



FullCAM Data Builder

Common Uses

Introduction

The FullCAM Data Builder allows users to access the data archives of the National Carbon Accounting System and build models for individual site and management practices. The models can then be saved and further adjusted by users based on their own knowledge of individual management practices.

Getting started

From the National Carbon Accounting Toolbox screen click "use FullCAM". If using FullCAM for the first time you will be asked to accept the licence agreement prior to the model becoming functional. At this point it is worthwhile reading through the introductory sections of the FullCAM help. The latest version of the FullCAM user manual can be downloaded from the NCAS website (www.greenhouse.gov.au/ncas/ncat).

To start using the Data Builder, begin a new 'plot file' by clicking on the toolbar or select "new plot..." from the file menu.

Configuration

Select your desired configuration from the drop down list on the Configuration tab. The configuration determines the type of system to be modeled. The Data Builder is only available for the configurations below. Once a configuration has been selected, other options on the Configuration tab are automatically set and no further information is required.

Multilayer Forest System: Used to model forest systems with no agricultural components. This is used for plantation-to-plantation systems (rotations) or native forest-to-plantation systems (conversion). It cannot be used for pasture-plantation transitions.

Multilayer agricultural systems: Used to model agricultural systems with no tree/forest components.

Multilayer mixed (forest and agriculture) systems: Used to model agriculture-forest transitions, land-clearing and ongoing management in mixed forest/agricultural systems (i.e. grazed woodlands).

Timing

The default simulation step for the toolbox is monthly. Users are required to enter the year and month to start and end the simulation. The start month depends on the point at which you wish to start the regimes. Generally Data Builder regimes are set up assuming the start month is 1 (January). Varying the start month will vary the timing of events as they are added using the Data Builder but will not vary the timing of events already in the event queue. If you are planning to build an Estate file then the timing is particularly important. See the section on Estate files for more information.

It is always prudent to 'run the model in' by setting the start year earlier (up to 20 years) than the actual period of interest. See the 'Initial soil carbon' and 'running in the model' sections for more information. This is because the soil carbon data at initialization represents a pristine condition, that is, a condition that does not reflect any prior management.

Once you have entered these values a series of new tabs will appear. Click on the Data Builder tab and click the 'Data Builder on' box. When using the Data Builder it is not necessary to enter data in any other section of the model.

Outputs

The Outputs tab contains a list of output windows that the model will display once a simulation is run. An output window with four default outputs displayed in graph form is pre-set. Click on the table button to change to the table view. Click on the graph button to return to the graph.

FullCAM allows users to easily choose which outputs they wish to display, and in what form, as described below:

1. Start a new output window and click on the 'outputs' button to display the outputs list.
2. The outputs list works in a similar fashion to windows explorer. Click the + button next to any folder to expand its contents. Select or deselect all the outputs in a folder by clicking the folder. Select/deselect individual outputs by clicking the output icon. Hovering the mouse pointer over each output name will display how the output is calculated.
3. Once you have selected your desired outputs, close the outputs list. If you have selected new outputs you will need to re-run the model simulation to display the results.

Example plot development for the Data Builder

Below are some examples of how to set up the Data Builder for some common land management systems. The examples are by no means exhaustive and many variants (some very complex) can be developed if required.

Transition from pasture to forest (reforestation)

Plot Setup

Configuration: Multilayer mixed System (forest and agricultural).

Initial forest percentage: 0%.

Available forest species/regimes: The initial set of plantation forest regimes available are limited to pasture-plantation systems only. After the first forest rotation has been downloaded, for 2nd and subsequent regimes forest to forest only regimes will be available.

Available agricultural species/regimes: A limited number of agricultural regimes are available.

Method

1. Setup FullCAM configuration as described above.
2. Set the timing. Make sure that the start year is set to 20 years prior to plantation establishment
3. Choose the forest species to be planted from the Tree Species/Groups drop down list and download the list of Tree Species/Regime for this species.
4. Choose the forest regime to be established in the Tree Species/Regime drop down list and download both the species and events for this regime.
5. To add additional forest rotations, select the desired regime (the list is now filtered to include forest-to-forest systems only) and download its regime and related species. Additional forest regimes can be added either within the same tree species/group or from other groups (to allow transitions from one forest species to another).
6. Click the 'download the tree and crop species required by the event queue' button. This will download the appropriate initial crop species required by the model. The plot should now be ready to simulate. There is no need to specifically download any crop information.

Forest (plantation) to forest (plantation)

Plot Setup

Configuration: Multilayer forest system.

Initial forest percentage: NA.

Available forest species/regimes: Forest-to-plantation forest regimes are available.

Available agricultural species/regimes: NA.

Method

1. Setup FullCAM configuration as described above.
2. Choose the current forest species from the Tree Species/Groups drop down list and download the list of Tree Species/Regime for this species.

3. Choose the select the forest species being cleared in the Tree Species/Regime drop down list and download the species and events for this regime.
4. Choose the relevant forest regime from the Tree Species/Regimes list and download the regime and species. To change species, change the Tree/Species Group to the desired species and download the relevant regime and species.
5. To add additional forest regimes, select the desired regime and download its regime and related species. Additional regimes can be added either within the same Tree Species/Group or from other groups (to allow transition from one plantations species to another).

Native forest to plantation forest

Plot Setup

Configuration: Multilayer forest system.

Initial forest percentage: NA.

Available forest species/regimes: First option is a forest regime from pasture only. After the first forest regime only plantation regimes will be available.

Available agricultural species/regimes: NA.

Method

1. Setup FullCAM configuration as described above.
2. Choose the 'Local species' from the Tree Species/Groups drop down list and download the list of Tree Species/Regime for this species.
3. Download the Local species by clicking on the 'download species button'.
4. Go back to the Tree Species/Group list and select the plantation species desired.
5. Choose the relevant forest regime from the Tree Species/Regime list and download the regime and species.
6. To add additional forest regimes, select the desired regime (the list should now be filtered to plantation systems only) and download its regime and related species. Additional regimes can be added either within the same Tree Species/Group or from other groups (to allow transition from one plantations species to another).

Transition from native forest to pasture (clearing)

Plot Setup

Configuration: Mixed System (forest and agricultural).

Initial forest percentage: Set to initial tree crown canopy cover

Forest species/regimes: Native Forest Groups

Agricultural species/regimes: Relevant pasture species

Method

1. Setup FullCAM configuration as described above.
2. Choose the 'Native Forest Groups' from the Tree Species/Groups drop down list, download the list of Tree Species/Regimes and download the relevant species.
3. Choose the relevant agricultural species to replace the native forest from the Crop Species list, select the appropriate management regime and download the regime and species. This regime will cycle through time.
4. To clear the forest you will need to build some new events
 - a. Go to the Events tab and select 'New..'
 - b. In the Type drop down list select 'thin'.
 - c. Enter the timing of the clearing (normally year 0, day 1).
 - d. Click the 'insert standard values' button. Click on the set of values to use and click OK. This will fill in all the values for the thin.
 - e. Name the event either manually by typing in to the box or using the 'Autoname' function.
 - f. Click OK. At this point the thin will be ready and placed in the event queue.
5. Repeat the above procedure, but select 'Forest percentage change' from the type list and enter the timing as 1 day after the clearing thin.
6. If you wish to burn the debris, repeat the above procedure but select 'Forest fire' from the type list

Grazed woodland (on-going agricultural/forest management)

Plot Setup

Configuration: Mixed System (forest and agricultural).

Initial forest percentage: less than 100%, greater than 0%.

Forest species/regimes: Native Forest Groups

Agricultural species/regimes: Relevant pasture species

Method

1. Setup FullCAM configuration as described above. Set the initial forest percentage depending on the mix of forest and agriculture for the plot
2. Choose the 'Native Forest Groups' from the Tree Species/Groups drop down list and download the list of Tree Species/Regime for this species.
3. Choose the agricultural species from the Crop Species list and select the appropriate regime and download the regime and species. This regime will cycle through time.

Crop and pasture management (on-going agricultural management)

Plot Setup

Configuration: Multilayer agricultural system

Initial forest percentage: NA

Available forest species/regimes: NA

Available agricultural species/regimes: All relevant pasture species for the entered location.

Method

1. Setup FullCAM configuration as described above.
2. Choose the Crop Species being used. Download the species and the list of management regimes.
3. Choose the agricultural species from the Crop Species list and select the appropriate regime and download the regime and species. This regime will cycle through time.

Hints and tips

Proceed in a logical order

When using the Data Builder it is best to move in a logical order down the window and in chronologically.

Soil Type

The initial soil type downloaded by FullCAM is considered to be the most common soil type in the identified IBRA region, it is not exactly location specific. If the soil at the entered point is incorrect, choose a more appropriate soil type from the drop down list and click 'Download soil'. This will download data for the newly selected soil and replace that of the original soil.

Initial soil carbon and 'running in' the model

The initial soil carbon data downloaded by the Data Builder is an estimate of soil carbon levels in natural systems prior to any significant human management. This data is suitable for regimes starting with a native forest system but may lead to excessive losses of soil carbon from previously managed systems (that are typically lower in soil carbon than managed systems) early in simulations starting from other bases (mainly agricultural). When using the model for agricultural systems only (i.e. no forest conversion) on sites where the land has been cleared for a long period of time, set the start of your simulation back 20 years or so from the time of interest. This will allow the model to 'run in' to the time period of interest and will give far more accurate results.

In ex-pasture forest systems it is expected that the soil carbon levels have been depleted since clearing. To account for this, twenty years of agricultural pasture management has been added to each ex-pasture regime to allow the soil carbon to stabilise. Hence you will need to set the start year of the model to 20 years prior to planting (i.e. if establishing a plantation in 2001, set the start date of the simulation to 1981).

Filtering

The species and regimes available for download at different stages are filtered depending on the model configuration and previously downloaded regimes. This filtering aids users in selecting appropriate species and regimes. However, it may also prevent advanced users from easily building complex agriculture/forestry mixes. If you wish to build plots for complex systems please contact the Australian Greenhouse Office at inquiries@fullcam.com for further information and guidance.

Building forest estates

FullCAM estate files allow users to pull together the results of several model simulations into one simulation. This is particularly useful for large landholders and to test the effects of varying the timing and amount of planting etc. For more information on building estate files see the FullCAM help.