

Field Manual
for the
Georgian National Forest Inventory

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1 Field Work and Measurements

1.1 Framework of Collaboration between Field Teams and the Steering Body

For a successful implementation of the National Forest Inventory (NFI) and satisfying data quality, motivation of the Field Teams as well as reliable support from the National Forest Inventory (NFI) working group, as the responsible steering unit are crucial. The NFI-WG shall be contacted in cases of uncertainties and will provide methodological advice and clarification upon request.

All Field Teams shall deliver the data collected in the field electronically to the NFI working group every Friday after starting the Field Work. Field teams shall deliver:

- GPS tracks;
- Collect Data files (Open Foris Collect Data);

Field Teams must keep a backup copy of all gathered data to be delivered to the NFI-WG upon request.

Timely delivery of the collected field data is a prerequisite for an efficient steering of the NFI and reliable support for the field teams.

1.2 Equipment and Materials

Each field team needs to be equipped with the following items for fieldwork:

Devices / Materials	Number	Check / Comment
GPS Receiver	1	Check battery status; Check all the necessary data to be uploaded on the receiver.
External Antenna for GPS	1	External antenna shall be attached to the GPS receiver
Combined instrument for distance, inclination and azimuth	1	Vertex Laser Geo 360°. Combined instrument for distance, inclination and azimuth.
Rod	1	Stick for attaching the transponder at DBH height, e.g. stick delivered with Vertex.
Briefcase Handle for tablet	1	The rubber briefcase handle provides a simple yet effective way to carry the device. 
SD Card	1	Storage device for the field computer

Diameter tape	1	3 or 5 meters	
Calliper	1	With an inventory scale in mm	
Mobile computer with integrated camera (Tablet)	1	With Sunlight readable display, screen no less than 24 cm, Charger for the car, Android System.	
Iron pole	4	30 cm iron poles for marking the Sample Plot positions (including 1 spare pole)	
Increment borer and plastic tubes	1 borer; 15 (max) straws	Bore cores from sample trees for age and diameter increment assessment must be stored and delivered. A proper storage needs to be secured. Any destruction must be avoided. Wrap cores in straws and note tree data on its label.	
Wood Marker		Sufficient amount of tree markers to temporarily mark/number the trees.	
Measuring tape (10 m)	1	To calibrate the VERTEX	
Stronger plastic bag	1	To efficiently protect the more sensitive electronic measurement devices in case of heavy rains.	
Replacement batteries	4	Spare batteries – chargable ones.	
External battery	1	External energy supply for Vertex, tablet and other electronic devices.	
Field manual and overview tables	1	Are also available via the mobile computer.	
Short manual for complicated devices		Shall be placed at the mobile computer or as print outs. GPS, Vertex, etc.	
First aid kit	1	Check for completeness and validity	

1.3 Locating the Sample Plot Centre in the Field

Geographic location of each Sample Plot centre is pre-defined by the sampling design and must not be modified nor changed. The grid coordinates are stored as waypoints on the GPS receiver and will be available to the field teams.

The way to the cluster, that starts from the car roadcuts always be tracked and automatically saved in GPS receiver via “tracking” mode. (GPS receiver is permanently on). This information is needed to define walking time and the difficulty of the road that will be an important data for the later field work optimization.

1.4 Navigation and Point Measurement with GPS

Navigation to a Sample Plot

It is important to realize that reaching the Sample Plot centre in the field is only possible by GPS.

Marking the Point by GPS

While using GPS following points must be considered:

- To get accurate data via GPS it is necessary to wait for 3-5 minutes
- To get accurate GPS data it is necessary to use an external GPS antenna

1.5 Slopover Plots at the Forest Boundary

When a Sample Plot is located so close to a forest boundary that part of its area is outside the forest, then a boundary correction is necessary to guarantee that the data close to the forest boundary is included with the same probability as trees in the interior of the stand. See the figure #1 below.

A clear definition of the forest boundary is necessary, which is sometimes difficult in the field. The boundary correction is necessary only when a part of the plot is outside the defined population which is “forest”. It is not necessary in case of open areas or roads that belong to the forest areas. The technique to be applied for the boundary correction is the “mirror method” described in the annex 3.13.

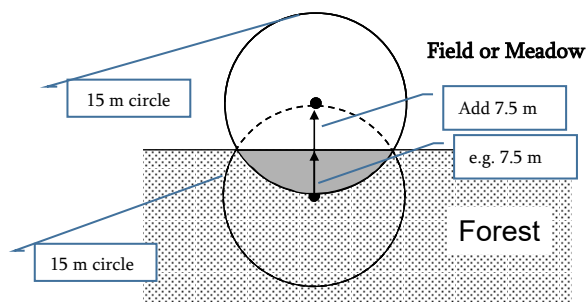


Figure 1: Slopover Plots at the Forest Boundary

A forest boundary as a feature to be recorded during the plot assessments is a boundary where the center of the plot is assigned “Forest” (see 2.6.4.1) and parts of the plot area are “Forest lands” or “Other lands” (agricultural fields, meadows, settlements, fenced gardens, waters as defined in 2.6.4.2). Independent of the shape of the boundary, no assessment shall be done beyond the recorded boundary line. This also applies to those parts of the regeneration sub-plots falling out of the forest area.

In the case of forest roads, the following distinctions are made:

Land use categories	Road class
Forest	Skidding roads (temporary)
Forest lands	Forest roads (for wood transport by trucks; permanent road)
Other lands	Public roads (asphalt or gravel roads)

1.6 Marking the Sample Plot Centre

Once the Sample Plot location is determined with sufficient accuracy, it is marked with an iron pole. As plots will be re-visited in the next inventory cycle (or during control measurements) they need to be marked permanently.

It is important that markings are invisible to ensure that the exact position of the Sample Plot is not directly revealed to the forest manager. Only then it is guaranteed that the Sample Plot will not be managed differently from the rest of the forest.

An iron pole (length ~ 30 cm) is driven into the ground. This iron pole can then be found again by means of a metal detector at later points in time so that the exact position of the plot centre is known for future measurements.

All marking on the Sample Plot area is only done temporarily with tree markers.

2 Assessment of Variables

2.1 Introduction

The variables that are observed in the context of each Sample Plot can be broken down into different categories according to their observation area, scale and / or the respective target object or entity they are describing.

Each variable is explicitly defined in terms of its subject matter meaning, its unit of measurement / observation, possible values / categories (in case of categorical variables) and their accuracy.

The following groups of variables are distinguished:

- **Variables assessed at cluster level** - This chapter subsequently describes the variables assessed / measured in the beginning of field work and procedures: Cluster ID; Field team leader, starting time and GPS coordinates with respective error at the point from where the field team starts walk to the cluster. These variables are used for work organization, for monitoring and for assessing the time / spent for field work.
- **Variables assessed at Sample Plot level** - this chapter includes the variables connected with the Sample Plot centre: accessibility class of the Sample Plot, marking the Sample Plot centre and identifying respective reference objects, forest, forest lands and other lands. With the help of these variables basic information is obtained which defines the continuation, approaches and procedures on the Sample Plot. The sequence and procedures are strictly regimented.
- **Variables assessed on the 15-m radius sub-plot** - this chapter covers Sample Plot variables and measurement / assessment procedures, such as, soil erosion, degradation, forest type – ground component, crown closure vertical structure;
- **Variables assessed on the 5-m radius sub-plot** - ground cover type, sub-forest (including NWFP shrubs)
- **Variables assessed on 25-m radius sub-plot** - cattle grazing, landscape features;
- **Assessment of down deadwood** - down deadwood is assessed in 5 and 10 m radius sub plots according to diameter classes;
- **Forest regeneration** is measured in 5 m distance from the centre of the Sample Plot to the North and South directions in sub-plots of 1.5 m radius;
- **Single forest tree variables** – single forest tree variables are assessed by observing the individual trees located in sub-plots of different radii. Certain variables, sequence and procedures are described in chapter 2.12. Woody plants assessed and measured as single trees comprise both trees and shrubs, in case the stem of the plant is equal to or exceeds 8 cm DBH.
- **Tree height and drilling of the trees for age and increment measurement**– height measurement and drilling of the trees are implemented as soon as all the rest of the single forest tree attributes are recorded.
- **Stump measurement** - stump measurement is done in different circles of the Sample Plot according to diameter classes.
- **End of work time** – it includes the break times as well, to calculate total time spent on field work.

Below each variable is defined and described.

2.2 Applicable Projection

For all mapping activities and GPS measurement the following projection is used:

- UTM 37 N WGS84 (EPSG 32637);
- UTM 38 N WGS84 (EPSG 32638);

2.3 GPS Coordinates Errors and Accuracy

The centre of the Sample Plot must be identified with the respective coordinates. Every GPS measurement is accompanied by certain error and the GPS error shall be recorded.

The accuracy is important information for the repeated assessment of the plot and for the co-registration with remote sensing data.

For each data (coordinates) recorded from GPS, the errors shall be indicated in meters ($\pm/-$).

2.4 Description of the Cluster and Sample Plot Design

One cluster contains three Sample Plots. The Sample Plot centres are located at pre-defined coordinates.

The Sample Plots of each cluster are arranged in the shape of the Latin letter “L”. The centre of the Sample Plot #2 is always the crossing point of the (underlying) grid, and its centre defines the location of the entire cluster (the centres of the remaining Sample Plots are located exactly 100 m North (Sample Plot #1) and 100 m East (Sample Plot #3) of this location).

A Sample Plot consists of several concentric circles (nested Sample Plot design) with pre-defined radii (5, 10, 15 and 25 m, respectively). Trees are selected for measuring according to their diameter class and are assessed up to a specific radius (5, 10, 15 m respectively). See the annex 3.1

2.5 Variables Assessed on Cluster Level

2.5.1 Cluster ID

Description:	Each cluster has its own pre-defined unique code, which is used for its identification.
Observation area	Cluster

2.5.2 Field Team Leader

Description	Full name of the field team leader which is conducting fieldwork on this cluster is indicated.
Observation area	Cluster

2.5.3 GPS Coordinates, when the Team Starts Walking towards the Cluster

Description	Field teams must have the navigation device (GPS) always switched on. As soon as the Field Team starts walking from the point, where they leave the car road, GPS coordinates are recorded as “waypoints”. While walking “tracking modus” is used.
Unit	x / y coordinates
Observation area	Cluster

2.5.4 GPS Error

Description	Every time when GPS coordinates (waypoint) are recorded, GPS Error is required to be recorded as well.
Unit	Meter
Observation area	Cluster; Sample Plot

2.5.5 Time and Date when the Team Starts Walking towards the Cluster

Description	The starting time and date are recorded when the team starts walking from the car road to the cluster to define the total time spent on fieldwork.
Unit / accuracy	HH-MM / 1 minute
Date format	DD-MM-YY
Observation area	Cluster

2.6 Variables Assessed on Sample Plot Level

General variables, which refer to all information that is specific to the entire Sample Plot, are sequentially recorded in tablet.

2.6.1 Sample Plot ID

Description	Pre-defined code of the Sample Plot, which is used for its identification, is recorded.
Observation area	Sample Plot

2.6.2 Accessibility of the Sample Plot

Description	To ensure a high quality of results inaccessibility needs to be avoided wherever possible. If a plot cannot be accessed from one side but from another, it is necessary to undertake every safe effort if this allows reaching the plot. If the plot centre and major parts of the plot can be accessed, but not the entire plot a Sloper plot is given. The boundary towards the inaccessible part shall be measured locating this boundary in safe distance to the inaccessible part. In this special case the attributes 2.6.9 and 2.6.10 have to be filled in. The reason for applying mirror method shall be indicated in the comment section. Accessibility is defined according to following classes.	
Code list	Code	Class
	1	Accessible - no obstacles on the way;
	2	Difficult to access - some obstacles on the way but still accessible;
	3	Not accessible - Sample Plot was not measured;
	A text field must be filled if code 3 is selected, to provide an explanation why it was not possible to access the Sample Plot; In addition, if it is possible, the conditions in the Sample Plot shall be described (Forest, Forest Land and Other Land.) and attribute 2.6.4.1 has to be filled in.	
Observation area	Sample Plot	

2.6.3 Start Time of Measurements on the Sample Plot

Description	Time recording starts when the Sample Plot is accessed, and field work starts.
Units / accuracy	HH-MM / one-minute
Observation area	Sample Plot Centre

2.6.4 Forests, Forest Lands and Other Lands

Sample Plots, where different variables are assessed can be either **Forest**, **Forest Land** or **Other Land**.

1. Forest – Forest in accordance with the forest definition: Land areas with the width of not less than 10 meters and area of not less than 0.5 hectares covered with trees higher than 3 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds in situ. Also, open lands with the size of less than 0.5 ha within the forest are considered as forest, to allow consistent Remote Sensing classification during the National Forest Inventory.

1.1 The term „forest“ is also applicable to the following:

- **Arid forest** – light forest, where the canopy cover does not reach 10% due to the low moisture and/or other natural conditions;
- **Temporarily degraded areas** – Territories that are temporarily degraded or destroyed due to natural and/or anthropogenic impact;

2. Forest Lands – areas more than 0,5 ha inside of forest contour, which are integral part of the forest ecosystem. Including:

- Lands used as hay lands and pastures;
- Special purpose lands, which include roads with hard surface, power transmission and telecommunication lines, oil pipelines, gas pipelines, water supply and sewerage systems, mining areas and its land annex, oil and gas resources lands with annex, land annex arranged in natural gas storage reservoir, ponds, pools, and industrial yards;
- Lands inside the forest, which include marshes, cliffs, stony shores and other areas unsuitable for afforestation;
- Infrastructure necessary for implementing forestry activities related to forests - forest roads, places for storing timber, etc.;

3. Other Lands - Lands outside the forest boundaries and all other territories, which are not included in Forests or in Forest Lands classes:

- Gardens, squares, parks;
- Territories which are not located within the forest and are used for short term rotation of forest tree species during up to thirty years from its afforestation;

- Dendrology parks and Christmas tree plantations;
- Wood species plantations for producing fruits, like berries and nuts (hazelnut, chestnut);

2.6.4.1 *Forest, Forest Lands and Other Lands*

Description	Sample Plots are assigned the classes of Forest, Forest Lands or Other Lands. Forest and non-forest classes are pre-assigned remotely. The results will be checked later by the field teams in nature. If the Sample Plot is crossed by different land classes, then that Sample Plot is given the land class according to the Sample Plot centre location.	
Code list	Code	Class
	1	Forest
	2	Forest Lands
	3	Other Lands
	4	Unknown (only if the plot is not accessible and cannot be classified from the distance)
Observation area	Sample Plot centre, considering all criteria of the forest definition.	

2.6.4.2 *Categories of land cover for Forests, Forest Lands and Other Lands at the actual Sample Plot location*

Description	Within Forest, Forest Lands, and Other Lands the land cover category is identified according to corresponding characteristics on the Sample Plot. If the Sample Plot is crossed by different land categories, this Sample Plot is given the category according to the location of the Sample Plot centre .				
Code list	Codes	Category	Forests	Forest lands	Other land
	1.	Tree covered area (area currently covered by trees or regeneration or recently cut or subject to	Yes		

		natural disturbance)			
	2.	Fire affected forests	Yes		
	3.	Agricultural plantations	Yes	Yes	Yes
	4.	Grass land	Yes	Yes	Yes
	5.	Arable land	Yes	Yes	Yes
	6.	Hay land	Yes	Yes	Yes
	7.	Pasture	Yes	Yes	Yes
	8.	Shrubs	Yes	Yes	Yes
	9.	Orchards	Yes	Yes	Yes
	10.	Vine yards	Yes	Yes	Yes
	11.	Buildings	Yes	Yes	Yes
	12.	Roads	Yes	Yes	Yes
	13.	Water Spaces	Yes	Yes	Yes
	14.	Others (needs to be specified)	Yes	Yes	Yes
Observation area	Sample Plot Centre				

2.6.5 GPS Coordinates of the Sample Plot Centre

Description	Coordinates (X / Y) are recorded by GPS in the centre of the Sample Plot along with the GPS error (see 2.5.4 GPS Error).
Unit / accuracy	x / y coordinates
Observation area	Sample Plot Centre

2.6.6 Elevation (Above Sea Level)

(Data will be acquired by the NFI WG)

Description	Elevation above sea level is recorded from GPS in the centre of the Sample Plot.
Unit	Meter
Observation area	Sample Plot Centre

2.6.7 Marking the Sample Plot Centre

Description	Sample Plot centre is marked by an iron pole, which is rammed entirely into the ground and shall not be visible above the ground. - Only if the <u>measurement from the defined centre coordinate is not possible</u> due to an <u>obstacle</u> (tree at the centre, block at the centre), the Sample Plot centre can be moved exactly 3 m to north. If a Sample Plot centre has to be moved, the reason shall be noted down. - Only if the <u>plot centre cannot be marked</u> (rocky ground does not allow to put the metal pole in) the metal pole can be moved to the nearest possible point, but the measurements will be done at the original point. The shift needs to be described by azimuth and distance from the defined Sample Plot centre towards the metal pole. The reason for shifting the metal pole needs to be noted down.	
Code list	Code	Class
	1	The centre location was not changed
	2	The Sample Plot centre location was changed (obstacle)
	3	The metal pole is not in the Sample Plot centre
Subsequent variable on <u>reason for deviation</u>	In case of class 2 and 3 the field must be filled with the explanation.	
Subsequent variable to define <u>the location of the metal pole in case of class 3</u>	Measure azimuth and horizontal distance from the metal pole to the plot centre.	

Description	Measure azimuth from Sample Plot centre
Unit/accuracy	Degree / 1 degree
Description	Measure horizontal distance from Sample Plot centre
Unit/accuracy	m / 1 hundredth
Observation Area	Sample Plot

2.6.8 Reference Objects Related to the Sample Plot Centre

Reference objects are used to find the Sample Plot centre again in the future. Using the known azimuth and horizontal distance from the Sample Plot centre to at least two reference objects (bigger stones, tree with the biggest diameter, rock, boulders, etc.), the exact location of the centre can be identified. Reference objects shall be selected that have a high probability to be present even after 10 years. The distance from the Sample Plot centre to the reference object is recommended to be in the vicinity to the Sample Plot centre but within the 25-m radius.

2.6.8.1 Type of Reference Object

Description	After having marked the Sample Plot centre with the iron pole, minimum 2 reference objects shall be identified.
Units	Descriptive keyword
Observation area	25 m radius is recommended

2.6.8.2 Azimuth - Reference Object

Description	Azimuth is measured from the centre to the reference object by compass. The azimuth of different reference objects must make the intersection point. Graphic image see in the annex 3.12
Unit / accuracy	Degrees (360° scale) /1°
Device	Compass
Observation area	25 m radius is recommended

2.6.8.3 Horizontal Distance - Reference Object

Description	After having measured the azimuth, horizontal distance between the Sample Plot centre and the object shall be measured.
Units / accuracy	Meters / decimal
Device	Vertex Laser Geo
Observation area	25 m radius is recommended

2.6.8.4 Standard Photo of Reference Object

Description	Each reference object is taken one photo.
Device	Tablet camera
Observation area	25m radius is recommended

2.6.9 Slopover Sample Plots at the Forest Boundary

Description	In case the area of the Sample Plot is not fully positioned in the forest, "mirror method" is used. See the annex 3.13	
Code list	Code	Class
	1	Complete Sample Plot
	2	Slopover Sample Plot
Observation area	Within 15m radius of Sample Plot	

2.6.10 Forest Boundary Points

Description	In case the Sample Plot is not fully located in the forest, or if parts are not accessible (see 2.6.2) for measurements so called "Mirror Method" is used. For the "Mirror Method" intersection points between the Sample Plot and the boundary are marked. (For the first and the second points only azimuth is measured, but for the third point azimuth and horizontal distance are recorded). No assessments are to be done beyond the recorded boundary line. Annex 3.13	
Code list	Code	Class
	Point 1	Azimuth from the centre
	Point 2	Azimuth from the centre
	Point 3	Azimuth from the centre
		Horizontal distance from the centre
Observation area	Within 15 m radius of Sample Plot	

2.7 Variables Assessed on the 15 m Radius Sample Plot

2.7.1 Terrain Shape on the Sample Plot

(Data will be acquired by the NFI WG)

Description	Terrain shape within the area of the Sample Plot is defined by its physical forms. See the annex 3.3	
Code list	Code	Class
	1	Flat
	2	Peak
	3	Ridge
	4	Shoulder
	5	Spur
	6	Slope
	7	Pit
	8	Valley
	9	Foot slope
	10	Hollow
Observation area	Within 15m radius of Sample Plot	

2.7.2 Position on the Slope

(Data will be acquired by the NFI WG)

Description	The Sample Plot can be located on different parts of the slope. The plot position on the slope is recorded (Graphic illustration of the plot position see in the annex 3.2)	
Code list	Code	Class
	1	Top of the slope
	2	Upper slope
	3	Middle slope
	4	Lower slope
	5	Valley bottom

Observation area	Within 15m radius of Sample Plot
------------------	----------------------------------

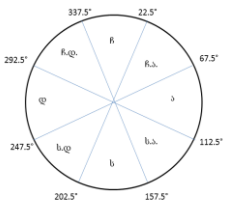
2.7.3 Slope Angle

(Data will be acquired by the NFI WG)

Description	The slope angle is measured from the upper boundary of the Sample Plot downwards along the slope gradient through the centre. The slope angle is measured in degrees.
Units / accuracy	Degrees / 1°
Device	Vertex Laser Geo
Observation area	Within 15 m radius of Sample Plot

2.7.4 Exposition

(Data will be acquired by the NFI WG)

Description	Sample Plot exposition is determined by compass.			
Code list	Code	Compass points:	Explanation	
	1	North	337.5°- 22.5°	
	2	North-East	22.5°-67.5°	
	3	East	67.5°-112.5°	
	4	South-East	112.5° -157.5°	
	5	South	157.5°-202.5°	
	6	South-West	202.5°-247.5°	
	7	West	247.5°-292.5°	
	8	North-West	292.5° - 337.5°	
Unit / accuracy	Compass points			
Device	Vertex Laser Geo			

Observation area	Within 15m radius of Sample Plot
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2.7.5 Soil Erosion

Description	Describes the erosion status on the plot area. The type and stage of erosion is assigned.	
Code list	Code	Class
	1	No erosion
	2	Slight erosion - ground vegetation or top soil is partly damaged
	3	Medium level of erosion - ground vegetation or top soil is damaged
	4	Heavy erosion - top soil and ground cover is reduced
Observation area	Within 15 m radius of Sample Plot	

2.7.6 Causes of Soil Erosion

Description	Erosion can be caused by different reasons. The reason of erosion that affected the soil can be eye-estimated according to following classes:	
Code List	Code	Class
	1	Natural - indicate the explanatory word
	2	Anthropogenic – indicate the explanatory word
	3	Unclear
Observation area	Within 15 m radius of Sample Plot	

2.7.7 Forest Degradation Status

Description	The changes that has been occurred in the forest and negatively affected on Forest structure and functions. Degradation can be estimated according to its level of severity.		
Code list	Code	Class (multiple selection for classes 2-7 possible)	Levels of severity
	1	No damage	- -
	2	Stands of Low density (artificially loose stands)	1 Slightly degraded 2 Average degraded 3 Strongly degraded
	3	Quality reduction because of non-systematic cuts	1 Slightly degraded 2 Average degraded 3 Strongly degraded
	4	Damage caused by Phyto- and Entompests	1 Slightly degraded 2 Average degraded 3 Strongly degraded
	5	Fire affected	1 Slightly degraded 2 Average degraded 3 Strongly degraded
	6	Grazing	1 Slightly degraded 2 Average degraded 3 Strongly degraded
	7	Others (need to be specified)	1 Slightly degraded 2 Average degraded 3 Strongly degraded
Observation area	Within 15 m radius of Sample Plot		

2.7.8 Forest Type – Ground Component

Description	Ground component of forest type is defined on the Sample Plot in 15-m radius. Forest type is identified according to this component.
Code list	List of forest types is provided in the annex 3.6
Observation area	Within 15m radius of Sample Plot

2.7.9 Crown Closure

Description	Crown closure is defined as the proportion of the forest floor covered by the vertical projection of the tree crowns of trees with DBH $\geq$ 8cm (see the annex 3.4). It is eye-estimated in 10%-classes.	
Code list	Code	Class
	0	0%
	1	10%
	2	20%
	3	30%
	4	40%
	5	50%
	6	60%
	7	70%
	8	80%
	9	90%
	10	100%
Unit / accuracy	Percent / 10%	
Observation area	Within 15 m radius of Sample Plot	

2.7.10 Sample Plot Vertical Structure (Layers)

Description	To distinguish the layers in the vertical structure of the Sample Plot the difference between the layers must be minimum 1/3 of height and crown closure of each layer must consist of minimum 20%.	
Code list	Code	Class

	1	Single layer- Stand with only one well-defined layer;
	2	Two layers - two well-defined layers (the upper layer differs from lower layer by at least 1/3 of height and crown closure for each layer consists of minimum 20%);
	3	Three or more layers – three or more well-defined layers (each of the layers differs from lower layer by at least 1/3 of height and crown closure for each layer consists of minimum 20%);
Observation area	Sample Plot of 15 m radius	

2.8 Variables Assessed on the 5m Radius Plot

2.8.1 Ground Cover Type

Description	To assess the ground cover, only the dominant cover type is defined in percentage.	
Code list	Code	Class
	1	<i>Litter</i>
	2	<i>Stones</i>
	3	<i>Rocks</i>
	4	<i>Grass (including herbs and perennial plants)</i>
	5	<i>Fern</i>
	6	<i>Moss</i>
	7	<i>Water (ponds; creeks)</i>
	8	<i>Bare soil</i>
Observation area	Within 5m radius of Sample Plot	

2.8.2 Ground Cover Type in Percentage

Description	Assessed existing coverage of ground in 10% step within the 5-m radius plot for the dominant cover type	
Code List:	Code	Class
	1	10%
	2	20%
	3	30%
	4	40%
	5	50%
	6	60%
	7	70%
	8	80%
	9	90%
	10	100%
Units / accuracy	Percent / 10%	
Observation area	Within 5m radius of Sample Plot	

2.8.3 Understory Species

Description	Woody plants that do not and will never create an upper canopy layer under the present conditions. Assessment is done according to species. Individuals that meet the definition of a single forest tree, are not described as part of understory (see chapter 2.1) List of wood species – see the annex 3.5
Observation area	Within 5m radius of Sample Plot

2.8.4 Understory Coverage

Description	Assessment is done by 5% gradation separately per species.	
Code List	Code	Class
	1	5%
	2	10%
	3	15%
	4	20%
	5	25%
	6	30%
	7	35%
	8	40%
	9	45%
	10	50%
	11	55%
	12	60%
	13	65%
	14	70%
	15	75%
	16	80%
	17	85%
	18	90%
	19	95%

	20	100%
Unit / Accuracy	Percent / 5%	
Observation area	Within 5m radius of Sample Plot	

2.8.5 Understory Height

Description	Average height of understory is measured per species.	
Code list	Code	Class
	1	< 50 cm
	2	50 – 150 cm
	3	> 150 cm
Observation area	Within 5m radius of Sample Plot	

2.9 Variables Assessed on the 25 m Radius Sample Plot

Landscape and forest characteristics shall be described inside the Sample Plot. Observation is done in Sample Plot of 25-m radius.

2.9.1 Cattle Grazing

Description	Damage of regeneration and ground vegetation caused by browsing.	
Code list	Code	Class
	1	No evidence for grazing – regeneration exists and browsing damage is not evident
	2	Only little signs of grazing are evident – regeneration browsed, ground vegetation browsed
	3	Average grazing –regeneration is rare and browsed, ground vegetation is intensively browsed
	4	Intensive signs of grazing - cattle trails, regeneration and ground vegetation is not maintained
Observation area	Within 25m radius of Sample Plot	

2.9.2 Landscape Features

Description	Landscape features that contribute to the functionality of habitat or to the biodiversity maintenance are recorded.	
Code list	Code	Class
	0	No landscape feature
	1	Big rocks / boulders
	2	Stone wall
	3	Cave
	4	Stone field
	5	River / stream
	6	Lake
	7	Karst caves
	8	Swamp
	9	Sandy area
	10	Edge effect located on the Sample Plot and caused by area without trees
	11	Other (specify)
Observation area	Within 25m radius of Sample Plot	

2.9.3 Forest Function

Considering the ecological, social and economic functions, Georgian Forests are broken down into categories which are defined by indicators.

These indicators are assessed for each Sample Plot before the field work (independently from the field work) and during the field work.

2.9.3.1 Indicators of Forest Categories

(Data will be acquired by the NFI WG)

Description	These forest categories are defined and following indicators are described in the draft forest code (as of December 27, 2018). If only a part of the Sample Plot is subject to a certain indicator of forest category the indicator is assigned according to the situation in the Sample Plot centre. Each Sample Plot center may be characterised by multiple indicators.		
Code List	Forest Category	Code	Indicator
	Protected	1	Reserved Area – IUCN I
		2	National Park – IUCN II
		3	Preserved Area – IUCN III
		4	Nature Monument – IUCN IV
		5	Protected Landscape - IUCN V
		6	Multi-use Area - IUCN VI
		7	Flood plain forest
		8	Arid Forest
		9	Dominant Endemic and/or relict species area
	Protective	10	First 200 meters width of forests located along permanent paths of avalanches and mudflows
		11	Forests located on the slopes with greater inclination than 35°
		12	Forest areas of up to 30 hectares located between non-forested territories
		13	First 100 meters width of forests located around landslides, eroded slopes, karstic formations, protrusions of mountain strata
		14	First 100 meters width of forests located along railways and motor roads (measured from the shoulders)
		15	First 100 meters width of forests located around rivers, lakes and water reservoirs
		16	Forests located around stone fall and rocky areas
		17	Forests around natural caves
		18	Forests, with the main function of protecting soil from erosion and snow restrain
		19	Forests located on creeping soils
		20	Forests located on slopes prone to landslides
		21	Subalpine forest
		22	Forests located within 100 meters radius area around water intake headworks
	Resorts and recreational	23	Forests located in the sanitary protection zone of resorts
		24	Forest areas located within 1 km radius area around medical institutions and mineral water springs. Established area is subject to restriction by natural boundaries of a watershed
		25	Forests adjacent to cities and settlements, which is used by population for public recreation, tourism and sport/health improving activities
	Commercial	26	Forest not included in above mentioned categories (1-25)
Observation area	Sample Plot centre		

2.10 Assessment of Down Dead Wood

The variables listed below only refer to down dead wood. (If the biggest part of the tree is located on the ground, then it is assessed as down deadwood. If the biggest part of the tree is not located on the ground, then it is assessed as a standing deadwood). Trees and parts of trees which have obviously been deposited with the purpose of later extraction from the forest, shall not be recorded.

2.10.1 Azimuth of Down Dead-Wood

Description	Azimuth is measured in degrees from the Sample Plot Center to the thickest end of the down dead-wood. Azimuth is measured via compass for each piece of down dead-wood. (see the annex 3.7)
Unit/Accuracy	Degree / 1°
Device	Vertex Laser Geo
Observation Area	Within 5 and 10 m radia of Sample Plot

2.10.2 Horizontal Distance to the thick end of Down Dead-Wood

Description	Horizontal distance is measured from the Sample Plot Center tot he thickest end of the down dead-wood (Annex 3.7)
Unit/Accuracy	Meter / Decimal
Device	Vertex Laser Geo
Observation Area	Within 5 and 10 m radia of Sample Plot

2.10.3 Down Dead-Wood Type

Description	Down dead-wood is assessed according to coniferous and broad-leaved species type, or unknown due to decay status.	
Code list	Code	Type
	1	Coniferous
	2	Broad-leaved

	3	Unknown
Observation area	Within 5 and 10 m radia of Sample Plot	

2.10.4 Down Dead-Wood Diameter

Description	Down dead wood is recorded when thicker end of the tree or wood piece is located inside the 5 and/or 10 m sub-plots down dead-wood diameter is measured on its thick and on its narrow end. See the annex 3.7 • Down dead wood ≥ 10cm at the thicker end it is recorded in 5 m radius sub plot. • Down dead wood ≥ 20cm at the thicker end is recorded in 10 m radius sub plot. In case the major part of the down deadwood is inside the sub plot, but the thicker end is outside of the respective sub plot, this down deadwood is not recorded.
Unit / accuracy	cm / mm accuracy
Instrument	Calliper / tape
Observation area	Within 5 and 10 m radia of Sample Plot

2.10.5 Down Dead-Wood Length

Description	The length is measured for each piece of down deadwood that complies with the conditions of being recorded, where length refers to the part of a dead wood piece that is thicker than 10 cm in diameter.
Unit / accuracy	Meters / 1 hundredth
Instrument	Tape
Observation area	Within 5 and 10 m radia of Sample Plot

2.10.6 Down Dead-Wood Decay Class

Description	Down deadwood is estimated according to decay class.	
Code list	Code	Class

	1	Not decayed - bark is on and wood is hard
	2	Medium decayed - bark partly is off, wood is soft
	3	Heavily decayed - bark is completely off, wood is rotten
Observation area	Within 5 and 10 m radia of Sample Plot	

2.11 Assessment of Regeneration

Only those woody species which will later take part in creation of the main canopy layers shall be described as regeneration. The individuals with less than 8 cm DBH are measured as regeneration.

2.11.1 Regeneration Sub-Plot Marking

Description	Regeneration is assessed in 5 m distance from the Sample Plot centre to the north and to the south in 1.5 m radius sub-Sample Plots. The centre point of the regeneration sub-plots shall be marked with a chalk-coloured stick or similar object to be easily recognizable for the control team.	
Code list	Code	Class
	1	Northern regeneration Sample Plot
	2	Southern regeneration Sample Plot
Observation area	Regeneration sub plot	

Commented [AL1]: Make it consistant with geo

2.11.2 Regeneration Species

Description	Regeneration species are recorded in the Sample Plot according to height classes and quantity. See the list in the annex 3.5
Observation area	Regeneration sub plot

2.11.3 Regeneration Height

Description	Regeneration height is measured according to species and quantity.	
Code list	Code	Class

	1	< 50 cm
	2	50 – 150 cm
	3	>150 cm
Observation area	Regeneration sub plot	

2.11.4 Regeneration Quantity

Description	Quantity of regeneration is recorded according to species and height classes. Damaged and healthy regeneration are counted separately.
Unit	Number
Observation area	Regeneration sub plot

2.12 Assessment of Single Forest Trees

Single Forest Tree variables are observed at the single sample trees (in case they reach the DBH-parameters value) within different radia of Sample Plot (graphic image see the annexes 3.8 and 3.9).

2.12.1 Tree Number / ID

Description	Tree numbering is always done in a clockwise manner starting from North
Observation area	Within 5,10 and 15 m radia of Sample Plot

2.12.2 Stem Number / ID

Description	If a tree has one or more stems reaching the respective DBH-threshold, (see DBH classes) each stem is assigned an individual number (ID).
Observation area	Within 5,10 and 15 m radia of Sample Plot

2.12.3 Azimuth

Description	Azimuth is measured in degrees from the Sample Plot centre to the stem centre at Breast Height (defined as 1.3 m height). Azimuth is measured by compass for each tree stem separately (see the annex 3.9).
Unit / accuracy	Degree / 1°
Device	Vertex Laser Geo
Observation area	Within 5,10 and 15 m radia of Sample Plot

2.12.4 Horizontal Distance to the Tree

Description	Horizontal distance is measured from the centre to the tree at DBH location. See the annex 3.11 and 3.9
Unit / accuracy	m / decimal
Device	Vertex Laser Geo
Observation area	Within 5,10 and 15 m radia of Sample Plot

2.12.5 Tree Class

Description	Every tree is assigned to a relevant class: The tree class influences the variables measured for each tree.	
Code list	Code	Class
	1	Growing tree (including low coppice)
	2	High coppice tree
	3	Standing dead tree (unbroken)
	4	Broken tree (living or dead)
Observation area	Within 5,10 and 15 m radia of Sample Plot	

Overview of variables measured by tree class

Variables	1 Growing trees	2 High Coppice	3 Standing dead trees	4 Broken trees
Single forest tree species	Y	Y	Y	Y
DBH of single forest tree	Y	Y	Y	Y
Tree origin	Y	Y	Y	Y
Damages of trees	Y	Y	Y	Y
Habitat trees	Y	Y	Y	Y
Tree position in layer	Y		Y	
Stem quality of growing trees	Y			
D for high coppice stem		Y		
H for high coppice stem		Y		
Quantity of high coppice sprouts		Y		
D for high coppice sprouts		Y		
H for high coppice sprouts		Y		
Status of high coppice and broken tree		Y		Y
D for broken trees				Y
H for broken trees				Y
Decay class		Y	Y	Y
H for remnant trees	Y		Y	
H for a single forest tree	Y			
Age for a single forest tree	Y			
Increment in diameter for a single forest tree	Y			

Bore Core Samples	Y			
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2.12.6 Species of a Single Forest Tree

Description:	A complete list of all native and possibly occurring alien tree species needs to be available for each field team, including a brief identification key. The taxon field contains a column for the species code, the scientific and a local name (See the annex 3.5). If a clear identification in the field is not possible, the tree shall be sampled, transported to the lab and identified by the experts. The result is reported back to the inventory team.
Observation area:	Within 5,10 and 15 m radia of Sample Plot

2.12.7 DBH of Single Forest Trees

Description	Stem DBH (diameter at breast height) is measured at 1.3 m from the surface of the ground in perpendicular of the stem with the special tape. Calliper can be used in case of slope equals to or exceeds 30°. If Calliper is used it shall be described in the note. In case the tree has abnormal shape at the usual measurement height of 1.3 m, the diameter is measured above and below the deformation and the average out of these two measurements is recorded as the DBH value. Only if the stem form does not allow for this procedure, the field worker shall indicate an approximate value which is assumed to be representative for a similar tree with normal shape. Whenever the recorded DBH is a result of the averaging method or an approximate value, the applied method must be described in the note. See the annex 3.10 for the instruction of DBH measurement.	
DBH classes according to sub-plots	5 m Sub-plot	DBH of 8 cm and more
	10 m sub-plot	DBH of 15.1 cm and more
	15 m sub-plot	DBH of 30.1 cm and more
Unit / accuracy	cm / mm	
Instrument	Diameter tape or calliper	
Observation area	Within 5,10 and 15 m radia of Sample Plot	

2.12.8 Tree Origin

Description	Tree origin can be natural (seed growth; coppice) or artificial	
Code list	Code	Class
	1	Natural (seed growth) - Tree from naturally seed growth origin
	2	Natural (coppice)- Tree from vegetative origin
	3	Artificial - Tree which is originated from artificially planting or seeding
Observation area	Within 5,10 and 15 m radia of Sample Plot	

2.12.9 Damage of the Tree

Description	Tree damage is assessed visually according to classes. In addition, the severity of damage is assessed. Several damage classes can occur on one tree (growing tree, high coppice tree, standing deadwood, broken tree).		
Code list	Code	Class	Classes for severity of damage
	1	Damage through logging and / or skidding activities	A - slightly damaged B - middle damage C - strong damage
	2	Fire damage	A - slightly damaged B - middle damage C - strong damage
	3	Pests / disease	A - slightly damaged B - middle damage C - strong damage
	4	Animal damage	A - slightly damaged B - middle damage C - strong damage
	5	Uprooted tree (natural causes)	A - slightly damaged B - middle damage C - strong damage
	6	Other anthropogenic damage	A - slightly damaged B - middle damage C - strong damage
	7	Other (specify)	A - slightly damaged B - middle damage C - strong damage

Observation area	Within 5,10 and 15 m radia of Sample Plot
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2.12.10 Habitat Trees

Description	If a tree shows any habitat tree traits, each of these traits for each measured tree are recorded. Several traits can be selected in the software.	
Code list	Code	Class
	0	No habitat features
	1	Nest
	2	Bigger holes
	3	Water syphon (in root caves)
	4	Mossy stem
	5	Presented dead branches in crown
	6	Larger fungi at stem
	7	Populated by special insects
	8	Ivy, Viscum, other
	9	Signs of woodpecker
	10	Other (specify)
Observation area	Within 5,10 and 15 m radia of Sample Plot	

2.12.11 Single Tree Position in Layers

Description	Tree position is defined according to its position in vertical structure of the Sample Plot. The difference between the layers shall be at least 1/3 of height.	
Code list	Code	Class

	1	First layer
	2	Second layer
	3	Third layer
	4	Outlier tree – A tree which does not belong to the main layers of the Sample Plot.
Observation area	Within 5,10 and 15 m radia of Sample Plot	

2.12.11.1 *Type of Outlier Tree*

Description	A tree which does not belong to the main layers of the Sample Plot is considered as outlier. Outlier trees are distinguished into two classes: Remnant trees and understory species.	
Code list	Code	Class
	1	Remnant tree – the tree that has significantly bigger diameter and / or height than the trees present in the Sample Plot, is considered as a Remnant tree. Remnant tree is recognized by eye.
	2	Understory species – species that in the Sample Plot are present as understory species with the diameter of 8 cm and more is considered as an understory species.
Observation area	Within 5,10 and 15 m radia of Sample Plot	

2.12.12 Stem Quality of Growing Tree

Description	Growing trees' stem quality is assessed according to quality classes that allow estimating volume according to quality. Quality is determined by stem shape and damage.	
Code list	Code	Class
	1	Construction timber - Tree belongs to construction category, if the length of undamaged, straight part of stem is ≥ 6.5 m; for trees less than 18 m high – the minimum of 1/3 m of tree height.

	2	Semi-Construction timber - Tree belongs to semi-construction category, if the length of undamaged, straight part of stem is 2.5 – 6.5 m;
	3	Firewood - Tree belongs to firewood category, if the length of undamaged, straight part of stem is < 2.5 m.
Observation area	Within 5,10 and 15 m radia of Sample Plot	

2.12.13 High Coppice Measurement

High coppice tree is a tree, where cutting was done at higher position (above 1.3 m) independent of the tree species or presence of sprouts (see 2.12.15)

To calculate the volume of high coppice trees, the sprouts and the stem are measured.

To calculate the volume of stem, the diameter of the stem is measured at its mid-point (according to designated sub plots of the Sample Plot (like with growing trees), and the height of the stem.

To calculate the volume of sprouts, the length and number of sprouts are measured, and the mean diameter of sprouts is eye-estimated at the bottom of the sprout.

2.12.14 Diameter of High Coppice Stem

Description	To calculate the volume of the stem, the diameter of the stem is measured by tape. If the stem is too high to be measured, it is eye-estimated. Diameter is measured / eye-estimated at the mid-point of the stem.
Unit	cm
Observation area	Within 5,10 and 15 m radia of Sample Plot

2.12.15 Height of High Coppice Stem

Description	To calculate the volume of the stem the height of the stem is measured. Stem height is measured from ground surface up to the top of the stem.
Unit / accuracy	m / decimal
Device	Vertex Laser Geo
Observation area	Within 5,10 and 15 m radia of Sample Plot

2.12.16 Quantity of High Coppice Sprouts

Description	To calculate the volume of sprouts, all the sprouts where the diameter at the bottom is ≥ 10 cm (eye-estimated) are counted.
Unit	Number of sprouts
Observation area	Within 5,10 and 15 m radia of Sample Plot

2.12.17 Diameter of High Coppice Sprouts

Description	To calculate the volume of sprouts, the average diameter of all the sprouts is eye-estimated. The diameter at the bottom of sprout is estimated ≥ 10 cm from the sprout origin.
Unit	cm
Observation area	Within 5,10 and 15 m radia of Sample Plot

2.12.18 Height of High Coppice Sprouts

Description	To calculate the volume of sprouts of the high coppice, the height of the sprout with the average diameter is measured. Height is measured from the bottom of the sprout up to the top.
Units/accuracy	m / decimal
Device	Vertex Laser Geo
Observation area	Within 5,10 and 15 m radia of Sample Plot

2.12.19 Status of High Coppice and Broken Trees

Description	Broken trees and high coppice trees are divided into two classes: Living or Dead.	
Code list	Code	Class
	1	Living
	2	Dead
Observation area	Within 5,10 and 15 m radia of Sample Plot	

2.12.20 Diameter of Broken Trees

Description	To calculate the volume of the broken tree, the diameter at the midpoint of the stem is measured or eye-estimated. If broken tree is too high to be measured, diameter is eye-estimated at its midpoint. If assessing the diameter at the midpoint is not representative (e.g. midpoint below fork, abnormal shape), assessment shall be done as close as possible to the midpoint while ensuring representativeness.
Unit	cm
Observation area	Within 5,10 and 15 m radia of Sample Plot

2.12.21 Height of Broken Trees

Description	To calculate the volume of the broken tree, the height is measured. It is measured from ground surface up to the top of the broken tree.
Unit / accuracy	m / decimal
Device	Vertex Laser Geo
Observation area	Within 5,10 and 15 m radia of Sample Plot

2.12.22 Decay Class

Description	Dead trees' (Standing dead, broken dead and dead high coppice trees) decay status is assessed according to different classes.	
Code list	Code	Class
	1	Not decayed – bark is on and wood is hard
	2	Medium decayed – bark is partly off, wood is soft
	3	Heavily decayed - bark is completely off, wood is rotten
Observation area	Within 5,10 and 15 m radia of Sample Plot	

2.12.23 Height of Remnant Trees

Description	To calculate the volume of the remnant tree, the height is measured. It is measured from ground surface up to the top of the remnant tree.
Unit / accuracy	m / decimal
Device	Vertex Laser Geo
Observation area	Within 5,10 and 15 m radia of Sample Plot

2.13 Measuring of Age, Height and Increment

Sample trees are selected for age, height and increment measurement. Do not select dead trees, trees with broken crowns or any other irregular shape (leaned, crooked, bended, miss-formed high coppice).

The variable “2.7.10 *Sample Plot vertical structure (layers)*”- needs to be set first. It fixes, if the sampling for age, height and increment needs to be done in 1 layer or in 2–3 layers.

2.13.1 Tree Height Measurement Steps

Work steps are as follows:

Dominant layer

Dominant layer is automatically given by the software – as the layer with the biggest BA percentage in the Sample Plot.

- Identify all tree species in the dominant layer;
- Select the 2 most dominant species by their share of BA in the dominant layer (dominant and co-dominant species) – data will be automatically calculated by software;
- In dominant and co-dominant species, we measure 3 trees (3x tree for dominant and 3x for co-dominant species);
- 1 x mean tree (according to its DBH) for dominant and co-dominant species (2 trees);
- 1 x thin tree for dominant and co-dominant species (2 trees);
- 1 x thick tree for dominant and co-dominant species (2 trees);
- Identify all the rest of the species presented in the layer. Select the mean tree for each (with mean DBH) – with mean BA - data will be calculated automatically by the software;
- **Co-dominant layer**

Co-dominant layer is automatically given by the software as a layer with the second biggest BA;

- Identify all tree species in co-dominant layer;

- Select the mean tree (mean DBH) in each species – calculations will be automatically done by the Software;
- Height measurements: - 1 mean tree in each species;

Subordinated layer

For the subordinated layer if existing: Repeat the steps described for the co-dominant layer;

2.13.1.1 Tree height

Description	Tree height is defined as vertical distance between tree top and ground level at the stem base. Do not select trees with abnormal shape or broken trunk as they will be outliers of the height curve. The trees, of which heights are measured in the dominant layer, shall span the entire existing diameter range.
Unit / accuracy	m / decimal
Device	Vertex Laser Geo
Observation area	Within 5,10 and 15 m radia of Sample Plot

2.13.2 Age of trees

If drilling to the core is not doable (e.g. diameter is too big), drill as deep as responsibly possible by means of the device.

Work steps are as follows:

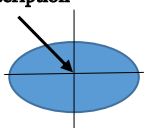
Dominant layer

- **Select the dominant layer:** It is given by the software – as the layer with the biggest BA percentage in the Sample Plot;
- Identify all tree species in the dominant layer;
- Identify dominant and codominant species – data will be calculated by the software;
- For every species identified in the layer, select 1 mean tree (according to its DBH). (data will be calculated by the software);
- Drilling: Drill one mean tree for dominant and co-dominant species (2 trees);

Other layer:

- **Select the co-dominant or subordinated layer (if existing)** - Repeat the steps described for the dominant layer.

2.13.2.1 Assessment of Tree Age

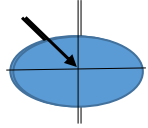
Description  Drilling position for an oval tree:	Age of the trees is assessed to allow a grouping of trees by age classes. Age is assessed by drilling Standard is drilling with the borer Only select trees without stem or crown damages or abnormal forms (strong ovality, lean, crooks, bends, miss-formed high coppice). Tree is drilled up to the tree centre at the breast height. Oval trees (mostly occurring on slopes): The core shall be sampled between the maximum and minimum diameter. Analysis: Cores will be analysed from the desk; Sample cores need to be labelled with cluster ID, Sample Plot ID and tree / stem number and saved safely. They must be delivered to the NFI coordinator / Control team.
Unit / accuracy	Years / 1 year
Device	Borer
Observation area	Within 5,10 and 15 m radia of Sample Plot

2.13.3 Increment in Diameter for Single Tree

To assess the increment in diameter only the tree from the first class (growing tree) is selected. A sample tree for the increment assessment is the first tree by numeration. Also, to measure the increment in diameter do not sample the trees that was selected for age assessment.

If the first tree (tree #1) does not meet the criteria for a sample tree, then next tree is selected (tree #2,3,4 etc).

2.13.3.1 Increment in Diameter

Description Drilling position for an oval tree: 	Tree diameter increment is measured by drilling. All trees selected for age assessment are also used to assess the increment. For increment one more tree is sampled, as described above. Only select trees without stem or crown damages or abnormal forms (lean, crooks, bends, high coppice). Trees for increment are drilled at the breast height with the width of last 10 rings (last 10 years). Analysis: Core analysis are done from the office. Sample cores need to be labled with cluster ID, plot ID and tree / stem number and saved safely in an appropriate container. They must be delivered to the NFI working group.
Unit / accuracy	cm / decimal
Instrument	Borer
Observation area	Within 5,10 and 15 m radia of Sample Plot

2.13.4 Taken Bore Core Samples

Description	Since the part of the trees are drilled for age and/or increment assessment, it is needed to record whether the tree was drilled or not. All bore cores from trees selected for age are also used to assess the increment. Consequently, for the single trees one of the following codes must be chosen:
Code list	Code
	0 – No bore core taken
	1 – Increment bore core taken
	2 – Age and increment bore core taken
Observation area	Within 5,10 and 15 m radia of Sample Plot

2.14 Stump Assessment Variables

Stumps are defined as remaining root collars of trees with a stem height of less than 1.3m. Usually, stumps result from harvesting operations but may also appear as a result of wind-breaks or other natural processes.

2.14.1 Type of Stump

Description	Stumps are assessed according to coniferous and broad-leaved types which is necessary for carbon calculation.	
Code list	Code	Type
	1	Coniferous
	2	Broad-leaved
	3	Unknown
Observation area	Within 5,10 and 15 m radia of Sample Plot	

2.14.2 Stump Diameter

Description	Stump diameter is measured at the middle point of the stump. The selection of the stumps follows the same sub-plot design like for standing trees. Minimum diameter 10 cm.
Units/ accuracy	Cm / with decimal accuracy
Instrument	Tape

Observation area	Within 5,10 and 15 m radia of Sample Plot
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2.14.3 Horizontal Distance to the Stump

Description	Horizontal distance is measured from the Sample Plot centre to the centre of stump top. See the annex 3.11
Unit / accuracy	m / 1 hundredth accuracy
Device	Vertex Laser Geo
Observation area	Within 5,10 and 15 m radia of Sample Plot

2.14.4 Stump Azimuth

Description	Azimuth is measured in degrees from the Sample Plot centre to the central point where the stump was cut. Azimuth is measured by compass for each stump. (Graphic illustration - see in the annex 3.9)
Unit / accuracy	degree / 1°
Device	Vertex Laser Geo
Observation area	Within 5,10 and 15 m radia of Sample Plot

2.14.5 Stump Height

Description	The height of the stump will be measured from the ground surface to the top of the stump.
Unit / accuracy	m / with decimal accuracy
Instrument	Tape
Observation area	Within 5,10 and 15 m radia of Sample Plot

2.14.6 Stump Origin

Description	The origin of the stump is recorded, indicating whether it results from harvesting operations or natural impacts.	
Code list	Code	Class
	1	Natural – no indication of human intervention
	2	Artificial – typical signs of harvesting activities
Observation area	Within 5,10 and 15 m radia of Sample Plot	

2.14.7 Stump Decay Class

Description	Stump decay status is assessed according to different classes.	
Code list	Code	Class
	1	Not decayed – bark is on and wood is hard
	2	Medium decayed – bark is partly off, wood is soft
	3	Heavily decayed - bark is completely off, wood is rotten
Observation area	Within 5,10 and 15 m radia of Sample Plot	

2.15 Final Variables

2.15.1 Standard Photographs of Sample-Plot

Description	One picture is taken from the south position to the North direction through the centre point from 10 m distance.
Observation area	Within 10 m radius of Sample Plot

2.15.2 Comments

Description	The field where the observation text about the Sample Plot and its surroundings shall be filled in the text later can be used to describe the plot location.
Unit / accuracy	Text
Observation area	Within 25 m radius of Sample Plot

2.15.3 End of Measurements Time on the Sample Plot

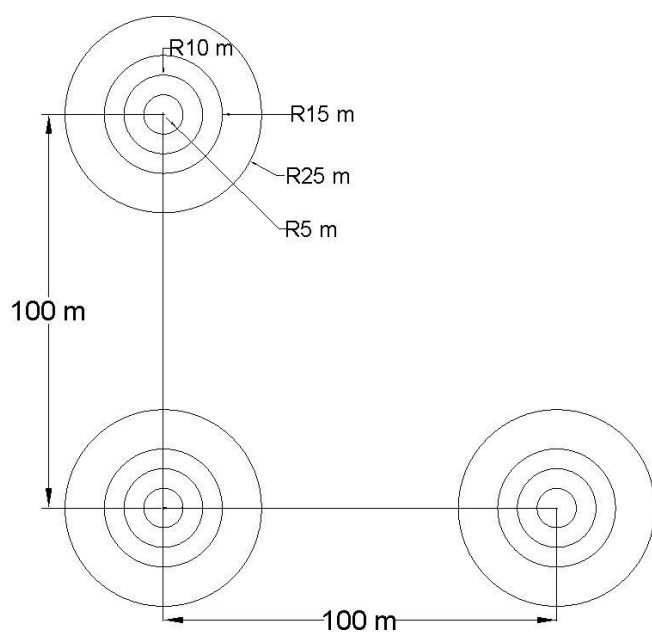
Description	End time of measurements, when all measurements are finished on the Sample Plot.
Unit / accuracy	HH-MM / one minute
Observation area	Sample Plot

2.15.4 Time and Date at the End of Field Work in the Cluster

Description	End time and date of measurements, when all measurements are finished on the cluster.
Unit / accuracy	HH-MM / one minute
Date format	DD-MM-YY
Observation area	Cluster

3 Appendices

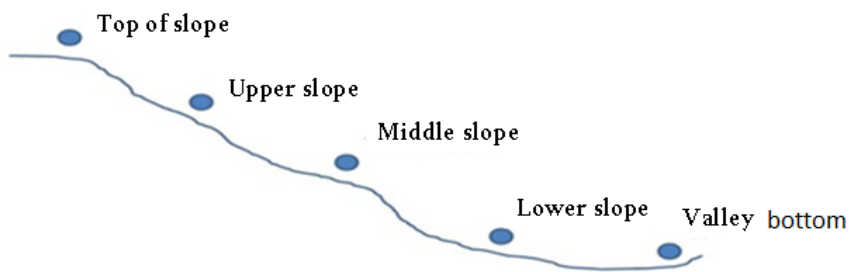
3.1 Design of Cluster Plots:



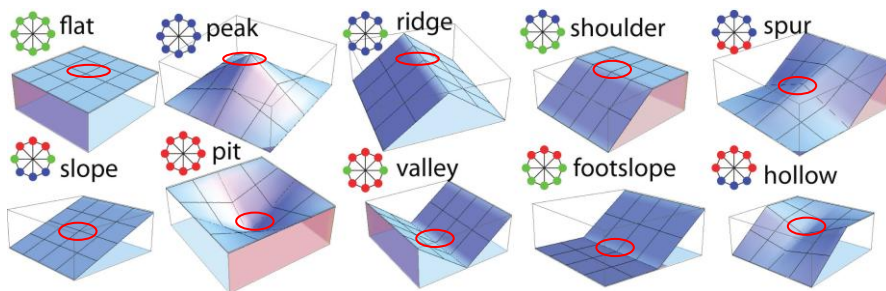
3.2 Sample Plot Position on the Slope

Evaluation of the Sample Plot position on the slope is done in the 15m radius of the Sample Plot). The slope position is relevant for the soil and water household on the Sample Plot. The evaluation shall always consider the water run-off direction and erosion process. In which direction is the water running off and where do I have an accumulation of horizontal water flow or respective accumulation of fine soil.

Visualization:

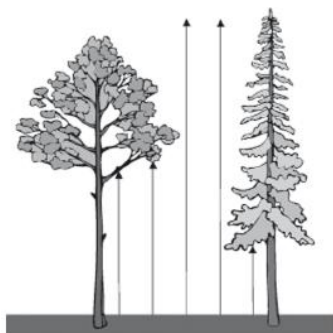


3.3 Terrain Shape of the Sample Plot



3.4 Crown Closure

The illustration is showing the principle of Crown Closure Assessment



3.5 List of Wooden Species

№	სამეცნიერო სახელი	გვარი, სახეობა	წითელი ნუსხა
1	<i>Abies nordmanniana</i>	სოჭი კავკასიური	No
2	<i>Abies pinsapo</i>	სოჭი ესპანური	No
3	<i>Acacia dealbata</i>	აკაცია ლეგა	No
4	<i>Acer campestre</i>	ნეკერჩხალი მინდვრის	No
5	<i>Acer cappadocicum</i>	ნეკერჩხალი ქორაფი	No
6	<i>Acer ibericum</i>	ნეკერჩხალი ქართული	yes
7	<i>Acer negundo</i>	ნეკერჩხალი ამერიკული	No
8	<i>Acer platanoides</i>	ნეკერჩხალი მახვილფოთლოვანი	No
9	<i>Acer pseudoplatanus</i>	ნეკერჩხალი ბოყვი	No
10	<i>Acer spnol</i>	ნეკერჩხალი უცნობი	-
11	<i>Acer tataricum</i>	ნეკერჩხალი თათრული	No
12	<i>Acer trautvetteri</i>	ნეკერჩხალი მაღალი მთის	No
13	<i>Acer velutinum</i>	ნეკერჩხალი დიადი ბოყვი	No
14	<i>Aesculus hippocastanum</i>	ცხენის წაბლი ჩვეულებრივი	No
15	<i>Ailanthus altissima</i>	ხემყრალი	No
16	<i>Albizzia julibrissin</i>	ალბიცია ლენქორანის	No
17	<i>Aleurites cordata</i>	ტუნგო იაპონური	No

18	<i>Aleurites spnol</i>	ტუნგო უცნობი	No
19	<i>Alnus barbata</i>	თხმელა ბუსუსიანი	No
20	<i>Alnus glutinosa</i>	თხმელა შავი	No
21	<i>Alnus incana</i>	თხმელა ნაცარა	No
22	<i>Alnus spnol</i>	თხმელა უცნობი	No
23	<i>Alnus subcordata</i>	თხმელა გულფოთილა	No
24	<i>Amorpha fruticosa</i>	ამორფა ზუჭისებრი	No
25	<i>Amygdalus communis</i>	ნუში ჩვეულებრივი	No
26	<i>Amygdalus georgica</i>	ნუში ქართული	Yes
27	<i>Amygdalus spnol</i>	ნუში უცნობი	-
28	<i>Arbutus andrachne</i>	ხემაწყვა	Yes
29	<i>Astragalus caucasicus</i>	გლერძი კავკასიის	No
30	<i>Astragalus sommieri</i>	გლერძი სომიერის	Yes
31	<i>Astragalus spnol</i>	გლერძი უცნობი	-
32	<i>Astragalus tanae</i>	გლერძი ტანას	Yes
33	<i>Atraphaxis caucasica</i>	ხორციფერა კავკასიის	No
34	<i>Aucuba chinensis</i>	აუკუბა ჩინური	No
35	<i>Berberis iberica</i>	კონახური ქართული	No
36	<i>Berberis spnol</i>	კონახური უცნობი	-
37	<i>Berberis vulgaris</i>	კონახური ჩვეულებრივი	No
38	<i>Betula litwinowii</i>	არყი ლიტვინოვის	No
39	<i>Betula medwediewii</i>	არყი მედედევის	Yes
40	<i>Betula megrelica</i>	არყი სამეგრელოს	Yes
41	<i>Betula pendula</i>	არყი მეჭეჭებიანი	No
42	<i>Betula raddeana</i>	არყი რადეს	Yes
43	<i>Betula spnol</i>	არყი უცნობი	-
44	<i>Biota orientalis</i>	ბიოტა აღმოსავლეთის	No
45	<i>Broussonetia papyrifera</i>	ბრუსონეცია (ქალაქის ხე)	No
46	<i>Buxus colchica</i>	ბუხა კოლხური	Yes
47	<i>Campsis radicans</i>	ვახისტანა	No
48	<i>Caragana arborescens</i>	კარაგანა ყვითელი	No
49	<i>Carpinus caucasica</i>	რცხილა კავკასიური	No

50	<i>Carpinus orientalis</i>	რცხილა ჯაგრცხილა	No
51	<i>Carpinus spnol</i>	რცხილა უცნობი	No
52	<i>Carya illinoensis</i>	კარია პეკანი	No
53	<i>Castanea crenata</i>	წაბლი იაპონური	No
54	<i>Castanea sativa</i>	წაბლი ჩვეულებრივი	Yes
55	<i>Castanea spnol</i>	წაბლი უცნობი	-
56	<i>Catalpa bignonioides</i>	კატალპა ბიგნონიასებრი	No
57	<i>Catalpa speciosa</i>	კატალპა დასავლური	No
58	<i>Cedrus atlantica</i>	კედარი ატლასის	No
59	<i>Cedrus deodara</i>	კედარი ჰიმალაური	No
60	<i>Cedrus libani</i>	კედარი ლიბანის	No
61	<i>Cedrus spnol</i>	კედარი უცნობი	No
62	<i>Celtis australis</i>	აკაკი სამხრეთის	Yes
63	<i>Celtis caucasica</i>	აკაკი კავკასიის	No
64	<i>Celtis glabrata</i>	აკაკი შიშველი	Yes
65	<i>Celtis occidentalis</i>	აკაკი დასავლეთის	No
66	<i>Celtis spnol</i>	აკაკი უცნობი	-
67	<i>Cerasus microcarpa</i>	ბალამწარა მცირენაყოფიანი	Yes
68	<i>Cercis siliquastrum</i>	არღვანი (იუდას ხე)	No
69	<i>Chaenomeles japonica</i>	კომში იაპონური	No
70	<i>Cinnamomum camphora</i>	ცინამონუმი ქაფურის ხე	No
71	<i>Cistus creticus</i>	საკმელა პონტოური	Yes
72	<i>Cistus salviifolius</i>	საკმელა სალზფოთოლა	No
73	<i>Cistus spnol</i>	საკმელა უცნობი	-
74	<i>Citrus limon</i>	ლიმონი ლიმონი	No
75	<i>Citrus unshiu</i>	მანდარინი უნშიუ	No
76	<i>Clematis orientalis</i>	კატაბარდა აღმოსავლეთის	No
77	<i>Clematis spnol</i>	კატაბარდა უცნობი	No
78	<i>Clematis vitalba</i>	კატაბარდა	No
79	<i>Clematis viticella</i>	კატაბარდა იისფერი	No
80	<i>Conifer spnol</i>	გაურკვეველი წიწვოვანი	-
81	<i>Cornus mas</i>	შინდი შინდი	No

82	<i>Corylus avellana</i>	თხილი ჩვეულებრივი	No
83	<i>Corylus colchica</i>	თხილი კოლხური	Yes
84	<i>Corylus iberica</i>	თხილი ქართული	No
85	<i>Corylus imeretica</i>	თხილი იმერული	No
86	<i>Corylus spnol</i>	თხილი უცნობი	-
87	<i>Cotinus coggygria</i>	თრიმლი ჩვეულებრივი	No
88	<i>Cotoneaster integerrimus</i>	სირვაშლა ჩვეულებრივი	No
89	<i>Crataegus microphylla</i>	კუნელი წითელი	No
90	<i>Crataegus orientalis</i>	კუნელი კნაპა	No
91	<i>Crataegus pentagyna</i>	კუნელი შავი	No
92	<i>Crataegus pontica</i>	კუნელი ყამბრო	Yes
93	<i>Crataegus spnol</i>	კუნელი უცნობი	-
94	<i>Cryptomeria japonica</i>	კრიპტომერია იაპონური	No
95	<i>Cupressus horisontalis</i>	კვიპაროსი ჰორიზონტალური	No
96	<i>Cupressus lusitanica</i>	კვიპაროსი ლუზიტანიის	No
97	<i>Cupressus macnabiana</i>	კვიპაროსი მაკნაბის	No
98	<i>Cupressus pyramidalis</i>	კვიპაროსი პირამიდალური	No
99	<i>Cupressus spnol</i>	კვიპაროსი უცნობი	No
100	<i>Cydonia oblonga</i>	კომში	No
101	<i>Cytisus ruthenicus</i>	ტყის ცოცხი კავკასიის	No
102	<i>Daphne albowiana</i>	მაჯაღვერი ალბოვის	Yes
103	<i>Daphne axillaris</i>	მაჯაღვერი რძიანი	No
104	<i>Daphne glomerata</i>	მაჯაღვერი მაღალმთის	No
105	<i>Daphne mezereum</i>	მაჯაღვერი ჩვეულებრივი	No
106	<i>Daphne pontica</i>	მაჯაღვერი პონტოური	No
107	<i>Daphne pseudosericea</i>	მაჯაღვერი ცრუაზრეშუმისებრი	Yes
108	<i>Daphne spnol</i>	მაჯაღვერი უცნობი	-
109	<i>Daphne transcaucasica</i>	მაჯაღვერი ამიერკავკასიური	Yes
110	<i>Deciduous spnol</i>	გაურკვეველი ფოთლოვანი	-
111	<i>Diospyros lotus</i>	ხურმა ჩვეულებრივი	No
112	<i>Elaeagnus angustifolia</i>	ფშატი ჭალის	No
113	<i>Elaeagnus pungens</i>	ფშატი ჩხვლეტია	No

114	<i>Elaeagnus spnol</i>	ფშატი უცნობი	No
115	<i>Ephedra equisetina</i>	ჯორის ბუა შვიტისებრი	No
116	<i>Ephedra procera</i>	ჯორის ბუა ტანმაღალი	No
117	<i>Ephedra spnol</i>	ჯორის ბუა უცნობი	No
118	<i>Epigaea gaultheroides</i>	ეპიგეა გაულთერიასმაგვარი	Yes
119	<i>Erica arborea</i>	მანანა ხემაგვარი	Yes
120	<i>Eriobotrya japonica</i>	მუშმულა	No
121	<i>Eucalyptus amygdalina</i>	ევკალიპტი ნუშისებრი	No
122	<i>Eucalyptus cinerea</i>	ევკალიპტი ცისფერი	No
123	<i>Eucalyptus globulus</i>	ევკალიპტი ლურჯი	No
124	<i>Eucalyptus macarthurii</i>	ევკალიპტი მაკარტურის	No
125	<i>Eucalyptus rostrata</i>	ევკალიპტი წითელი	No
126	<i>Eucalyptus spnol</i>	ევკალიპტი უცნობი	No
127	<i>Eucalyptus urnigera</i>	ევკალიპტი ურნისებრნაყოფიანი	No
128	<i>Eucalyptus viminalis</i>	ევკალიპტი მანანის	No
129	<i>Eucommia ulmoides</i>	ევკომია თელისებრი	No
130	<i>Euonymus europaeus</i>	ჟანჟყატი ჩვეულებრივი	No
131	<i>Euonymus japonicus</i>	ჟანჟყატი იაპონური	No
132	<i>Euonymus latifolius</i>	ჟანჟყატი განიერფოთლიანი	No
133	<i>Euonymus spnol</i>	ჟანჟყატი უცნობი	No
134	<i>Euonymus verrucosus</i>	ჟანჟყატი მეჭეჭებიანი	No
135	<i>Eversmannia subspinos</i>	ევერსმანია ნახევრადეკლიანი	Yes
136	<i>Fagus orientalis</i>	წიფელი აღმოსავლური	No
137	<i>Ficus carica</i>	ლეღვი	No
138	<i>Firmiana simplex</i>	ფირმიანა ჭადარფოთოლა	No
139	<i>Frangula alnus</i>	ხეჭრელი ჩვეულებრივი	No
140	<i>Fraxinus excelsior</i>	იფანი ჩვეულებრივი	No
141	<i>Fraxinus ornus</i>	იფანი თეთრი	No
142	<i>Fraxinus oxycarpa</i>	იფანი მახვილფოთოლა	No
143	<i>Fraxinus spnol</i>	იფანი უცნობი	No
144	<i>Genista abchasica</i>	კურდღლისცოცხა აფხაზეთის	Yes
145	<i>Genista adzharia</i>	კურდღლისცოცხა აჭარის	No

146	<i>Genista spnol</i>	კურდღლისცოცხა უცნობი	No
147	<i>Gleditsia triacanthos</i>	გლედისია სამეკალა	No
148	<i>Grossularia reclinata</i>	ხურტკმელი ჩვეულებრივი	No
149	<i>Halimodendron halodendron</i>	ჩინგილი მლაშობის	Yes
150	<i>Hedera colchica</i>	სურო კოლხური	No
151	<i>Hedera helix</i>	სურო ჩვეულებრივი	No
152	<i>Hedera pastuchovii</i>	სურო პასტუხოვის	No
153	<i>Hedera spnol</i>	სურო უცნობი	No
154	<i>Hippophae rhamnoides</i>	ქაცვი	No
155	<i>Humulus lupulus</i>	სვია	No
156	<i>Ignoratus spnol</i>	სრულიად უცნობი	-
157	<i>Ilex aquifolium</i>	ჰყორი ევროპული	No
158	<i>Ilex colchica</i>	ჰყორი კოლხური	No
159	<i>Ilex spnol</i>	ჰყორი უცნობი	No
160	<i>Jasminum fruticans</i>	ჟასმინი ბუჩქისებრი	No
161	<i>Jasminum nudiflorum</i>	ჟასმინი ჩინური	No
162	<i>Jasminum officinale</i>	ჟასმინი ნამდვილი	No
163	<i>Jasminum spnol</i>	ჟასმინი უცნობი	No
164	<i>Juglans mandshurica</i>	კაკალი მანჯურიის	No
165	<i>Juglans regia</i>	კაკალი ჩვეულებრივი	Yes
166	<i>Juglans spnol</i>	კაკალი უცნობი	-
167	<i>Juniperus excelsa</i>	ღვია მაღალი	No
168	<i>Juniperus foetidissima</i>	ღვია შავი	Yes
169	<i>Juniperus media</i>	ღვია მედია	No
170	<i>Juniperus oblonga</i>	ღვია გრძელწიწვანი	No
171	<i>Juniperus oxycedrus</i>	ღვია წითელი	No
172	<i>Juniperus polycarpus</i>	ღვია მრავალწიწვანი	Yes
173	<i>Juniperus pygmaea</i>	ღვია ქონდარა	No
174	<i>Juniperus sabina</i>	ღვია ყაზახური	No
175	<i>Juniperus spnol</i>	ღვია უცნობი	-
176	<i>Koelreuteria paniculata</i>	კოელრეუტერია ჩაქინდრული	No
177	<i>Laburnum anagyroides</i>	ოქროწვიმა ჩვეულებრივი	No

178	<i>Lagerstroemia indica</i>	ირმის რქა	No
179	<i>Larix americana</i>	ლარიქსი ამერიკული	No
180	<i>Larix decidua</i>	ლარიქსი ევროპული	No
181	<i>Larix spnol</i>	ლარიქსი უცნობი	No
182	<i>Larix sibirica</i>	ლარიქსი ციმბირული	No
183	<i>Laurus nobilis</i>	დაფნა კეთილშობილი	Yes
184	<i>Ligustrum japonicum</i>	კვიდო იაპონური	No
185	<i>Ligustrum lucidum</i>	კვიდო პრიალა	No
186	<i>Ligustrum spnol</i>	კვიდო უცნობი	No
187	<i>Ligustrum vulgare</i>	კვიდო ჩვეულებრივი	No
188	<i>Liriodendron tulipifera</i>	ლირიოდენდრონი ჩვეულებრივი ხეტიტა	No
189	<i>Lonicera caprifolium</i>	ცხრატყავა ჯიქა	No
190	<i>Lonicera caucasica</i>	ცხრატყავა კავკასიური	No
191	<i>Lonicera fragrantissima</i>	ცხრატყავა სურნელოვანი	No
192	<i>Lonicera iberica</i>	ცხრატყავა ქართული	No
193	<i>Lonicera spnol</i>	ცხრატყავა უცნობი	No
194	<i>Lycium barbarum</i>	თეთრეკალა წითელნაყოფა	No
195	<i>Maclura pomifera</i>	მაკლურა	No
196	<i>Magnolia grandiflora</i>	მაგნოლია მსხვილფეხილი	No
197	<i>Malus orientalis</i>	მაჟალო	No
198	<i>Malus spnol</i>	ვაშლი	No
199	<i>Melia azedarach</i>	მელია ჩვეულებრივი	No
200	<i>Mespilus germanica</i>	ზღმარტლი	No
201	<i>Morus alba</i>	თუთა თეთრი	No
202	<i>Morus nigra</i>	თუთა შავი	No
203	<i>Morus spnol</i>	თუთა უცნობი	No
204	<i>Nandina domestica</i>	ნანდინა	No
205	<i>Nerium oleander</i>	ოლეანდრე	No
206	<i>Nitraria schoberi</i>	ნიტრარია შობერის	Yes
207	<i>Olea europaea</i>	ზეთის ხილი ევროპის	No
208	<i>Orphanidesia gaultherioides</i>	ორფანიდეზია ორფანიდეზია	No
209	<i>Osmanthus decorus</i>	ზეთის ხე (წყავმაზა)	Yes

210	<i>Ostrya carpinifolia</i>	უხრავი	Yes
211	<i>Padus racemosa</i>	შოთხვი შოთხვი	No
212	<i>Paliurus spina-christi</i>	მეძვი ჩვეულებრივი	No
213	<i>Parrotia persica</i>	პაროცია ხერკინა	No
214	<i>Paulownia tomentosa</i>	პავლოვანია ბურძღლიანი	No
215	<i>Periploca graeca</i>	ღვედკევი	No
216	<i>Phellodendron amurense</i>	ფელოდენდრონი ამურის	No
217	<i>Philadelphus caucasicus</i>	უცვეთელა	No
218	<i>Photinia bodinieri</i>	ფოტინია დაკბილული	No
219	<i>Phyllostachys bambusoides</i>	ბამბუკი იაპონიის	No
220	<i>Phyllostachys edulis</i>	ბამბუკი მოსო	No
221	<i>Phyllostachys spnol</i>	ბამბუკი უცნობი	No
222	<i>Picea abies</i>	ნამკი ევროპული	No
223	<i>Picea orientalis</i>	ნამკი აღმოსავლური	No
224	<i>Picea spnol</i>	ნამკი უცნობი	No
225	<i>Pinus eldarica</i>	ფიჭვი ელდარის	No
226	<i>Pinus hamata</i>	ფიჭვი კავკასიური	No
227	<i>Pinus nigra</i>	ფიჭვი შავი	No
228	<i>Pinus pentaphylla</i>	ფიჭვი ხუთწიწვიანი	No
229	<i>Pinus peuce</i>	ფიჭვი ვეიმუტის	No
230	<i>Pinus pinaster</i>	ფიჭვი ზღვისპირა	No
231	<i>Pinus pinea</i>	ფიჭვი იტალიური	No
232	<i>Pinus pithyusa</i>	ფიჭვი ბიჭვინთის	Yes
233	<i>Pinus sosnowskyi</i>	ფიჭვი სოსნოვსკის	No
234	<i>Pinus spnol</i>	ფიჭვი უცნობი	-
235	<i>Pistacia mutica</i>	სალსალაჯი	Yes
236	<i>Pistacia spnol</i>	ფსტა უცნობი	-
237	<i>Pistacia vera</i>	ფსტა	No
238	<i>Platanus orientalis</i>	ქადარი აღმოსავლეთის	No
239	<i>Populus canadensis</i>	ვერხვი კანადური	No
240	<i>Populus euphratica</i>	ვერხვი ამიერკავკასიის თურანულა	Yes

241	<i>Populus hybrida</i>	ვერხვი ხვალა	No
242	<i>Populus nigra</i>	ვერხვი შავი	No
243	<i>Populus spnol</i>	ვერხვი უცნობი	No
244	<i>Populus tremula</i>	ვერხვი მთრთოლავი	No
245	<i>Prunus armeniaca</i>	ჭერამი	No
246	<i>Prunus avium</i>	ბალი ბალამწარა	No
247	<i>Prunus cerasifera</i>	ტყემალი	No
248	<i>Prunus cerasus</i>	ბალამწარა მწარე ნაყოფიანი	No
249	<i>Prunus laurocerasus</i>	წყავი წყავი	No
250	<i>Prunus persica</i>	ატამი ჩვეულებრივი	No
251	<i>Prunus spinosa</i>	კვრინჩხი	No
252	<i>Prunus spnol</i>	ბალი უცნობი	No
253	<i>Pterocarya pterocarpa</i>	ლაფანი	Yes
254	<i>Punica granatum</i>	ბროწეული ჩვეულებრივი	No
255	<i>Pyracantha coccinea</i>	ჩიტავაშლა ჩვეულებრივი	No
256	<i>Pyrus caucasica</i>	ბერყენა კავკასიური	No
257	<i>Pyrus demetrii</i>	ბერყენა დიმიტრის	Yes
258	<i>Pyrus ketzkhoveli</i>	ბერყენა კეცხოველის	Yes
259	<i>Pyrus sachokiana</i>	ბერყენა სახოკიას	Yes
260	<i>Pyrus salicifolia</i>	ბერყენა ტირიფოტოლა	No
261	<i>Pyrus spnol</i>	ბერყენა	No
262	<i>Quercus castaneifolia</i>	მუხა წაბლფოთოლა	No
263	<i>Quercus dshorochensis</i>	მუხა ჭოროხის	No
264	<i>Quercus hartwissiana</i>	მუხა კოლხური	Yes
265	<i>Quercus iberica</i>	მუხა ქართული	No
266	<i>Quercus ilex</i>	ქვამუხა	No
267	<i>Quercus imeretina</i>	მუხა იმერული	Yes
268	<i>Quercus macranthera</i>	მუხა მაღალმთის	Yes
269	<i>Quercus pedunculiflora</i>	მუხა ჭალის	Yes
270	<i>Quercus pontica</i>	მუხა პონტოური	Yes
271	<i>Quercus spnol</i>	მუხა უცნობი	-
272	<i>Quercus suber</i>	მუხა კორპის	No

273	<i>Rhamnus cathartica</i>	ხეშავი ჩვეულებრივი	No
274	<i>Rhamnus imeretina</i>	ხეშავი იმერული	No
275	<i>Rhamnus pallasii</i>	ხეშავი შავჯაგა	No
276	<i>Rhamnus spnol</i>	ხეშავი უცნობი	-
277	<i>Rhododendron caucaseum</i>	დეკა	No
278	<i>Rhododendron luteum</i>	შქერი იელი	No
279	<i>Rhododendron ponticum</i>	შქერი შქერი	No
280	<i>Rhododendron smirnowii</i>	შქერი სმირნოვის	Yes
281	<i>Rhododendron spnol</i>	შქერი უცნობი	-
282	<i>Rhododendron ungerii</i>	შქერი უნგერნის	Yes
283	<i>Rhus chinensis</i>	თუთუბო ჩინური	No
284	<i>Rhus coriaria</i>	თუთუბო თუთუბო	No
285	<i>Rhus spnol</i>	თუთუბო უცნობი	No
286	<i>Rhus verniciflua</i>	თუთუბო ლაქის ხე	No
287	<i>Ribes alpinum</i>	მოცხარი მაღალმთის	No
288	<i>Ribes biebersteinii</i>	მოცხარი კავკასიური	No
289	<i>Ribes orientale</i>	მოცხარი აღმოსავლეთის	No
290	<i>Ribes spnol</i>	მოცხარი უცნობი	No
291	<i>Robinia pseudoacacia</i>	რობინია ცრუ აკაცია	No
292	<i>Rosa canina</i>	ვარდი ასკილი	No
293	<i>Rubus bushii</i>	მაყვალა ჟოლო	No
294	<i>Rubus spnol</i>	მაყვალა	No
295	<i>Ruscus aculeatus</i>	თაგვისარა	No
296	<i>Ruscus colchicus</i>	ძმერხლი	No
297	<i>Ruscus spnol</i>	ძმერხლი თაგვისარა უცნობი	No
298	<i>Salix alba</i>	ტირიფი წნორი	No
299	<i>Salix babylonica</i>	ტირიფი მტირალა	No
300	<i>Salix caprea</i>	ტირიფი მდგნალი	No
301	<i>Salix kikodseae</i>	ტირიფი ქიქოდის	Yes
302	<i>Salix spnol</i>	ტირიფი უცნობი	-
303	<i>Salix viminalis</i>	ტირიფი მანეული	No

304	<i>Sambucus nigra</i>	დიდგულა შავი	No
305	<i>Sambucus spnol</i>	ანწლი უცნობი	-
306	<i>Sambucus tigranii</i>	ანწლი ტიგრანის	Yes
307	<i>Smilax excelsa</i>	ეკალიჭი ჩვეულებრივი	No
308	<i>Sorbus caucasigena</i>	ცირცელი ჭნავი	No
309	<i>Sorbus graeca</i>	ცირცელი ამპურა	No
310	<i>Sorbus hajastana</i>	ამპურა სომხური	Yes
311	<i>Sorbus spnol</i>	ცირცელი უცნობი	-
312	<i>Sorbus torminalis</i>	ცირცელი თამელი	No
313	<i>Spartium junceum</i>	კურდღლისცოცხა ესპანური	No
314	<i>Spiraea crenata</i>	გრაკლა ფოთოლდაკბილული	No
315	<i>Spiraea hypericifolia</i>	გრაკლა კრაზანაფოთლიანი	No
316	<i>Spiraea spnol</i>	გრაკლა უცნობი	No
317	<i>Staphylea colchica</i>	ჯონჯოლი კოლხური	Yes
318	<i>Staphylea pinnata</i>	ჯონჯოლი ჩვეულებრივი	No
319	<i>Staphylea spnol</i>	ჯონჯოლი უცნობი	-
320	<i>Styphnolobium japonicum</i>	სოფორა იაპონური	No
321	<i>Swida australis</i>	შინდანწლა	No
322	<i>Syringa vulgaris</i>	იასამანი ჩვეულებრივი	No
323	<i>Tamarix ramosissima</i>	იალღუნი ჩვეულებრივი	No
324	<i>Taxodium distichum</i>	ტაქსოდიუმი ჭაობის	No
325	<i>Taxus baccata</i>	უთხოვარი ჩვეულებრივი	Yes
326	<i>Thea sinensis</i>	ჩაი ჩინური	No
327	<i>Thuja occidentalis</i>	ტუია დასავლეთის	No
328	<i>Thymus karjaginii</i>	ზეგქონდარა კარიაგინის	Yes
329	<i>Tilia caucasica</i>	ცაცხვი კავკასიური	No
330	<i>Tilia cordata</i>	ცაცხვი წვრილფოთლოვანი	No
331	<i>Tilia spnol</i>	ცაცხვი უცნობი	No
332	<i>Trachycarpus fortunei</i>	ტრახიკარპუსი ფორტუნის	No
333	<i>Ulmus carpiniifolia</i>	თელა ჩვეულებრივი	No
334	<i>Ulmus elliptica</i>	თელა ელიფსური	No
335	<i>Ulmus georgica</i>	თელა ქართული	No

336	<i>Ulmus glabra</i>	თელადუმა შიშველი	Yes
337	<i>Ulmus minor</i>	თელადუმა პატარა	Yes
338	<i>Ulmus scabra</i>	თელა თელამუშა	No
339	<i>Ulmus spnol</i>	თელა უცნობი	-
340	<i>Ulmus suberosa</i>	თელა კორპის	No
341	<i>Vaccinium arctostaphylos</i>	მოცვი კავკასიის მაღალი	No
342	<i>Vaccinium idaea</i>	მოცვი წითელი	No
343	<i>Vaccinium myrtillus</i>	მოცვი მოცვი	No
344	<i>Vaccinium spnol</i>	მოცვი უცნობი	No
345	<i>Vaccinium uliginosum</i>	მოცვი ლურჯი	No
346	<i>Vernicia fordii</i>	ტუნგო ჩინური	No
347	<i>Viburnum lantana</i>	მახველი უზანი	No
348	<i>Viburnum opulus</i>	მახველი	No
349	<i>Viburnum orientale</i>	მახველი მოლოზანა	No
350	<i>Viburnum spnol</i>	მახველი უცნობი	No
351	<i>Vitis sylvestris</i>	ვაზი ტყის	No
352	<i>Zelkova carpinifolia</i>	ძელქვა	Yes
353	<i>Ziziphus jujuba</i>	უნაბი ჩვეულებრივი	No

Note: Species unknown is ID 295 "Ignoratus sp."

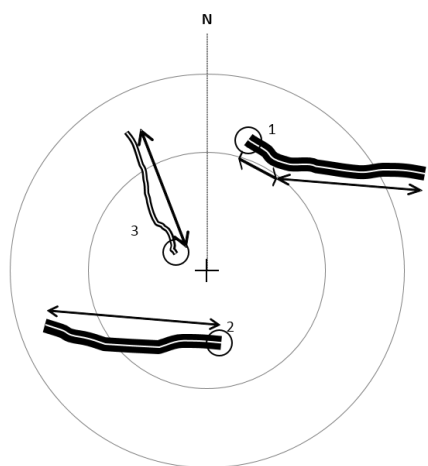
3.6 List of Forest Types - Ground Component

The combination of ground component and dominant wood species define the forest type. Ground component is an important element to define the forest type and it can be covered with grass or dominant species of sub-forest

Code	Forest Type
1	<i>Festuc</i>
2	<i>Vaccinium</i>
3	Fern
4	<i>Rubus</i>
5	<i>Ilex aquifolium</i>
6	<i>Prunus laurocerasus</i>

7	Alpestrine
8	Litter
9	<i>Viburnum orientalis</i>
10	<i>Rhododendron ponticum</i>
11	<i>Carex</i>
12	Mixed grass cover
13	<i>Rhododendron luteum</i>
14	<i>Oxalis spp.</i>
15	Nut
16	<i>Rhododendron caucasicum</i>
17	<i>Pistacia atlantica</i>
18	<i>Juniperus sabina</i>
19	<i>Celtis spp.</i>
20	Dominated by other species – the species will be noted down in type field

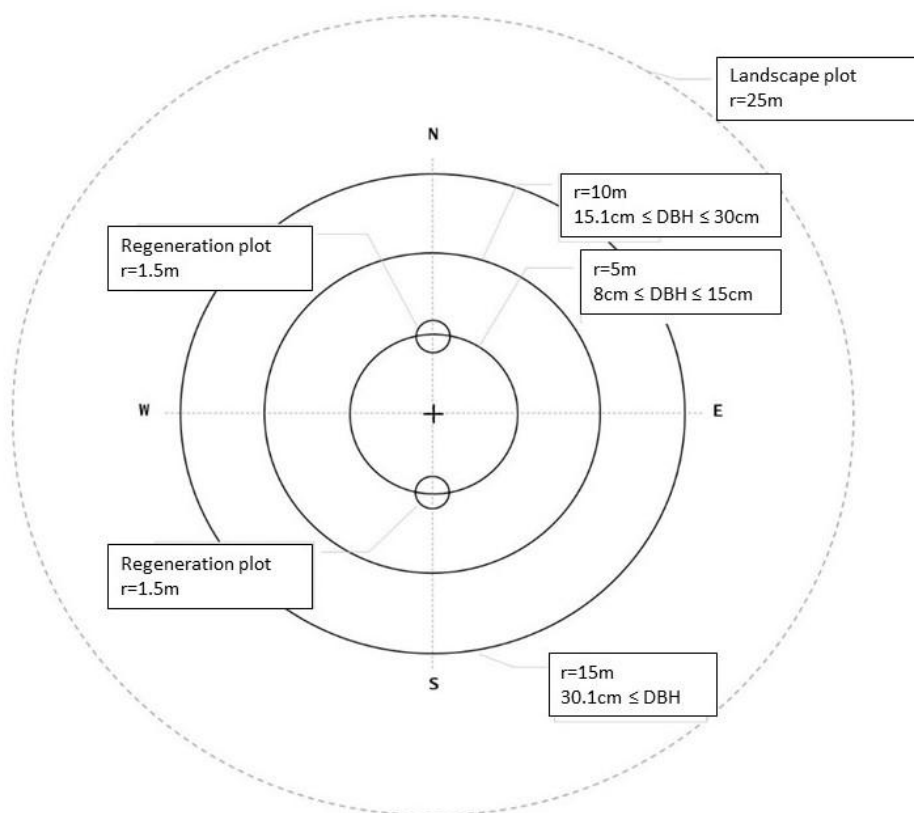
3.7 Assessment of Down Dead Wood



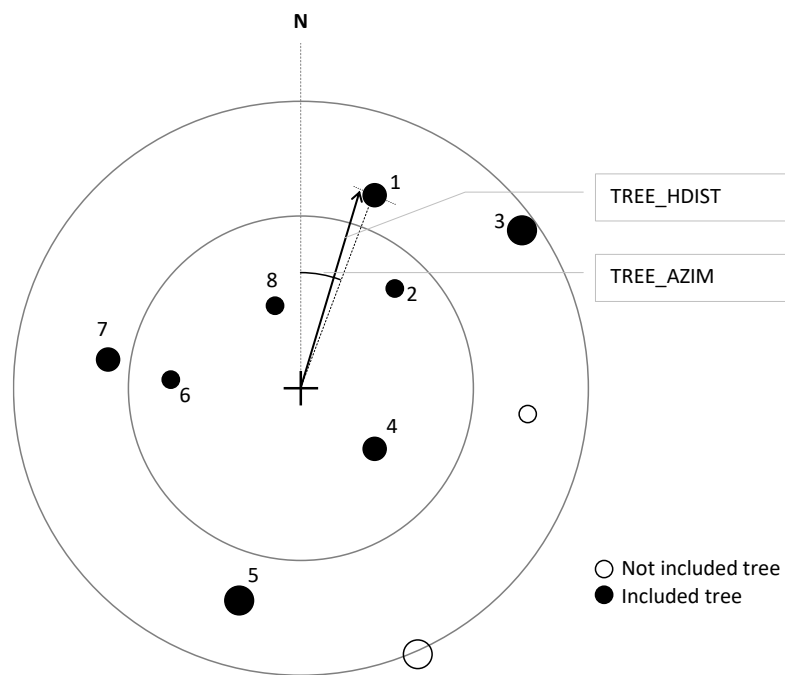
Both parts are measured separately in case of fork tree.

In case of non-cylindric deadwood pieces, diameter is measured in two perpendicular directions assessing the maximum and minimum value of the respective diameter. Arithmetic mean value is calculated and documented.

3.8 Graphical Reflection of Trees Measurement in Different Radius Cycles of Sample Plot



3.9 Selection of Single Tree Variables (Horizontal Distance, Azimuth, Tree ID)

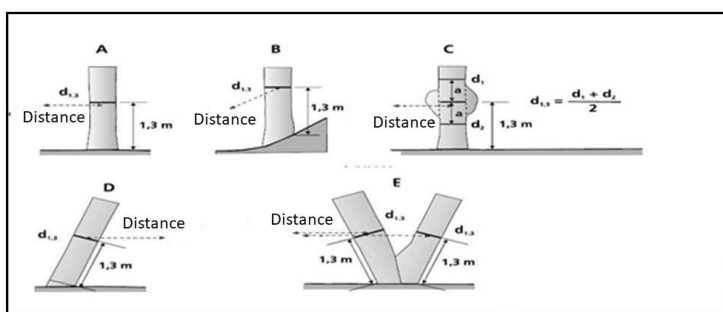


3.10 DBH of Single Forest Tree

The figure shows some instructions how to measure DBH in certain cases.

Definition of DBH and distance measurements for special cases. In case of situations not covered by the examples displayed below, assessment is to be done in a way that represents the given characteristics (i.e. volume) as good as possible.

Whenever diameters are assessed with adjusted methods, a short description must be provided in the commenting section.



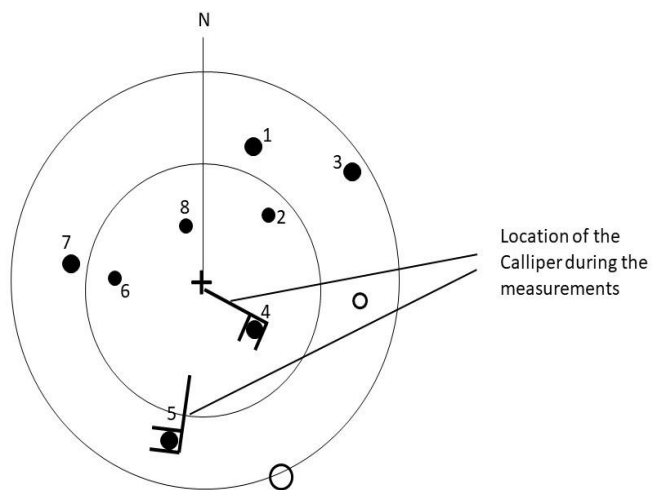
DBH measurement with tape: The tape must be tightened perpendicular to the stem axis. Climbers growing at the stem need to be removed or the tape must be lanced below:



Measuring DBH with a tape (left) and a diameter calliper (right).

DBH measurement with calliper: Calliper is used perpendicular to the stem axis. Climbers growing on the stem have to be removed and measurement is done without climbers. The ending part of the tool should be directed towards the centre of the Sample Plot as shown in the picture. If the tree diameter is too big and it is not possible to use a calliper, then it will be measured by tape.

Independent of the measurement tool and the height of the diameter measurement, the measuring point shall be marked with a tree marker.

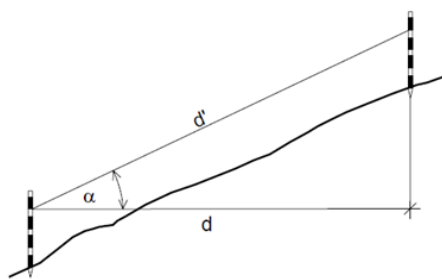


3.11 Horizontal Distance towards the Tree and Stump

Description/Definition

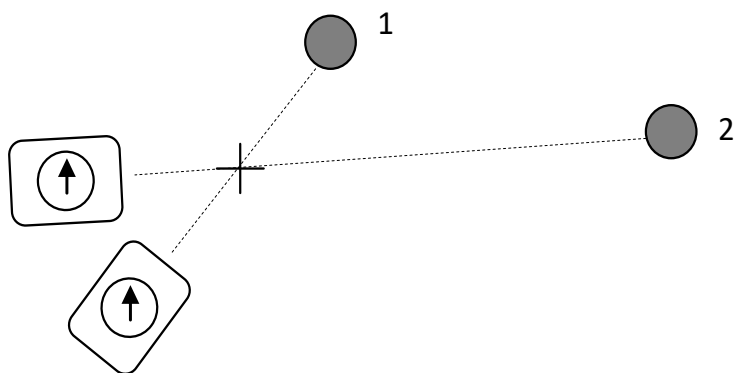
Horizontal distance between the Sample Plot centre and the tree stem centre at the height of 1.3 m.

This distance can be measured by using Vertex Laser Geo, it can be measured from the Sample Plot centre to the tree.



In case of stumps, the horizontal distance is measured from the Sample Plot centre to the centre of the stump top.

3.12 Graphic Imagery of Measuring Azimuth of Reference Objects

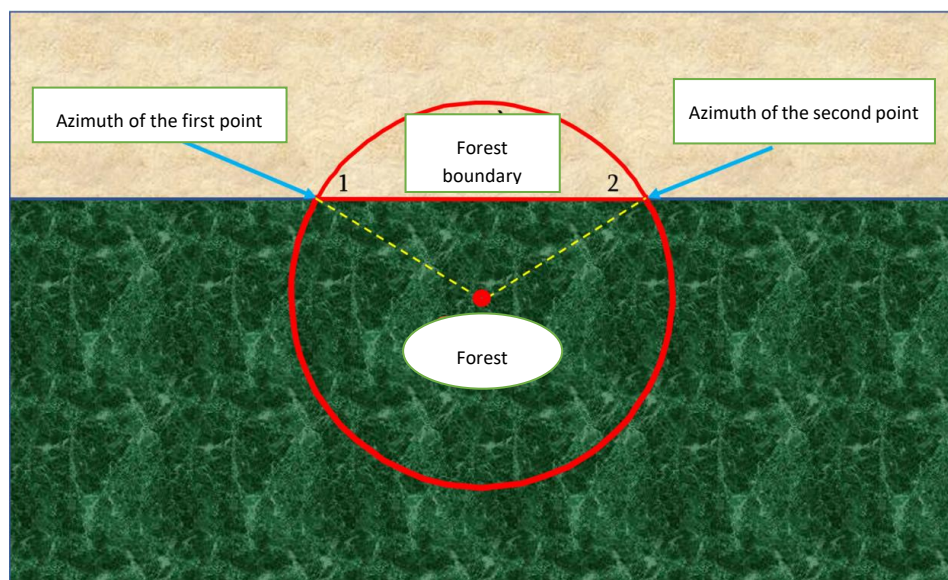


3.13 Forest Boundary Points

First figure shows an example when the Sample Plot is cut with the straight-line boundary. In this case it is necessary to record the azimuth of the first and the second points.

Order must always be followed as shown below:

Figure 1



The second and the third figures show examples when the Sample Plot is not crossed with straight-line forest boundary. In such case it is necessary to record the azimuth of the first and second points and for the third point – azimuth and horizontal distance from the centre. Independent of the shape of the boundary, no assessment shall be done beyond the recorded boundary line.

Order of the points must always be kept as shown below:

Figure 2

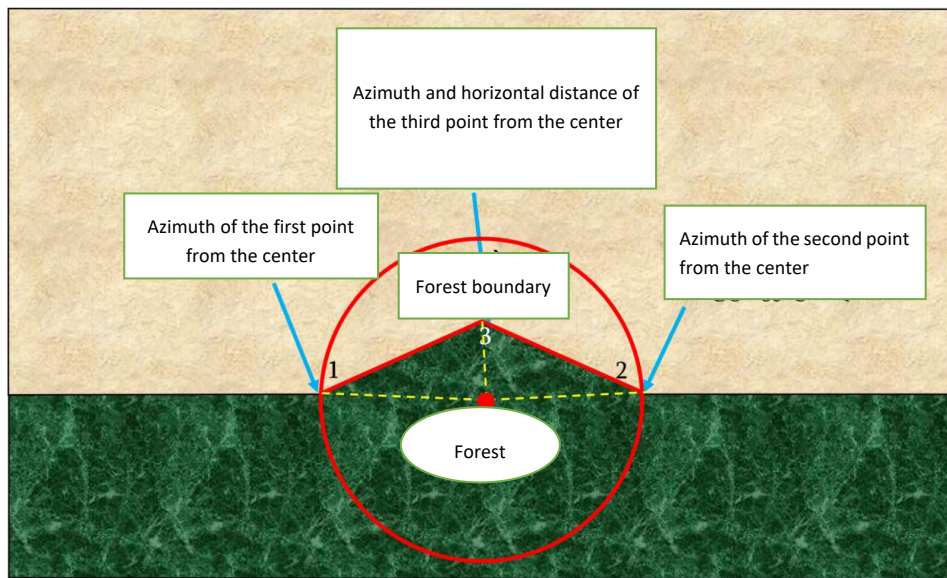


Figure 3:

