

Forest generator – User Guide

A. Forest Operations

Generating a forest

When generating a forest the following general parameters must be specified:

- **Forest area** → the total area in hectares
- **TPH** → trees per hectare, as a measure of density
- **Minimum tree distance** → in meters, constrains the minimum allowed distance between any two trees
- **Folding** → this options specifies the 3D manifold around which the forested surface will be conceptually wrapped.
- **The Weibull parameters** → α , β and γ of the Weibull distribution from which the tree diameters are generated.

In addition to the general parameters, several parameters specify the clusterization of the trees:

- **Cluster count** → the number of clusters
- **Cluster factor** → a real number between that specifies the factor of translation of a tree toward a cluster center. 0 means no translation and 1 corresponds to a complete translation in the cluster center. Negative values will translate the trees away from their cluster center.
- **Random cluster factor** → is an option that picks a random cluster factor for each tree
- **Minimum cluster distance** → in meters, constrains the minimum allowed distance between any two cluster centers
- **Clusterization ratio** → the percentage of trees that will be translated towards a cluster center.

When all these parameters are specified press Generate and the program will start generating the forest. During the generation feedback is given in a progress bar.

Saving/Loading a forest

Once a forest is generated it can be saved in a file for later use with the **Save..** option. Later it can be loaded to the program using **Load..**

Saving an image of the forest

The **Save image..** option allows the user to save an image of the forest in a PNG format. A pixel on the image corresponds to a meter squared in the forest and it will be colored if it has at least one tree. Trees in the same cluster are assigned the same color.

Saving the forest in CSV format

Forest output.. will save the current forest in a CSV document with the following attributes: **forestID**, **X**, **Y**, **Weibull**. It is recommended that the forest be saved in the **/ForestOutput** directory. Each time a forest is written to a CSV file a corresponding entry will be added to the **forest_register.csv** file in the **/Registers** directory. **forest_register.csv** maintains the attributes of all the forests.

Note: This option will always append at the end of the file if it already exists.

B. Sample Operations

Generating a sample

When extracting a sample the following parameters are required:

- **Sample size** → the number of plots to be extracted
- **Sample shape** → the shape of the plots: circular, square, triangular or random
- **Sample area** → in meters squared, the area of a plot
- **Layout** → specifies how the plots are located relative to each other. Uniform will lay the plots equally spaced in a grid while Random will place them randomly across the forest.

Saving/Loading a sample

<similar to the forest>

Saving an image of the forest

The **Save image..** option allows the user to save an image of the sample in a PNG format. A pixel on the image corresponds to a meter squared in the forest and it will be colored if it has at least one tree. Trees in the same plot are assigned the same color.

Saving the sample in CSV format

Forest output.. will save the current sample in a CSV document with the following attributes: **sampleID, forestID, X, Y, Weibull, plot**. It is recommended that the sample be saved in the **/SampleOutput** directory. Each time a sample is written to a CSV file a corresponding entry will be added to the **sample_register.csv** file in the **/Registers** directory. **sample_register.csv** maintains the attributes of all the samples.

Note: This option will always append at the end of the file if it already exists.

C. Multiple generations

When running multiple forest generation/sample extraction some parameters can take multiple values separated with commas. Parameters that are not present in the **Multiple Generation** panel will be taken from the **Forest** panel. The program will generate forests and samples by selecting all the possible combinations of the specified parameters. The results will be saved in two different files with names starting with a user specified suffix and ending in **_forest.csv** for the forests and **_sample.csv** for the samples respectively. Each forest and sample will be appended to their corresponding file as in **Forest output..** and **Sample output..** options.