



# Modelling the Implications of 'Zoning Changes' using ISE

April 2013

# Contents

1. Modelling the Implications of a Zoning Rule Change.....	3
1.1 Accessing the Zoning Tool using the Policy Interface.....	3
1.2 Changing maps and zoning using the modeller interface.....	5
1.3 Using the Map Comparison Kit to interpret results of changes.....	6
1.3.1 An introduction to the Map Comparison Kit .....	7
1.3.2 Comparing maps .....	9

# 1. Modelling the Implications of Zoning Changes

In this tutorial we will learn how to using the Zoning Tool contained within ISE. The Zoning Tool is a powerful feature of ISE which enables planners and policy makers to add, delete and modify the zoning GIS layers contained within ISE. It has a number of features which will be demonstrated in the course of this tutorial. In addition to adding, deleting and modifying zones ISE allows the user to set zones according to:

- RMA consent type (discretionary, non-complying, prohibited and so on) for each land use category within ISE
- When zones become active, or inactive, in the future and for which periods of time
- And the precedence that zoning rules may have over each other

While we will not fully explore all of these features within this workshop, you should develop enough confidence to be able to do so with a little dedicated effort on your own part.

A secondary purpose of this tutorial will be learning how to use the Map Comparison Kit (MCK) contained with ISE. The MCK enables the user to spatially compare the results of two, or more, scenario runs of ISE. It is particularly useful for identifying, what has, and what has not, changed between scenarios or simulation runs.

Unlike the Getting Started guide, this tutorial is not a full guided tour, but for the most part you should be able to work your way through it without too much trouble. If you have any queries please do not hesitate to ask for assistance. Give it a go!

## 1.1 Accessing the Zoning Tool using the Policy Interface

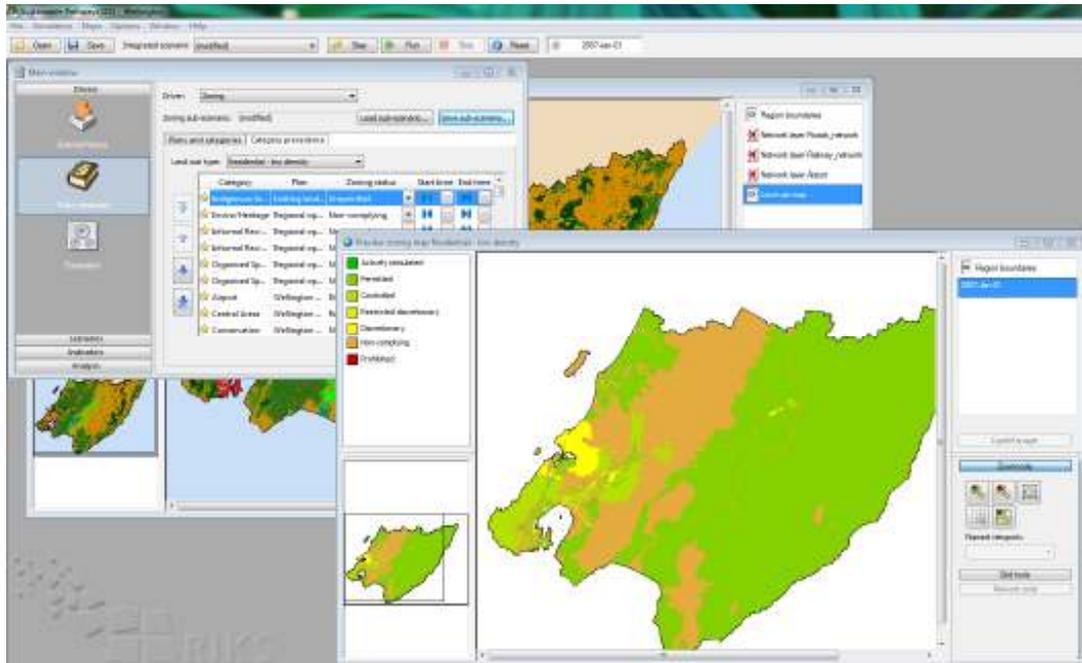
- If you have not started ISE, please do so now.
- Select Zoning from the Driver drop-down list.

Here you will see two tabs. The first tab called Plans and categories is where you can import GIS data that spatially represents the factors (categories) that influence land use zoning.

- Select the Category precedence tab.

This tab is where you assign a precedence of order, zoning status, start time and end time for each zoning category for each functional land use. You can also preview the zoning map that results.

- Select Residential – Low Density from the Land use type: drop-down list.



- Select the Preview zoning map button on the bottom right of the main window (this may take a while to load).

You can zoom, pan and inspect these maps just as you can the land use map. With the zoning maps you can also view changes to the maps that are scheduled in the future.

- Use the zoom tools to zoom in to the Wellington area.
- The map you see now is the combined map with all the various zoning rules consolidated into one 'definitive' zoning map, with all conflicts resolved by assigning precedence of some maps over others and minding enactment dates of various policies.
- Close the Preview zoning map window by clicking on the small x at the top right of the window.

**Scenario: Use the Zoning Tool to protect indigenous vegetation  
from economic development.**

Now we will enter a new plan that will protect the indigenous vegetation from further development. For doing so, we will make use of the current land use map and protect all current indigenous vegetation.

- Go to the tab 'Plans and categories'.
- Select 'Import plan...' and a dialog window pops up.
- In this window choose as a name 'Existing land use'.
- Click on the browse button to select the map 'landuse.rst' from the folder My Documents \ Geonamica \ ISE \ Wellington \ Data and press 'open'.
- Choose 'Use existing legend' and select 'Landuse'.

- Now press 'OK' and you will find the land use map added to the list of 'Plans and categories'.
- Go to the tab 'Category precedence', with the land use type 'Horticulture and fruit growing' selected and go to the category 'Indigenous forest and vegetation' of the 'Existing land use map', change the zoning status to 'Prohibited' and move the whole category to the top of the list.
- Repeat the above for all land use types from the drop down list.

You have now prohibited further development of the indigenous forest and vegetation by socio-economic development.

- Look at one or more of the zoning maps by pressing 'Preview zoning map' to see the changes you have made to these maps.
- Save your changes as a new sub-scenario for the policy measure zoning, similarly to what you have done for the external factor population.

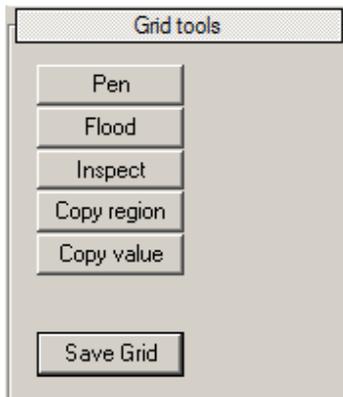
## 1.2 Changing maps and zoning using the modeller interface

In the software, clicking on the name of a sub-module in the system diagram gives the modeller access to the underlying model.

- Click on the name 'Land use' in the system diagram to open the Land use sub-module.

The dialog window that pops-up is organised in such a way that the (external) inputs – data and parameters – can be found and adapted on the top and middle panes of the window, while the output(s) can be found at the bottom. Parameters can be changed by entering new values or selecting different options (in the case of the Land use sub-module this is the 'Random coefficient' and 'Random seed' parameters). Some input maps can also be updated either by drawing on them (using the pen and flood operators of the Grid Tools) or by uploading an entirely new map (by browsing to a new location for this map by selecting the Show / Edit button beside the map location).

- In the 'Input' pane of the 'Land use model window' select the 'Show / Edit' button just to the right of 'Initial land use map'.
- Zoom in to an area of your choice.
- In the legend on the left select the class 'Indigenous forest and vegetation' by clicking on the little circle to the left of it
- On the right hand side of the map window, select the 'Grid tools' menu



- Click the 'Pen' button and start drawing anywhere in the region where there is not 'Indigenous forest and vegetation'.

You will notice the Pen fills by cell so it can be used to make very detailed changes

- Click the 'Flood' button from the Grid Tools and click somewhere else in the district where there is a large area of a land use that is not 'Indigenous forest and vegetation'.

You will notice the flood tool automatically fills larger areas that are of the same value and touching the land use you chose to flood.

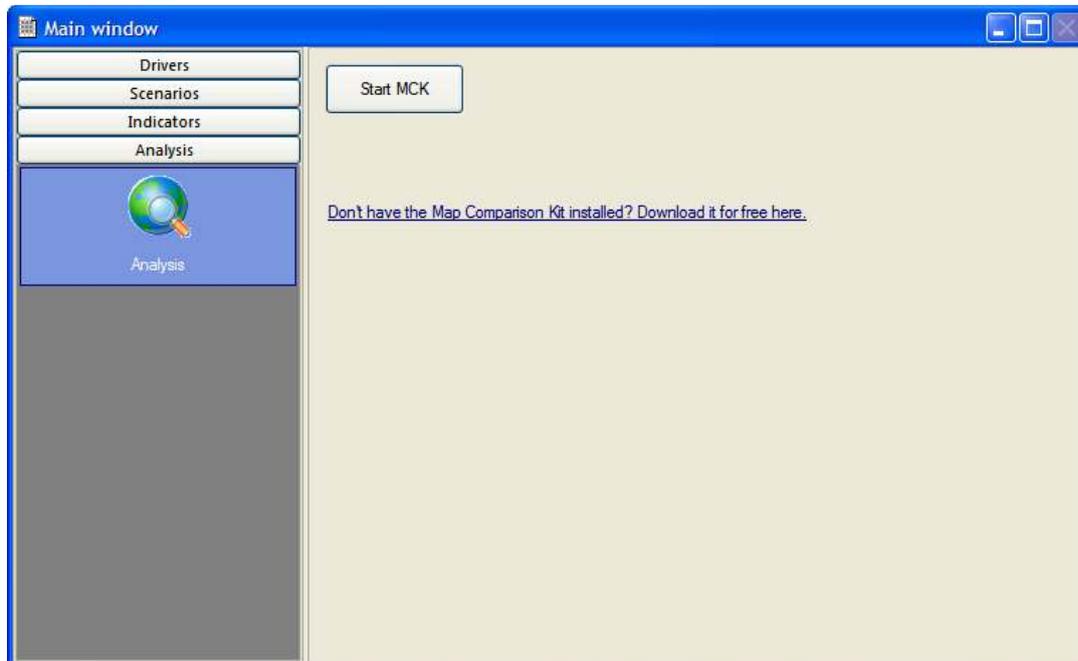
- Close the 'Initial land use map'
- Depending on the changes you have decide whether or not to save your changes when prompted.
- Close the 'Land use' sub-module window.

Set up ISE to run the changes you have just made. Remember to set up logging of maps (log specifically the land use map at 2007 and 2051), animations and writing of land results to an Excel file before you run ISE. Then, run ISE!

### 1.3 Using the Map Comparison Kit to interpret results of changes

The maps you have logged can be compared and analysed with the Map Comparison Kit (MCK). The MCK is an integral part of the system and can be opened by going to the 'Analysis' part of the 'Main window'.

- Click on the 'Analysis' button in the 'Main window'. On the right you will see the 'Start MCK' button.



- Click on the 'Start MCK' button.

You will be prompted to open a log file. This should automatically find the file Wellington.log in My Documents \ Geonamica \ ISE \ Wellington \ Log . Check this and if it hasn't (and you can't find it yourself), let your facilitator know.

- Select the Wellington.log file and select Open.

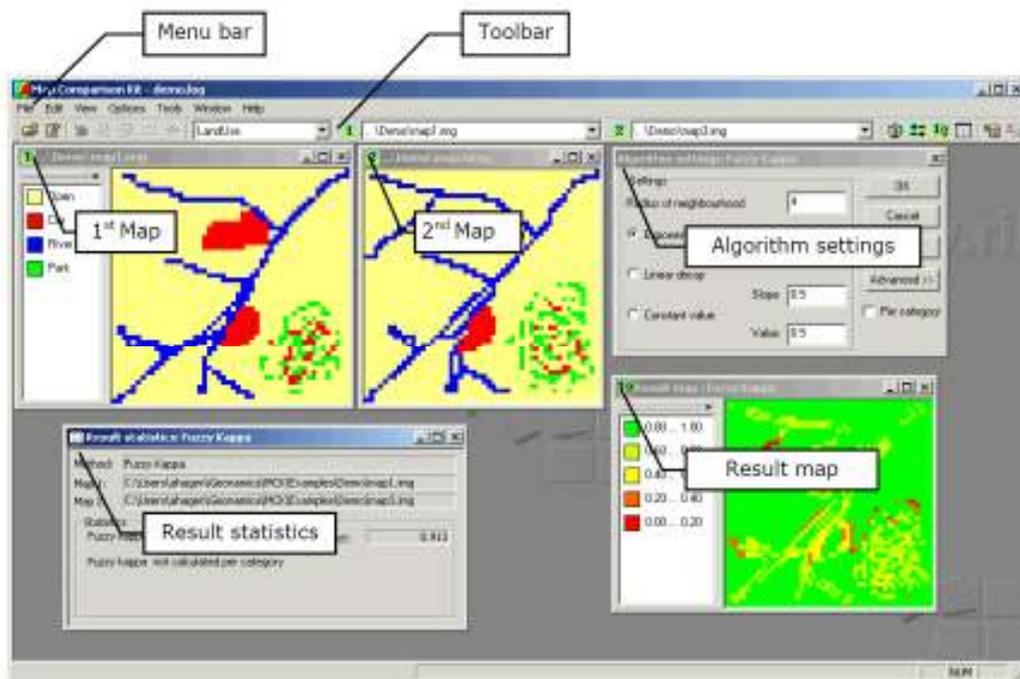
You will likely be prompted to locate or create a Palettes directory.

- If this happens browse to the folder My Documents \ Geonamica \ ISE \ Wellington, select the Palettes folder and select OK.

The MCK should now open.

### 1.3.1 An introduction to the Map Comparison Kit

The MCK looks and runs a bit differently to ISE so we will first run through some of the basics of the interface using an example.



The Menu bar has commands ordered according to the Windows conventions thus ensuring quick familiarization with the software. The following overview gives a short description of each menu.

Use this menu	To...
File	manage your files. The printing facilities are also located in this menu. If you want to exit the program, you can do it from here
Edit	access the log, legend or palette editor
View	change the presentation of a map in the active window
Options	perform all the steps necessary for a map comparison
Tools	find additional functionality related to managing quantities of comparisons. Also the Preferences dialog is found here.
Window	manage the windows inside the application window
Help	access the help function

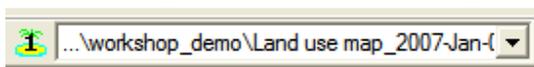
The Toolbar, gives fast access to the principal functions of the Map Comparison Kit that are also found in the Main menu. All steps required for performing a map comparison can be undertaken via the Toolbar.



Use this button	To...
	open a log-file from the disk
	edit the log-file
	start the <b>LEGEND EDITOR</b>
	<i>Zoom In.</i>
	<i>Zoom Out.</i>
	<i>Zoom to rectangle, draw a rectangle on the map to delineate the zoom extent</i>
	<i>Zoom Full Extent, adjust the zoom level and focus to display</i>

### 1.3.2 Comparing maps

- Select the drop down list for the first map on the toolbar.



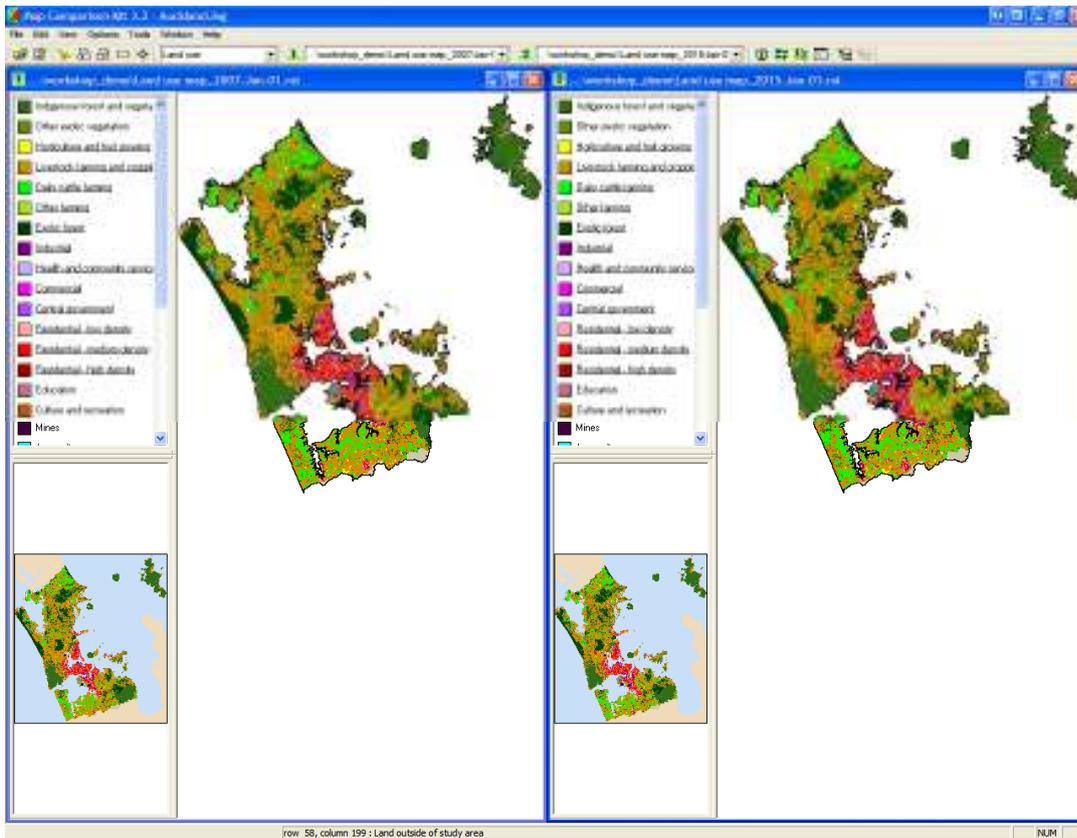
What you should see is a list of 2 land use maps, one for 2007 and one for 2051.

- Make sure the map selected for Map 1 is Land use map\_2007-Jan-01.rst.
- Select the button on the toolbar that opens Map 2 and ensure the map selected is Land use map\_2051-Jan-01.rst.



	the full map in the active window.
	select the theme to compare
	open the <i>1<sup>st</sup> Map</i> window
	select the map to be shown in the <i>1<sup>st</sup> Map</i> window
	open the <i>2<sup>nd</sup> Map</i> window
	select the map to be shown in the <i>2<sup>nd</sup> Map</i> window
	select a comparison algorithm
	specify the comparison algorithm settings
	perform comparison and open the <i>Result map</i> window
	perform comparison and open the <i>Result statistics</i> window
	add the current settings to the <i>Comparison set manager</i>
	overwrite the selected <i>Comparison set</i> with the current settings.

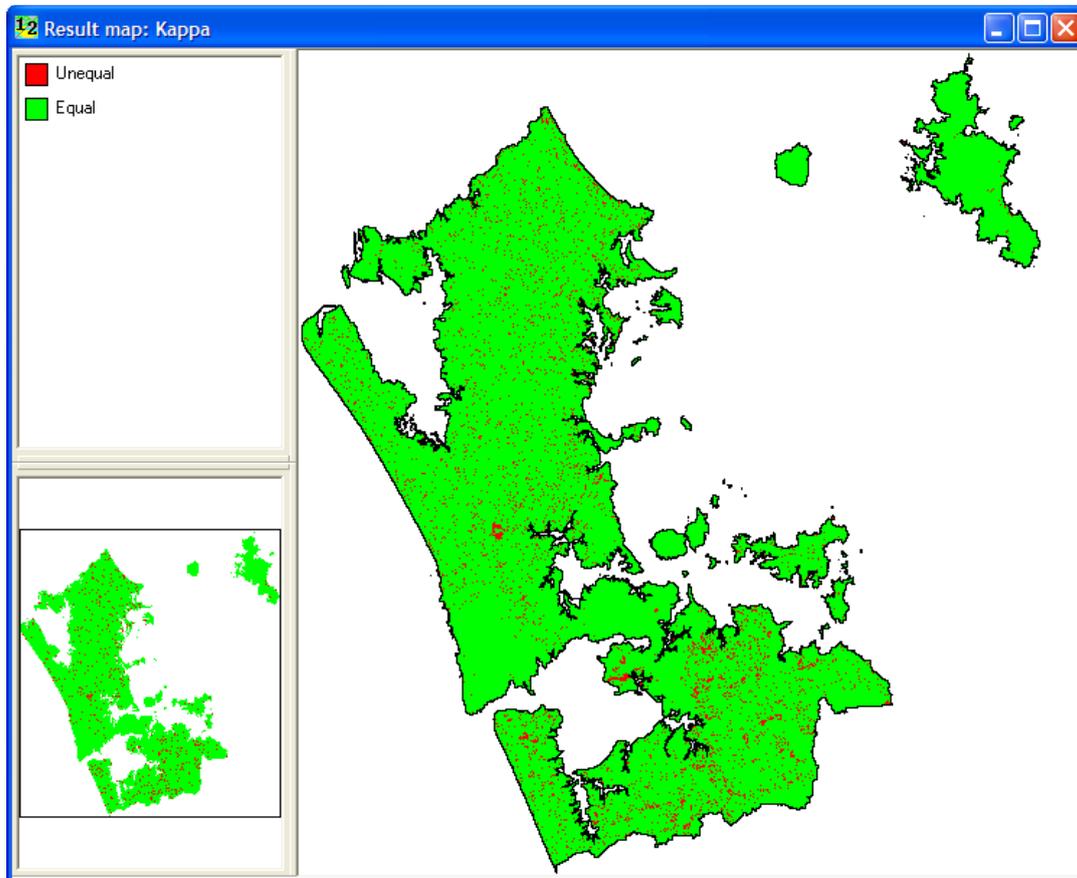
- Adjust your window extent to allow you to see both maps 1 and 2 side by side (use the ‘Window -> Tile Vertically’ menu option for this). Put map 1 on the left and map 2 on the right. It should look something like this, except that it should be for Wellington, rather than Auckland ...



Have a good look at the two maps. Can you spot the land use differences between the two maps? It's not always obvious is it? That is why we use the map comparison algorithms to clearly show us the differences and give us the statistics we need. First we will look at what is known as a *Kappa* comparison.

### ***Kappa Comparison***

- Select the Comparison algorithm button from the toolbar .
  - Select the second check box down in the list next to Kappa and press OK.
  - Now select the Compare button from the toolbar .
- You should get a map that looks something like this....



A Kappa comparison simply compares cells from one map against those same cells from another map. If the cells have different values then they are mapped red. If they have the same values they are mapped green. So a Kappa map is designed to give you a quick overview of general change for a theme (in this case the theme is land use).

- Now select the Statistics button from the toolbar .
- Maximise the Result statistics: Kappa window as big as you can.

A Kappa comparison also provides useful statistics to the user. In the Per category pane it provides a statistical measure of similarity between the two maps but we won't discuss this today. But what if you wanted to know which, and how much, land uses had replaced or been replaced by other land uses for your two maps? The Contingency table is one way to find this out.

For each land use the rows give you the count of cells that stay as that land use in both maps and also the number of cells that have changed from that land use to another. The column at the far right gives the total number of cells for that land use for Map 1. The columns give the count of cells that stay as that land use in both maps and also the number of cells that have changed from another land use to the one you are highlighting. The row at the bottom gives the total number of cells for that land use for Map 2.

- Select the Indigenous Vegetation row of the Contingency table by clicking on the text Indigenous Vegetation on the far left of the table. Look at the values in this row by scrolling across.

What this data is telling you is that a lot of cells stay as indigenous vegetation in both maps but also that indigenous vegetation from Map 1 (2006) is significantly replaced by other land uses in Map 2 (2050).

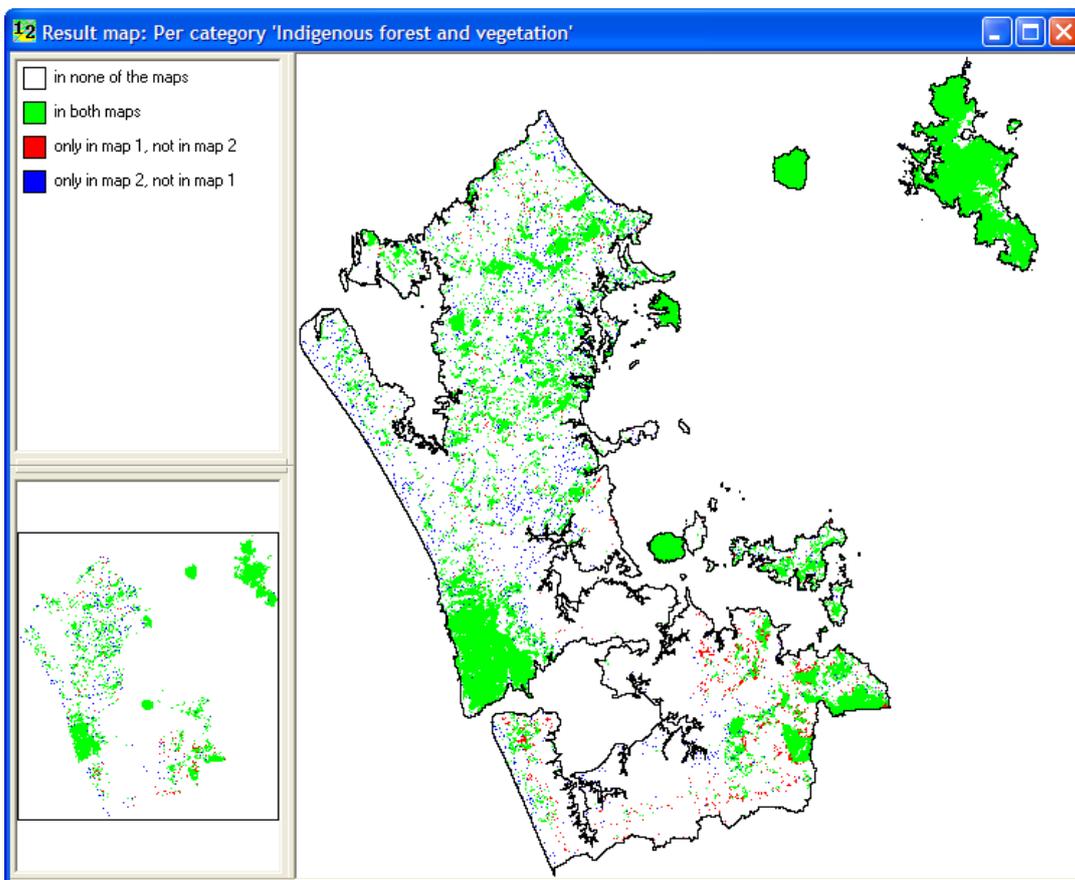
- Don't close the windows you have open just yet...

### ***Per category comparison***

So what if you want to actually see where that change has happened for each land use?

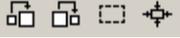
- Select the Comparison algorithm button from the toolbar .
- Select the first check box down in the list next to Per category and press OK.

The map and statistics windows you should still have open should now change. You may need to minimise the Statistics window now and then the map should look something like this...



What this map shows in white are cells that are not the selected land use in both maps. In green are cells that are the selected land use in both maps. In red are cells that are the selected land use in Map 1 but not in Map 2. In blue are cells that are not the selected land use in Map1 but are in Map 2.

- Select the Parameters button from the toolbar .
- From the Algorithm settings window that appears select the 'Indigenous forest and vegetation' land use.
- Select the Apply button.

- Now use the zoom buttons  to explore your result map a bit.
- Finally, take a look at the **Result statistics** window for the land use you selected. Note the statistics given here are for cells and one cell equals four hectares.



From looking at the **Per Category Results** map and **Statistics**, what does this information tell you about what happened to your selected land use between Map 1 (2007) and Map 2 (2051)?

Need to explain what land uses replaced your selected land use or were replaced by your selected land use? Change the comparison algorithm back to Kappa and go and look at those rows and columns in the Contingency table again.

Besides comparing maps within a scenario, you can also compare maps between scenarios. If the file which is currently open in the MCK does not yet contain the alternative scenario, you can open it, by selecting edit log file and pressing import... on the screen that opens next.

- Now compare both scenarios for one or more future years for various years and explore the differences in land use between them.