

Getting started – iLand release 0.7

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Installing iLand

The downloaded iLand package contains:

- The executable (iland.exe) and the required library files (QtCore4.dll, QtGui4.dll, QtScript4.dll, QtSql4.dll, QtXml4.dll, libgcc_s_dw_2-1.dll, mingwm10.dll) for running iLand on Microsoft Windows (XP, Vista, Windows 7).
- An extensive example for running the model "out of the box" in the "example" folder.
- The full source code of iLand is packed in the "src.zip" file (see also <http://iland.boku.ac.at/publicsvn>)

To install iLand, simply extract the ZIP folder to a location of your choice und start the model by double clicking the "iland.exe" file. iLand comes without a dedicated installer and does not modify the Windows registry. It is thus also possible to run iLand from a USB stick.

iLand is written in C++ and uses the cross-platform toolkit Qt. Therefore iLand works also on Linux and Mac platforms. We have successfully compiled and employed iLand on a Linux machine (e.g., Ubuntu). Macs should work as well, but we actually never tried running iLand on a Mac yet (see also the building instructions below).

Running iLand

iLand organizes its inputs and outputs in so-called "projects". A "project" is a set of folders containing different kinds of data (e.g. climate data or species parameters) and a "project-file" (<http://iland.boku.ac.at/project+file>), which is a XML-file acting as the main controller for the various model options.

In order to run simulations with iLand you need to (see also Figure 1):

- Start The iLand viewer (iland.exe) (see also <http://iland.boku.ac.at/iLand+Software>)
- Select a project file (1)
- Create the model (2). This sets up the model landscape and initial trees.
- Run the model (3). Enter the number of years you want the model to run.
- While the model is running (there is also a "Pause" button), you can view different types of data in the GUI visualization:
 - "Light influence field": This is the "LIF" (<http://iland.boku.ac.at/competition+for+light>). Red means low, blue high light levels. Spatial resolution is a 2m grid.
 - "dominance grid": Maximum tree heights at 10m resolution
 - "Individual trees" shows tree crowns from bird's eye perspective (i.e. as stylized circles with the radius indicating the size of the tree). The color indicates their competitive status as described by the light resource index (LRI, again, red means low LRIs, see <http://iland.boku.ac.at/competition+for+light>)

- “resource unit” show the resource units, i.e. a 100m grid used for the calculation of e.g. the water balance. (<http://iland.boku.ac.at/resource+units>)
- Clicking on a tree and a resource unit, respectively, shows their attribute in the “Data” box in the lower right corner. You can enter mathematical expressions (<http://iland.boku.ac.at/Expression>) using these variables in the „Expression“ field to visualize various aspects (e.g. “dbh” or “dbh*dbh/4*3.141592” to calculate basal area, see <http://iland.boku.ac.at/tree+variables> for available variables)
- The area for log messages (4) contains messages from the model. This kind of log info is especially helpful to track configuration or model errors.
- The bulk of numeric outputs of the model are stored in an output database (<http://iland.boku.ac.at/Outputs>). See <http://iland.boku.ac.at/Software+Tools> for tools helping to access the SQLite databases iLand uses to store simulation results in (it is also quite easy to read these databases into, for instance, R for further analysis).

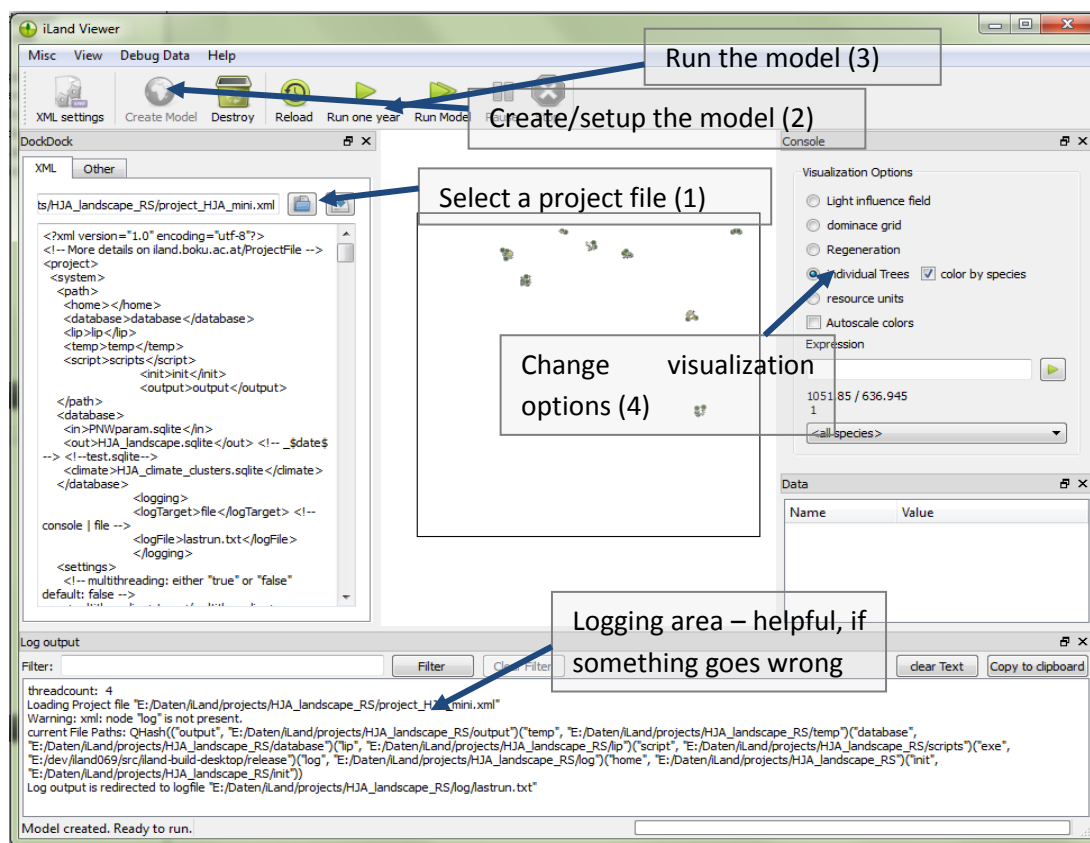


Figure 1. Main window of iLand at startup

Building iLand from source

The download package also contains the full source code of the model as a ZIP archive “src.zip” (also available online at <http://iland.boku.ac.at/publicsvn>). In order to be able to modify and compile iLand for yourself, you will need Qt and the QtCreator IDE. Both packages are freely available at <http://qt-project.org/>. The shipped release is compiled with Qt 4.8.3 (mingw).

After installing the Qt Creator IDE, open the “iland.pro” project in the “src/iland” folder (be sure to preserve file paths when extracting the source code). iLand uses no external libraries (except the Qt libraries) which should simplify the building process considerably – a click to “build” should suffice.

The example project

The example supplied with the model is meant for illustrative purposes only, to allow you to conduct first runs “out of the box”, to get a feel of how the model works, and how its input data look like. The data supplied here are for the experimental watersheds 1 and 2 of the HJ Andrews experimental forest (<http://andrewsforest.oregonstate.edu/>) in the western central Oregon Cascades, with a total forest area of 171 hectares. The simulations are set up to start in the year 1501, i.e. after the last large landscape scale fire event in the area (see also Seidl et al. 2012, Ecosystems, doi: 10.1007/s10021-012-9587-2). The landscape is thus initialized containing only a small number of remnant (groups of) trees scattered over the landscape, which is assumed to resemble a post-fire landscape after a high severity event. For the description of soil initialization, as well as the climate drivers used we refer to Seidl et al. (2012, doi: 10.1007/s10021-012-9587-2). More context on the provided example data and simulation is also provided by the iLand blog (<http://iland.boku.ac.at/blogpost25>).

The simulation is set up to run for 500 years, i.e. up to the recent past. It includes the dynamic simulation of regeneration after fire (see the regeneration module that was newly included in iLand v0.69: <http://iland.boku.ac.at/regeneration>), and the calculation of a closed carbon cycle by means of the newly added module of soil dynamics (<http://iland.boku.ac.at/soil+dynamics>). Fire disturbance is prescribed in the simulation (i.e., mimicked by means of management), based on previous fire reconstruction work in the area. Following these reconstructions, two fires are simulated for the study area, in the years 1675 and 1849. Forest management set in after approximately 1950 in the area. Based on management records, overstorey management interventions are simulated for the years 1964, 1966, and 1975 in parts of the landscape, with the southern part of the study area (watershed 1) being clearcut in 1966. Furthermore, thinning management is simulated in multiple years according to historical management records. The specification and implementation of these management interventions can be found in the “scripts” subfolder of the management example. Out of the box the model output database will record stand-level information as well as data on the forest carbon cycle (1 ha aggregates), but different levels of output (e.g., individual tree output) can be activated in the “output” section of the project file. For more details on the example project we refer to Seidl et al. (2012, doi: 10.1007/s10021-012-9587-2). Please cite this study if you should use any part of the supplied example in your work (e.g., parameters etc.), and also acknowledge the original data providers (e.g., with regard to soil, climate, etc.) as appropriate.