Papua New Guinea Forest Authority

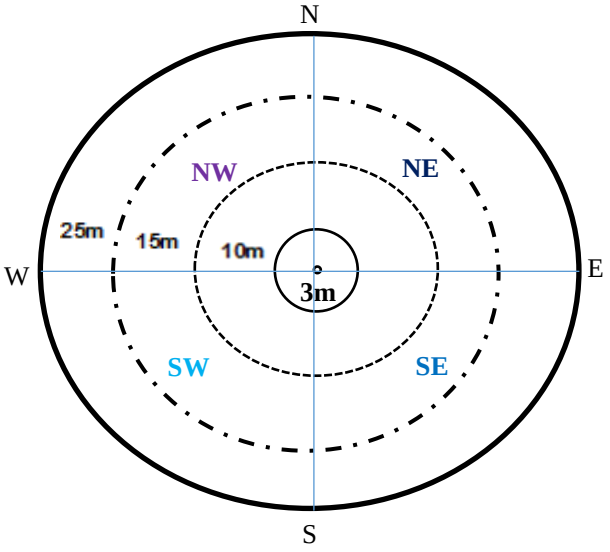
# Multi-purpose National Forest Inventory

# Protocol Guidelines for Upper Plants and Trees Survey

Slop Correction Table

| | Radius (m) | | | |
|---|---|---|---|---|
| | 3 | 10 | 15 | 25 |
| slope (°) | | | | |
| 2 | 3.00 | 10.00 | 15.00 | 25.01 |
| 4 | 3.00 | 10.01 | 15.02 | 25.03 |
| 6 | 3.01 | 10.03 | 15.04 | 25.07 |
| 8 | 3.01 | 10.05 | 15.07 | 25.12 |
| 10 | 3.02 | 10.08 | 15.12 | 25.19 |
| 12 | 3.03 | 10.11 | 15.17 | 25.28 |
| 14 | 3.05 | 10.15 | 15.23 | 25.38 |
| 16 | 3.06 | 10.20 | 15.30 | 25.50 |
| 18 | 3.08 | 10.25 | 15.38 | 25.64 |
| 20 | 3.09 | 10.32 | 15.47 | 25.79 |
| 22 | 3.12 | 10.39 | 15.58 | 25.96 |
| 24 | 3.14 | 10.46 | 15.69 | 26.16 |
| 26 | 3.16 | 10.55 | 15.82 | 26.37 |
| 28 | 3.19 | 10.64 | 15.96 | 26.61 |
| 30 | 3.22 | 10.75 | 16.12 | 26.86 |
| 32 | 3.26 | 10.86 | 16.29 | 27.15 |
| 34 | 3.29 | 10.98 | 16.47 | 27.46 |
| 36 | 3.34 | 11.12 | 16.68 | 27.79 |
| 38 | 3.38 | 11.27 | 16.90 | 28.16 |
| 40 | 3.43 | 11.43 | 17.14 | 28.56 |
| 42 | 3.48 | 11.60 | 17.40 | 29.00 |
| 44 | 3.54 | 11.79 | 17.69 | 29.48 |
| 46 | 3.60 | 12.00 | 18.00 | 30.00 |

# Plot Design




**A. SEGMENT**

- Direction of the assessment from the start to finish. It is standard that the assessment starts in a clock wise direction (NE, SE SW, and NW), quadrate by quadrat, from Radius 3m through to Radius 25m and then move to the next quadrate.

B. **RADIUS(R)**

- Radius 3m, 10m, 15m and 25m
- From 0-3m radius you record R3 in the column R, from 3m-10m radius you record R10, from 10m- 15m radius you record R15 and from 15m-25m radius you record R25
- This means that any assessment done within that radius (nest) you record the bearing and radius

| Position | | Tree No. | Species name (+Dialect) |
|---|---|---|---|
| R | Bearing | | |
| R3 | NW | 1 | Premna |
| R3 | NW | 2 | Macaranga |

**C. Point Of Measurement (POM)**

- **POM**; some trees will have Buttress that will be higher than 1.3m, this will result in you climbing up to take a diameter reading. POM is the distance from the base of the tree to the point where the diameter reading was taken. However, if it's taken at 1.3m please record as well.

| Position | | Tree No. | Species name (+Dialect) | DBH (cm) | POM (m) |
|---|---|---|---|---|---|
| R | Bearing | | | | |
| R3 | NW | 1 | Premna | 2 | 1.3 |
| R3 | NW | 2 | Macaranga | 5 | 1.3 |

**D. STEM FORM**

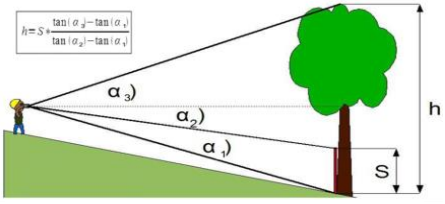
- This is a grading system to describe the bole of the stem, different types have been given a code from A-E. 'A' being the best and 'F' the worst form

| DBH (cm) | POM (m) | Stem form (code) | Base | 10 m | Merchantable | Top |
|---|---|---|---|---|---|---|
| | | | (degree) | | | |
| 40 | 1.3 | A | -3 | 19 | 22 | 39 |
| 60 | 1.3 | C | -2 | 23 | 34 | 46 |

**Note: Stem Form for all stem dbh ≥40cm/ Height for A-C only**

## E. HEIGHT

- Tree height must be measured from the first tree assessed, followed by every 5th tree in the plot
- Trees ≥40cm DBH with a stem from of A, B or C all around the plot, respective height measurements must be taken




**Always stand upslope when using a clinometer to measure height**

- For every dead standing tree inside the plot, height must be measured using the clinometer or Range Finder if >10m in height.
- ***Option II*** on the data sheet for height refers to direct measurement of the respective tree height using the height pole or range finder. Use height pole if ≥10m tall.
- For the columns***: Base, 10m, Merchantable and Top***, refers to height measurement taken by a Clinometer, this is indicated by the ***(degree)*** on the bottom row. **For merchantable height, when using range finder, insert the merchantable height under same heading**
- For **Lianas and Bamboos** an estimated height can be taken using the height pole and recorded in the column ***Option II***
- When measuring height of **Palms**, the height pole, VL5 or clinometer can be used. When Height readings is taken using a clinometer: measure: **Base, 10m and Top**; if ≤10m, measure direct and record in ***option II, t****he* same for **Pandanus**
- **Assessment of Palms must be done individually even if in clumps. Do not average or group**.

| Status | Type | Broken top (₦) | NTFP (₦) | Remarks |
|---|---|---|---|---|
| L=Live, D=Dead | P, L, F, PS | | | |
| | P | | | |

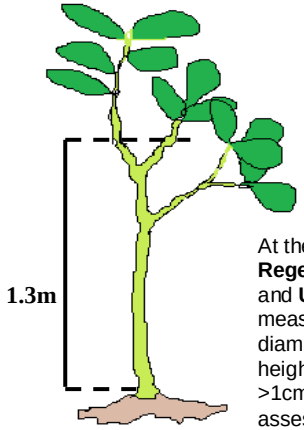
**F. BAMBOO**

- Bamboos, measure the Clump mean height, estimate the total number of Bamboo stems. If too many to count, do a 10% sampling of the stems ≥2cm and average it for the whole clump. BUT MUST INDICATE ON DATA SHEET.
- If there happens to be some dead shoots please do the same above separately
- Bamboo assessment from 0-15m radius

| L=Live D=Dead | Average diameter (cm) | Average height (m) | Number of stems |
|---|---|---|---|
| L | 2.5 | 12 | 30 |
| D | 3 | 16 | 24 |

**G. LIANAS/ PALMS/ PANDANUS**

- **Lianas** Assessment done within 3m radius for diameter ≥1cm
- **Palms and Pandanus**; assessment done around the plot with respective DBH class as trees




At the **R3m** , **Regeneration** and **Understory**, measure diameter at the height of 1.3m, if >1cm do not assess.

## H. UNDERSTORY, Coarse Woody Debris (CWD), LITTER

- Understory; any live plant species within the clip-plot that is <1cm dbh
- CWD; deadwood within the clip-plot between 2cm and 9.9cm in diameter
- Litter; any dead leaves, twigs, sticks <2cm diameter
- If grass is dominant in the clip-plot, remove all assess and take sample.

## I. REGENERATION

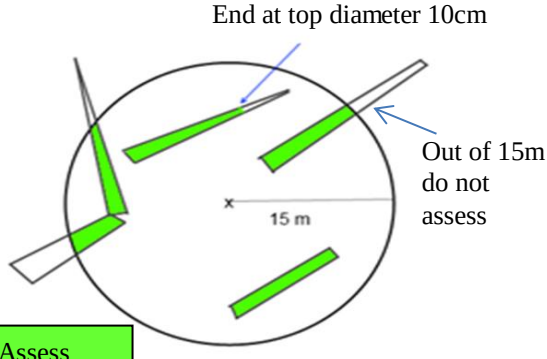
- **Vegetation other than trees**; for a species that can not be counted, a percentage coverage **(Cov.%)** can be given (grass).In addition, for those plants species that can be counted but not sure of the % of coverage , indicate how many stems in the **Number** column. These maybe cases where the plant is growing within the grass, small or only one. However if there's plenty of species and you're sure of the % then give % coverage

| n other than trees | | | |
|---|---|---|---|
| # | Species | Number | Cov.(%) |
| 1 | Grass | | 30 |
| 2 | piper | 1 | |

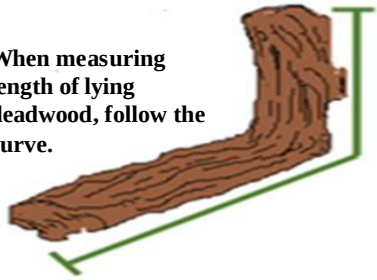
- **Seedlings**; this part refers to tree seedlings only; **Measurement**: >10cm in height and <1cm in dbh;

**J. LYING DEAD WOOD**

- Assessed from 0 -15m radius, any dead wood ≥10cm diameter, must be assessed.
- two diameter measurements, one from base and one the other end, however both points of measurement must be ≥10cm diameter. If one end falls <10cm diameter, move/ shift forward or backwards to measure a point that falls just above 10cm diameter at that end.
- **Length** measurement must be taken between measured points




- **Minimal length to be measured is 1m;** <u><1m do not assess at all</u>**, unless combined broken parts add up to**




**>1m, then can be assessed but still as one sample. See Table below.**

- If the wood curves/bends, when measuring length follows the curve

| Diam 1 (cm) | Diam 2 (cm) | Length (m) | Number of similar parts | Decay (S/I/R) |
|---|---|---|---|---|
| 12 | 11 | 1.5 | 3 | I |

**K. STUMP**

- Minimum diameter 30cm
- for stumps <1.3m measure diameter the point of cut
- For stumps just above 1.3m, measure diameter at 1.3m
- In case of buttress or other root structures measure diameter at the point of cut.
- Measure two diameters if irregular shape and take average