FunDivEUROPE

Functional significance of forest biodiversity in Europe

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Plot characterization protocol Exploratory Platform

FunDivEUROPE (FP7) field protocol

V1.0

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Content

1 Introduction

The Exploratory Platform is one of the three scientific platforms of the FunDivEUROPE project. It consists of a network of observational plots that vary primarily in tree diversity: monocultures, 2-, 3- and 4-species mixtures. In each of six study regions, *ca.* 40 plots of 30 m × 30 m will be established according to a strict plot selection manual. This protocol describes the procedure for the characterization of each of those plots, which will be synthesised in an extensive plot description report (deliverable D1.1). The plot characterization will follow a two-step procedure with a first coarse description (used in the selection procedure) followed by a detailed description of the final selection of plots. For more information on the first characterization round we also refer to the detailed plot selection manual.

2 Objectives

The objective of this manual is to work out a two-step, uniform methodology for the full description of the Exploratory Platform. The protocol covers the characterization of plot-level environmental conditions (soil, topography, ...), forest management and structure, tree species composition and individual tree positions.

3 Location of measurements and sampling

3.1 Field sampling design

The first plot characterization round will be performed before the plots are physically marked in the field. It is a coarse description of a site that might be included as a plot in the final platform. The field design is therefore plotless. The second characterization round is used to describe the environmental conditions and tree population of the entire plot. The entire plot is thus the observational unit for making a full stand description.

3.2 Sampling equipment

Both characterization rounds:

- Plot characterization template I or II;
- GPS device;
- Two measuring tapes of at least 30 m.

Only for second characterization round:

- A calliper to measure tree diameter at breast height;
- Calibrated device to measure distances up to 20 m, for instance with laser (e.g., Vertex) [optional];
- Soil augur of at least 70 cm long;
- Magnetic compass.

3.3 Frequency of sampling

First characterization round: during plot selection (March-May).
Second characterization round: after final plot selection (before the end of October).

4 Measurements

4.1 First characterization round: site descriptors (during plot selection)

During the first phase of the plot selection of the Exploratory Platform, an oversample of about 200 locations is selected in each of the six study regions following a strict protocol (see Plot selection manual). During this first phase, a set of basic site descriptors is recorded for each location using a template plot characterization form (Template I, see below). The template contains a section on plot identification (e.g., code, GPS coordinates), soil conditions, forest management and stand characteristics. Each white box should be completed.

4.2 Second characterization round: tree positioning (after final plot selection)

During the second characterization round, the plot-level site descriptors (§4.1) are complemented with a detailed description of the canopy species composition and structure. All trees with diameter at breast height (dbh) > 7.5 cm will be positioned. For each individual > 7.5 cm dbh we need:

- species name;
- x- and y-coordinate (± 10 cm accuracy);
- dbh (± 0.5 cm accuracy).

This means we need an explicit agreement on the coordinate system that is being used, i.e., the location of the origin (x = 0, y = 0) and the direction of the axes. The exact location of the nine 10 m × 10 m subplots is also attached to this coordinate system. Fig. 1A gives a graphical representation of the x- and y-axis coordinates for a single plot in the Exploratory Platform. The corner post that indicates the x = 0, y = 0 (and the corner of subplot 1) will receive a unique mark (see plot establishment protocol).

Many techniques can be used for tree positioning, each with its own pros and cons. Each of the six regions may use its own method based on the availability of measuring equipment, experience and the particularities of the local forest type. The method described below is a low-tech, sound method that is worked out as an illustrative example. Other methods are for instance the Field Map system or a procedure with an ultrasonic distance measurer and a central transponder. No matter how the trees are positioned, the **data are compiled in one of**

two coordinate systems: the final x, y system (Fig. 1A) or the system with a central, vertical B position and horizontal A-left or A-right position (Fig. 1B). A template data sheet for the x,y or A,B system is given below (Template II).

The low-tech method for tree positioning is illustrated in Fig. 1B:

- In this method, the tree positions are estimated visually using measuring tapes. Because the estimation error increases with distance between the tree and the tape and because it may become difficult to observe trees at a 30 m distance, a measuring tape is laid out along the central axis of the plot. This tape forms the B-axis and is oriented towards the north (in case of flat areas) or towards the top of the steep slope. The orientation (wind direction) of the B-axis is recorded. In this way, the lower left corner post, which can be identified because of its unique marking (e.g., two red strips), always lies on A (left) = 15 and B = 0. Subplot number 1 is also in the lower left corner of the plot.

- There are two ways to estimate the A- and B-coordinates of each tree:
    - With device to measure distances: one person moves along the B-axis measuring tape, the second goes from tree to tree. The first person starts at B = 0, the second person identifies the first tree on the left hand side of the B-axis and measures its diameter at breast height (dbh) with a calliper. He places the transponder of the measuring device to the tree so that the first person can measure the A position. The B coordinate can estimated from the measuring tape. The posts marking the subplots have known coordinates and can be used as a control.

    - With a second measuring tape: the second tape is laid out along the bottom side of the plot (at B = 0) and forms the A-axis. The first person moves along the y-axis, the second person measures the dbh. In this case, both the A- and B-position are estimated from the two tapes, subplot posts are used as a control. The tape along the A-axis is moved towards the top of the plot if necessary (e.g., placed at B = 10 and B = 20).

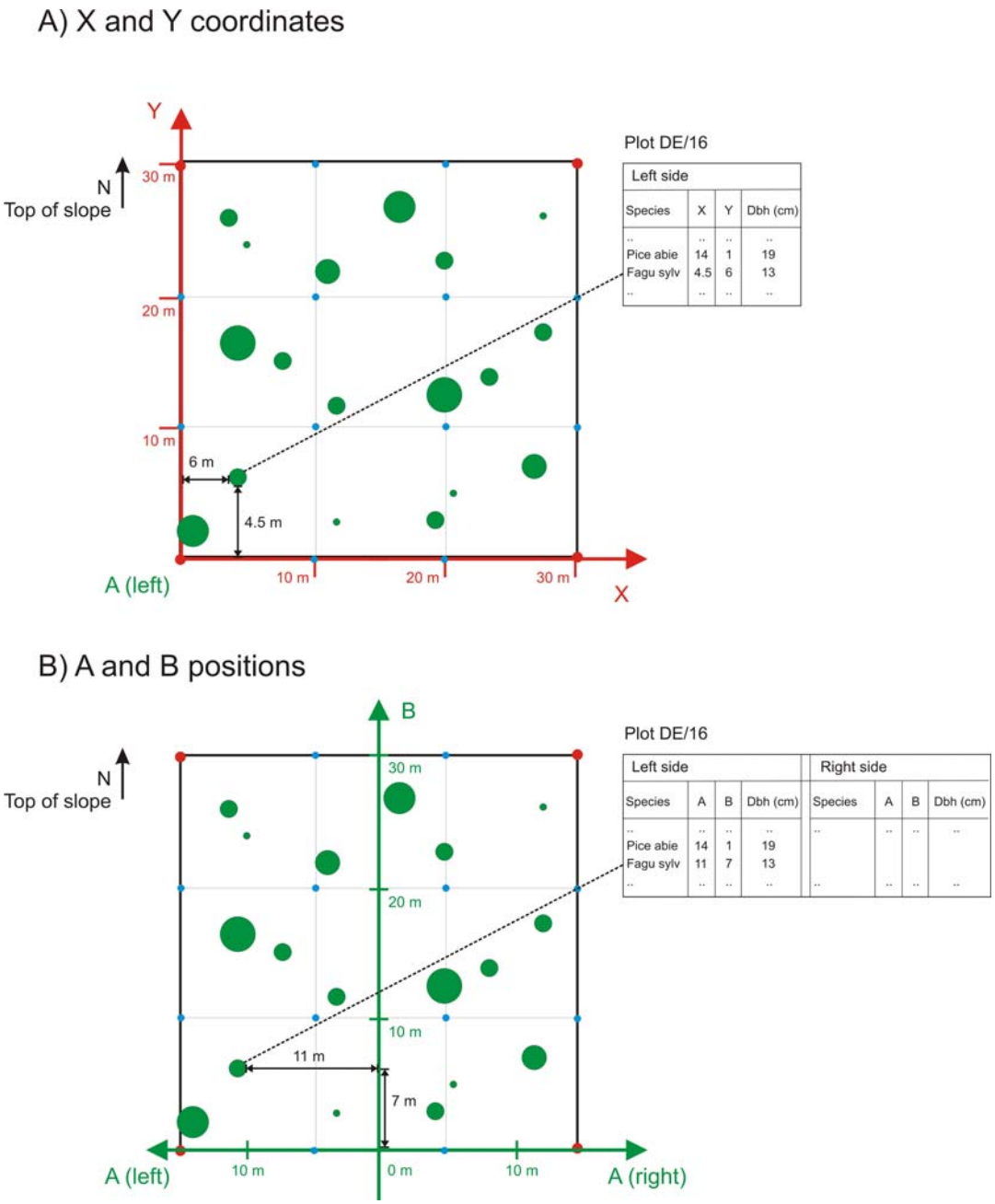

Figure 1: Schematic overview of two coordinate systems for tree positioning. The X and Y positions will be the final coordinates for the project. See text for a detailed description.

5 Templates for data sheets

Plot characterization template I

1. Identification

Plot ID:	GPS: N ___ ° _____’ E___ ° _____’
Date:	Surveyor:

2. Site description

Ownership	State / Communal / Private / ____
Accessibility	____ m walk from 4WD accessible road
Altitude	____ m
Slope	flat (< 5% / 3°) / medium slope (< 50% / 27°) / steep slope (> 50 % / 27 °)
Exposition	N / NE / E / SE / S / SW / W / NW

3. Soil conditions

Cover coarse rocks and boulders	____ %
Type bedrock (e.g., granite, gneiss)	
Bedrock calcareous	Yes / No
Field estimation soil constituents*	Sand: dominant / clearly present / little Silt: dominant / clearly present / little Clay: dominant / clearly present / little
Soil drainage	dry / fresh / moist / wet
Average soil depth (A + E + B + C horizon)	< 20 cm / 20-40 cm / 40-60 cm / 60-80 cm / > 80 cm
Soil type (FAO WRB reference group, e.g., luvisol, cambisol, podzol) http://www.fao.org/ag/agl/agll/wrb/doc/wrb2006final.pdf	

*__Clay__: soils fingers, is cohesive (sticky), is formable, has a high plasticity and has a shiny surface after squeezing between fingers. __Silt__: soils fingers, is non-sticky, only weakly formable, has a rough and ripped surface after squeezing between fingers and feels very floury (like talcum powder). __Sand__: cannot be formed, does not soil fingers and feels very grainy.

4. Stand characteristics and forest management

Species richness level	1 / 2 / 3 / 4

Past forest management	Clear cutting / coppicing / coppice-with-standards / group cutting / selective cutting / minimal intervention			
Current Forest management	Clear cutting / coppicing / coppice-with-standards / group cutting / selective cutting / minimal intervention			
Tree species			Forest structure	Single / multiple layered canopy
1.			Age distribution	Even / uneven aged
2.			Stand age (if relevant)	____ years
3.			# canopy forming trees	____ trees/ha
4.			Average dbh canopy trees	____ cm
5.			Estimated canopy closure canopy trees	____ %
			Estimated canopy closure shrub layer	____ %

4. Additional information

Plot characterization template II

Template data sheet if the X,Y coordinate system is used (Fig. 1A)

Tree ID	Species	X	Y	Dbh (cm)

Template data sheet if the A,B coordinate system is used (Fig. 1B)

Left side				
Tree ID	Species	A	B	Dbh (cm)

Right side				
Tree ID	Species	A	B	Dbh (cm)