allometric equations.

The total plot-level AGB in 61 trees with  $\text{dbh} \geq 20\text{cm}$  is **146 tons** from TLS and **210 tons** from allometry. The per-tree values are compared in Figure 17, which illustrates that the allometry seems to underestimate AGB compared to the TLS values, by more than 30%.



**Figure 17** TLS-derived AGB v AGB derived from allometry. Error bars represent the uncertainty in the reconstruction process (TLS) and the model uncertainty (allometric). Circled points are the top four largest departures from the allometry in terms of the residuals.

The per-tree AGB values derived from the TLS measurements shown above are compared against AGB derived from the allometric equation of Chave et al. (2014) using the TLS-derived DBH and H values. Wood density (WD) values are taken from the plot-average census data provided by CMCC.

Uncertainty in TLS-derived AGB estimates is derived from a theoretical framework, realised through a Monte Carlo assessment of possible reconstruction modelling parameters. Metrics including coefficient of variation of model volume and model-to-cloud trunk conformity per parameter set are compared to theoretical values for the definition of optimisation. Modelling uncertainty is quantified from the reconstructed tree volume fluctuations that result from random multiple initialisations of the model in the optimised parameter set i.e. a sensitivity analysis of volume, based on multiple instances for different parameter sets.

Uncertainty in the allometric estimates of AGB derives from various sources, including a lack of large trees in destructive harvest samples (Clark and Kellner, 2012), which can lead to differences in predicted AGB of 7-30%, due to the disproportionate biomass of large trees in many tropical forests. This is compounded by the fact that large-diameter trees can take on a wider range of biomass values than smaller trees (*ibid.*). Uncertainty values here are derived from the uncertainty given by Chave et al. (2004). TLS-derived AGB values for all trees, plus uncertainty, are given in Table 1. This shows that the fractional uncertainty in the TLS-derived values ranges from 1-2% AGB in some cases, to nearly 30% for e.g. ghanaAS\_25.mat.



Table 1 Estimated AGB (and uncertainty) of trees with DBH > 20 cm.

Tree ID	AGB	uncertainty
ghanaASb_0	8.64	0.33
ghanaASb_100	0.86	0.04
ghanaASb_101	1.03	0.05
ghanaASb_102	0.61	0.03
ghanaASb_103	0.51	0.02
ghanaASb_104	1.21	0.06
ghanaASb_105	2.20	0.10
ghanaASb_106	0.39	0.01
ghanaASb_10	0.79	0.06
ghanaASb_11	2.32	0.02
ghanaASb_12	1.59	0.05
ghanaASb_13	0.90	0.01
ghanaASb_14	1.85	0.06
ghanaASb_15	1.28	0.02
ghanaASb_16	0.31	0.02
ghanaASb_17	0.44	0.01
ghanaASb_201	0.41	0.01
ghanaASb_203	9.59	0.24
ghanaASb_205	2.39	0.05
ghanaASb_206	1.70	0.08
ghanaASb_207	2.83	0.04
ghanaASb_208	1.77	0.02
ghanaASb_22	6.37	0.30
ghanaASb_23	0.74	0.02
ghanaASb_24	5.13	0.13
ghanaASb_25	0.37	0.00
ghanaASb_27	12.44	1.36
ghanaASb_28	11.05	0.31
ghanaASb_29	0.90	0.04

ghanaASb_2	0.59	0.01
ghanaASb_31	0.87	0.07
ghanaASb_32	5.73	0.16
ghanaASb_35	0.91	0.09
ghanaASb_36	11.98	0.56
ghanaASb_47	0.98	0.08
ghanaASb_48	7.73	0.07
ghanaASb_50	8.77	0.14
ghanaASb_52	0.46	0.01
ghanaASb_59	0.76	0.01
ghanaASb_61	2.06	0.07
ghanaASb_62	5.76	0.28
ghanaASb_64	6.86	0.21
ghanaASb_65	0.69	0.05
ghanaASb_83	1.96	0.04
ghanaASb_94	0.59	0.04
ghanaASb_96	0.95	0.07
ghanaAS_10	12.59	1.80
ghanaAS_11	17.00	1.29
ghanaAS_12	14.48	1.28
ghanaAS_1	4.45	0.48
ghanaAS_20	11.69	0.96
ghanaAS_22	10.98	0.64
ghanaAS_24	3.84	0.23
ghanaAS_25	11.67	0.67
ghanaAS_27	6.02	0.85
ghanaAS_2	8.18	0.51
ghanaAS_5	9.63	0.66
ghanaAS_7	39.06	0.45
ghanaAS_8	10.94	0.64

Figure 18 shows the four trees with the largest deviations (in terms of residuals) between TLS- and allometry-derived AGB estimates. These are the ones highlighted in red in Figure 17 above.



Figure 18 The four trees with the largest residuals between the TLS and allometry-derived AGB estimates. The original point clouds are shown in black, overlaid on the reconstructed cylinder model in red.

### Next steps, publication plans

The data and analysis presented here should prove useful for assessing the accuracy and uncertainty of ESA BIOMASS estimates of AGB (eg via cal/val) as they quantify the uncertainty in AGB estimates from H (and DBH)-derived allometry, which will be used for the ESA BIOMASS mission. These data will also be used by UCL and WU teams in ongoing assessment of tropical forest AGB, in particular the difference between TLS-derived and allometric estimates. Work from other tropical campaigns suggests that the consistent underestimate in AGB from allometry compared to TLS-derived values seen here, is also present in these other areas. This is likely to be significant for any EO-derived estimates of AGB, which will rely on H-based allometry at some level. The census data provided by CMCC will be vital for this work as it will allow per-tree analysis of the TLS data, allowing us to assess the impact of wood density on the TLS-derived and allometric estimates of AGB, as well as to explore relationships between species/genus and tree size and shape across the plot.

A further application of the TLS structure derived here would be to parameterise (or compare with) the structural information used to drive P-band RADAR radiative transfer models for ESA BIOMASS simulation. These structural models will provide direct estimate of the key structural inputs which, if they can be used/compared the RADAR RT models, should provide excellent assessment of model sensitivity to tree structure.

Additional use will be made of the data to compare with airborne laser scanner (ALS) and hyperspectral data collected by CMCC over the Ghana site. This will be of interest for direct comparison of tree height and vertical profile information derived from the ALS with the more accurate, but spatially limited estimates from the TLS. Another application of these data will be to estimate crown size and shape for identification of tree species from the ALS and hyperspectral data in combination with the census information.

All funding from ESA would be acknowledged in any publications using the data collected here.

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## Appendix 1

### ANKASA BOTANICAL SURVEY DATA, CMCC2016

Tag No.	Species	Family	DBH (cm)	Height (m)	Life form	Sub plot	Coordinates Lat (N)	Coordinates Long (W)	Slope (m)	Remarks
						1	5.26775	2.69472	106	No species recorded
						2	5.26784	2.69478	111	No species recorded
7	Heritiera utilis (Sprague) Sprague	Malvaceae (sterc.)	78.8	53.3	Tree	3	5.26793	2.69488	112	P.O.M 3.67m
6	Tapura ivorensis	Dichapetalaceae	20.7	13.5	Tree	4	5.26803	2.69496	117	
8	Cassipourea hiotou Aubrév. & Pellegr.	Rhizophoraceae	13	12.3	Tree	4	5.26803	2.69496	117	
9	Drypetes aylmeri Hutch. & Dalz.	Putranjivaceae	22.4	18.4	Tree	4	5.26803	2.69496	117	
10	Drypetes aylmeri Hutch. & Dalz.	Putranjivaceae	16.3	23.8	Tree	4	5.26803	2.69496	117	
11	Drypetes aylmeri Hutch. & Dalz.	Putranjivaceae	12.5	18	Tree	4	5.26803	2.69496	117	
12	Blighia welwitschii (Hiern) Radlk.	Sapindaceae	50.5	36.5	Tree	5	5.26809	2.69498	119	
13	Drypetes aylmeri Hutch. & Dalz.	Putranjivaceae	19.4	14.9	Tree	5	5.26809	2.69498	119	P.O.M 2.6m
14	Parkia bicolor A.Chev.	Leguminosae-mim.	57.5	31.3	Tree	5	5.26809	2.69498	119	P.O.M 2.3m
15	Cynometra ananta Hutch. & Dalz.	Leguminosae-caes.	48.2	39.1	Tree	5	5.26809	2.69498	119	
16	Cynometra ananta Hutch. & Dalz.	Leguminosae-caes.	13.8	15.9	Tree	5	5.26809	2.69498	119	
17	Tapura ivorensis	Dichapetalaceae	12.5	11.4	Tree	6	5.26814	2.69599	121	
18	Breteler	Dichapetalaceae	12.5	12.4	Tree	6	5.26814	2.69599	121	
19	Coula edulis Baill.	Olacaceae	11	14.8	Tree	6	5.26814	2.69599	121	
20	Tapura ivorensis	Dichapetalaceae	12.5	12.4	Tree	6	5.26814	2.69599	121	
21	Breteler	Dichapetalaceae	12.5	12.4	Tree	6	5.26814	2.69599	121	
22	Strephonema pseudocola A.Chev.	Combretaceae	39.5	27.4	Tree	6	5.26814	2.69599	121	
23	Cassipourea hiotou	Rhizophoraceae	18.3	16.7	Tree	7	5.26827	2.69506	123	
24	Aubrév. & Pellegr.	Rhizophoraceae	18.3	16.7	Tree	7	5.26827	2.69506	123	
25	Cynometra ananta Hutch. & Dalz.	Leguminosae-caes.	19.6	23.3	Tree	7	5.26827	2.69506	123	
26	Strephonema pseudocola A.Chev.	Combretaceae	25.3	20.6	Tree	7	5.26827	2.69506	123	
27	Memecylon lateriflorum (G. Don)	Melastomataceae	16.1	18.4	Tree	7	5.26827	2.69506	123	
28	Bremek.	Melastomataceae	16.1	18.4	Tree	7	5.26827	2.69506	123	
29	Memecylon lateriflorum (G. Don)	Melastomataceae	13.5	19.7	Tree	7	5.26827	2.69506	123	
30	Bremek.	Melastomataceae	13.5	19.7	Tree	7	5.26827	2.69506	123	
31	Berlinia tomentella	Leguminosae-caes.	11.7	18.3	Tree	8	5.26831	2.69508	124	
32	Keay	Leguminosae-caes.	11.7	18.3	Tree	8	5.26831	2.69508	124	
33	Scytopetalum tieghemii (A.Chev.) Hutch. & Dalz	Lecythidaceae (scytomet.)	14.1	16.4	Tree	8	5.26831	2.69508	124	
34	Scytopetalum tieghemii (A.Chev.) Hutch. & Dalz	Lecythidaceae (scytomet.)	14.1	16.4	Tree	8	5.26831	2.69508	124	
35	Diospyros heudelotii	Ebenaceae	28.2	22.3	Tree	8	5.26831	2.69508	124	
36	Hiern	Ebenaceae	22.9	21.5	Tree	8	5.26831	2.69508	124	
37	Dactyladenia hirsuta (A.Ch. ex De Wild.)	Ebenaceae	22.9	21.5	Tree	8	5.26831	2.69508	124	
38	G.T.Pr. & F.W	Chrysobalanaceae	12.3	17.8	Tree	9	5.26839	2.69512	125	
39	Heritiera utilis (Sprague) Sprague	Malvaceae (sterc.)	51.4	31.6	Tree	9	5.26839	2.69512	125	P.O.M 2.3m
40	Memecylon afzelii	Melastomataceae	16.1	16.1	Tree	9	5.26839	2.69512	125	
41	G. Don	Melastomataceae	16.1	16.1	Tree	9	5.26839	2.69512	125	
42	Memecylon lateriflorum (G. Don)	Melastomataceae	16.1	16.1	Tree	9	5.26839	2.69512	125	
43	Bremek.	Melastomataceae	12.5	15.6	Tree	9	5.26839	2.69512	125	

34	Sacoglottis gabonensis (Baill.) Urb.	Humiriaceae	67.3	42.8	Tree	9	5.26839	2.69512	125	
35	Drypetes aylmeri Hutch. & Dalz.	Putranjivaceae	13.5	17.1	Tree	10	5.26845	2.69517	128	P.O.M 3.55m
36	Chrysophyllum subnudum Bak.	Sapotaceae	14.5	24.3	Tree	10	5.26845	2.69517	128	
37	Strephonema pseudocola A.Chev.	Combretaceae	37.4	28.7	Tree	10	5.26845	2.69517	128	
38	Drypetes aylmeri Hutch. & Dalz.	Putranjivaceae	14.9	15.6	Tree	10	5.26845	2.69517	128	
39	Lovoa trichilioides Harms	Meliaceae	23.4	19.4	Tree	10	5.26845	2.69517	128	
40	Heritiera utilis (Sprague Berlinia tomentella Keay)	Malvaceae (sterc.) Leguminosae-caes.	78.3	16.5	Tree	10	5.26845	2.69517	128	P.O.M 3.8m
41	Cynometra ananta Hutch. & Dalz.	Leguminosae-caes.	15	46.2	Tree	10	5.26845	2.69517	128	
42	Diospyros sanza-minika A.Chev.	Leguminosae-caes.	17.1	23.9	Tree	11	5.26858	2.69511	121	
43	Diospyros sanza-minika A.Chev.	Ebenaceae	22.4	18.8	Tree	11	5.26858	2.69511	121	
44	Chrysophyllum subnudum Bak.	Ebenaceae	33.8	21.8	Tree	11	5.26858	2.69511	121	
45	Hymenostegia gracilipes Hutch. & Dalz	Sapotaceae Leguminosae-caes.	15.9	22.4	Tree	11	5.26858	2.69511	121	
46	Strephonema pseudocola A.Chev.	Leguminosae-caes.	21.7	28	Tree	11	5.26858	2.69511	121	
47	Salacia sp.	Combretaceae	24.4	28.7	Tree	11	5.26858	2.69511	121	
48	Drypetes aylmeri Hutch. & Dalz.	Celastraceae	10.2	0	Liana	11	5.26858	2.69511	121	
49	Anthonotha fragrans (Bak.f.) Excell & Hillc.	Putranjivaceae Leguminosae-caes.	11.2	12.9	Tree	11	5.26858	2.69511	121	
50	Cassipourea hiotou Aubrév. & Pellegr.	Leguminosae-caes.	15.1	19.2	Tree	11	5.26858	2.69511	121	
51	Pausinystalia lane-polei (Hutch.) Hutch. ex Lane-polee	Rhizophoraceae	14.2	8.9	Tree	11	5.26858	2.69511	121	
52	Hannoa klaineana (Pierre & Engl.) Dialium aubrevillei Pellegr.	Rubiaceae	11.1	8.1	Tree	12	5.26847	2.69508	120	
53	Hunteria umbellata (K.Schum.) Hallier f.	Simaroubaceae Leguminosae-caes.	11.7	17	Tree	12	5.26847	2.69508	120	
54	Memecylon lateriflorum (G.Don) Bremek.	Apocynaceae	24.5	26.3	Tree	12	5.26847	2.69508	120	
55	Quassia silvestris Cheek & Jongkind	Apocynaceae	14.4	18.9	Tree	13	5.26838	2.69505	118	
56	Calpocalyx brevibracteatus Harms	Melastomataceae	11.5	18.9	Tree	13	5.26838	2.69505	118	
57	Pausinystalia lane-polei (Hutch.) Hutch. ex Lane-polee	Simaroubaceae Leguminosae-mim.	13.9	12.8	Tree	13	5.26838	2.69505	118	
58	Lophira alata Banks ex Gaertn.	Rubiaceae	11.3	15.4	Tree	13	5.26838	2.69505	118	
59	Cynometra ananta Hutch. & Dalz.	Rubiaceae	38.4	22.6	Tree	13	5.26838	2.69505	118	
60	Scottellia klaineana Pierre	Ochnaceae Leguminosae-caes.	53.7	32.1	Tree	13	5.26838	2.69505	118	P.O.M 3.35m
61	Strombosia pustulata Oliv.	Achariaceae (flacourt.)	65.3	53.8	Tree	14	5.26829	2.69497	114	
62	Lophira alata Banks ex Gaertn.	Olacaceae	11.6	16.7	Tree	14	5.26829	2.69497	114	
63	Memecylon lateriflorum (G.Don) Bremek.	Ochnaceae	11.2	17.7	Tree	14	5.26829	2.69497	114	P.O.M 1.45m
64	Strephonema pseudocola A.Chev.	Melastomataceae	49.8	42.7	Tree	14	5.26829	2.69497	114	
65	Drypetes aylmeri Hutch.	Melastomataceae	14.4	19.3	Tree	15	5.26819	2.69493	113	
66	Strephonema pseudocola A.Chev.	Combretaceae	42.4	24.5	Tree	15	5.26819	2.69493	113	
67	Drypetes aylmeri Hutch.	Putranjivaceae	15.7	17.7	Tree	15	5.26819	2.69493	113	

	& Dalz.									
68	Cynometra ananta Hutch. & Dalz.	Leguminosae- caes.	10.9	18.4	Tree	15	5.26819	2.69493	113	
70	Memecylon lateriflorum (G.Don) Bremek.	Melastomataceae	17.9	17.9	Tree	15	5.26819	2.69493	113	
69	Maranthes chrysophylla (Oliv.) Prance	Chrysobalanaceae	10.5	18.1	Tree	16	5.26813	2.69486	115	
71	Memecylon lateriflorum (G.Don) Bremek.	Melastomataceae	18.1	19.8	Tree	16	5.26813	2.69486	115	
72	Heritiera utilis (Sprague) Sprague	Malvaceae (sterc.)	83.4	41.6	Tree	16	5.26813	2.69486	115	P.O.M 3.4m
73	Cynometra ananta Hutch. & Dalz.	Leguminosae- caes.	57.4	36.6	Tree	16	5.26813	2.69486	115	P.O.M 3.0m
74	Strephonema pseudocola A.Chev.	Combretaceae	16.9	19.5	Tree	16	5.26813	2.69486	115	
75	Strombosia pustulata Oliv.	Olacaceae	18.6	25.3	Tree	16	5.26813	2.69486	115	
76	Drypetes aylmeri Hutch. & Dalz.	Putranjivaceae	12.3	16.2	Tree	16	5.26813	2.69486	115	
77	Anthonotha fragrans (Bak.f.) Excell & Hillc.	Leguminosae- caes.	26.6	31.1	Tree	17	5.26809	2.69484	112	
78	Pleiocarpa mutica Benth.	Apocynaceae	15.4	18.5	Tree	17	5.26809	2.69484	112	
79	Strombosia pustulata Oliv.	Olacaceae	12.2	16.1	Tree	17	5.26809	2.69484	112	
80	Cynometra ananta Hutch. & Dalz.	Leguminosae- caes.	19	22.8	Tree	17	5.26809	2.69484	112	
81	Cassipourea hiotou Aubrév. & Pellegr.	Rhizophoraceae	11.2	17.7	Tree	17	5.26809	2.69484	112	
82	Drypetes aylmeri Hutch. & Dalz.	Putranjivaceae	11	18.9	Tree	17	5.26809	2.69484	112	
83	Pentadesma butyracea Sabine	Guttiferae	18.3	20.7	Tree	17	5.26809	2.69484	112	
84	Hannoa klaineana (Pierre & Engl.)	Simaroubaceae	15.8	17.2	Tree	17	5.26809	2.69484	112	
85	Cassipourea hiotou Aubrév. & Pellegr.	Rhizophoraceae	12.4	15.7	Tree	17	5.26809	2.69484	112	
86	Cynometra ananta Hutch. & Dalz.	Leguminosae- caes.	64.6	38.8	Tree	17	5.26809	2.69484	112	P.O.M 1.38m
87	Cola nitida (Vent.) Schott. & Endl.	Malvaceae (sterc.)	14.2	12.8	Tree	17	5.26809	2.69484	112	
88	Drypetes aylmeri Hutch. & Dalz.	Putranjivaceae	10.9	17.9	Tree	18	5.26795	2.69484	111	
89	Strephonema pseudocola A.Chev.	Combretaceae	14.4	18.8	Tree	18	5.26795	2.69484	111	
90	Strombosia pustulata Oliv.	Olacaceae	20.8	25.3	Tree	18	5.26795	2.69484	111	
91	Chrysophyllum subnudum Bak.	Sapotaceae	24.5	18.9	Tree	18	5.26795	2.69484	111	
92	Drypetes aylmeri Hutch. & Dalz.	Putranjivaceae	16.2	18.7	Tree	18	5.26795	2.69484	111	
93	Heritiera utilis (Sprague) Sprague	Malvaceae (sterc.)		13.6	Tree	18	5.26795	2.69484	111	
94	Drypetes aylmeri Hutch. & Dalz.	Putranjivaceae	12.6	11.8	Tree	19	5.26786	2.69479	110	
95	Cynometra ananta Hutch. & Dalz.	Leguminosae- caes.	64	35.9	Tree	19	5.26786	2.69479	110	
96	Memecylon lateriflorum (G.Don) Bremek.	Melastomataceae	17.5	14.3	Tree	19	5.26786	2.69479	110	
97	Carapa procera DC Strephonema	Meliaceae	13.8	22	Tree	19	5.26786	2.69479	110	P.O.M 1.6m
98	pseudocola A.Chev. Memecylon	Combretaceae	32.9	35.1	Tree	19	5.26786	2.69479	110	
99	lateriflorum (G.Don) Bremek.	Melastomataceae	20.2	17.8	Tree	19	5.26786	2.69479	110	
100	Coula edulis Baill.	Olacaceae	14.9	15.8	Tree	20	5.26775	2.69466	110	

101	Drypetes aylmeri Hutch. & Dalz.	Putranjivaceae	10.9	14.4	Tree	20	5.26775	2.69466	110	
102	Drypetes aylmeri Hutch. & Dalz.	Putranjivaceae	19.3	21	Tree	20	5.26775	2.69466	110	
103	Heritiera utilis (Sprague) Sprague	Malvaceae (sterc.)	21.4	16.1	Tree	20	5.26775	2.69466	110	
104	Tapura ivorensis Breteler	Dichapetalaceae	14.6	6.1	Tree	21	5.26776	2.69462	118	
105	Scottellia klaineana Pierre	Achariaceae (flacourt.)	11.1	10.1	Tree	21	5.26776	2.69462	118	
106	Beilschmiedia mannii (Meisn) Benth & Hook.f.	Lauraceae	15.4	12.3	Tree	21	5.26776	2.69462	118	
107	Strombosia pustulata Oliv.	Olacaceae	19	16.1	Tree	21	5.26776	2.69462	118	
108	Macaranga barteri Mull.Arg	Euphorbiaceae	12.8	15.4	Tree	21	5.26776	2.69462	118	
109	Heritiera utilis (Sprague) Sprague	Malvaceae (sterc.)	45.6	28.4	Tree	22	5.26794	2.69469	117	P.O.M 1.5m
110	Strombosia pustulata Oliv.	Olacaceae	13.3	17.7	Tree	22	5.26794	2.69469	117	
111	Klainedoxa gabonensis Pierre ex Engl.	Irvingiaceae	35.4	24.8	Tree	22	5.26794	2.69469	117	
112	Pentadesma butyracea Sabine	Guttiferae	41.9	27.4	Tree	22	5.26794	2.69469	117	
113	Drypetes aylmeri Hutch. & Dalz.	Putranjivaceae	12.8	15.8	Tree	22	5.26794	2.69469	117	
114	Drypetes aylmeri Hutch. & Dalz.	Putranjivaceae	13.6	13	Tree	22	5.26794	2.69469	117	
115	Drypetes aylmeri Hutch. & Dalz.	Putranjivaceae	17.6	13	Tree	23	5.26804	2.69473	118	
116	Coula edulis Baill.	Olacaceae	15.4	17.7	Tree	23	5.26804	2.69473	118	
117	Dacryodes klaineana (Pierre) H.J.Lam	Burseraceae	10.8	14.5	Tree	23	5.26804	2.69473	118	
118	Dialium aubrevillei Pellegr.	Leguminosae-caes.	25.8	28.5	Tree	23	5.26804	2.69473	118	
119	Strombosia pustulata Oliv.	Olacaceae	11	14.7	Tree	23	5.26804	2.69473	118	
120	Aptandra zenkeri Engl.	Olacaceae	17.9	18.9	Tree	24	5.26808	2.69474	119	
121	Hunteria umbellata (K.Schum.) Hallier f.	Apocynaceae	14.9	9.8	Tree	24	5.26808	2.69474	119	
122	Parkia bicolor A.Chev.	Leguminosae-mim.	27.7	20.7	Tree	25	5.26819	2.69481	120	P.O.M 1.4m
123	Homalium dewevrei De Wild. & Th.Dur.	Salicaceae (flacourt.)	14.9	17.7	Tree	25	5.26819	2.69481	120	
124	Cassipourea afzelii (Oliv.) Alston	Rhizophoraceae	12.9	11.8	Tree	25	5.26819	2.69481	120	
125	Dacryodes klaineana (Pierre) H.J.Lam	Burseraceae	11.8	14.9	Tree	25	5.26819	2.69481	120	
126	Hunteria umbellata (K.Schum.) Hallier f.	Apocynaceae	11	8.3	Tree	25	5.26819	2.69481	120	
127	Cynometra ananta Hutch. & Dalz.	Leguminosae-caes.	43.9	38.5	Tree	26	5.26828	2.69483	118	P.O.M 1.4m
128	Dactyladenia dinklagei (Engl.) G.T.Prance & F.White	Chrysobalanaceae	29.5	29.4	Tree	26	5.26828	2.69483	118	
129	Drypetes aylmeri Hutch. & Dalz.	Putranjivaceae	10	12.5	Tree	26	5.26828	2.69483	118	
130	Strephonema pseudocola A.Chev.	Combretaceae	24.1	23.1	Tree	26	5.26828	2.69483	118	
131	Cynometra ananta Hutch. & Dalz.	Leguminosae-caes.	68.8	36	Tree	26	5.26828	2.69483	118	P.O.M 3.65m
132	Drypetes principum	Putranjivaceae	11	7.5	Tree	27	5.26835	2.69492	121	
133	Manilkara obovata (Sabine & G.Don) J.H.Hemsley	Sapotaceae	15	20.9	Tree	27	5.26835	2.69492	121	
134	Berlinia confusa Hoyle	Leguminosae-caes.	11.4	15.5	Tree	27	5.26835	2.69492	121	
135	Pentadesma butyracea Sabine	Guttiferae	20.1	29.7	Tree	27	5.26835	2.69492	121	



136	Maesobotrya barteri (Baill.) Hutch.	Euphorbiaceae	10	10.8	Tree	27	5.26835	2.69492	121	
137	Hunteria umbellata (K.Schum.) Hallier f.	Apocynaceae	11.2	13.4	Tree	27	5.26835	2.69492	121	
138	Cynometra ananta Hutch. & Dalz.	Leguminosae- caes.	53.4	38.9	Tree	27	5.26835	2.69492	121	P.O.M 3.35m
139	Hunteria umbellata (K.Schum.) Hallier f.	Apocynaceae	11.6	8.7	Tree	27	5.26835	2.69492	121	
140	Scottellia klaineana Pierre	Achariaceae (flacourt.)	12.9	15.3	Tree	27	5.26835	2.69492	121	
141	Strephonema pseudocola A.Chev.	Combretaceae	19.6	24.7	Tree	27	5.26835	2.69492	121	
142	Cassipourea afzelii (Oliv.) Alston	Rhizophoraceae	14	18.1	Tree	27	5.26835	2.69492	121	
143	Maranthes glabra (Oliv.) Prance	Chrysobalanaceae	26.9	29.6	Tree	28	5.26841	2.69496	120	
144	Memecylon lateriflorum (G.Don) Bremek.	Melastomataceae	10.5	12.5	Tree	28	5.26841	2.69496	120	
145	Cassipourea hiotou Aubrév. & Pellegr.	Rhizophoraceae	11.8	15	Tree	28	5.26841	2.69496	120	
146	Strombosia pustulata Oliv.	Olacaceae	13.5	17.8	Tree	29	5.26847	2.69502	119	
147	Pleiocarpa mutica Benth.	Apocynaceae	10	7.5	Tree	29	5.26847	2.69502	119	
148	Cynometra ananta Hutch. & Dalz.	Leguminosae- caes.	10.3	13.2	Tree	29	5.26847	2.69502	119	
149	Cassipourea hiotou Aubrév. & Pellegr.	Rhizophoraceae	15	8.7	Tree	29	5.26847	2.69502	119	
150	Tapura ivorensis Breteler	Dichapetalaceae	10.5	6.9	Tree	30	5.26856	2.69507	112	
151	Heritiera utilis (Sprague) Sprague	Malvaceae (sterc.)	92.6	39.5	Tree	30	5.26856	2.69507	112	P.O.M 3.93m
152	Leptaulus daphnoides Benth.	Icacinaceae	15	20.3	Tree	31	5.26858	2.69497	114	
153	Heritiera utilis (Sprague) Sprague	Malvaceae (sterc.)	15.4	22.7	Tree	31	5.26858	2.69497	114	
154	Greenwayodendron oliveri (Engl.) Verdc.	Annonaceae	25.6	25.1	Tree	31	5.26858	2.69497	114	
155	Memecylon lateriflorum (G.Don) Bremek.	Melastomataceae	10.6	13.3	Tree	31	5.26858	2.69497	114	
156	Cynometra ananta Hutch. & Dalz.	Leguminosae- caes.	21.5	27.9	Tree	31	5.26858	2.69497	114	
157	Chrysophyllum pruniforme Pierre ex Engl.	Sapotaceae	27.9	29.5	Tree	31	5.26858	2.69497	114	
158	Drypetes aylmeri Hutch. & Dalz.	Putranjivaceae	22.9	14.7	Tree	31	5.26858	2.69497	114	
159	Strombosia pustulata Oliv.	Olacaceae	15.2	7.5	Tree	32	5.26851	2.69491	116	
160	Mammea africana Sabine	Guttiferae	11.1	11.6	Tree	32	5.26851	2.69491	116	
161	Drypetes aylmeri Hutch. & Dalz.	Putranjivaceae	10	12.2	Tree	32	5.26851	2.69491	116	
162	Tabernaemontana africana A.DC.	Apocynaceae	13.5	11.8	Tree	32	5.26851	2.69491	116	
163	Strombosia pustulata Oliv.	Olacaceae	10.3	8.5	Tree	32	5.26851	2.69491	116	
164	Memecylon afzelii G.Don	Melastomataceae	24.2	25.1	Tree	33	5.26847	2.69489	116	
165	Drypetes aylmeri Hutch. & Dalz.	Putranjivaceae	20.1	19.9	Tree	33	5.26847	2.69489	116	
166	Cassipourea hiotou Aubrév. & Pellegr.	Rhizophoraceae	16.2	16.2	Tree	33	5.26847	2.69489	116	
167	Cynometra ananta Hutch. & Dalz.	Leguminosae- caes.	13.9	14.2	Tree	33	5.26847	2.69489	116	
168	Cynometra ananta Hutch. & Dalz.	Leguminosae- caes.	56.8	48.6	Tree	34	5.26841	2.69483	114	P.O.M 2.9m
169	Chrysophyllum subnudum Bak.	Sapotaceae	16.4	21	Tree	34	5.26841	2.69483	114	

170	Maesobotrya barteri (Baill.) Hutch.	Euphorbiaceae	10.2	11.2	Tree	34	5.26841	2.69483	114	
171	Strombosia pustulata Oliv.	Olacaceae	22.9	27	Tree	34	5.26841	2.69483	114	
172	Beilschmiedia mannii (Meisn) Benth & Hook.f.	Lauraceae	19.4	25.5	Tree	34	5.26841	2.69483	114	
173	Strephonema pseudocola A.Chev.	Combretaceae	17.8	20.8	Tree	34	5.26841	2.69483	114	
174	Cynometra ananta Hutch. & Dalz.	Leguminosae- caes.	44.8	38.7	Tree	35	5.26829	2.69476	112	P.O.M 1.8m
175	Strephonema pseudocola A.Chev.	Combretaceae	30.4	29.9	Tree	35	5.26829	2.69476	112	
176	Leptaulus daphnoides Benth.	Icacinaceae	24.9	17.4	Tree	35	5.26829	2.69476	112	
177	Greenwayodendron oliveri (Engl.) Verdc.	Annonaceae	11.7	12.2	Tree	35	5.26829	2.69476	112	
178	Cola nitida (Vent.) Schott. & Endl.	Malvaceae (sterc.)	22.2	17	Tree	36	5.26822	2.69474	113	
179	Strephonema pseudocola A.Chev.	Combretaceae	20.5	19.9	Tree	36	5.26822	2.69474	113	
180	Amphimas pterochloides Harms	Leguminosae-pap.	11.4	13.7	Tree	36	5.26822	2.69474	113	
181	Strephonema pseudocola A.Chev.	Combretaceae	18.1	15.4	Tree	36	5.26822	2.69474	113	
182	Cassipourea afzelii (Oliv.) Alston	Rhizophoraceae	12.9	21.1	Tree	36	5.26822	2.69474	113	
183	Dacryodes klaineana (Pierre) H.J.Lam	Burseraceae	10.4	15.5	Tree	37	5.26817	2.6947	110	
184	Dacryodes klaineana (Pierre) H.J.Lam	Burseraceae	16.2	15.9	Tree	37	5.26817	2.6947	110	
185	Manilkara obovata (Sabine & G.Don) J.H.Hemsley	Sapotaceae	12.4	17.7	Tree	37	5.26817	2.6947	110	
186	Dacryodes klaineana (Pierre) H.J.Lam	Burseraceae	13.4	17.7	Tree	37	5.26817	2.6947	110	
187	Lovoa trichilioides Harms	Meliaceae	11.9	19.7	Tree	38	5.26801	2.69462	112	
188	Vitex micrantha Gurke	Verbenaceae	11.3	10.2	Tree	38	5.26801	2.69462	112	
189	Combretum sp.	Combretaceae	13.8	0	Lian a	38	5.26801	2.69462	112	
190	Diospyros sanza-minika A.Chev.	Ebenaceae	28	21.2	Tree	38	5.26801	2.69462	112	
191	Cynometra ananta Hutch. & Dalz.	Leguminosae- caes.	42.4	25	Tree	38	5.26801	2.69462	112	P.O.M 2.55m
192	Drypetes aylmeri Hutch. & Dalz.	Putranjivaceae	12.7	12.2	Tree	38	5.26801	2.69462	112	
193	Drypetes aylmeri Hutch. & Dalz.	Putranjivaceae	14.3	14.7	Tree	38	5.26801	2.69462	112	
194	Scottellia klaineana Pierre	Achariaceae (flacourt.)	11.9	17.2	Tree	38	5.26801	2.69462	112	
195	Leptaulus daphnoides Benth.	Icacinaceae	14.4	14.2	Tree	38	5.26801	2.69462	112	
196	Drypetes aylmeri Hutch. & Dalz.	Putranjivaceae	13.9	16.6	Tree	39	5.26793	2.69456	114	
197	Chrysophyllum subnudum Bak.	Sapotaceae	37.5	23.7	Tree	39	5.26793	2.69456	114	
198	Guarea thompsonii Sprague & Hutch.	Meliaceae	11	16.6	Tree	39	5.26793	2.69456	114	
199	Berlinia tomentella Keay	Leguminosae- caes.	22.9	19.6	Tree	39	5.26793	2.69456	114	
200	Harungana madagascariensis Lam. ex Poir	Guttiferae	12.9	15.2	Tree	40	5.26792	2.69456	116	
201	Cassipourea hiotou Aubrév. & Pellegr.	Rhizophoraceae	18.3	14.2	Tree	40	5.26792	2.69456	116	
202	Musanga cecropioides F.Br	Cecropiaceae	13.4	12.5	Tree	40	5.26792	2.69456	116	
203	Tapura ivorensis Breteler	Dichapetalaceae	10.5	9.1	Tree	40	5.26792	2.69456	116	
204	Musanga cecropioides F.Br	Cecropiaceae	14.5	12	Tree	40	5.26792	2.69456	116	

205	Pentadesma butyracea Sabine	Guttiferae	24.7	15.2	Tree	40	5.26792	2.69456	116	
206	Musanga cecropioides F.Br	Cecropiaceae	15.7	14.2	Tree	41	5.26801	2.69455	113	
207	Tetrorchidium didymostemon (Baill.) Pax & K.Hoffm	Euphorbiaceae	13.7	15.7	Tree	41	5.26801	2.69455	113	
208	Musanga cecropioides F.Br	Cecropiaceae	15.2	12.9	Tree	41	5.26801	2.69455	113	
209	Trichoscypha arborea (A.Chev.) A.Chev.	Anacardiaceae	28.9	13.5	Tree	41	5.26801	2.69455	113	
210	Trichoscypha baldwinii Keay	Anacardiaceae	15.7	15.1	Tree	41	5.26801	2.69455	113	
211	Parkia bicolor A.Chev. Manilkara obovata (Sabine & G.Don)	Leguminosae- mim.	57.2	31.3	Tree	42	5.26807	2.6945	120	P.O.M 2.9m
212	J.H.Hemsley Cynometra ananta	Sapotaceae Leguminosae- caes.	15.1	16.9	Tree	42	5.26807	2.69451	120	P.O.M
213	Hutch. & Dalz. Drypetes aylmeri Hutch. & Dalz.	Putranjivaceae	50.7	32.8	Tree	42	5.26807	2.69451	120	3.0m
214	Homalium dewevrei De Wild. & Th.Dur.	Salicaceae (flacourt.)	12.3	14.6	Tree	42	5.26807	2.69451	120	
215	Memecylon lateriflorum (G.Don) Bremek.	Melastomataceae	24.2	21.9	Tree	42	5.26807	2.69451	120	
216	Hymenostegia gracilipes Hutch. & Dalziel	Leguminosae- Caes.	15	19.4	Tree	42	5.26807	2.69451	120	
217	Strephonema pseudocola A.Chev.	Combretaceae	20.3	14.7	Tree	42	5.26807	2.69451	120	
218	Diospyros sanza-minika A.Chev.	Ebenaceae	29.2	19.6	Tree	42	5.26807	2.69451	120	
219	Maesobotrya barteri (Baill.) Hutch.	Euphorbiaceae	23.1	18.2	Tree	43	5.26815	2.69458	122	
220	Uapaca corbisieri De Wild.	Euphorbiaceae	10.2	9.8	Tree	43	5.26815	2.69458	122	P.O.M 4.4m
221	Manilkara obovata (Sabine & G.Don) J.H.Hemsley	Sapotaceae	82.4	37.1	Tree	43	5.26815	2.69458	122	
222	Dacryodes klaineana (Pierre) H.J.Lam	Burseraceae	14	19	Tree	44	5.26822	2.69462	124	
223	Cynometra ananta Hutch. & Dalz.	Leguminosae- caes.	16.4	21.8	Tree	44	5.26822	2.69462	124	
224	Tapura ivorensis Breteler	Dichapetalaceae	15.7	24.6	Tree	44	5.26822	2.69462	124	
225	Strombosia pustulata Oliv.	Olacaceae	10.5	6.8	Tree	44	5.26822	2.69462	124	
226	Drypetes aylmeri Hutch. & Dalz.	Putranjivaceae	20.9	24.4	Tree	44	5.26822	2.69462	124	
227	Drypetes aylmeri Hutch. & Dalz.	Putranjivaceae	16.6	22.9	Tree	44	5.26822	2.69462	124	
228	Pycnanthus angolensis (Welw.) Warb.	Myristicaceae	22.6	23.9	Tree	44	5.26822	2.69462	124	
229	Spathandra blakeoides (G.Don) Jac.-Fel.	Melastomataceae	25.8	32	Tree	45	5.26828	2.69465	124	
230	Strombosia pustulata Oliv.	Olacaceae	14	21.3	Tree	45	5.26828	2.69465	124	
231	Cynometra ananta Hutch. & Dalz.	Leguminosae- caes.	17.8	24.8	Tree	45	5.26828	2.69465	124	P.O.M 4.45m
232	Antiaris toxicaria (Rumph. ex Pers.) Leschen.	Moraceae	107	55.5	Tree	45	5.26828	2.69465	124	
233	Bussea occidentalis Hutch.	Leguminosae- caes.	31.1	33.2	Tree	45	5.26828	2.69465	124	
234	Strephonema pseudocola A.Chev.	Combretaceae	23.7	17.8	Tree	46	5.26837	2.69472	120	
235	Dacryodes klaineana (Pierre) H.J.Lam	Burseraceae	17.2	23.1	Tree	46	5.26837	2.69472	120	
236	Drypetes aylmeri Hutch.	Putranjivaceae	26.8	28.1	Tree	46	5.26837	2.69472	120	
237			12	15.9	Tree	46	5.26837	2.69472	120	



272	Pterygota bequaertii De Wild.	Malvaceae (sterc.)	46.8	37.4	Tree	55	5.26842	2.69461	116	
273	Scottellia klaineana Pierre	Achariaceae (flacourt.)	11.8	14.5	Tree	55	5.26842	2.69461	116	
274	Calpocalyx brevibracteatus Harms	Leguminosae-Mim.	42.5	36.4	Tree	56	5.26835	2.69459	114	
275	Drypetes aylmeri Hutch. & Dalz.	Putranjivaceae	37.6	35.4	Tree	56	5.26835	2.69459	114	P.O.M
276	Scottellia klaineana Pierre	Achariaceae (flacourt.)	17.9	17.7	Tree	56	5.26835	2.69459	114	2.15m
277	Memecylon lateriflorum (G. Don) Bremek.	Melastomataceae	10.9	17.9	Tree	57	5.26823	2.69451	116	
278	Manilkara obovata (Sabine & G. Don) J.H. Hemsley	Sapotaceae	20.7	24.8	Tree	57	5.26823	2.69451	116	
279	Cassipourea afzelii (Oliv.) Alston	Rhizophoraceae	10.3	14.8	Tree	57	5.26823	2.69451	116	
280	Trichoscypha arborea (A. Chev.) A. Chev.	Anacardiaceae	26.9	33.4	Tree	57	5.26823	2.69451	116	
281	Homalium dewevrei De Wild. & Th. Dur.	Salicaceae (flacourt.)	10.1	17.5	Tree	58	5.26815	2.69446	115	
282	Strephonema pseudocola A. Chev.	Combretaceae	27.5	23.9	Tree	58	5.26815	2.69446	115	
283	Drypetes aylmeri Hutch. & Dalz.	Putranjivaceae	13.7	17.9	Tree	58	5.26815	2.69446	115	
284	Cassipourea hiotou Aubrév. & Pellegr.	Rhizophoraceae	17.4	14.4	Tree	59	5.26809	2.69443	114	
285	Drypetes aylmeri Hutch. & Dalz.	Putranjivaceae	17.1	21.1	Tree	59	5.26809	2.69443	114	
286	Memecylon lateriflorum (G. Don) Bremek.	Melastomataceae	14.7	22.1	Tree	59	5.26809	2.69443	114	
287	Trichoscypha baldwinii A Keay	Anacardiaceae	10.8	13.5	Tree	59	5.26809	2.69443	114	
287	Trichoscypha baldwinii B Keay	Anacardiaceae	11.3	13.5	Tree	59	5.26809	2.69443	114	
288	Uapaca corbisieri De Wild.	Euphorbiaceae	23.7	20.8	Tree	60	5.26803	2.69441	117	P.O.M 2.7m
289	Hannoa klaineana (Pierre & Engl.) Strombosia pustulata Oliv.	Simaroubaceae	15.9	17.5	Tree	61	5.26807	2.69435	117	
290	Homalium dewevrei De Wild. & Th. Dur.	Olacaceae	13.1	13.8	Tree	61	5.26807	2.69435	117	
291	Cassipourea hiotou Aubrév. & Pellegr.	Salicaceae (flacourt.)	10.6	15.7	Tree	61	5.26807	2.69435	117	
292	Rhizophora utilis (Sprague) Sprague	Rhizophoraceae	14.7	17.4	Tree	62	5.26819	2.69437	118	
293	Bombax brevisuspe Roberty	Malvaceae (sterc.)	63.6	35.1	Tree	62	5.26819	2.69437	118	
294	Strombosia pustulata Oliv.	Malvaceae (Bombacaceae)	21.2	13.9	Tree	62	5.26819	2.69437	118	
295	Drypetes aylmeri Hutch. & Dalz.	Olacaceae	10.8	14.6	Tree	62	5.26819	2.69437	118	
296	Pausinystalia lane-poolei (Hutch.) Hutch. ex Lane-poole	Putranjivaceae	14.7	13.8	Tree	62	5.26819	2.69437	118	
297	Cynometra ananta Hutch. & Dalz.	Rubiaceae	13	21.8	Tree	63	5.26822	2.69441	119	
298	Microdesmis puberula Leonard	Leguminosae-caes.	69	46.7	Tree	63	5.26822	2.69441	119	P.O.M 4.0m
299	Pausinystalia lane-poolei (Hutch.) Hutch. ex Lane-poole	Pandaceae	14.7	14.3	Tree	63	5.26822	2.69441	119	
300	Dacryodes klaineana (Pierre) H.J. Lam	Rubiaceae	15.6	16.5	Tree	63	5.26822	2.69441	119	
301	Hannoa klaineana (Pierre & Engl.)	Burseraceae	14.8	22.8	Tree	63	5.26822	2.69441	119	
302	Drypetes aylmeri Hutch. & Dalz.	Simaroubaceae	15.1	21.7	Tree	64	5.26833	2.69446	119	
303		Putranjivaceae	13.8	20.6	Tree	64	5.26833	2.69446	119	

304	<i>Anthonotha fragrans</i> (Bak.f.) Excell & Hillc.	Leguminosae- caes.	16.3	17.2	Tree	64	5.26833	2.69446	119	
305	<i>Xylopia</i> sp. <i>Pausinystalia lane- poollei</i> (Hutch.) Hutch. ex Lane-poolle	Annonaceae	31.3	29.8	Tree	64	5.26833	2.69446	119	P.O.M 3.6m
306	<i>Scottellia klaineana</i> Pierre	Rubiaceae Achariaceae (flacourt.)	11.6	16	Tree	64	5.26833	2.69446	119	
307	<i>Chrysophyllum</i> subnudum Bak.	Sapotaceae	53.3	47.2	Tree	64	5.26833	2.69446	119	P.O.M 2.6m
308	<i>Chrysophyllum</i> subnudum Bak.	Sapotaceae	29.9	45.7	Tree	65	5.26839	2.69449	123	P.O.M 2.2m
309	<i>Strombosia pustulata</i> Oliv.	Olacaceae	10	13.8	Tree	65	5.26839	2.69449	123	
310	<i>Cynometra ananta</i> Hutch. & Dalz.	Leguminosae- caes.	62.9	42.8	Tree	66	5.26849	2.69455	121	P.O.M 2.7m
311	<i>Trichoscypha arborea</i> (A.Chev.) A.Chev.	Anacardiaceae	10.1	7.5	Tree	66	5.26849	2.69455	121	
312	<i>Scottellia klaineana</i> Pierre	Achariaceae (flacourt.)	24.2	21.1	Tree	66	5.26849	2.69455	121	
313	<i>Hannoa klaineana</i> (Pierre & Engl.)	Simaroubaceae	27	23.2	Tree	66	5.26849	2.69455	121	
314	<i>Drypetes aylmeri</i> Hutch. & Dalz.	Putranjivaceae	13.5	17.5	Tree	67	5.26857	2.69461	118	
315	<i>Calpocalyx</i> brevibracteatus Harms	Leguminosae- Mim. (Leguminosae- Mim.)	37	29.8	Tree	67	5.26857	2.69461	118	P.O.M 1.93m
316	<i>Parkia bicolor</i> A.Chev.	Leguminosae-pap.	49.6	29.9	Tree	67	5.26857	2.69461	118	
317	<i>Baphia nitida</i> Lodd. <i>Garcinia gnetoides</i> Hutch. & Dalz.	Guttiferae	13.6	17.3	Tree	67	5.26857	2.69461	118	
318	<i>Strombosia pustulata</i> Oliv.	Olacaceae	26.1	29.8	Tree	68	5.26867	2.69467	115	
319	<i>Strombosia pustulata</i> Oliv.	Olacaceae	15.1	20.2	Tree	68	5.26867	2.69467	115	
320	<i>Diospyros sanza-minika</i> A.Chev.	Ebenaceae	18.4	26.3	Tree	68	5.26867	2.69467	115	
321	<i>Strombosia pustulata</i> Oliv.	Olacaceae	14.4	12.1	Tree	68	5.26867	2.69467	115	
322	<i>Pleiocarpa mutica</i> Benth.	Apocynaceae	11	14.2	Tree	68	5.26867	2.69467	115	
323	<i>Strombosia pustulata</i> Oliv.	Olacaceae	13.3	18.1	Tree	69	5.26875	2.69472	115	
324	<i>Garcinia smeathmannii</i> (Planch. & Triana) Oliv.	Guttiferae	12.3	15.4	Tree	69	5.26875	2.69472	115	
325	<i>Cola chlamydantha</i> K.Schum.	Malvaceae (Sterc.)	10.8	11.2	Tree	69	5.26875	2.69472	115	
326	<i>Cynometra ananta</i> Hutch. & Dalz.	Leguminosae- caes. Leguminosae- caes.	17.4	23.7	Tree	69	5.26875	2.69472	115	
327	<i>Berlinia confusa</i> Hoyle <i>Eriocoelum pungens</i> Radlk. ex Engl.	Sapindaceae	10.7	12.9	Tree	70	5.26873	2.69475	113	
328	<i>Coula edulis</i> Baill. <i>Cynometra ananta</i> Hutch. & Dalz.	Olacaceae Leguminosae- caes.	10.5	14	Tree	70	5.26873	2.69475	113	P.O.M 1.81m
329	<i>Tapura ivorensis</i> Breteler	Dichapetalaceae	16.1	8.7	Tree	70	5.26873	2.69475	113	
330	<i>Strombosia pustulata</i> Oliv.	Olacaceae	11.8	17.5	Tree	70	5.26873	2.69475	113	
331	<i>Trichoscypha arborea</i> (A.Chev.) A.Chev.	Anacardiaceae	25.9	25.9	Tree	70	5.26873	2.69475	113	

## AGB per tree in subplots

Subplot	Species	Family	DBH (cm)	Height (m)	Wood density (g/cm <sup>3</sup> )	F	$\pi D^2/4$	AGB (kg)
3	Heritiera utilis (Sprague) Sprague	Malvaceae (sterc.)	78.8	53.3	0.558	0.06	4878.845	8706.222
4	Tapura ivorensis Breteler	Dichapetalaceae	20.7	13.5		0.06	714	116
4	Cassipourea hiotou Aubrév. & Pellegr.	Rhizophoraceae	13	12.3	0.624	0.06	336.6707	0
4	Drypetes aylmeri Hutch. & Dalz.	Putranjivaceae	22.4	18.4	0.688	0.06	143	61.14941
4	Drypetes aylmeri Hutch. & Dalz.	Putranjivaceae	16.3	23.8	0.688	0.06	143	486
4	Drypetes aylmeri Hutch. & Dalz.	Putranjivaceae	12.5	18	0.688	0.06	299.4457	299.4457
5	Blighia welwitschii (Hiem) Radlk.	Sapindaceae	50.5	36.5	0.786	0.06	394.24	805
5	Drypetes aylmeri Hutch. & Dalz.	Putranjivaceae	19.4	14.9	0.688	0.06	208.7564	205.0956
5	Parkia bicolor A.Chev.	Leguminosae-mim.	57.5	31.3	0.448	0.06	286	758
5	Cynometra ananta Hutch. & Dalz.	Leguminosae-caes.	48.2	39.1	0.83	0.06	122.7678	91.22142
5	Cynometra ananta Hutch. & Dalz.	Leguminosae-caes.	13.8	15.9	0.83	0.06	571	857
6	Tapura ivorensis Breteler	Dichapetalaceae	12.5	11.4	0.895	0.06	2003.767	3449.165
6	Coula edulis Baill.	Olacaceae	11	14.8	0.895	0.06	857	763
6	Tapura ivorensis Breteler	Dichapetalaceae	12.5	12.4		0.06	295.7114	181.8838
6	Strephonema pseudocola A.Chev.	Combretaceae	39.5	27.4	0.633	0.06	286	198
7	Cassipourea hiotou Aubrév. & Pellegr.	Rhizophoraceae	18.3	16.7	0.624	0.06	2597.767	2185.616
7	Cynometra ananta Hutch. & Dalz.	Leguminosae-caes.	19.6	23.3	0.83	0.06	857	4
7	Strephonema pseudocola A.Chev.	Combretaceae	25.3	20.6	0.633	0.06	1825.402	3554.387
7	Bremek.	Melastomataceae	16.1	18.4	0.813	0.06	857	935
7	Bremek.	Melastomataceae	13.5	19.7	0.813	0.06	149.6314	118.4811
8	Berlinia tomentella Keay	Leguminosae-caes.	11.7	18.3	0.617	0.06	122.7678	75.15602
8	Scytopetalum tieghemii (A.Chev.) Hutch. & Dalz.	Lecythidaceae	14.1	16.4	0.625	0.06	571	679
8	Scytopetalum tieghemii (A.Chev.) Hutch. & Dalz.	Lecythidaceae (scytomet.)	28.2	22.3	0.625	0.06	95.07142	75.55896
8	Diospyros heudelotii Hiern	Ebenaceae	22.9	21.5	0.801	0.06	857	857
9	Dactyladenia hirsuta (A.Ch. ex De Wild.) G.T.Pr. & F.W	Chrysobalanaceae	12.3	17.8		0.06	122.7678	75.15602
9	Heritiera utilis (Sprague) Sprague	Malvaceae (sterc.)	51.4	31.6	0.558	0.06	571	679
9	Memecylon afzelii G. Don	Melastomataceae	16.1	16.1	0.813	0.06	1225.910	1275.746
9	Memecylon lateriflorum (G. Don)	Melastomataceae	12.5	15.6	0.813	0.06	714	437
9	Bremek.	Melastomataceae	12.5	15.6	0.813	0.06	263.1278	164.5201
9	Sacoglottis gabonensis (Baill.) Urb.	Humiriaceae	67.3	42.8	0.796	0.06	571	664
10	Drypetes aylmeri Hutch. & Dalz.	Putranjivaceae	13.5	17.1	0.688	0.06	301.84	256
10	Chrysophyllum subnudum Bak.	Sapotaceae	14.5	24.3	0.46	0.06	502.9278	393.4847
10	Strephonema pseudocola A.Chev.	Combretaceae	37.4	28.7	0.633	0.06	571	203

10	<i>Drypetes aylmeri</i> Hutch. & Dalz.	Putranjivaceae	14.9	15.6	0.688	0.06	174.4364	112.3314
							286	78
							430.2257	227.8561
10	<i>Lovoa trichilioides</i> Harms	Meliaceae	23.4	19.4	0.455	0.06	143	428
		Malvaceae					4817.127	2661.077
10	<i>Heritiera utilis</i> (Sprague) Sprague	(sterc.)	78.3	16.5	0.558	0.06	857	771
		Leguminosa					176.7857	302.3608
10	<i>Berlinia tomentella</i> Keay	e-caes.	15	46.2	0.617	0.06	143	5
		Leguminosa					229.7507	273.4538
11	<i>Cynometra ananta</i> Hutch. & Dalz.	e-caes.	17.1	23.9	0.83	0.06	143	952
								319.7412
11	<i>Diospyros sanza-minika</i> A.Chev.	Ebenaceae	22.4	18.8	0.719	0.06	394.24	557
							897.6314	844.1792
11	<i>Diospyros sanza-minika</i> A.Chev.	Ebenaceae	33.8	21.8	0.719	0.06	286	723
							198.6364	170.8591
11	<i>Chrysophyllum subnudum</i> Bak.	Sapotaceae	15.9	22.4	0.64	0.06	286	104
		Leguminosa						518.3933
11	<i>Hymenostegia gracilipes</i> Hutch. & Dalz.	e-caes.	21.7	28	0.834	0.06	369.985	832
		Combretaceae					467.7828	509.8954
11	<i>Strephonema pseudocola</i> A.Chev.	ae	24.4	28.7	0.633	0.06	571	766
		Celastraceae					81.74571	
11	<i>Salacia</i> sp.	e	10.2	0		0.06	429	0
		Putranjivaceae						52.48438
11	<i>Drypetes aylmeri</i> Hutch. & Dalz.	ae	11.2	12.9	0.688	0.06	98.56	272
	<i>Anthonotha fragrans</i> (Bak.f.) Excell & Hillc.	Leguminosa					179.1507	109.1758
11		e-caes.	15.1	19.2	0.529	0.06	143	785
		Rhizophoraceae					158.4314	54.14552
11	<i>Cassipourea hiotou</i> Aubrév. & Pellegr.	eae	14.2	8.9	0.64	0.06	286	503
	<i>Pausinystalia lane-poolei</i> (Hutch.) Hutch. ex Lane-poole	Rubiaceae	11.1	8.1	0.274	0.06	96.80785	12.89132
12		Simaroubaceae					714	149
							107.5564	
12	<i>Hannoa klaineana</i> (Pierre & Engl.)	eae	11.7	17		0.06	286	0
		Leguminosa						608.7754
12	<i>Dialium aubrevillei</i> Pellegr.	e-caes.	24.5	26.3	0.818	0.06	471.625	365
		Apocynaceae					162.9257	
13	<i>Hunteria umbellata</i> (K.Schum.) Hallier f.	e	14.4	18.9		0.06	143	0
	<i>Memecylon lateriflorum</i> (G.Don) Bremek.	Melastomataceae	11.5	18.9	0.813	0.06	103.9107	95.79965
							143	175
		Simaroubaceae					151.8078	31.94523
13	<i>Quassia silvestris</i> Cheek & Jongkind	eae	13.9	12.8	0.274	0.06	571	099
		Leguminosa					100.3278	55.99257
13	<i>Calpocalyx brevibracteatus</i> Harms	e-mim.	11.3	15.4	0.604	0.06	571	576
	<i>Pausinystalia lane-poolei</i> (Hutch.) Hutch. ex Lane-poole	Rubiaceae	38.4	22.6	0.619	0.06	1158.582	972.8012
							857	187
							2265.756	3914.370
13	<i>Lophira alata</i> Banks ex Gaertn.	Ochnaceae	53.7	32.1	0.897	0.06	429	653
		Leguminosa					3350.356	8976.408
14	<i>Cynometra ananta</i> Hutch. & Dalz.	e-caes.	65.3	53.8	0.83	0.06	429	958
		Achariaceae					105.7257	61.01980
14	<i>Scottellia klaineana</i> Pierre	(flacourt.)	11.6	16.7	0.576	0.06	143	745
								86.87669
14	<i>Strombosia pustulata</i> Oliv.	Olacaceae	11.2	17.7	0.83	0.06	98.56	76
							1948.602	4478.111
14	<i>Lophira alata</i> Banks ex Gaertn.	Ochnaceae	49.8	42.7	0.897	0.06	857	506
	<i>Memecylon lateriflorum</i> (G.Don) Bremek.	Melastomataceae	14.4	19.3	0.813	0.06	162.9257	153.3870
15							143	654
		Combretaceae					1412.525	1314.369
15	<i>Strephonema pseudocola</i> A.Chev.	ae	42.4	24.5	0.633	0.06	714	302
		Putranjivaceae					193.6707	141.5066
15	<i>Drypetes aylmeri</i> Hutch. & Dalz.	ae	15.7	17.7	0.688	0.06	143	694
		Leguminosa					93.35071	85.53912
15	<i>Cynometra ananta</i> Hutch. & Dalz.	e-caes.	10.9	18.4	0.83	0.06	429	651
	<i>Memecylon lateriflorum</i> (G.Don) Bremek.	Melastomataceae	17.9	17.9	0.813	0.06	251.7507	219.8191
							143	572
		Chrysobalanaceae						78.83464
16	<i>Maranthes chrysophylla</i> (Oliv.) Prance	aceae	10.5	18.1	0.838	0.06	86.625	05
	<i>Memecylon lateriflorum</i> (G.Don) Bremek.	Melastomataceae	18.1	19.8	0.813	0.06	257.4078	248.6158
16							571	344
		Malvaceae					5465.082	7611.592
16	<i>Heritiera utilis</i> (Sprague) Sprague	(sterc.)	83.4	41.6	0.558	0.06	857	521



16	<i>Cynometra ananta</i> Hutch. & Dalz.	Leguminosa e-caes.	57.4	36.6	0.83	0.06	2588.74	4718.444
16	<i>Strephonema pseudocola</i> A.Chev.	Combretace ae	16.9	19.5	0.633	0.06	224.4078	166.1987
16	<i>Strombosia pustulata</i> Oliv.	Olacaceae	18.6	25.3	0.83	0.06	271.8257	342.4840
16	<i>Drypetes aylmeri</i> Hutch. & Dalz.	Putranjivace ae	12.3	16.2	0.688	0.06	143	905
17	<i>Anthonotha fragrans</i> (Bak.f.) Excell & Hillc.	Leguminosa e-caes.	26.6	31.1	0.529	0.06	118.8707	79.49312
17	<i>Pleiocarpa mutica</i> Benth.	Apocynacea e	15.4	18.5		0.06	143	599
17	<i>Strombosia pustulata</i> Oliv.	Olacaceae	12.2	16.1	0.83	0.06	555.94	572
17	<i>Cynometra ananta</i> Hutch. & Dalz.	Leguminosa e-caes.	19	22.8	0.83	0.06	186.34	0
17	<i>Cassipourea hiotou</i> Aubrév. & Pellegr.	Rhizophorac eae	11.2	17.7	0.624	0.06	116.9457	93.76473
17	<i>Drypetes aylmeri</i> Hutch. & Dalz.	Putranjivace ae	11	18.9	0.688	0.06	143	48
17	<i>Pentadesma butyracea</i> Sabine	Guttiferae	18.3	20.7	0.806	0.06	283.6428	322.0594
17	<i>Hannoa klaineana</i> (Pierre & Engl.)	Simaroubac eae	15.8	17.2		0.06	98.56	928
17	<i>Cassipourea hiotou</i> Aubrév. & Pellegr.	Rhizophorac eae	12.4	15.7	0.624	0.06	95.07142	74.17396
17	<i>Cynometra ananta</i> Hutch. & Dalz.	Leguminosa e-caes.	64.6	38.8	0.83	0.06	857	8
17	<i>Cola nitida</i> (Vent.) Schott. & Endl.	Malvaceae (sterc.)	14.2	12.8	0.601	0.06	263.1278	263.4046
18	<i>Drypetes aylmeri</i> Hutch. & Dalz.	Putranjivace ae	10.9	17.9	0.688	0.06	571	676
18	<i>Strephonema pseudocola</i> A.Chev.	Combretace ae	14.4	18.8	0.633	0.06	196.1457	143
18	<i>Strombosia pustulata</i> Oliv.	Olacaceae	20.8	25.3	0.83	0.06	120.8114	71.01392
18	<i>Chrysophyllum subnudum</i> Bak.	Sapotaceae	24.5	18.9	0.64	0.06	286	421
18	<i>Drypetes aylmeri</i> Hutch. & Dalz.	Putranjivace ae	16.2	18.7	0.688	0.06	3278.911	6335.643
18	<i>Heritiera utilis</i> (Sprague) Sprague	Malvaceae (sterc.)		13.6	0.558	0.06	429	819
19	<i>Drypetes aylmeri</i> Hutch. & Dalz.	Putranjivace ae	12.6	11.8	0.688	0.06	158.4314	73.12687
19	<i>Cynometra ananta</i> Hutch. & Dalz.	Leguminosa e-caes.	64	35.9	0.83	0.06	286	762
19	<i>Memecylon lateriflorum</i> (G.Don) Bremek.	Melastomat aceae	17.5	14.3	0.813	0.06	93.35071	68.97796
19	<i>Carapa procera</i> DC	Meliaceae	13.8	22	0.604	0.06	429	299
19	<i>Strephonema pseudocola</i> A.Chev.	Combretace ae	32.9	35.1	0.633	0.06	162.9257	116.3328
19	<i>Memecylon lateriflorum</i> (G.Don) Bremek.	Melastomat aceae	20.2	17.8	0.813	0.06	339.9314	428.2932
20	<i>Coula edulis</i> Baill.	Olacaceae	14.9	15.8	0.895	0.06	286	041
20	<i>Drypetes aylmeri</i> Hutch. & Dalz.	Putranjivace ae	10.9	14.4	0.688	0.06	471.625	6
20	<i>Drypetes aylmeri</i> Hutch. & Dalz.	Putranjivace ae	19.3	21	0.688	0.06	206.2028	159.1754
20	<i>Heritiera utilis</i> (Sprague) Sprague	Malvaceae (sterc.)	21.4	16.1	0.558	0.06	571	087
21	<i>Tapura ivorensis</i> Breteler	Dichapetala ceae	14.6	6.1		0.06	0	0
21	<i>Scottellia klaineana</i> Pierre	Achariaceae (flacourt.)	11.1	10.1	0.576	0.06	124.74	60.76135
21	<i>Beilschmiedia mannii</i> (Meisn) Benth & Hook.f.	Lauraceae	15.4	12.3	0.569	0.06	124.74	296
21	<i>Strombosia pustulata</i> Oliv.	Olacaceae	19	16.1	0.83	0.06	3218.285	5753.715
21	<i>Macaranga barteri</i> Mull.Arg	Euphorbiace	12.8	15.4	0.406	0.06	714	566

		ae					286	304
22	Heritiera utilis (Sprague) Sprague	Malvaceae (sterc.)	45.6	28.4	0.558	0.06	1633.782	1553.453
							857	022
								122.5097
22	Strombosia pustulata Oliv.	Olacaceae	13.3	17.7	0.83	0.06	138.985	181
							984.6257	1356.703
22	Klainedoxa gabonensis Pierre ex Engl.	Irvingiaceae	35.4	24.8	0.926	0.06	143	956
							1379.407	1827.803
22	Pentadesma butyracea Sabine	Guttiferae	41.9	27.4	0.806	0.06	857	693
		Putranjivaceae					128.7314	83.96172
22	Drypetes aylmeri Hutch. & Dalz.	ae	12.8	15.8	0.688	0.06	286	727
		Putranjivaceae					145.3257	77.98759
22	Drypetes aylmeri Hutch. & Dalz.	ae	13.6	13	0.688	0.06	143	131
		Putranjivaceae					243.3828	130.6089
23	Drypetes aylmeri Hutch. & Dalz.	ae	17.6	13	0.688	0.06	571	765
								177.1143
23	Coula edulis Baill.	Olacaceae	15.4	17.7	0.895	0.06	186.34	066
							91.64571	57.80553
23	Dacryodes klaineana (Pierre) H.J.Lam	Burseraceae	10.8	14.5	0.725	0.06	429	429
		Leguminosae-caes.					523.0028	731.5659
23	Dialium aubrevillei Pellegr.		25.8	28.5	0.818	0.06	571	365
							95.07142	
23	Strombosia pustulata Oliv.	Olacaceae	11	14.7	0.83	0.06	857	69.59799
							251.7507	
24	Aptandra zenkeri Engl.	Olacaceae	17.9	18.9		0.06	143	0
		Apocynaceae					174.4364	
24	Hunteria umbellata (K.Schum.) Hallier f.	e	14.9	9.8		0.06	286	0
		Leguminosae-mim.					602.8707	335.4469
25	Parkia bicolor A.Chev.		27.7	20.7	0.448	0.06	143	114
		Salicaceae (flacourt.)					174.4364	134.4925
25	Homalium dewevrei De Wild. & Th.Dur.	Rhizophoraceae	14.9	17.7	0.726	0.06	286	797
							130.7507	57.76461
25	Cassipourea afzelii (Oliv.) Alston		12.9	11.8	0.624	0.06	143	957
							109.4028	70.90946
25	Dacryodes klaineana (Pierre) H.J.Lam	Burseraceae	11.8	14.9	0.725	0.06	571	186
		Apocynaceae					95.07142	
25	Hunteria umbellata (K.Schum.) Hallier f.	e	11	8.3		0.06	857	0
		Leguminosae-caes.					1514.236	2903.245
26	Cynometra ananta Hutch. & Dalz.		43.9	38.5	0.83	0.06	429	505
	Dactyladenia dinklagei (Engl.) G.T.Prance & F.White	Chrysobalanaceae	29.5	29.4		0.06	683.7678	
		Putranjivaceae					571	0
26	Drypetes aylmeri Hutch. & Dalz.	ae	10	12.5	0.688	0.06	78.57142	40.54285
		Combretaceae					857	714
26	Strephonema pseudocola A.Chev.	ae	24.1	23.1	0.633	0.06	456.3507	400.3738
		Leguminosae-caes.					143	23
26	Cynometra ananta Hutch. & Dalz.	ae	68.8	36	0.83	0.06	3719.131	6667.658
		Putranjivaceae					429	825
27	Drypetes principum	ae	11	7.5	0.688	0.06	95.07142	29.43411
	Manilkara obovata (Sabine & G.Don) J.H.Hemsley						857	429
		Sapotaceae	15	20.9	0.861	0.06	176.7857	190.8744
		Leguminosae-caes.					143	75
27	Berlinia confusa Hoyle		11.4	15.5	0.602	0.06	102.1114	57.16810
							286	44
27	Pentadesma butyracea Sabine	Guttiferae	20.1	29.7	0.806	0.06	317.4364	455.9314
		Euphorbiaceae					286	029
27	Maesobotrya barteri (Baill.) Hutch.	ae	10	10.8		0.06	78.57142	
		Apocynaceae					857	0
27	Hunteria umbellata (K.Schum.) Hallier f.	e	11.2	13.4		0.06	98.56	0
		Leguminosae-caes.					2240.511	4340.363
27	Cynometra ananta Hutch. & Dalz.		53.4	38.9	0.83	0.06	429	55
		Apocynaceae					105.7257	
27	Hunteria umbellata (K.Schum.) Hallier f.	e	11.6	8.7		0.06	143	0
		Achariaceae (flacourt.)					130.7507	69.13679
27	Scottellia klaineana Pierre		12.9	15.3	0.576	0.06	143	369
		Combretaceae						283.1579
27	Strephonema pseudocola A.Chev.	ae	19.6	24.7	0.633	0.06	301.84	15
		Rhizophoraceae						104.3602
27	Cassipourea afzelii (Oliv.) Alston		14	18.1	0.624	0.06	154	56
		Chrysobalanaceae					568.5507	883.5278
28	Maranthes glabra (Oliv.) Prance		26.9	29.6	0.875	0.06	143	1

28	Memecylon lateriflorum (G. Don) Bremek.	Melastomataceae	10.5	12.5	0.813	0.06	86.625	52.81959
		Rhizophoraceae					109.4028	375
28	Cassipourea hiotou Aubrév. & Pellegr.		11.8	15	0.624	0.06	571	61.44064
							143.1964	457
29	Strombosia pustulata Oliv.	Olacaceae	13.5	17.8	0.83	0.06	286	126.9350
		Apocynaceae					78.57142	421
29	Pleiocarpa mutica Benth.		10	7.5		0.06	857	0
		Leguminosae-caes.					83.35642	54.79518
29	Cynometra ananta Hutch. & Dalz.		10.3	13.2	0.83	0.06	857	189
		Rhizophoraceae					176.7857	57.58405
29	Cassipourea hiotou Aubrév. & Pellegr.		15	8.7	0.624	0.06	143	714
		Dichapetalaceae						
30	Tapura ivorensis Breteler		10.5	6.9		0.06	86.625	0
		Malvaceae					6737.311	8909.824
30	Heritiera utilis (Sprague) Sprague	(sterc.)	92.6	39.5	0.558	0.06	429	872
							176.7857	
31	Leptaulus daphnoides Benth.	Icacinaceae	15	20.3		0.06	143	0
		Malvaceae						141.6176
31	Heritiera utilis (Sprague) Sprague	(sterc.)	15.4	22.7	0.558	0.06	186.34	546
							514.9257	
31	Greenwayodendron oliveri (Engl.) Verdc.	Annonaceae	25.6	25.1		0.06	143	0
	Memecylon lateriflorum (G. Don) Bremek.	Melastomataceae	10.6	13.3	0.813	0.06	88.28285	57.27562
31		Leguminosae-caes.					714	236
							363.1964	504.6323
31	Cynometra ananta Hutch. & Dalz.		21.5	27.9	0.83	0.06	286	818
	Chrysophyllum pruniforme Pierre ex Engl.						611.6078	692.8293
31		Sapotaceae	27.9	29.5	0.64	0.06	571	806
		Putranjivaceae					412.0364	250.0302
31	Drypetes aylmeri Hutch. & Dalz.		22.9	14.7	0.688	0.06	286	974
							181.5314	67.80198
32	Strombosia pustulata Oliv.	Olacaceae	15.2	7.5	0.83	0.06	286	857
							96.80785	42.24617
32	Mammea africana Sabine	Guttiferae	11.1	11.6	0.627	0.06	714	439
		Putranjivaceae					78.57142	39.56982
32	Drypetes aylmeri Hutch. & Dalz.		10	12.2	0.688	0.06	857	857
		Apocynaceae					143.1964	57.28143
32	Tabernaemontana africana A. DC.		13.5	11.8	0.565	0.06	286	536
							83.35642	35.28477
32	Strombosia pustulata Oliv.	Olacaceae	10.3	8.5	0.83	0.06	857	621
		Melastomataceae					460.1457	563.3922
33	Memecylon afzelii G. Don		24.2	25.1	0.813	0.06	143	894
		Putranjivaceae					317.4364	260.7651
33	Drypetes aylmeri Hutch. & Dalz.		20.1	19.9	0.688	0.06	286	379
		Rhizophoraceae					206.2028	125.0678
33	Cassipourea hiotou Aubrév. & Pellegr.		16.2	16.2	0.624	0.06	571	065
		Leguminosae-caes.					151.8078	107.3524
33	Cynometra ananta Hutch. & Dalz.		13.9	14.2	0.83	0.06	571	443
		Leguminosae-caes.					2534.902	6135.174
34	Cynometra ananta Hutch. & Dalz.		56.8	48.6	0.83	0.06	857	687
							211.3257	170.4130
34	Chrysophyllum subnudum Bak.	Sapotaceae	16.4	21	0.64	0.06	143	56
		Euphorbiaceae					81.74571	
34	Maesobotrya barberi (Baill.) Hutch.		10.2	11.2		0.06	429	0
							412.0364	554.0241
34	Strombosia pustulata Oliv.	Olacaceae	22.9	27	0.83	0.06	286	819
	Beilschmiedia mannii (Meisn) Benth & Hook.f.						295.7114	257.4374
34		Lauraceae	19.4	25.5	0.569	0.06	286	984
		Combretaceae					248.9457	196.6631
34	Strephonema pseudocola A. Chev.		17.8	20.8	0.633	0.06	143	312
		Leguminosae-caes.						3039.211
35	Cynometra ananta Hutch. & Dalz.		44.8	38.7	0.83	0.06	1576.96	93
		Combretaceae					726.1257	824.5898
35	Strephonema pseudocola A. Chev.		30.4	29.9	0.633	0.06	143	134
							487.1507	
35	Leptaulus daphnoides Benth.	Icacinaceae	24.9	17.4		0.06	143	0
							107.5564	
35	Greenwayodendron oliveri (Engl.) Verdc.	Annonaceae	11.7	12.2		0.06	286	0
		Malvaceae					387.2314	237.3806
36	Cola nitida (Vent.) Schott. & Endl.	(sterc.)	22.2	17	0.601	0.06	286	103
36	Strephonema pseudocola A. Chev.	Combretaceae	20.5	19.9	0.633	0.06	330.1964	249.5631

		ae					286	211
		Leguminosa					102.1114	51.78826
36	Amphimas pterocarpoides Harms	e-pap.	11.4	13.7	0.617	0.06	286	167
		Combretaceae					257.4078	150.5557
36	Strephonema pseudocola A.Chev.	ae	18.1	15.4	0.633	0.06	571	964
		Rhizophoraceae					130.7507	103.2909
36	Cassipourea afzelii (Oliv.) Alston	eae	12.9	21.1	0.624	0.06	143	723
							84.98285	57.29969
37	Dacryodes klaineana (Pierre) H.J.Lam	Burseraceae	10.4	15.5	0.725	0.06	714	143
							206.2028	142.6202
37	Dacryodes klaineana (Pierre) H.J.Lam	Burseraceae	16.2	15.9	0.725	0.06	571	061
	Manilkara obovata (Sabine & G.Don)						120.8114	110.4677
37	J.H.Hemsley	Sapotaceae	12.4	17.7	0.861	0.06	286	957
							141.0828	108.6267
37	Dacryodes klaineana (Pierre) H.J.Lam	Burseraceae	13.4	17.7	0.725	0.06	571	459
								59.83942
38	Lovoa trichiloides Harms	Meliaceae	11.9	19.7	0.455	0.06	111.265	965
		Verbenaceae					100.3278	27.87589
38	Vitex micrantha Gurke	e	11.3	10.2	0.454	0.06	571	445
		Combretaceae					149.6314	
38	Combretum sp.	ae	13.8	0	0.826	0.06	286	0
								563.3738
38	Diospyros sanza-minika A.Chev.	Ebenaceae	28	21.2	0.719	0.06	616	88
		Leguminosa					1412.525	1758.594
38	Cynometra ananta Hutch. & Dalz.	e-caes.	42.4	25	0.83	0.06	714	514
		Putranjivaceae					126.7278	63.82217
38	Drypetes aylmeri Hutch. & Dalz.	ae	12.7	12.2	0.688	0.06	571	65
		Putranjivaceae					160.6707	97.49756
38	Drypetes aylmeri Hutch. & Dalz.	ae	14.3	14.7	0.688	0.06	143	016
		Achariaceae						66.13947
38	Scottellia klaineana Pierre	(flacourt.)	11.9	17.2	0.576	0.06	111.265	648
							162.9257	
38	Leptaulus daphnoides Benth.	Icacinaceae	14.4	14.2		0.06	143	0
		Putranjivaceae					151.8078	104.0260
39	Drypetes aylmeri Hutch. & Dalz.	ae	13.9	16.6	0.688	0.06	571	305
							1104.910	1005.557
39	Chrysophyllum subnudum Bak.	Sapotaceae	37.5	23.7	0.64	0.06	714	143
							95.07142	54.73148
39	Guarea thompsonii Sprague & Hutch.	Meliaceae	11	16.6	0.578	0.06	857	057
		Leguminosa					412.0364	298.9703
39	Berlinia tomentella Keay	e-caes.	22.9	19.6	0.617	0.06	286	363
	Harungana madagascariensis Lam. ex Poir						130.7507	55.92574
40		Guttiferae	12.9	15.2	0.469	0.06	143	152
		Rhizophoraceae					263.1278	139.8913
40	Cassipourea hiotou Aubrév. & Pellegr.	eae	18.3	14.2	0.624	0.06	571	99
		Cecropiaceae					141.0828	25.71235
40	Musanga cecropioides F.Br	e	13.4	12.5	0.243	0.06	571	071
		Dichapetalaceae						
40	Tapura ivorensis Breteler	ceae	10.5	9.1		0.06	86.625	0
		Cecropiaceae					165.1964	28.90276
40	Musanga cecropioides F.Br	e	14.5	12	0.243	0.06	286	714
							479.3564	352.3614
40	Pentadesma butyracea Sabine	Guttiferae	24.7	15.2	0.806	0.06	286	887
		Cecropiaceae					193.6707	
41	Musanga cecropioides F.Br	e	15.7	14.2	0.243	0.06	143	40.09681
	Tetrorchidium didymostemon (Baill.) Pax & K.Hoffm	Euphorbiaceae					147.4707	60.98474
41		ae	13.7	15.7	0.439	0.06	143	424
		Cecropiaceae					181.5314	34.14279
41	Musanga cecropioides F.Br	e	15.2	12.9	0.243	0.06	286	415
		Anacardiaceae					656.2364	342.3191
41	Trichoscypha arborea (A.Chev.) A.Chev.	ae	28.9	13.5	0.644	0.06	286	706
		Anacardiaceae					193.6707	108.6132
41	Trichoscypha baldwinii Keay	ae	15.7	15.1	0.619	0.06	143	48
		Leguminosa					2570.731	2162.869
42	Parkia bicolor A.Chev.	e-mim.	57.2	31.3	0.448	0.06	429	463
	Manilkara obovata (Sabine & G.Don)						179.1507	156.4082
42	J.H.Hemsley	Sapotaceae	15.1	16.9	0.861	0.06	143	477
		Leguminosa					2019.670	3299.010
42	Cynometra ananta Hutch. & Dalz.	e-caes.	50.7	32.8	0.83	0.06	714	932
		Putranjivaceae					118.8707	71.64195
42	Drypetes aylmeri Hutch. & Dalz.	ae	12.3	14.6	0.688	0.06	143	305

42	Homalium dewevrei De Wild. & Th.Dur.	Salicaceae (flacourt.)	24.2	21.9	0.726	0.06	460.1457	438.9624
	Memecylon lateriflorum (G.Don)						143	462
42	Bremek.	Melastomataceae	15	19.4	0.813	0.06	176.7857	167.2979
							143	786
42	Hymenostegia gracilipes Hutch. & Dalziel	Leguminosae-Caes.	20.3	14.7	0.834	0.06	323.785	238.1723
							669.9314	606
42	Strephonema pseudocola A.Chev.	Combretaceae	29.2	19.6	0.633	0.06	286	498.7023
								149
								329.1850
43	Diospyros sanza-minika A.Chev.	Ebenaceae	23.1	18.2	0.719	0.06	419.265	762
							81.74571	
43	Maesobotrya barteri (Baill.) Hutch.	Euphorbiaceae	10.2	9.8		0.06	429	0
							5334.811	7350.804
43	Uapaca corbisieri De Wild.	Euphorbiaceae	82.4	37.1	0.619	0.06	429	659
	Manilkara obovata (Sabine & G.Don)							151.1571
44	J.H.Hemsley	Sapotaceae	14	19	0.861	0.06	154	6
							211.3257	200.4001
44	Dacryodes klaineana (Pierre) H.J.Lam	Burseraceae	16.4	21.8	0.725	0.06	143	749
							193.6707	237.2621
44	Cynometra ananta Hutch. & Dalz.	Leguminosae-caes.	15.7	24.6	0.83	0.06	143	187
44	Tapura ivorensis Breteler	Dichapetalaceae	10.5	6.8		0.06	86.625	0
							343.2078	417.0387
44	Strombosia pustulata Oliv.	Olacaceae	20.9	24.4	0.83	0.06	571	314
							216.5114	204.6708
44	Drypetes aylmeri Hutch. & Dalz.	Putranjivaceae	16.6	22.9	0.688	0.06	286	516
							401.3114	395.9306
44	Drypetes aylmeri Hutch. & Dalz.	Putranjivaceae	22.6	23.9	0.688	0.06	286	449
							523.0028	410.7036
45	Pycnanthus angolensis (Welw.) Warb.	Myristicaceae	25.8	32	0.409	0.06	571	837
45	Spathandra blakeoides (G.Don) Jac.-Fel.	Melastomataceae	14	21.3		0.06	154	0
							248.9457	307.4579
45	Strombosia pustulata Oliv.	Olacaceae	17.8	24.8	0.83	0.06	143	15
							8995.642	24863.05
45	Cynometra ananta Hutch. & Dalz.	Leguminosae-caes.	107	55.5	0.83	0.06	857	729
	Antiaris toxicaria (Rumph. ex Pers.)						759.9507	590.3905
45	Leschen.	Moraceae	31.1	33.2	0.39	0.06	143	109
							441.3278	373.2998
46	Bussea occidentalis Hutch.	Leguminosae-caes.	23.7	17.8	0.792	0.06	571	159
							232.4457	203.9334
46	Strephonema pseudocola A.Chev.	Combretaceae	17.2	23.1	0.633	0.06	143	581
							564.3314	689.8105
46	Dacryodes klaineana (Pierre) H.J.Lam	Burseraceae	26.8	28.1	0.725	0.06	286	217
							113.1428	74.26154
46	Drypetes aylmeri Hutch. & Dalz.	Putranjivaceae	12	15.9	0.688	0.06	571	057
							162.9257	109.6268
46	Drypetes aylmeri Hutch. & Dalz.	Putranjivaceae	14.4	16.3	0.688	0.06	143	478
								93.07567
46	Vitex micrantha Gurke	Verbenaceae	17.5	14.2	0.454	0.06	240.625	5
							122.7678	141.8410
47	Cynometra ananta Hutch. & Dalz.	Leguminosae-caes.	12.5	23.2	0.83	0.06	571	714
							78.57142	45.00822
47	Cassipourea hiotou Aubrév. & Pellegr.	Rhizophoraceae	10	15.3	0.624	0.06	857	857
							151.8078	117.8818
47	Diospyros sanza-minika A.Chev.	Ebenaceae	13.9	18	0.719	0.06	571	372
							118.8707	83.07493
47	Diospyros sanza-minika A.Chev.	Ebenaceae	12.3	16.2	0.719	0.06	143	835
							165.1964	107.7450
48	Drypetes aylmeri Hutch. & Dalz.	Putranjivaceae	14.5	15.8	0.688	0.06	286	754
							697.7457	1147.261
48	Pentadesma butyracea Sabine	Guttiferae	29.8	34	0.806	0.06	143	413
							295.7114	204.3957
48	Scottellia klaineana Pierre	Achariaceae (flacourt.)	19.4	20	0.576	0.06	286	394
							147.4707	86.44379
48	Drypetes aylmeri Hutch. & Dalz.	Putranjivaceae	13.7	14.2	0.688	0.06	143	342
							80.15071	31.50884
48	Cassipourea afzelii (Oliv.) Alston	Rhizophoraceae	10.1	10.5	0.624	0.06	429	88
							1548.925	1275.614
49	Protomegabaria macrophylla (Pax) Hutch	Euphorbiaceae	44.4	22.8	0.602	0.06	714	797
49	Leptaulus daphnoides Benth.	Icacinaceae	10.2	13.5		0.06	81.74571	0

							102.1114	82.81869
49	Manilkara obovata (Sabine & G. Don) J.H.Hemsley	Sapotaceae	11.4	15.7	0.861	0.06	286	948
50	Memecylon sp.	Melastomat aceae	36.3	29.5	0.813	0.06	1035.327	1489.847
50	Strombosia pustulata Oliv.	Olacaceae	11.2	12.8	0.83	0.06	857	14
							98.56	64
							165.1964	128.2783
50	Diospyros sanza-minika A.Chev.	Ebenaceae	14.5	18	0.719	0.06	286	307
50	Vitex micrantha Gurke	Verbenaceae	14.4	18.6	0.454	0.06	162.9257	82.54859
50	Memecylon lateriflorum (G. Don) Bremek.	Melastomat aceae	22.8	26.9	0.813	0.06	143	41
							408.4457	535.9551
							143	143
							518.9564	427.6066
51	Diospyros sanza-minika A.Chev.	Ebenaceae	25.7	19.1	0.719	0.06	286	043
51	Octoknema borealis Hutch. & Dalz.	Olacaceae	25	21.6	0.688	0.06	491.0714	437.8692
							286	8
							277.7028	207.8989
51	Mammea africana Sabine	Guttiferae	18.8	19.9	0.627	0.06	571	116
52	Cynometra ananta Hutch. & Dalz.	Leguminosa e-caes.	67.5	49.9	0.83	0.06	3579.910	8896.149
52	Cassipourea afzelii (Oliv.) Alston	Rhizophorac eae	10.8	15.6	0.624	0.06	714	723
							91.64571	53.52696
							429	247
							460.1457	480.3866
52	Diospyros sanza-minika A.Chev.	Ebenaceae	24.2	24.2	0.719	0.06	143	04
53	Strephonema pseudocola A.Chev.	Combretace ae	34.7	31.8	0.633	0.06	946.0707	1142.630
53	Drypetes aylmeri Hutch. & Dalz.	Putranjivace ae	12.8	17.3	0.688	0.06	143	15
							128.7314	91.93277
53	Drypetes aylmeri Hutch. & Dalz.	Putranjivace ae	14.6	23	0.688	0.06	286	733
							167.4828	159.0149
54	Newtonia duparquetiana (Baill.) Keay	Leguminosa e-Mim.	10.5	17.6	0.574	0.06	571	239
							86.625	52.50722
							4	4
54	Strephonema pseudocola A.Chev.	Combretace ae	65.8	33.3	0.633	0.06	3401.86	4302.448
							3319.642	8050.997
54	Cynometra ananta Hutch. & Dalz.	Leguminosa e-caes.	65	48.7	0.83	0.06	857	036
55	Cassipourea afzelii (Oliv.) Alston	Rhizophorac eae	11.3	14.8	0.624	0.06	100.3278	55.59286
							571	958
							295.7114	360.4692
55	Coula edulis Baill.	Olacaceae	19.4	22.7	0.895	0.06	286	743
55	Cynometra ananta Hutch. & Dalz.	Leguminosa e-caes.	36.8	47.2	0.83	0.06	1064.045	2501.103
55	Pterygota bequaertii De Wild.	Malvaceae	46.8	37.4	0.534	0.06	714	294
		(sterc.)					1720.902	2062.151
		Achariaceae					857	01
55	Scottellia klaineana Pierre	(flacourt.)	11.8	14.5	0.576	0.06	109.4028	54.82395
56	Calpocalyx brevibracteatus Harms	Leguminosa e-Mim.	42.5	36.4	0.727	0.06	571	977
							1419.196	2253.354
56	Drypetes aylmeri Hutch. & Dalz.	Putranjivace ae	37.6	35.4	0.688	0.06	429	675
							1110.811	1623.242
							429	07
							251.7507	153.9989
56	Scottellia klaineana Pierre	Achariaceae	17.9	17.7	0.576	0.06	143	329
57	Memecylon lateriflorum (G. Don) Bremek.	(flacourt.)	10.9	17.9	0.813	0.06	93.35071	81.51029
		Melastomat aceae					429	639
57	Manilkara obovata (Sabine & G. Don) J.H.Hemsley	Sapotaceae	20.7	24.8	0.861	0.06	336.6707	431.3317
							143	457
57	Cassipourea afzelii (Oliv.) Alston	Rhizophorac eae	10.3	14.8	0.624	0.06	83.35642	46.18879
							857	735
57	Trichoscypha arborea (A.Chev.) A.Chev.	Anacardiace ae	26.9	33.4	0.644	0.06	568.5507	733.7579
							143	066
							80.15071	61.09888
58	Homalium dewevrei De Wild. & Th. Dur.	Salicaceae	10.1	17.5	0.726	0.06	429	95
		(flacourt.)					594.1964	539.3651
58	Strephonema pseudocola A.Chev.	Combretace ae	27.5	23.9	0.633	0.06	286	705
							147.4707	108.9678
58	Drypetes aylmeri Hutch. & Dalz.	Putranjivace ae	13.7	17.9	0.688	0.06	143	804
							237.8828	128.2512
59	Cassipourea hiotou Aubrév. & Pellegr.	Rhizophorac eae	17.4	14.4	0.624	0.06	571	121
59	Drypetes aylmeri Hutch. & Dalz.	Putranjivace ae	17.1	21.1	0.688	0.06	229.7507	200.1147
							143	101

59	Memecylon lateriflorum (G. Don) Bremek.	Melastomat aceae	14.7	22.1	0.813	0.06	169.785	183.0346
							818	
		Anacardiace ae					91.64571	47.80607
59	Trichoscypha baldwinii Keay	Anacardiace ae	10.8	13.5	0.644	0.06	429	04
							100.3278	52.33502
59	Trichoscypha baldwinii Keay	Euphorbiace ae	11.3	13.5	0.644	0.06	571	34
							441.3278	340.9310
60	Uapaca corbisieri De Wild.	Simaroubac eae	23.7	20.8	0.619	0.06	571	656
							198.6364	
61	Hannoa klaineana (Pierre & Engl.)		15.9	17.5		0.06	286	0
							134.8364	92.66498
61	Strombosia pustulata Oliv.	Olacaceae	13.1	13.8	0.83	0.06	286	717
		Salicaceae					88.28285	60.37593
61	Homalium dewevrei De Wild. & Th. Dur.	(flacourt.) Rhizophorac eae	10.6	15.7	0.726	0.06	714	974
								110.6074
62	Cassipourea hiotou Aubrév. & Pellegr.	Malvaceae (sterc.)	14.7	17.4	0.624	0.06	169.785	57
							3178.182	3734.835
62	Heritiera utilis (Sprague) Sprague	Malvaceae (Bombacace ae)	63.6	35.1	0.558	0.06	857	228
							353.1314	124.5784
62	Bombax brevisuspe Roberty		21.2	13.9	0.423	0.06	286	116
							91.64571	66.63376
62	Strombosia pustulata Oliv.	Olacaceae	10.8	14.6	0.83	0.06	429	594
		Putranjivace ae						96.72040
62	Drypetes aylmeri Hutch. & Dalz. Pausinystalia lane-polei (Hutch.) Hutch. ex Lane-polee	Rubiaceae	14.7	13.8	0.688	0.06	169.785	224
							132.7857	107.5465
63		Leguminosa e-caes.	13	21.8	0.619	0.06	143	335
							3740.785	8699.795
63	Cynometra ananta Hutch. & Dalz.		69	46.7	0.83	0.06	714	704
63	Microdesmis puberula Leonard Pausinystalia lane-polei (Hutch.) Hutch. ex Lane-polee	Pandaceae	14.7	14.3		0.06	169.785	0
							191.2114	117.2158
63		Rubiaceae	15.6	16.5	0.619	0.06	286	548
							172.1028	170.6916
63	Dacryodes klaineana (Pierre) H.J. Lam	Burseraceae	14.8	22.8	0.725	0.06	571	137
		Simaroubac eae					179.1507	
64	Hannoa klaineana (Pierre & Engl.)	Putranjivace ae	15.1	21.7		0.06	143	0
							149.6314	127.2417
64	Drypetes aylmeri Hutch. & Dalz. Anthonotha fragrans (Bak.f.) Excell & Hillc.	Leguminosa e-caes.	13.8	20.6	0.688	0.06	286	787
							208.7564	113.9659
64			16.3	17.2	0.529	0.06	286	795
							769.7564	882.2240
64	Xylopia sp. Pausinystalia lane-polei (Hutch.) Hutch. ex Lane-polee	Annonaceae	31.3	29.8	0.641	0.06	286	008
							105.7257	62.84766
64		Rubiaceae	11.6	16	0.619	0.06	143	969
		Achariaceae (flacourt.)					113.1428	50.83282
64	Scottellia klaineana Pierre		12	13	0.576	0.06	571	286
							2232.127	4045.687
64	Chrysophyllum subnudum Bak.	Sapotaceae	53.3	47.2	0.64	0.06	857	099
							702.4364	1232.691
65	Chrysophyllum subnudum Bak.	Sapotaceae	29.9	45.7	0.64	0.06	286	64
							78.57142	53.99742
65	Strombosia pustulata Oliv.	Olacaceae	10	13.8	0.83	0.06	857	857
		Leguminosa e-caes.					3108.607	6625.811
66	Cynometra ananta Hutch. & Dalz.	Anacardiace ae	62.9	42.8	0.83	0.06	857	131
							80.15071	23.22767
66	Trichoscypha arborea (A. Chev.) A. Chev.	Achariaceae (flacourt.)	10.1	7.5	0.644	0.06	429	7
							460.1457	335.5456
66	Scottellia klaineana Pierre	Simaroubac eae	24.2	21.1	0.576	0.06	143	172
							572.7857	
66	Hannoa klaineana (Pierre & Engl.)	Putranjivace ae	27	23.2		0.06	143	0
							143.1964	
67	Drypetes aylmeri Hutch. & Dalz.	Leguminosa e-Mim.	13.5	17.5	0.688	0.06	286	103.4451
							1075.642	1398.202
67	Calpocalyx brevibracteatus Harms	(Leguminosa e-Mim.)	37	29.8	0.727	0.06	857	335
							1932.982	1553.561
67	Parkia bicolor A. Chev.	Leguminosa e-pap.	49.6	29.9	0.448	0.06	857	518
							84.98285	42.18481
67	Baphia nitida Lodd.		10.4	14.8	0.559	0.06	714	042
							145.3257	115.8513
67	Garcinia gnetoides Hutch. & Dalz.	Guttiferae	13.6	17.3	0.768	0.06	143	342

68	Strombosia pustulata Oliv.	Olacaceae	26.1	29.8	0.83	0.06	535.2364	794.3122
							286	695
							179.1507	180.2184
68	Strombosia pustulata Oliv.	Olacaceae	15.1	20.2	0.83	0.06	143	525
							266.0114	301.8117
68	Diospyros sanza-minika A.Chev.	Ebenaceae	18.4	26.3	0.719	0.06	286	787
							162.9257	98.17577
68	Strombosia pustulata Oliv.	Olacaceae	14.4	12.1	0.83	0.06	143	691
		Apocynaceae					95.07142	
68	Pleiocarpa mutica Benth.	e	11	14.2		0.06	857	0
								125.2782
69	Strombosia pustulata Oliv.	Olacaceae	13.3	18.1	0.83	0.06	138.985	993
	Garcinia smeathmannii (Planch. & Triana) Oliv.						118.8707	84.35446
69		Guttiferae	12.3	15.4	0.768	0.06	143	272
		Malvaceae					91.64571	37.01313
69	Cola chlamydantha K.Schum.	(Sterc.)	10.8	11.2	0.601	0.06	429	792
		Leguminosae-caes.					237.8828	280.7636
69	Cynometra ananta Hutch. & Dalz.	e-caes.	17.4	23.7	0.83	0.06	571	21
		Leguminosae-caes.					211.3257	122.1293
69	Berlinia confusa Hoyle	e-caes.	16.4	16	0.602	0.06	143	568
							89.95642	36.41454
70	Eriocoelum pungens Radlk. ex Engl.	Sapindaceae	10.7	12.9	0.523	0.06	857	22
								65.12467
70	Coula edulis Baill.	Olacaceae	10.5	14	0.895	0.06	86.625	5
		Leguminosae-caes.					2597.767	4592.593
70	Cynometra ananta Hutch. & Dalz.	e-caes.	57.5	35.5	0.83	0.06	857	795
		Dichapetalaceae						
70	Tapura ivorensis Breteler	ceae	16.1	8.7		0.06	203.665	0
							109.4028	
70	Strombosia pustulata Oliv.	Olacaceae	11.8	17.5	0.83	0.06	571	95.34459
		Anacardiaceae						527.4740
70	Trichoscypha arborea (A.Chev.) A.Chev.	ae	25.9	25.9	0.644	0.06	527.065	024

**Subplot      Number of Species Counted**

1	188
5	218
10	209
35	180
61	190
65	167
70	337



## Mean AGB per species

Species	Total (kg)
<i>Amphimas pterocarpoides</i> Harms	51.78826167
<i>Anthonotha fragrans</i> (Bak.f.) Excell & Hillc.	257.3060051
<i>Antiaris toxicaria</i> (Rumph. ex Pers.) Leschen.	590.3905109
<i>Aptandra zenkeri</i> Engl.	0
<i>Baphia nitida</i> Lodd.	42.18481042
<i>Beilschmiedia mannii</i> (Meisn) Benth & Hook.f.	167.8428819
<i>Berlinia confusa</i> Hoyle	89.6487306
<i>Berlinia tomentella</i> Keay	224.7323366
<i>Blighia welwitschii</i> (Hiern) Radlk.	3449.165763
<i>Bombax brevicuspe</i> Roberty	124.5784116
<i>Bussea occidentalis</i> Hutch.	373.2998159
<i>Calpocalyx brevibracteatus</i> Harms	1235.849862
<i>Carapa procera</i> DC	119.2981454
<i>Cassipourea afzelii</i> (Oliv.) Alston	64.60476086
<i>Cassipourea hiotou</i> Aubrév. & Pellegr.	90.33286372
<i>Chrysophyllum pruniforme</i> Pierre ex Engl.	692.8293806
<i>Chrysophyllum subnudum</i> Bak.	995.3563725
<i>Cola chlamydantha</i> K.Schum.	37.01313792
<i>Cola nitida</i> (Vent.) Schott. & Endl.	155.253744
<i>Combretum</i> sp.	0
<i>Coula edulis</i> Baill.	165.2539113
<i>Cynometra ananta</i> Hutch. & Dalz.	4139.592876
<i>Dacryodes klaineana</i> (Pierre) H.J.Lam	187.2704937
<i>Dactyladenia dinklagei</i> (Engl.) G.T.Prance & F.White	0
<i>Dactyladenia hirsuta</i> (A.Ch. ex De Wild.) G.T.Pr. & F.W	0
<i>Dialium aubrevillei</i> Pellegr.	670.1706865
<i>Diospyros heudelotii</i> Hiern	425.7531213
<i>Diospyros sanza-minika</i> A.Chev.	359.5519585
<i>Drypetes aylmeri</i> Hutch. & Dalz.	166.1661317
<i>Drypetes principum</i>	29.43411429
<i>Eriocoelum pungens</i> Radlk. ex Engl.	36.4145422
<i>Garcinia gnetoides</i> Hutch. & Dalz.	115.8513342
<i>Garcinia smeathmannii</i> (Planch. & Triana) Oliv.	84.35446272
<i>Greenwayodendron oliveri</i> (Engl.) Verdc.	0
<i>Guarea thompsonii</i> Sprague & Hutch.	54.73148057
<i>Hannoa klaineana</i> (Pierre & Engl.)	0
<i>Harungana madagascariensis</i> Lam. ex Poir	55.92574152
<i>Heritiera utilis</i> (Sprague) Sprague	3570.87365
<i>Homalium dewevrei</i> De Wild. & Th.Dur.	173.7324638
<i>Hunteria umbellata</i> (K.Schum.) Hallier f.	0
<i>Hymenostegia gracilipes</i> Hutch. & Dalz.	378.2828719
<i>Klainedoxa gabonensis</i> Pierre ex Engl.	1356.703956
<i>Leptaulus daphnoides</i> Benth.	0

Lophira alata Banks ex Gaertn.	2239.055753
Lovoa trichilioides Harms	143.8477862
Macaranga barteri Mull.Arg	48.29282304
Maesobotrya barteri (Baill.) Hutch.	0
Mammea africana Sabine	125.072543
Manilkara obovata (Sabine & G.Don) J.H.Hemsley	155.3639414
Maranthes chrysophylla (Oliv.) Prance	78.8346405
Maranthes glabra (Oliv.) Prance	883.52781
Memecylon afzelii G.Don	361.6711132
Memecylon lateriflorum (G.Don) Bremek.	177.0378331
Memecylon sp.	1489.84714
Microdesmis puberula Leonard	0
Musanga cecropioides F.Br	32.2136805
Newtonia duparquetiana (Baill.) Keay	52.507224
Octoknema borealis Hutch. & Dalz.	437.86928
Parkia bicolor A.Chev.	1559.373573
Pausinystalia lane-polei (Hutch.) Hutch. ex Lane-polee	254.6605196
Pentadesma butyracea Sabine	809.3525331
Pleiocarpa mutica Benth.	0
Protomegalaria macrophylla (Pax) Hutch	1275.614797
Pterygota bequaertii De Wild.	2062.15101
Pycnanthus angolensis (Welw.) Warb.	410.7036837
Quassia silvestris Cheek & Jongkind	31.94523099
Sacoglottis gabonensis (Baill.) Urb.	7274.495257
Salacia sp.	0
Scottellia klaineana Pierre	114.4093904
Scytopetalum tieghemii (A.Chev.) Hutch. & Dalz.	309.2915571
Spathandra blakeoides (G.Don) Jac.-Fel.	0
Strephonema pseudocola A.Chev.	784.1963159
Strombosia pustulata Oliv.	202.2245408
Tabernaemontana africana A.DC.	57.28143536
Tapura ivorensis Breteler	9.394503348
Tetrorchidium didymostemon (Baill.) Pax & K.Hoffm	60.98474424
Trichoscypha arborea (A.Chev.) A.Chev.	406.6946892
Trichoscypha baldwinii Keay	69.58478059
Uapaca corbisieri De Wild.	3845.867862
Vitex micrantha Gurke	67.83338785
Xylopia sp.	882.2240008
Grand Total	798.3086228