SFM VR

Sustainable Forest Management
through Virtual Reality

TRAINING 2000 ITALY

CTRL REALITY

Universitatea Ştefan cel Mare Suceava

TTS Työtehoseura

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Innovative digital tools and methodologies in SFM training in Italy

Hybrid seminar 05.10.2022

Kylene De Angelis, Training2000 (Italy)

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1. Marteloscope and I+Software

- Marteloscopes for **Italian** forestry management and trainings

- Collected data (georeferencing, biometric characteristics, community functions, ecological value, etc.)

- **special software** that allows the return in quantitative and graphical terms of silvicultural choices simulated by users.

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I+Software

The I+ software is used to perform virtual tree selection exercises in designated forest training or marteloscopes.

The I+ software package consists of four components

- **I+ Manager** desktop - Allows to manage and update any information on individual sites
- **I+ Trainer** for mobile devices -Used for conducting marteloscope exercises in the field.
- **Central I+ Repository** stores all marteloscope information (e.g. inventory data, exercise design, user accounts and exercise results).
- **I+ API** server-based app - Supports communication between I+ Trainer and I+ Repository.

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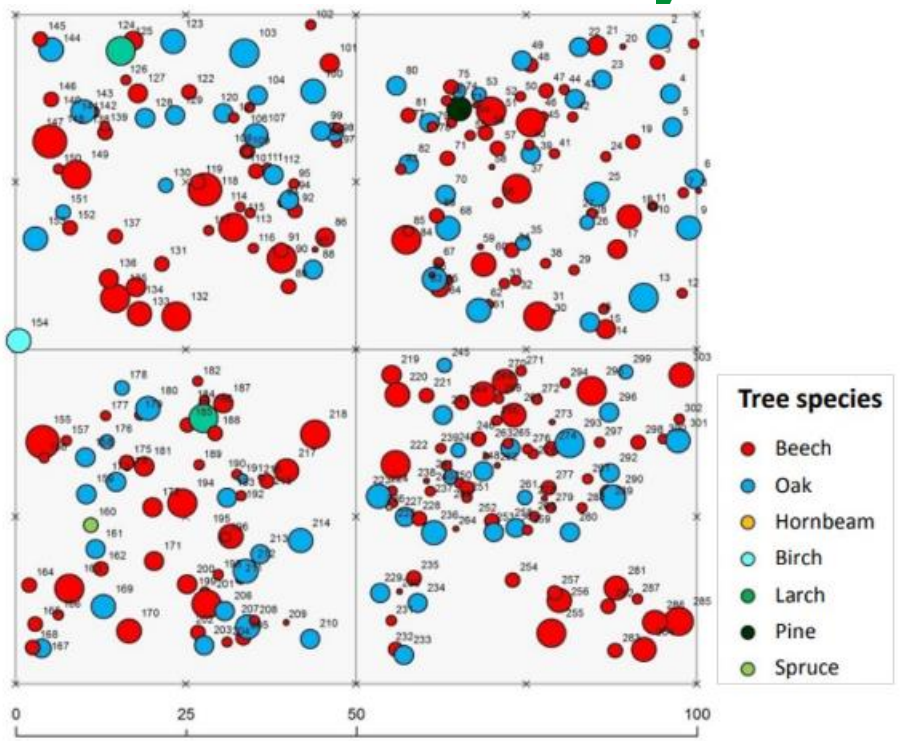
I+TRAINER

Specific marteloscope area for different exercises and simulations



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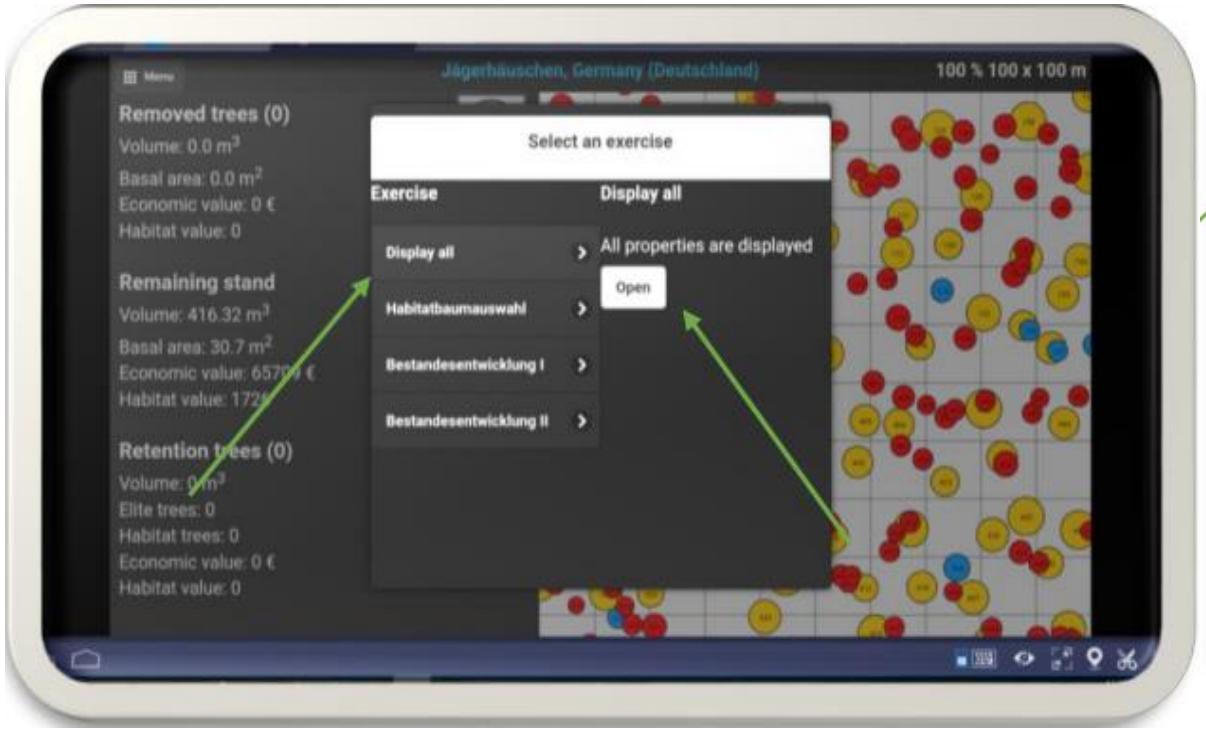

You can select the desired exercise. Some marteloscopes have a set of predefined exercises, others don't.

You can access three types of overview information

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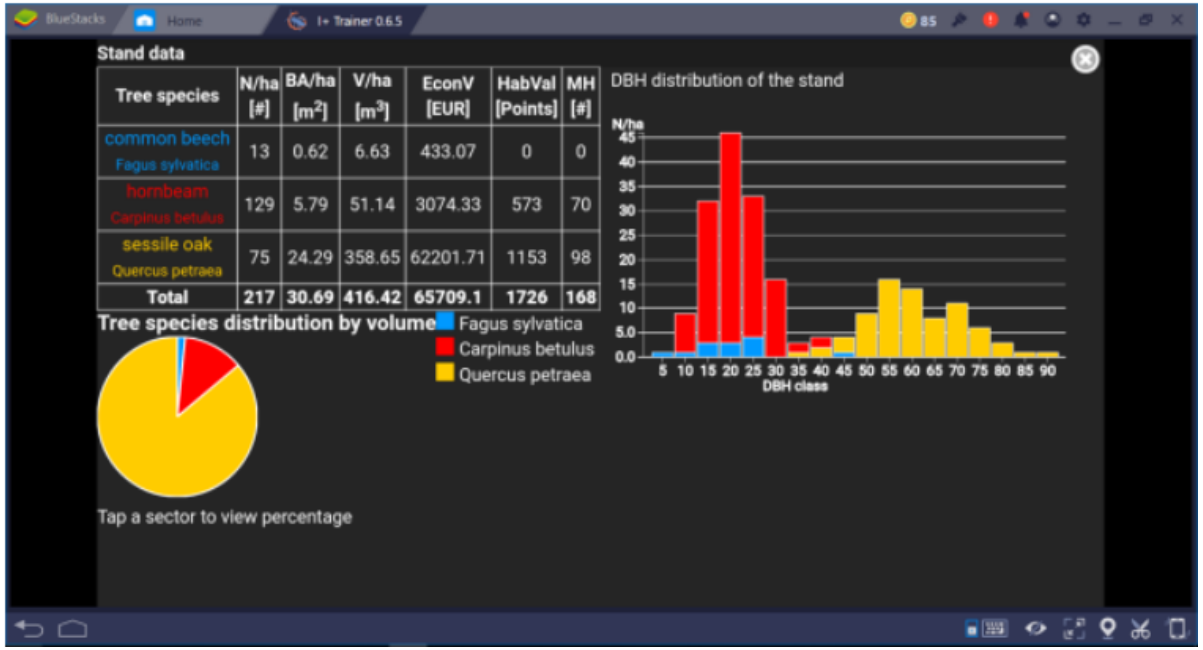

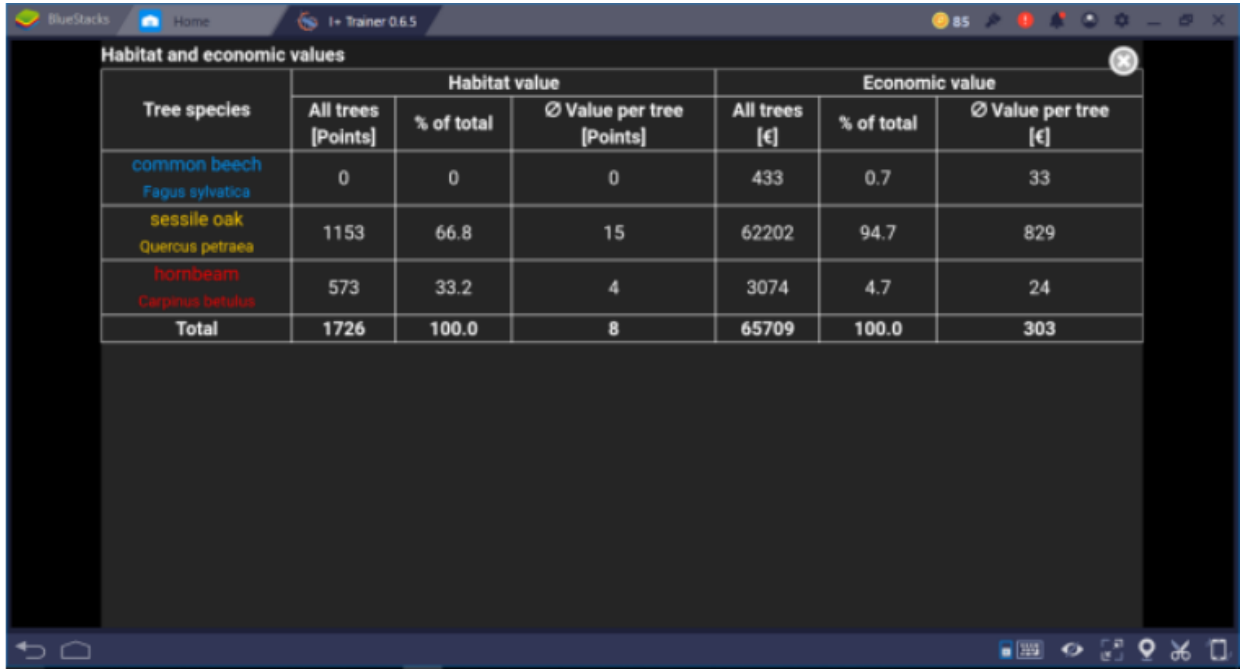

Stand data: stand composition, tree number, basal area, economic value, habitat value and microhabitats

Stand value: more detailed overview of the economic and habitat value of the stand

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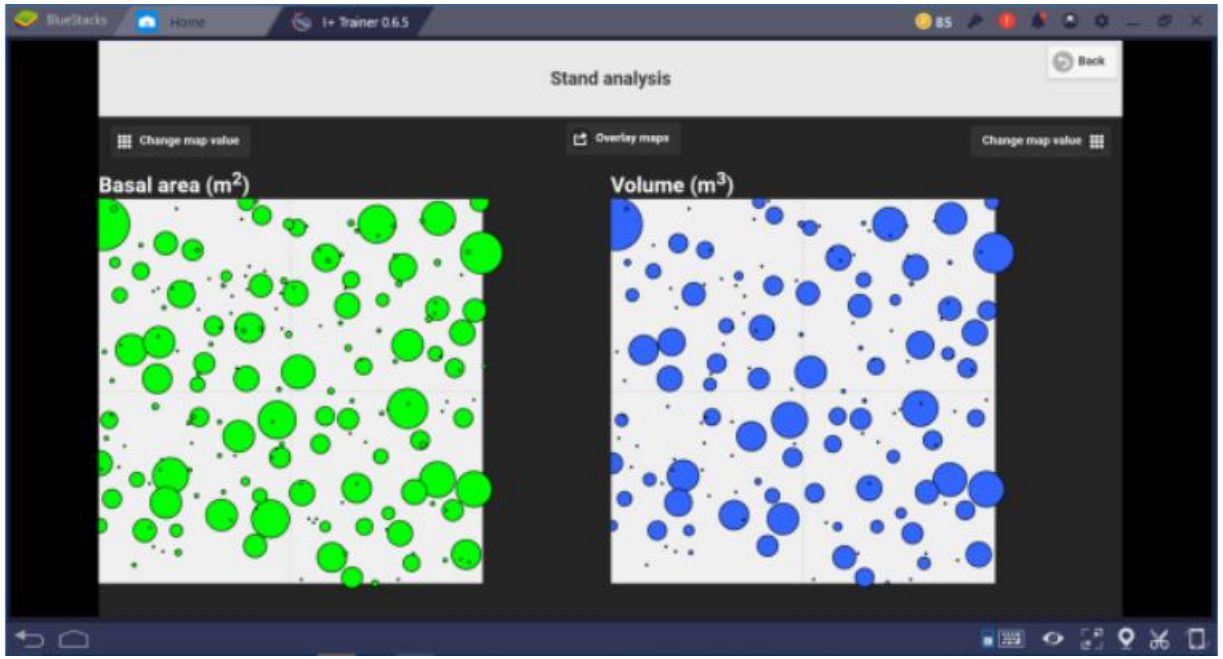

Compare maps: This tool allows you to get a visual view of the different attributes of the stand. The data include: habitat value, volume (m3), economic value (€), basal area (m2)

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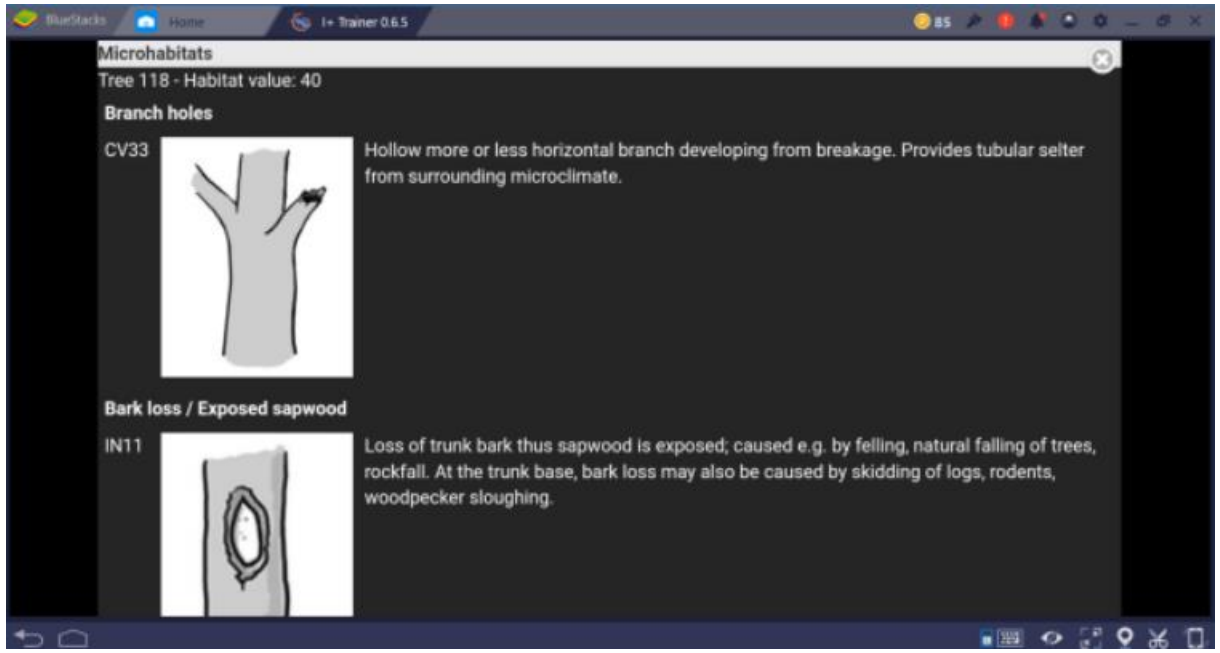

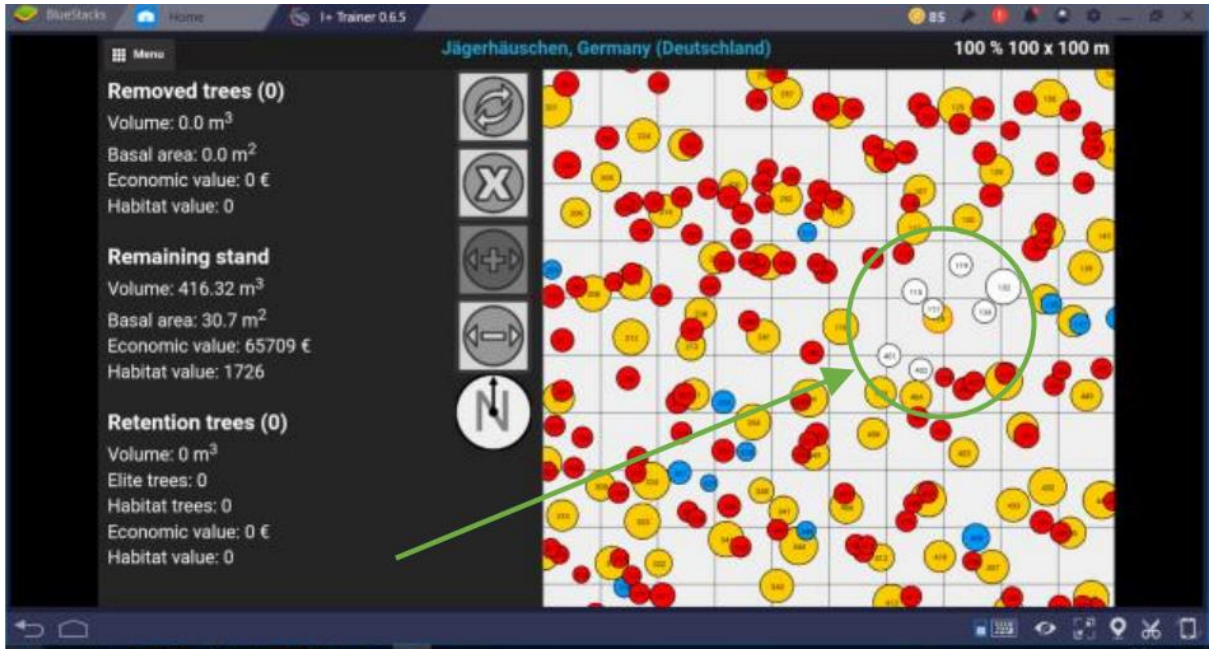

Tree Information:

- **Basic information**: species, ID number, height and basal area
- **Microhabitats:** tree microhabitats
- **Quality distribution**: overview of the wood quality classes of the stem.
- **Toggle competing trees**: the competitors of the selected trees are highlighted in white

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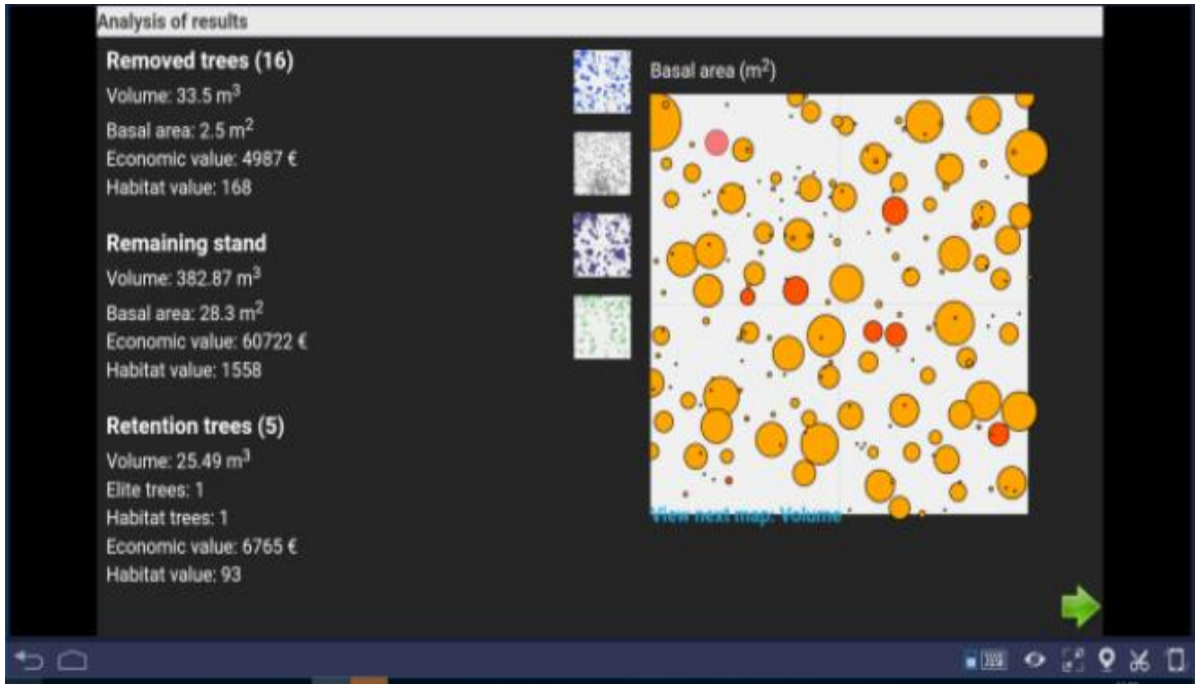

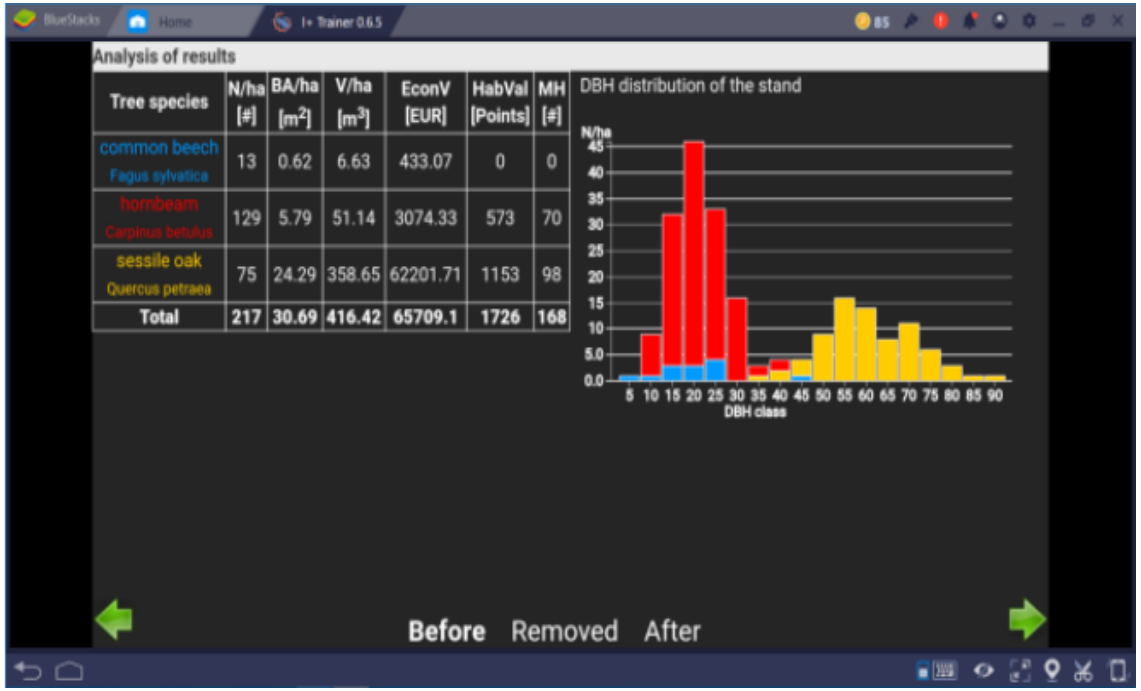

Thinning maps: the first tool offers a map view of the harvested trees. There is a choice between four maps, picturing - habitat value - volume (m3) - economic value (€) - basal area (m2)

Value graphs: overview of the stand data after the thinning, to be compared with the initial situation

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After selecting all the desired trees, you can see the results and a summary of a virtual forest operation.

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2. 3I3D Algorithm- Arezzo Tuscany

A research article in Journal of Silviculture and Forest Ecology available here

Three Indices Three Dimensions (3I3D) is an unsupervised algorithm that, without requiring input parameters or calibrations, allows the **identification of forest changes** (such as clear cuts, fires and pathogen damage, or other natural disturbances such as wind, drought or frost) and the creation of a automatic **tridimensional map**.

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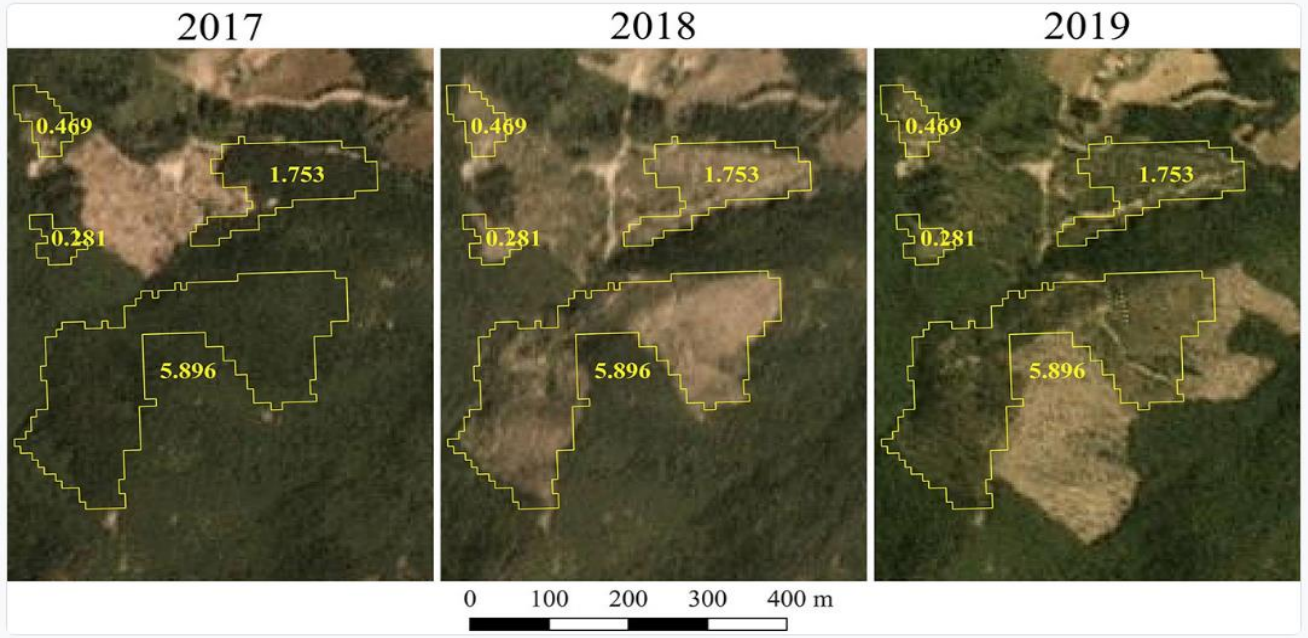
3I3D Algorithm- Arezzo Tuscany

A new method for forest disturbance mapping and area estimation based on optical remotely sensed imagery.



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3. INTEGRATION OF GEOMATIC TECHNIQUES FOR THE 3D REPRESENTATION

research study by UNIVPM about photogrammetry for an accurate forest and individual tree three-dimensional (3D) reconstruction .

A 3D representation of a chestnut tree (Castanea sativa Mill.) containing various data for users.

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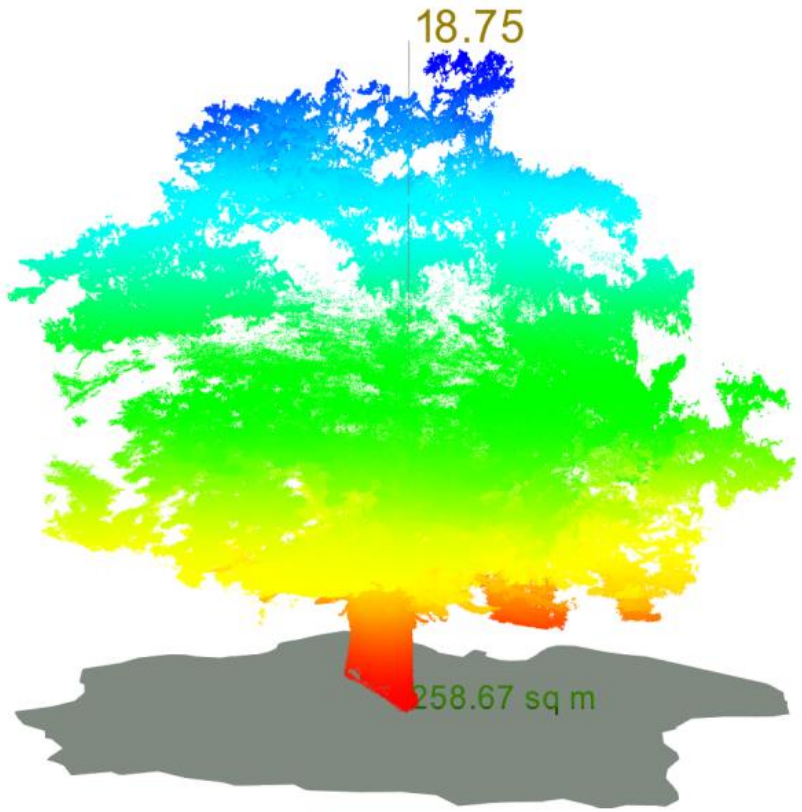
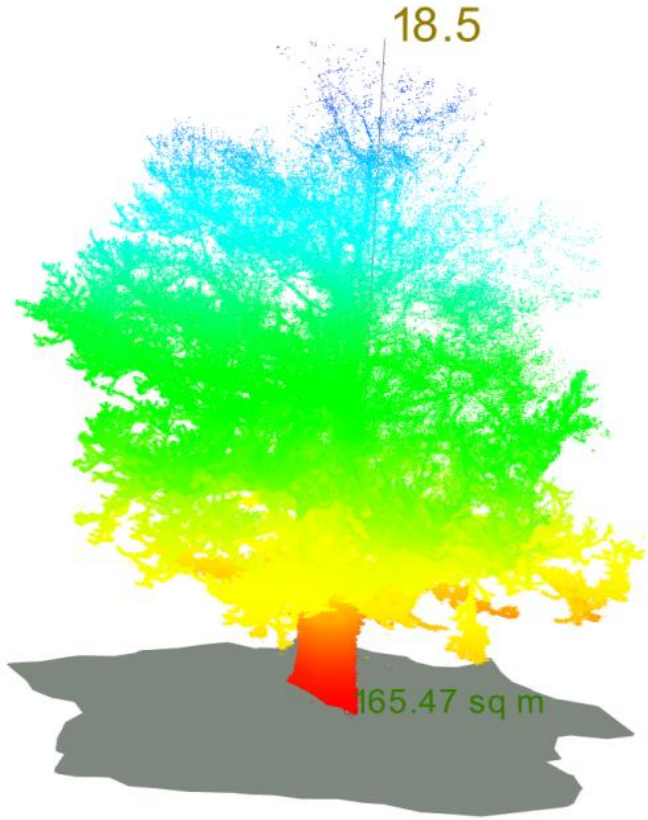
3D Forest outputs





The veteran chestnut tree in the summer and winter season.
3DForest outputs showing the TH (m) and the crown basal area (sq m).

Mesh of the tree skeleton by AdQSM algorithm

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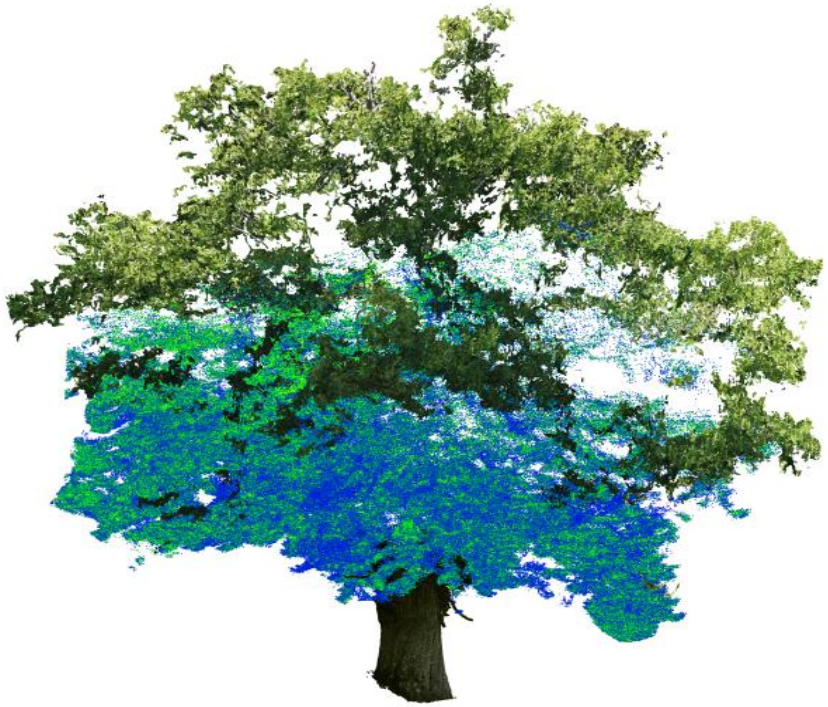
3D Graphic Restitution



3D tree model: upper crown by UAV, lower crown by MLS and trunk by reflex.

The three-dimensional veteran chestnut tree is consequently used as a ”data container”.

The cloud can be updated throughout the years, obtaining a historical representation useful to monitor the evolution and the decay of this ancient tree, with the integration of new data and applications.

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Thank you!

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