Operator´s Guide

INPE / FUNCATE

TerraAmazon 4.6.3
User´s Guide
Operator

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The information in this document is subject to change without notice.

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Preface

Welcome to TerraAmazon

TerraAmazon is a GIS tool designed to be a multi-user editor of geographic vectorial data stored in a TerraLib model database. It engages land use and land cover classification tools as well as spatial operations between vector data, allowing transitions analysis among other applications. TerraAmazon keeps working time records for project control. It´s functionalities are extensible through plugins, such as the already existing TerraImage (PDI) and TerraPrint (plotting).

TerraAmazon was first developed by INPE and FUNCATE in early 2005. It was initially applied to SISPRODES project and quickly conquered space in other projects, such as DETER and DETEX, among others, due to its multi-user characteristic. Until late 2009 TerraAmazon was used only within FUNCATE, being widely applied to many of its projects. With the creation of CRA, INPE´s Amazon Regional Center, located in Belém, TerraAmazon reached international space, having regular training being held in CRA´s facilities for both national and international specialists.

Nowadays, TerraAmazon is constantly being updated and having tools and system enhancements, pursuing national and international approval.

TerraAmazon is part of Brazil´s attempt to become an international reference on forest monitoring programmes.

TerraAmazon is free and open source provided under GPL license as published by Free Software Foundation at www.gnu.org.

TerraAmazon is available for download at www.terraamazon.org.

Involved Institutions

The following institutions are involved in TerraAmazon´s development process.

INPE, Brazil´s *National Institute for Space Research*, founded in 1961. It is engaged on many research fronts in various areas of space science and their applications. INPE is involved with TerraAmazon in the political sphere and settling agreements between countries and institutions.

www.inpe.br

INPE Amazon (**CRA**, *Amazon Regional Center*) is an INPE unit settled in Belém, State of Para, and east of the Brazilian Amazon. Founded in 2007 to support researches and fieldwork in the Amazonian region, this unit became fully operational in 2009 and since 2010 implemented the *International Course on Tropical Forests Monitoring*. This capacity building activity is based on the knowledge of the TerraAmazon System, for which documentation and training tutorials were developed enabling participants from Latin America, Africa and Asia countries to monitor their forests, as Brazil has been doing for more than 20 years.

www.inpe.br/cra

FUNCATE, *Foundation for Space Science, Technology and Applications*, is a non-profit private organization founded in 1982. It is engaged on national projects involving land use and land cover classification, estimating GHG emissions due to land use as well as many others. It has technical agreements with Brazilian research partners, such as INPE, CTA (Aerospatial Technical Center, Brazilian Air Force) and others. FUNCATE is involved with TerraAmazon by programming the software, developing and enhancing tools, testing, writing user´s guides such as this one, developing and maintaining the website as well as other related activities.

www.funcate.org.br

TerraAmazon Documentation

TerraAmazon has the following documentation available for download at www.terraamazon.org:

User´s Guide Administrator: defines the administrator roles and presents the use of each interface related to administration procedures.

User´s Guide Operator: defines the operator roles and presents each procedure for working on multi-user environment and the use of each vectorial edition tools.

Edition Plugin User´s Guide: presents each procedure for image edition.

Digital Image Processing (DIP) Plugin User´s Guide: presents each procedure to process digital image.

Digital Terrain Model (DTM) Plugin User´s Guide: presents each procedure to model digitally terrain surfaces.

1 Introduction to TerraAmazon

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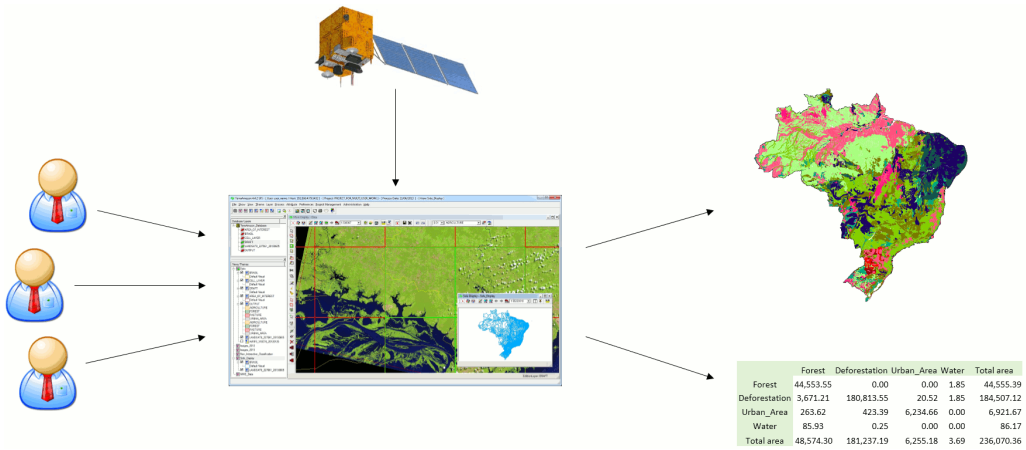
What is TerraAmazon

TerraAmazon is a GIS tool designed to be a multi-user editor of geographic vectorial data.

It was developed to improve the corporate production of geographic data in order to provide an accurate measurement of deforestation, forest degradation, land use and land cover change and similar applications.



In TerraAmazon, several users can work simultaneously in the same data following a methodology fixed by Administrator Users. This reduces the time of project execution and ensures that the final data is entirely produced under the same methodology.

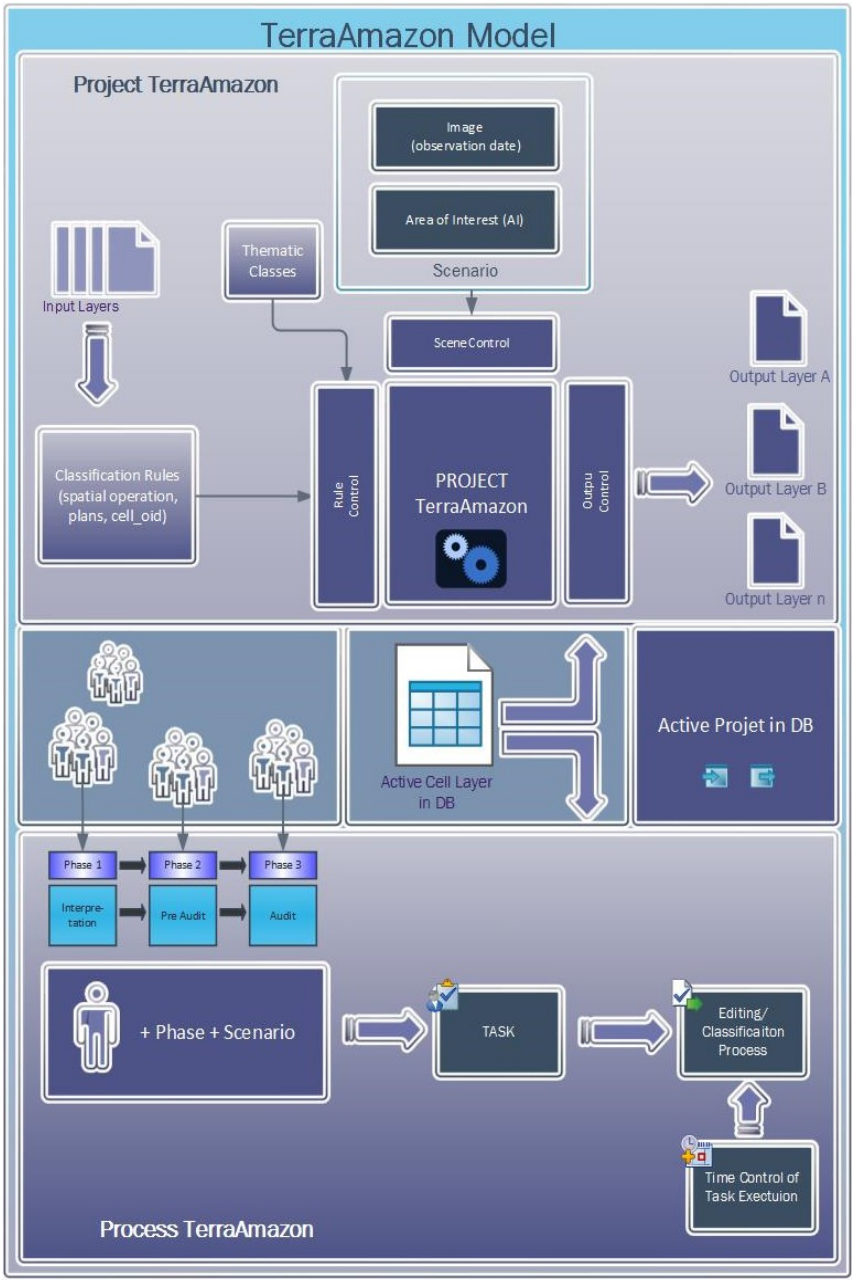
The spatial operations between vector data allow transitions analysis among other applications.

The system has a built-in structure to allow experienced users to audit the data produced. It also provides reports so Project Managers can follow and analyze the evolution of the work.

The data is stored in a TerraLib model database (www.terralib.org) and is worked within a client-server environment.

TerraAmazon Model

The concepts of TerraAmazon data model treated in this User´s Guide are briefly described here.



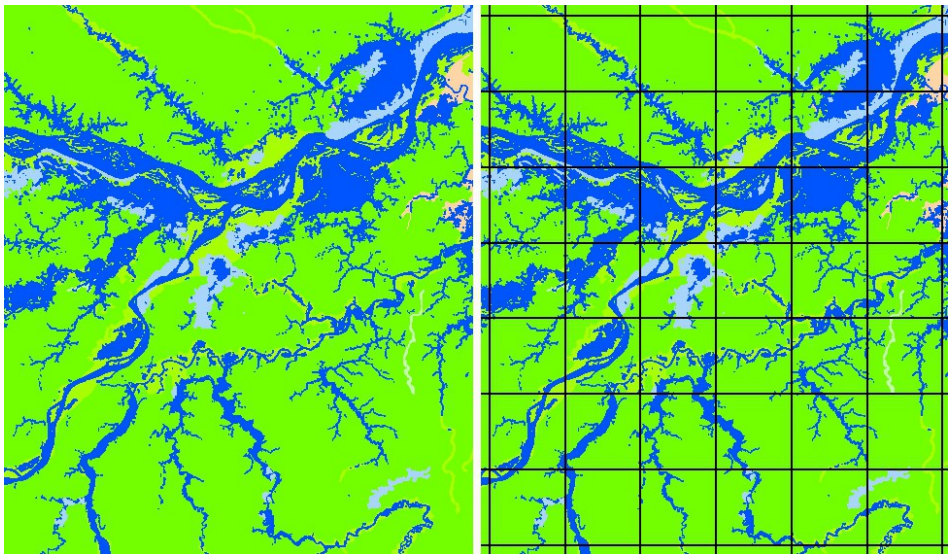
Access Control and Users

TerraAmazon has two user levels: Administrator and Operator. The Administrator User has full access to all the menus and spatial operations, while the Operator User has not.

Cell Layer

Vector layer with a different type of representation: cell. TerraAmazon requires the existence of a cell layer for the Vectorial Edition Through Project (refer to page 70) and for most of the spatial operations available.

The cell layer cuts classified data in tiles, as shown in the next figure. That means that when classifying a polygon covered by more than one cell, the polygon will be cut according to the limit of each cell.



Class

Classes are the attributes that will be applied to polygons through the classification process. They can be land cover, land use, soil typology, vegetation, climate, etc.

Classification Process

Group of procedures needed to create polygons and apply them attributes through the use of the classification tools within the edition through projects.

Database

A TerraAmazon database encloses the whole set of data, either raster or vector data.

Edition Layer (or Input Layer)

Layer pointed by the theme active when opening the edition mode. Works as a draft in the classification process of the vectorial edition through projects and is edited directly in the direct vectorial edition. Once the user has opened the edition mode, every geometry created in it is instantly stored in this layer. Any vector layer containing polygons representation can be used as an input layer to the classification process until it is associated to rules or intentionally blocked by an Administrator user for data security matters.

Edition Mode

The Edition Mode enables vectorial editions. It is opened by clicking on the icon having an Edition Layer active. The Main Interface changes to display the Drawing and Classification Tools.

If there is an active project, then the Classification tools become functional and the classification process is executed when triggered by one of the following tools: or . The result of the classification process is stored in the Output Layer.

If there is no active project, then only the Edition Layer can be edited through direct edition and its attributes must be applied to each polygon by typing the values in the attribute pop-up interface. In this case, the classification tools are not functional and nothing happens if they are triggered.

Interest Area (or Area of Interest)

A spatial delimitation of a geographic area. When assigned to a project, vectorial edition can be performed only within such area.

Layer

Vector or raster data. Every vector or raster data stored in the database is presented to the user as a layer in the Layers Tree (see the main interface on page 7).

Vector data can have three types of representation: polygons, lines or points.

Layers are visible to all users.

Output Layer

In TA interfaces you can find two different uses for the output layer term.

- Vector or raster processed and saved by the TA operation, for example, creating a buffer.
- Destination layer for the resulting output of the classification process in a project. Different classes can have different output layers. Output layers cannot be used to access the edition mode.

Phase

A phase is a stage of the vectorial edition in a project´s execution. Through the concept of phase, TerraAmazon can keep logs of the time spent in each stage, enhancing project management. A typical set of phases is to have a data production phase and a data verification phase.

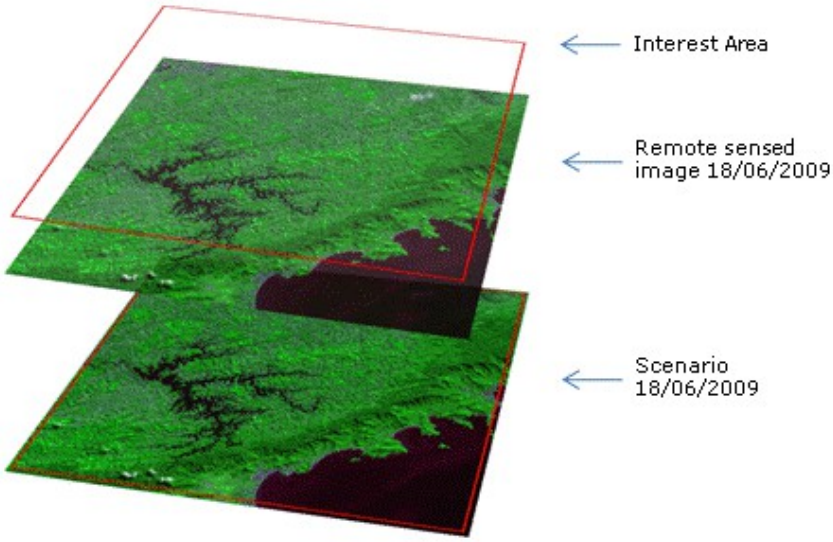
Project

A project identifies the set of rules that will be active in the classification process, as well as the classes involved. Besides the procedures involved in or supporting the vectorial edition through projects, no other procedure in TerraAmazon requires the existence of a project.

Scenario

A scenario is composed by an area of interest and an observation date assigned to it. As an example, if a certain satellite grid is used as an area of interest, then the observation date of the image to be used must be assigned to the area of interest.

A Scenario does not attach an image to an area of interest, but an *observation date*.



Theme

A theme is a structure that defines which data from one particular layer will be visualized and how will it be displayed on the screen. Themes are user-related, that is, if a user creates a certain theme, he will be the only one able to see it, change it or remove it.

No user can see other user´s themes, not even having administrator privileges.

View

A view is a structure that defines the data that will be visualized and manipulated simultaneously. That is, if the user needs to visualize a satellite image and a vectorial data at the same time, both these data must be added to the same view. Views are user-related, that is, if a user creates a certain view, he will be the only one able to see it, change it or remove it.

No user can see other user´s views, not even having administrator privileges.

Starting with TerraAmazon

Before you attempt to start using TerraAmazon, have an Administrator User run the installer and create and configure the working database, as well as the client-server setups. If you are working by yourself, please refer to the Administrator User´s Guide for these procedures.

Once setups are complete, open TerraAmazon and proceed to connect to a database.

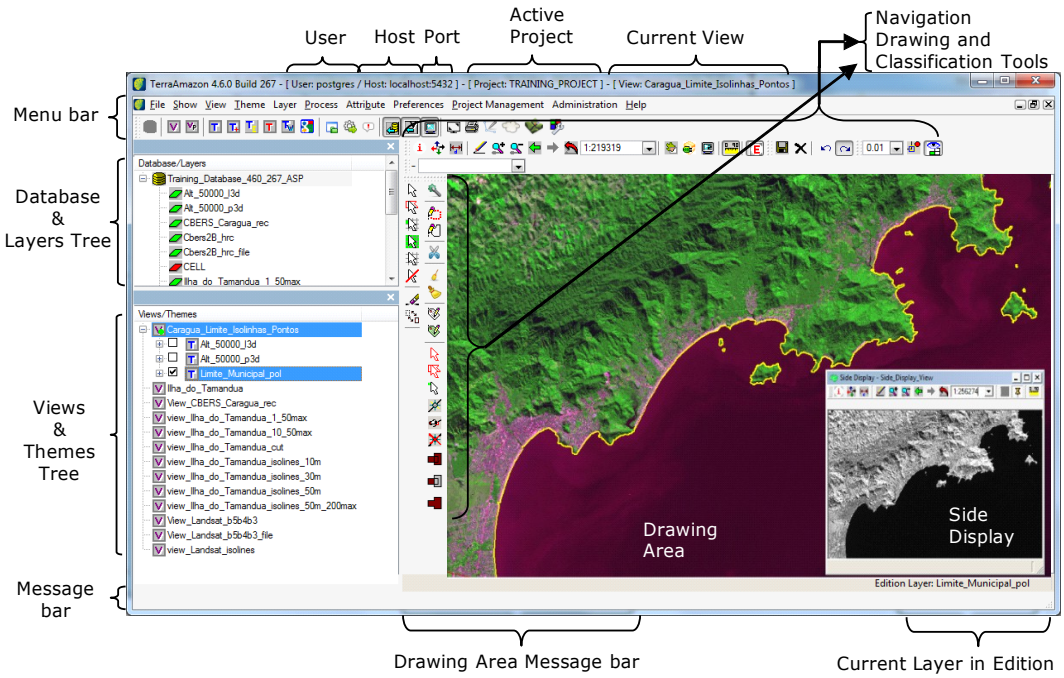
Refer to Chapter 2 for connection procedures.

TerraAmazon is pen tablet friendly.

Presenting the Main Interface

The following figure presents the main interface. It has three main areas:

- Database & Layers Tree
- Views & Themes Tree
- Drawing Area.



In the *Database & Layers Tree*, the icon identifies the currently connected Database, while the icon identifies the layers. This tree is shown the same way for every user since it contains every single layer in the database.

In the *Views & Themes Tree*, the icon identifies the views, while the icon identifies the themes. This tree is different for each user since both views and themes are user custom.

The drawing area displays the data from the selected themes in the current view.

The other items in the interface are shown only in specific conditions. The *Drawing and Classification Tools*, as well as the *Current Layer in Edition*, only show when the user opens the edition mode. The *Navigation Tools* are shown all the time. The number of the connection Port is shown only when informed by the user at the moment of the database connection.

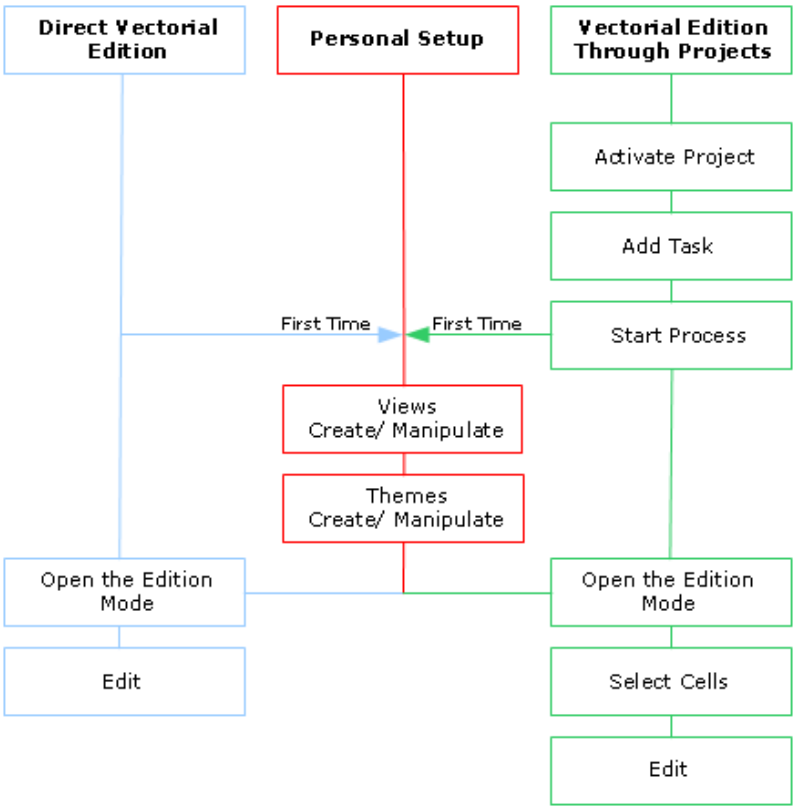
Operator Roles

Operator roles are the activities involved in or related to the vectorial edition process. Some of these activities are personal setups, some are procedures required by the system in order to enable the vectorial edition. The Operator User should dominate these procedures.

The personal setups can be made, changed or unmade at any time without any dependence of an Administrator User (except for providing the user with access to the database). However, to perform the procedures required by the system it is necessary that an Administrator User previously elaborates the entire project structure and provides the Operator User the necessary information for the job.

This User´s Guide presents the personal setups and the procedures required by the system to enable vectorial edition.

The following scheme presents the basic groups of operator roles.



There are several other procedures that Operator Users are able to do, such as most of the spatial operations with vector data and DIP procedures (through the available DIP plugin), such as register and histogram manipulations and so on.

The Operator User may also import and export both raster and vector data at any time.

However, these procedures are not listed as being part of the roles of a specific type of user within TerraAmazon´s user model. That is, TerraAmazon does not require privileges of Operator or Administrator users to enable such activities. Being so, describing these procedures is not within the objectives of this document.

2 Accessing the Database

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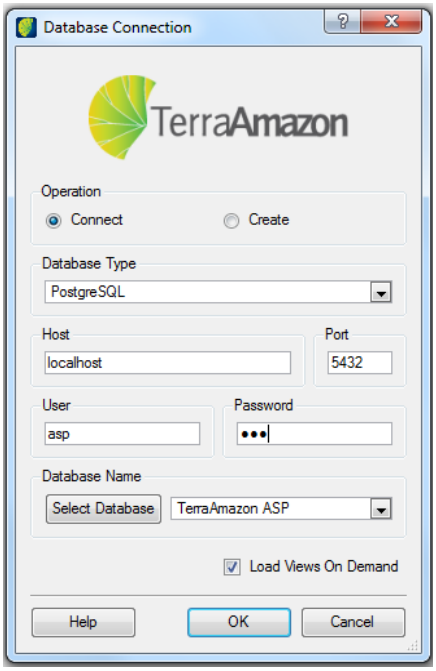
Changing Password 11

Procedures to perform the connection with an already existing database, previously configured by an Administrator User.

Operator Users cannot create new databases. Contact an Administrator user if needed.

Connecting to a Database

To connect to an existing database, that is, to start a working session in TerraAmazon, click on the icon or go to the menu FILE → OPEN DATABASE.



The *Connect* operation must be selected.

Contact an Administrator User to inform the options to be chosen or typed on the fields *Database Type*, *Host* and *Port*.

Type your user name and password. For your first connection, an Administrator User must create both user name and password for you. Once you connect, it is advised to change your password and keep it safe (refer to Changing Password, on page 11)

Next, click on the **Select Database** button and choose the database you need to connect to.

The option *Load Views On Demand* determines if the contents of the views owned by the user will be loaded at the time of connection:

- If selected, then only the list of views on the Views Tree will be loaded and the connection will be faster. In this case, the user must click on each desired view in order for it´s themes to be loaded and enabled for visualization and work.
- If unselected, every theme from every view owned by the user will be loaded during connection. This will increase time demanded for the connection if the user has many views and each one having many themes. It is advised not to uncheck this box when working on the corporate environment.

Changing Password

Operator users may change their own password at any time by going to the menu FILE → CHANGE PASSWORD after connecting to the database.

Inform the old password and type the new password on their respective fields. Repeat the new password on the field *Repeat*.

Click on the **Save** button to apply the password change.

If the user has forgotten his password, contact an Administrator User to have a new password set up.

3 Formatting TerraAmazon Appearance

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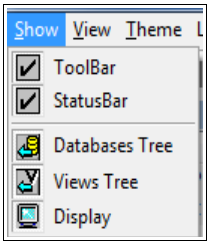
The user can format the main TerraAmazon window to his/her preference.

Adjusting main window appearance

In the main menu select Show.

There are 5 configuration options.



ToolBar: show tool bar in the main window

StatusBar: show status bar in the main window

DatabaseTree: click on this option if database and layers are to be presented in window

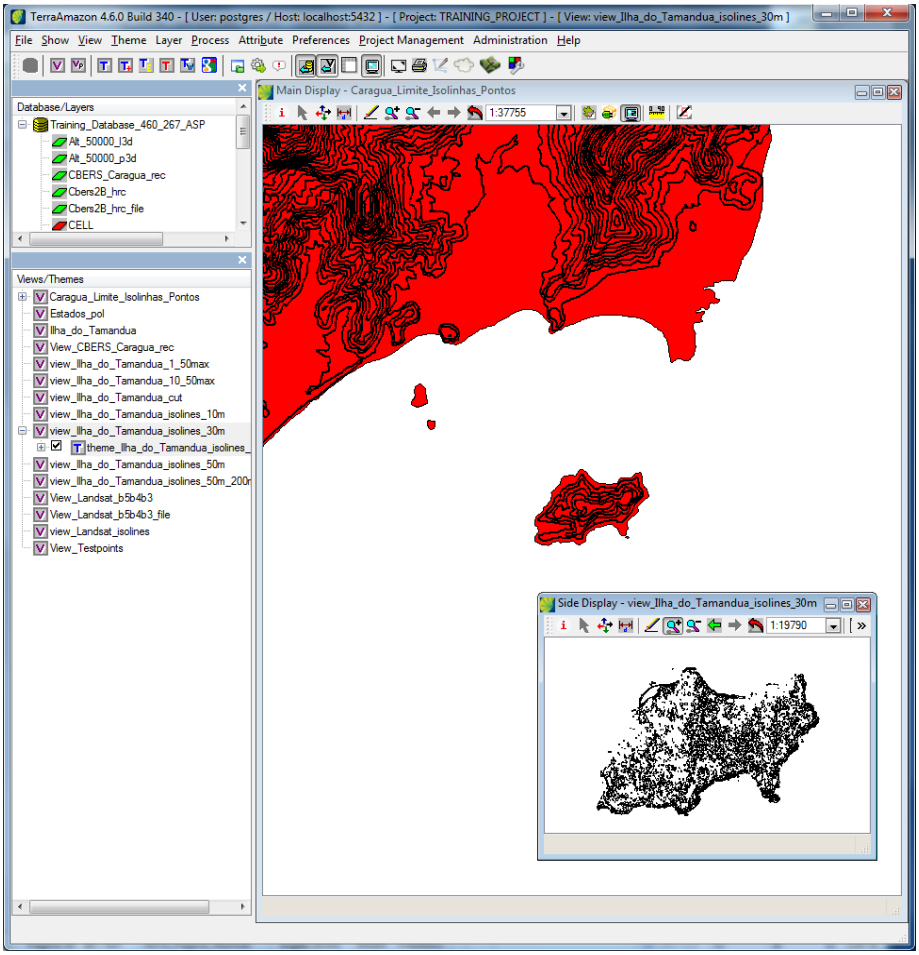
Views Tree: click on this option if views and themes are to be presented in window

Display: select this option to show visualization window

Using the side display

An auxiliary display can be used as secondary visualization window.

Activate it clicking on icon in main menu, then click on the display and select the a view in *Themes/Views* Tree that will be visualized.



Note: The Side Display is only for visualization, no edition is possible.

Click on in auxiliary display menu to attach the Side Display to the Main Display so that navigation is synchronized.

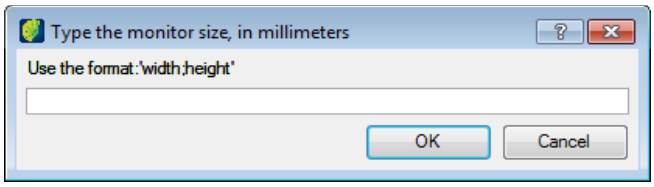
Click on in auxiliary display menu to dock the Side Display on the Main Interface, next to the Main Display.

Adjusting Preferences

The user can adjust some general preferences to work with TerraAmazon.

Adjust monitor size

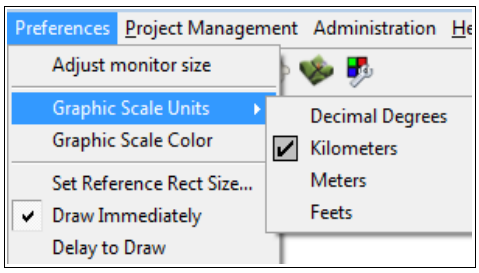
Click on PREFERENCES → ADJUST MONITOR SIZE in the main menu.



Enter the value of monitor size in millimeters in the following format: width;height.

Adjusting graphical scale unit

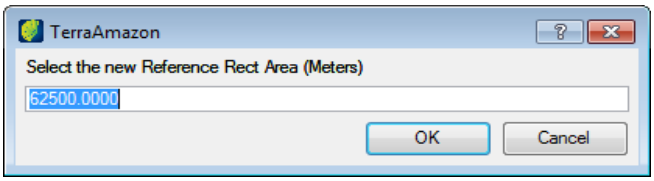
Click on PREFERENCES → GRAPHIC SCALE UNITS in the main menu.



Select one of the available units to be used as default.

Setting reference rectangle size

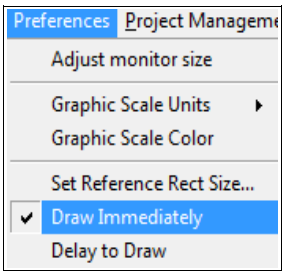
Click on PREFERENCES → SET REFERENCE RECT SIZE in the main menu.



Enter the value of rectangle area in square meters.

Activating instant drawing

Click on PREFERENCES → DRAW IMMEDIATELY in the main menu.



After selecting this option the picture will be automatically be drawn in the visualization area.

4 Manipulating Views

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Changing View´s Projection 27

TerraAmazon is a multi-user environment. Many users can work on the same database simultaneously. For that reason, TerraAmazon uses the concept of views, allowing each user to define which data to visualize.

A view is a user related structure, visible only to the user who created it. Each user can either create or remove his views at any time without causing data loss.

Definition: a view is a structure that defines the data that will be visualized and manipulated simultaneously.

That is, if the user needs to visualize a satellite image and a vectorial data at the same time, both these data must be added to the same view.

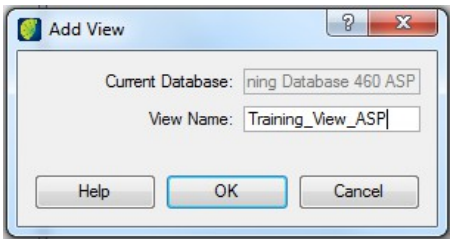
A view also defines the projection in which data will be visualized. That makes it possible to visualize at the same time data with different projections by adding them to the same view. Data will be reprojected to the same projection as the view.

This chapter presents the procedures to create views and the possible manipulations.

Creating Views

Click on the icon , or go to menu VIEW → ADD VIEW.

Inform the name for the view and click **OK**.



Do not use special characters, such as accents, empty spaces or symbols.

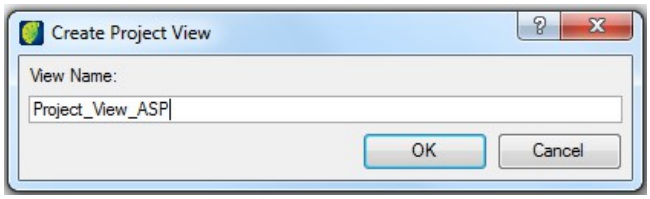
Note: To rename a view, right-click on it and choose *Rename*. Type the new name and press ENTER.

Creating Project Views

A project view is a smart way to create a view dedicated to perform vectorial edition on a given project. It automatically creates a theme for each of the layers involved in the rules of the active project.

To create a project view, click on the icon , or go to VIEW → ADD PROJECT VIEW.

Inform the name for the view and click **OK**.



You must have an active project to create a project view. Refer to Activating a Project, on page 71.

Removing Views

Views can be removed at any time, without causing data loss. Nevertheless, the user must be warned that removing a view implies that all of its themes are also permanently removed, along with their visual definitions.

View removal is permanent.

> **Note**: If the Edition *Mode* is active, the view that is being edited cannot be removed.

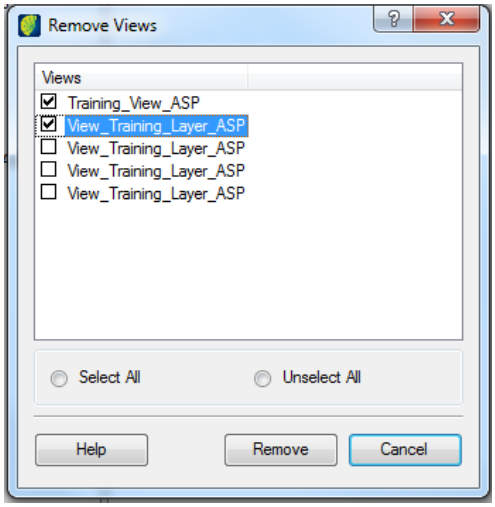
Removing a Single View

To remove a view, right-click on it and click on the **Remove** button.

> **Note**: Removing a View also removes permanently its themes.

Removing Multiple Views

To remove many views at once, go to VIEW → REMOVE VIEWS.



Select the views that will be removed.

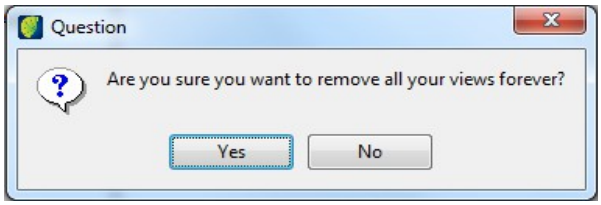
Click on the **Remove** button to delete the selected views.

Removing All Views

It is possible to remove all the views of the logged user at once.

Go to VIEW → REMOVE ALL VIEWS.

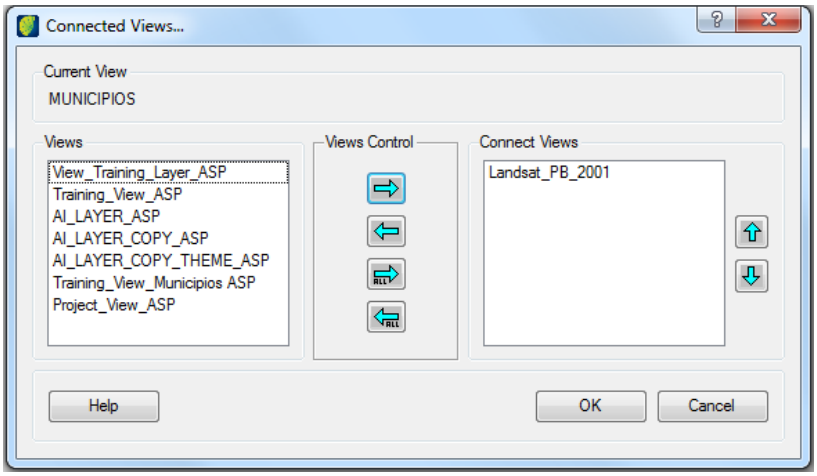
Confirmation will be requested before removal.



Connecting Views

Connecting views is a procedure that allows the user to alternate between the visualization of two or more views.

Right-click on the view and select *Connect View*. The name of this view is shown in the area *Current View* of the interface, which identifies the active view.



The list *Views* shows all the views available for connection. The active view is not shown in the list.

Note: A view becomes connectable when it is loaded. When connecting to a TerraAmazon database, the system queries about how the user´s views must be loaded (refer to Connecting to a Database, page 10). If the desired view does not show on the list, close the interface for connecting views, load the view by clicking on it in the Views Tree, and than proceed to connect the views again.

The list *Connect Views* shows the views that the user has selected for connection. It also shows the views previously connected to the active view.

In the *Views* list, click on the views to be connected to the active view and use the arrows to the Right to select them for connection.

Click on the **OK** button to connect.

In case more than one view is connected to the active view, use the *Up* and *Down* arrows from the keyboard to set up the order of the views´ display during connection.

Views can be connected and disconnected at any time. Use the arrows to the Left to disconnect.

Refer to Visualization Tools, page 139, for more details on the usage of this tool.

On the situation represented by the previous figure, the view *Landsat_PB_2001* is connected to the active view, while the other views are not.

After activating one of the tools for connecting views, or , the first view displayed at the right-click in the visualization area would be *Images_2011*.

To see the view *Images_2010*, the user should use the arrow Down from the computer´s keyboard. The arrow Up would go back to *Images_2011*.

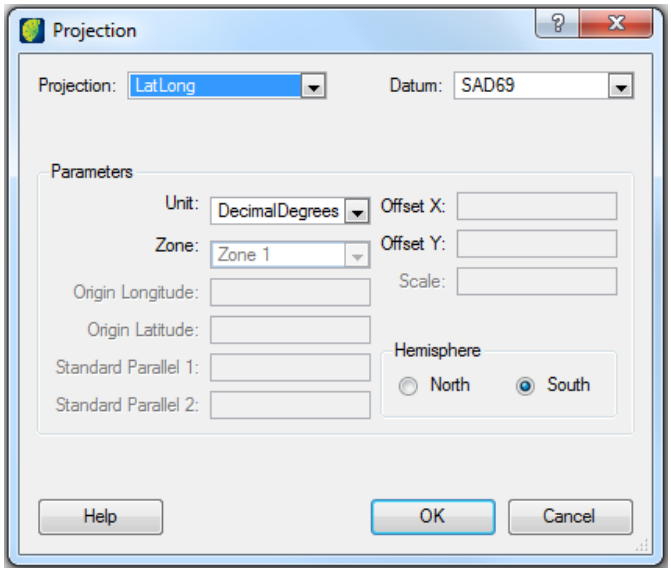
The right-click keeps alternating between the work view and the connected views.

Changing View´s Projection

Each view has it´s own projection. Initially, it assumes the projection of the first data inserted in it as a theme. The next data will be reprojected to this first one before visualization. This allows the simultaneous visualization of data with different projections in the same view.

Note: Inserting a theme of a data whose projection is different than the view´s projection WILL NOT change the projection of the layer, which is the data itself. The reprojection is only for visualization purposes.

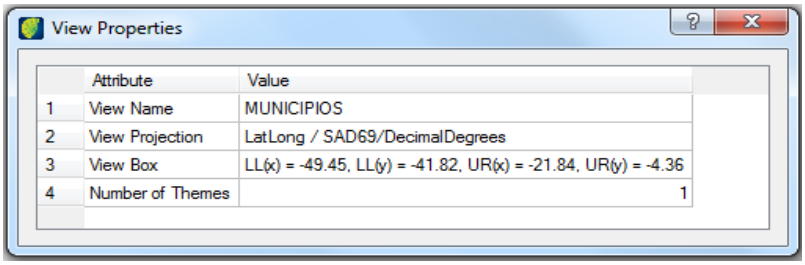
To change a view´s projection, right-click on it and select *Change Projection*.



Choose the projection and the datum desired and fill the other fields as required by each projection type. Select the hemisphere.

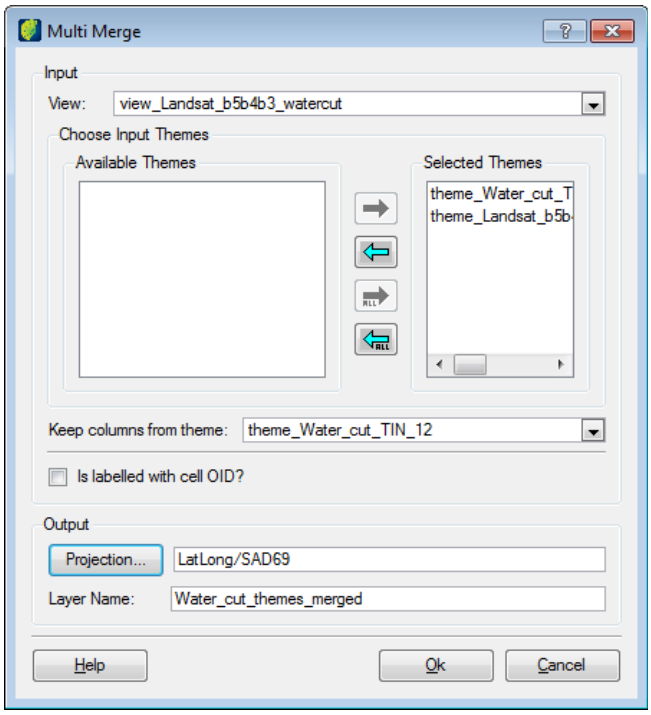
Click on the **OK.**

Note: The current projection of a view, as well as it´s other properties, can be verified by right-clicking on it and selecting *Properties*.



Executing multi merge

To execute multi merge of themes, right-click on the view and it and select *Multi Merge.*



Choose Input Themes: Select in left list themes to be merged and click on right arrow to transfer to Selected Themes list.

Keep columns from theme: select the theme that will be reference to keep columns.

Is labeled with cell OID?: check in this box if theme has cell OID.

Projection: click on this button to adjust projection parameters.

Layer Name: enter the name for the new layer.

Click on the **OK** button.

5 Manipulating Themes

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TerraAmazon uses the concept of themes to allow each user to choose which data to visualize and how. Different users can choose to visualize the same data in different ways through theme manipulation. Themes can only exist inside views. The view selected when creating a theme is called the *target view*.

A theme defines which data from one particular layer will be visualized and how will such data be displayed on the screen.

Through themes, users can decide to visualize all the data from a certain layer or just part of it creating restrictions by attributes (comparative expressions).

Correctly manipulating themes is the key to extract the most from the tools provided by TerraAmazon.

Themes can be created using five different methods:

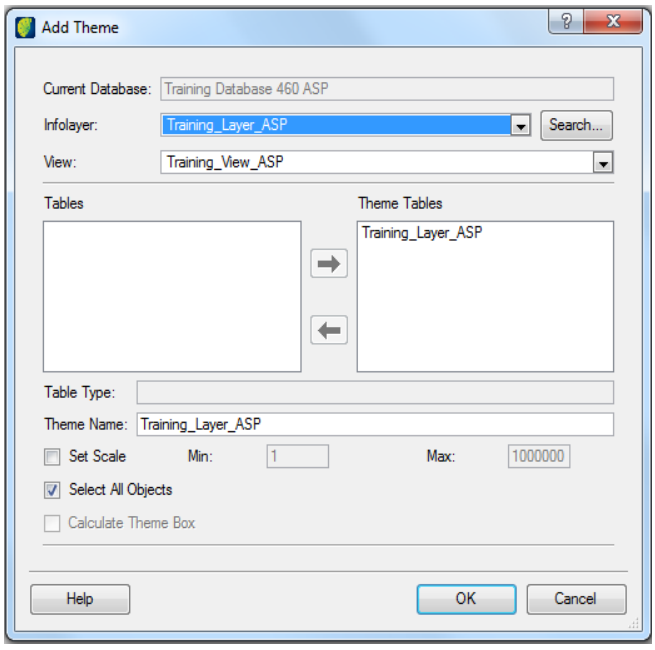
- *Simple Theme* : generates one theme pointing to all the data contained in the selected layer. (page 31)
- *Theme with Restriction* : generates one theme pointing only to the data which satisfies the restrictions imposed by the user. Available only for vectorial data. (page 33)
- *Theme Grouped by Attribute* : generates one theme for each value of one selected attribute. For example, if a layer contains data classified with land cover classes, selecting that attribute will result in one theme for each occurring land cover class. Available only for vectorial data. (page 34)

- *Multiple Themes* : generates one simple theme for each layer selected with the interface. Themes created with this method are inserted into the same view, chosen by the user. Currently available only on TerraAmazon SFS version. (page 32)
- *External Theme* : points to a layer stored in another database. (page 37)
- *WMS Theme* : points to a layer stored in a WMS server. (page 45)

Creating Simple Themes

To create a theme, it is required to have at least one view where to insert it.

Click on the target view and then click on the icon , or go to the menu THEME → ADD THEME.



Infolayer: select the name of the desired layer. By default, this field is loaded with the layer selected in the layers tree. Use the floating menu or the **Search** button to change it (Appendix D, 149).

View: displays the name of the selected target view. If needed, open the floating menu to select a different view. Only views previously loaded are displayed in this list. If the desired view is not shown, exit the theme interface, click on the view to load it, then get back to creating the theme (refer to Load Views On Demand, page 10).

Theme Name: type a name for the theme. By default, the interface suggests the same name as the layer.

Set Scale: mark this option to set up a range of scale values in which the data pointed by the theme should be visible. Outside the range, the data will not be displayed. After the theme is created, it is possible to change this range by right-clicking on the theme and selecting *Visualization Scale*. By default, the option is unchecked and the theme will be displayed in all scale values.

Select All Objects: defines that the theme will point to all the data contained in the selected layer. Uncheck this option will enable the creation of a theme with restriction (refer to Creating Themes with Restriction, page 33). Available only for vectorial data.

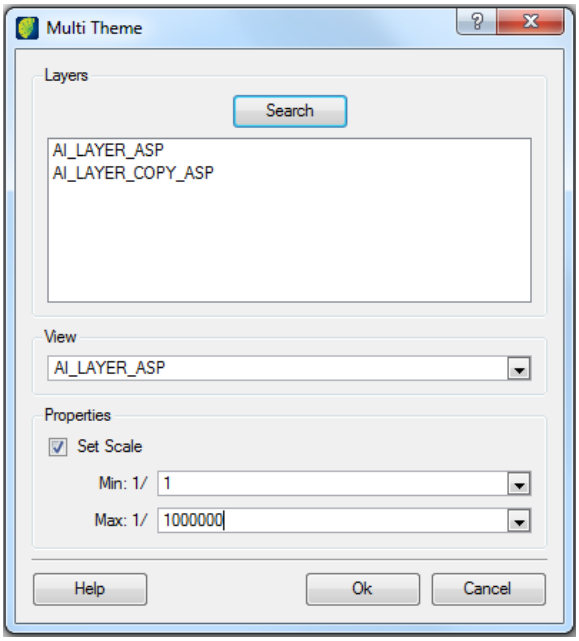
Calculate Theme Box: enabled only when the option *Select All Objects* is unchecked.

Note: Use the lists *Tables* and *Theme Tables* only when the chosen layer has more than one attributes table. In such case, use the arrows to select the table that will be accessed by the theme. Most commonly, layers have only one attributes table, in which case nothing should be changed.

Creating Multiple Themes

Creating multiple themes is currently available only on TerraAmazon SFS version.

Click on the target view and then click on the icon , or go to the menu THEME → ADD MULTIPLE THEMES.



Search: click on this button to select the layers using the search window (Appendix D, 149). The selected layers will be listed in the *Layers* area.

View: select the target view.

Set Scale: mark this option to set up a range of scale values in which the data pointed by the themes should be visible. Outside the range, the data will not be displayed. The range will be applied to all the generated themes. After the themes are created, it is possible to separately change their range by right-clicking on each theme and selecting *Visualization Scale*. By default, the option is unchecked and the themes will be displayed in all scale values.

Creating Themes with Restriction

Applying restrictions to the visualization of layer data is a way to select a specific group of geometries among all the ones stored in the layer.

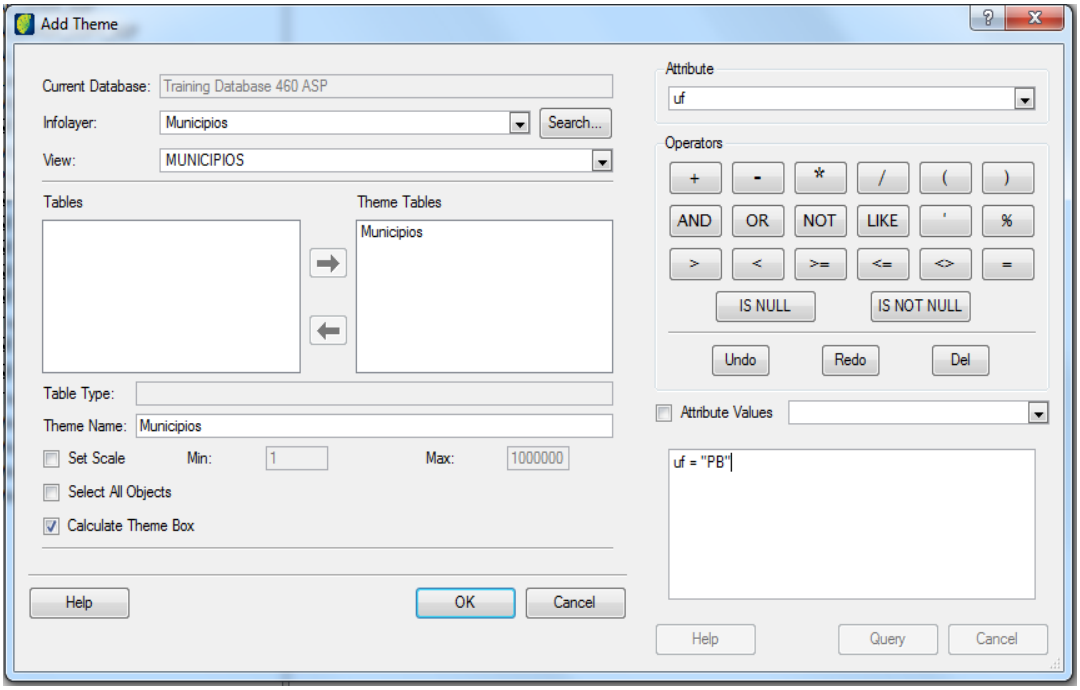
This method for creating themes is available only to vectorial data.

Click on the target view and then click on the icon , or go to the menu THEME → ADD THEME.

Proceed the same way as to create a simple theme (refer to Creating Simple Themes, page 31), but uncheck the option *Select All Objects*.

The interface will open the restriction area. For instructions on how to use it, refer to Appendix A: Composing Restrictions, page 145.

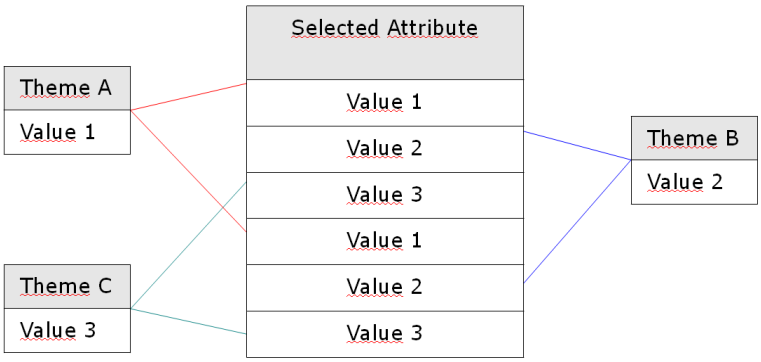
Also, the option *Calculate Theme Box* will be enabled. Checking this option will recalculate the box to suit the area containing the data that satisfies the restriction created. If left unchecked, the theme will inherit the box of the layer.



The theme resulting from the highlighted restriction shown above will point only to the polygons from the Brazilian state of Paraíba (PB).

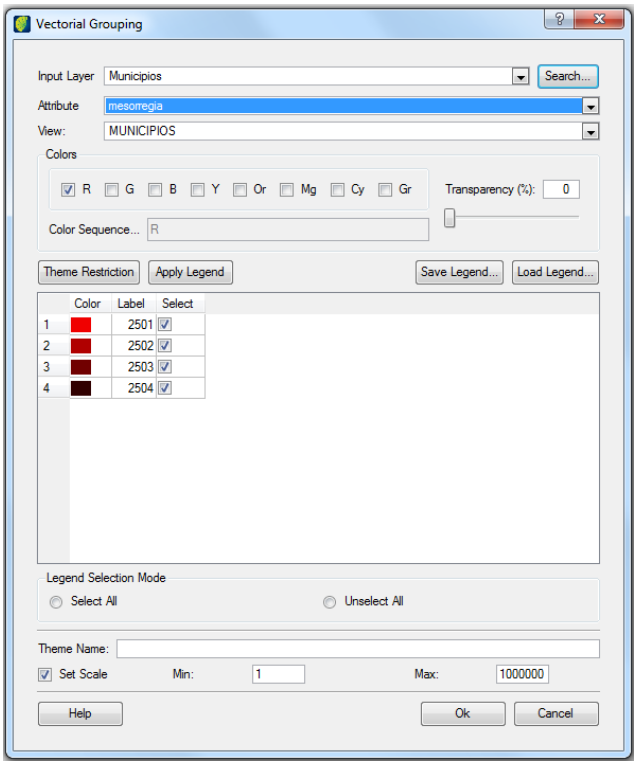
Creating Themes Grouped by Attribute

Themes grouped by attribute are created one for each value of one selected attribute occurring in a layer. For example, if a layer contains data classified with land cover classes, selecting that attribute will result in one theme for each occurring land cover class.



The scheme above shows how the grouping is made: the values occurring in the selected attribute of this generic layer are “Value 1”, “Value 2” and “Value 3”. Creating themes grouped by restriction based on this attribute will result on three different themes: “Theme A”, exclusively pointing to all the “Value 1” geometries; “Theme B” for the “Value 2” polygons and “Theme C” for the “Value 3”.

Click on the target view and then click on the icon , or go to the menu THEME → ADD VECTORIAL GROUPING.



Input Layer: select the name of the desired layer. By default, this field is loaded with the layer selected in the layers tree. Use the floating menu or the **Search** button to change it (Appendix D, 149).

Attribute: select the attribute that should be used for the grouping. This list contains all the attribute columns from the chosen layer.

View: displays the name of the selected target view. If needed, open the floating menu to select a different view. Only views previously loaded are displayed in this list. If the desired view is not shown, exit the theme interface, click on the view to load it, then get back to creating the themes (refer to Load Views On Demand, page 10).

Colors: select the color groups to set the visual for each theme that will be created. Different tones of the selected colors will be applied to the themes.

Transparency: sets the level of transparency for the themes that will be created. Drag and move the slider or type the desired value.

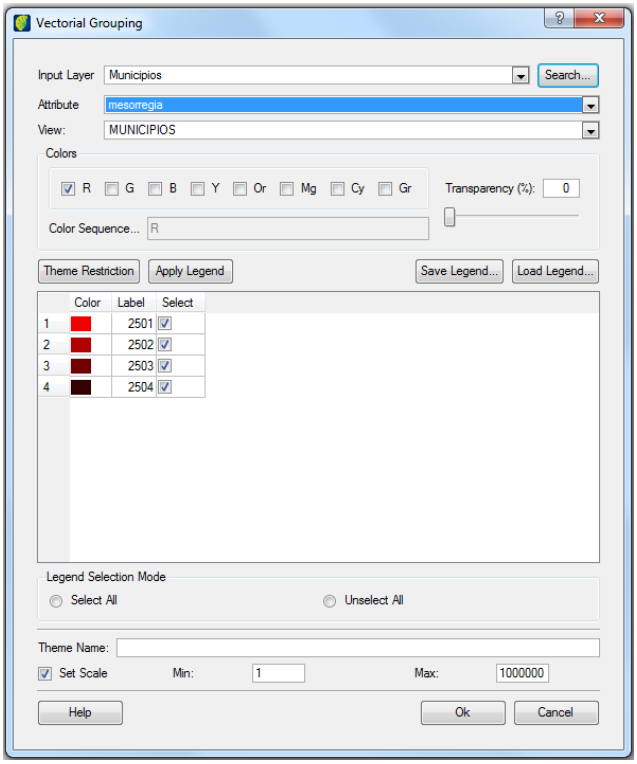
Theme Restriction: this button opens the restriction interface. Use it to restrict the generated themes. For instructions on how to use it, refer to Appendix A: Composing Restrictions, page 145.

Apply Legend: this button lists the themes that will be generated, as a result for the occurring values of the chosen attribute and restrictions applied to them.

Save Legend: click on this button to save the legend in a file containing the chosen set of colors.

Load Legend: it is possible to load a previously elaborated legend file to define the set of colors for the resulting themes. Use the **Load Legend** button to load it. Compare the following figure with the previous one to see that colors changed.

The legend file can be generated in any text editor. Save it and change the file´s extension to .leg. Use the following example to set the legend file, considering that the values are in RGB:



2501;240,0,0

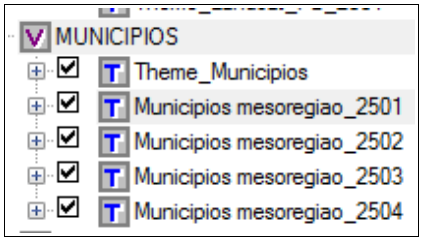
2502;176,0,0

2503;113,0,0

2504;49,0,0

Legend Selection: use the options in this area to choose between selecting or unselecting all the themes that can be generated. It is also possible to check or uncheck themes one by one by clicking no their check boxes. Only the checked themes will be generated.

Theme Name: type a name to be used as a prefix to the names of the generated themes. The prefix if followed by the name of the class, as seen on the next figure.

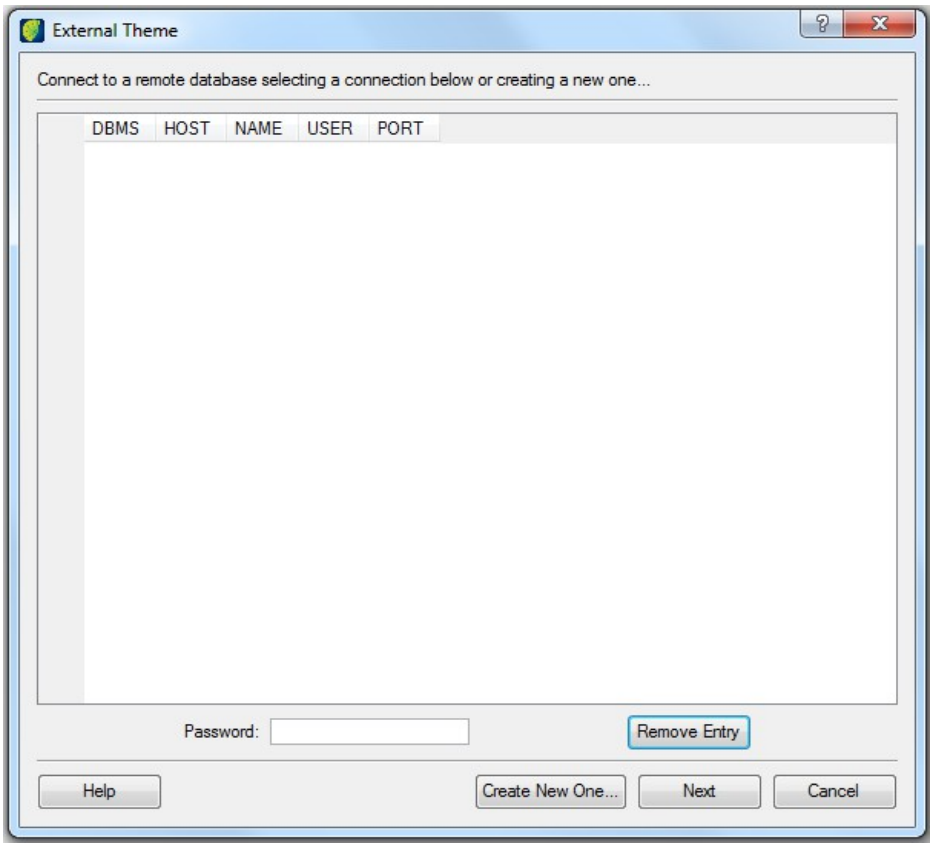


Set Scale: mark this option to set up a range of scale values in which the data pointed by the theme should be visible. Outside the range, the data will not be displayed. After the theme is created, it is possible to change this range by right-clicking on the theme and selecting Visualization Scale. By default, the option is unchecked and the theme will be displayed in all scale values.

Creating External Themes

TerraAmazon allows the visualization of data stored in different databases without having to copy it to the current database. This is achieved through external themes.

Select the target view and click on the icon , or go to the menu THEME → ADD EXTERNAL THEME.



The figure above shows the interface before there are connections created.

There are two situations to consider when creating external themes:

- new connections, page 38
- existing connections, page 39

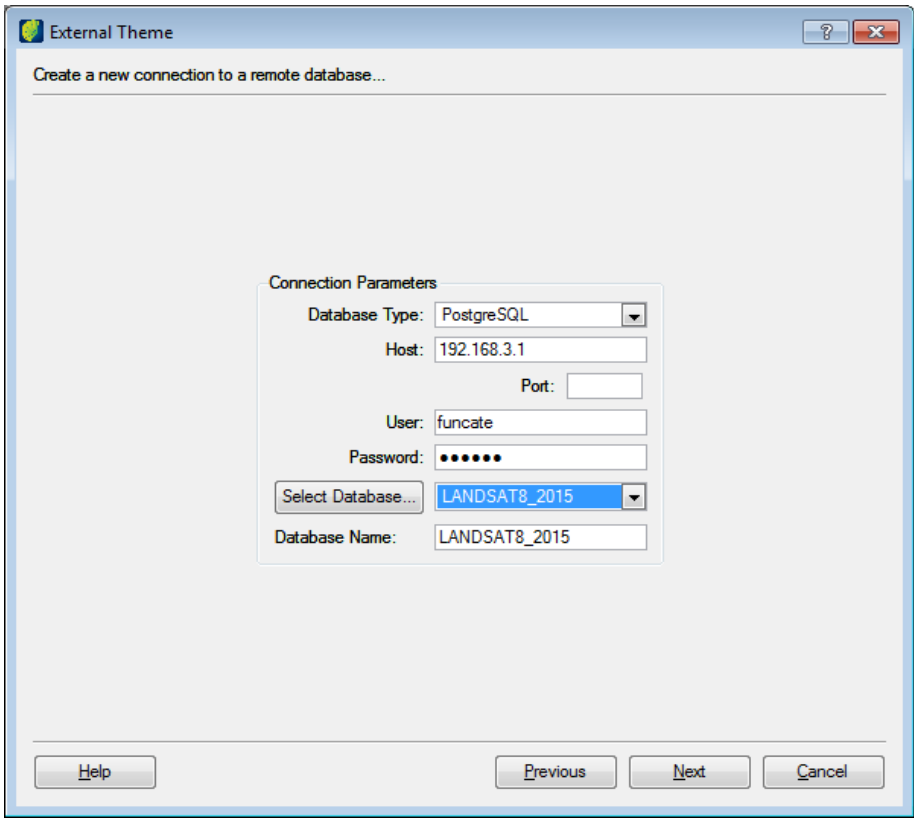
In either case, a special user name and password must be used, different than the one used for logging in TerraAmazon. Contact an Administrator User to provide that for you.

Note: External themes establish a *read-only* link to the external data.

Adding Connections

Click on the **Create New One** button**.**

The interface will change to a connection step which works the same way as the regular connection to a TerraAmazon database (refer to Connecting to a Database, page 10), except that the both user

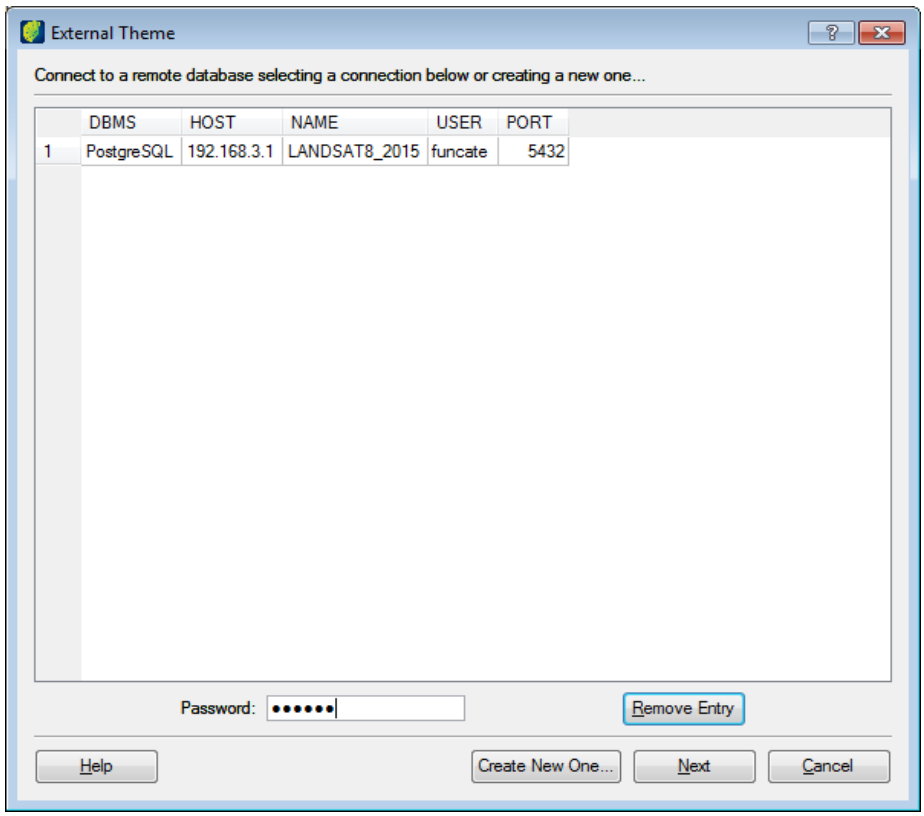


name and password are different. Contact an Administrator User to provide those for you, as well as the *Database Type, Host, Port* and *Database Name* to be selected.

Click on **Next** button to connect and access the available views.

Using Existing Connections

When using a connection previously created, select it in the list presented in the interface.



The user that was used to create the connection is displayed in the column USER. Type that user´s password in the *Password* field.

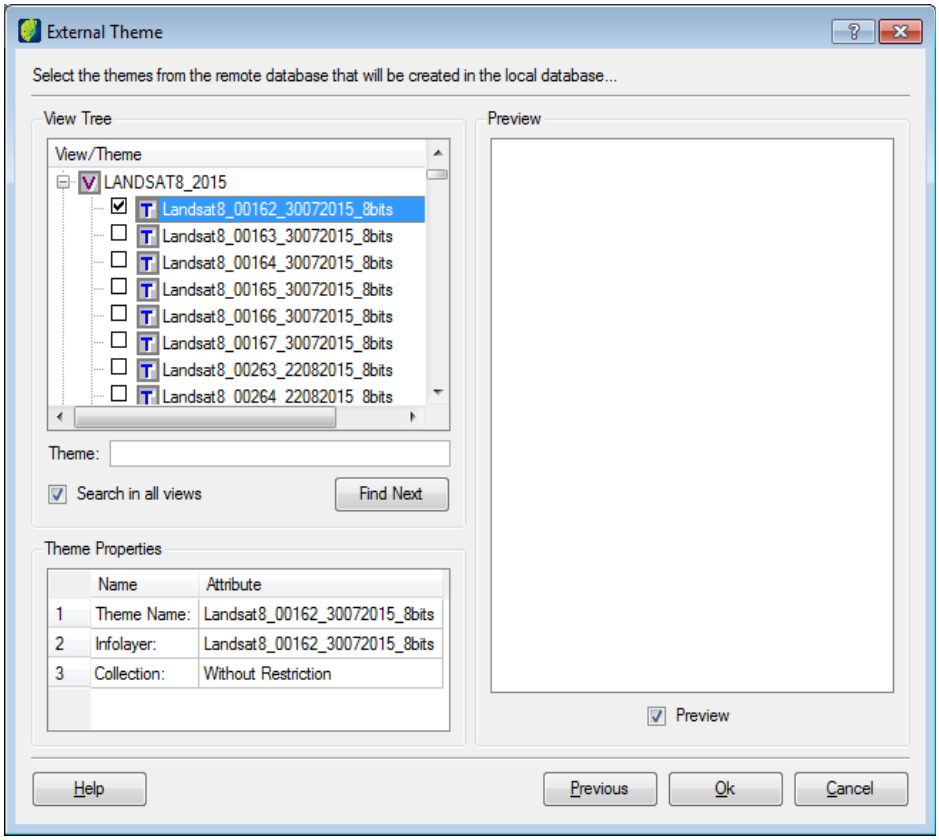
Click on **Next** button to connect and access the available views.

Remove Entry: this button removes permanently the connection selected in the list.

Is is not possible to remove connections through which External Themes are currently in use. Remove the external themes first, then remove the connection.

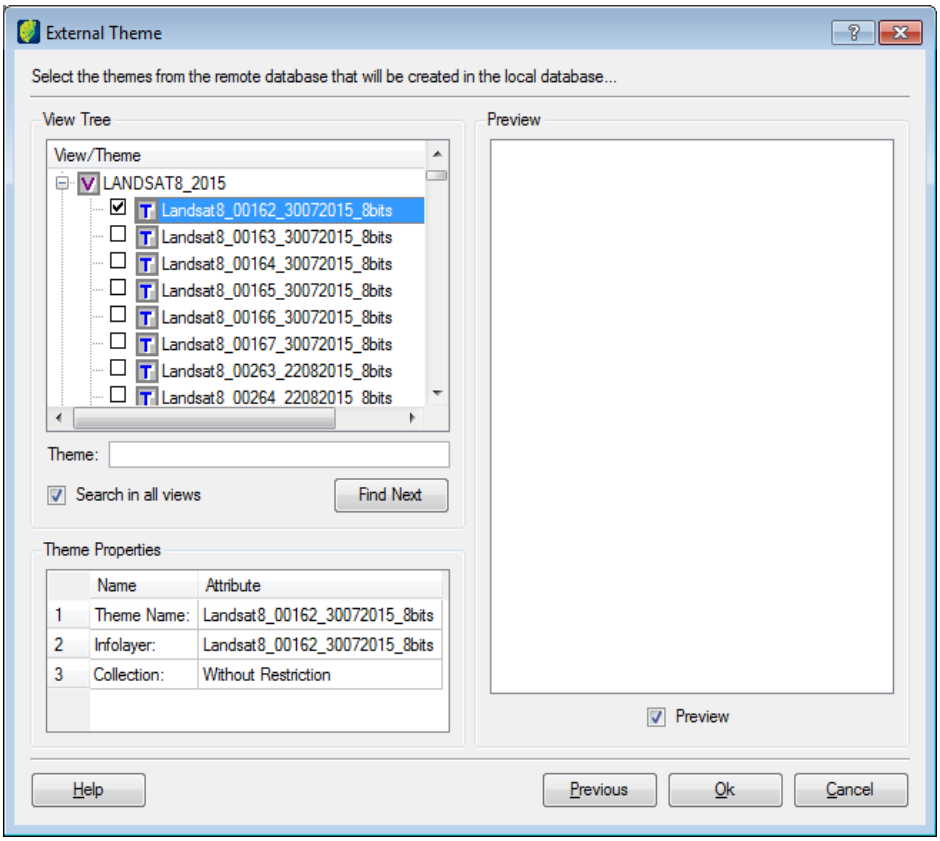
Selecting External Themes

Once the connection is made, the interface lists the available views. The views displayed in this list must be previously created (refer to Appendix C: Setup for External Theme, page 148).



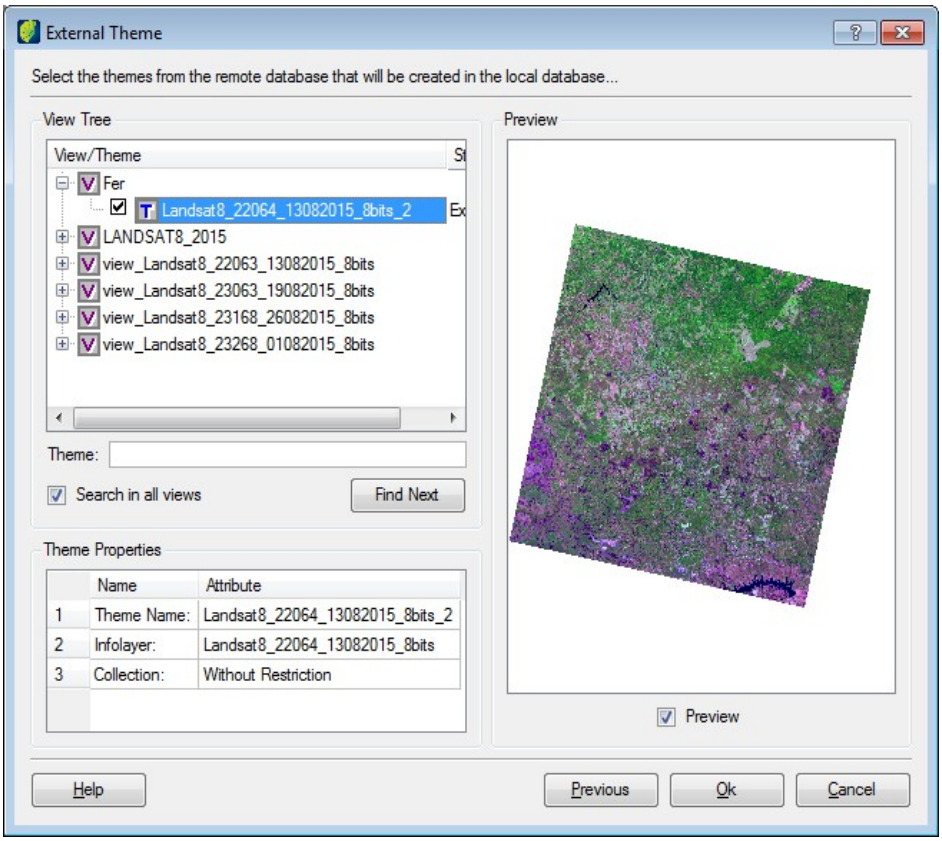
Locate the desired view and click on + at its left to expand it and see the list of the themes available.

Select the desired theme by checking it.



Theme: Type the name or a part of the name of the desired theme. It is possible to do the search only inside of a selected view or search in all views by selecting the option *Search in all views*. Click on **Find Next** button to continue the search to the next themes that match the search.

Preview: checking this option will immediately trigger the display of a preview of the selected theme in the Preview area, as the next figure shows.



It is possible to select more than one theme at a time, by checking as many as needed.

Click **OK** to finish.

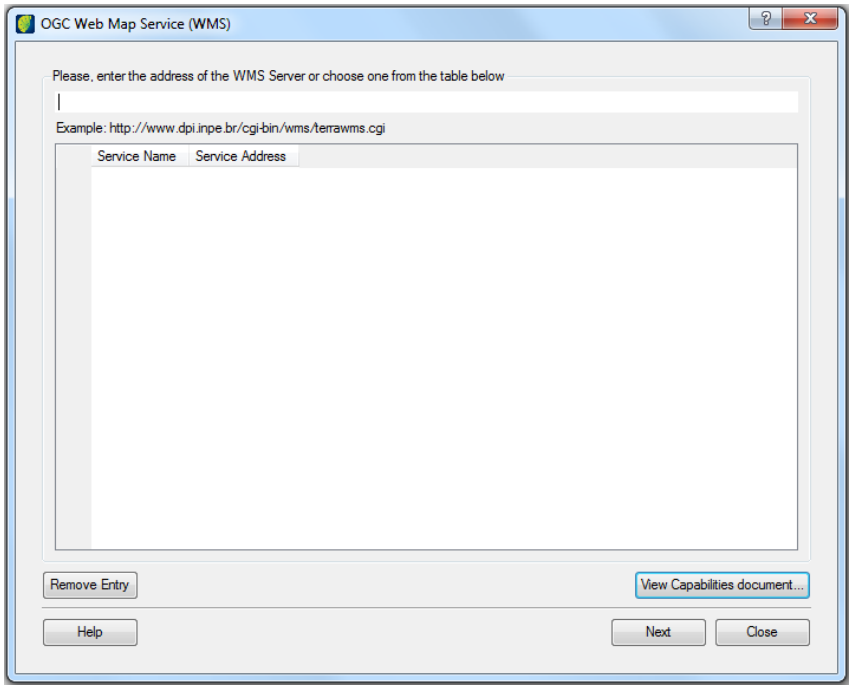
The external themes will be created and displayed along with the regular themes in the Views and Themes tree, but with a different icon: .

The icon indicates that there has been a connection problem between the current database and the database in which the external theme is stored. This problem can have many sources. Wait a few minutes and restart the connection by going to the menu FILE → RESTART DATABASE. If that has no result, contact an Administrator User.

WMS Themes

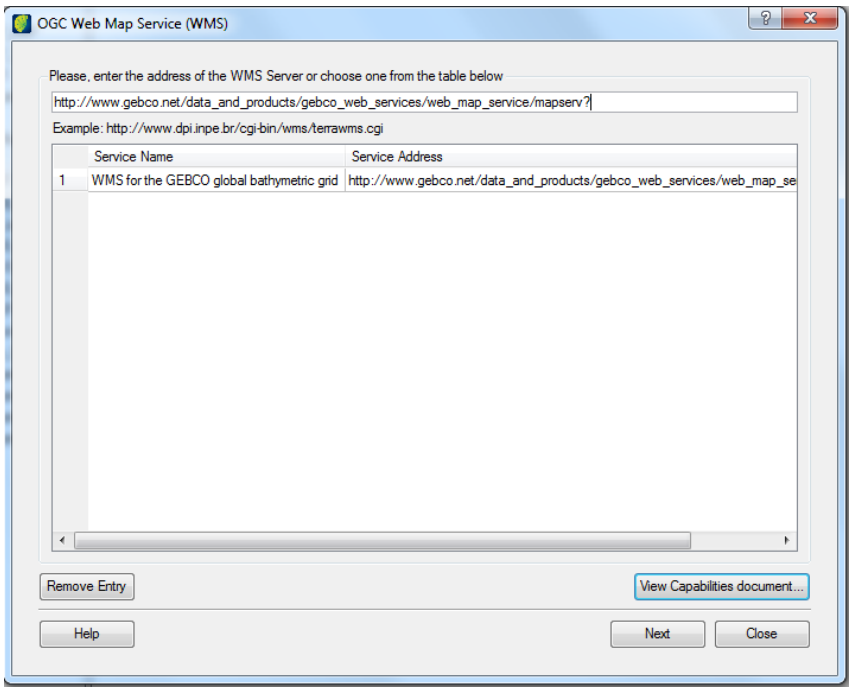
TerraAmazon allows the visualization of data stored in a remote WMS Server.

Select the view in which the WMS theme will be added, then click on the icon or go to the menu THEME → ADD WMS THEME.

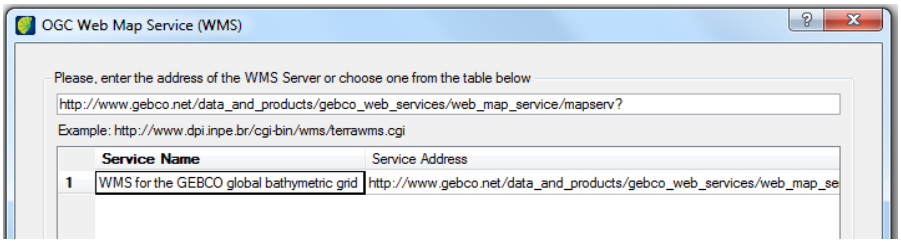


Creating and Using connections

To create a new connection, inform the address of the WMS Server then click on **Next** button.



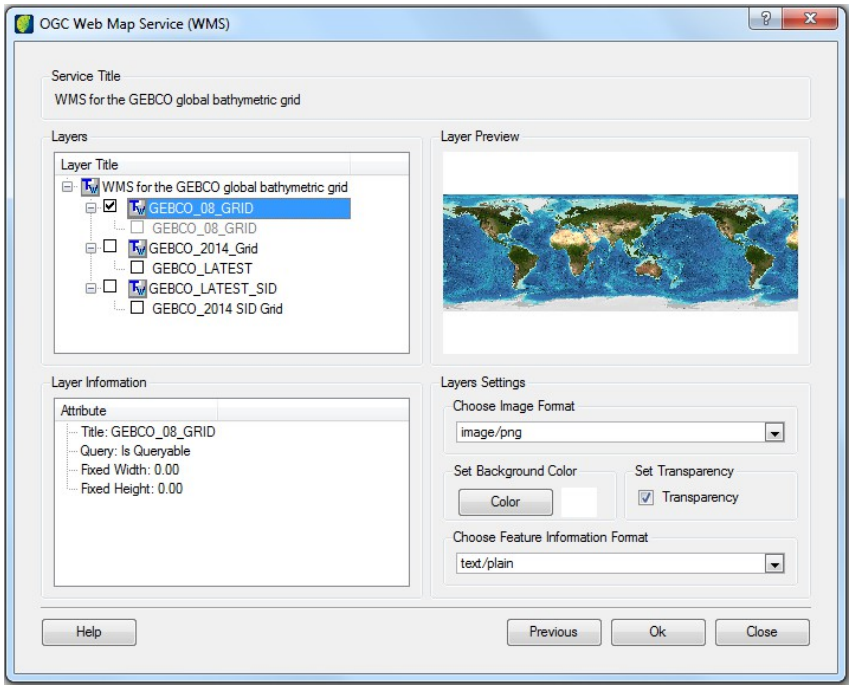
When using existing connections, select the one that will be used and click on **Next** button.



To remove a connection from the list, select it and click on **Remove Entry** button**.**

Adding WMS Themes

After selecting the WMS Server, the follow screen will be shown.



Service Title: *s*hows the name of the connected WMS server.

Layers: lists all the layers available on that WMS Server.

Layer Preview: previews the currently selected and checked layer.

Layer Information: shows some information about the selected layer, e. g., box and projection.

Choose Image Format: define the format of the image.

Set Background Color: set a background color for the WMS theme.

Set Transparency: define the transparency of the generated image.

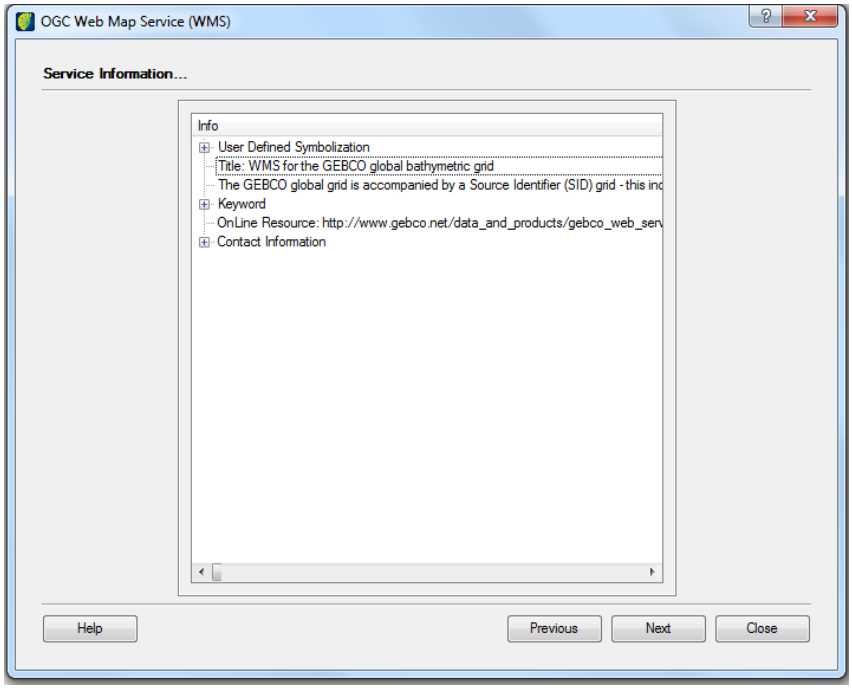
Choose Feature Information Format: define the format of the features information.

After selecting the desired layers click on the **OK** button to add them to the selected view.

Capabilities Document

It is possible to see the capabilities document of the WMS server.

Type the address of the WMS Server or select it in the list, then, click on **View Capabilities document** button**.**



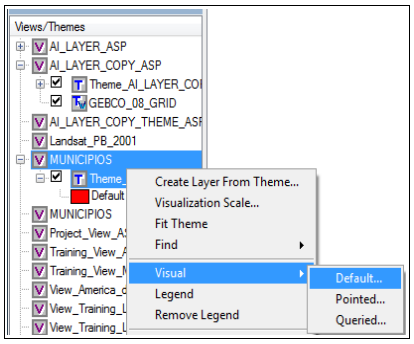
Previous: returns to the connection interface.

Next: resumes the creation of the WMS Themes.

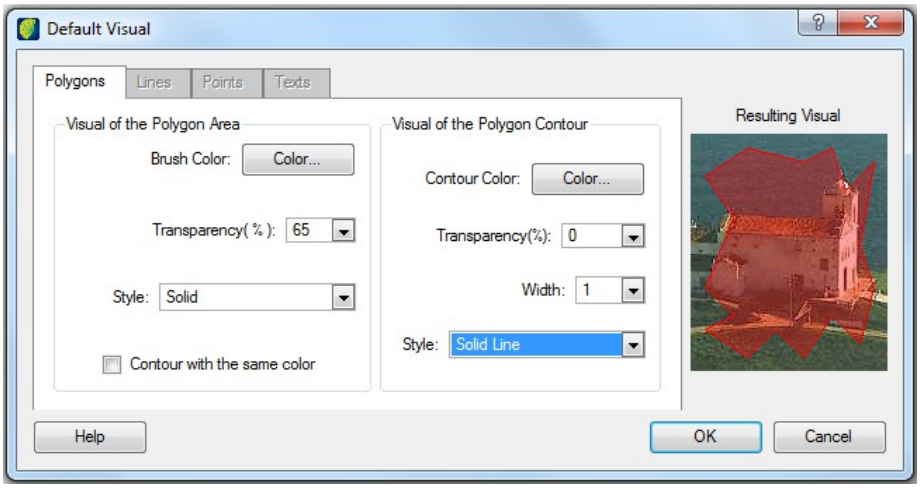
Setting Theme´s Visual

Every theme is created with a default visual. However, users can change that at any time after the theme is created.

Right-click on the theme and select VISUAL → DEFAULT.



Default visual window opens.



There are separate visuals for each of the supported representations: polygons, lines, points and texts.

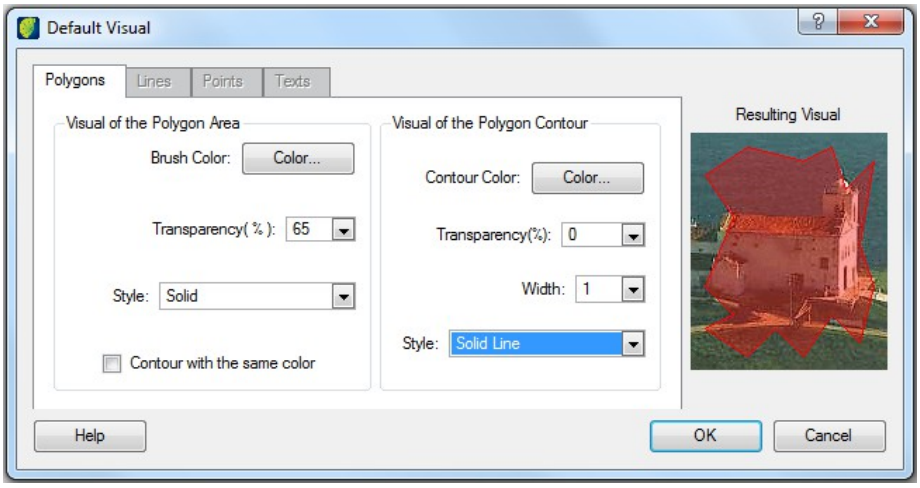
The interface allows changing the visual according to the representations present in the selected theme.

Refer to:

- Visual of Polygons, page 48
- Visual of Lines, page 49
- Visual of Points, page 50

Visual of Polygons

Polygon visual is divided into two different attributes: inside area and contour. Use the buttons and options within each area to set the visual for the desired attribute.



Color: this button opens the color selection interface. For instructions on how to use it, refer to Appendix B: Defining Colors, page 147.

Transparency: sets the level of transparency which allows visualization of underneath layers.

Style: presents the available types of filling for geometries and lines for the contours.

Contour with the same color: sets the polygon contour with the same color chosen at brush color.

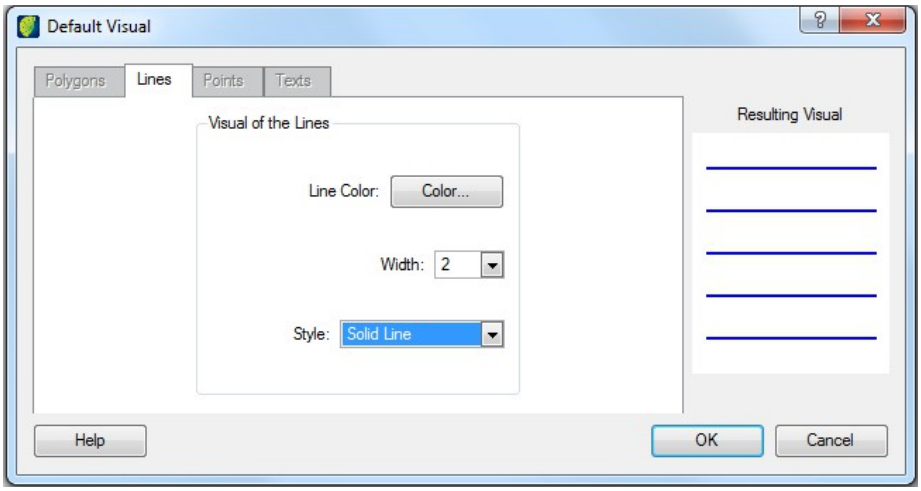
Width: sets the width for the contour line.

Click on **OK** button to apply the visual.

> **Note**: The **OK** button not only stores the defined visual but it also immediately redraws the contents the drawing area. This detail becomes important when working with themes that point to large amounts of data, since they will be drawn at once, requiring time. If necessary, uncheck the larger themes before changing visuals.

Visual of Lines

Defining the visual of the lines within a theme is very simple and refers only to the geometries with line representation. It does nos affect the visual of the contours of polygons since they are part of the polygons representation.



Color: this button opens the color selection interface. For instructions on how to use it, refer to Appendix B: Defining Colors, page 147.

Width: sets the width of the line.

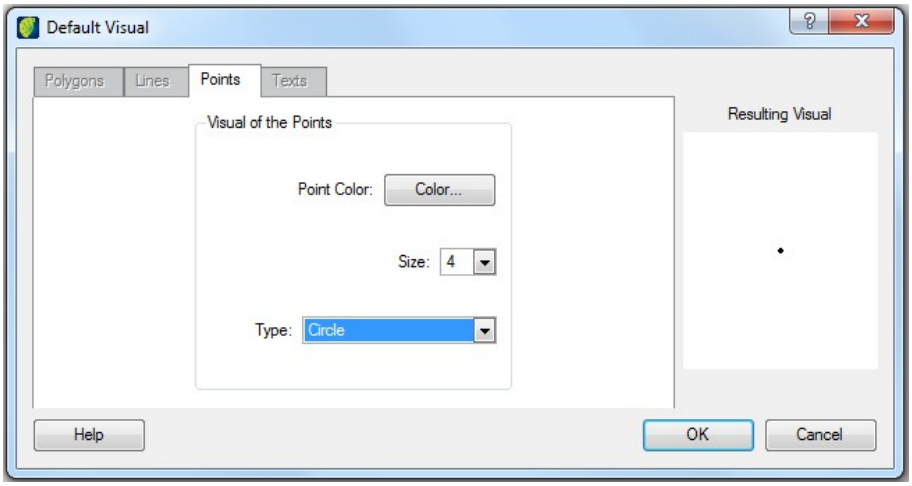
Style: presents the available types of lines.

Click on **OK** button to apply the visual.

The **OK** button not only stores the defined visual but it also immediately redraws the contents the drawing area. This detail becomes important when working with themes that point to large amounts of data, since they will be drawn at once, requiring time. If necessary, uncheck the larger themes before changing visuals.

Visual of Points

Defining the visual of the points within a theme is very simple.



Color: this button opens the color selection interface. For instructions on how to use it, refer to Appendix B: Defining Colors, page 147.

Size: sets the size of the point.

Style: presents the available types of points.

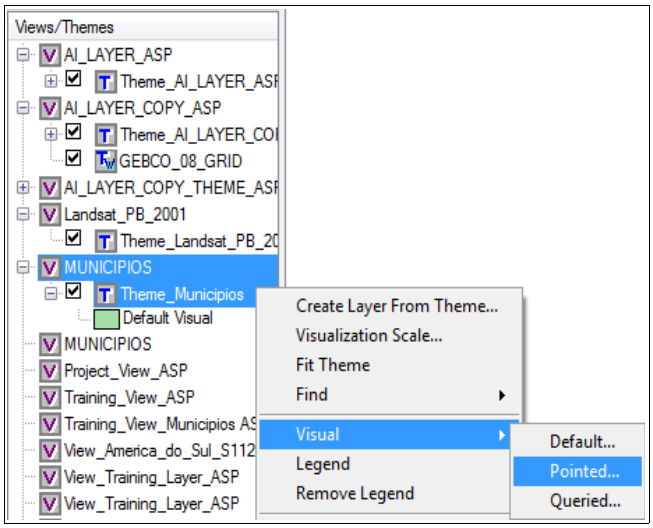
Click on the **OK** button to apply the visual.

> The **OK** button not only stores the defined visual, but it also immediately redraws the contents the drawing area. This detail becomes important when working with themes that point to large amounts of data, since they will be drawn at once, requiring time. If necessary, uncheck the larger themes before changing visuals.

Setting the Visual of Pointed & Queried Geometries

It is possible to define the visual for geometries selected by pointing or querying tools.

To access the interfaces, right-click on the theme and select the desired option: VISUAL → POINTED or VISUAL → QUERIED.



The visuals can be modified the same way as the default visual, described in the section Setting Theme´s Visual, page 47.

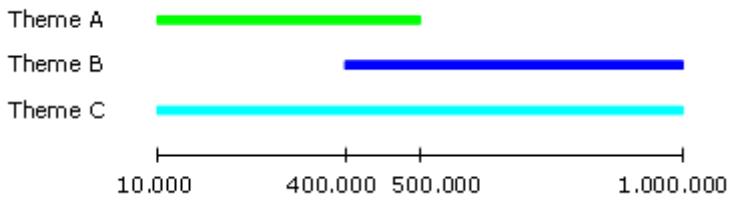
The pointed geometries are the ones that are selected by one of the pointing tools: , , , , (refer to Tools, page 137).

The queried geometries are the ones that are selected by the Find Geometries tool (refer to Finding Geometries on Themes, page 54).

Setting Visualization Scale Range

Visualization scale range defines the scale values in which a theme will be displayed in the drawing area.

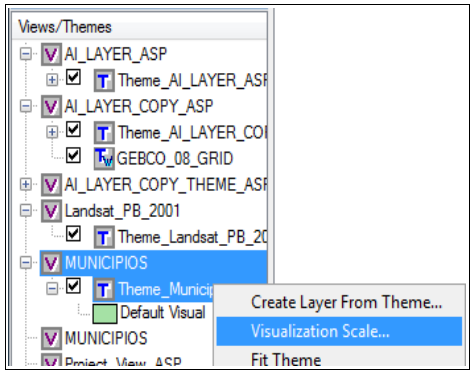
When working outside the set range, the theme will not be visualized.



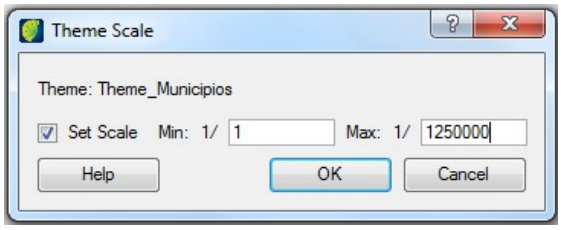
The figure above shows three themes and the range of scale values in which each of them will be visualized. For example, *Themes A* and *B* will be displayed only within part of the considered range, while *Theme C* will be displayed the entire range. With this setup, it is possible to display all three themes at the same time only between 1:400.000 and 1:500.000.

Set up the range as needed for each case.

Right-click on the desired theme and select *Visualization Scale*.



Theme scales window opens.

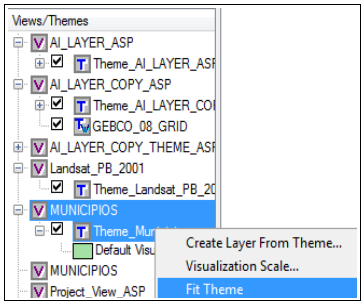


Set Scale: check this box to enable the set up of the minimum and maximum scale values. When unchecked, the theme can be displayed in every scale value.

Fitting Themes

Fitting themes is a way to visualize the data in a scale that fully fits it in the drawing area.

Right-click on the theme and select *Fit Theme*. The theme will be fully visualized.



Fitting a theme can take a while if it points to a large amount of data. On the corporate environment, fitting this kind of theme can slow down the work of other users, depending on server capabilities as well as the amount of people accessing the database.

To avoid this and to increase efficiency, manage the visualization scales from your themes (refer to Setting Visualization Scale Range, page 52).

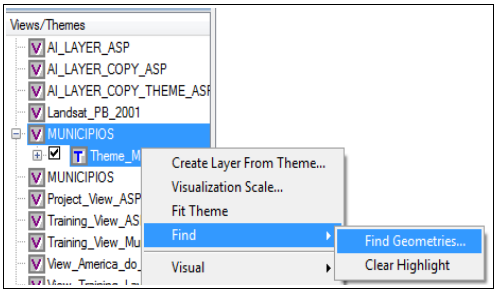
TerraAmazon will fit themes on different scales depending on monitor configurations as well as the user´s dimensioning of the visualization area.

Note: When fitting themes, if the data is not drawn, check the range of its Visualization Scale. Change it if necessary (refer to Setting Visualization Scale Range, page 52) and fit the theme again.

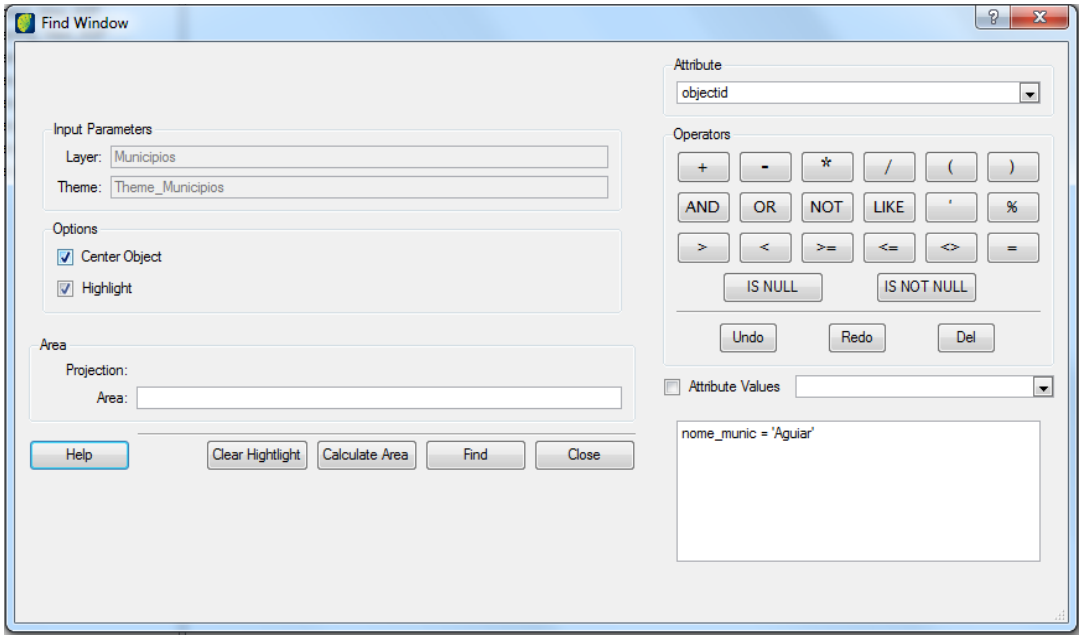
Finding Geometries on Themes

The Find Geometries tool allows the user to locate geometries on the screen through the use of restrictions.

Right-click on the desired theme and select FIND → FIND GEOMETRIES.



Find window opens.



Input Parameters: this area identifies the selected theme and the layer to which that theme points. The search will be made only in the group of data pointed by this selected theme.

Create the restriction using the tools available in the restriction area at the right of the interface. For instructions on how to use it, refer to Appendix A: Composing Restrictions, page 145.

Center Object: checking this option will center on the screen the geometries resulting from the search.

Highlight: checking this option will highlight the geometries resulting from the search. The color of the highlight can be defined by the user by right-clicking on the theme and selecting VISUAL → QUERIED (refer to Setting the Visual of Pointed & Queried Geometries, page 51).

Clear Highlight: this button resets the highlighted geometries to the regular visual set up for the current theme. After closing this search interface, it is also possible to clear the highlighted geometries by right-clicking on the theme and selecting FIND → CLEAR HIGHLIGHT.

Area: this area presents the sum of the area of the polygons resulting from the search. Once the restriction is made, click on the **Calculate Area** button to see the result in the *Area (km²)* field.

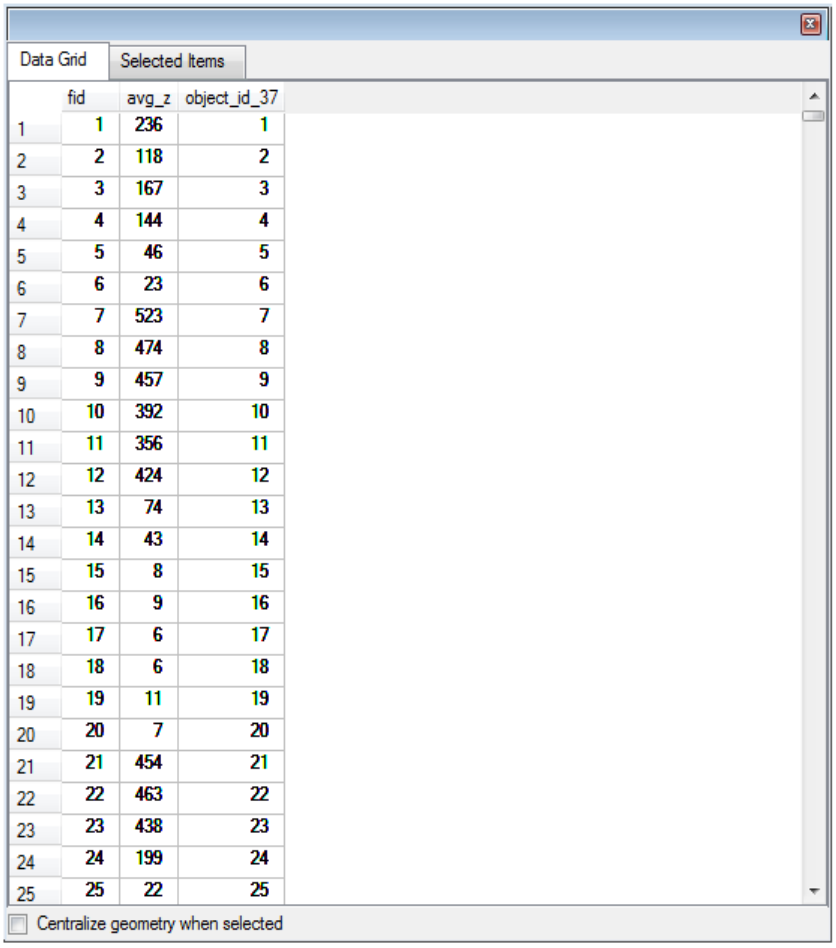
Find: this button triggers the search. Every selected theme in the current view will be drawn just as a regular visualization, except that the geometries resulting from the search may be highlighted or centralized depending on the chosen settings.

Both **Find** and **Clear Highlight** buttons will redraw all the selected themes in the current view in order to locate the resulting geometries or to reset their visual. This detail becomes important when working with themes that point to large amounts of data, since they will be drawn at once, requiring time. If necessary, uncheck the larger themes before using these tools.

Opening Geometries Table

The user can open a table listing all geometries in a view (polygons, lines and points).

Select a view in view window and click on the icon to open the attribute table.

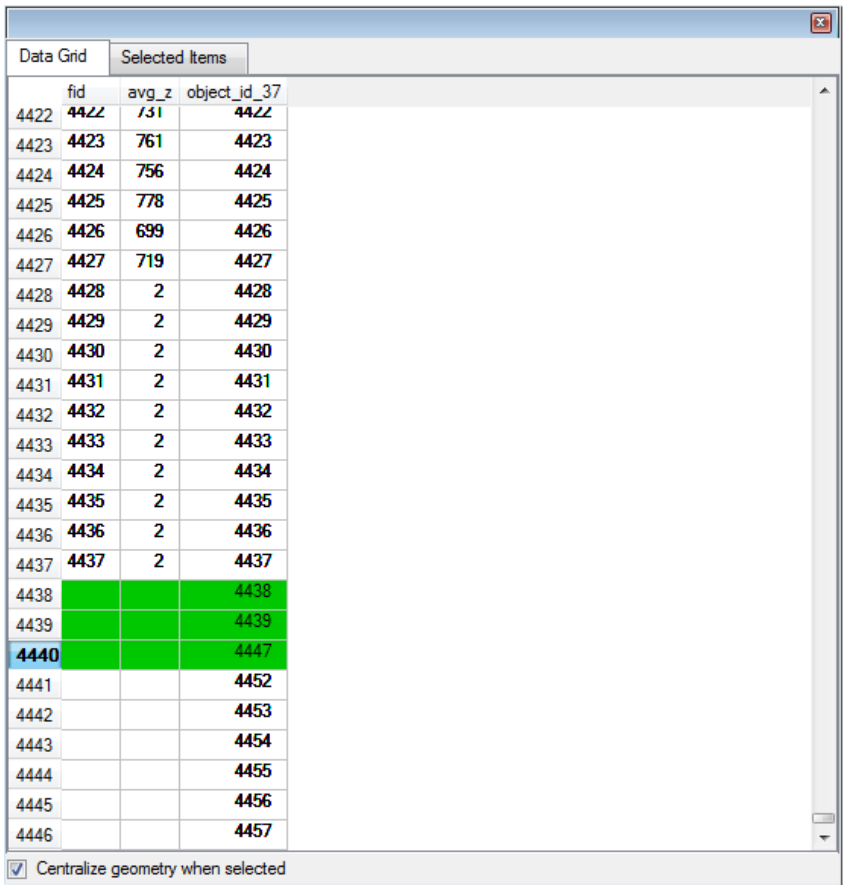


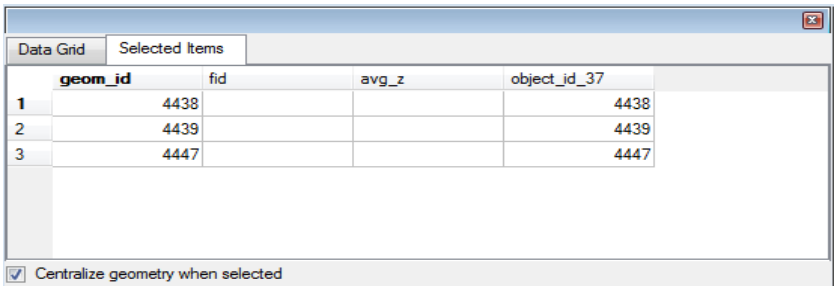
	fid	avg_z	object_id_37
1	1	236	1
2	2	118	2
3	3	167	3
4	4	144	4
5	5	46	5
6	6	23	6
7	7	523	7
8	8	474	8
9	9	457	9
10	10	392	10
11	11	356	11
12	12	424	12
13	13	74	13
14	14	43	14
15	15	8	15
16	16	9	16
17	17	6	17
18	18	6	18
19	19	11	19
20	20	7	20
21	21	454	21
22	22	463	22
23	23	438	23
24	24	199	24
25	25	22	25

Data Grid Tab: List all geometries in the view.

Click on one or more items in the list for selection. Selected geometries will be highlighted in visualization area.

Selected Items tab: only items selected on data grid tab will be presented in this list.

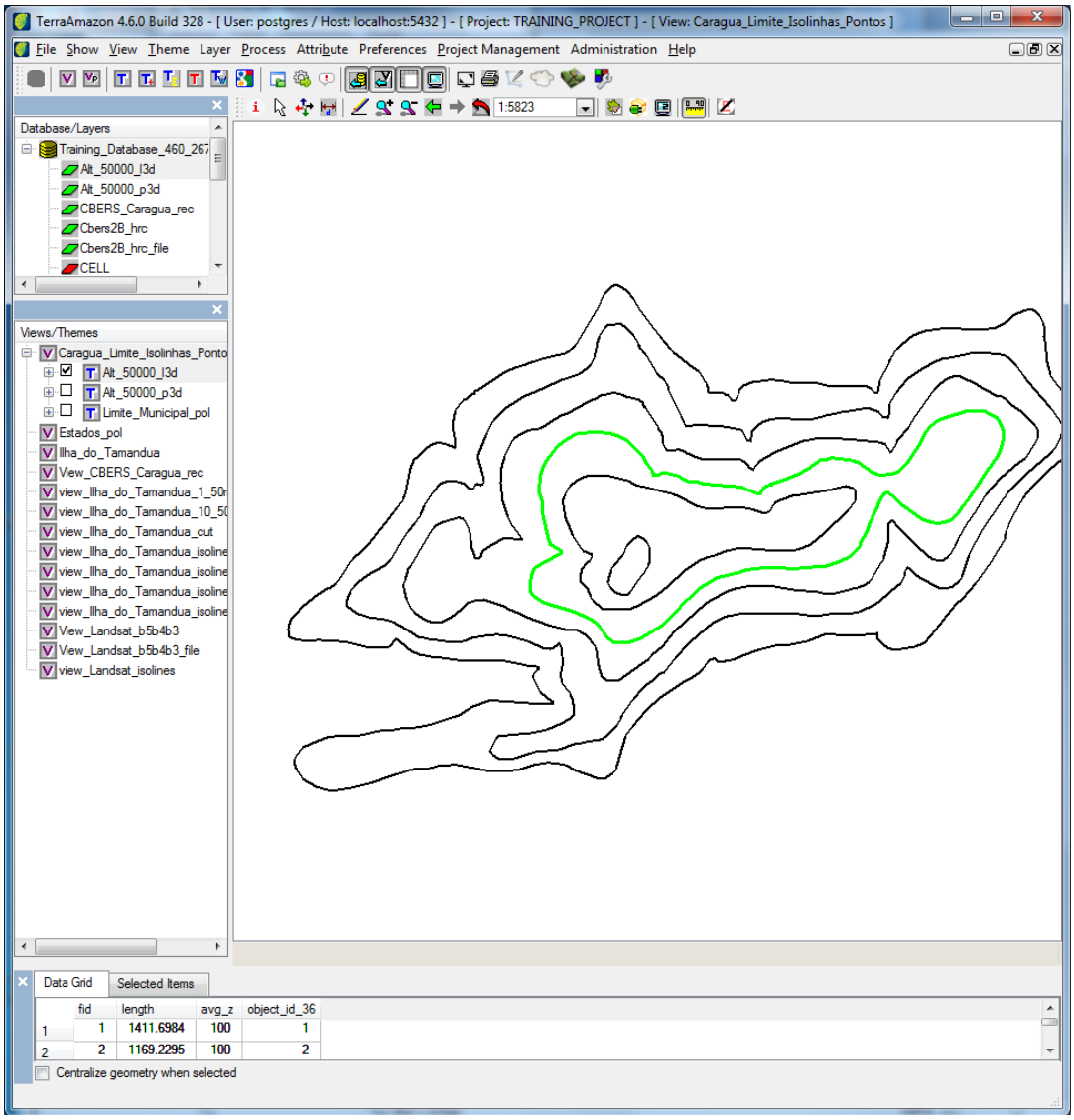




Click on the box on the lower left corner to centralize in the visualization area he last geometry selected in the table.

It is also possible to select a geometry directly in visualization window using the mouse pointer. Click on the icon and then click on the geometry to be highlighted.

The user can fix the attribute table in TerraAmazon main window just by dragging it to the bottom.


TerraAmazon 4.6.0 Build 328 - [User: postgres / Host: localhost:5432] - [Project: TRAINING_PROJECT] - [View: Caragua_Limite_Isolinhas_Pontos]
File Show View Theme Layer Process Attribute Preferences Project Management Administration Help
1:5823
Database/Layers
Training_Database_460_267
Alt_50000_l3d
Alt_50000_p3d
CBERS_Caragua_rec
Cbers2B_hrc
Cbers2B_hrc_file
CELL
Views/Themes
Caragua_Limite_Isolinhas_Ponto
Alt_50000_l3d
Alt_50000_p3d
Limite_Municipal_pol
Estados_pol
Ilha_do_Tamandua
View_CBERS_Caragua_rec
view_Ilha_do_Tamandua_1_50
view_Ilha_do_Tamandua_10_5
view_Ilha_do_Tamandua_cut
view_Ilha_do_Tamandua_isoline
view_Ilha_do_Tamandua_isoline
view_Ilha_do_Tamandua_isoline
view_Ilha_do_Tamandua_isoline
View_Landsat_b5b4b3
View_Landsat_b5b4b3_file
view_Landsat_isolines
Data Grid
Selected Items
fid length avg_z object_id_36
1 1 1411.6984 100 1
2 2 1169.2295 100 2
Centralize geometry when selected

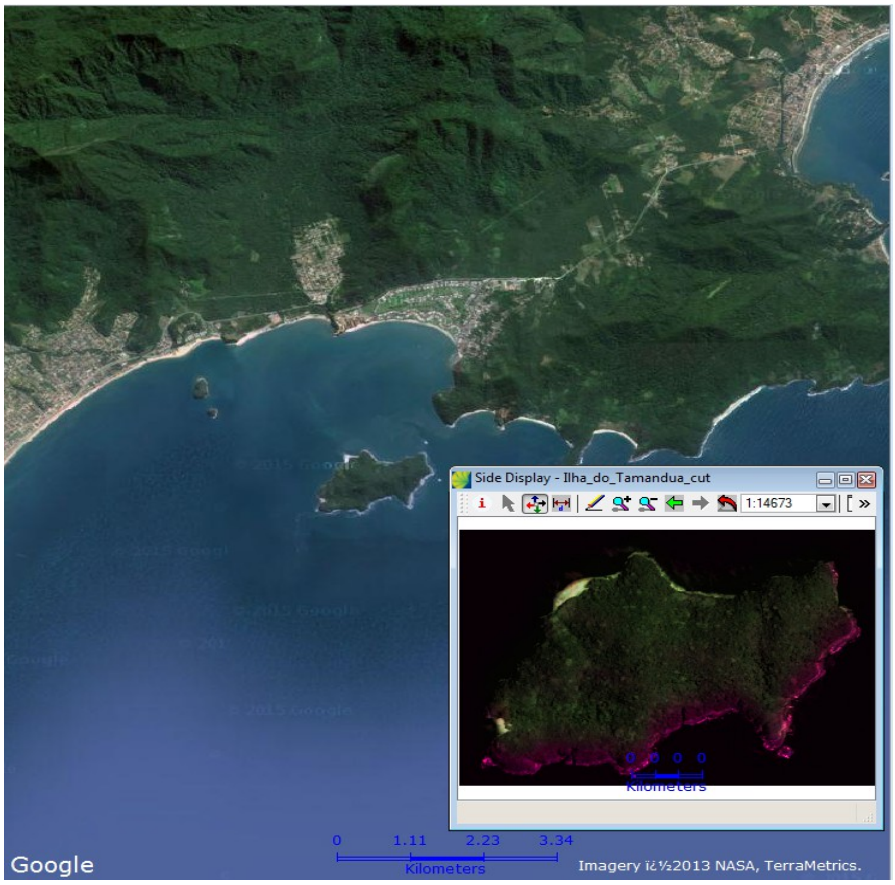
Google™ Theme

It is possible to create a theme with Google™ data. For this, TerraAmazon will access the Google™ server to show the data, so internet connection is required.

To add a Google™ select the target view and click on the icon .

Note: Whenever there are other themes in a view with Google™, the tool will recompose to the box of the visible themes.

The Google™ theme can be used along with Connected Views (refer to Connecting Views, page 26) and Side Display (refer to Visualization Tools, page 139).

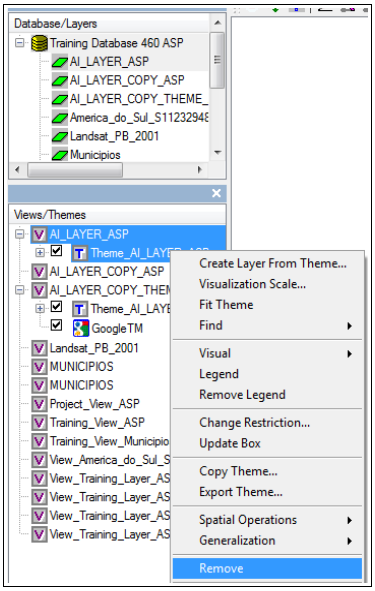


Note: After triggering the visualization of a view with Google™ theme, TerraAmazon will load the Google™ images and that can take a while, depending on internet conditions. During this loading time, it is possible to abandon the view that is being loaded and work on a different view. Google™ images will stop being loaded.

Removing Themes

Themes do not contain data, so they can be removed at any time without causing data loss. That means that if a theme is removed, the data will remain intact in the database.

Right-click on the theme and select *Remove*.

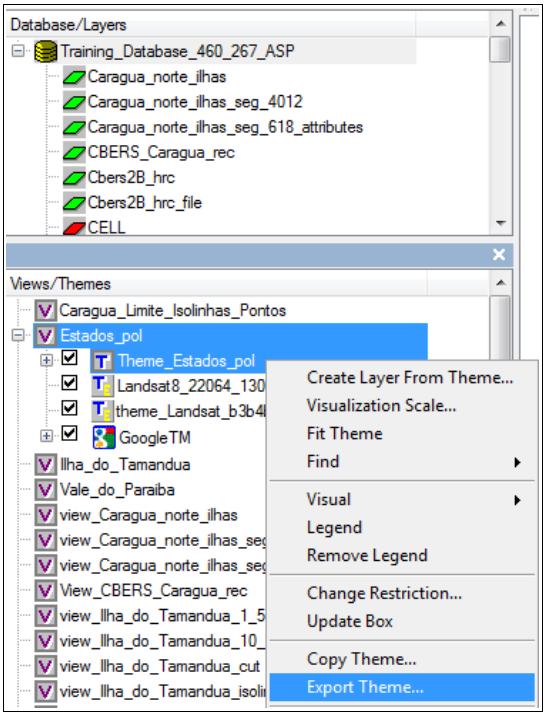


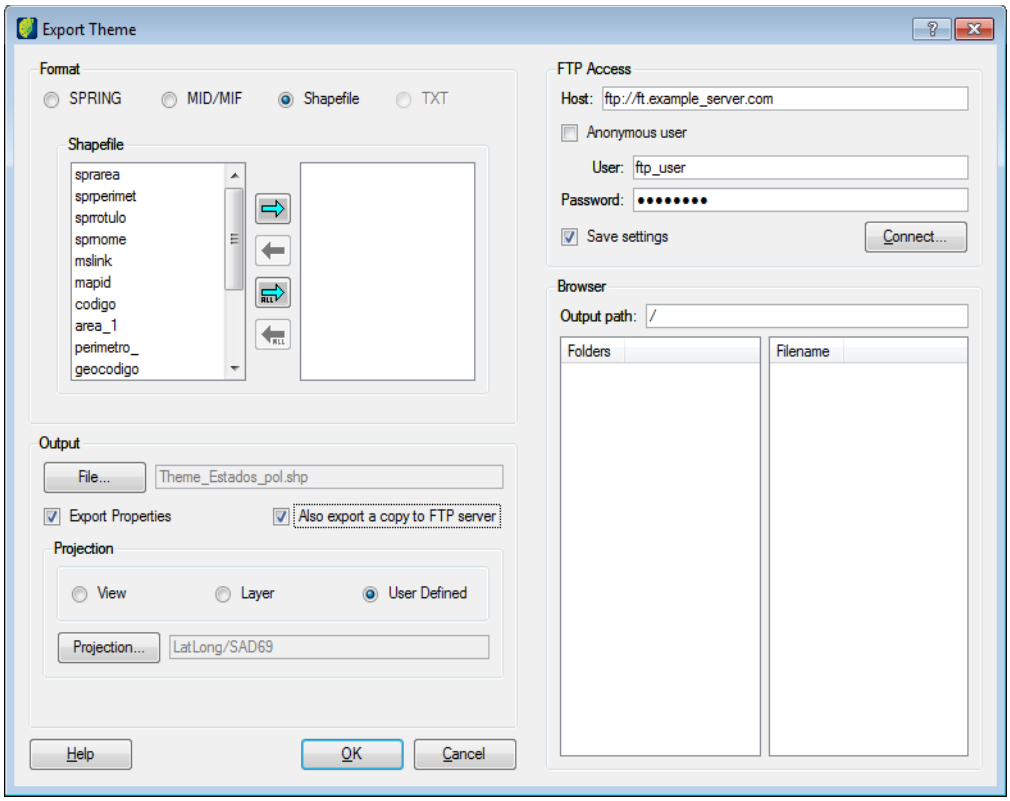
Note: Removing themes is permanent. If needed, create a new theme to visualize the data again.

Exporting a theme

An existing theme can be exported.

Right-click on the theme and select *Export Theme*.





Format: select the file format to export the theme and complete its correspondent parameters.

Output file: a default value is create or click on the **File** button to browse and enter a different name.

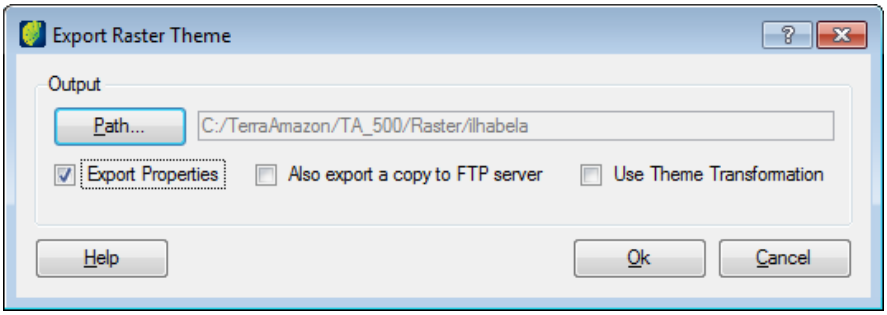
Export Properties: check this box if properties are to be exported.

Also export a copy to FTP server: check this box if a second copy will be exported to a FTP server. An additional side window is opened and user must enter the ftp server data.

Projection: user can select to export projection from the view, layer or a user defined.

Click on the **OK** button.

When the theme is a raster the export theme interface is the following:



Path: Click on this button to browse the correct folder to save the file and enter the file name.

Select one or more options to export:

Export properties: all theme properties will be saved on the file.

Also export a copy to a FTP server: the interface expands and the user can enter the ftp server parameters to connect and transfer the theme to a file.

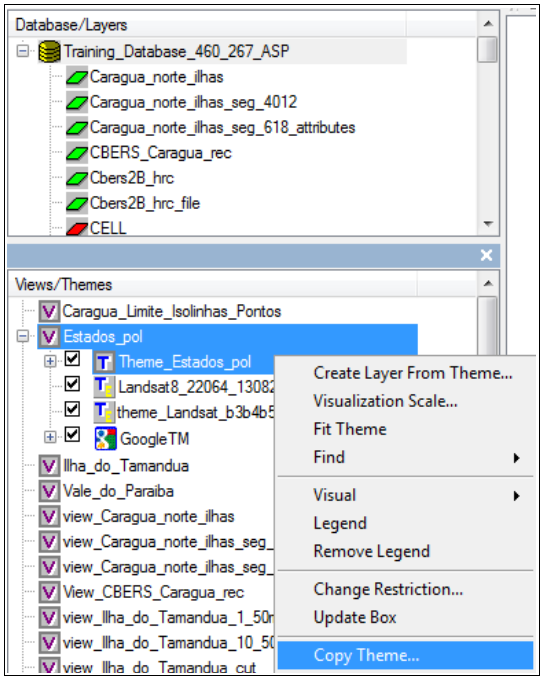
Use theme transformation

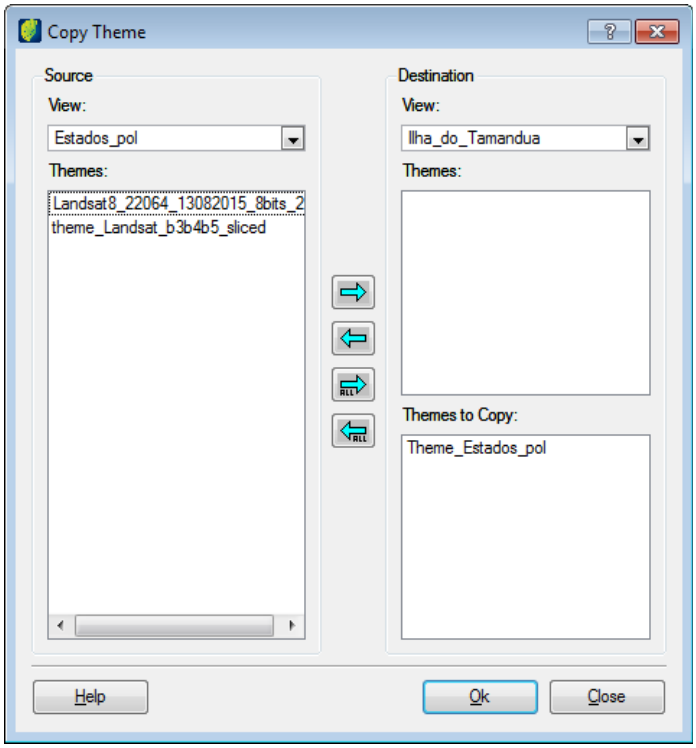
Click on the **OK** button.

Copying a theme

An existing theme can be copied to another view.

Right-click on the theme and select *Copy Theme*.





Source: Select the view and available themes will be listed below. Select one or more themes and click on right arrow to indicate which themes will be copied to destination view.

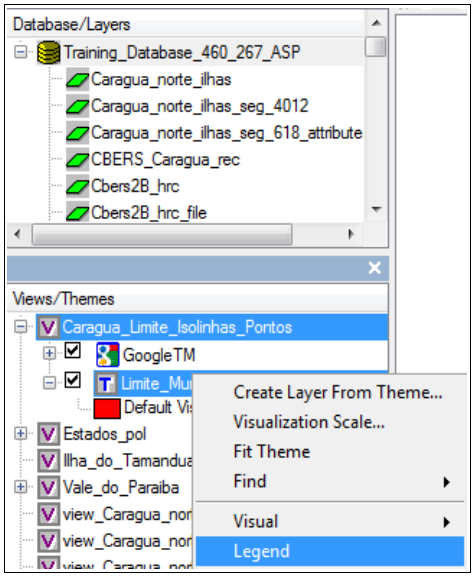
Destination: select the destination view from the list.

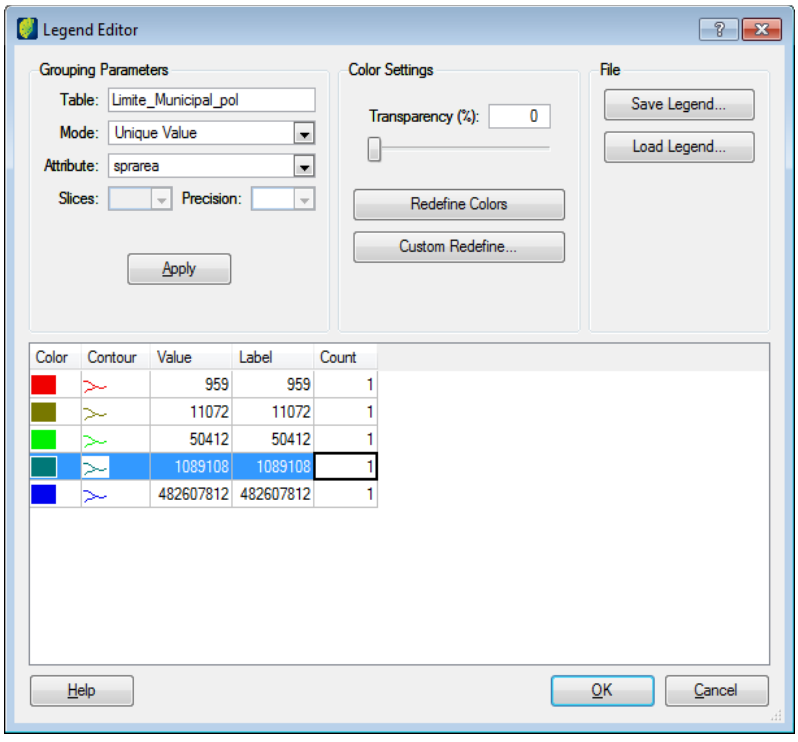
Click on the **OK** button.

Editing a theme legend

An existing theme can be copied to another view.

Right-click on the theme and select *Copy Theme*.





Grouping parameters

Mode: select the mode style

Attribute: select the attribute of legends

Slices: depending on the mode user can enter the number of slices

Precision: enter the precision related to the legend

Color settings

Transparency: enter the percentage of color transparency or slide the button below.

Custom Redefine: click on this button if user wants to change the customized legend colors.

Redefine colors: click on this button if user want to change default colors.

File

Load: click on this button to load a saved legend file.

Save: click on this button to save the set legend to a .leg file.

Click on the **OK** button.

6 Vectorial Edition

Direct Vectorial Edition	68
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Non-Interactive Classification	84

TerraAmazon has two types of vectorial edition:

- Direct edition, which does not involve projects and that acts directly on the active theme.
- Edition through projects, which allows the use of various layers and the definition of spatial operations for the classification process according to the rules configured by an Administrator User.

The choice of which type of edition should be used depends on the work that should be done and on how the database was elaborated by the Administrator User.

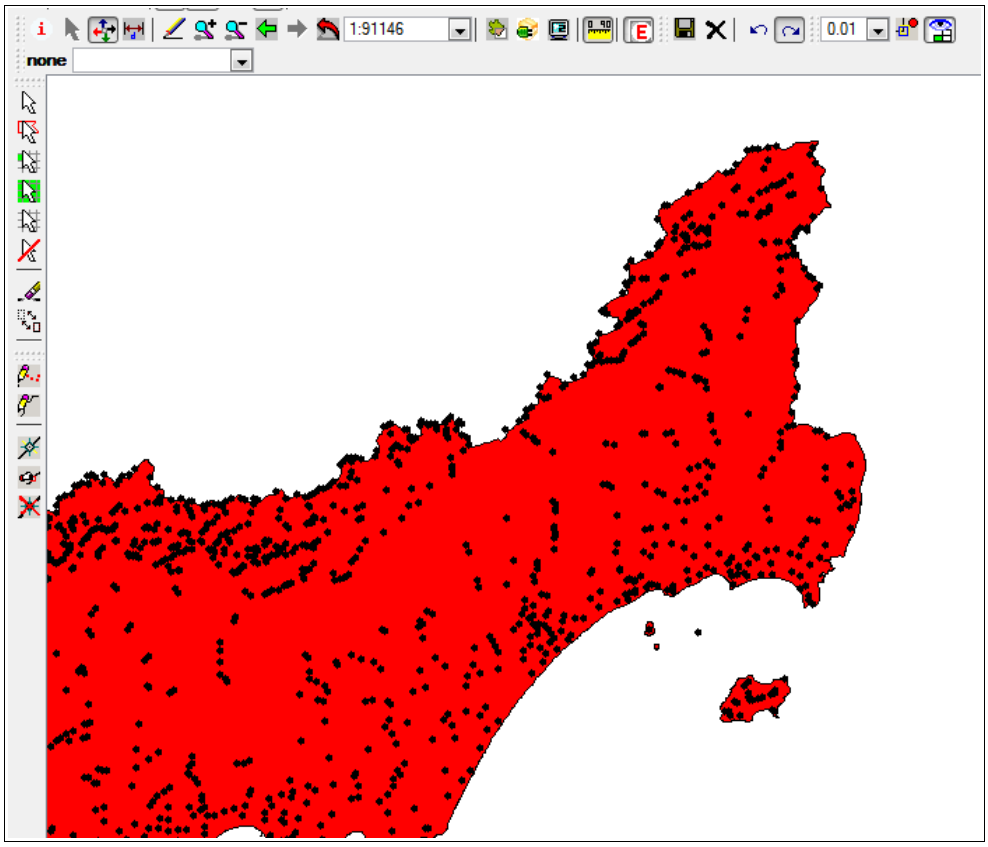
Direct Vectorial Edition

This type of edition allows the user to draw new polygons using the edition tools. Attributes must be manually informed at the moment of creation of each polygon. The edition is made directly on the layer represented by the theme which was active when opening the edition mode. Every edition made will be immediately stored in such layer.

Initially, every vectorial layer in the database is enabled for a direct edition. However, as projects are configured, some of them are locked. Besides that, the Administrator User can lock any layer at any time, depending on the need.

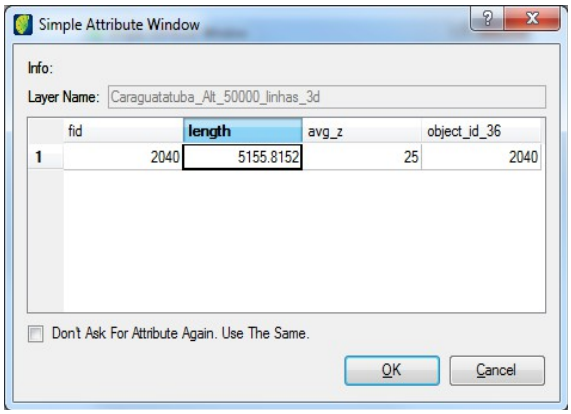
To work using direct edition, the user must have a theme pointing to the layer that will be edited.

Select that theme and click on the icon in the visualization toolbar to open the edition mode. Use the edition tools presented on Edition Tools, page 141, to perform the editions.



After creating new polygons, right-click on the drawing area to close the polygon and to manually inform the attributes on the following interface.

If the interface is not displayed, go to the menu ATTRIBUTE and activate the option SHOW ATTRIBUTE WINDOW. After that, click on the desired polygon using one of the selection tools. The interface will be displayed.



This interface identifies the layer being edited and shows the columns of its attributes table. Click on the field in which the attribute will be inserted and type it in. This must be done for every polygon created unless the values are the same for all of them. In such case, mark the check box *Don´t Ask For Attribute Again. Use the Same.* The same value will be attributed to every polygon created from that moment on. To change it, go back to the menu ATTRIBUTE → SHOW ATTRIBUTE WINDOW and then resume the edition.

The direct vectorial edition is useful only for small activities.

This type of edition does not have any kind of spatial limit to work in. Also, there are no spatial operations available to avoid overlapping polygons or to restrict their creation.

Note: When working with Direct Edition, both classification and reclassification tools are ineffective. These tools are the ones that trigger the classification process for the selected polygons, submitting each one to the spatial operations defined by the rules for the active project, in case there is one. That means that if you use direct edition without having an active project and attempt to use one of these tools, the polygons created will be correctly stored on the direct edition layer but also you will be asked to *Start a process first!*, which is required to perform editions through a project. However, if there is an active project, then using these tools will trigger the classification process, storing the polygon made on the direct edition layer, as desired, and the result of the classification process in the output layer defined for the active project.

Vectorial Edition Through Project

This type of vectorial edition can only be used when there is a project previously configured by an Administrator User.

To use it, a few steps must be taken before and after the edition itself.

First of all, create a view to work in. It is possible to either create a regular view and insert in it the desired themes, or to create a Project View (refer to page 23) and have TerraAmazon create it for you.

It is possible to substitute this view, as well as its themes, at any time without jeopardizing the edition process or causing data loss.

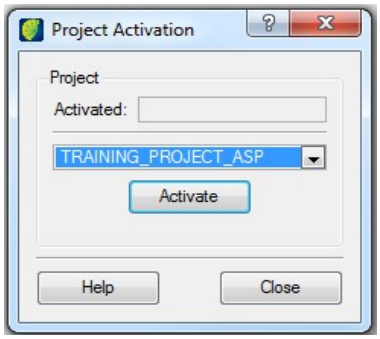
After creating the view with the necessary themes, skip to the next topic.

Note: The existence of a work view is not required for project activation or to add tasks. However, without it, you cannot open the edition mode, since that requires the existence of an active theme.

Activating a Project

Activating a project is the initial procedure to start the vectorial edition through a project and is exclusive for such activity. No other work is possible to be made because TerraAmazon requires an active project.

Click on the icon or go to the menu PROCESS → ENABLE PROJECT.



Contact an Administrator User to inform the name of the project to activate.

Select the project and click on the **Activate** button. The name of the activated project will appear in the *Activated* field.

An active project remains active until it is deactivated or until another project is activated instead.

To change the active project, select the new project to be activated and click on the **Activate** button. The previously active project will be deactivated and the new one, activated.

To simply deactivate a project, select the empty field in the project combo box to enable the *Deactivate* option. Click on it and the project will be deactivated.

The Operator User should know that the Administrator User can completely put projects unavailable at any time. When that happens, the project will no longer appear on the project list of this interface.

ATTENTION- Make sure you have the correct active project before you open the edition mode. Working with the wrong active project may cause permanent damage to the output data of that project. In TerraAmazon, each project has an output layer in which the outcoming polygons of the classification process are stored. If the wrong project is active, your work will be stored in the wrong output layer and you will not be able to roll back.

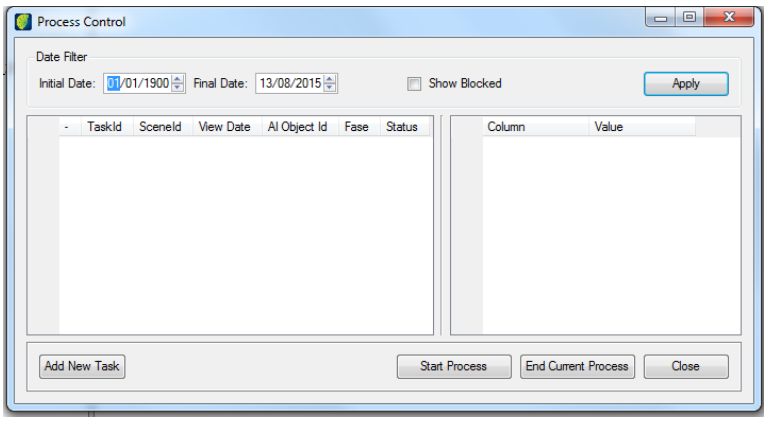
Adding Tasks

In TerraAmazon, a task identifies the area that a certain user will work in (Area of Interest) and the observation date that will be assigned to the created polygons.

Usually, the area of interest is based on a certain satellite grid and the observation date refers to the date in which the image was taken.

Each user must add his own task. It is possible to have more than one user working on the same area of interest and observation date, but each one will have his own task.

Click on the icon or go to the menu PROCESS → PROCESS CONTROL.



Initially, the list of tasks is empty and will remain empty until a task is added. Each user has his own list of tasks.

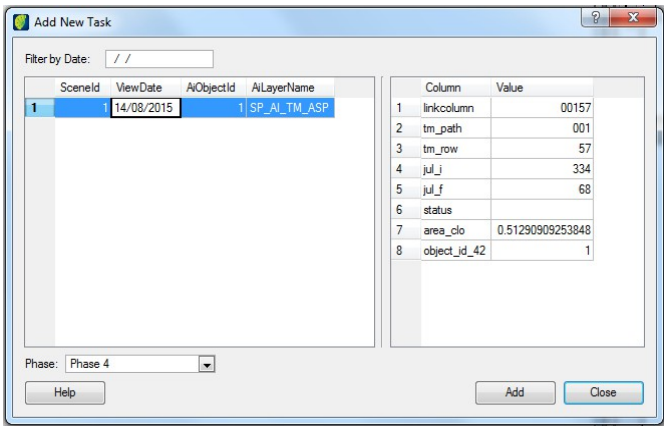
The area at the left of the interface shows the task list, which will grow as tasks are added during the project.

The area at the right shows the columns of the layer that contain the geographic boundaries of the area of interest selected to work in. Click on the task in the list at the left and check the columns at the right.

Date Filter: filters the tasks displayed in the task list. The range of dates set up is stored to the next access. It is automatically applied to the list every time the interface is accessed. So, if a specific task does not show in the task list of this interface, make sure that its date is not beyond the range set up in the Date Filter. If so, change the range by typing the desired dates or by using the up and down arrows.

Show Blocked: select this option to show the tasks blocked by an Administrator User. It is not possible to work on a blocked task, but it is useful to check the history of added tasks on the selected range of dates.

Add New Task: opens the following interface.



Contact an Administrator User to inform you the area of interest and the date to work in. The composition of a date associated to an area of interest is called *Scenario*.

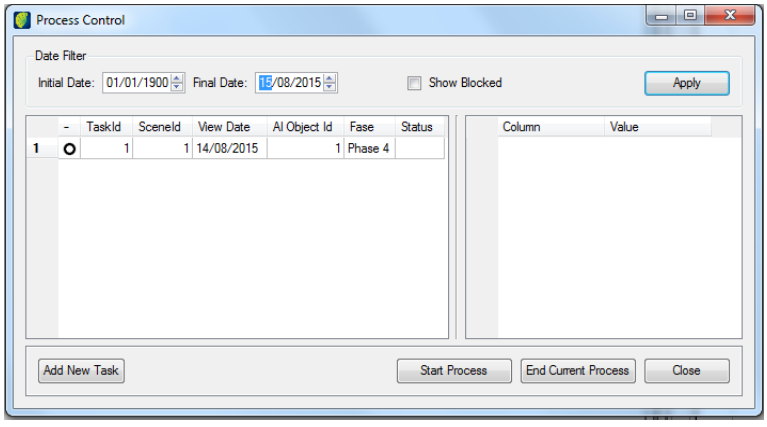
Fill the *Date* field, the interface will automatically list the existing scenarios matching the informed date.

Click on a scenario in the list at the left and use the area at the right of the interface to check if the area of interest is the one assigned to you by the Administrator User. If not, click no the next one and so on.

Select the *Phase*. Contact an Administrator User to inform the phase to be chosen.

Click on the **Add** button. Tasks can be added only once. After that, it cannot be removed by any other user, including Administrator Users. It becomes part of the log for the activities executed along the project.

After adding the task, close the interface and the new task will be displayed in the *Process Control* interface, as shown in the next figure.



Note: Phases added to the database by the Administrator User while Operator Users are connected to the database might not be immediately updated in the Add New Task interface. In that case, restart the database by going to the menu FILE → RESTART DATABASE, or deactivate the project and activate it again.

Legend of Process Status

The icons present at the processes list show the status of the process. See their meanings below:

New processes

Started processes

Processes left open

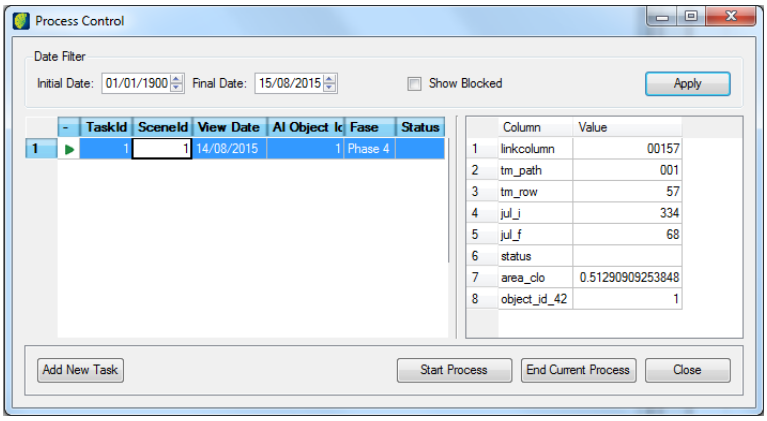
Processes that were sent to review

Closed processes

Starting Processes

In TerraAmazon, a process represents the development of a task in time along with a project. Before opening the edition mode, the user must add the task related to the work that must be done (refer to Adding Tasks, page 72) and then start its process.

Click on the icon or go to the menu PROCESS → PROCESS CONTROL.



In the task list, locate the task to work on. If needed, use the *Date Filter* for faster search.

Once the task is located in the list, click on it and use the area at the right of the interface to check if the selected task is the correct one. In the figure above, the user was assigned to work in the *Interpretation_Phase* with the observation date 18/06/2009 (found in the task list) in the geographical area of the Alos satellite image identified as *interest_area_id = 2A181094070* (located at the right).

Select the task and click on **Start Process** button**.**

After starting the process, everything will be set for the vectorial edition through projects. Open the edition mode to start editing (refer to Opening the Edition Mode, page 82).

Note: Closed processes can be reopened at any time by proceeding the same way as to start it.

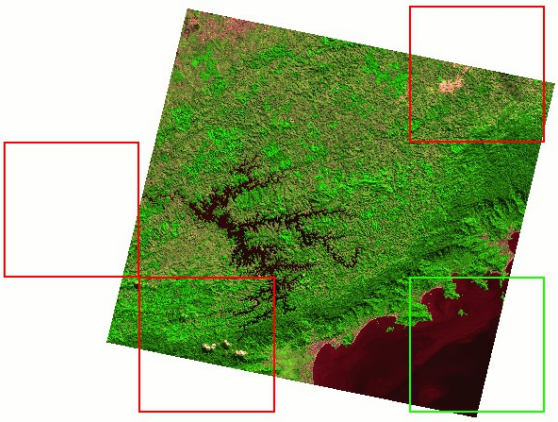
Selecting Cells

After opening the edition mode (refer to Opening the Edition Mode, page 82), the user must select the cells to work on.

By doing so, the user locks the area delimited by the cell so that no other user can edit within such area. One user can lock a limited number of cells at a time, depending on the project´s configuration.

To select cells, use one of the available tools: or (for instructions on how to use them, refer to Edition Tools, page 141)

The cells you select will be displayed with a green contour in your drawing area, while the cells selected by other users will be displayed with a red contour to let you know that those cells are already locked.



Vectorial editions made within the cells locked by other users are ignored by the classification process and will not be saved in the output layer.

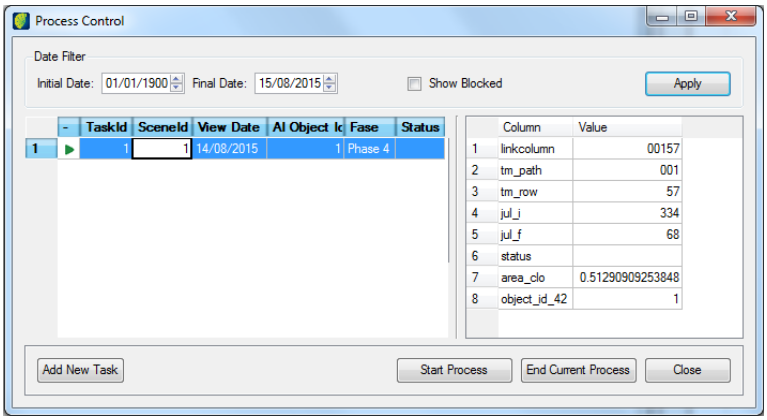
Closing Processes

Closing a process is a procedure needed to:

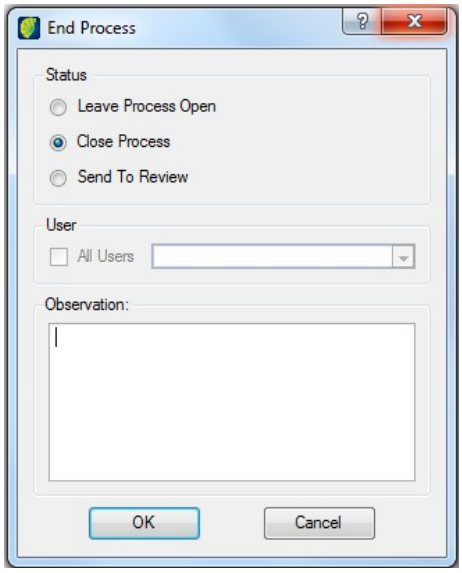
- inform the system that the task has been finished
- release the user´s locked cells, making them available for other users
- stop the clock of the task´s time control

A process should be closed every time the user stops working on the task. However, there are different status that can be attributed to a task when closing processes.

Click on the icon or go to the menu PROCESS → PROCESS CONTROL.



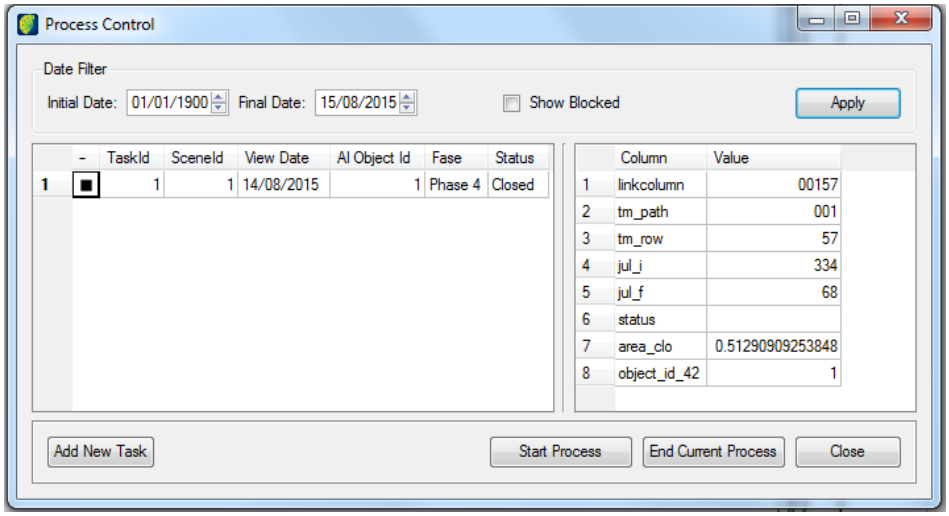
Select the task on the task list and click on the **End Current Process** button**.** The following interface will be shown.



The user should choose between one of the available options, according to each case:

- *Leave Process Open*: select this option whenever the task is not finished
- *Close Process*: select this option when the task is completely finished
- *Send to Review*: this option should be used on the validation phase of a project, more specifically when the work done is reproved by one of the auditors.

Select the option *Close Process*. The process will appear as shown in the following figure.

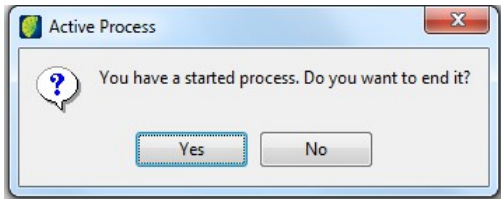

Process Control
Date Filter
Initial Date: 01/01/1900
Final Date: 15/08/2015
Show Blocked
Apply
- TaskId SceneId View Date AI Object Id Fase Status
1 1 1 14/08/2015 1 Phase 4 Closed
Column Value
1 linkcolumn 00157
2 tm_path 001
3 tm_row 57
4 jul_i 334
5 jul_f 68
6 status
7 area_clo 0.51290909253848
8 object_id_42 1
Add New Task
Start Process
End Current Process
Close

Leaving a Process Opened

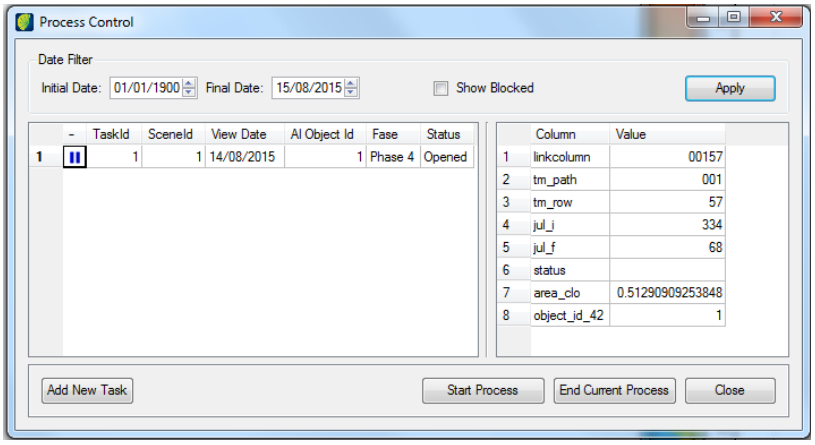
Processes can be left opened. Closing a process is a very important procedure however it is not required by the system.

When a process is left opened, the cells locked by the user are not released and other users will not be able to select them for edition.

To leave a process opened, you must close TerraAmazon while your process is started. The system will query:



Click on the **No** button. TerraAmazon will be closed and the process will be left opened. The process will appear as shown in the following figure.



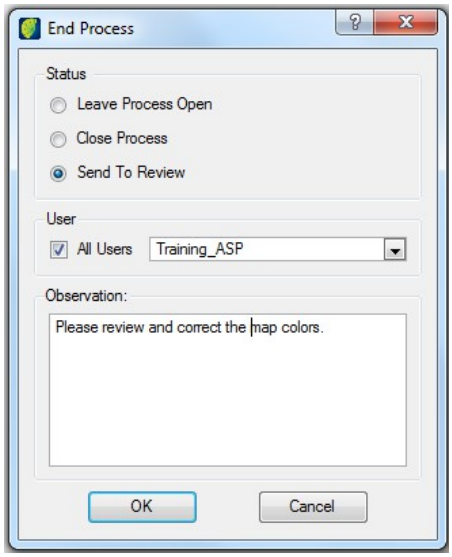
If you click on the **Yes** button, you will be taken to the project closing interface, described on Closing Processes, page 77.

Note: Leave a process opened only during temporary stops, specially when it is needed to guarantee that no other user will work in the cells you have locked. Administrator Users can unlock these cell at any time, if necessary.

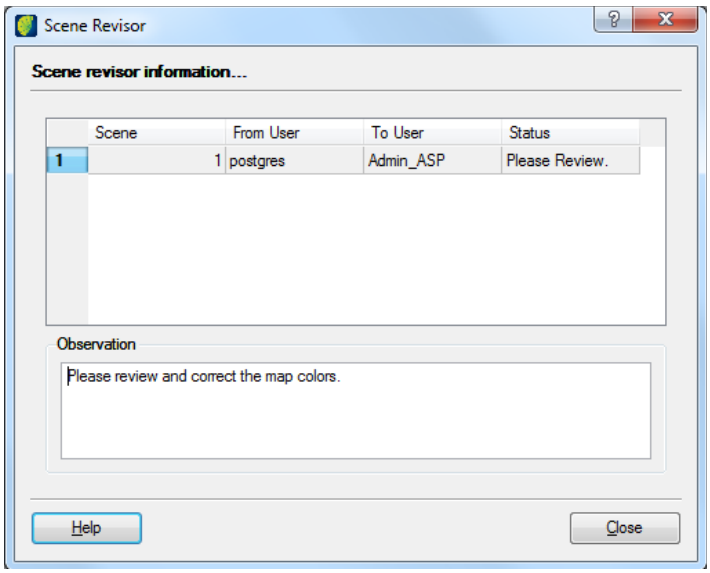
Send a Process to Review

In that case, the process will be sent to be reviewed by the user indicated on the *User* combo. The next figure shows a process being sent for the *Training_ASP* user to review it.

Open the Process Control window, select the process to be reviewed and fill up required information.

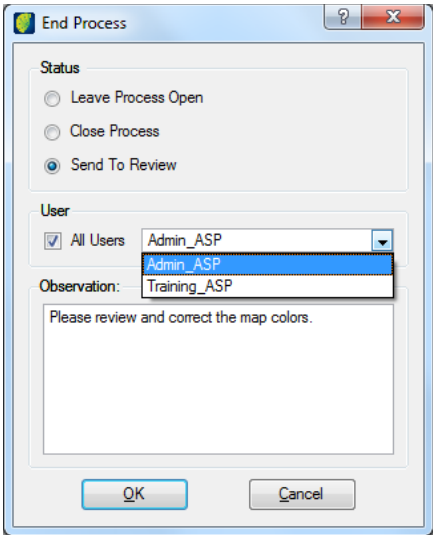


Use the *Observation* field to store a quick note to the user appointed to do the review. It is possible to store notes when applying any of the status available. The difference is that when a process is sent to review, the user appointed will receive the message in his next connection to the database.



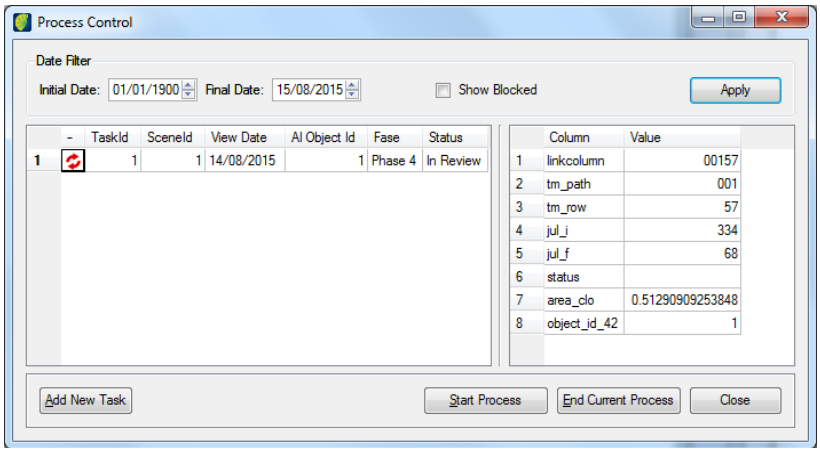
Such user will receive the message on every new connection to the database and the icon will be blinking until the process is approved by the auditor user, that is, until the auditor closes the process he has sent for review. He may also check the message interface by accessing the *Scene Revisor* interface through the icon , which is loaded in the menu bar when a review message is displayed.

The option *All Users* lists all the users in the database, except the current user.



Note: The user selected with this method will only receive the review message after he activates the project in which the work has been sent to review.

The process will appear as shown in the following figure.



Processes can be closed at any time. Closed processes can always be reopened (refer to Starting Processes, page 75).

Closing a process is a very important procedure however it is not required by the system. Refer to Leaving a Process Opened, page 79, for details.

Note: If you choose not to close a process when leaving TerraAmazon, the process will be left open and TerraAmazon will be closed. Doing so will not release the cells you have selected to work on in the edition mode, in case vectorial editions have already been made and cells were left selected. That means that the selected cells will be left locked for vectorial editions by other users until you go back into the edition mode and release the cells, or until you close the process, or until an Administrator User releases them from you.

Opening the Edition Mode

Opening the edition mode enables the vectorial edition tools.

The minimum required to perform vectorial editions in TerraAmazon is a view containing at least one theme pointing to an unlocked vectorial layer, that is a layer which is not locked for vectorial editions.

However, other themes are usually needed to back up the interpretation procedures. For instance, you may need a theme pointing to a satellite image, one for the area of interest, and so on, depending on each case.

Select the chosen theme and click on the icon .

The main interface will display the edition tools (refer to Edition Tools, page 141) and vectorial edition will be enabled. The name of the theme selected is displayed at the lower right corner of the main interface. Always verify the name of that theme before starting your work, in order to avoid damaging data by mistakenly editing the wrong layer.

> Opening the edition mode using a theme that points to the wrong layer does not by itself damage the layer. However, any edition performed in this situation may cause unrepairable damage. If you have mistakenly opened the edition mode using the wrong theme, immediately close the edition mode without performing any kind of edition.

TerraAmazon provides two types of vectorial edition: direct edition (page 68) and the edition through projects (page 70). Both types of edition are opened the same way, but each one has a different use for the theme that should be active when opening the edition mode: for the direct edition, it is the layer that will be directly edited; for the edition through projects, it is the draft layer that works as an input to the classification process. Refer to the pages mentioned above for details on how to work with each method.

Click on the icon to close the edition mode.

At this point, there is another difference between both edition methods: the use of cells. When working through projects, the user must select a cell before classifying polygons (refer to Selecting Cells, page 76). But when working with direct edition, selecting cells is not part of the process, thus not even possible.

Project Work Scale Range

When the user opens the edition mode having an active project, the visualization of the data on the drawing area becomes restricted to the project´s work scale range.

This restriction determines the maximum and minimum scale values in which users can work. It is not possible to view the data on scales beyond the range set for the active project.

The values of the working scales are configured by the Administrator User.

Note: The project work scale range is only active when working in edition mode. It is set for each project, which means that different projects on the same database may have different work scale ranges. When the edition mode is not open, data can be visualized in all scale values, depending only on the scale range set for each theme (refer to page 52).

Non-Interactive Classification

This tool allows the use of an entire layer as an input to the classification process. That means that the polygons contained in this layer will be used by the classification process just as the polygons drawn in the Edition Mode during Vectorial Edition Through Project (page 70).

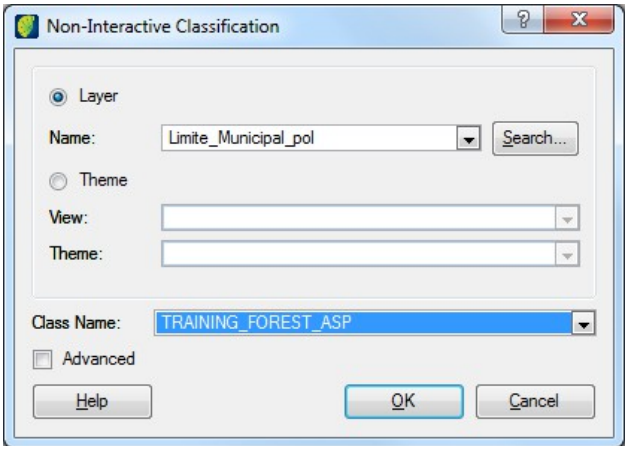
The classification process is the same one used when classifying through the edition mode, which means that the same rules will apply.

It is not required to open the Edition Mode.

Only geometries that are inside the area of interest polygon will be classified. Non-Interactive Classification does not need a preselection of cells.

Note: A project must be active and a process must be started before triggering this tool.

Go to the menu PROCESS → CLASSIFICATION NON-INTERACTIVE.



Basic Non-Interactive Classification

The Basic Non-interactive Classification will apply the same class to all output polygons.

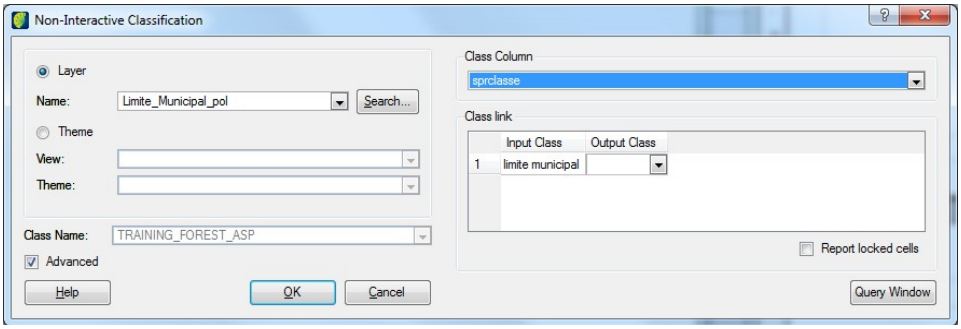
Layer: select the layer containing the polygons to be used as input to the classification process.

Theme: select the view and theme to be used as input to the classification process. By using a theme, it is possible to classify only chosen polygons, filtered by Theme Restriction.

Class Name: select the class to be applied to the output polygons of the classification process.

Click **OK** to trigger the classification.

Advanced Non-Interactive Classification



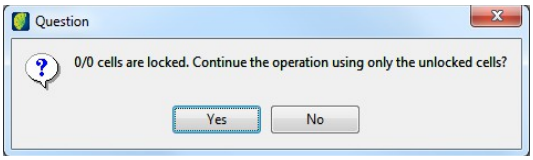
The *Advanced* check box opens a new area of the interface in which it is possible to relate input and output classes.

Class Column: select the attribute columns of the chosen input data.

Input Class: contains a list of all the classes found in the indicated class column.

Output Class: select the class that corresponds to the input class next to it. Classes that are spelled the same will automatically be selected. If an *Output Class* combo is left empty, the correspondent *Input Class* will not generate output geometries. The classes shown in the *Output Class* combos are the ones available in the active project.

Report locked cells: this option reports the number of cells locked by other users compared to the number of cells that intersect with the current geometry of the *area of interest* (defined by the started process). The user will be prompted to continue the operation using only the unlocked cells (along with cells eventually locked by the current user himself).



- *No*: stops the operation and returns to the Non-Interactive Classification interface
- *Yes:* runs the Non-Interactive Classification

When the option *Report Locked Cells* is not checked, the Non-Interactive Classification will run just the same however the user will not know if there are cells locked by other users unless the area is visualized.

> **Note**: It is suggested to uncheck this option when classifying a large area, since counting the cells may take some time.

Query Window: quick access to the *Layer Query Window,* so users can check the layer data before using it.

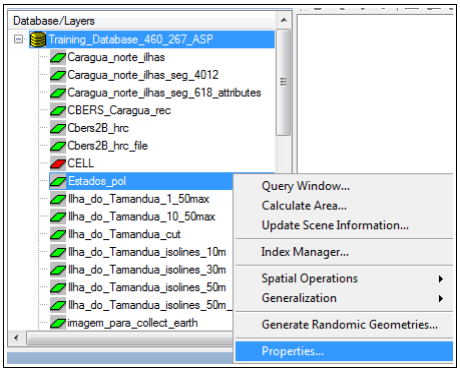
7 Spatial Operations and Generalization

Viewing Layer Properties 88
Calculating a Layer Area 89
Checking Topological Errors 90
Executing Spatial Operations 94
Generalization 118

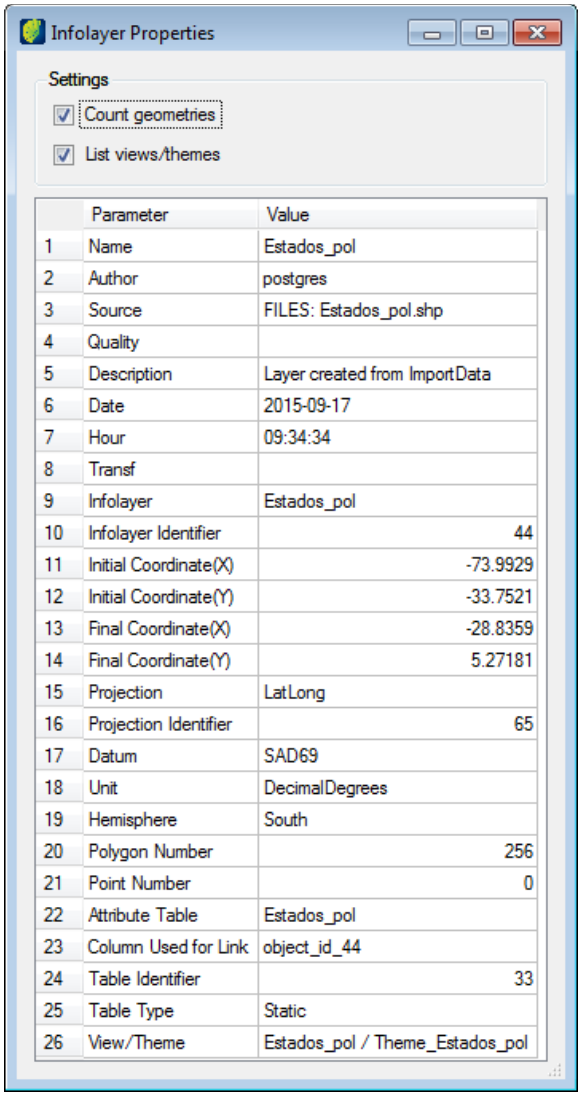
Viewing Layer Properties

The user can quickly view a list of layer properties.

Select the layer in the Database Tree and click with mouse right button.



Click on PROPERTIES...

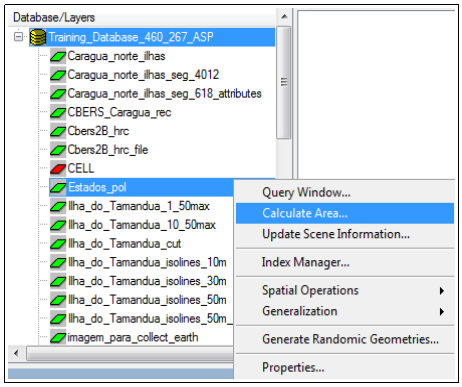


	Parameter	Value
1	Name	Estados_pol
2	Author	postgres
3	Source	FILES: Estados_pol.shp
4	Quality	
5	Description	Layer created from ImportData
6	Date	2015-09-17
7	Hour	09:34:34
8	Transf	
9	Infolayer	Estados_pol
10	Infolayer Identifier	44
11	Initial Coordinate(X)	-73.9929
12	Initial Coordinate(Y)	-33.7521
13	Final Coordinate(X)	-28.8359
14	Final Coordinate(Y)	5.27181
15	Projection	LatLong
16	Projection Identifier	65
17	Datum	SAD69
18	Unit	DecimalDegrees
19	Hemisphere	South
20	Polygon Number	256
21	Point Number	0
22	Attribute Table	Estados_pol
23	Column Used for Link	object_id_44
24	Table Identifier	33
25	Table Type	Static
26	View/Theme	Estados_pol / Theme_Estados_pol

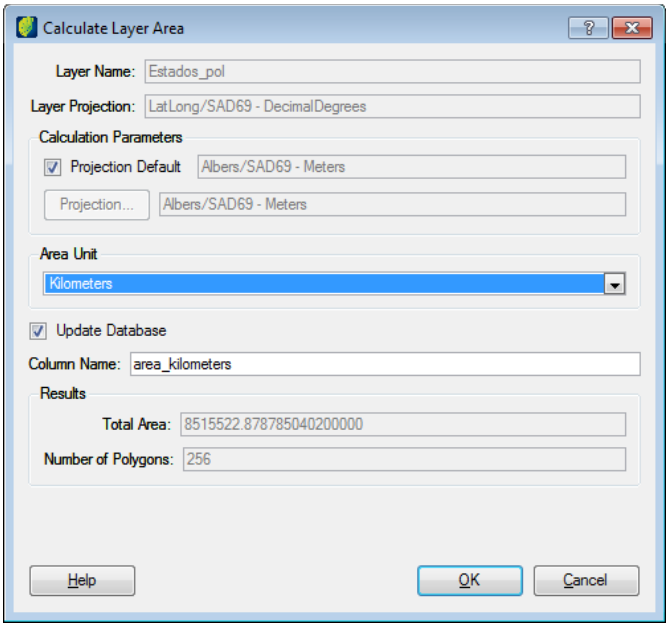
Calculating a Layer Area

The user can calculate and update database with layer area.

Select the layer in the Database Tree and click with mouse right button.



Click on CALCULATE AREA...



Projection Default: click on this box if layer projection is to be used, otherwise unselect the box and click on **Projection** button to change the layer projection.

Area Unit: select the wanted unit.

Update Database: click on this box if calculated result is to be stored.

Column Name: enter the name of the column.

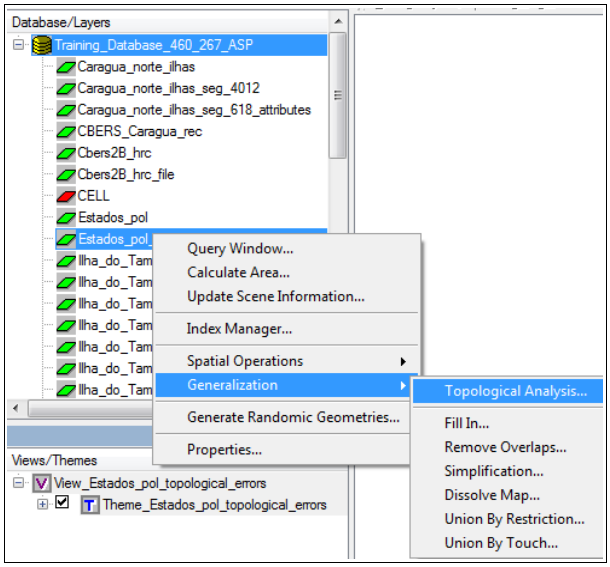
Click on **OK** button.

Results will be presented in the interface.

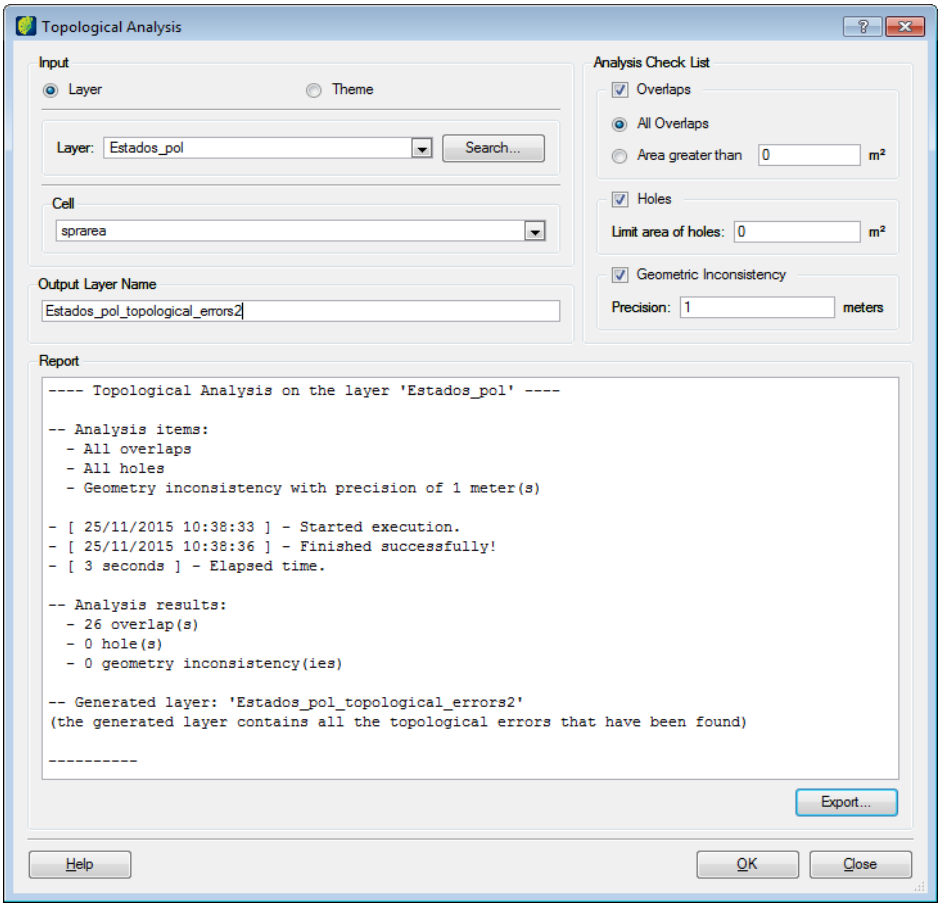
Checking Topological Errors

The user can analyze and obtain an error report of the layer.

Select the layer in the Database Tree and click with mouse right button.



Click on GENERALIZATION → TOPOLOGICAL ANALYSIS.



Analysis Check List: Select the wanted parameters to be analyzed.

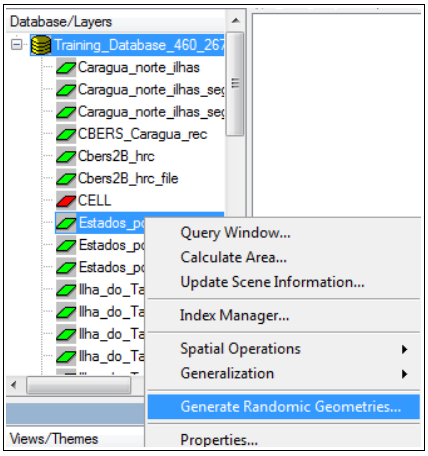
Click on the **OK** button.

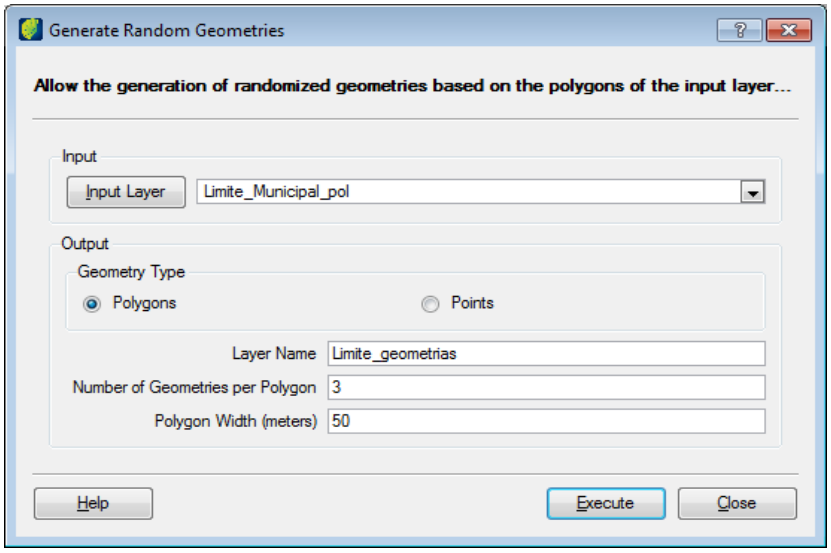
If user wants to export the result to a text file click on the **Export** button.

Generating Random Geometries

The user can generate geometries randomly and create a new layer.

Select the layer in the Database Tree and click with mouse right button.





Click on the **Input Layer** button or select in the list the input layer.

Geometry type: select if polygons or points will be created.

Layer name: enter the name of the new layer

Number of Geometries per Polygon: enter how many geometries will be created per polygon.

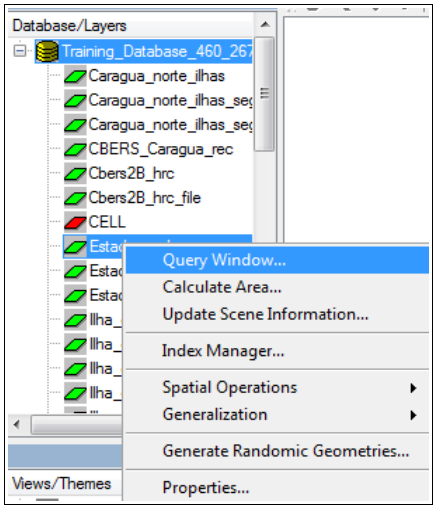
Polygon Width: enter the width in meter of each polygon.

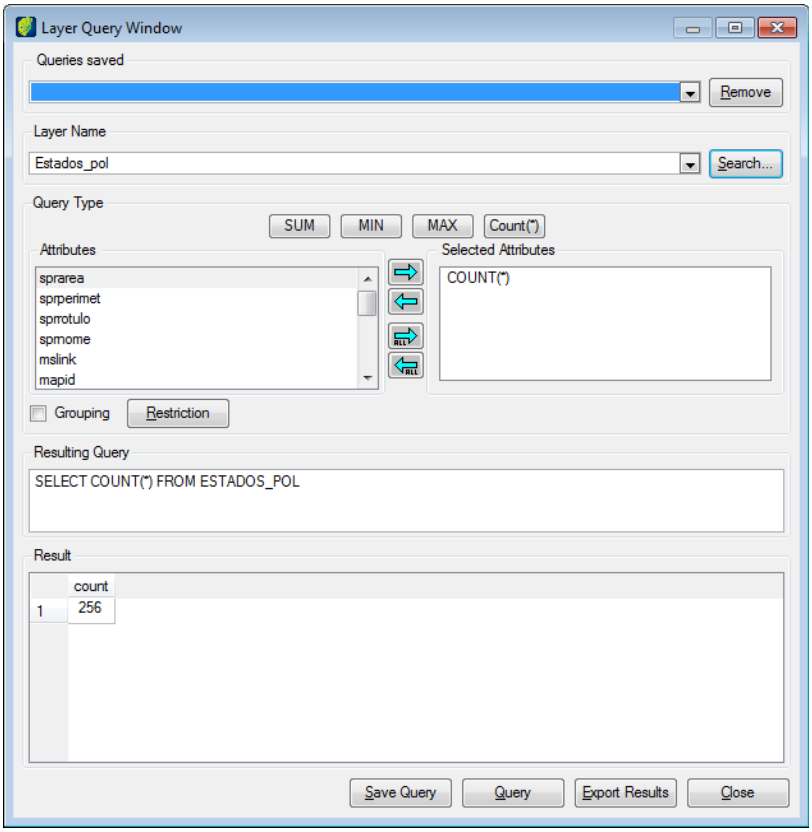
Click on the **Execute** button.

Layer query

The user can query information of a selected layer by creating query equations and restrictions.

Select the layer in the Database Tree and click with mouse right button.





Queries saved: if user wants to use an previously saved query select in the list.

Layer Name: select the layer in the list or click on the **Search** button.

Query Type: there are four operation buttons: SUM, MIN, MAX and COUNT. They can be used to compose the query.

Select the attribute in left list followed by the query type button, e.g. SUM.

If no operation is needed, simply select the attribute in left list and click on the right arrow button.

If restriction restriction is to be used in the query click on the Restriction button and create the restriction clause. (See Composing Restrictions)

If user wants an ordered result check the box *Grouping*.

Click on Query button and result will be presented in list below.

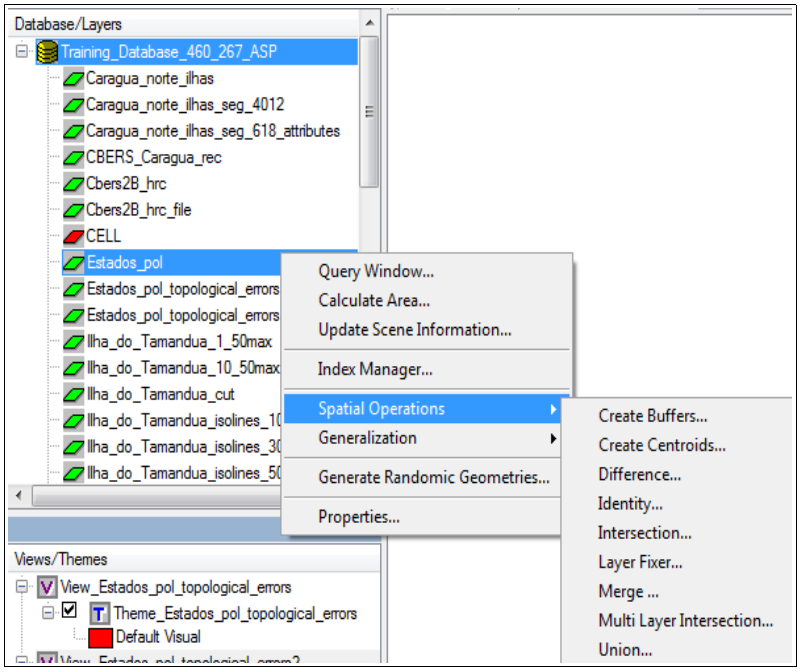
To save created query to be used later click on **Save Query** button.

To export the result to a .csv file click on the **Export Results** button.

Executing Spatial Operations

Several spatial operations can be executed according to operator´s need.

Select the layer in the Database Tree and click with mouse right button.

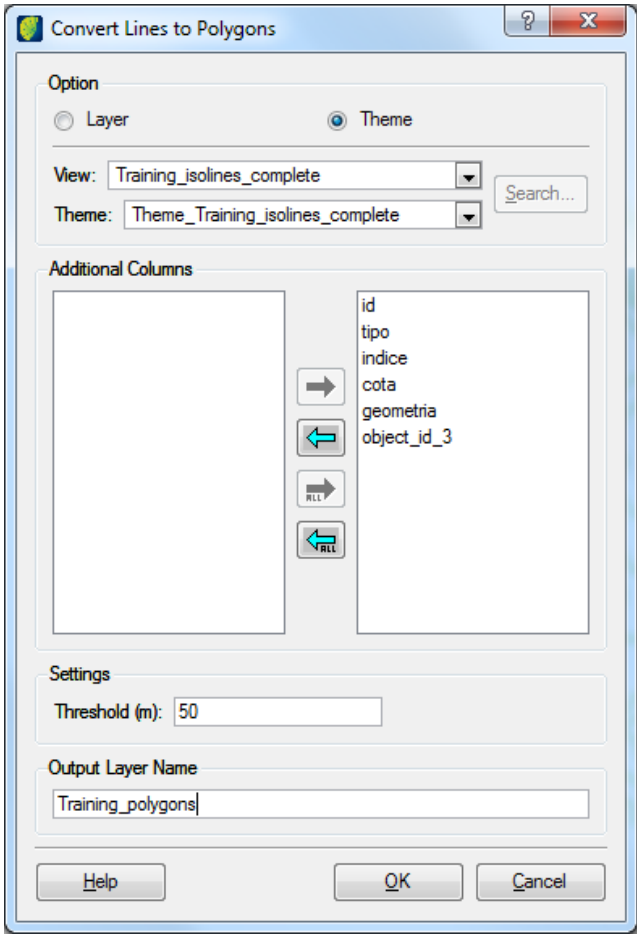


Several operations will appear in the side list. Select the wanted spatial operation.

Converting lines to polygons

This operation will convert a line vector into a polygon vector based on a threshold distance in meters. The user can also select the columns to be included in the new output layer.

Click on SPATIAL OPERATIONS → CONVERT LINES TO POLYGONS.



Select the input layer or theme from the list.

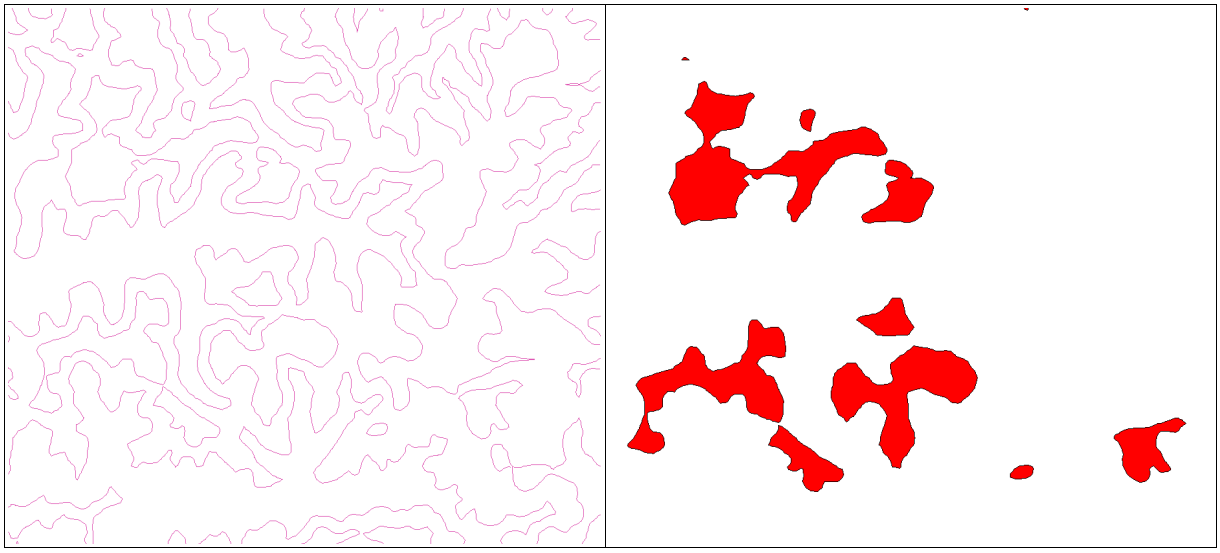
Choose the columns in the left list and click on the right arrow button.

Enter the threshold in meters.

Enter the output layer name.

Click on the **OK** button.

After processing the image all closed lines withing the threshold of 50 meter will be converted in polygons.



The new theme will include all columns selected from the source layer or theme.

Data Grid | Selected Items

	id	tipo	indice	cota	geometria	object_id_3	old_oid
1	0	Curva de Nivel	Normal	39	TeLINES	1	1
2	1	Curva de Nivel	Normal	39	TeLINES	2	2
3	10	Curva de Nivel	Normal	66	TeLINES	3	3
4	11	Curva de Nivel	Normal	66	TeLINES	4	4
5	12	Curva de Nivel	Normal	66	TeLINES	5	5
6	13	Curva de Nivel	Normal	66	TeLINES	6	6
7	14	Curva de Nivel	Normal	66	TeLINES	7	7
8	15	Curva de Nivel	Normal	66	TeLINES	8	8
9	16	Curva de Nivel	Normal	66	TeLINES	9	9
10	17	Curva de Nivel	Normal	66	TeLINES	10	10
11	18	Curva de Nivel	Normal	66	TeLINES	11	11
12	19	Curva de Nivel	Normal	66	TeLINES	12	12
13	2	Curva de Nivel	Normal	39	TeLINES	13	13

Centralize geometry when selected

Creating buffers

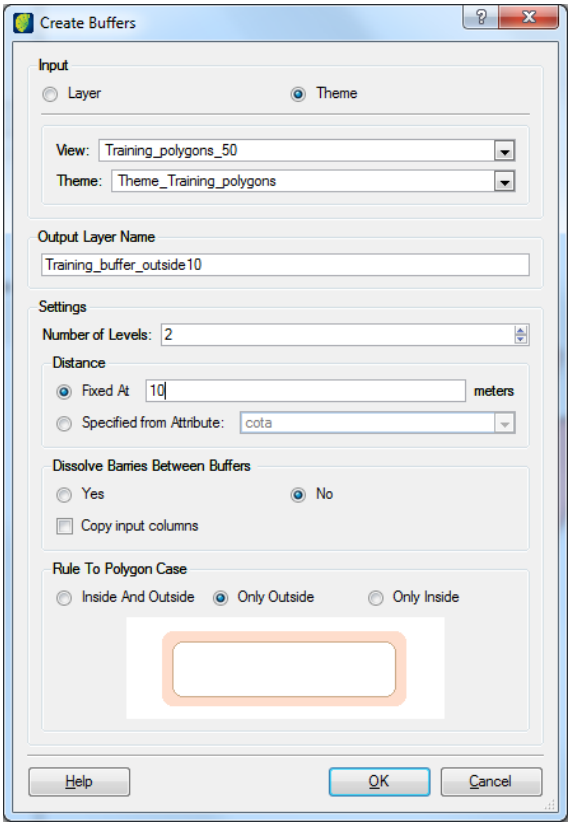
The buffer spatial operation generates buffer zones (or zones of influence) around the geometry of a layer, considering a predefined distance.

If the geometry of the objects are polygons it is possible to ask for internal and/or external buffers.

It is possible to ask for several levels of buffers. Selecting a distance d and n levels will result in n buffers each at a distance d*(n-1).

As the buffers around different polygons might overlap, it is possible to request the dissolving of the boundaries inside the overlapping areas.

Click on SPATIAL OPERATIONS → CREATE BUFFERS.



Select the input layer or theme.

Enter the output layer name.

Choose the number of levels for the buffer.

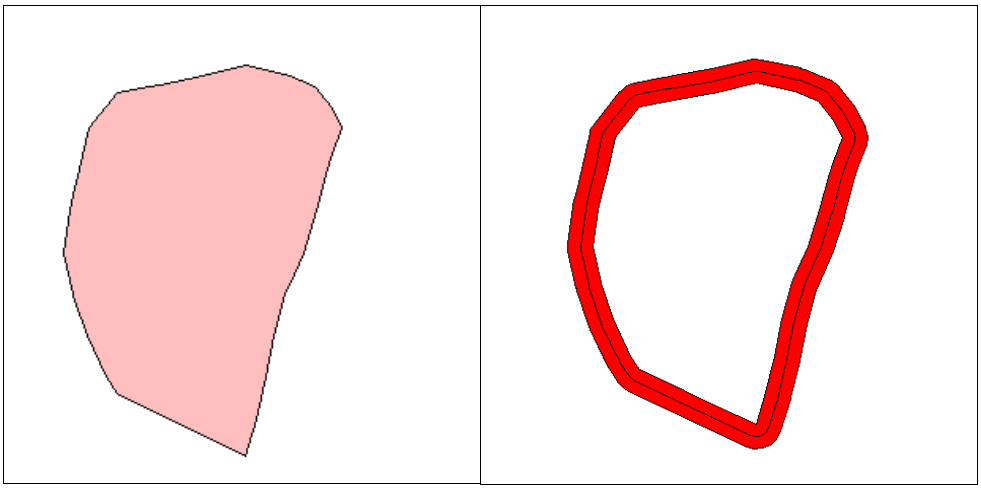
For buffer distance click on *Fixed at* to enter the value in meters or click on *Specified from Attribute* to choose the reference attribute.

Select if levels will have level barriers dissolved or not.

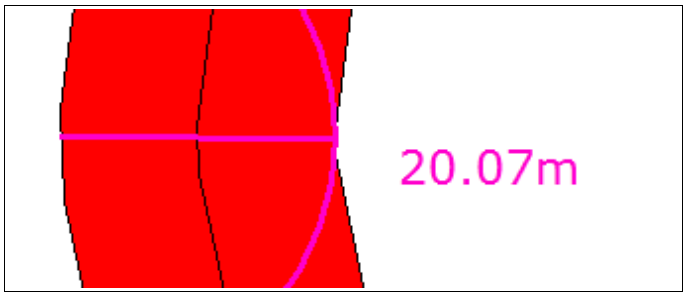
Check in the *Copy Input Columns* box to include the columns in the output layer.

Finally define the rule for the buffer indicating if it should be built inside, outside or both.

Click on the **OK** button.



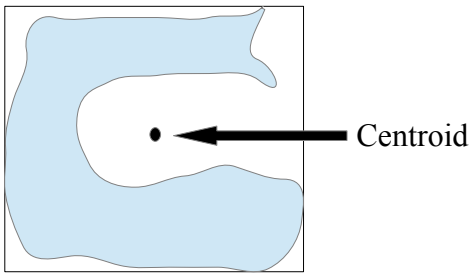
In this example it was created two levels of 10 meters each outside of the polygons.



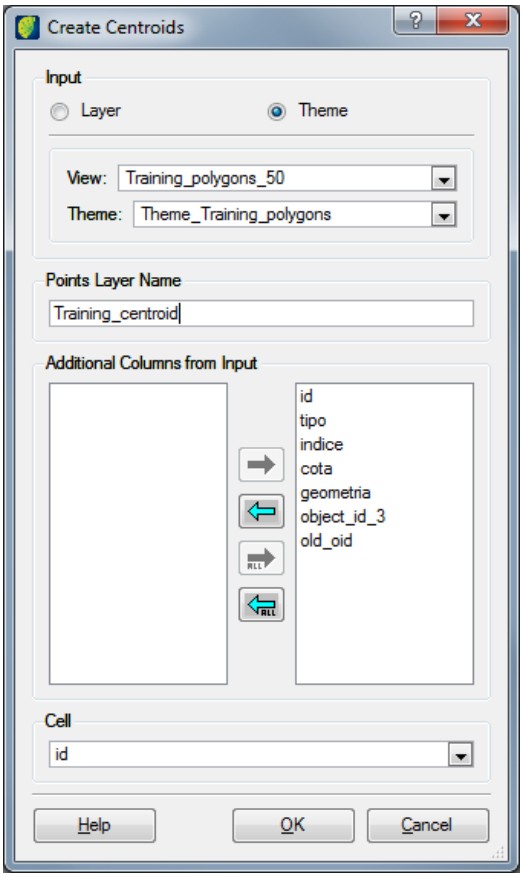
Note: When choosing the no dissolve option it is recommended to reduce the polygon color transparency in order to have a better presentation of different levels.

Creating Centroids

The centroid operation defines the center point of the bounding box where the geometry is inserted in. Therefore depending on the polygon shape the centroid can or cannot be inside of it. The user can also select the columns to be included in the new output layer.



Click on SPATIAL OPERATIONS → CREATE CENTROIDS.



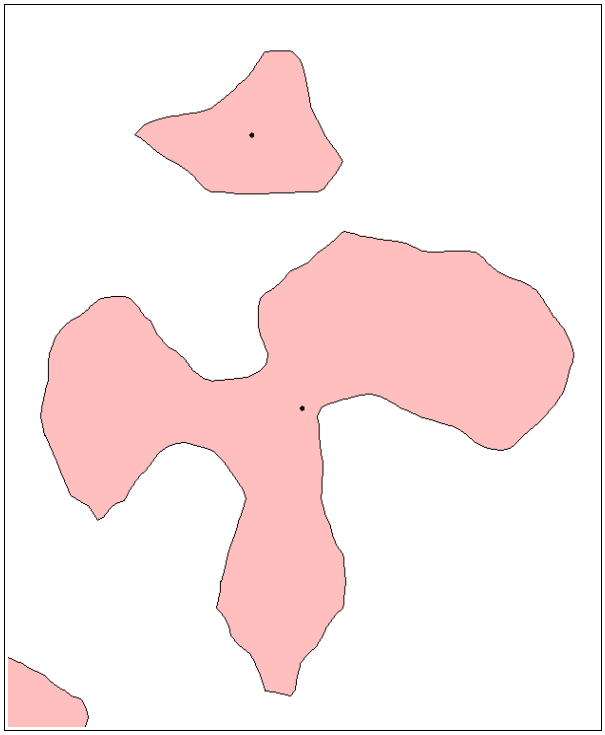
Select the input layer or theme and its columns will be showed in the left list below.

Enter the name of the output points layer.

Choose the columns to be included in the points layer and click on the right arrow button to move them to the right list.

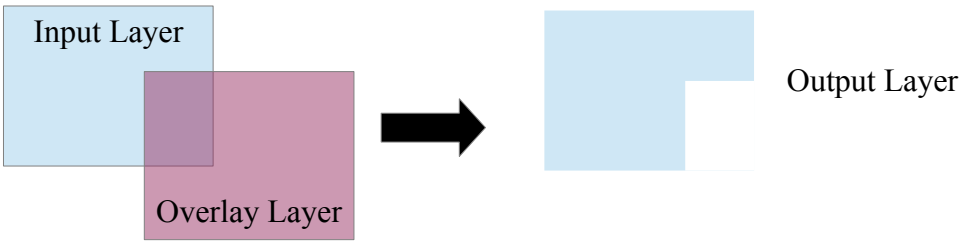
Choose the cell to be used as reference.

Click on the **OK** button.



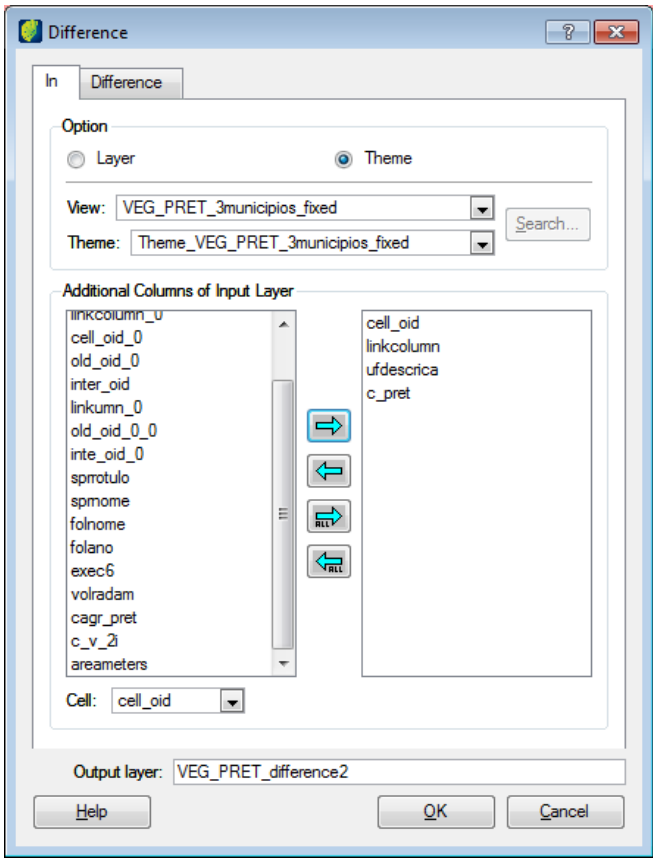
Difference

The difference operation computes the spatial difference between the geometries of two layers. The geometries of the input layer that have the difference with the geometries of the overlay layer will be cut and included in an output layer. The difference result is also called the relative complement of geometry B relative to geometry A.



Click on SPATIAL OPERATIONS → DIFFERENCE.

On the *In* tab select the layer or theme option and define the input. Choose the columns to be transferred to the output layer and click on the right arrow button.

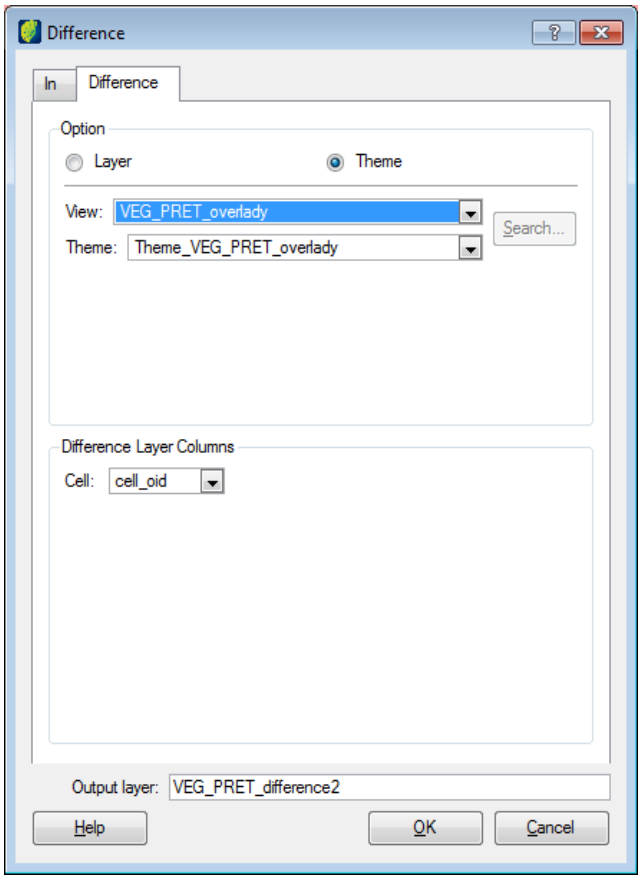


Select the cell to be used as reference.

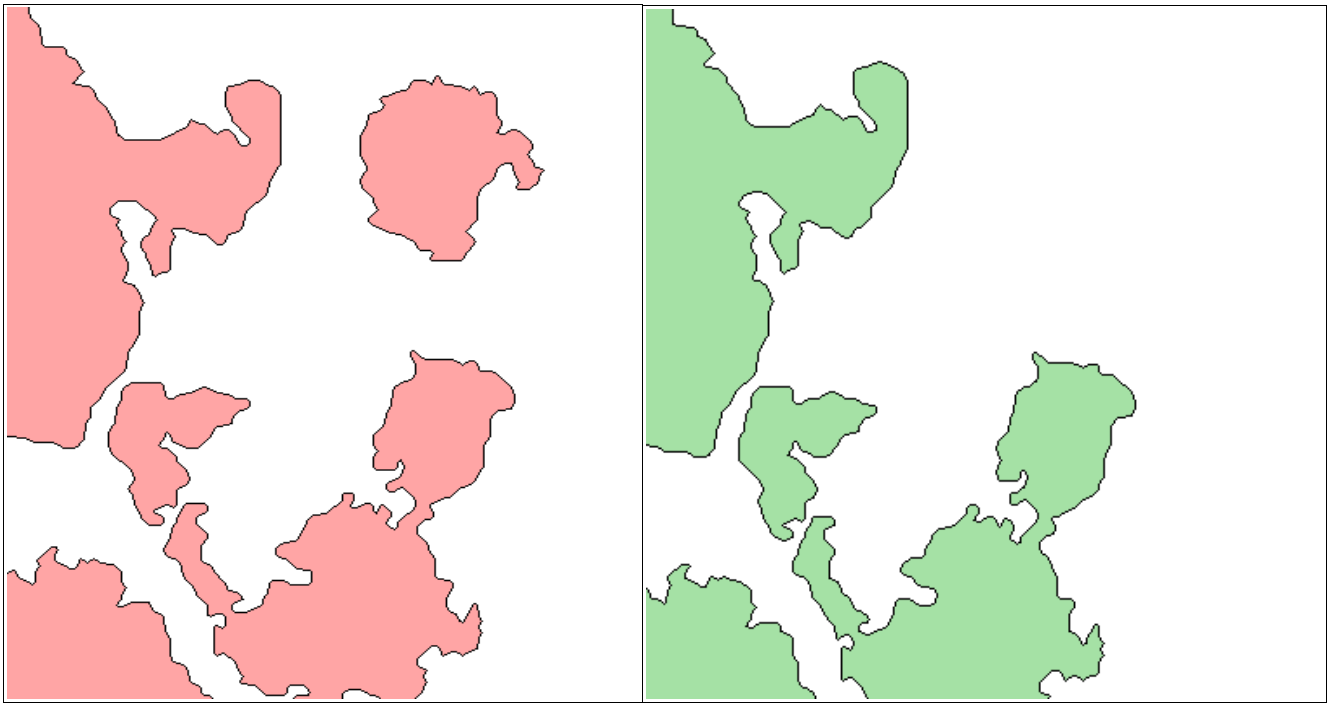
Enter the name of the output layer.

Click on *Difference* tab and select the overlay layer and theme to do the operation.

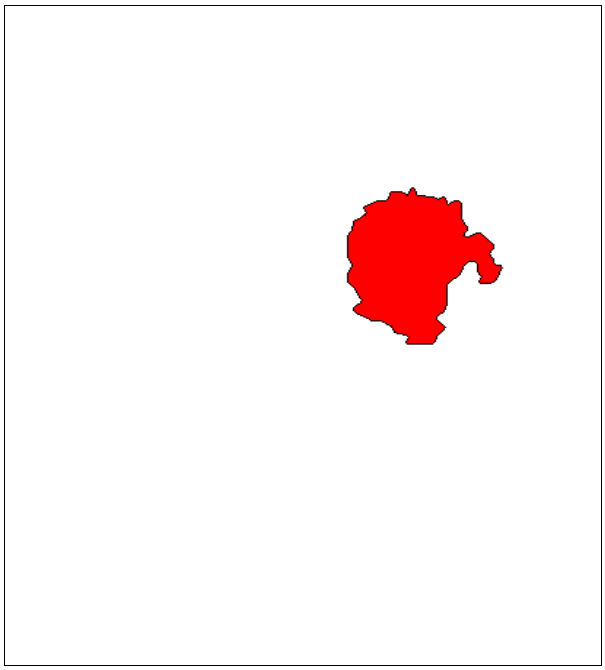
Click on the **OK** button.



Below left the input theme and on the right the overlay theme to differentiate.

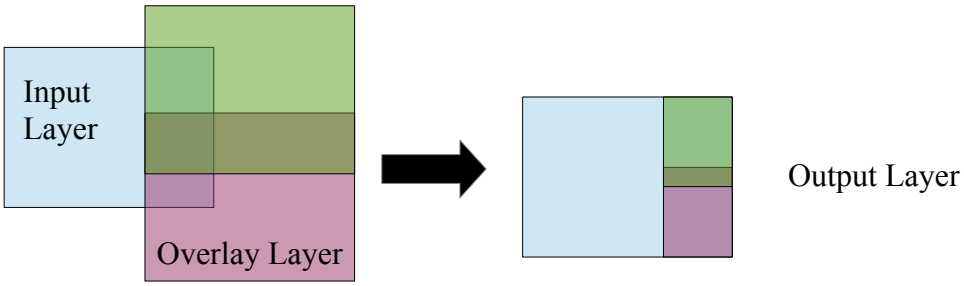


Below is the output layer resulting from the difference spacial operation.

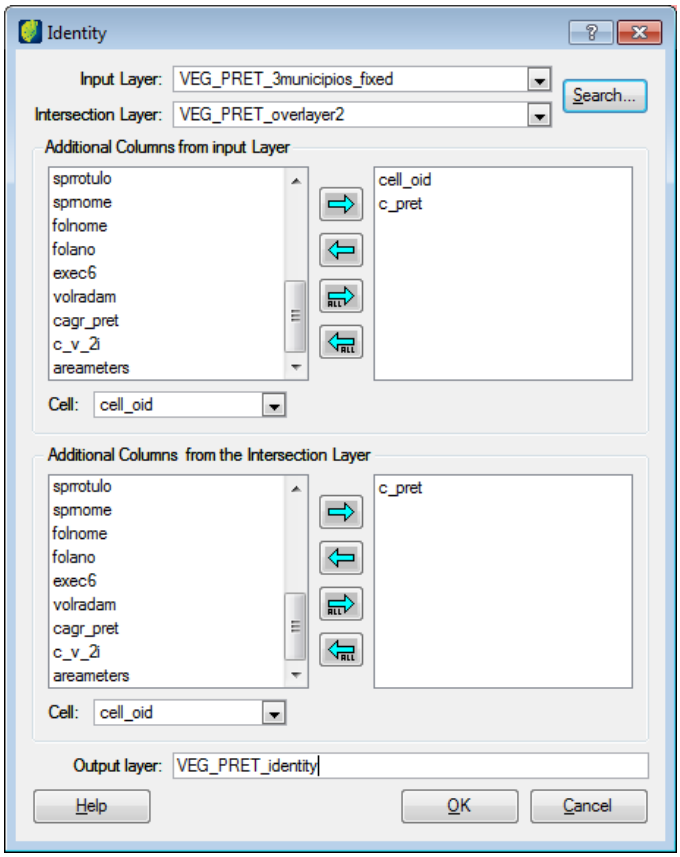


Identity

The identity operation computes the spatial intersection between the geometries of two layers keeping the geometries of the input layer and result will be included in an output layer.



Click on SPATIAL OPERATIONS → IDENTITY.



Select the input layer from the list. Correspondent columns will be showed in the proper list below.

Select the intersection layer. Correspondent columns will be showed in the proper list below.

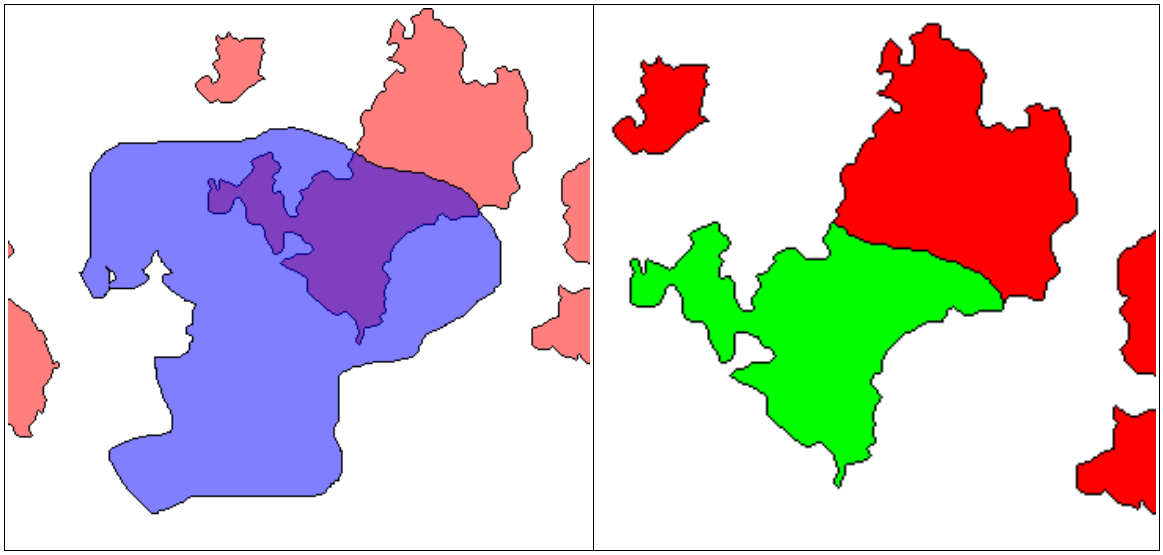
Select from both lists the columns to be included in the output layer. Click on the right arrow button.

Select the cell to be used as reference for both layers.

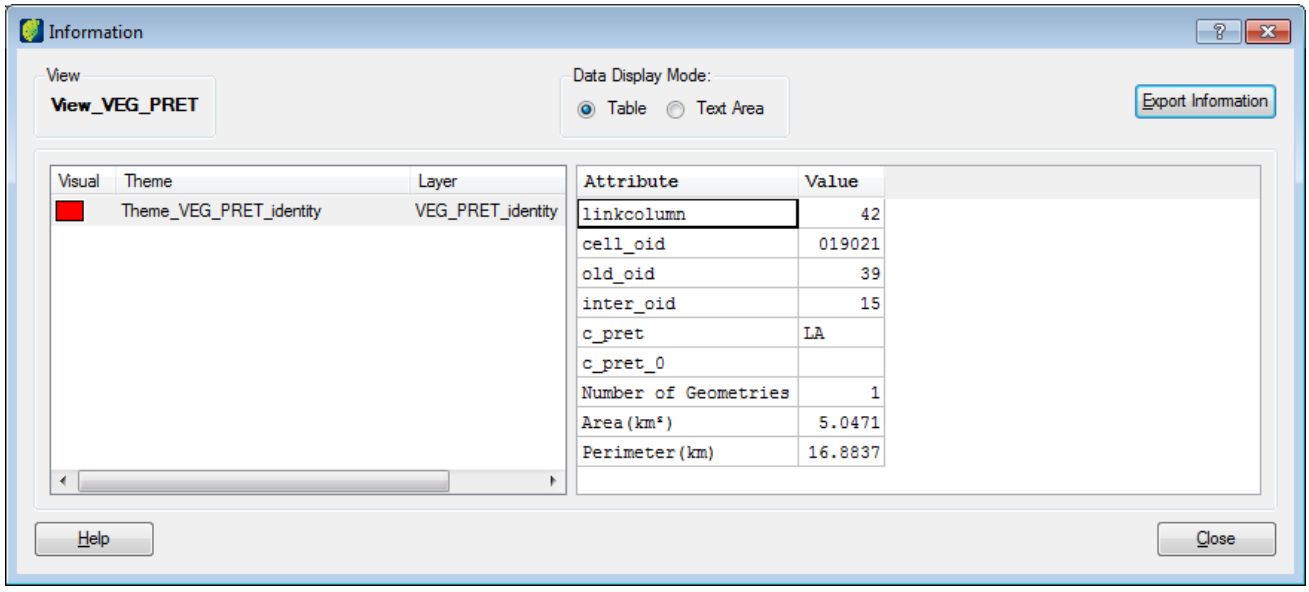
Enter the name of the output layer.

Click on the **OK** button.

On the left picture input and overlay layer polygons. On the right picture the output layer.

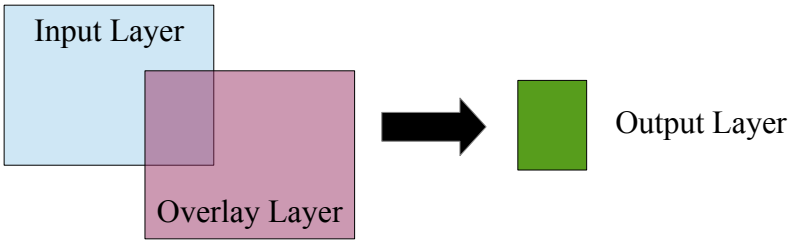


Below the information of the intersection layer.

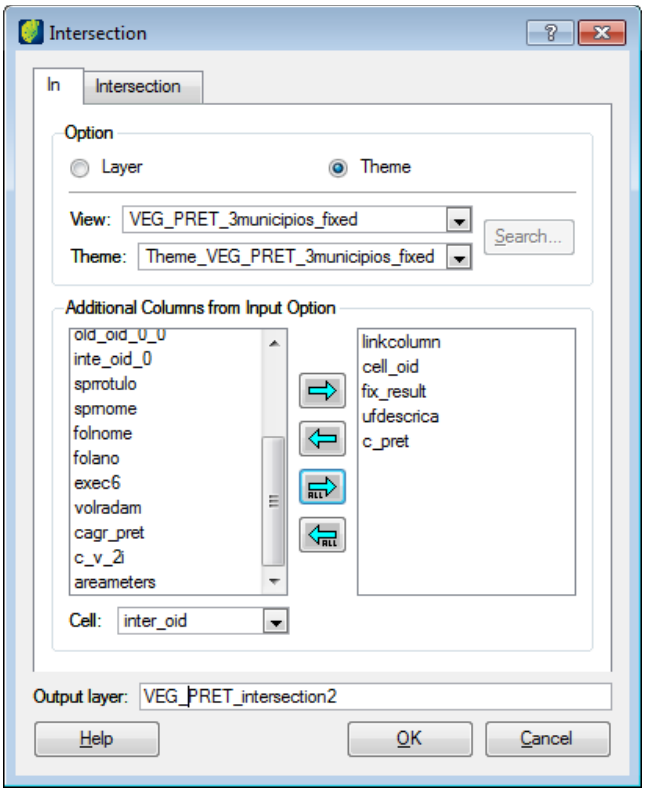


Intersection

The intersection operation computes the spatial intersection between the geometries of two layers. The geometries of the input layer that have an intersection with the geometries of the overlay layer will be cut and included in an output layer.



Click on SPATIAL OPERATIONS → INTERSECTION.



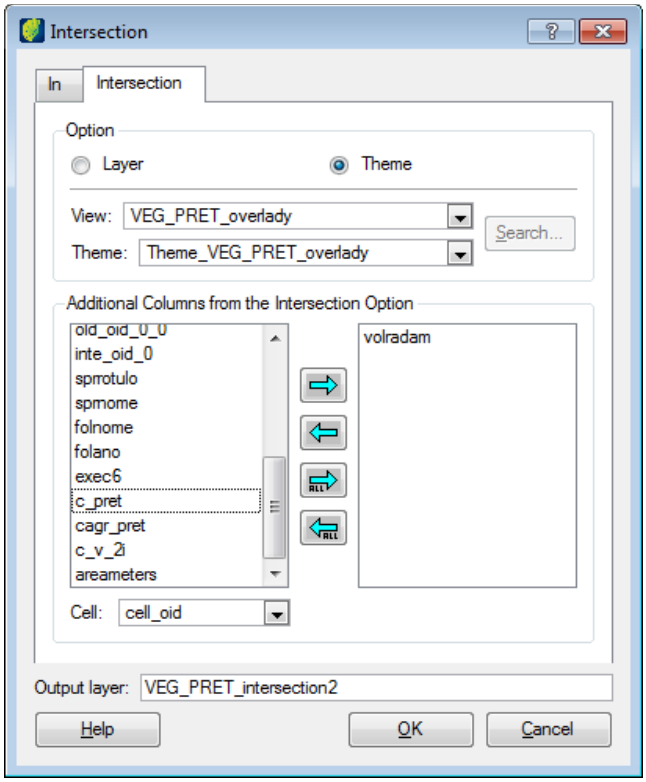
Select the input layer or theme to be processed. The correspondent columns will be showed in the left list below.

Choose the columns to be included in the output layer and click on the right arrow button.

Select the cell to be used as reference.

Enter the name of the output layer.

Click on the *Intersection* tab.

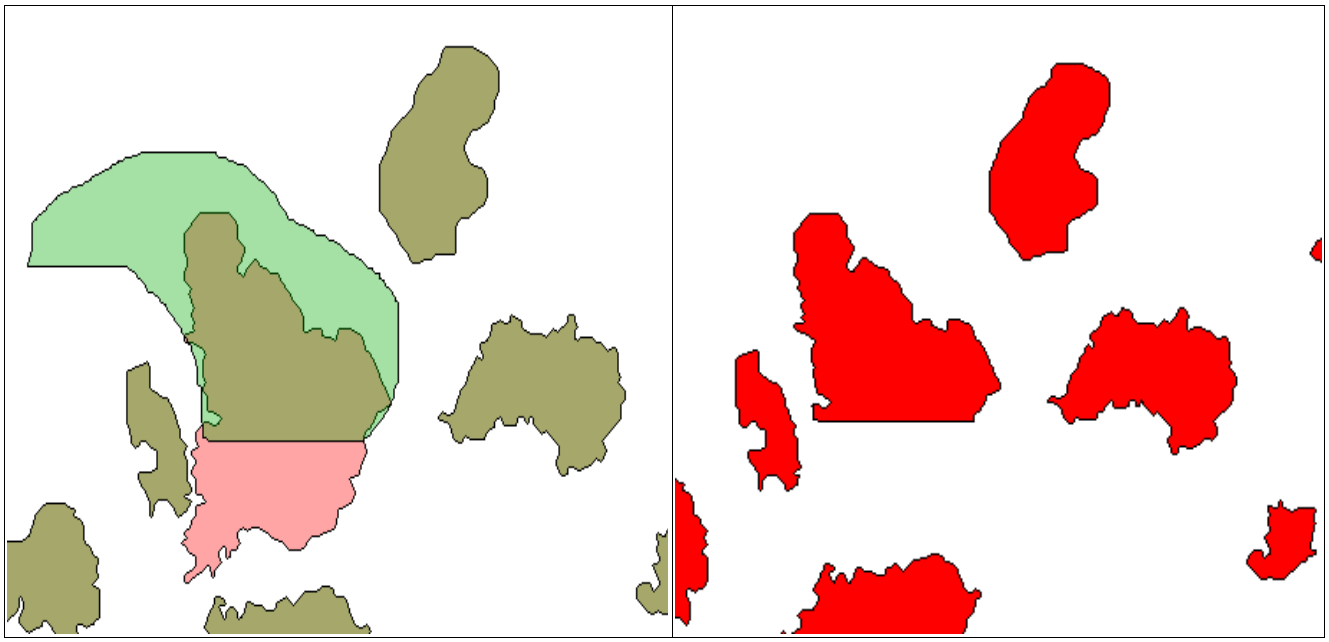


Select the overlay layer or theme to be processed. The correspondent columns will be showed in the left list below.

Choose the columns to be included in the output layer and click on the right arrow button.

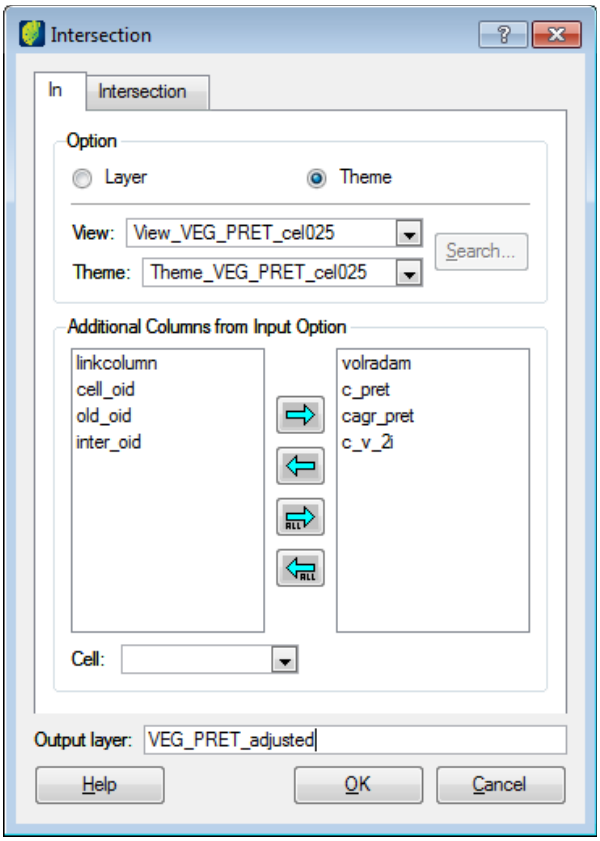
Click on the **OK** button.

On the left picture input and overlay layer polygons. On the right picture the output layer polygons.



The intersection operation can be used to adjust different resolution layers with the database cell layer.

Click on the *In* tab and select the input layer.



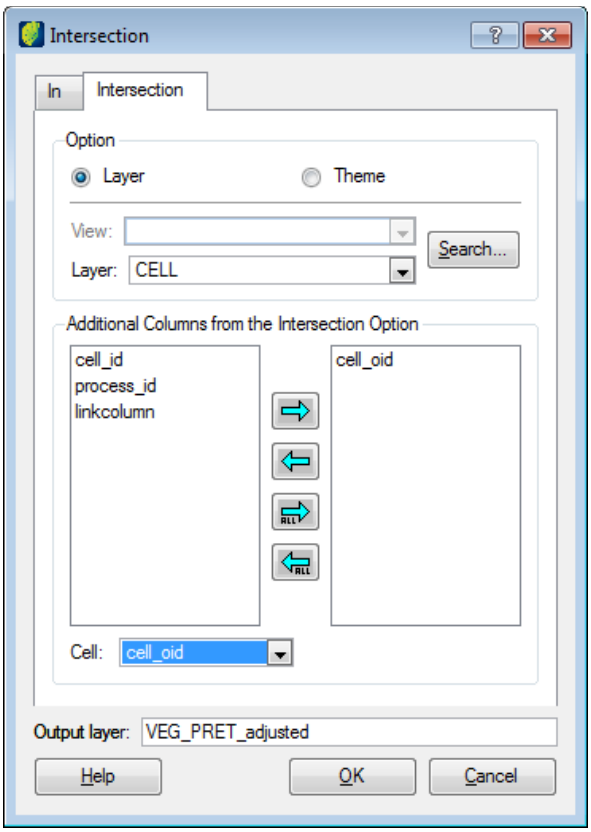
Select the input layer.

Select the needed columns to the output layer except cell_oid attribute.

Keep the *Cell* field empty.

Enter the output layer name.

Click on the *Intersection* tab.

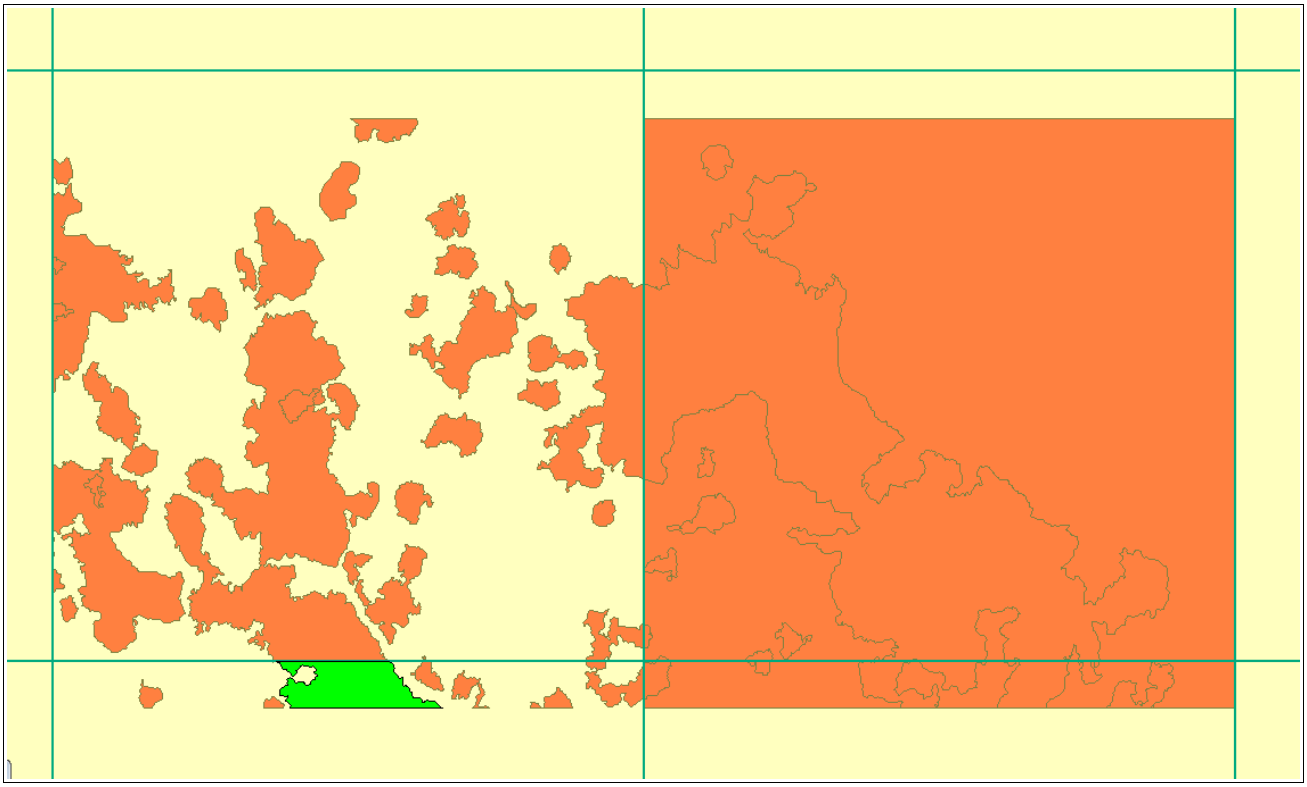


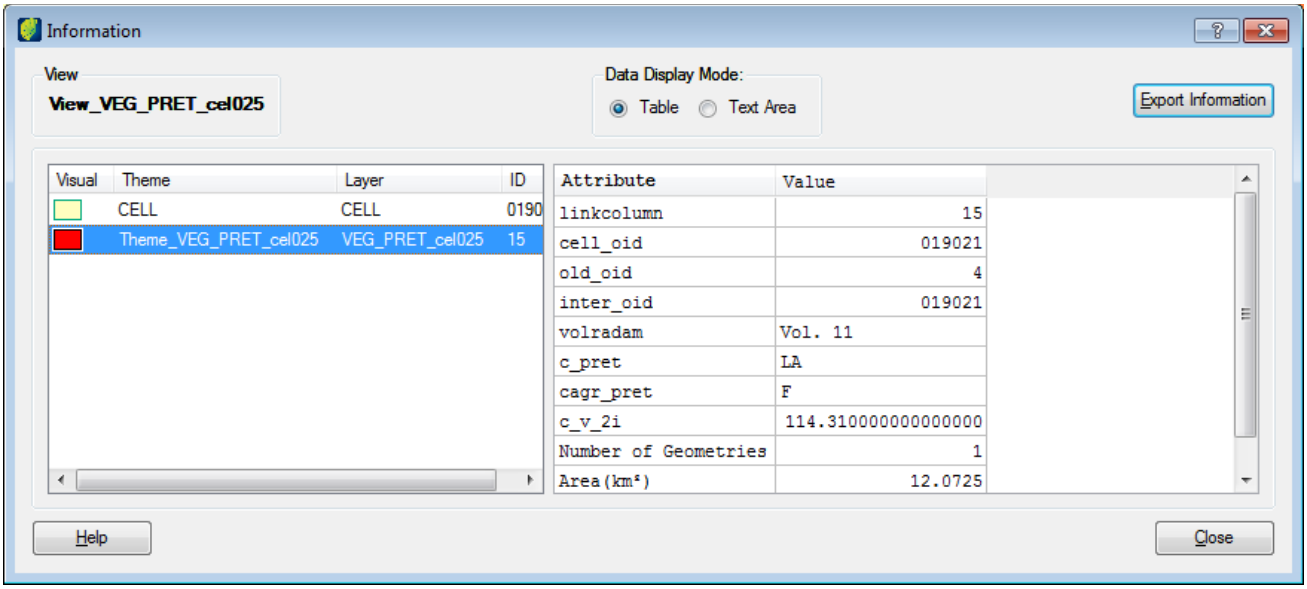
Select the cell layer.

Select the cell_oid column.

Select in field Cell the attribute cell_oid.

Click on the **OK** button.





Fixing a Layer

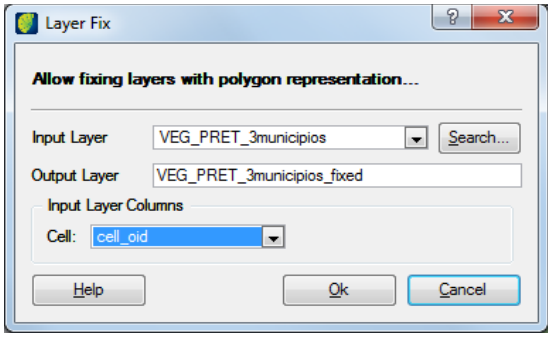
This operation fix some of most known spatial errors, such as:

- Auto intersection.
- More than one vertices with same coordinates based on the algorithm predefined tolerance.
- Valid holes check and exclusion of no valid ones
- Polygon orientation: verify if the external perimeter is created clockwise while internal polygons are in anti-clockwise.
- Check if initial and final polygon vertices have the same coordinates.

Click on SPATIAL OPERATIONS → LAYER FIX.

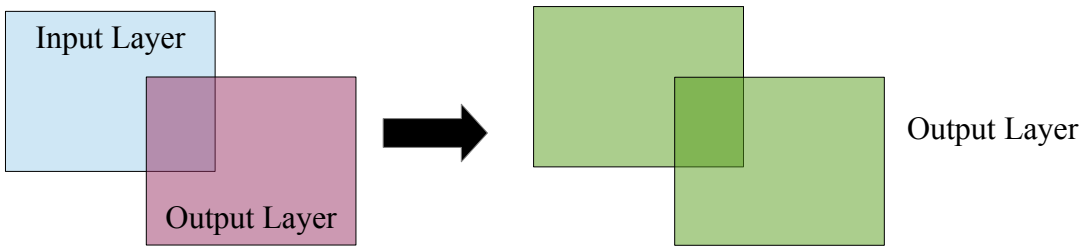
Select the input layer and enter the name of the output layer.

Select the input layer column and click on the **OK** button.

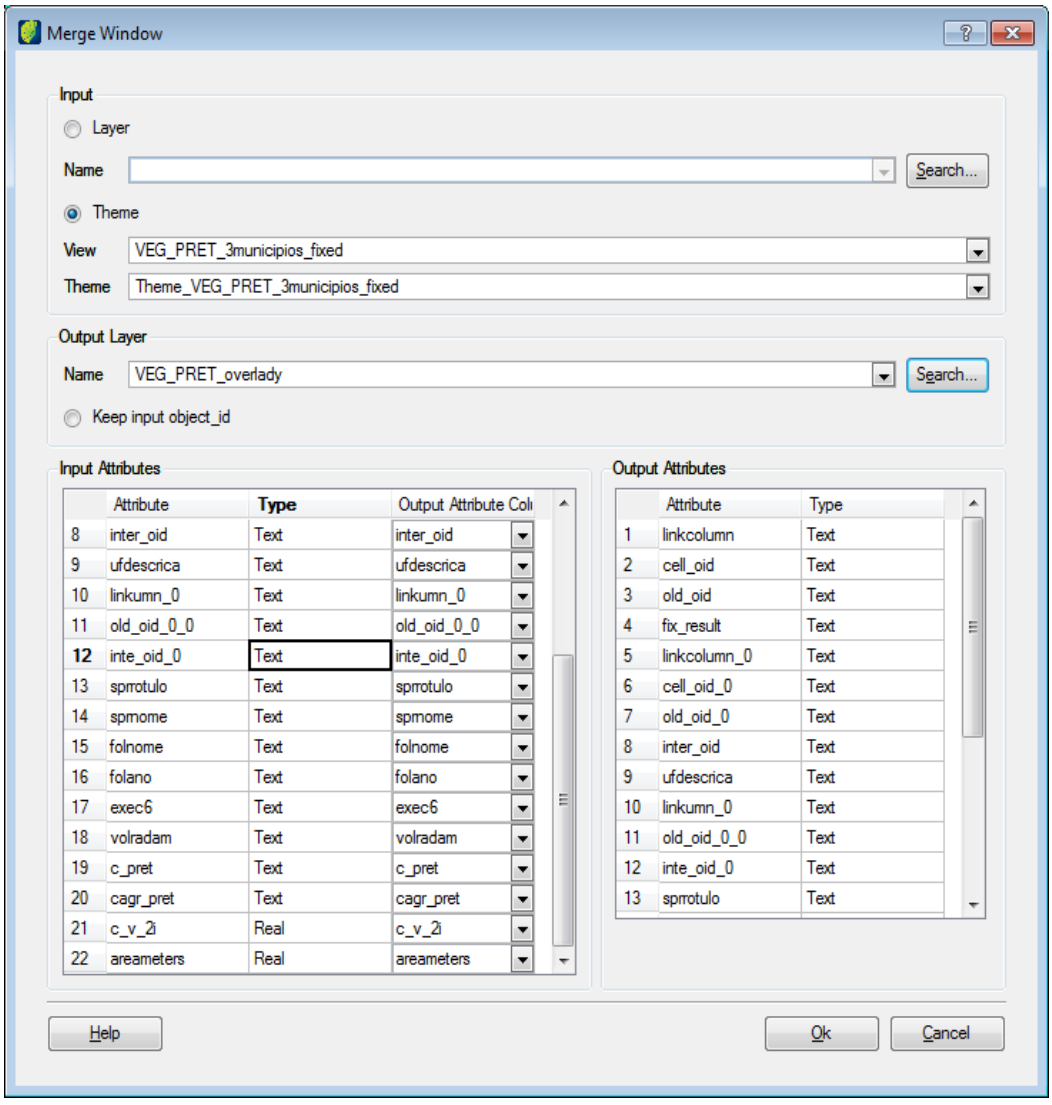


Merging layers

The merge operation makes a copy of geometries of two layers maintaining its overlapping and the result will be included in an output layer.



Click on SPATIAL OPERATIONS → MERGE LAYER

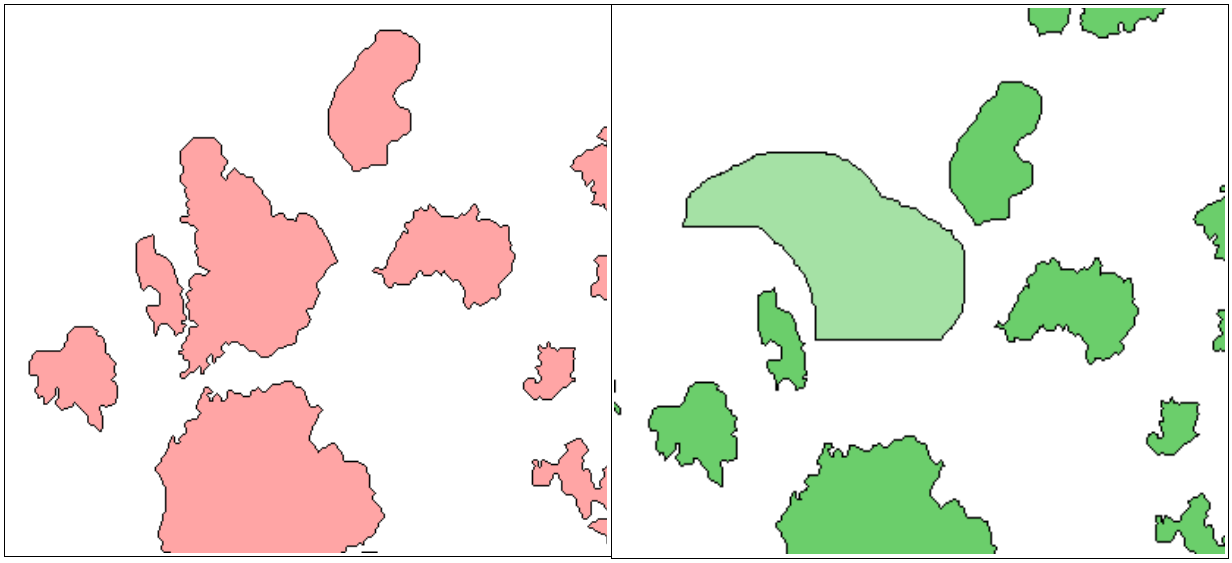


Select the input layer or theme for the input layer and choose the output layer. If output layer is not available in the list click on **Search** button.

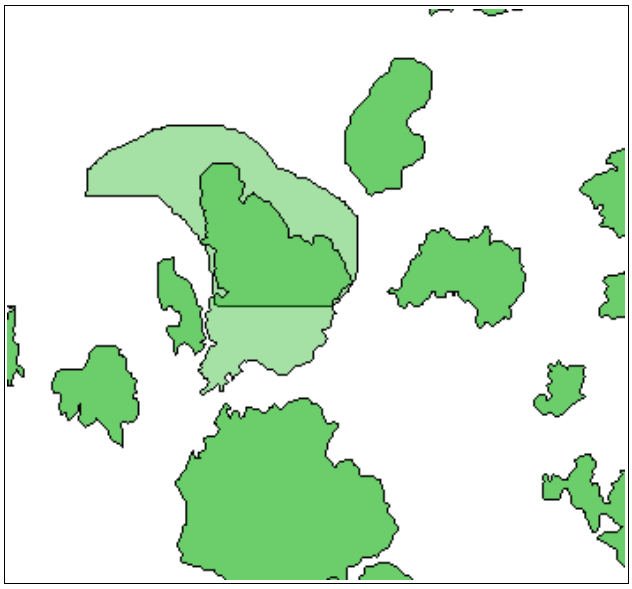
Both layers will have their attributes showed in correspondent lists below. In the *Input Attributes* list under *Output Attribute Column* choose the associated attributes that will include polygons to the output layer.

Click on the **OK** button.

On the left picture input layer polygons. On the right picture overlay layer polygons.

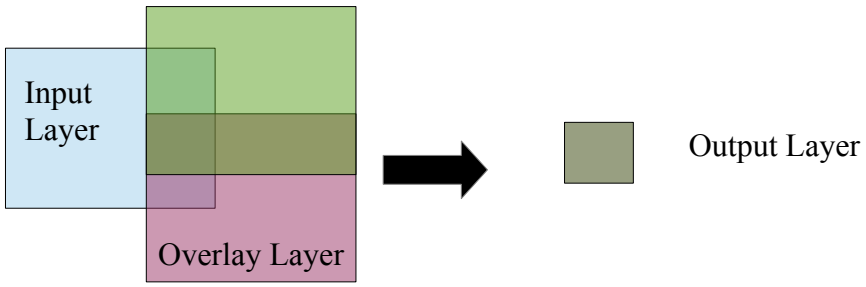


Below the output layer polygons.

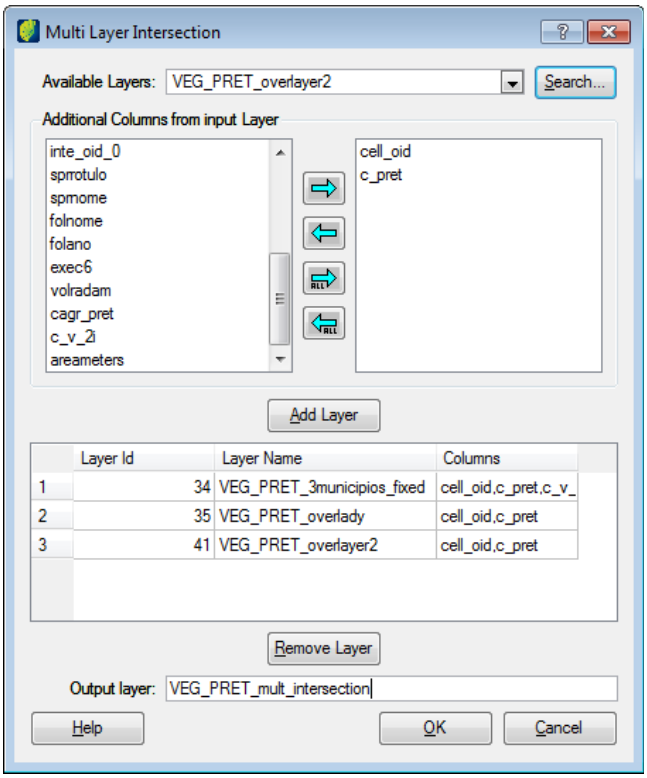


Multi Layer Intersection

The multi layer intersection operation computes the spatial intersection between the geometries of several layers. The geometries of the input layers that have intersection will be cut and included in an output layer.



Click on SPATIAL OPERATIONS → MULTI LAYER INTERSECTION.



Select one layer in the *Available Layers* field and available columns will be shown in left list below. Choose the columns to be included in the output layer and click on the right arrow button.

Click on **Add Layer** button. The selected layer and columns will be listed below the button.

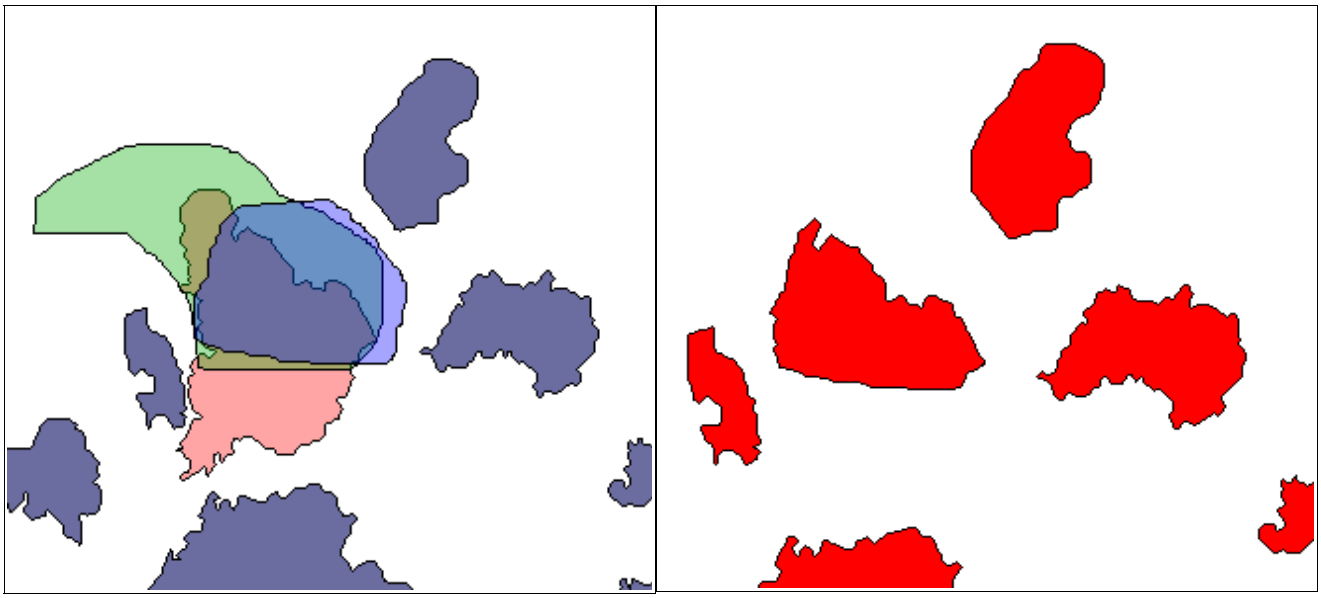
Repeat the procedure for each layer to be added for multi intersection operation.

If a wrong layer was included, select it in the layer list and click on the **Remove Layer** button.

After selecting all layers and correspondent columns enter the name of the output layer.

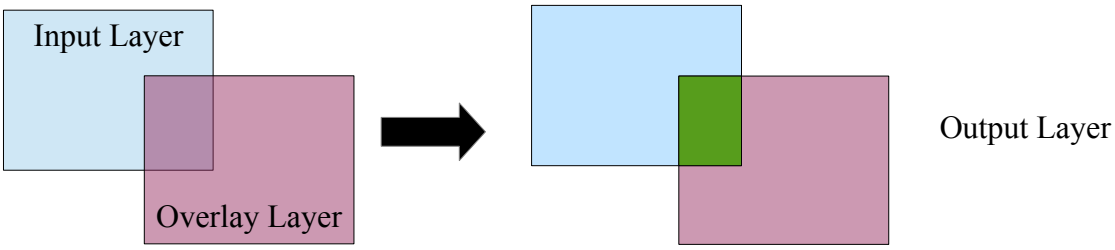
Click on the **OK** button.

On the left picture input and overlay layer polygons. On the right picture the output layer.

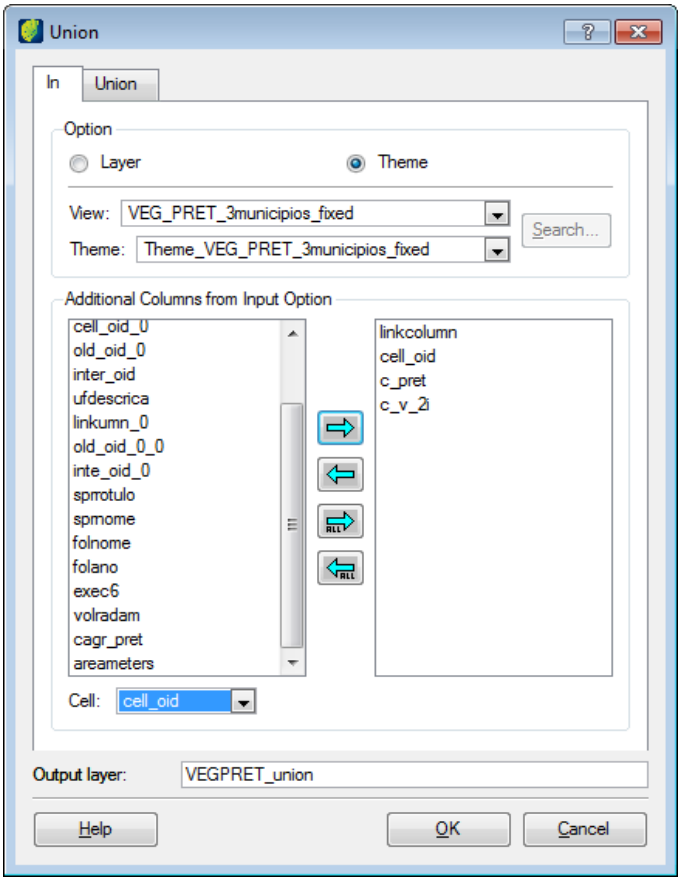


Union

The union operation computes the spatial union between the geometries of two layers. The set whose geometries are either in the input layer or geometries in the overlay layer or both will be united and included in an output layer.



Click on SPATIAL OPERATIONS → UNION.



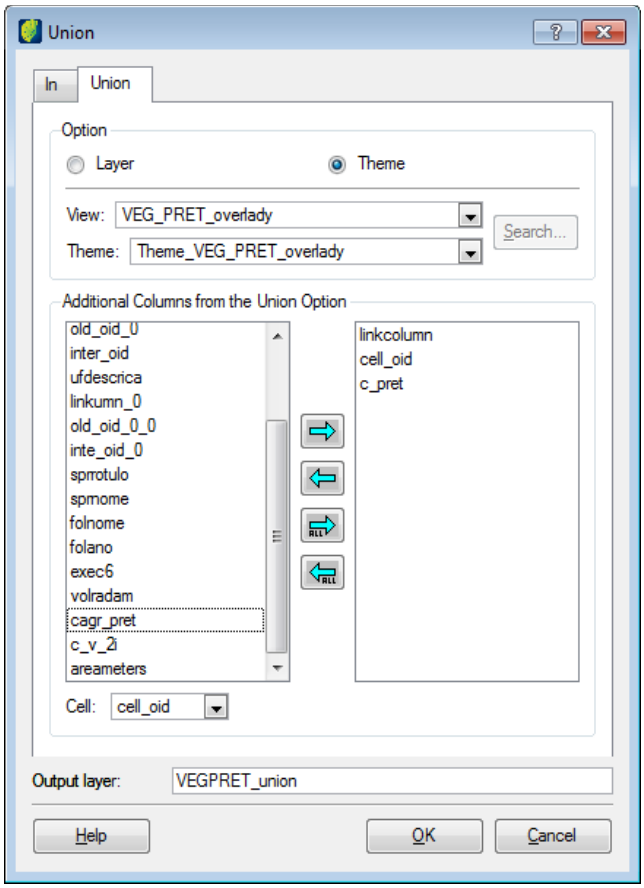
Select the input layer or theme. Input columns will be showed in the left list below.

Choose the columns to be included in the output layer and click on the right arrow button.

Select the cell to be used as reference.

Enter the output layer name.

Click on the *Union* tab.

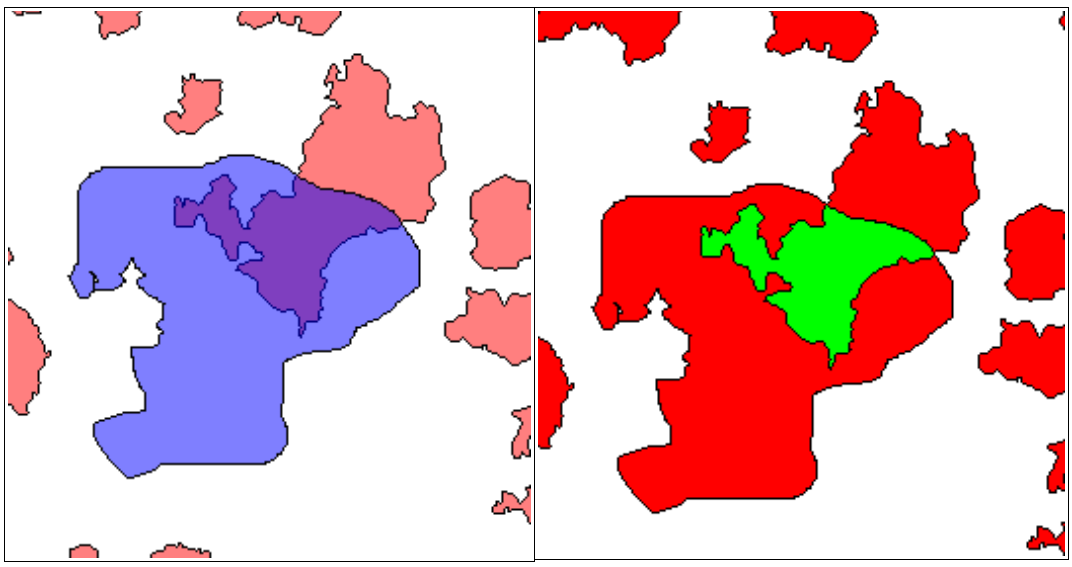


Select the overlay layer.

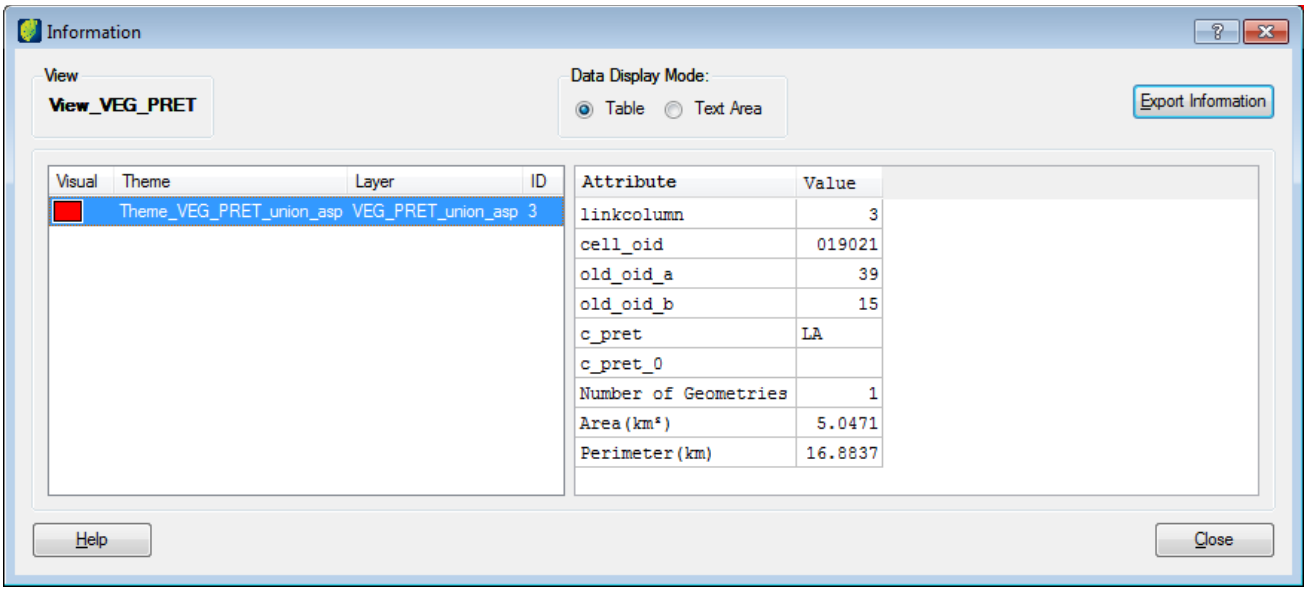
Choose the columns to be included in the output layer and click on the right arrow button.

Click on the **OK** button.

On the left picture input and overlay layer polygons. On the right picture output layer polygons.



Below the attribute table of the intersection polygon.

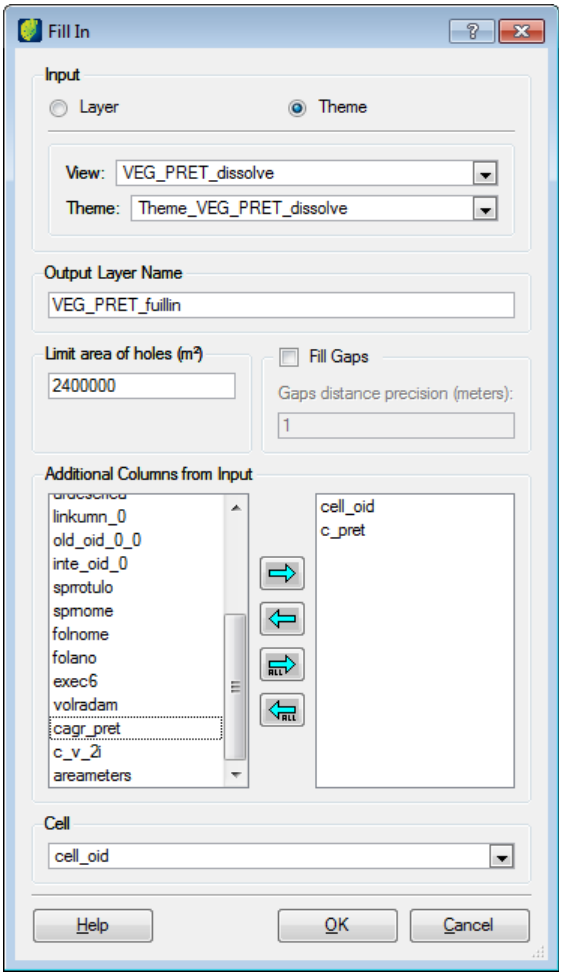

Information
View
View_VEG_PRET
Data Display Mode:
Table
Text Area
Export Information
Visual
Theme
Layer
ID
Theme_VEG_PRET_union_asp
VEG_PRET_union_asp
3
Attribute
Value
linkcolumn
3
cell_oid
019021
old_oid_a
39
old_oid_b
15
c_pret
LA
c_pret_0
Number of Geometries
1
Area(km²)
5.0471
Perimeter(km)
16.8837
Help
Close

Generalization

Filling in roles and gaps

This operation fills in gaps inside polygons of the layer or theme based on a limit area defined by the user.

Click on GENERALIZATION → FILL IN.



Choose the input layer or theme to be processed and enter the name of the output layer.

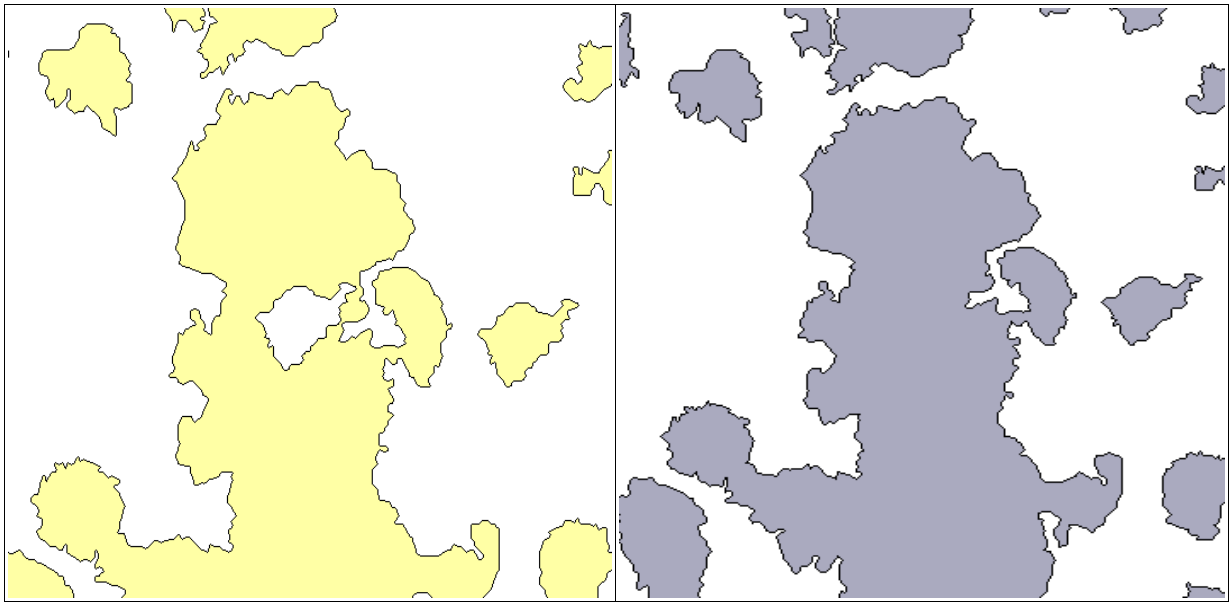
Enter the maximum limit area in square meters that should be filled in.

Select the additional columns to be included in the output layer. Click on the right arrow button to transfer the columns to the right list.

Select the cell to be used as reference for the operation.

Note: Click on the Fill Gaps box to enter the gap distance precision in meters, but the user must be careful because depending on the inserted precision it may damage the data. It should be used only if the layer has too many gaps between geometries.

On the left picture the input layer. On the right the output layer.

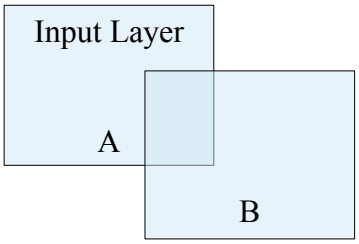


Removing overlaps

The remove overlaps operation identifies polygons overlaps with a minimum area defined by the user. There area 5 possible cases:

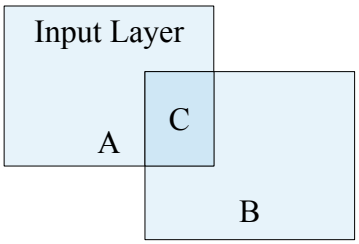
In case of equal attributes of the overlapped polygons, the algorithm will apply the operation based on the following precedence.

1. Do not correct.
2. Dissolve.
3. Union with greater area neighbor.
4. Union with greater intersection boundary neighbor.



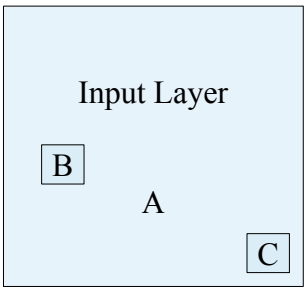
In the case of different attributes of the overlapped polygons, the algorithm will apply the operation based on the following precedence.

1. Do not correct
2. Generate a polygon C on the output layer. The output attributes should be based on the greater area neighbor or boundary intersection. It executes a difference operation of C in A and B removing the overlaps.
3. Union with greater area neighbor.
4. Union with greater intersection boundary neighbor.



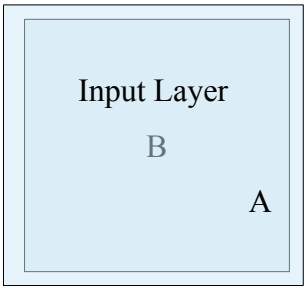
In the case of overlaps where A contains B and C overlapped polygons with very small areas and different attributes, the algorithm will apply operation based on the following precedence.

1. Do not correct.
2. Unite A, B and C considering attributes of A.
3. Generate holes in A corresponding to B and C, considering that B and C are independent geometries.



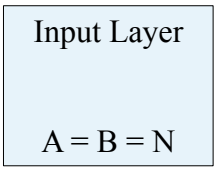
In the case of overlaps where A and B have almost equal areas with different attributes, the algorithm will apply operation based on the following precedence.

1. Do not correct.
2. Add B to the overlap layer.
3. Difference A-B, A will loose area, keeping attributes from both.

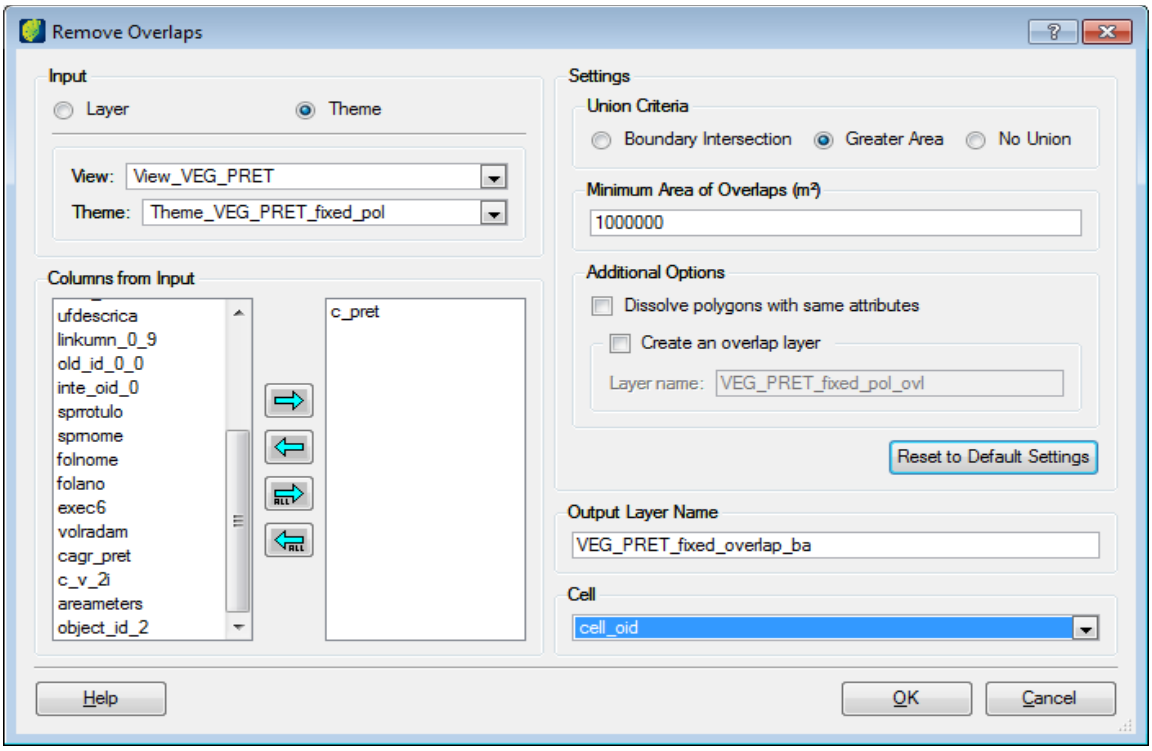


In the case of overlaps where A and B (or several polygons) have equal areas with different attributes, the algorithm will apply operation based on the following precedence.

1. Do not correct
2. Add one polygon in the resulting layer and all equal polygons area will be saved in the overlap layer.



Click on GENERALIZATION → REMOVE OVERLAPS.



Choose the input layer or theme from the list. Correspondent columns will be showed in the list below.

Select the columns to be included in the output layer and click on the right arrow button.

In *Settings*, select one of the three union criteria and insert the minimum area of overlaps in square meters below.

Boundary intersection: union operation will be executed with the neighbor polygon with bigger boundary intersection.

Greater Area: union operation will be executed with the neighbor polygon with greater area intersection.

No union: there will no be corrections to the output layer.

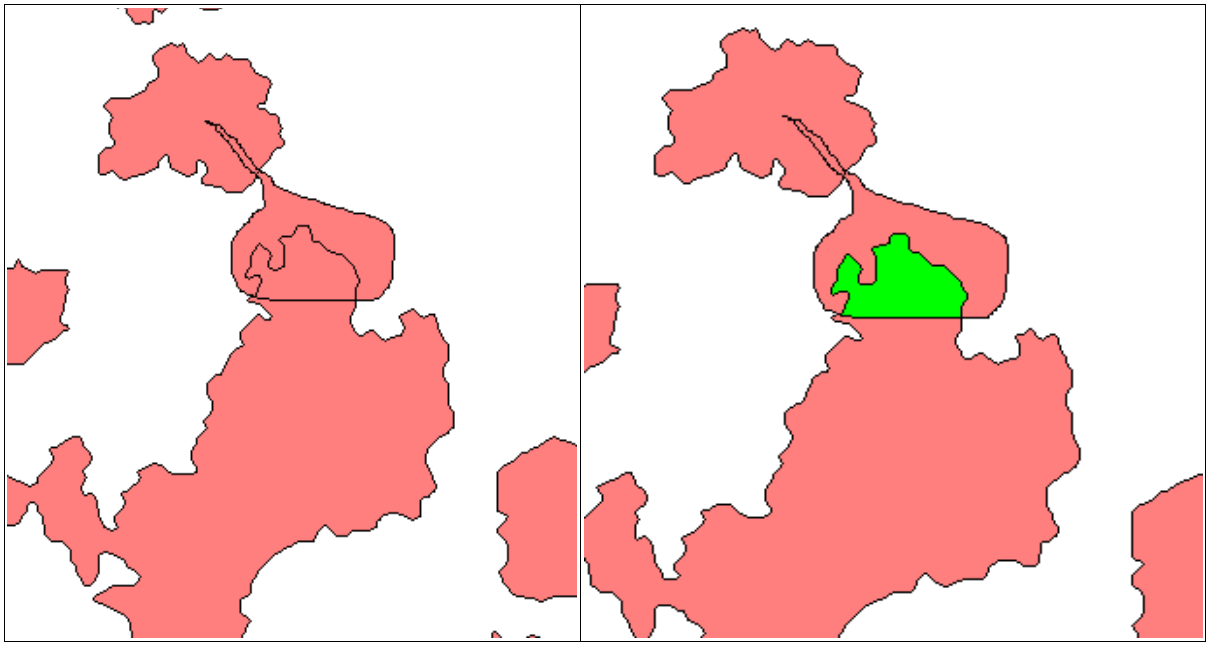
Check in *Dissolve polygons with same attributes* box if boundaries are to be dissolved.

Check in *Create an overlap layer* box if the user wants to create a layer including the overlaps. Enter the name of the overlap layer in *Layer name* field.

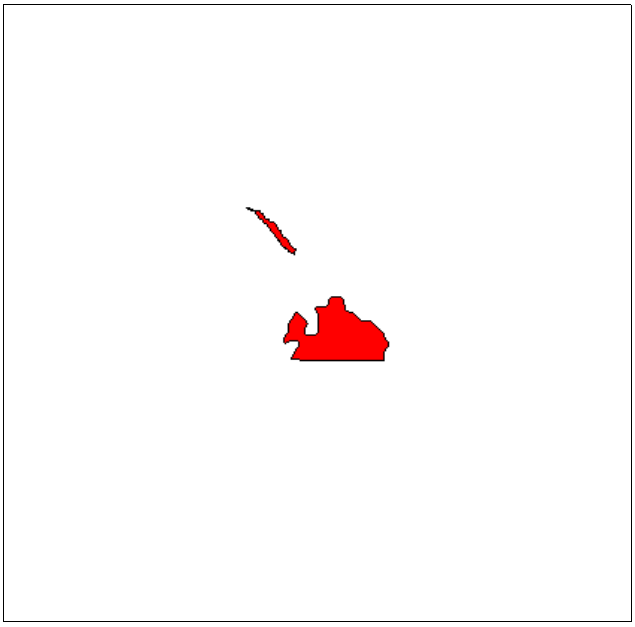
Enter the output layer name and choose the cell column to be used as reference.

To return to normal setup click on the **Reset to Default Setting** button.

On the left picture the input layer with polygons overlap. On the right the new polygon of the overlapped area.



Below the overlapped areas saved in the overlap layer.



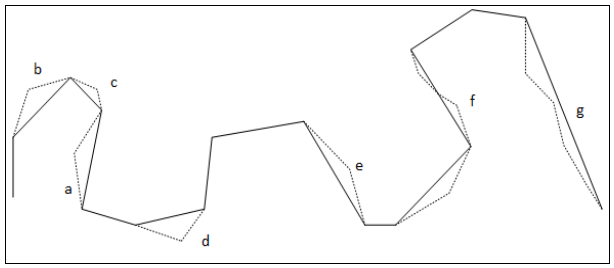
Simplification

Simplification is a generalization process aiming to depict the element, linear or superficial, according to the representation scale.

When mentioning simplify the graphic representation of a geographic element in vector format, we associate to the removal of some points that composes such element in a simpler presentation.

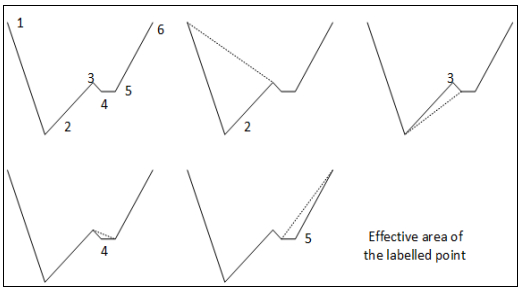
Douglas Peucker Simplification

The purpose of the algorithm is, from a line shaped by a vertex set, to create another similar line but with fewer vertexes. It is a recursive algorithm. Initially it selects the first and the last line points, analyzes the line segment between these two points marking both points so they are kept. In this analysis, it first locates the farthest vertex – in perpendicular distance – from created segment. If this distance between the vertex and created segment is smaller than the tolerance value used (an algorithm input parameter), then no points are marked to be kept but removed. However, in case this distance is bigger than the tolerance then this vertex should be kept, and the algorithm is applied recursively in both line parts, between the first vertex and the farthest vertex and in sequence between the farthest vertex and the last vertex.

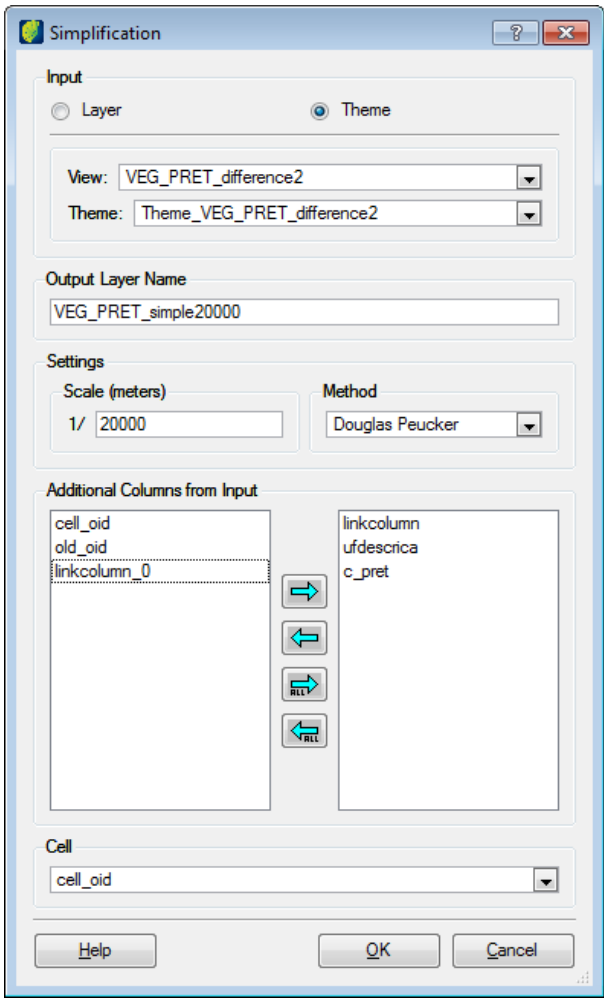


Effective Area Simplification

This algorithm consists of creating a triangle to each three consecutive vertexes of line and calculate its area. The triangle center vertex of the smaller area is removed and the algorithm is applied recursively using the remaining vertexes. The result when a certain condition is reached, e.g. a given number or points are removed or an effective area of triangle reaches a pre-defined threshold.



Click on GENERALIZATION → SIMPLIFICATION.



Select the input layer or theme.

Enter the output layer name.

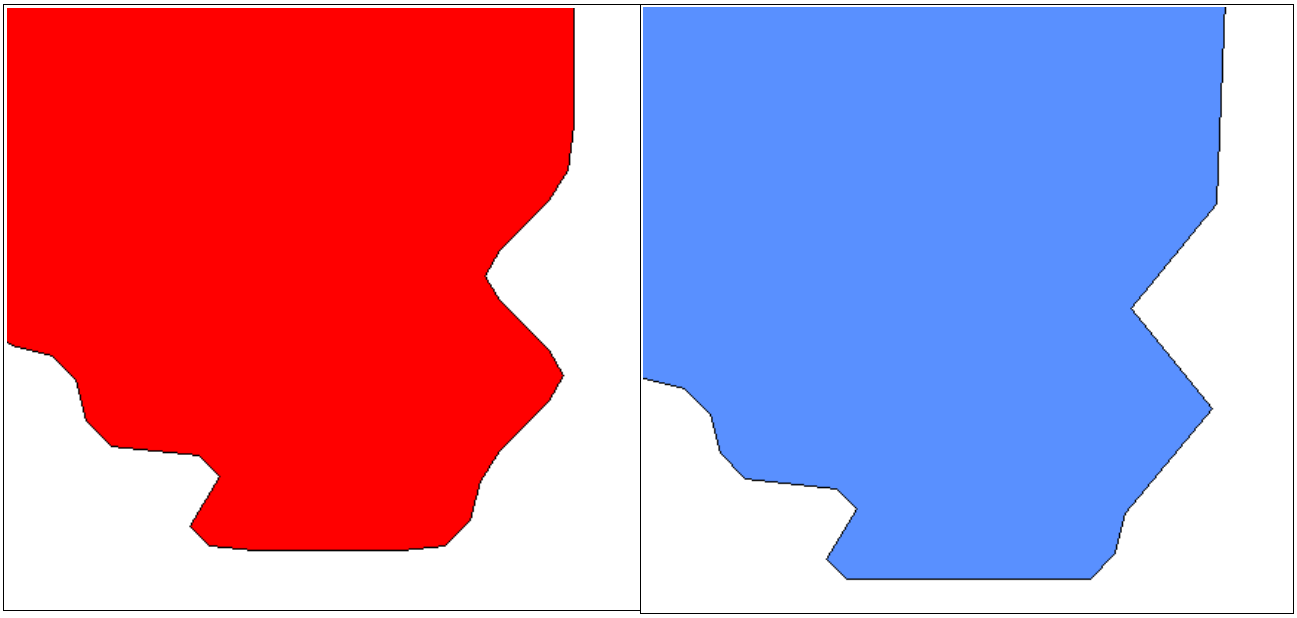
In *Settings*, enter the scale and method for simplification

Choose the columns to be included in the output layer and click on the right arrow button.

Select the cell to be used as reference.

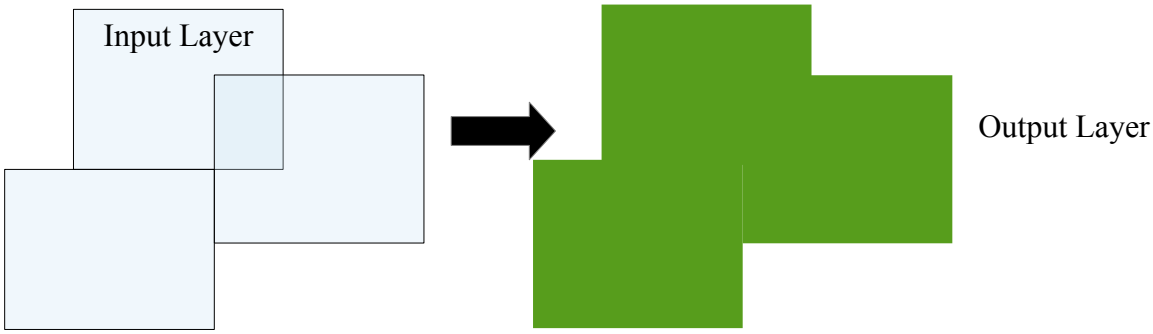
Click on the **OK** button.

On the left picture the input layer. On the right picture the output layer.

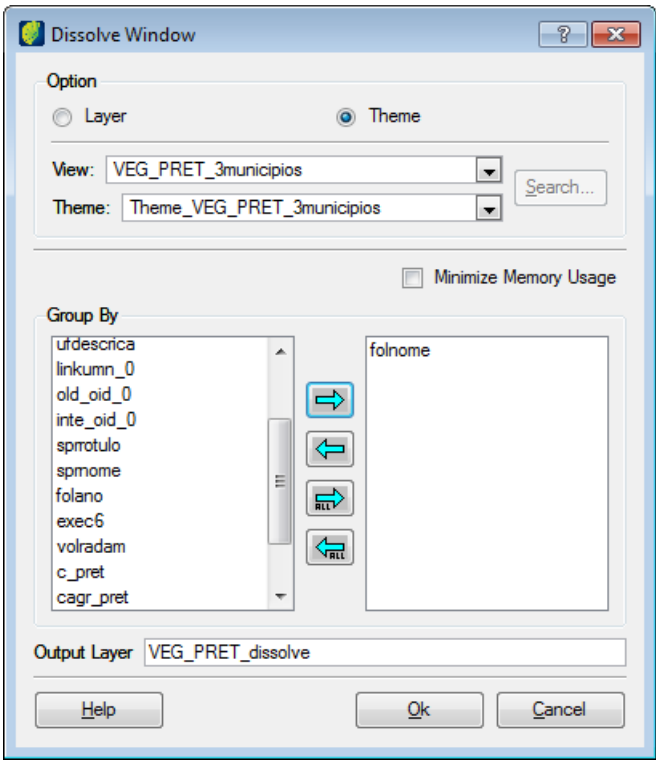


Dissolving a map

The dissolve operation aggregate features based on a specified attribute or attributes. Dissolve creates regions by removing the boundaries between geometries represented by selected attribute.



Click on GENERALIZATION → DISSOLVE MAP.

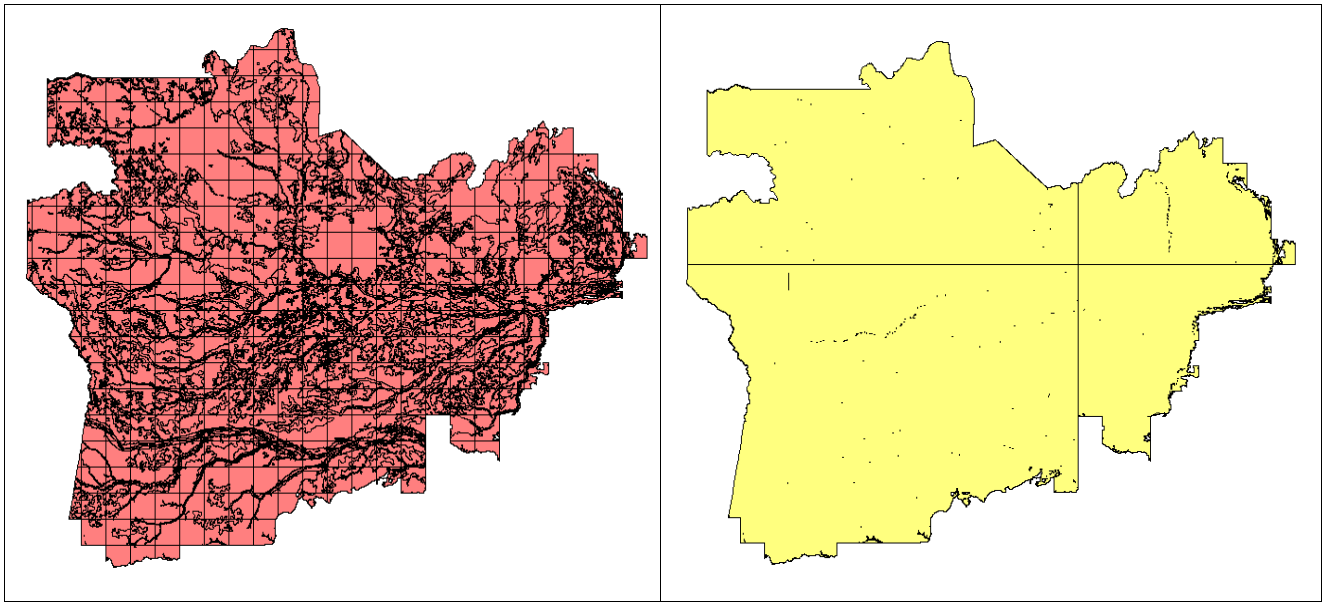


Select the Layer or Theme to execute the operation.

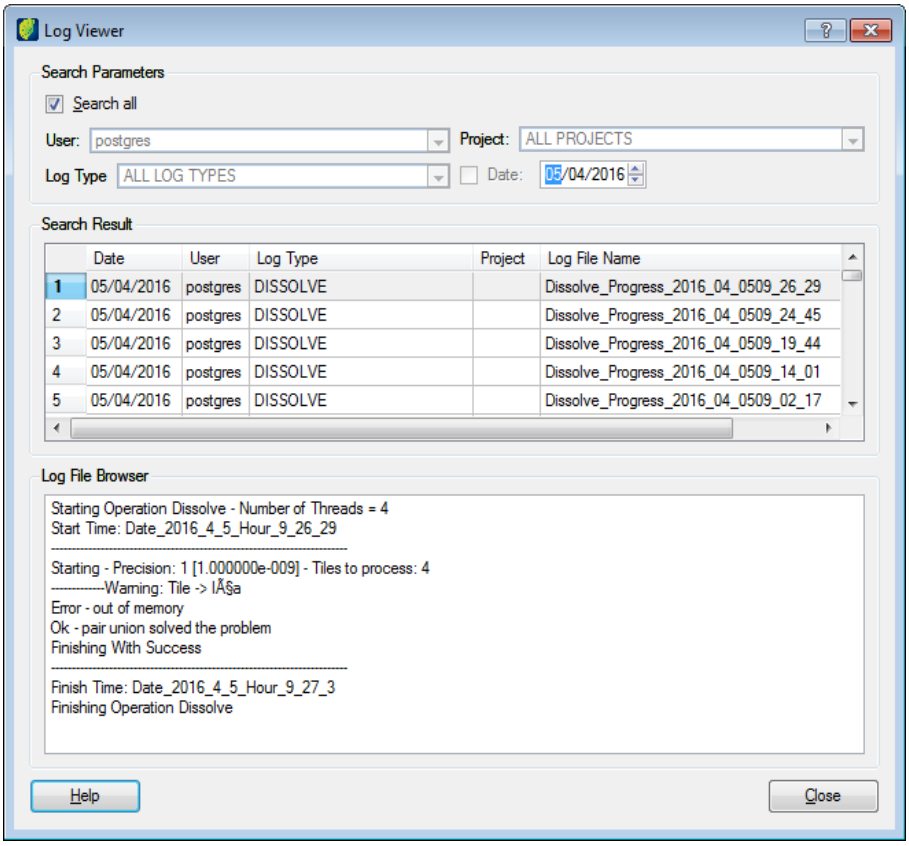
A list of layer columns will be presented and choose which ones will be used to dissolve the map. Transfer the columns clicking on the right arrow button.

Enter the name of the output layer and click on the **OK** button.

In the example all the polygons with the same folnome column were dissolved and presented in a new layer with four polygons.



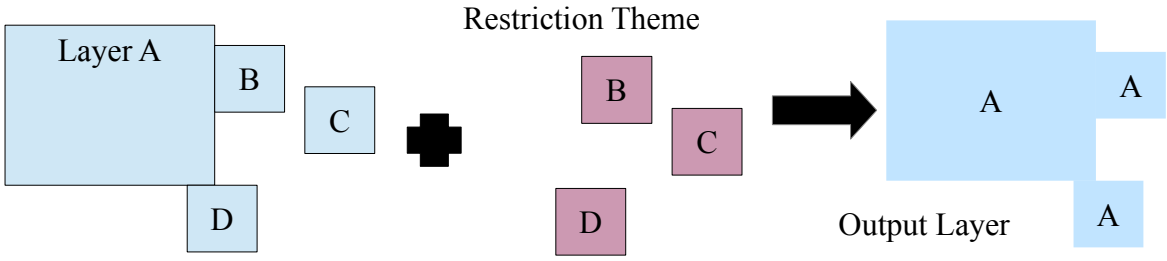
Depending on the size of the map processing error may occur and can be seen in the log viewer (PROCESS → LOG VIEWER)



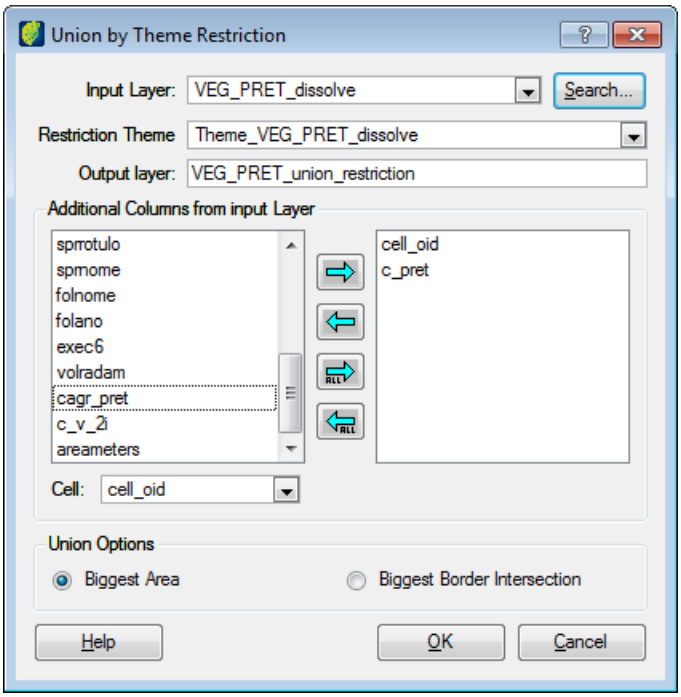
Note: In case of memory error some alternatives can be used: add more columns to dissolve in smaller areas, or use less memory during process by clicking on the Minimize Memory Usage box.

Union by restriction

The union by restriction operation computes the spatial union between the input layer geometries and a restriction theme based on two conditions: biggest area or biggest border intersection. The set whose geometries are in the input layer will be united and included in an output layer.



Click on GENERALIZATION → UNION BY RESTRICTION.



Select the input layer and correspondent theme. Columns will be presented in left list below.

Type the name of the output layer.

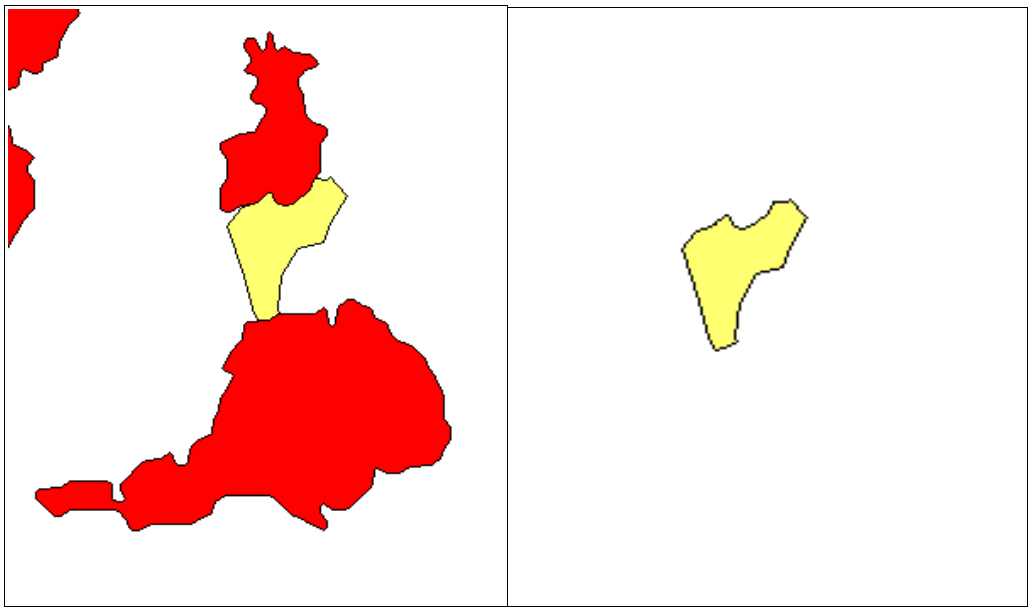
Choose the columns to be included in the output layer and click on right arrow button to include them.

Choose the cell column to be include in the output layer.

Choose the type of restriction to be used by the operation: biggest area or biggest border intersection.

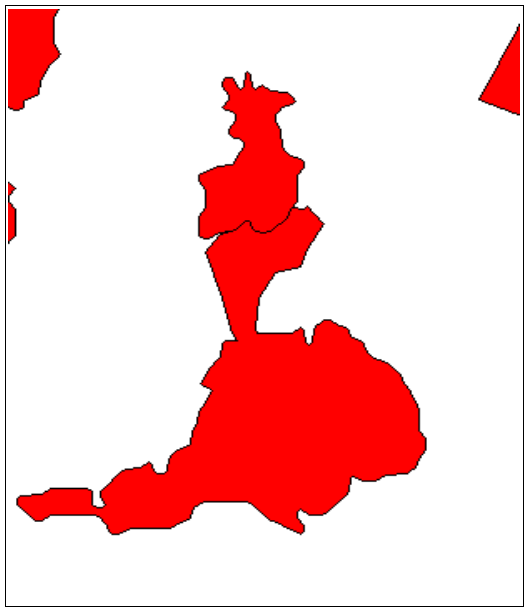
Click on the **OK** button.

On the right figure input layer with touching polygons. On the right figure the restriction theme polygon.



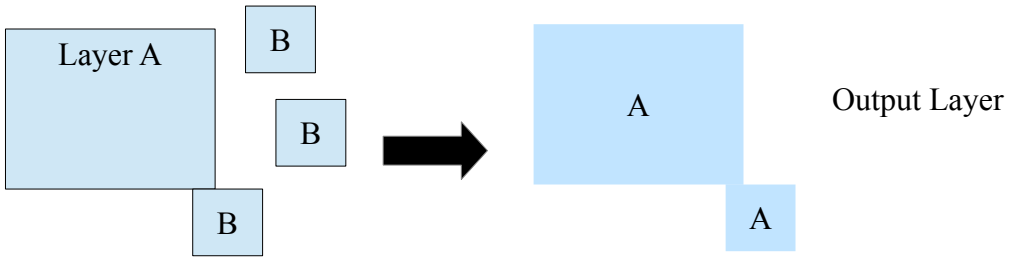
Output layer with union by border intersection.

Output layer with union by bigger area.

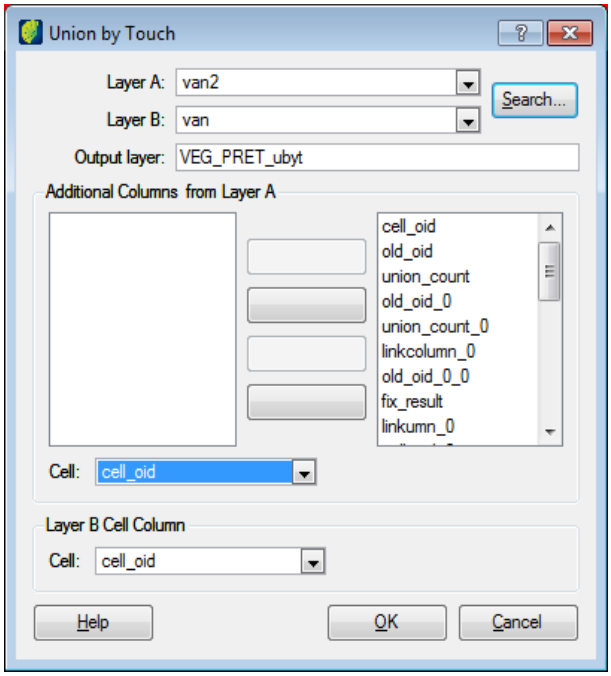


Union by touch

The union by touch operation computes the spatial union between the geometries of two layers, where Layer A has single part geometries and Layer B has multi part geometries. The set whose geometries are in the input layer A and touched by geometries in the input layer B will be united and included in an output layer.



Click on GENERALIZATION → UNION BY TOUCH.



Select the input layer A and correspondent columns will be presented in left list below.

Choose the columns of the layer A to be included in the output layer and click on right arrow button to include them.

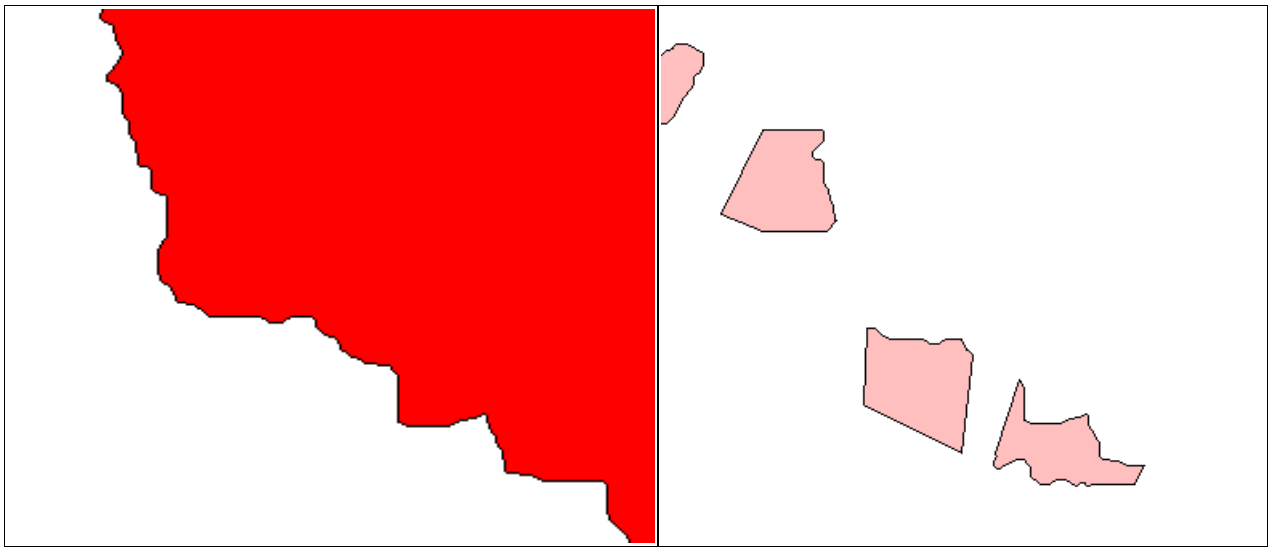
Select the input layer B.

Type the name of the output layer.

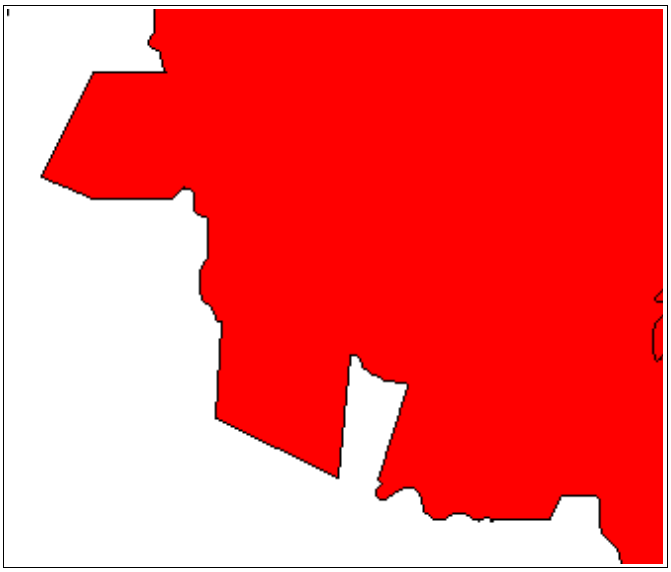
Choose the cell column for layers A and B.

Click on the **OK** button.

On the left picture the input layer polygon. On the right picture the touching polygons of the overlay layer.



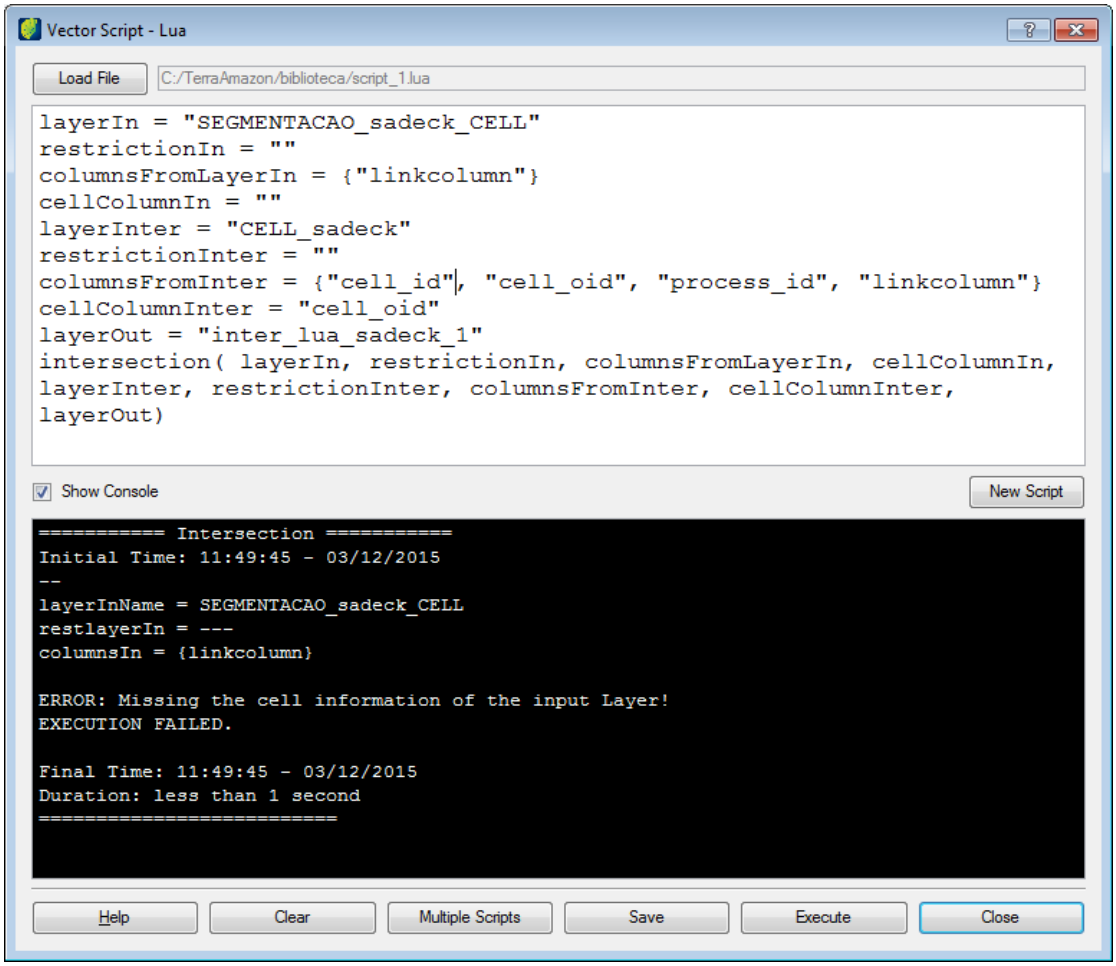
Below the output layer of the union by touch operation.



Using Lua vector scripts

The user can load script file in LUA to execute several or repetitive vector spatial operations.

Click on PROCESS → VECTOR SCRIPT – LUA.



Load File: click on this button to browse and select the .lua script file.

New Script: click on this button to clean script window and edit a new one.

Show Console: click in this box if script result is to be shown.

Clear: click on this button to clean the console window.

Multiple Scripts: click on this button if user needs to load several scripts.

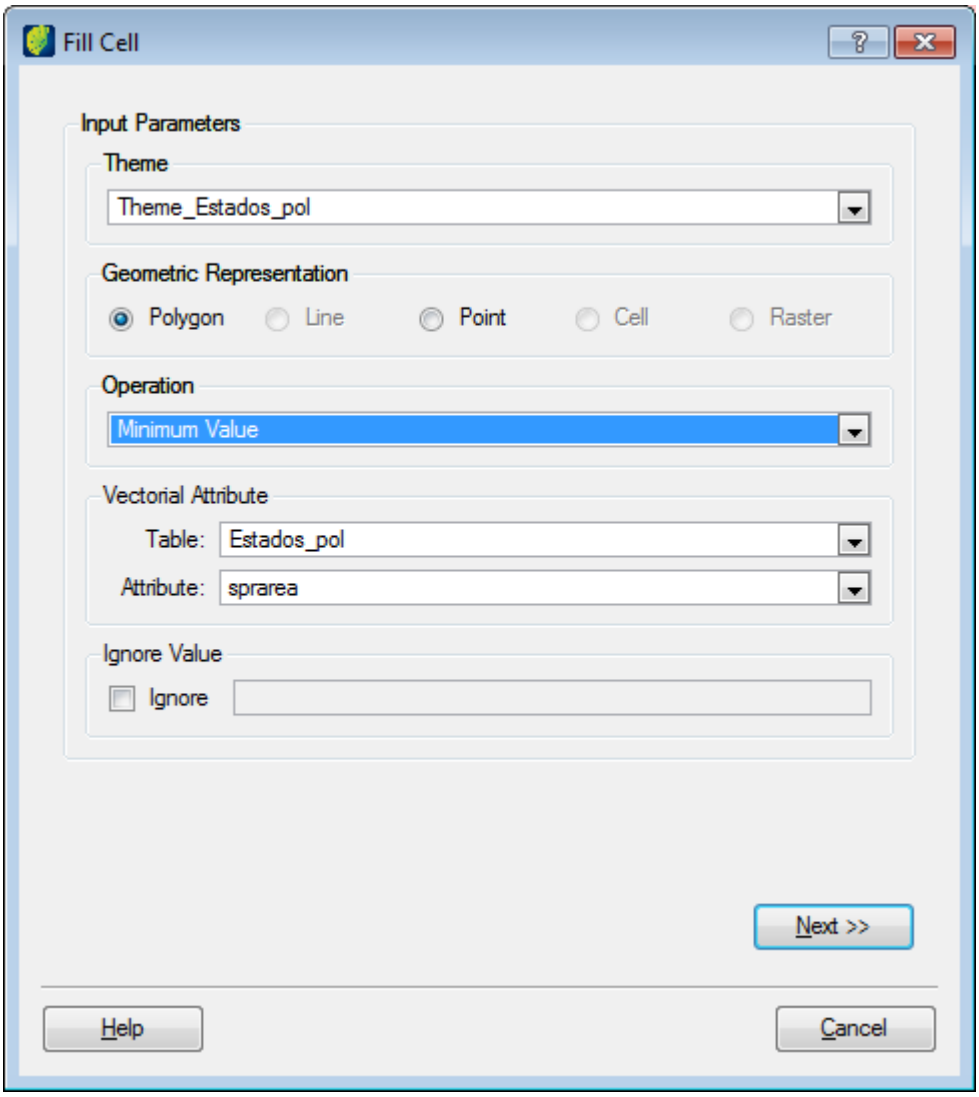
Save: click on this button to save an edited script.

Execute: click on this button to execute the loaded script file.

Note: predefined script files for spatial operation can be downloaded in TerraAmazon home page http://terraamazon.org/images/DocumentacaoTerraAmazon/Documentacao_do_modulo_de_scripts_vetoriais_do_TerraAmazon.pdf.

Fill Cell

Click on PROCESS → FILL CELL.



Input Parameters:

Theme: select one theme from the list

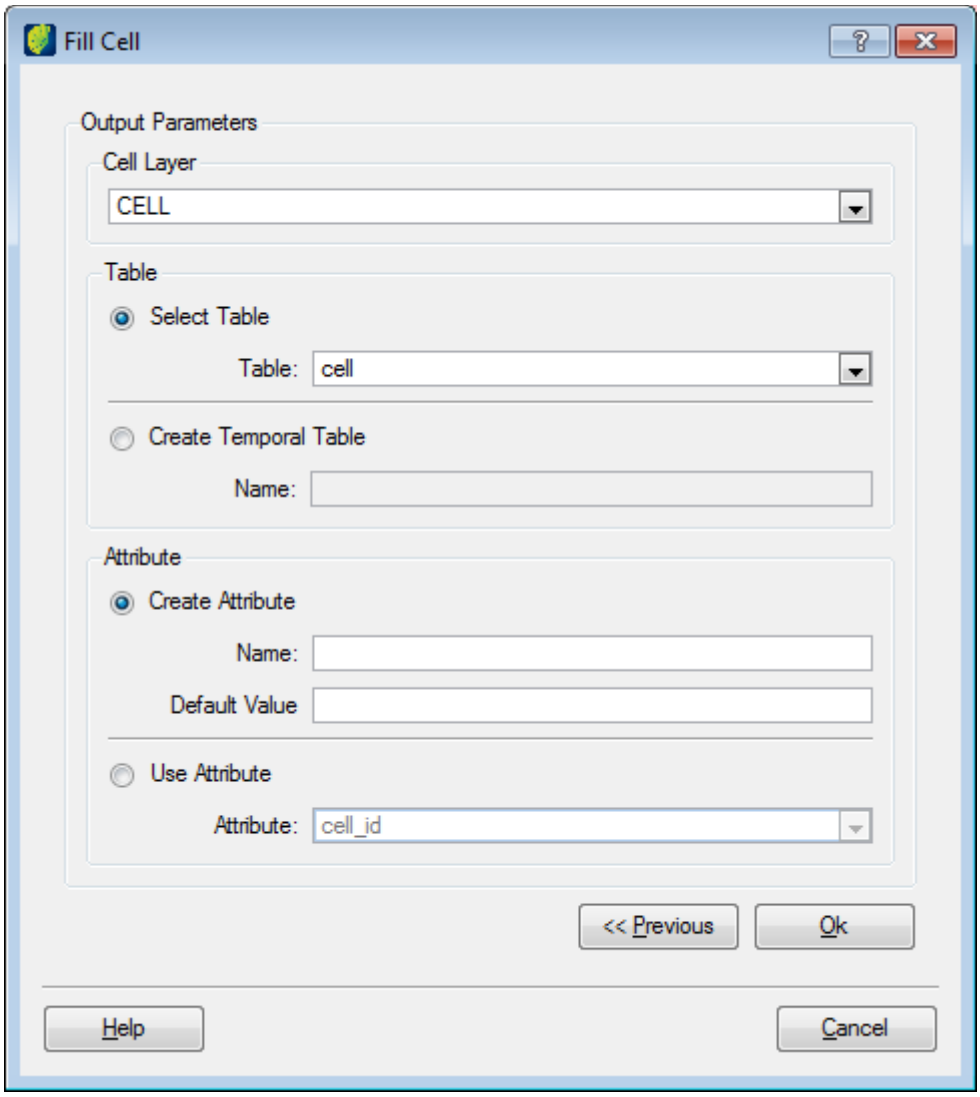
Geometric Representation: depending on the theme choose the type of geometry to use.

Operational: several operations can be applied to obtain the result, select one to be applied.

Vectorial Attribute: depending on the operation this parameters can be configured. Choose the table and corresponding attribute from the lists.

Ignore Value: if some value should be ignored by the operation click on this box and enter the value in the field beside it.

Click on **Next** button.



Output Parameters:

Cell Layer: select a cell layer from the list.

Table: the user can choose one existing table from the list in the first option or create a temporal table by entering a new name in the second option.

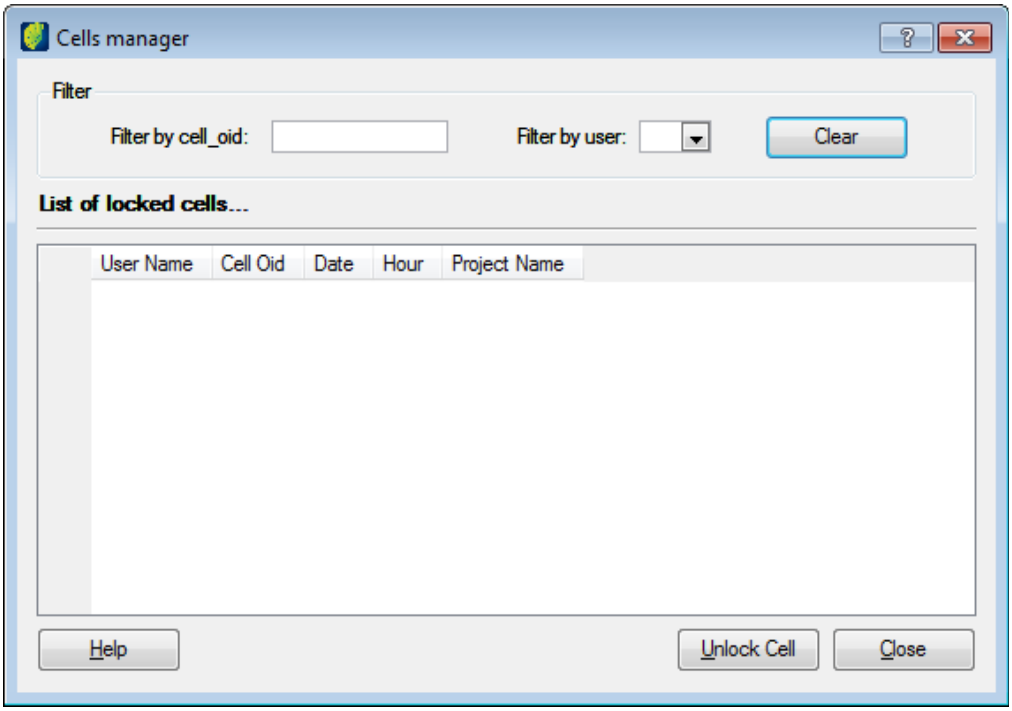
Attribute: in the first option user create a new one by entering the name and default value or in the second one to use an existing attribute selecting one from the list.

Click on the **OK** button.

Checking cell status

The user can get a list with all locked cells.

Click on PROCESS → CELLS MANAGER.



Filter: enter conditions to filter the by cell name or by user.

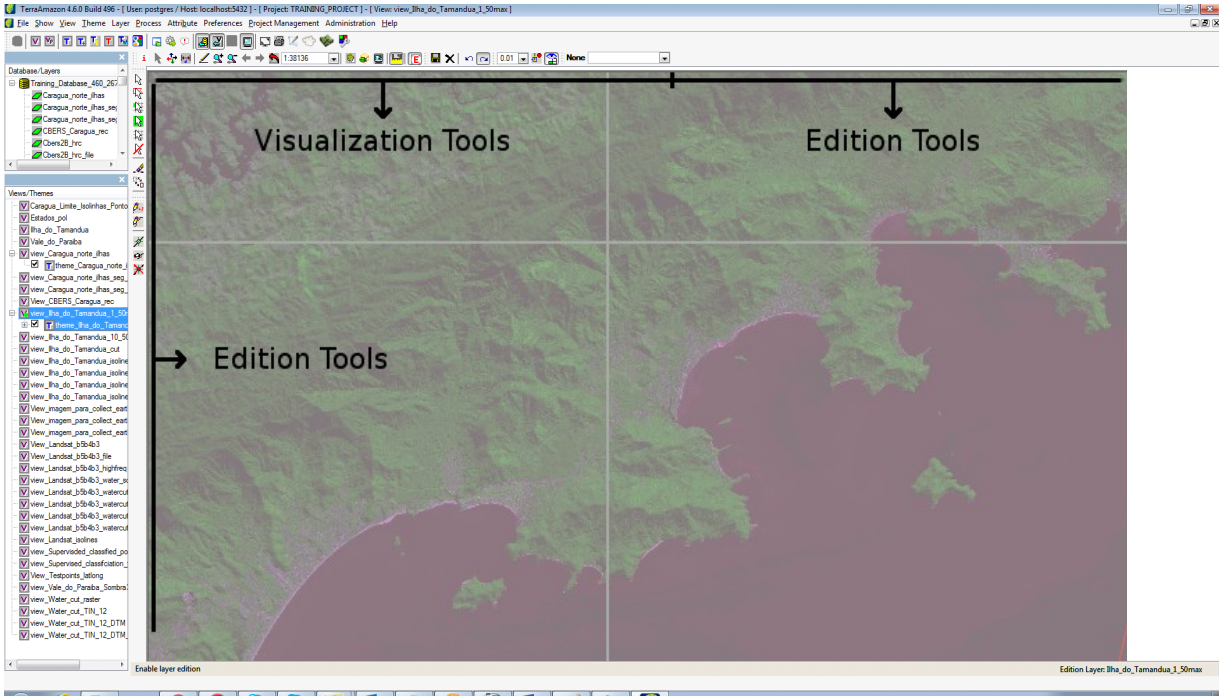
To unlock a cell select one from the list of locked cell and click on the **Unlock Cell** button.

8 Tools

ACCESS TOOLS 138
VISUALIZATION TOOLS 139
EDITION TOOLS 141

TerraAmazon has three different types of tools in on the main interface:

- *Access Tools*: available at any time.
- *Visualization Tools*: enabled only when there is a theme selected to be visualized.
- *Edition Tools*: displayed on the main interface when the user opens the edition mode.



Access Tools

Tools to access databases and its data, interfaces for user-related setups and access to the installed plugins.

Use these tools to:

Connect to TerraAmazon databases (page 10). Administrators may also use it to create new databases (Refer to the Administrator´s User Guide for creating databases).

Create views. (page 22)

Create a project view. (page 23)

Create themes with or without restriction. Refer to Creating Simple Themes, page 31, and Creating Themes with Restriction, page 33.

Create multiple themes. (page 32)

Create an external theme, that is, a theme pointing to another theme previously created in another database or in the same database, but by a different user. (page 37)

Create themes grouped by attribute. (page 34)

Create a WMS theme. Requires internet connection. The user must know the address of the WMS server. (page 43)

Creates a theme with Google™ satellite images. Requires internet connection.

Activating a Project. (page 71)

Process control: Adding Tasks, page 72, and Starting Processes, page 75.

Access the *Scene Revisor* message interface (page 80). Loaded when the *Scene Revisor* message interface is displayed for the first time in the work section, after the user receives a process for his review (page 80).

Show or hide the Database and Layers tree.

Show or hide the Views and Themes tree.

Show or hide the drawing area (or visualization area).

Full Screen mode. Hides database, layers, views, themes and menus. To exit full screen mode, click on the icon .

Access the *TerraPrint* plugin. This icon will only be available if the plugin is installed.

Access the Cloud Detection plugin. This icon will only be available if the plugin is installed.

DTM Plugin: Open the tools to handle quantitative measurements and generate TIN, DTM, volume, profile among other measurements.

Access the *Image Processing* (DIP) plugin. This icon will only be available if the plugin is installed.

Visualization Tools

Tools to display and manipulate the both vector and raster data in the drawing area. All visualization tools are effective on the drawing area only.

To use these tools, you must have a theme pointing to the data (layer) you wish to visualize or manipulate.

To visualize the data for the first time after connecting to the database, select the themes to be displayed by checking their check boxes on the Views and Themes tree.

Click on the tool to visualize it in the drawing area.

> The time required by the system to display the data on the drawing area depends on the amount of data selected to be displayed and on how complex such data is. That is so because a theme can have restrictions in order to point only to part of the data, which as a consequence makes the display process concern only the data effectively pointed by the selected themes, instead of on the total amount of data in their respective layers. Also, the time will depend on the area selected to be visualized, that is, selecting the entire theme (using the *Fit Theme* option, for example) will result in a larger amount of data to be drawn than it would be if a small area would be chosen. For the same reason, visualizing data in a scale of 1:25.000 will be much faster then doing it on 1:100.000, since more data will be visualized.

Information Cursor: queries the geometry´s attributes. Select the tool and on the desired geometry. It has an effect on the geometry of the theme which is active in the Views and Themes tree.

Pan cursor. Click and hold on the drawing area, move to the desired direction and release the click.

Distance Meter. Select the tool and click on the point where you need to start the measurement. Move the mouse to the next point and click to finish. The distance value will be displayed in the Drawing Area Message Bar (page 7).

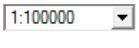
Draw tool. Triggers the data display in the visualization area. The data visualized are determined by the themes which are selected on the Views and Themes tree. That means that TerraAmazon will display only the themes whose visualization scale range (page 52) is within the scale defined to be drawn. Drawing data for the first time will entirely fit all the selected themes in the drawing area. However, the following visualizations will resume the previous one, even after TerraAmazon is closed.

Zoom in. Select the tool and delimit the area to be visualized by holding a click in the visualization area and drawing a rectangle involving the desired area.

Zoom out. Just click anywhere in the drawing area. Multiplies the visualization scale by two.

Previous and Next visualization.

Recompose. Visualization is recomposed to a box that entirely contains the selected themes. Only the themes whose visualization scale range (page 52) is within the scale targeted by the reset tool will be displayed. In case none of the selected themes are allowed to be drawn in the targeted scale, then only the empty box will be drawn.



Scale factor. Select one of the available values, or type the desired value and press

Enter to apply.

Connect View. Alternates between the connected views. First connect the desired views (page 26). Select the tool, click and hold anywhere in the drawing area and move the mouse to create a rectangle and then release the click. Right-click to alternate between the connected views. Use the up and down arrows from the keyboard to choose the view to be displayed in the connected rectangle. Click on the tool to release it.

Connect View (Current Box). Connects the entire drawing area. First connect the desired views (page 26). Right-click anywhere in the drawing area to alternate between the connected views. Use the up and down arrows from the keyboard to choose the view to be displayed. Click on the tool to disconnect the box.

Show the auxiliary window Side Display. Click to show the display. Then click on the display and select the *View* that will be visualized. The Side Display is only for visualization, no edition is possible. Click on to attach the Side Display to the Main Display so that navigation is synchronized. Click on to dock the Side Display on the Main Interface, next to the Main Display.

Show or hide the graphic scale in the visualization area.

Enable Layer Edition. Opens the edition mode. Takes effect on the active theme.

Edition Tools

Tools for vectorial editions and classification process. These tools are displayed on the main interface only when the user opens the edition mode (page 82).

Tools effective on Direct Edition are identified with DE and tools effective on Edition Through Project are with ETP.

Select geometry. Click on the desired geometry to select it. Hold the *Ctrl* key to select more than one geometry. (DE, ETP)

Select by Drawing Area. Click and hold anywhere in the visualization area and move the mouse to cover the area that contains the desired geometries. Every geometry touched by the tool will be selected when the click is released. (DE, ETP)

Select cell. Activate the tool and click on the cell to select it. Click on a selected cell to release it. Cells that have been previously selected by a user are said to be “locked cells” and cannot be selected by anybody else working on any of the projects from that database. After selecting the desired cells, click once again in the tool to release it and resume the data visualization. The number of cells that can be selected using this tool will depend on the project´s configuration. It is only possible to select cells that are completely or partly within the Area of Interest defined by the started process (page 75). (ETP)

Select cells in the box. Click on the tool and TerraAmazon will select as may cell as possible among the cells displayed in the drawing area. The number of cells that can be selected using this tool will depend on the project´s configuration. It is only possible to select cells that are completely or partly within the Area of Interest defined by the stared process (page 75). (ETP)

Unselect all cells. Click on the tool and all of your selected cells will be released. However, it does not release the cells you have selected in a different project. (ETP)

Unselect all polygons. Click on the tool and all highlighted polygons will be cleared.

Delete geometries. Use one of the selection tools to select the geometries you wish to remove and click on this tool to delete. Deletion is permanent. (DE, ETP)

Move geometries. Use one of the selection tools to select the geometry to be moved. Then, use this tool to move the geometry. Save the changes with the right-click or with the tool . (DE)

Create polygon. Click to insert points to the polygon and right-click to finish the polygon. Every polygon created is automatically selected when finished. Visualization tools can be used while creating polygons without releasing this tool. (DE, ETP)

Continuous polygon. Click and hold while drawing the polygon. Right-click to finish it. It is possible to draw part of the polygon, release the click, then click again and keep drawing the same polygon as many times as needed until you right-click to finish. Every polygon created is automatically selected when finished. (DE, ETP)

Create line step by step. Click to insert points to the line and right-click to finish the line. Every line created is automatically selected when finished. Visualization tools can be used while creating polygons without releasing this tool. (DE)

Continuous line. Click and hold while drawing the line. Right-click to finish it. It is possible to draw part of the line, release the click, then click again and keep drawing the same line as many times as needed until you right-click to finish. Every line created is automatically selected when finished. (DE)

Create point. Click to create a point and right-click to save it. Many clicks will create many points. Right-click will save all the created points at once on the database. (DE)

Split Polygon. Cut a polygon in two or more new polygons. Use one of the selection tools to select the polygons that will be split. Click on the *Split Polygon* tool and draw a line where the split will be applied, right-click to finish. (DE)

Magic Wand. Select a area when a vector theme is associated (overlayed) with a raster theme. The generated geometries by the magic wand initially are in the computer memory, and clicking on the **ESC** button, they are removed. Once the classification is done the polygons are stored in the output layer and can only be removed using the clear tools. (DE, ETP)

Magic Wand Accuracy. It shows up when the magic wand tool is selected. It adjusts the area size covered when the wand touches the visualization area.

Clear current class. Use the same way as the *Clear classification* tool. The difference is that this too affects only the polygons in the output layer that stores the class currently selected in the class box. If the project has only one output layer for all of it´s classes, then both clear tools will ha the same final result. (ETP)

Clear classification. Removes the areas of the output polygons that are overlapped by the input polygons. Use one of the tools to draw the input polygons on the area you wish to clear, drawing over previously classified polygons, if necessary. Click on this tool to clear. You can also use one of the selection tools to select either polygon from the draft layer (input polygons) or from the output layer itself and then click on this tool to clear. Affects only the polygons in the output layers. (ETP)

Classify geometries. Create new input polygons, using one of the provided tools, or select existing polygons, by using one of the selection tools and chose the new class to be applied to them. Click on this tool to trigger the classification process and apply the class to the polygons. (ETP)

Reclassify. Changes the classification applied to previously classified polygons. Use one of the selection tools to select the desired polygons and chose the new class to be applied to them. Click on this tool to reclassify. It is also possible to draw new input polygons, using the drawing tools, and then click on this tool to reclassify. (ETP)

Select multi-layer. Select geometries from the output layers that are visible in the drawing area. Click on the desired polygon to select it. Hold the *Ctrl* key to select more than one geometry. (ETP)

Select area multi-layer. Select geometries from the output layers that are visible in the drawing area. Click and hold anywhere in the visualization area and move the mouse to cover the area that contains the desired polygons. Every polygon touched by the tool will be selected when the click is released. (ETP)

Reference Rectangle. Shows at the end of the cursor a square to be used as a reference to a certain area value. Click on the tool and move the mouse into the drawing area. The rectangle will be displayed until the tool is released by clicking again on it. Have and

Administrator User inform you about the area represented by the tool. (DE, ETP)

Insert vertex. Insert a new vertex in a geometry. Use one of the selection tools to select the geometry in which the new vertex will be created. Click on the *Insert Vertex* tool and click where the vertex must be inserted, then right-click to finish. Available for lines and polygons. (DE)

Move vertex. Move a vertex of the geometry. Use one of the selection tools to select the geometry that will be modified. Click on the *Move Vertex* tool and drag the desired vertex to the new position, then right-click to finish. Available for lines and polygons. (DE)

Delete vertex. Delete a vertex of the geometry. Use one of the selection tools to select the geometry that will be modified. Click on the *Delete Vertex* tool, click at the vertex to remove it, right-click to finish. Available for lines and polygons. (DE)

Aggregate Area. Adds a new area to the polygon. Use one of the selection tools to select the geometry that will be modified. Click on the *Aggregate Area* tool, draw the additional area. The new area must intercept the selected polygon. It is necessary to save the change using the save tool . (DE)

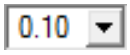
Remove Area. Remove a determined area from the polygon. Use one of the selection tools to select the geometry that will be modified. Click on the *Remove Area* tool, draw the area that will be removed. The drawn area must intercept the selected polygon. It is necessary to save the change using the save tool . (DE)

Unite polygons. Attach two or more polygons keeping the attribute of one of them. Use one of the selection tools to select the geometries that will be united. Click on *Unite polygons* tool, select the *Id* of the polygon whose attributes will be kept. It is necessary to save the change using the save tool . (DE)

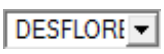
Save. Saves the changes made in existing polygons using one of the tools: *Aggregate Area*, *Remove Area* and *Unite Polygons*. In some tools, Save has the same effect as a right-click. (DE)

Cancel editions. Click on this tool to remove unfinished polygons, that is, polygons that were not yet finished by a right-click. This tool does not alter polygons already finished or classified. (DE, ETP)

Undo and Redo. When inserting points to create polygons, use these tools to undo or redo point insertions. Only works on unfinished polygons, that is, the ones that were not yet finished by a right-click. (DE, ETP)



Digitalization step (mm). Defines the step between points inserted by the continuous tool to create polygons . (DE, ETP)



Class box. Shows the classes available for the active project. Select the desired class in this box and then use one of the classification tools to attribute it to the outcoming polygons of the classification process. (ETP)

Snap tool. Attracts the cursor to vertexes and edges of existing polygons. Click on this tool to turn it on and then select one of the tools to create polygons. When the cursor is attracted to a vertex, a yellow square appears at the end of the cursor. When it is attracted to an edge, a blue square appears. Click again on the tool to turn it off. This tool can be turned on and off at any time during vectorial edition. (DE, ETP)

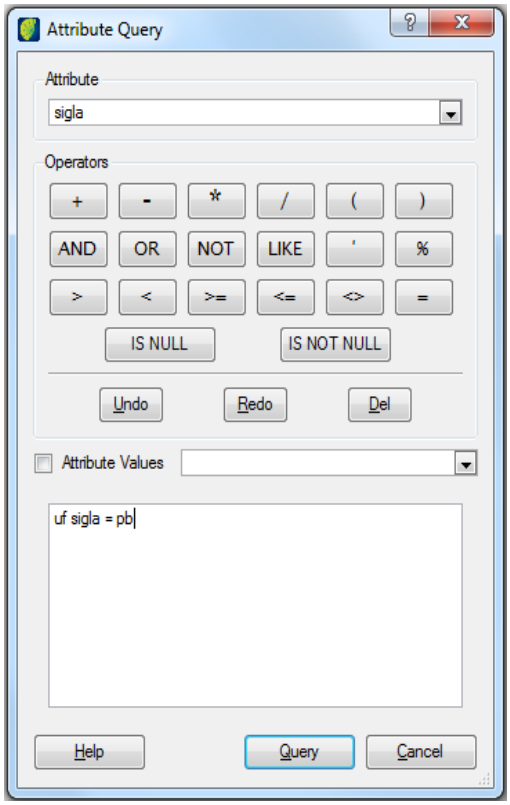
View cells. Enables the visualization of the cells locked by other users. Click on this tool to activate or deactivate at any time during vectorial edition and redraw using to update visualization. (ETP)

Appendix A

Composing Restrictions

Composing restrictions is possible in different situations, all related to vector data only.

In every case, the interface and the way to use it is the same. Sometimes the interface comes embedded in a larger one (such as when creating themes with restrictions, page 33, or when finding geometries, page 54); sometimes it comes alone (such as when applying restrictions to themes grouped by attribute, page 34, or when deleting objects from layers, accessed by Administrator Users only), but the usage remains the same.



Attribute: this floating menu shows the attribute columns of the selected layer. Open the menu and click on the desired column name. It will be inserted in the resulting restriction field.

Operators: use the available operators to compose the restriction.

Attribute Values: this floating menu displays all the existing values for the attribute selected in the *Attribute* floating menu. Values are listed when the check box is checked.

Query: apply the restriction. This button is enabled or disabled depending on how the interface is accessed. When disabled, refer to the current interface´s usage.

It is also possible to type the desired restriction directly in the resultant restriction field.

This interface allows as many combined restrictions as necessary.

The highlighted area in the figure above shows a possible restriction applied to a layer that has two types of attributes: “classification_output”, representing the classes applied to polygons through the classification process; and “polygon_area_m2”, representing the area of the polygons in square meters (m²).

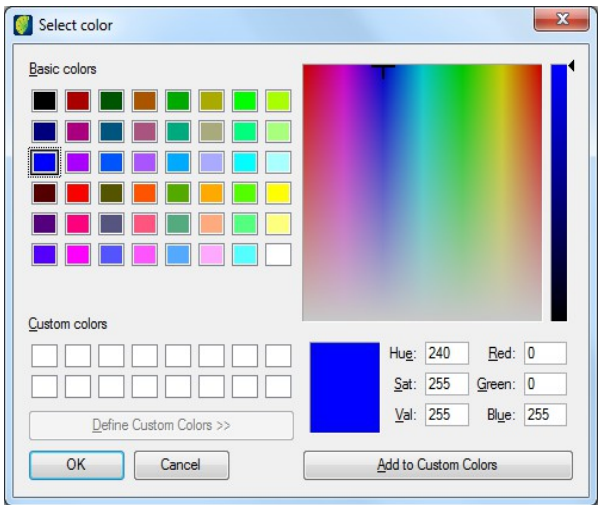
This restriction will result in the polygons classified as “DEFORESTATION” that have areas larger or equal to 62500 m².

Appendix B

Defining Colors

There are three ways to define colors in the Select Color interface:

- clicking directly in one of the Basic Colors
- clicking anywhere on the color gradient and, if necessary, adjusting the intensity through the vertical side bar at the right (notice a small black arrow: click on it and slide it up/down)
- typing the values for Red, Green, Blue, Alpha Channel, Hue, Saturation and Value (color systems RGB and HSV).



Select PREFERENCES / GRAPHIC SCALE COLOR

Use the **Add to Custom Colors** button to store the chosen colors for later use in other themes or parameters.

Click on the **OK** button to apply the color.

Appendix C

Setup for External Theme

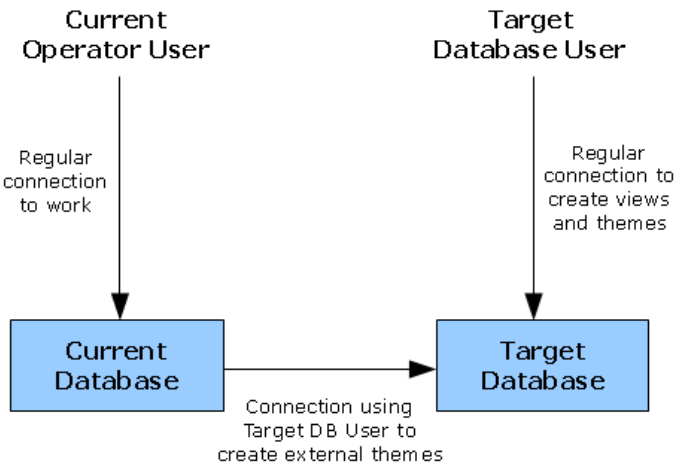
Before being able to create external themes, a few procedures must be made.

Considering that Views and Themes are user-related entities, visible only to the user who creates them, External Themes require a connection from one specific user.

The reason why it is so is that External Themes are essentially different than regular themes: while these point to LAYERS, external themes point to THEMES.

So one user must create such themes so that external themes can point to them. And since themes are user-related, that same user must be used to create the connection described on Adding Connections, page 38.

Being so, have an Administrator User provide you the name and password of the user that must create the theme. Once you have that, log directly into the target database, that is, the TerraAmazon database that stores the data needed to be accessed by an external theme.



In the target database, create the necessary views and themes. If any image processing is needed, such as a histogram manipulation, it must be done in these themes or in the layers to which they point, directly in the target database.

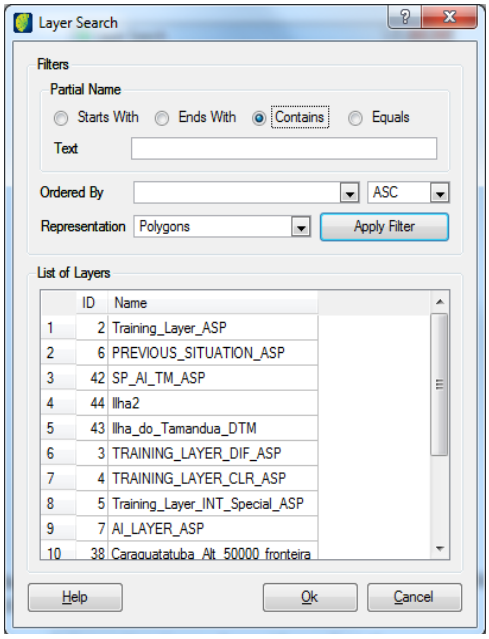
After setting up views and themes in the target database, it is done. Users from the current work database can now create external themes.

Logoff from the target database.

Appendix D

Search Window

The search window appears on many different interfaces and the way to use it is the same in all of them. It is a simple window composed by two parts: a filter to improve the search and the list of layers.



Partial Name: select the criteria among the available options (Starts With, Ends With, Contains, Equals) and type the text to search for.

Ordered By: choose the ordering option (name, layer_id or select the empty option) and the listing option (ascendent or descendant)

Representation: choose the representation of the searched layer (Points, Lines, Polygons, Text, Cells, Raster or select the empty option).

Click on the **Apply Filter** button**.**

List of layers: this area presents the result of the search. Click on the desired layer to select it and click on the **OK** button.

In some situations, it is possible to select more than one layer.

Abbreviations and Acronyms

CCD	Charge Coupled Device
CRA	Centro Regional para Amazônica (Amazon Regional Center)
DEGRAD	Sistema de Detecção de Áreas de Degradação Florestal na Amazônia Legal Brasileira
DBMS	Database Management System
DEM	Digital Elevation Model
DESM	Dynamic Earth System Model
DETER	Sistema de Detecção do Desflorestamento da Amazônica Legal Brasileira em Tempo "Quase" Real
DETEX	Sistema de Detecção de Exploração Seletiva de Madeira na Amazônia Legal Brasileira
DIP	Digital Image Processing
DTM	Digital Terrain Model
EO	Earth Observation
ETM+	Enhanced Thematic Mapper Plus
GCP	Ground Control Point
GIS	Geographic Information System
HLS	Hue, Saturation, Lightness
HRC	High Resolution Camera
IHS	Intensity, Hue, Saturation
LUT	Look Up Table
OGC	Open Geospatial Consortium
PALSAR	Phased Array Type L-Band Synthetic Aperture Radar
PRISM	Panchromatic Remote-Sensing Instrument for Stereo Mapping
PRODES	Projeto de Monitoramento do Desmatamento na Amazônica Legal por Satélite
SWIR	Shortwave Infrared
TERRACLASS	Projeto de Mapeamento de Uso da Terra na Amazônia Legal Brasileira
TIN	Triangle Irregular Network
TIR	Thermal Infrared
TM	Thematic Mapper
WFI	Wide Field Imager
WMS	Web Map Service

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