# User Manual

## Melbourne Region Stocks and Flows Framework

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# Introduction

The User Manual is constructed in two parts: the first being primarily for education and the second for reference. The reference section is a general guide to the functions, displays and facilities available in the *whatIf?*® user interface of the framework. For assistance with the technical background of specific nodes, calculators or variables within the framework, refer to the accompanying **Technical Manual**.

The introductory sections provide you with three short, step by step **Tutorials** that will help you get started quickly and get a sense of the *whatIf?*® user interface to the frameworks. At the beginning is a section called **Quickstart**. This section is a handy quick reference that summarises most of the information in the ensuing tutorials. Although this section is foremost, it is recommended that you begin with the tutorials and when you feel confident and familiar with the *whatIf?*® system and its procedures, you may find it faster to refer to Quickstart.

After completing the tutorials you should be able to navigate and interrogate frameworks and be able to create scenarios of your own devising that can be represented in the framework.

When using this manual in electronic format please note that all of the **Contents** items are hyperlinked to the section titles and subtitles so that hitting the CTRL key and clicking the left mouse button on a Contents item will take you to the beginning of that section. There are also hyperlinks at the end of each section to return to the Contents Page.



## Key

| | |
|---|---|
| * | = option or note |
| #text# | = an example of text |
| CAL | = calibrator framework |
| SIM | = simulator framework |
| > | = directs you to a sub-menu item eg. File>Open. |
| “” | quotation marks are placed around the special names for windows, menus and their components the first time the names occur in the text. Where these names have a particular meaning the first letter is capitalised e.g. “File” menu distinguishes a particular menu name as different from the general mention of any file or files. Only the capitalised form of the noun continues in the remainder of the text. |
| text | = text that is technically incorrect or needs editing. |

# Quick Start

## Starting the Simulation and Model Manager – SAMM:

1. SAMM is launched by double clicking on this icon:

If the above SAMM icon isn't on your desktop, go to the Start Menu and click on All Programs. Click on the "whatIf" sub-menu and choose the option called "SAMM".

2. The SAMM program will load and a "Connect" window automatically appears to connect to the server, otherwise choose "Connect" from SAMM's File menu.
3. Make sure you have the correct server name, port number, account name and password.

## Entering a Framework:

1. Select the "Melbourne Region Stocks and Flows Framework" model family in the "Model Families" window that should have just popped up and click on the "MF Actions" menu.
2. Click on "Enter". You will be presented with a second window: the "Frameworks" window, displaying a list of the frameworks within the MRSFF model family.
3. Select the simulator framework in the Frameworks window and in the "FW Actions" menu click on "Enter". A tick will appear next to the "Framework Description" for the simulator and several new windows will pop up.

## Picking a History and a Scenario for the Future

1. Select a history in the "Histories" window and double click, or using the "History Actions" menu, click on "Pick".
2. Select the "Scenario" window and select a scenario.

## Seeing Values for Variables:

1. First select the "Diagram" window and enter a calculator (yellow box) - double clicking on it
2. Select a variable and then right click to see the "Diagram Actions" options for dealing with variables. Within the "See Variable" option, choose "graph", "table" or "Microsoft Excel".

For more information on navigating around graph, table, geomap or Excel windows see the section on: Seeing Results – Tables, Graphs, Excel and Geomap.

**Note that it's not always possible to see a variable in the "geomap" output format.**

## Creating Instances of Variables

1. Make sure that you have a history selected (it may also be necessary to select a background scenario)
2. Select a variable and then right click to see the "Diagram Actions" options for dealing with variables. Within the "Create Variable Instance" option, choose graph, table or Microsoft Excel.

   **Graph:** draw in the data points on the graph, using the left mouse button to select the data points.

**Table:** two rows appear in any given cell in the table. The top row has values corresponding to the background scenario. Click on the lowest row in any of the columns corresponding to simulation time and insert your own values.
Note: You can fill out the contents of a table quickly by "Broadcasting" a value along a row by CTRL right arrow or down a column using CTRL down arrow.

**Excel:**

1. Make sure you have excel.tmp2 open
2. Insert your own values in the place of those shown for the background scenario. This will not affect the instance of this variable in the background scenario.
3. Now save this file as excel.tmp2
4. You will be asked about writing over the original file – do so. You will also be asked whether you want to retain the same file format or change to an Excel format. Keep the same format.

When you close the graph, table or Excel windows, save the variable instance.

## Saving a New Scenario

**You can create new instances for many other variables before saving that collection of instances under a scenario name. One scenario can represent instances of many variables.**

1. After saving the new instance(s) of your variable(s), click anywhere in the Diagram window and then select "Save Scenario" from the Diagram Actions menu.
2. Enter a name for your scenario (it becomes the picked scenario in the Scenario window).
3. Now you can look at the values of variables in the framework under your new scenario.

To view variable instances from two or more scenarios at the same time, hold down the CTRL key and highlight other scenarios by clicking on their description using the left mouse button.

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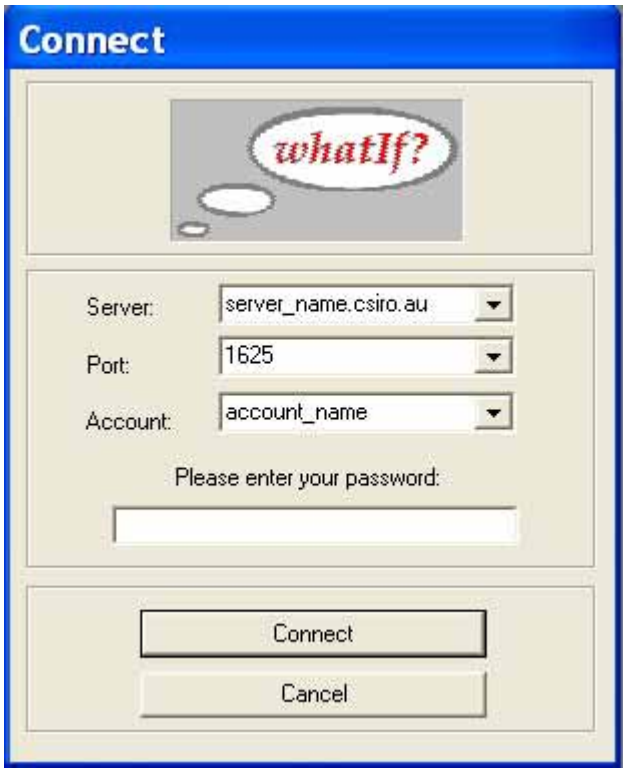
# Tutorial I

## Starting the Simulation and Model Manager – SAMM:

SAMM is launched by double clicking on this icon:

If the SAMM icon isn't on your desktop, go to the Start Menu and click on All Programs. Click on the "whatIf" sub-menu and choose the option called "SAMM".

The SAMM program will load and you should see something like the following login window. Otherwise choose "Connect" from SAMM's File menu.



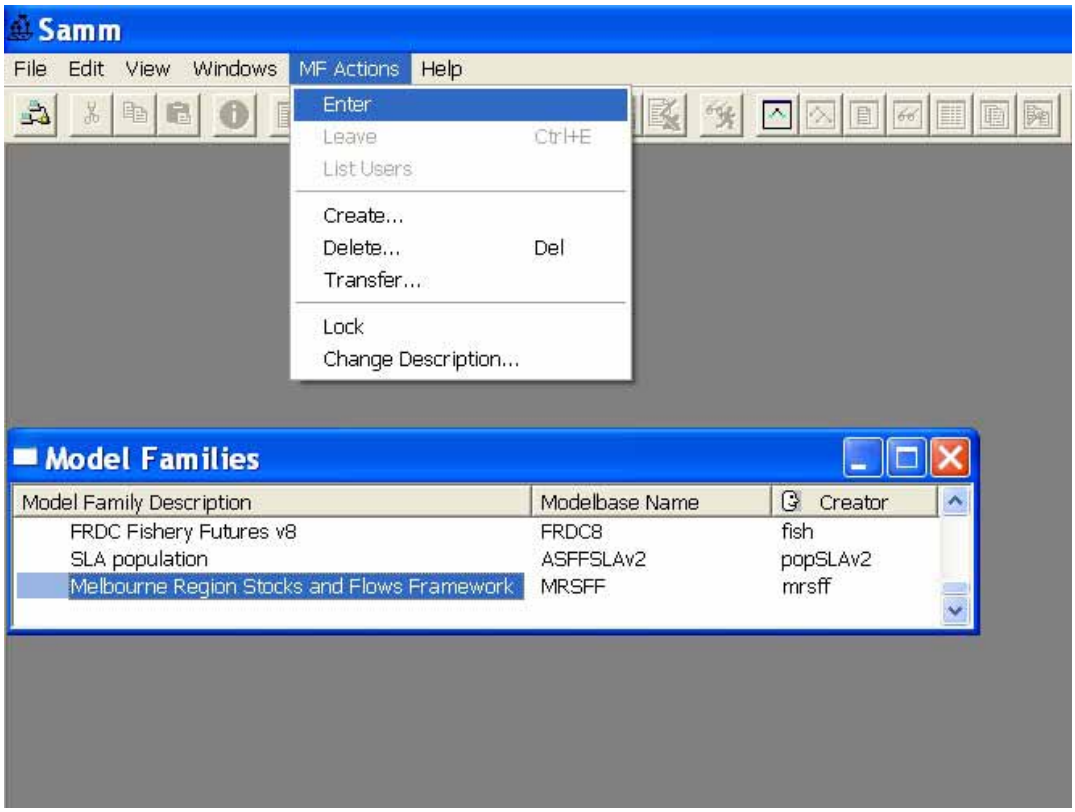

Enter the correct server name and port and your password. Click on "Connect"

## Entering a Framework:

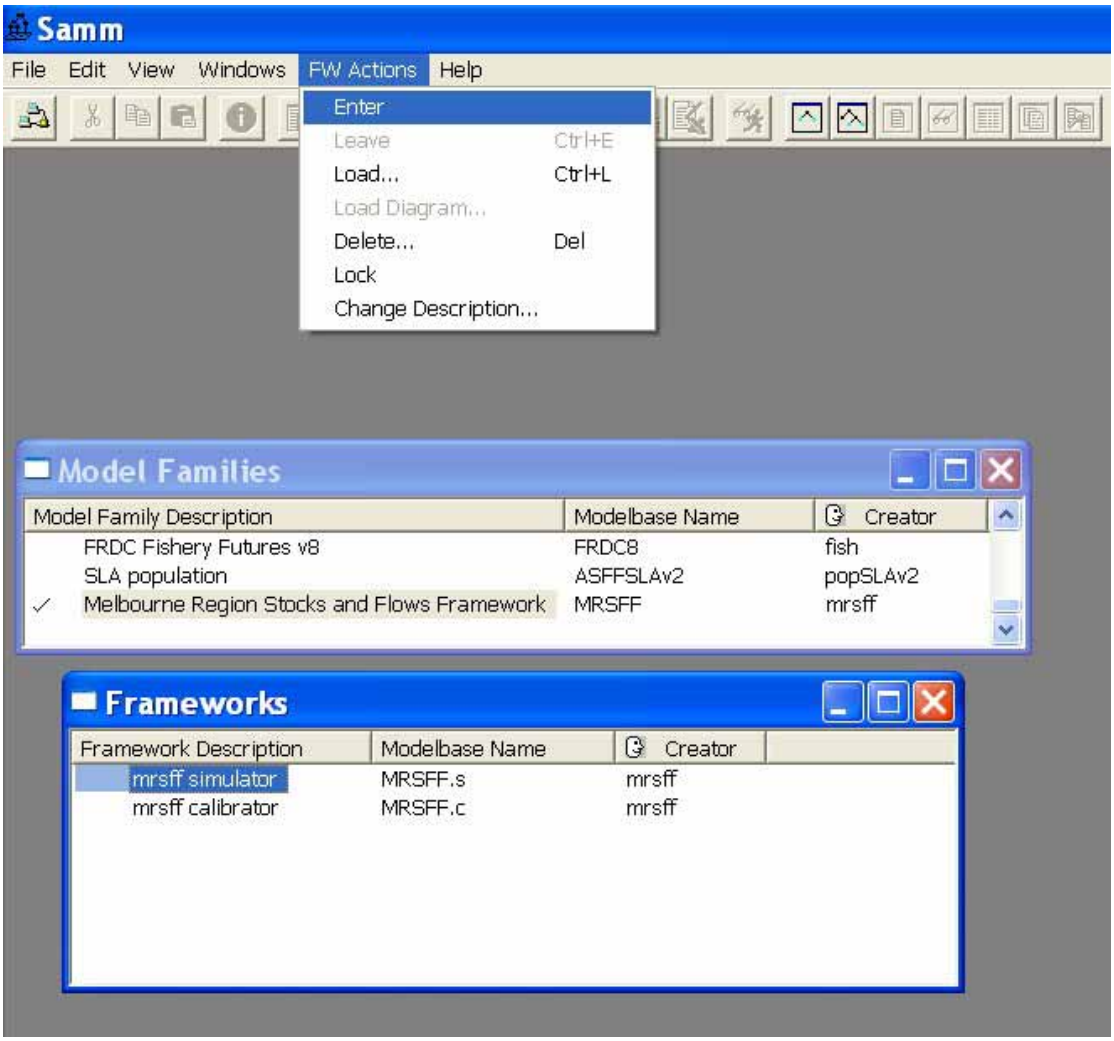
After connecting with the server the “Model Families” window will pop up. This window allows you to enter a family of framework models. The Melbourne Region Stocks and Flows Framework (MRSFF) will be one of the model families and there may be others.

Select the MRSFF model family in the Model Families window, as shown below, and click on the “MF Actions” menu.

* All menu actions associated with a particular window can also be accessed by clicking the right mouse button anywhere within that window.



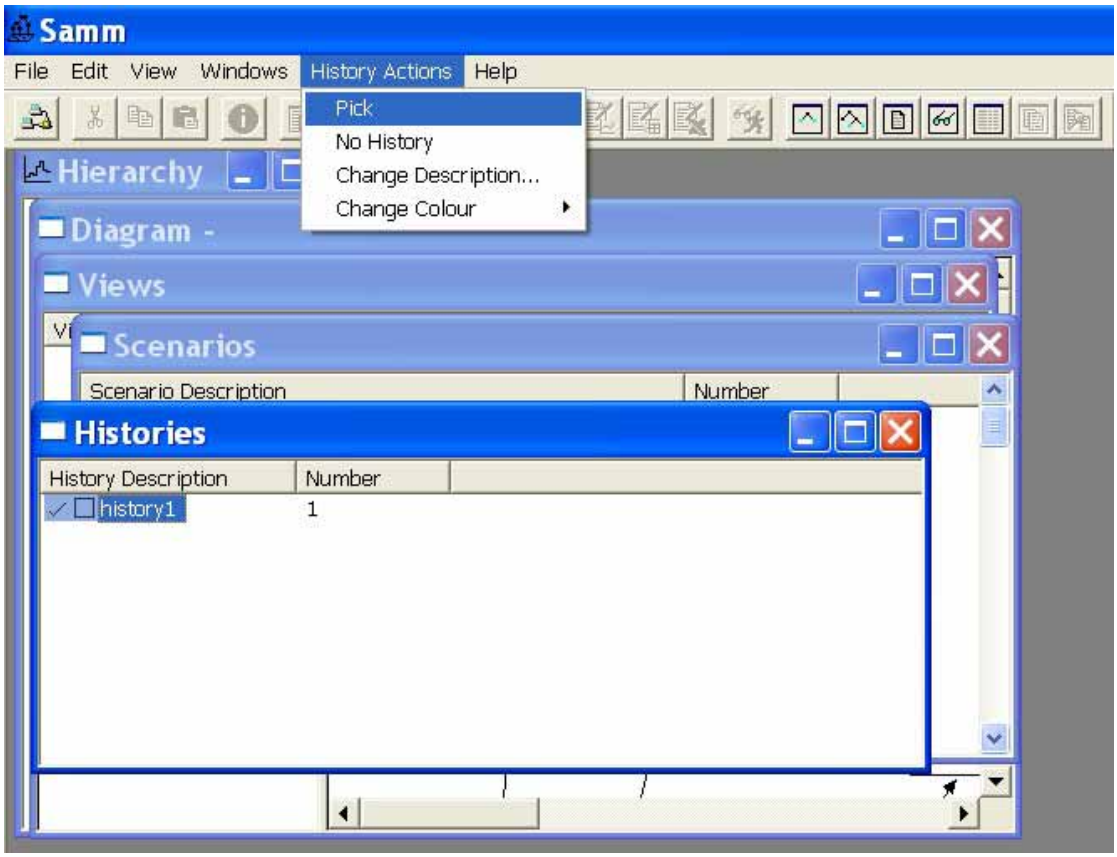

The MF Actions menu has several options which are explained further on in this manual. For now, choose and click on “Enter” shown in the preceding diagram. A tick will appear next to the MRSFF “Model Family Description”. You will be presented with a second window: the “Frameworks” window, displaying a list of the frameworks within the MRSFF model family.




Select the “mrsff simulator” framework in the Frameworks window and in the “FW Actions” menu click on “Enter”. A tick will appear next to the “Framework Description” for mrsff simulator.

## Picking a History:

Several new windows will now pop up but the first one you will have to deal with is the “Histories “window. Each item in the Histories window (shown below) represents a collection of historical data for the “mrsff simulator” framework and they are often labelled “history” or “history1”. It is possible to have more than one item in the Histories window if, for example, several, alternative historical data sources had been available. These could then be used to generate more than one possible historical data set to be used as a history for the simulator framework.



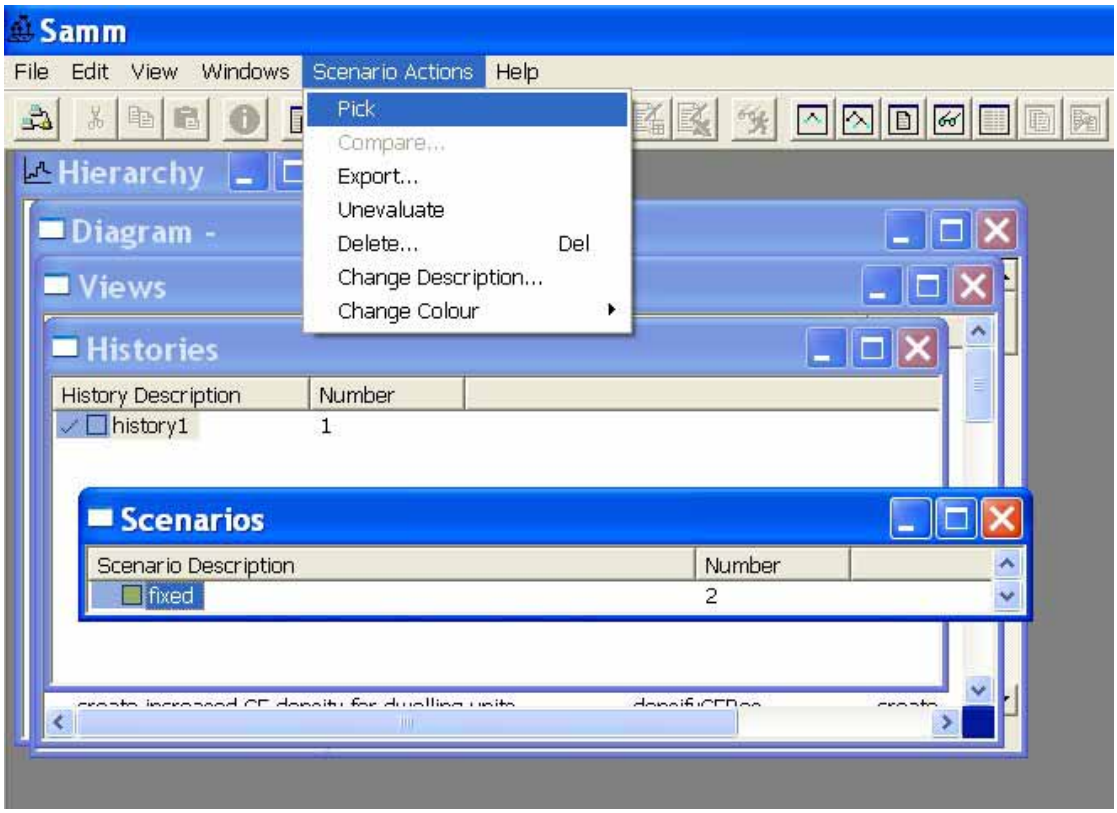

Select “history1” in the Histories window and using the “History Actions” menu, click on “Pick”. A tick will appear next to the history1 “History Description”.

## Picking a Scenario for the Future:

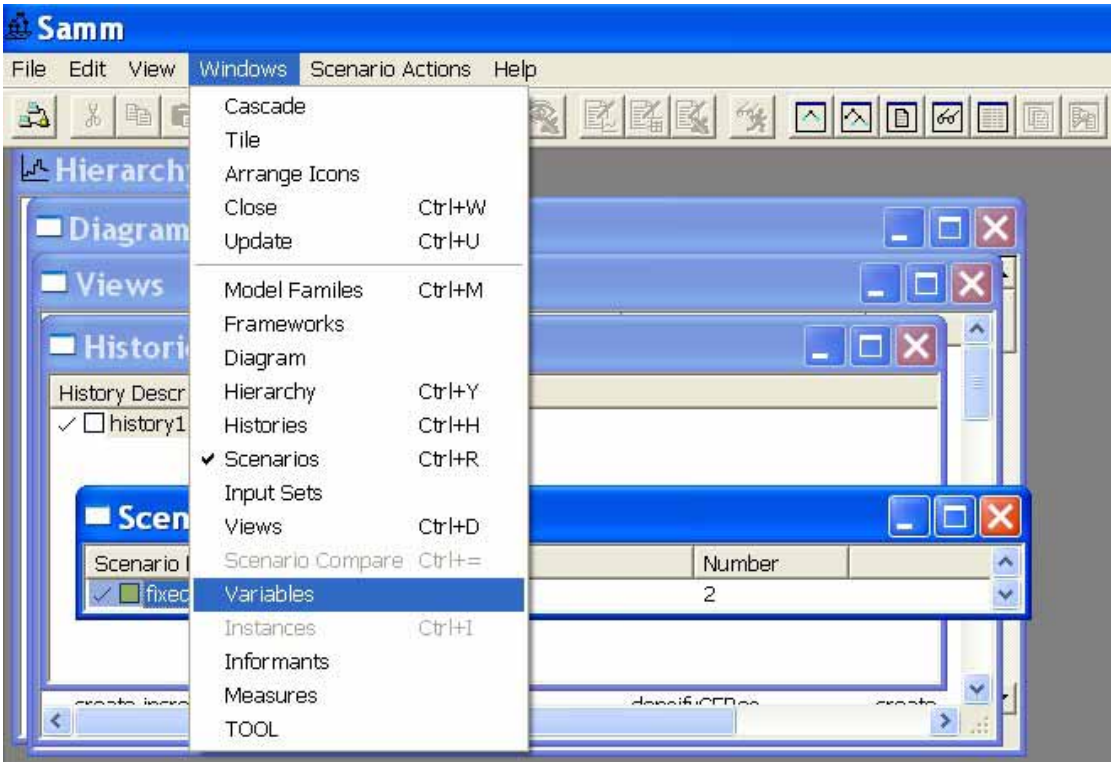
In the context of the *whatIf?*® software environment, and the stocks and flows frameworks described here, a future “scenario” is the collection of “instances” for a group of control variables in the framework. An instance of a variable refers to a specific value for that variable representing one assumption about the physical future. The collection of different variables, each with a specific instance, defines a scenario.

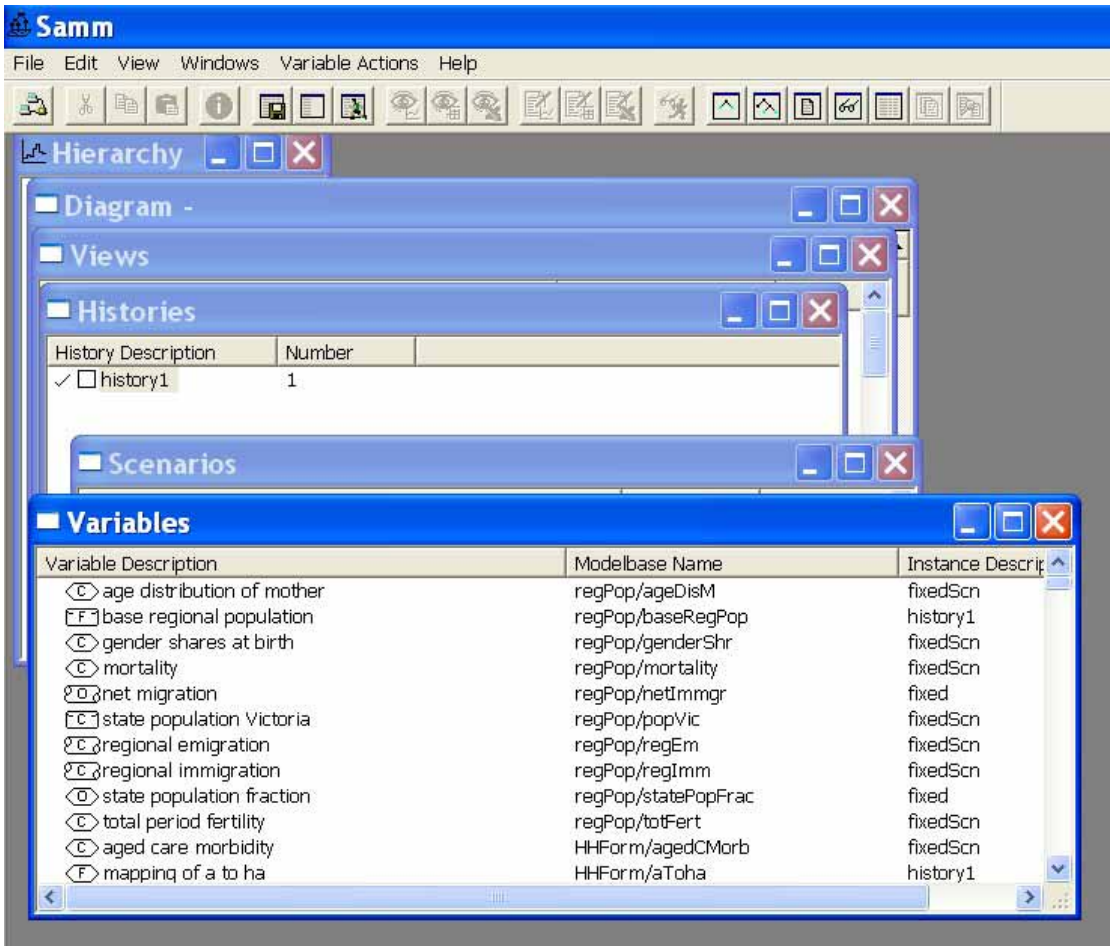
Select the “Scenario” window and select a scenario. Often a simple scenario called “fixed” is provided where all variables maintain the same value they had in the last year of the historical data (“the base year”) fixed for the duration of the simulation.

To get started quickly select the “fixed” scenario and click on “Pick” from the “Scenario Actions” menu (see following diagram).




A tick will appear before the “Scenario Description” to indicate you have chosen the set of variables, with their particular instances, that define the “fixed” scenario. If you now go to the “Windows” menu in SAMM, and click on “Variables”, you can see the full of those variables (see below).



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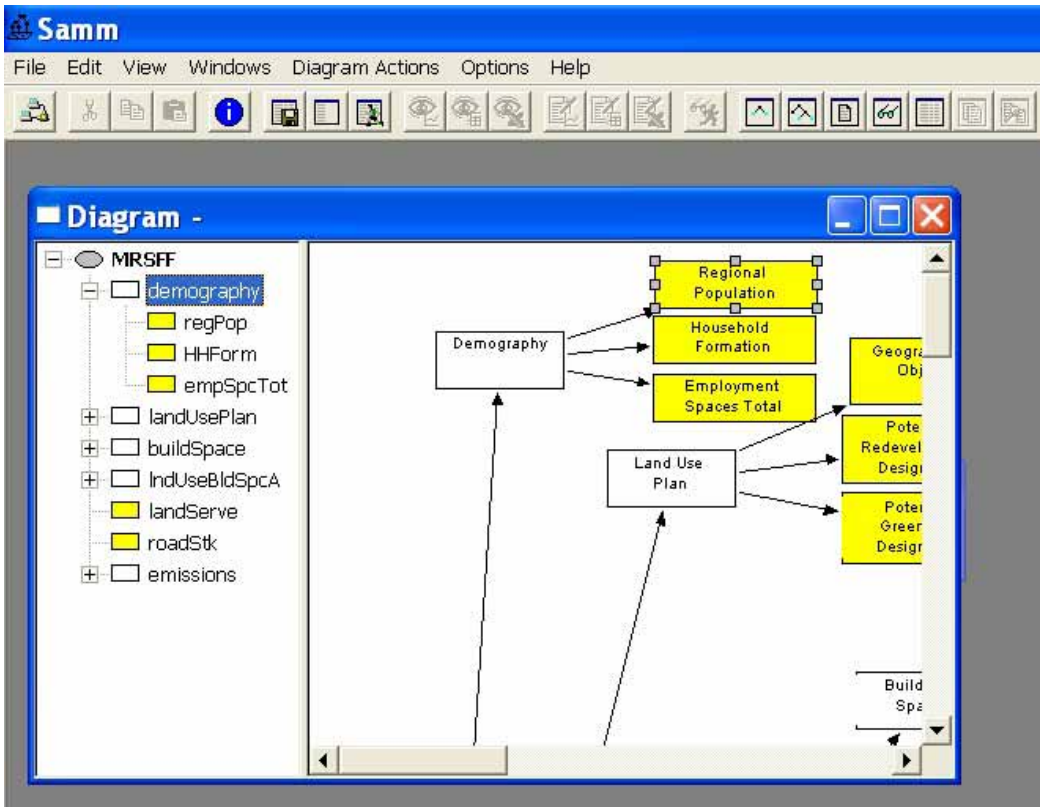
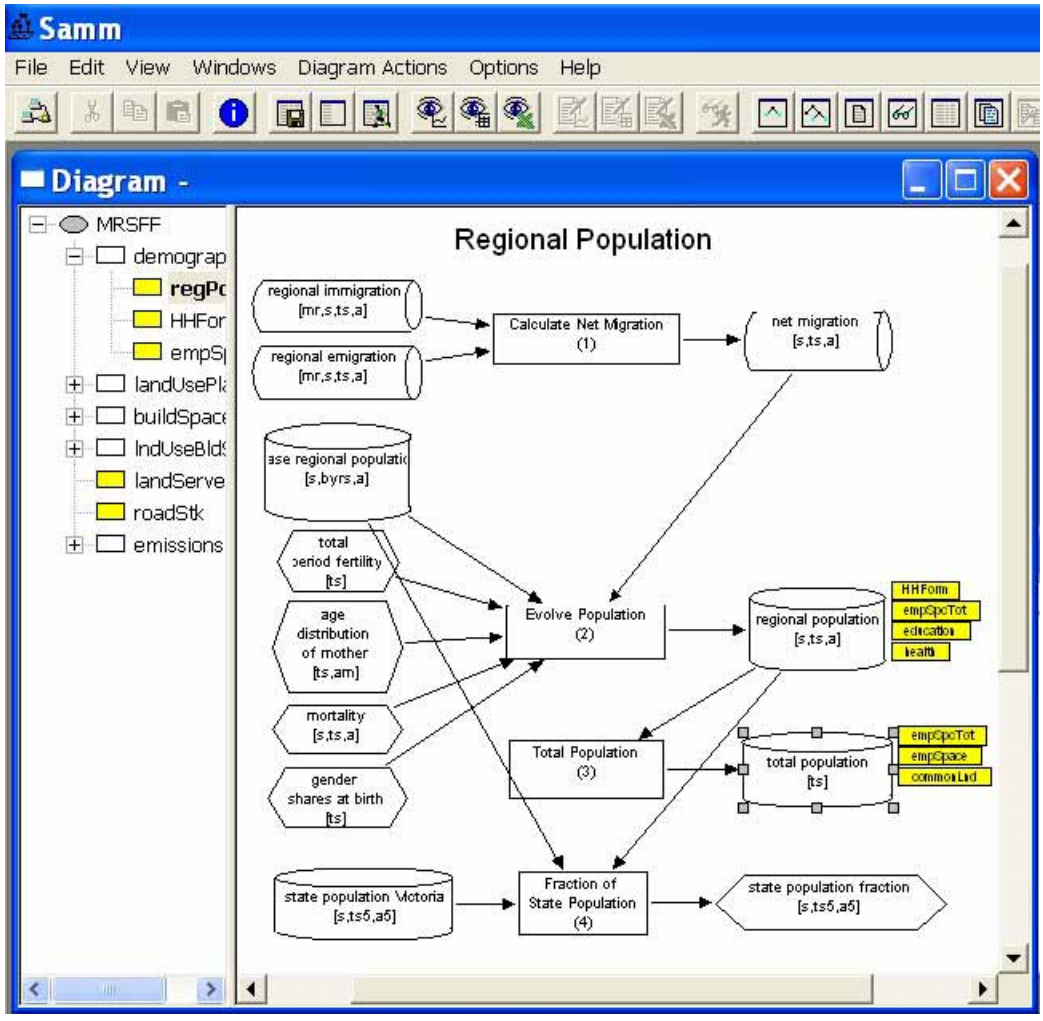
## Seeing Values for these Variables:

There are a number of ways to actually see the data values (for a given history and scenario) 'behind' the variables as they are shown in the "Diagram" window. These include graphs, tables and Microsoft Excel ® which we are going to describe shortly.

First select the Diagram window and – just for this example – select the yellow box representing the "Regional Population" calculator. Double-click on this box to see the substructure of the calculator within (see diagrams below).

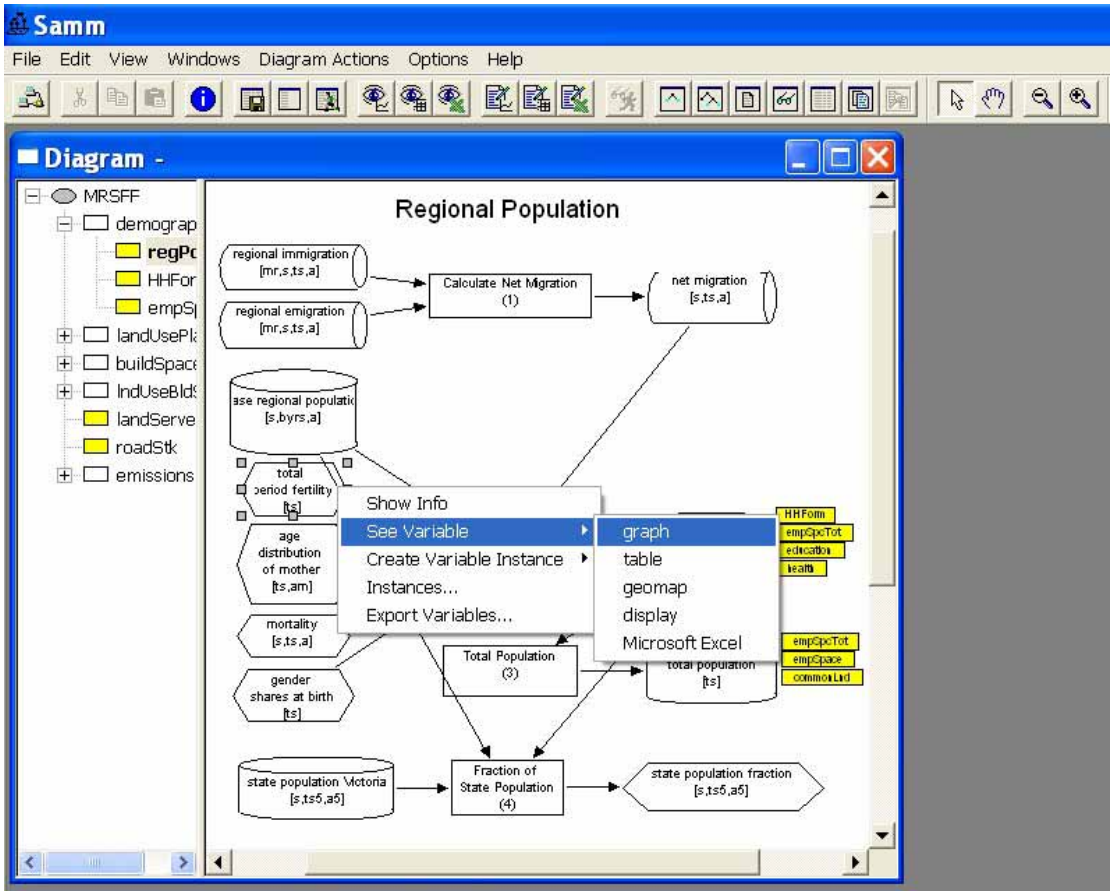
Through navigating through the Diagram window you'll be able to see several other calculators relating to other sectors but we are just focussing in on the Regional Population calculator and the "total period fertility" variable for demonstration purposes.


Samm
File Edit View Windows Diagram Actions Options Help
Diagram -
MRSFF
demography
regPop
HHForm
empSpcTot
landUsePlan
buildSpace
IndUseBldSpcA
landServe
roadStk
emissions
Regional Population
Household Formation
Demography
Employment Spaces Total
Land Use Plan


Samm
File Edit View Windows Diagram Actions Options Help
Diagram -
MRSFF
Regional Population
regional immigration [mr,s,ts,a]
regional emigration [mr,s,ts,a]
Calculate Net Migration (1)
net migration [s,ts,a]
total period fertility [ts]
age distribution of mother [ts,am]
mortality [s,ts,a]
gender shares at birth [ts]
Evolve Population (2)
regional population [s,ts,a]
HHForm
empSpcTot
education
health
Total Population (3)
total population [ts]
empSpcTot
empSpace
commonLnd
state population Victoria [s,ts5,a5]
Fraction of State Population (4)
state population fraction [s,ts5,a5]

## Using Graph to See Variable Values:

Now we are going to see the values of one of the variables shown in the previous diagram. Not all variables are easily seen in all output forms. For the example here we are just going to look at the hexagonal total period fertility variable in the Regional Population calculator shown below. However it's not possible to see this variable, for example, in the "geomap" output format.




Select the total period fertility variable and then right click to see the "Diagram Actions" options for dealing with variables. Within the "See Variable" option, choose "graph" (see the results in the next diagram).

The white line displays the historical data for fertility and the yellow line shows the fixed scenario values (remember that these are set to be the same as that for the last year of history)

For more information on navigating around a graph window see the section on Graphs in the chapter: Seeing Results – Tables, Graphs, Excel and Geomap.

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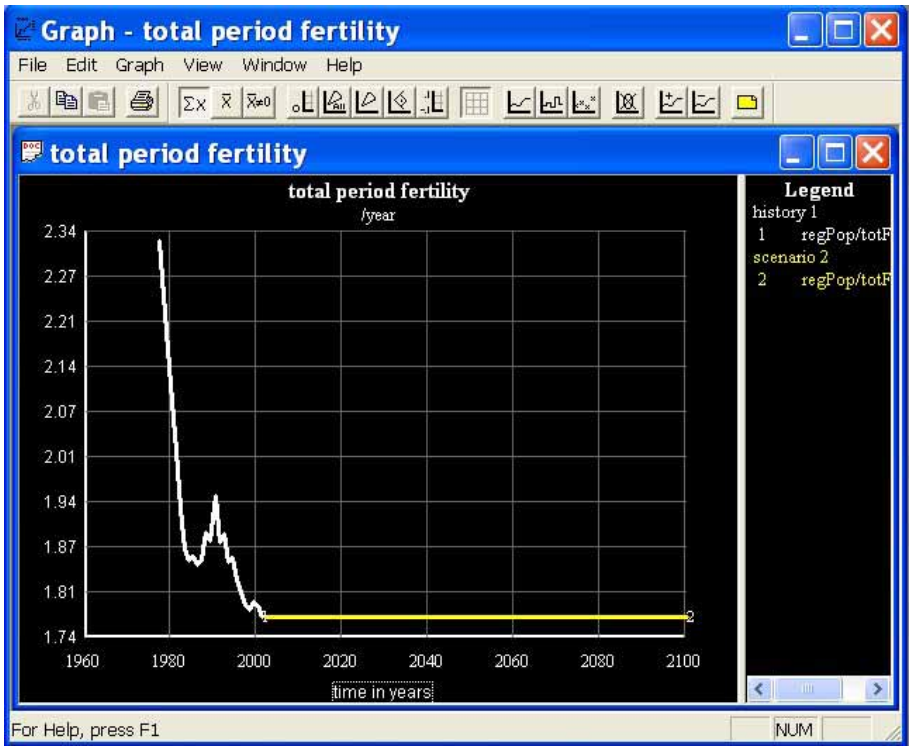
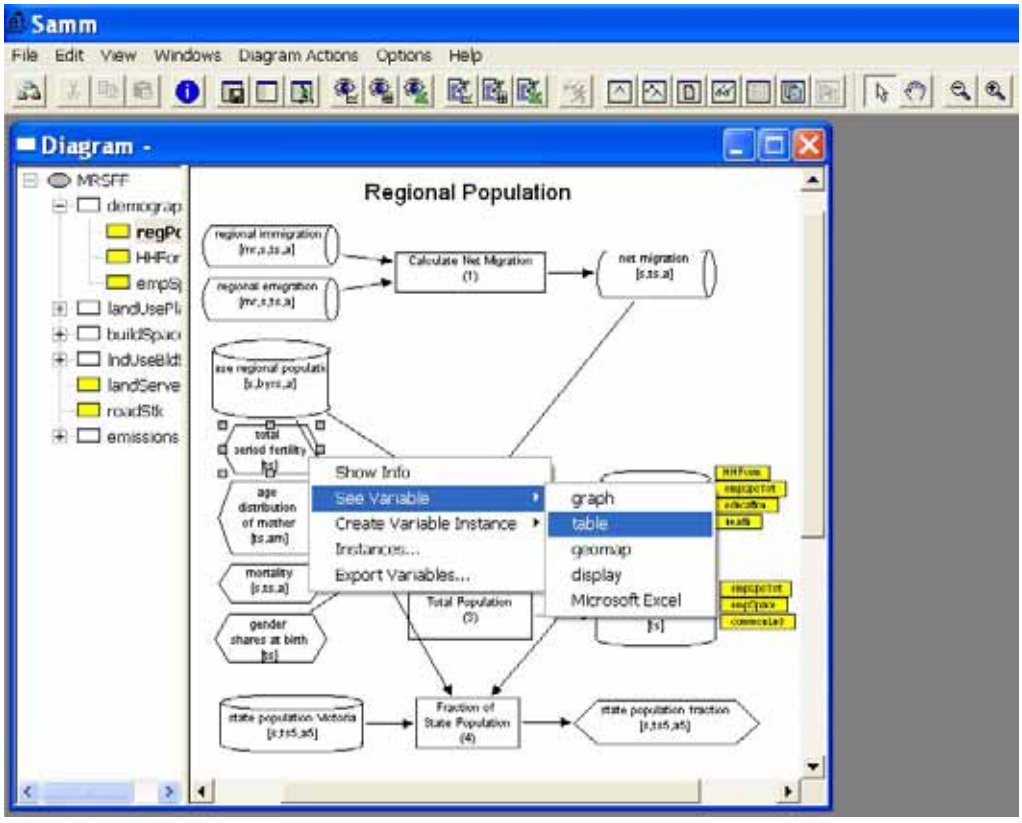
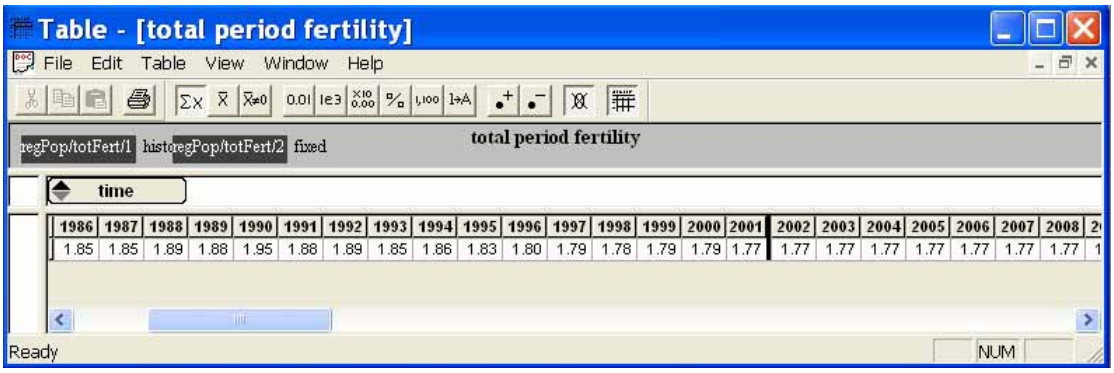



## Using Table to See Variable Values:

Select the total period fertility variable again and then right click to see the “Diagram Actions” options for dealing with variables. Within the “See Variable” option, choose “table” (see the results in the next diagram).




The result is the following “Table” window




For more information on navigating around a table window see the section on Tables in the chapter: Seeing Results – Tables, Graphs, Excel and Geomap.

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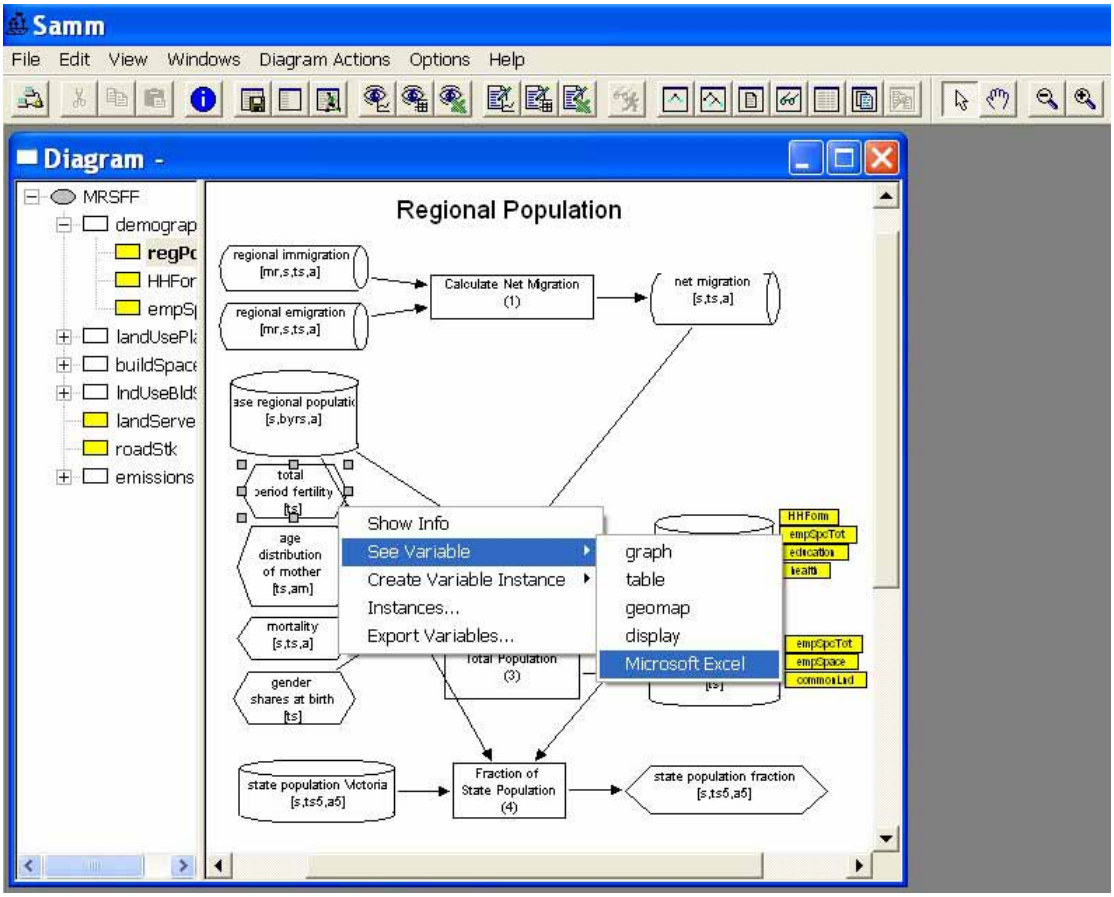
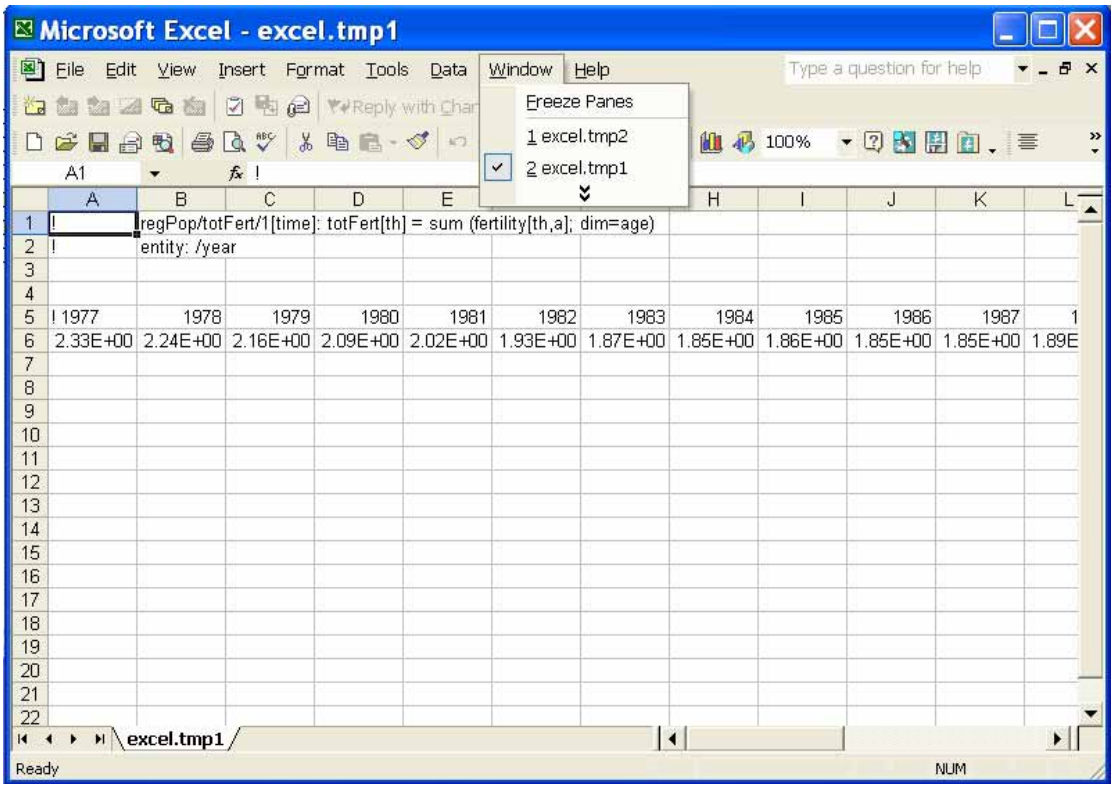
## Using Excel to See Variable Values:

Select the total period fertility variable and then right click to see the “Diagram Actions” options for dealing with variables. Within the “See Variable” option, choose “Microsoft Excel” (see the results in the next diagram).




The results are in the following diagram:




Note there are two excel files. One for history: excel.tmp1 and one for the future scenario: excel.tmp2

For more information on navigating around a table window see the section on Excel in the chapter: Seeing Results – Tables, Graphs, Excel and Geomap.

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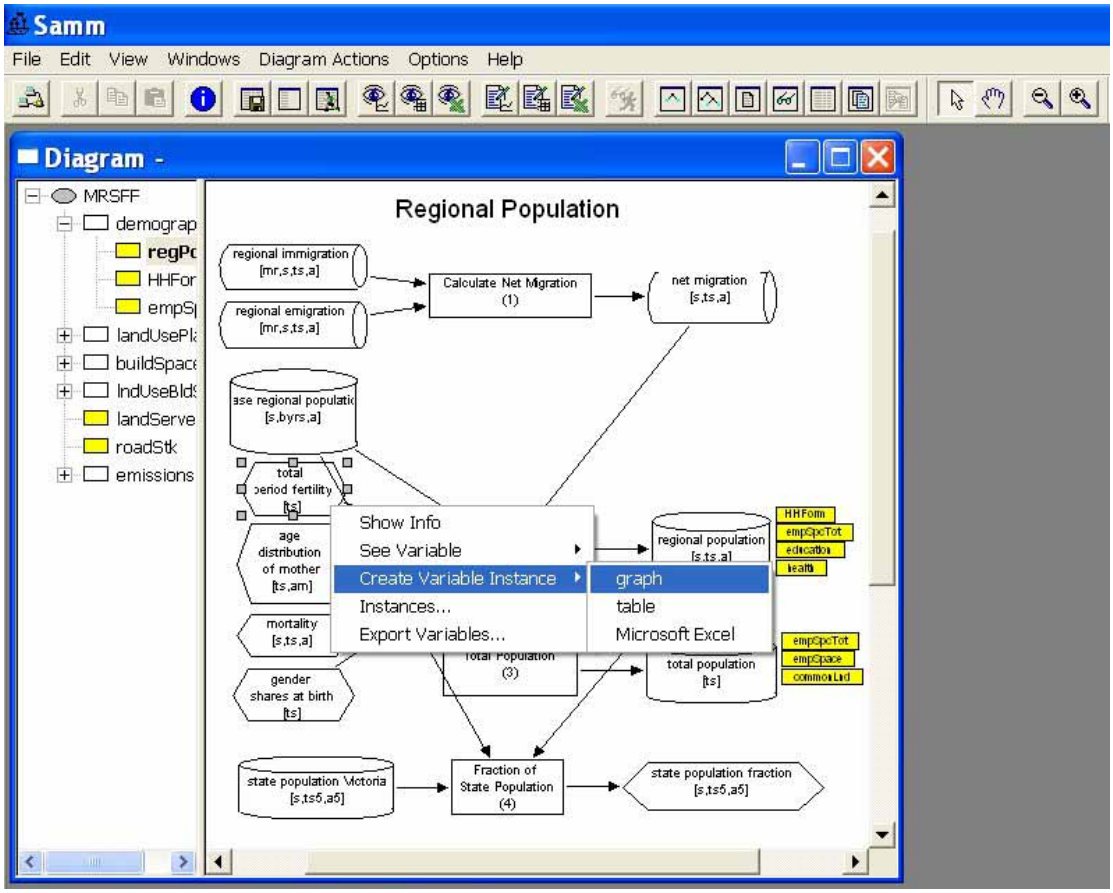
# Tutorial II

## Creating Scenarios

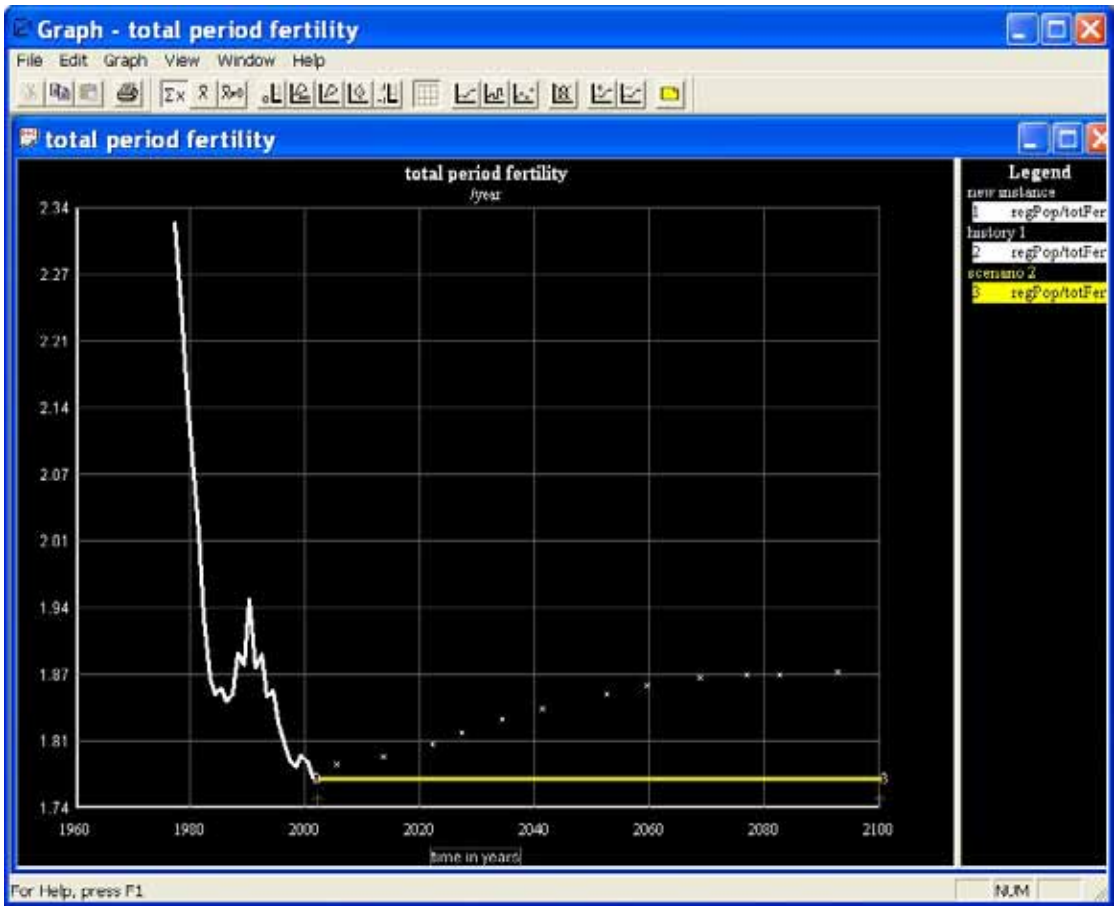
You can create your own scenarios by directly inputting data using the graph and table facilities and through Microsoft Excel ®. Scenarios can be created from scratch or they can be based on pre-existing scenarios. It is recommended that you first pick the “fixed” scenario (as shown in Tutorial I) as a background scenario before creating your own scenarios in the following examples.

## Creating Scenarios Using Graph:

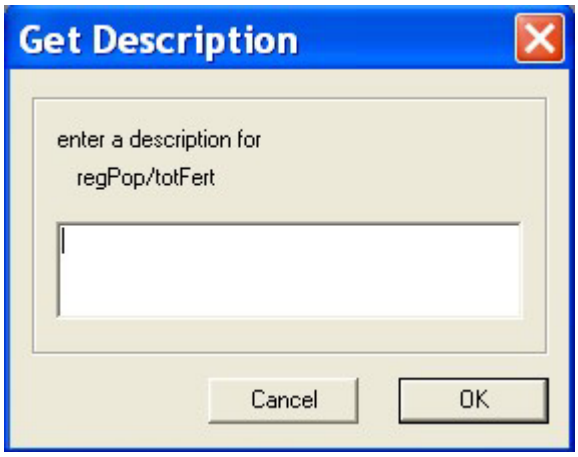
Select the total period fertility variable and then right click to see the “Diagram Actions” options for dealing with variables. Within the “Create Variable Instance” option, choose “graph”.




Draw in the data points on the graph, using the left mouse button to select the data points – see the white crosses on the figure below.

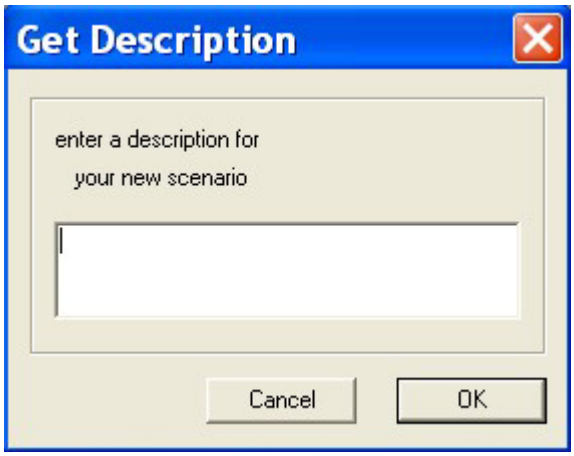



When you close the window, you'll be asked to save a name for the new instance of the total period fertility variable:




After saving the instance of this variable, click anywhere in the Diagram window and then select "Save Scenario" from the Diagram Actions menu. You will be asked to save your new scenario through a dialogue box – see below.

**You can, of course, create new instances for many other variables before saving that collection of instances under a scenario name. One scenario can represent instances of multiple variables.**




After entering a name for your scenario you will see that it has become picked in the Scenario window. Now you can look at the values of variables in the framework under your scenario (such as “total population” in the Regional Population calculator).

It is also possible to view variable instances from two or more scenarios at the same time. Hold down the CTRL key and highlighting other scenarios by clicking on their description using the left mouse button. Now, when you view a variable, several instances corresponding to the scenarios chosen will appear in the same graph, table or Excel file.

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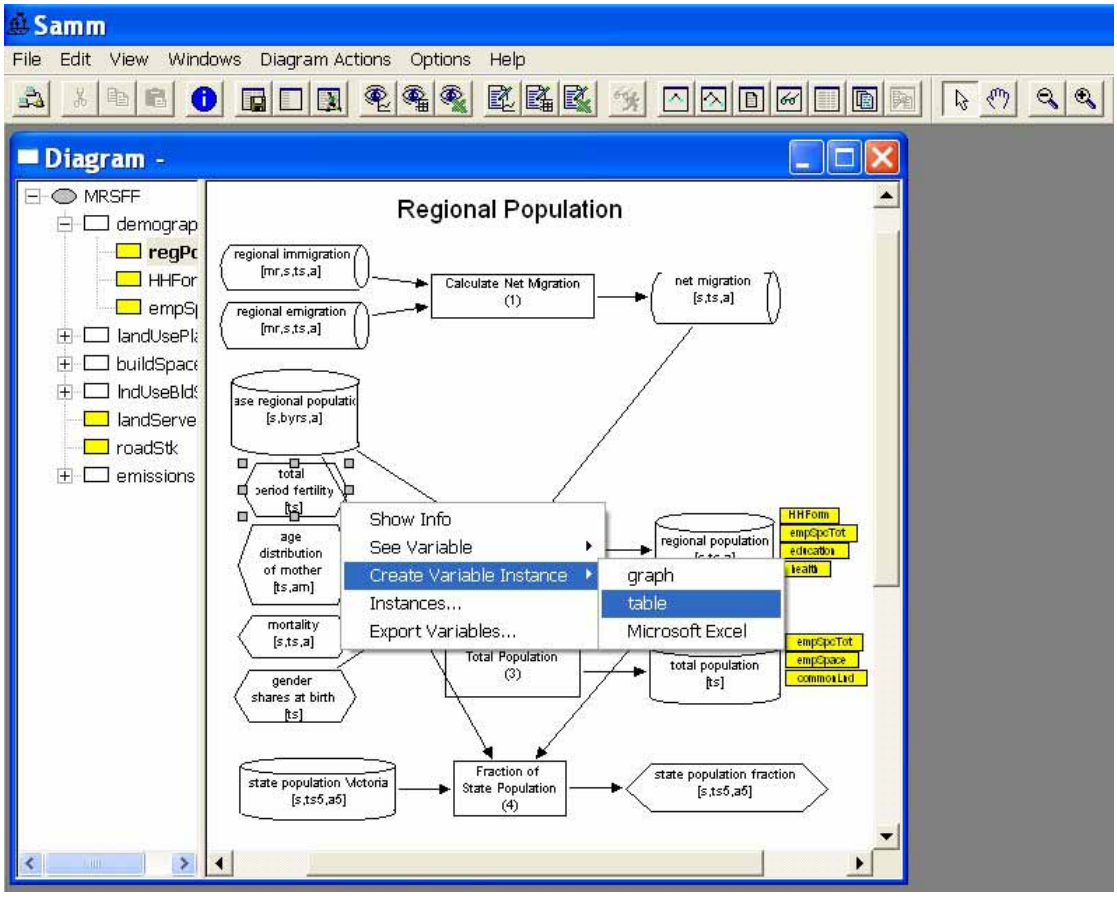
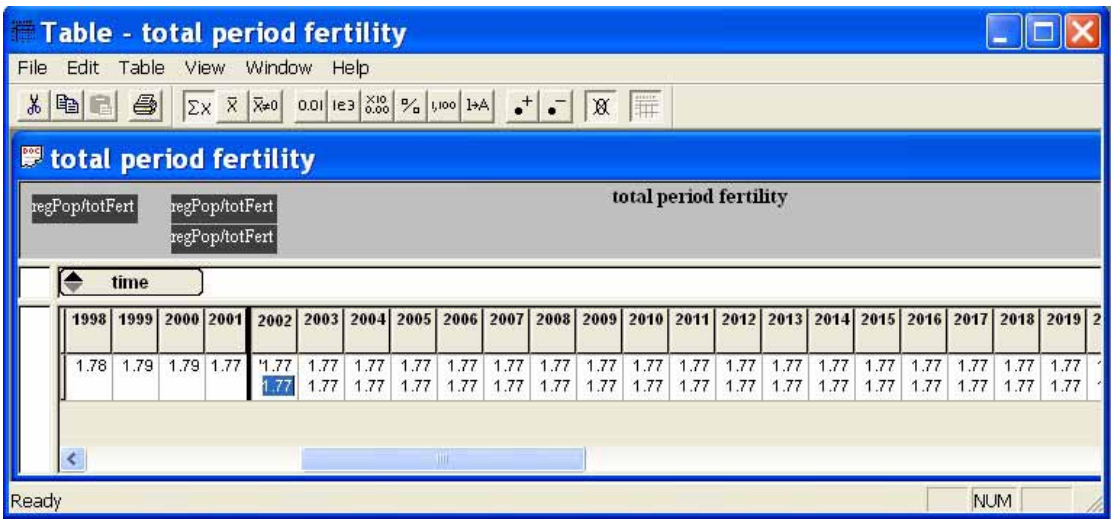
## Creating Scenarios Using Table:

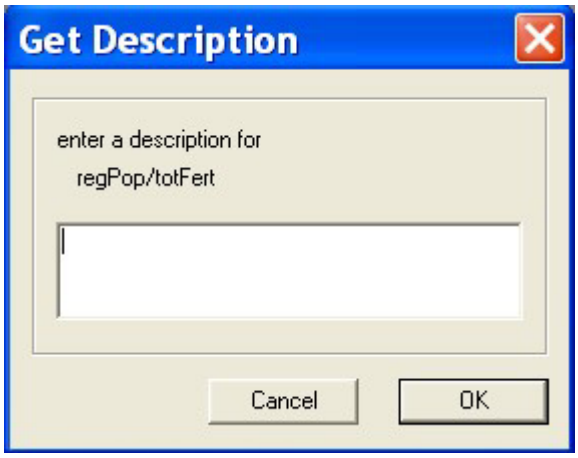
Again select the total period fertility variable and then right click to see the “Diagram Actions” options for dealing with variables. Within the “Create Variable Instance” option, choose “table”.



Two rows can appear in any given cell in the table. The top row has values corresponding to the background scenario or history. A bold vertical black line separates the columns of data belonging to historical time and those for the future or “simulation time” (see diagram below). Click on the lower row of the simulation time and insert your own values. It’s possible to fill out the contents of a table quickly by copying or “Broadcasting” a value along a row by CTRL right arrow or down a column using CTRL down arrow.

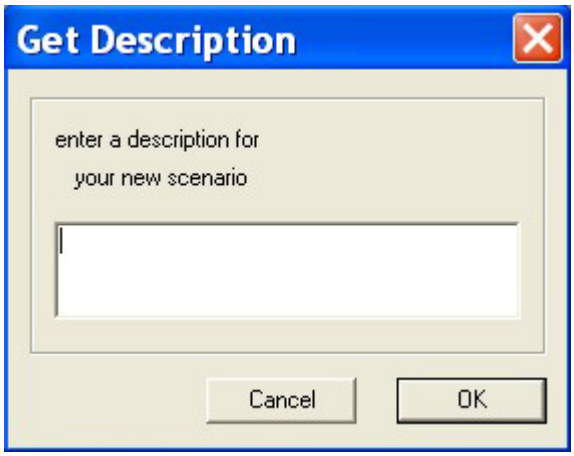



When you close the window, you’ll be asked to save the new instance of the variable:




After saving the instance of this variable, click anywhere in the Diagram window and then select “Save Scenario” from the Diagram Actions menu. You will be asked to save your new scenario through a dialogue box – see below.

**You can, of course, create new instances for many other variables before saving that collection of instances under a scenario name. One scenario can represent instances of multiple variables.**




After entering a name for your scenario you will see that it has become picked in the Scenario window. Now you can look at the values of variables in the framework under your scenario (such as “total population” in the Regional Population calculator).

It is also possible to view variable instances from two or more scenarios at the same time. Hold down the CTRL key and highlighting other scenarios by clicking on their description using the left mouse button. Now, when you view a variable, several instances corresponding to the scenarios chosen will appear in the same graph, table or Excel file.

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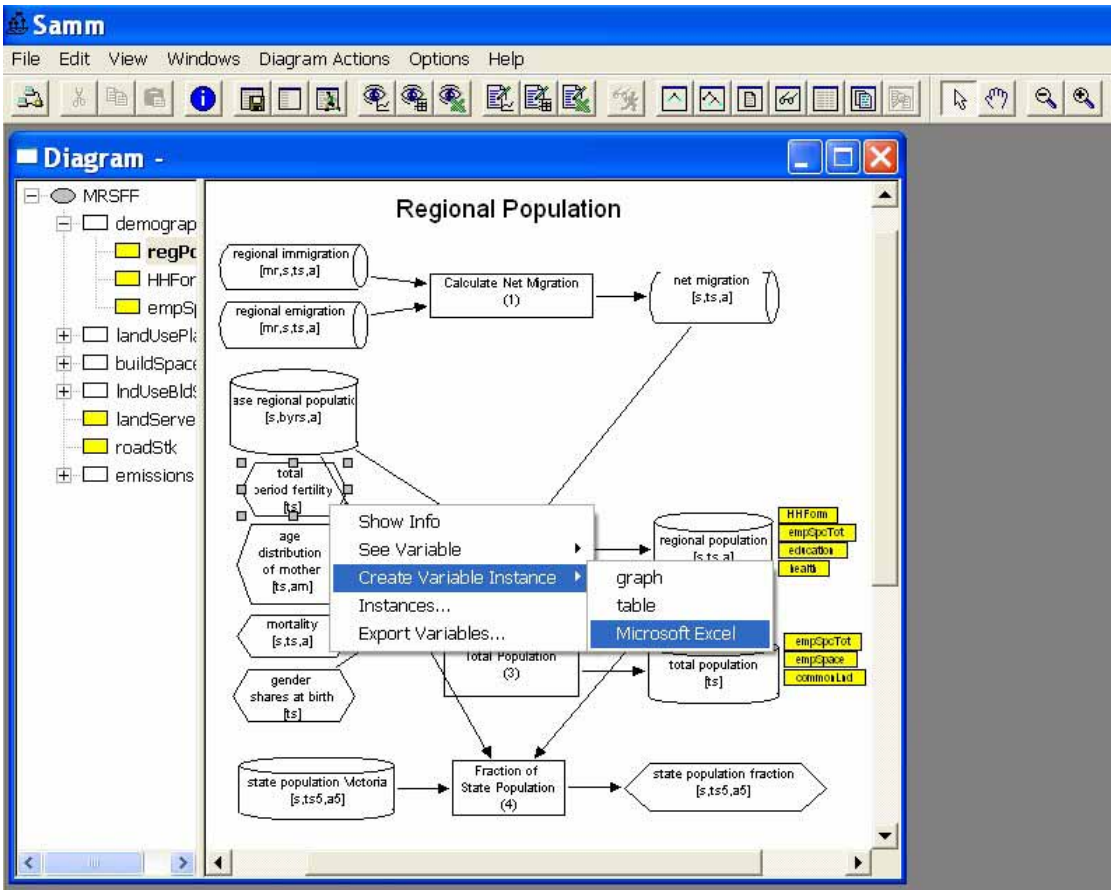
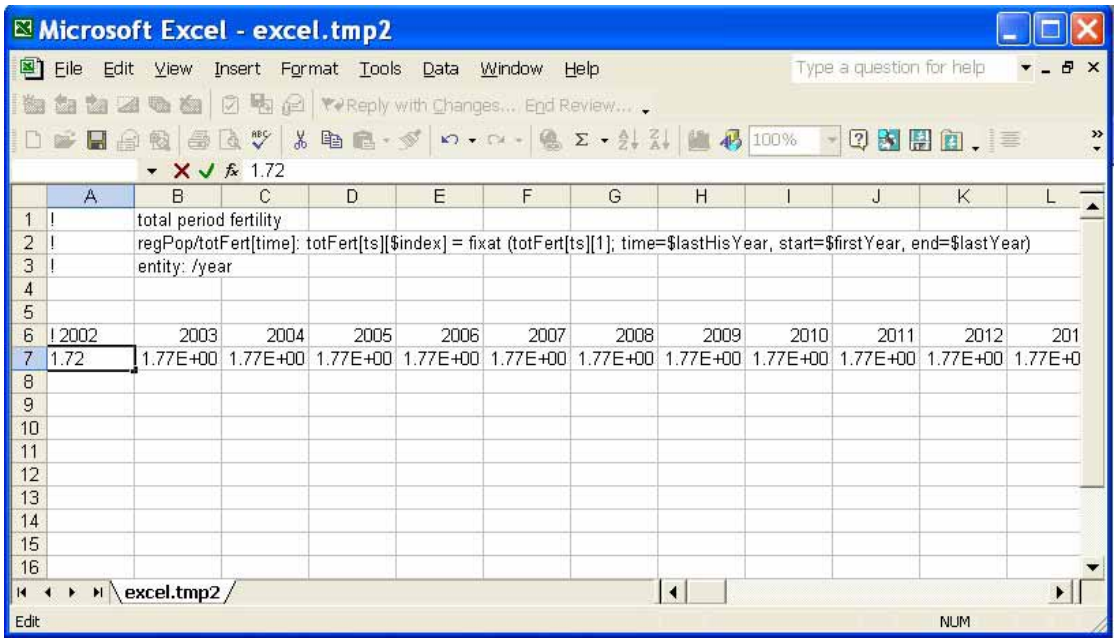
### Creating Scenarios Using Excel:

Again select the total period fertility variable and then right click to see the “Diagram Actions” options for dealing with variables. Within the “Create Variable Instance” option, choose “Microsoft Excel”.




**Note** that, unlike the example in Tutorial I, now there's only one Excel file shown: "excel.tmp2". Using this you can actively enter values through Microsoft Excel ® - see below.




| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ! | total period fertility | | | | | | | | | | |
| 2 | ! | regPop/totFert[time]: totFert[ts][$index] = fixat (totFert[ts][1]; time=$lastHisYear, start=$firstYear, end=$lastYear) | | | | | | | | | | |
| 3 | ! | entity: /year | | | | | | | | | | |
| 4 | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | |
| 6 | ! 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 201 |
| 7 | 1.72 | 1.77E+00 | 1.77E+00 | 1.77E+00 | 1.77E+00 | 1.77E+00 | 1.77E+00 | 1.77E+00 | 1.77E+00 | 1.77E+00 | 1.77E+00 | 1.77E+0 |
| 8 | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | |
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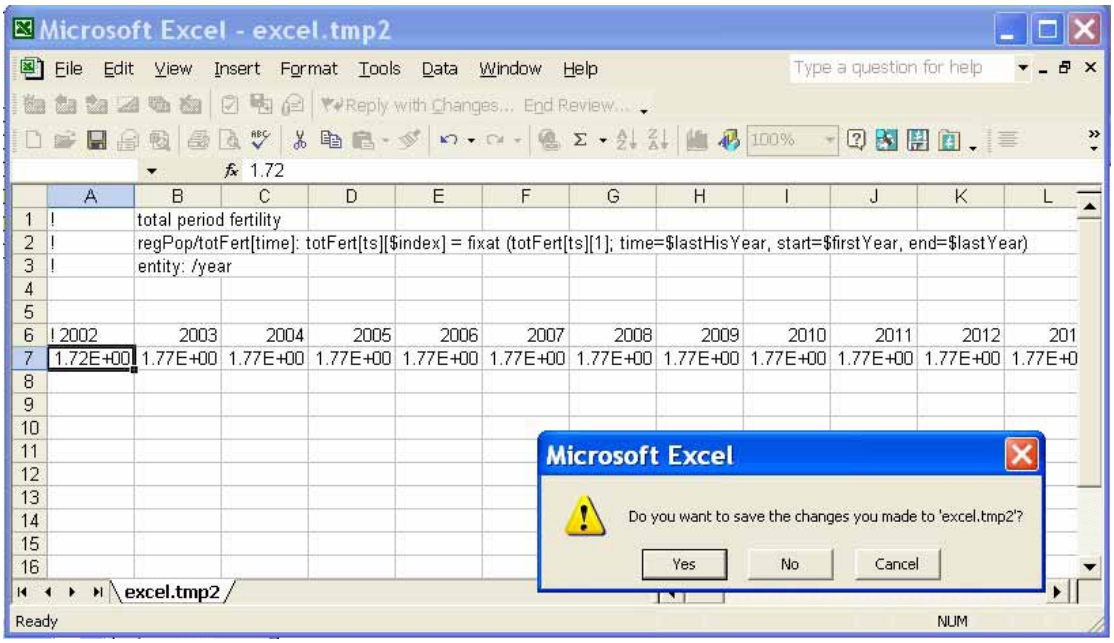
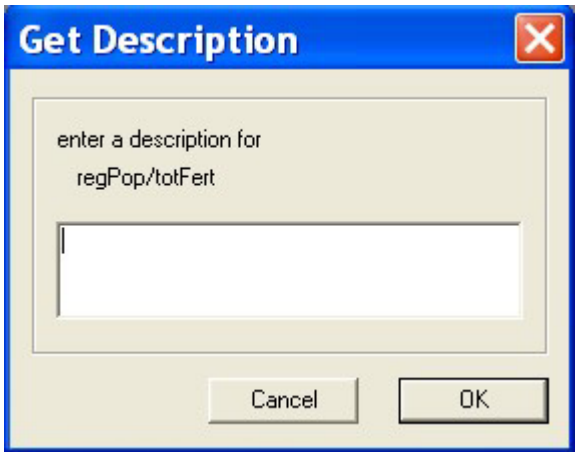
| 13 | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | |

Now save this file as excel.tmp2



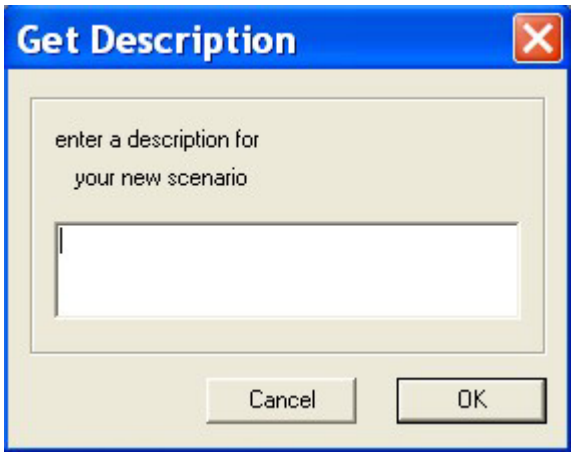

You will be asked about writing over the original file – do so. You will also be asked whether you want to retain the same file format or change to an Excel format. Keep the same format.

You'll be asked to save the new instance of the variable:




After saving the instance of this variable, click anywhere in the Diagram window and then select "Save Scenario" from the Diagram Actions menu. You will be asked to save your new scenario through a dialogue box – see below.

**You can, of course, create new instances for many other variables before saving that collection of instances under a scenario name. One scenario can represent instances of multiple variables.**




After entering a name for your scenario you will see that it has become picked in the Scenario window. Now you can look at the values of variables in the framework under your scenario (such as “total population” in the Regional Population calculator).

It is also possible to view variable instances from two or more scenarios at the same time. Hold down the CTRL key and highlighting other scenarios by clicking on their description using the left mouse button. Now, when you view a variable, several instances corresponding to the scenarios chosen will appear in the same graph, table or Excel file.

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# Tutorial III

## Example Scenarios

In this tutorial you will run through a few examples of how to create a series of scenarios which incorporate different assumptions about net immigration, fertility rates, and the siting and quantity of greenfield land released for new development. These initial scenarios will be restricted to siting new development on greenfield land, and will not incorporate redevelopment, for the sake of clarity.

## Setting Up

The assumed starting point for this tutorial is that you have just entered MRSFF, and selected in a history.

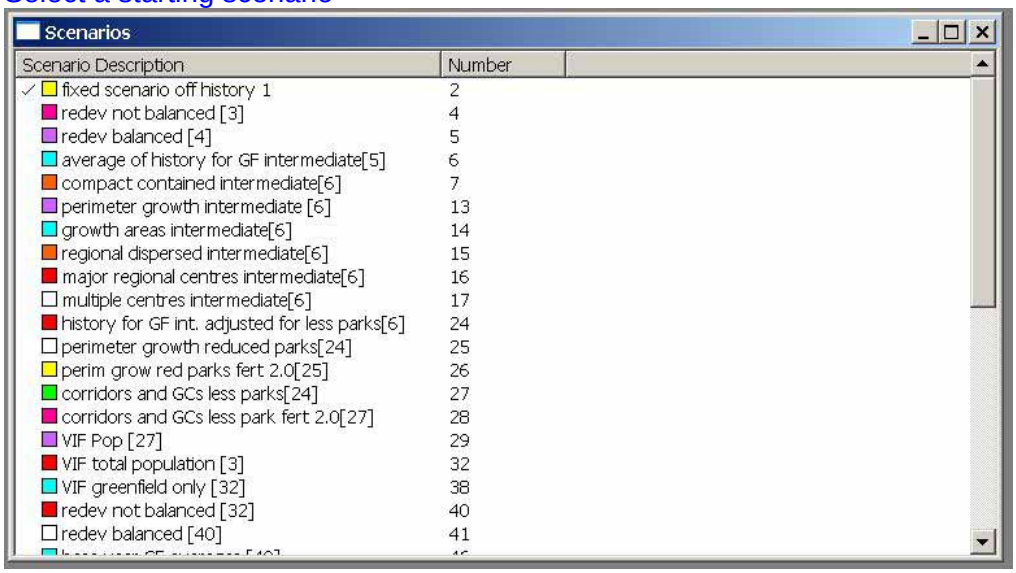
This tutorial will rely on the presence of at least one base scenario (with the word “fixed” in its title) having been pre-created and available in the scenarios window. For the purposes of this tutorial, just think of the fixed scenario as ensuring that all variables which need initialisation are initialised. You will also be called on to use “views” at various times. These will are also assumed to be pre-existing and available to the user. A detailed section on using the views window is presented in the Views Actions section. The views used here are basically scripts which simplify and automate data input and processing.

## Building and Modifying Scenarios – Step by Step

1. Select the starting point scenario.

Within MRSFF, bring up the Scenarios window either by selecting it from the windows menu, or keying ctrl + r. From the Scenarios window, find the scenario “fixed scenario off history1”, and select it by double clicking on the box to its immediate left.

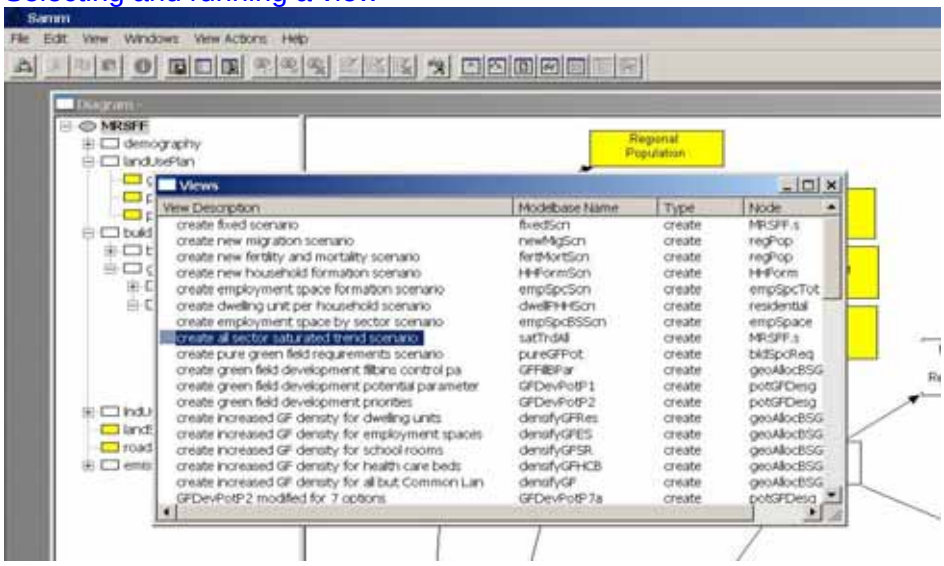
Select a starting scenario



2. Bring up the Views window (ctrl + d). Find the View satTrdAll (search down the Model base Name Column).

If it isn't displayed, go to the hierarchy window (ctrl + y), and ensure that you have selected the highest element in the hierarchy, MRSFF. Go back to the views window, and select load from the View Actions menu. The satTrdAll View should now be available.

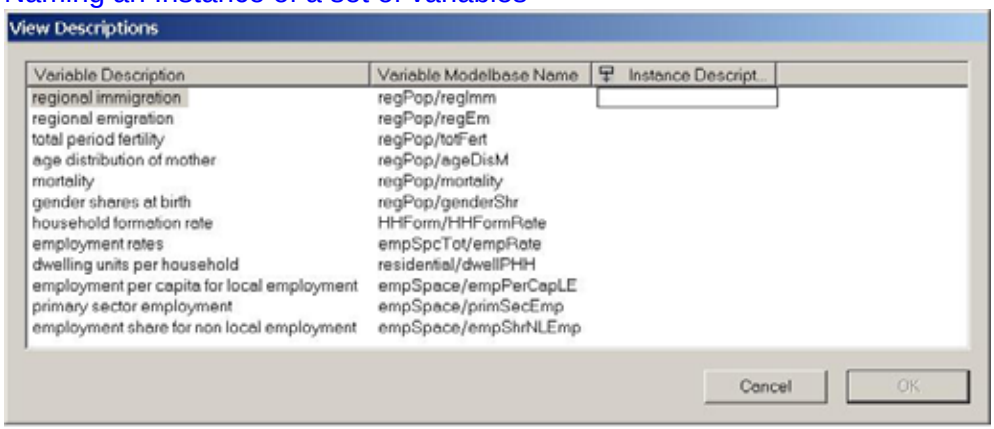
Selecting and running a view




Run satTrdAll by double clicking it. A window will pop up, and prompt you for input. This is the "Tool" window. Accept all defaults at this stage i.e. just hit enter to all questions, but take note of the actual questions. They tell you how you are setting key control variables for your new scenario.

3. when the view finishes running, a window will pop up prompting to supply a name to describe the new instances of variables you have just created. Enter something like sat25defaults, and then double click on the Instance Descriptions bar to copy the name down for all variables, and then hit OK.

Naming an Instance of a set of variables



4. Select the Diagram window from the Windows menu, and then select Save Scenario from the Diagram Actions menu. A pop up window will prompt you to select a name for scenario you have just created.

There is a convention we suggest be followed when naming scenarios:

- The name should reflect key information about the scenario. In this case, you have used the satTrendAll view to create a scenario where key variables have been set by following trends based on history, but limited to diverging from the last data point by a maximum of 25% i.e. the trends "saturate" rather than continue increasing/decreasing to infinity. (Check validity of this explanation). Thus a suitable name to use here is "saturate trend All 25%".

- The name should terminate with the number of the initial scenario on which it was based, in square brackets. Thus if the number of "fixed scenario off history1" in your Scenario window is 2, the new scenario should be named "saturate trend All 25%[2]".

Note that the act of naming the scenario should bring up the new scenario's name in the Scenarios window, and automatically select it (it will have a tick).

5. Go to the Views window again, locate the view named pureGFPot, and run it. You will be prompted again to provide names for new instances of variables you have just created, as for 3. above. A suitable name would be pureGFPot.

6. From Views window, run GFFillBPar. When prompted, provide name for new instances e.g. GFFillBPar.

7. From Views window, run GFDevPotP1. When prompted, provide name for new instances. e.g. GFDevPotP1.

8. Save the new scenario as outlined in 4. above. Suitable name would be "average of history Pure GF intermediate[initID]" (initID = ID No. for saturate trend All 25% scenario).

Over the previous 8 steps, the views you ran filled many variables throughout the framework with values different to those that were in the base scenario you started with, "fixed scenario off history1". The means by which values were determined were varied (e.g. based on historical trends, arbitrarily declared, etc) and a different set of views could use entirely different algorithms to deliver different values.

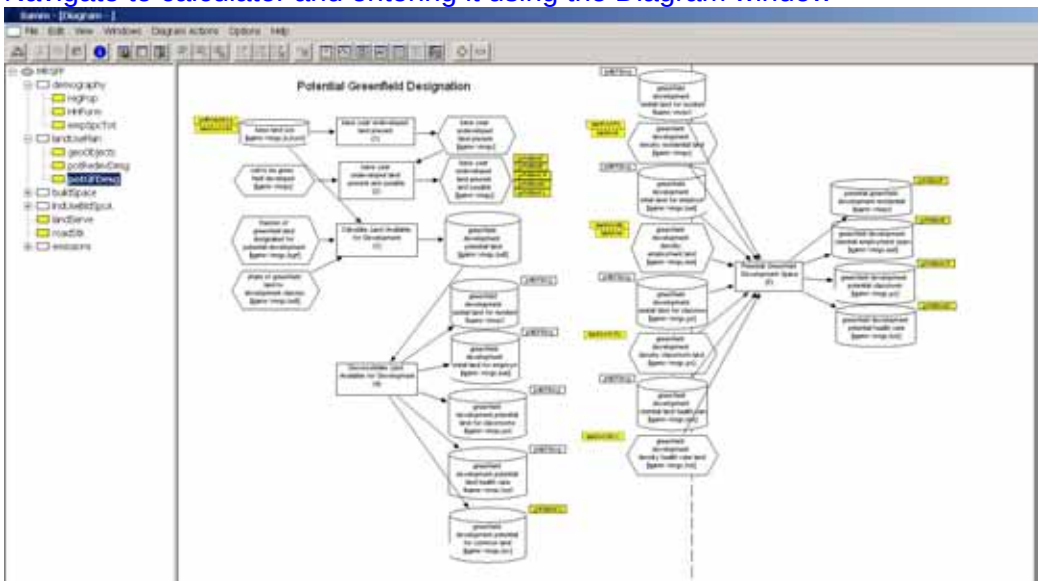
An example of this is the "share of greenfield land to development classes" variable (you will look at this variable and alter it in step 10). When you ran the GFDevPotP1 view, it determined a value for this variable from data on land use states in 2001 by simply summing and normalising the areas within each developed land category, for the whole area. This value is then applied to all geocells. This is an expedient way of coming up with a initial value for this variable, but any scenario using it then assumes that all future greenfield development will exactly mirror the aggregate of current development. This is unlikely to be adequate to explore all of the different scenarios a user might be interested in.

For our purposes in this tutorial, it is best to just to accept the views as "black box" operations.

The next few steps involve the user in manually changing instances of variables, to reflect different scenarios they may wish to explore.

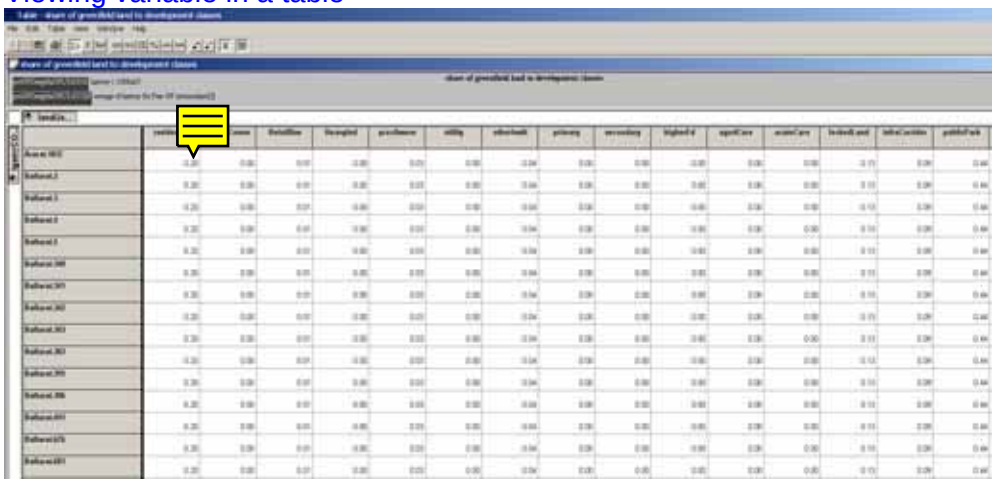
9. Go to the Diagram window, expand the landUsePlan node in the hierarchical tree on the left hand side, and double click on the potGFDesg calculator box there. This should take you into a full display of the potGFDesg calculator on the main right hand frame of the window.

Navigate to calculator and entering it using the Diagram window




10. Find the parameter variable (hexagon) called “share of greenfield land to development classes” (Or shrGFLToDC if you have selected Show Model base Name under the Option menu in the samm window). Right click on the hexagon to bring up pop up menu, and select See Variable -> table option. This will bring up a table showing the current values being used in your currently selected scenario, for this variable. (Note, there may be some delay in displaying the table, as 2130 x 16 data elements must be retrieved for this variable).

Viewing variable in a table



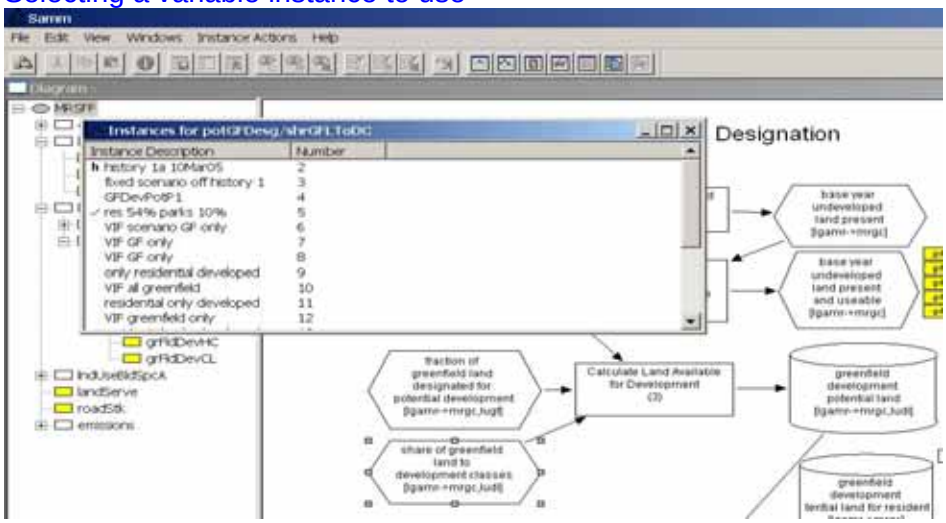
In this case, the variable that you are looking at describes a constraint on how greenfield land released for development within a geocell must be shared out among the different developed land uses. This can be specified differently for each of MRSFF’s 2130 geocells. Here, the same values have been set for each geocell. Note that for any share variable, each row must total to 1.

Look here at the values given for Residential (first column) and Public Park. They are around 0.2 and 0.44 respectively. This implies that for every hectare of greenfield land released for development, a maximum of 20% can be developed as residential land, whilst up to 44% can be set aside as Public Parks. The user might consider this to be unrealistic, and wish to change this setting. This is where the user has the option of manually changing a variable instance.

11. Close the table window, and right click again on the “share of greenfield land to development classes” variable. This time select “instances”. A pop up window will display a list of instances available for the variable. The instance being used in your current scenario will have a tick in its check box.

12. Select the instance “res 54% parks 10%” by double clicking on it. Now go to the Scenarios window (ctrl + r), and look at the list. Note that none of the existing scenarios is now selected. In changing the instance of one variable, you have made (but not saved) a new scenario.

Selecting a variable instance to use




13. Save this new scenario as in 4. above. A suitable name would be “GF intermediate res54% parks10%[initID]” (initID = ID No. for “average of history for Pure GF intermediate” scenario) .

14. Go to the Diagram window, expand buildSpace -> bldSpcReq node in the hierarchical tree, and enter the commonLnd calculator display, as for 9. above.

15. Display the current values for “common land per capita”. Note that the current requirement for Public Parks is set to 0.08Ha per capita. For this tutorial we assume that the user thinks that this is excessive. Follow the procedure outline in steps 11 and 12, this time for the “common land per capita” variable, selecting in the “reduce ppk 2ha” instance.

16. Save this scenario as “GF 2Ha Parks per 100[initID]”, where x = ID No. for “GF intermediate res54% parks10%”.

17. Look at the values for both “common land per capita” and the “share of greenfield land to development classes” variables, to confirm that they have the new values you require.

**Bug Note: if you want to look at a newly selected instance, you not will see the updated instance value, until you save the new scenario. If you wish to change instances for a number of variables, you can change them all prior to saving as a new scenario, but you will not see the updated values until you save.*

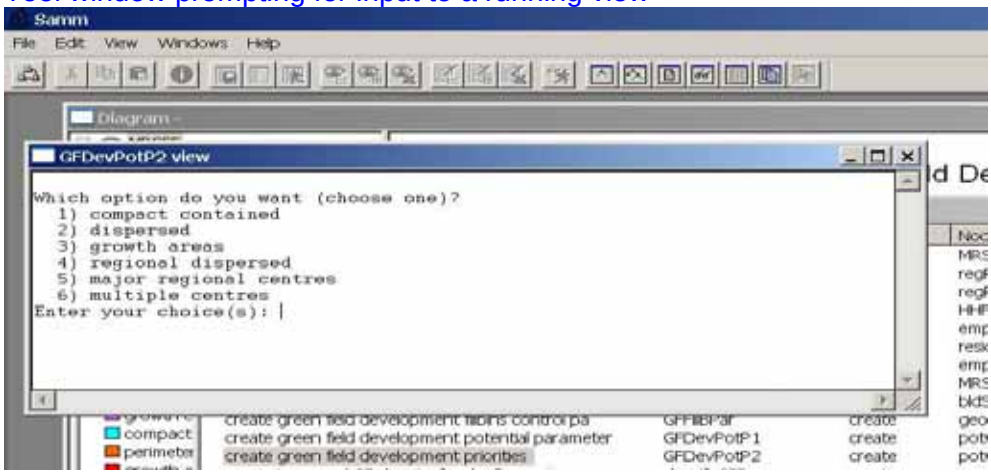
We now use a view which allows the user discretion in the siting and quantity of greenfield land released for new development.

18. Go to the Scenarios window and ensure that you have the “GF 2Ha Parks per 100[initID]” scenario selected.

19. Go to the Views window, find GFDevPotP2, and run it. (See step 2 if you need a refresher).

20. You will be presented in a tool window with 6 options. Choose option 2) dispersed.

Tool window prompting for input to a running view




In choosing this option, you will have selected a plan which prioritises the areas in which greenfield development is to take place, starting with development on available greenfield land within the existing metropolitan area, then moving out from there as available greenfield land is used up, in concentric buffer zones of decreasing priority. It emulates a typical perimeter growth pattern.
When prompted, provide appropriate instance name, then save the new scenario as “pure GF dispersed[initID]”.

21. Go to the Scenarios window, and reselect the “GF 2Ha Parks per 100[initID]” scenario. Note that you are setting the initial scenario to the same one you used to create “pure GF dispersed[initID]”

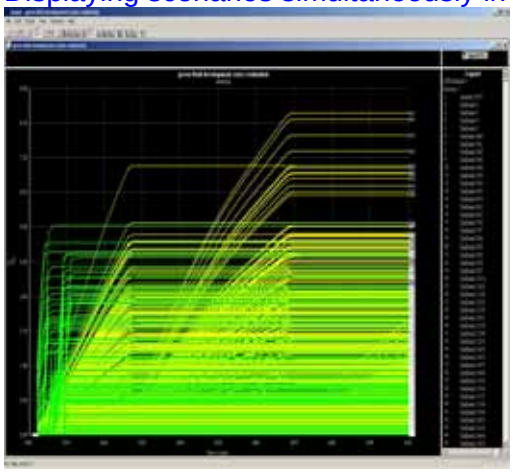
22. repeat steps 19. and 20., this time selecting option 3) Growth Areas. Name the scenario “pure GF dispersed[initID]”. This time the user is restricting greenfield development to a much more restricted set of Growth Areas, with most geocells concentrated in the Wyndham, Whittlesea, Hume, Casey, and Cardinia LGAs.

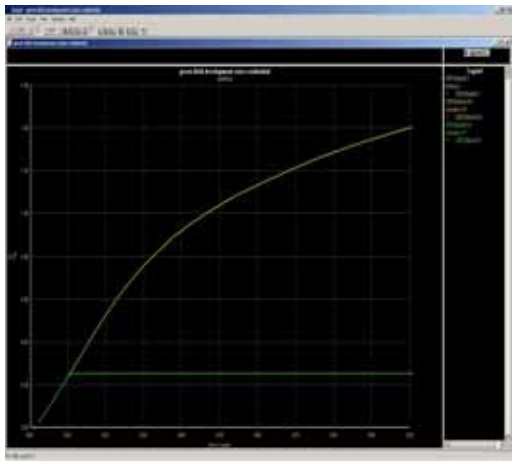
This is a good point to compare some output from the two different scenarios you have just constructed.

23. Go to the Scenarios window, and ensure that one of your new scenarios is selected. You can then also select the other scenario (but for display purposes only) by single clicking on it with the ctrl key held down. Note that you can highlight as many scenarios for simultaneous display as you like by this method.

24. Go to the Diagram window, expand buildSpace -> geoAllocBS -> geoAllocBSGF and enter the grFldDevR calculator. Right click on the “green field development state residential” variable, then select See Variable -> Graph. The first time you wish to display any variable which is created within the framework, the framework must initially calculate the values. Thus a tool window will typically pop up and provide some information on the progress of those calculations. When this process finishes, the graph display will pop up automatically. Note that the graph will initially display as shown on in the left hand diagram below.

Displaying scenarios simultaneously in graph window





The display is cluttered because it is simultaneously graphing the variable for each of the 2130 geocells, for two scenarios i.e. 4260 curves. In the top right hand corner of the graph display, you will find a grey button with “lgamrCo..” on it. Click on the up pointing triangle, to “Roll Up” (sum) all of the curves within each scenario, leaving you with just 2 curves, one for each scenario. You can disaggregate the curves again by clicking on the down triangle.

Note for these two scenarios, you should see both curves tracking identically until around 2010, when the curve for the Growth Centres scenario goes flat. This indicates that no more greenfield land is having dwelling units built on it. In the Dispersed scenario, development continues. This abrupt divergence between them indicates a tension has likely resulted from the land use plan selected for the Growth Centres scenario, (remember that the base demographic drivers for both scenarios are identical as they are both based on the “GF 2Ha Parks per 100[initID]” scenario).

25. In this calculator, the “green field development shortage residential” variable captures the tension where insufficient greenfield land has been made available in the Land Use Plan to accommodate a particular scenario’s requirement for residential development. To view this variable, repeat the procedure outlined in 24.

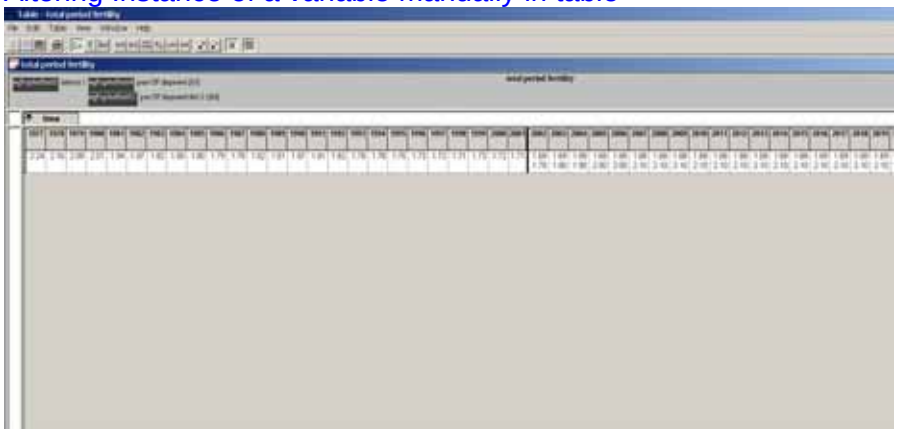
Display of a greenfield land shortage tension

If the user wishes to change or refine variable settings for a scenario, and there are no suitable instances available, the user can create their own new instances. In the following steps we create a new variable instance.

26. Select the “pure GF dispersed” scenario, then go to the Diagram window, expand the Demography node in the hierarchical tree, and enter the regPop calculator display.

27. Right click on the “total period fertility” variable, and select Create Variable Instance -> table from the pop up window.

Altering Instance of a variable manually in table



28. The table will display the current values for fertility for each year. Historical data (that prior to 2001) has only 1 value shown per year, and can’t be altered here. Values for simulation time (2002 – 2100) have at the outset 2 identical values shown for each year. The upper row is not editable, and is a record of the current instances values. The lower row is where the user should enter the new values they wish to use.

In this example the user will create an instance where fertility rises from 1.8 in 2002 to 2.1 in 2006, then remains constant until the end of the simulation.

29. Click into the lower data row for the year 2002. Enter the value 2.1, then hit ctrl + ->. This will cast the 2.1 value across all years to 2100 (thus saving the effort of individually typing them in). You can then alter the values for 2002 – 2006 individually if a smoother transition to the new fertility rate is desired. This has been done for this example. Alternatively, you could have used the graph tool to fill out this instance, as described in Tutorial II above.

30. Shut the table window. You will be prompted to supply a name for the new instance you have just created. Fertility 2.1 would be suitable. Then save the new scenario, e.g. “dispersed fert 2.1[initID]”.

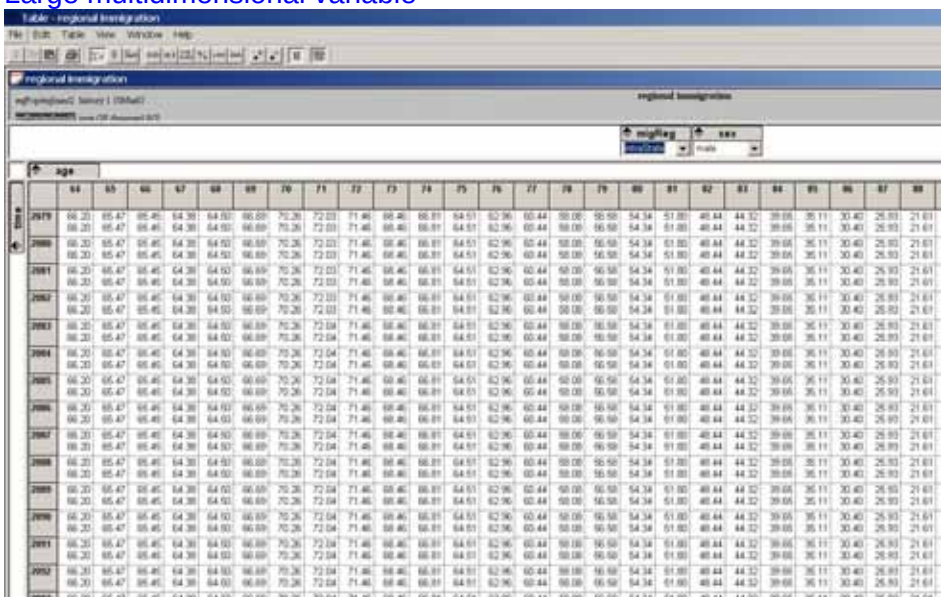
31. Go to the Scenarios window and ensure that both the “dispersed fert 2.1[initID]” and the “pure GF dispersed” are selected then display the “green field development state residential” variable in the graph window as outlined in steps23. and 24. The Tool window will pop up as those variables which alter with a changed fertility rate are recalculated.

Development impact of higher fertility rate

The curve for the new scenario (in blue above) reflects the change in greenfield development which flows through from the higher fertility, in a scenario otherwise identical settings for control variable to that behind the yellow curve. Note that a tension develops around 2080.

It is possible, but not always practical, to create new instances of virtually all control variables in the manner described for total period fertility. The reason for this is the size and dimensionality of some variables. To illustrate this point, enter the regPop calculator, and display the “regional immigration” variable in a table.

Large multidimensional variable

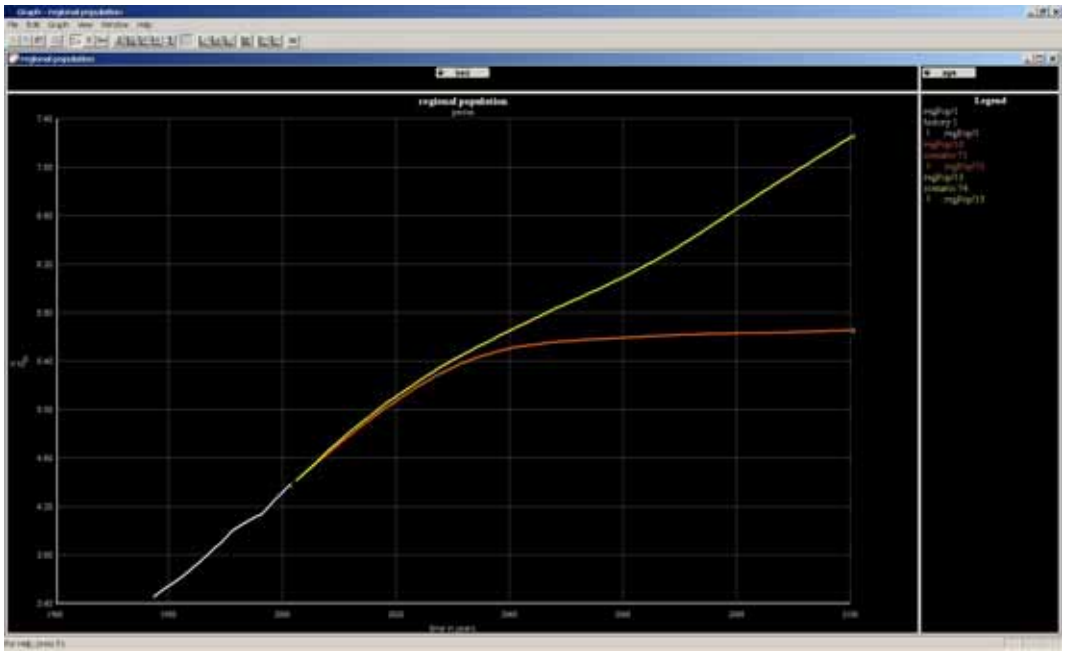


This variable is disaggregated by time (123 possible values) , age (100), migration region (3), and sex(2). This means to create a new instance of this variable using table the user would have to fill out a 123 x 100 cell table, for each migration region (x3) and for each sex(x2), i.e. at total of 33800 data points. Even using the ability to broadcast values through rows and columns, it would entail a large effort, every time you wished to change it substantially.

This is an application where views can come into their own, but their application is not discussed further here. You can also use Excel to fill an instance, as described previously in Tutorial II.

## Further Explorations

At this point you might like to experiment with running some views again to enter your own parameter values rather than accepting default values, or substitute different instances of variables, to create further scenarios.




In the graph above, the two scenarios where created running the satTrdAll view twice more off the “fixed scenario off history 1”. Instead of accepting all defaults, the immigration rate trend was set to allow 15% change for one scenario, and 0% in the other (all other settings were kept at the default values). The scenario with the 0% was then further modified by selecting in a total period fertility of 2.1 instance, similar to what you would have created above. An interesting feature of this graph (for Regional Population) is the manner in which the populations for the two scenarios track closely out till 2030, both adding around 1 million people to the MRSFF population over that time, but diverge sharply soon afterwards.

To explore the effects of these two new demographic scenarios on landuse, the user would substitute each one in turn for the “saturate trend All 25%” scenario at step 5, then repeat those steps necessary to your purpose.

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# The Scenario and Model Manager - SAMM

This is the interface between the ‘live’ framework, the data, and you. The scenario and model manager, SAMM, enables the management of models and scenarios in a ‘model base’. SAMM gives the user access to the model base and its associated data through a number of windows of information each with a specific set of actions enabled.

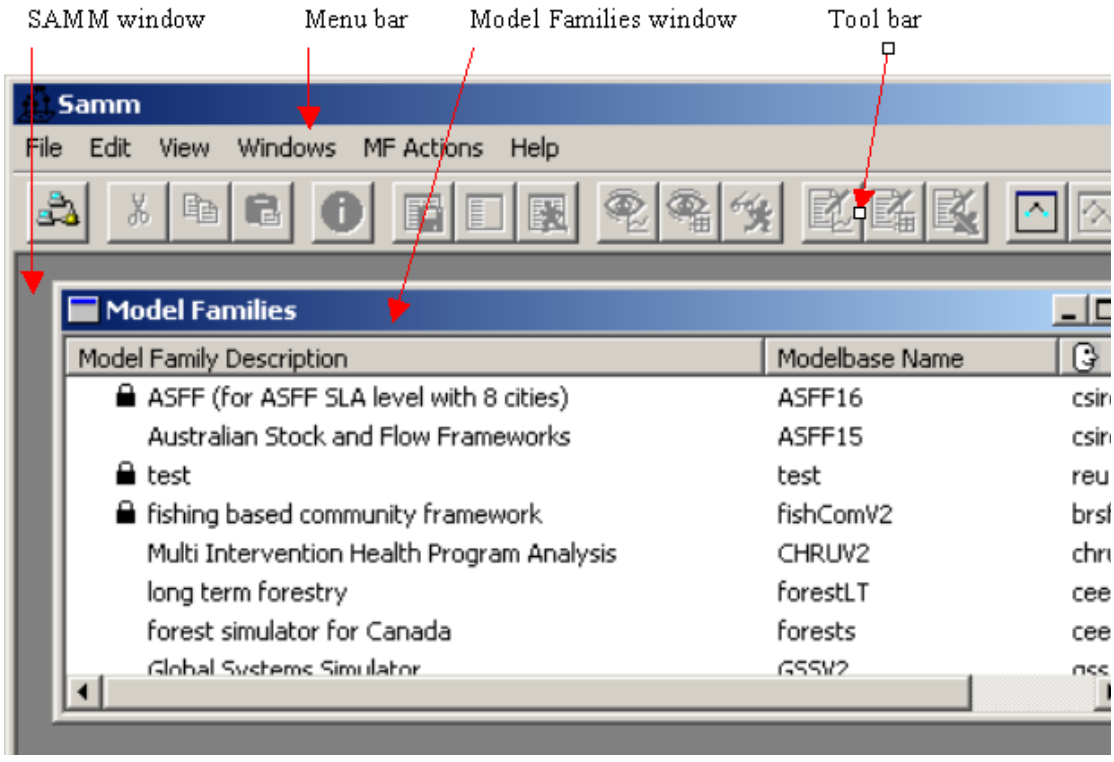
## Launching SAMM

SAMM is launched by double clicking on samm.exe or its icon:

If the SAMM icon isn’t on you desktop, go to the Start Menu and click on All Programs. Click on the “whatIf” sub-menu and choose the option called “SAMM”.

## The Model Base and Its Model Families

At launch you will be put into a model base and presented with the model families available in that model base as below.

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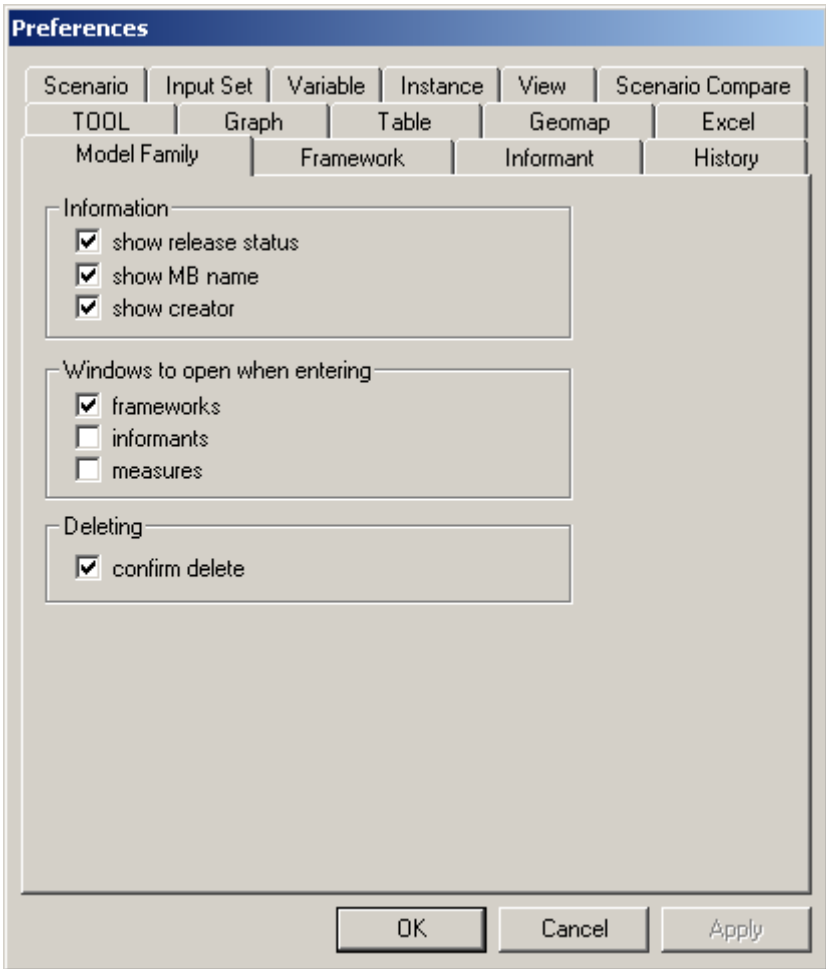
## Windows of Information

The various windows of information, enabling their associated actions, may be opened from the Windows menu (or the equivalent power key strokes). These are opened inside the SAMM window. Depending on the current state of selections and opened windows some windows will be able to be activated, while other will not. Each window may be positioned within the SAMM window according to the users' preference and the next time SAMM is launched it will position that window in the same place. Each window also has a set of preferences determining its operation which may be set selecting the menu item "File>Preferences..."




Preferences for the display tools graph, table, geomap and excel may be set here as well as preferences for the TOOL window. Tabbing through lets you set preferences for each mentioned window.

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## Actions In Window

Action items may be accessed,

1) through the Actions menu on the Menu bar when the window is active,
2) through a right mouse click on the opened window of choice or
3) through clicking the tool of choice on the tool bar

The Action menu (1) provides the exhaustive list of possible actions whereas right mouse clicking and tool bar are generally a subset.

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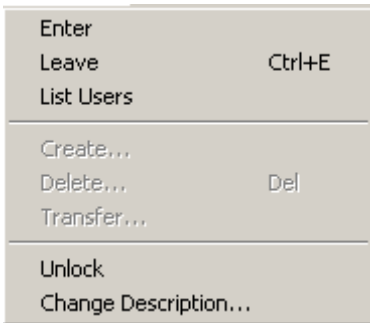
## Model Families Actions




**Enter**
MF Actions>Enter after selecting a model family by clicking on it
Double click on a model family. Right click on a model family and Enter

**Leave**
MF Actions>Leave to leave a model family if you are in a model family.
Right click on a model family and Leave

**List Users**
MF Actions>List Users lists all users currently logged into this model base.
Right click on a model family and List Users

**Create**...
MF Actions>Create... a new model family. Only active if you are not currently in a model family.
Right click on window and Create....

**Delete...**
MF Actions>Delete... a model family. Only active if a model family is selected. Only the owner may delete a model family. Right click on window and Delete....

**Transfer...**
MF Actions>Transfer... creates enabling files to transfer a model family to another model base.
Right click on model family and Transfer....

**Lock and Unlock**
MF Actions>Lock or MF Actions>Unlock the currently selected model family. Only owner can do so. Right click on model family and Lock or Unlock.

**Change Description...**
MF Actions>Change Description... enables changing the description of the currently selected model family. Only owner can do so.
Right click on model family and Change Description....
Click on description after highlighting model description line for in place editing of description.

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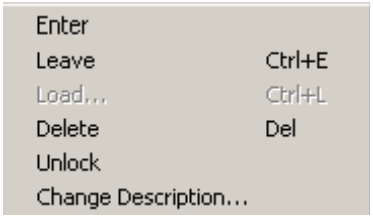
## Frameworks Actions




**Enter**
FW Action>Enter to enter a framework. Only active if a framework in the frameworks window is selected (by clicking on the one of your choice in the frameworks window). Double clicking on that framework is the same action.
Right click on a framework and Enter.

**Leave**
Leave a framework. Only active if you are in a framework. Right click on a framework and Leave.

**Load**
Load a framework from a SAMM framework load file collection. Only active if you are not in a framework. SAMM will look for this file collection in the directory indicated by the Set File Path action under the File menu. Right click on the framework window and Load.

**Delete...**
Delete a framework. Only active if a model family is selected. Only the owner may delete a framework. Right click on a framework and Delete.

**Lock and Unlock**
Lock or unlock the currently selected framework. Only owner can do so. Right click on a framework and Lock or Unlock.

**Change Description...**
FW Actions>Change Description... enables changing the description of the currently selected framework. Only owner can do so. Right click on a framework and Change Description.... Click on description after highlighting framework description line for in place editing of description.

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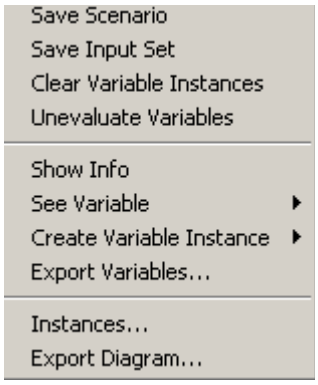
## Diagram Actions




**Save Scenario**
FW Action>Enter to enter a framework. Only active if a framework in the frameworks window is selected (by clicking on the one of your choice in the frameworks window). Double clicking on that framework is the same action. Right click on a framework and Enter.

**Save Input Set**
Leave a framework. Only active if you are in a framework. Right click on a framework and Leave.

**Clear Variables Instances**
Load a framework from a SAMM framework load file collection. Only active if you are not in a framework. SAMM will look for this file collection in the directory indicated by the Set File Path action under the File menu. Right click on the framework window and Load.

**Export Variables...**
Delete a framework. Only active if a model family is selected. Only the owner may delete a framework. Right click on a framework and Delete.

**Instances...**
Lock or unlock the currently selected framework. Only owner can do so.
Right click on a framework and Lock or Unlock.

**Export Diagram...**
Lock or unlock the currently selected framework. Only owner can do so.
Right click on a framework and Lock or Unlock.

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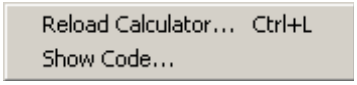
## Hierarchy Actions




**Reload Calculator...**
Reload a calculator. Only the owner reloads a calculator. It will reload the calculator selected in the hierarchy window from an external file in the folder set by the File Path and named “calculator name.t”.

**Show code...**
Show the code of the currently selected calculator (the one selected in the hierarchy window).

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## Histories Actions


**Pick**
History Actions>Pick in a history from the ones available in the history window. Double clicking on that history is the same action.
Right mouse click Pick on the history line desired.

**No History**
History Actions>Set history to no history. Not available with CAL framework.

**Change Description...**
History Actions>Change Description... enables changing the description of the currently selected history. Only owner can do so. Right click on a history and
Change Description.... Click on description after highlighting history description line for in place editing of description.

**Change Colour**
History Actions>Change Colour to change the colour of the selected history. Right click on a history and Change Colour.

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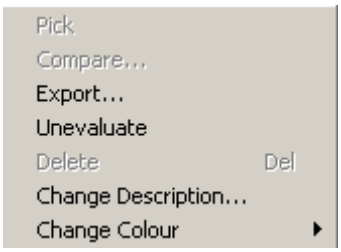
## Scenarios Actions




**Pick**
Scenario Actions>Pick picks that scenario into the variables list as the currently active scenario the scenario currently selected in the scenarios window. Double clicking on that scenario is the same action as is right clicking on the scenario.

**Compare...**
Scenario Actions>Compare.. compares scenarios. Two or more scenarios must be selected to activate the comparison which will be displayed in the Scenario Compare window. Can be activated with a right click on the highlighted scenarios.

**Export...**
Scenario Actions>Export exports a scenario. SAMM will export files to the directory indicated by the Set File Path action under the File menu. Can be activated with a right click on the scenario.

**Unevaluate**
Scenario Actions>Unevaluate unevaluates the complete scenario for each scenario currently selected in the scenario window. Can be activated with a right click on the highlighted scenarios.

**Delete...**
Scenario Actions>Delete deletes the selected scenarios. Only the owner may delete scenarios. Can be activated with a right click on the highlighted scenarios.

**Change Description...**
Scenario Actions>Change Description... enables changing the description of the currently selected scenario. Only owner can do so. Right click on a Scenario and Change Description.... Click on description after highlighting scenario description line for in place editing of description.

**Change Colour**
Change the colour of the selected scenario. Can be activated with a right click on the scenario.

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## Input Sets Actions


**Pick**
Input Set>Pick to pick the selected input set into the variables list. Double clicking on that input set is the same action. Right click on input set to pick it.

**Delete...**
Input Set>Delete... deletes the selected input sets. Only the owner may delete input sets. Right click on input set to delete it.

**Change Description...**
Input Set Actions>Change Description... enables changing the description of the currently selected input set. Only owner can do so. Right click on an input set and Change Description.... Click on description after highlighting input set description line for in place editing of description.

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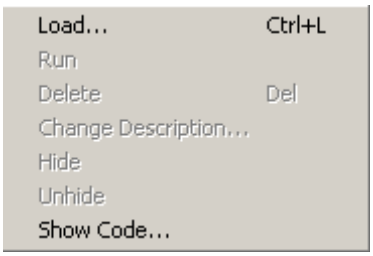
## Views Actions




**Load...**
View Actions>Load views from a SAMM view load file. SAMM will look for this file in the directory indicated by the Set File Path action under the File menu. Right click to Load.

**Run**
View Actions>Run a view for all scenarios selected in the scenarios window. Double clicking on that view is the same action. Right click on a view to Run

**Delete...**
View Actions>Delete the selected views. Only the owner may delete views.
Right click on a view to Delete....

**Change Description...**
View Actions>Change Description... enables changing the description of the currently selected view. Only owner can do so. Right click on a view and Change Description.... Click on description after highlighting view description line for in place editing of description.

**Hide View**
View Actions>Hide the selected views. Right click on a view to Hide.

**Unhide View**
View Actions>Unhide the selected views. Right click on a view to Unhide.

**Show code...**
View Actions>Show Code to show the code of the currently selected view. Right click on a view to Show Code.

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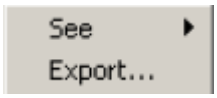
## Scenario Compare Actions




**See**
Scn Cmp>See allows viewing of the instances of all the variables currently selected in the scenario compare window for all the scenarios being compared. Double clicking on a variable in

the scenario compare window will activate the see action. The display mode ratchet determines the display mode used. Right click on the variable(s) initiates the same action.

**Export...**
Scn Cmp>Export exports the instance of all the variables in the scenario compare window for all the scenarios being compared. SAMM will export files to the directory indicated by the Set File Path action under the File menu. Right click on the variable(s) initiates the same action.

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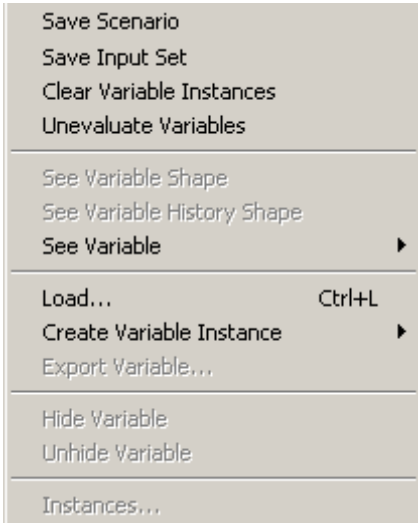
## Variable Actions




**Save Scenario**
Variable Actions>Save saves the current working scenario as a scenario. Will not be active unless all inputs to the model have instances selected in the variables list for the working scenario. Right click on the variable window initiates the same action.

**Save Input Set**
Variable Actions>Save saves an input set for all inputs to the model as scoped by the currently selected node of the hierarchy in the hierarchy window. Right click on the variable window initiates the same action.

**Clear**
Variable Actions>Clear clears the currently selected scenario form the worksheet. Right click on the variable window initiates the same action.

**Unevaluate**
Variable Actions>Unevaluate unevaluates the components of the scenario selected for all model components as scoped by the currently selected node of the hierarchy in the hierarchy window. Right click on the variable window initiates the same action.

**See Shape**
Variable Actions>See shows the shape of all the variables currently selected within the variables list. Right click on the variable window initiates the same action.

**See History Shape**

Variable Actions>See shows the history shape of all the variables currently selected in the variables list. Right click on the variable window initiates the same action.

**See**
Variable Actions>See shows the instance values of all the variables currently selected in the variables list. Double clicking on a variable in the variables list will activate the see action. The display mode ratchet determines the display mode used. Right click on the variable window initiates the same action.

**Load**...
Variable Actions>Load initiates a load into the variables list of one instance of one or many variables from a SAMM variable instance load file.SAMM will look for this file in the directory indicated by the Set File Path action under the File menu. Right click on the variable window initiates the same action.

**Fill**
Variable Actions>Fill enables the filling of the selected variable to create a new instance for it.
Right click on the variable window initiates the same action.

**Export...**
Variable Actions>Export enables the export of the selected variable with its current instance.
Right click on the variable window initiates the same action.

**Hide Variable**
Variable Actions>Hide hides the selected variables.
Right click on the variable window initiates the same action.

**Unhide Variable**
Variable Actions>Unhide unhides the selected hidden variables.
Right click on the variable window initiates the same action.

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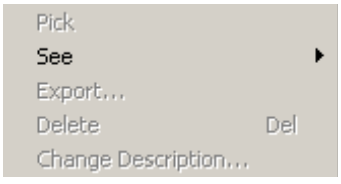
## Instances Actions




**Pick**
Instance Actions>Pick picks the selected instance into the current variables list. Double clicking on that instance is the same action.
Right click on the Instance ... window initiates the same action.

**See**
Instance Actions>See shows the instance values of all the selected instances. Double clicking
Right click on the Instance ... window initiates the same action.

**Export**...
Instance Actions>Export exports the selected instance. SAMM will export files to the directory indicated by the Set File Path action under the File menu.
Right click on the Instance ... window initiates the same action.

**Delete...**

Instance Actions>Delete deletes the selected instances. Only the owner may delete instances.
Right click on the Instance ... window initiates the same action.

**Change Description...**
Instance Actions>Change Description... enables changing the description of the currently selected instance. Only owner can do so. Right click on the Instance ... window initiates the same action. Click on description after highlighting instance description line for in place editing of description.

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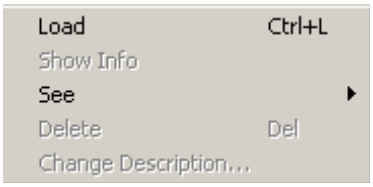
## Informants Actions




**Load**
Informant Actions>Load loads informants from a SAMM informants load file. SAMM will look for this file in the directory indicated by the Set File Path action under the File menu. Right click on informants window and Load.

**Show Info**
Informant Actions>Show Info shows the information about the selected informant. Right click on informant and Show Info.

**See**
Informant Actions>See a selected informant. Informant must be selected for see to be active. Right click on informant and See. Only display will show information about an informant.

**Delete...**
Informant Actions>Delete an informant. Only the owner may delete an informant. Right click on informant and Delete....

**Change Description...**
Informant Actions>Change Description... enables changing the description of the currently selected informant. Only owner can do so. Right click on an informant and Change Description.... Click on description after highlighting informant description line for in place editing of description.

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## Tool bar button actions

 Connect/Disconnect

 Cut

 Copy

 Paste

 Show Info - shows information on a selected object in the diagram

 Save scenario

 Clear variable instances that are in scope

 Unevaluate variables that are in scope

 See variables with Graph - shows a variable instance with graph

 See variables with Table - shows a variable instance with table

 See variables with Microsoft Excel - shows a variable instance with excel

 Run View - runs the selected view

 Create Instance with Graph - enables creation of a variable instance with graph

 Create Instance with Table - enables creation of a variable instance with table

 Create Instance with Excel - enables creation of a variable instance with excel

 Models Families Window - opens and/or activates the models families window

 Frameworks Window - opens and/or activates the frameworks window

 Scenarios Window - opens and/or activates the scenarios window

 Views Window - opens and/or activates the view window

 Variables Window - opens and/or activates the variables window

 Instances Window - opens and/or activates the instances window

 Scenario Compare Window - opens and/or activates the scenario compare window

 Select - selects and object in the diagram

 Pan - pans the diagram

 Zoom in - zoom in one layer in the diagram

 Zoom out - zoom out one layer in the diagram

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## Loading Frameworks in SAMM

(instructions taken from Loading Manual for new frameworks)

Open SAMM (Scenario And Model Manager)
Enter the MRSFF model family
Select the SIM or CAL frameworks in the Frameworks Window and enter one of these frameworks

∗ A model family can have a number of frameworks but they must share a common set of informants.

Open the Views Window and in the File menu change the file path to the location of views.samm eg.: "/*whatIf*/mrsff/views/cal/V1".

➔ Under the "View Actions" menu choose "Load" to load views from the file views.samm.

∗ To see all views associated with the CAL framework, make sure you are located at the top of the hierarchy. You can do this by clicking on the framework name at the top of the Hierarchy Window or on the oval icon for the framework in the Diagram Window. Otherwise, only the views associated with a particular node or calculator will be displayed.

➔ Once at the top of the hierarchy, select the "Create History" view and run (see also \views\cal\V1\history.t). you will be asked to resister the 'instance' of the history.t view variables eg. "history1".

∗ An 'instance' is a version of a variable (or set of variables) that's associated with the results from a particular view or view code. In this case the view code is history.t.

➔ Save as a scenario (eg. "history1"). Historical scenarios are all you can have in the CAL framework.
➔ Pick this scenario from the Scenario Window then from the Scenario Actions menu choose "Evaluate History Inputs".
➔ After the above is complete choose "Evaluate History Outputs" from the Scenario Actions menu.

∗ In CAL this action establishes the historical values for control variables that will ultimately be used in the SIM framework to simulate the historical period.

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## Running the Simulation Framework in SAMM

The preceding actions in CAL have now provided a history for use in SIM:

- ➔ Enter the SIM framework in the Frameworks Window and, when the various framework windows have loaded, choose a history from the Histories Window.
- ➔ Open or select the Views Window and through the File menu set the file path to eg. /*whatIf*/mrsff/views/sim/V1/
- ➔ In the View Actions menu choose Load views (see also views.samm for list of available views and their association with the various calculators of the SIM framework)

∗ As in CAL it is important to make sure you are at the top of the hierarchy so that you can see all the views in SIM and not just those at the level of a specific node or calculator.

- ➔ In the Views Window choose a view and run it.

∗ Often there will be a basic view like: “create fixed scenario” where the values for all variables at the end of history are kept constant for the remainder of simulation time. The variable values generated by a view can form the basis for more sophisticated scenarios.

- ➔ When the view code has finished, you will be asked to register the ‘instance’ name for the variables changed or generated by the view code. The above two steps can be repeated with other views.
- ➔ When you have finished running views, you can save the results – the group of different instances of variables – as a ‘scenario’. Open the Diagram Window and click anywhere on the diagram, then choose “Save Scenario” from the Diagram Actions menu.
- ➔ In the context of the *whatIf?* software environment, and the stocks and flows frameworks described here, a future “scenario” is the collection of “instances” of a group of variables. An instance of a variable refers to a unique value for that variable that represents one assumption about a particular physical future. The collection of variables’ instances defines a scenario
- ➔ The same instance of a variable may be used in more than one scenario

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# Seeing Results – Tables, Graphs, Excel and Geomap.

## Tables

**Description – see separate file: Tables**

Tables can be used to display a collection of data objects in a collection of windows (Display Mode), or to create instances of data objects (Create Mode) through user input.

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## Graphs

**Description – see separate file: Graph**

Displays line graphics for a collection of objects in a collection of windows (Display Mode), or to create instances of data objects (Create Mode) through user input.

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## Excel

**Description – see separate file: Excel**

This function allows you to display and generate data objects using Microsoft® Excel.

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## Geomap

**Description – see separate file: Geomap**

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# Using Views and Creating Scenarios

➔ This section is currently under construction.

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# Basic Code to Create Your Own Views

➔ This section is currently under construction.

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# Creating your own Views

➔ This section is currently under construction.

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