

## **Administrator's Guide**

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INPE / FUNCATE

# **TerraAmazon 4.6.3**

## **User's Guide**

### **Administrator**

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## Summary

Preface.....	i
Welcome to TerraAmazon.....	i
Involved Institutions.....	ii
TerraAmazon Documentation.....	iii
1 Introduction to TerraAmazon.....	1
What is TerraAmazon.....	1
TerraAmazon Model.....	2
Access Control, Users and User Groups.....	2
Cell Layer.....	3
Class.....	4
Classification Process.....	4
Database.....	4
Conceptual Model.....	4
Edition Layer (or Input Layer).....	5
Edition Mode.....	5
Interest Area (or Area of Interest).....	5
Layer.....	5
Output Layer.....	6
Phase.....	6
Project.....	6
Rule.....	7
Scenario.....	7
Theme.....	8
View.....	8
Starting with TerraAmazon.....	9
Presenting the Main Interface.....	10
Administrator Roles.....	11
2 Accessing the Database.....	13
Creating a Database.....	14
Creating the Conceptual Model.....	16
Using an Existing Cells Layer.....	19
Checking cell status.....	20
Connecting to a Database.....	21
Copying the database.....	22
Copying table.....	25
Copying a project.....	27
Checking connected users.....	29
Process Analysis.....	30
Changing user encoding.....	31
Cleaning the database.....	32
Viewing the activities history.....	33
Viewing notifications.....	34
3 Users and User Groups.....	35
Creating Users.....	36
Removing Users.....	37
Changing Password.....	38
Creating Groups.....	39
Removing Groups.....	41
Associating Users & Groups.....	42
4 Phases.....	43

Creating Phases.....	44
Associating Phases & Groups.....	45
Removing a Phase.....	46
5 Project.....	47
Creating, Updating and Removing a Project.....	48
Defining Project Work Scale Range.....	50
Defining Tags.....	51
Sending message.....	52
6 Classes.....	53
Creating and Updating Classes.....	54
Creating Class Groups.....	55
Inserting Classes into Class Groups.....	56
Exporting and Importing Classes.....	57
Importing Land Cover Classification System (LCCS) files.....	58
Associating loaded LCCS classes.....	59
7 Rules.....	65
Operations Available for the Rules.....	65
Creating Rules.....	67
Intersection Rule.....	68
Difference Rule.....	69
Clean Rule.....	70
Exporting Rules.....	71
8 Rules Control.....	73
Rules Control Parameters.....	74
Defining Output Layers.....	76
Associating Output Layers with a Project.....	77
Associating Rules with an Output Layer.....	78
Associating Attributes with an Output Layer.....	79
Associating Class Columns with Output Layer.....	81
Associating Classes with Output Layers.....	82
Associating Clean Rules with an Output layer.....	83
Validating an Output Layer.....	84
9 TerraAmazon Project Wizard.....	85
Starting TerraAmazon Project Wizard.....	86
Creating users.....	87
Group.....	88
User x Group.....	89
Project settings.....	90
Creating rules of the project.....	91
Associating rules to the output layer.....	92
Associating attributes to output layer.....	93
Creating new classes.....	94
10 Defining AI and Scenarios.....	95
Defining AI Layer and Scenarios.....	96
Changing a Scenario Date.....	99
Locking a Scenario.....	100
11 Project Dependencies.....	101
Consulting Project Dependencies.....	102
Understanding the Dependencies List.....	104
12 Database Handling.....	107
Database Properties.....	108

Creating Layers.....	109
New Layer.....	110
New Layer Based on Another Layer.....	113
Create Layer from Theme.....	115
Importing Vector Data.....	116
Simple Import and Mosaic Import .....	117
Multi Import.....	119
Importing Single Raster Data.....	121
Data Characteristics.....	121
Geographical Characteristics.....	122
Storage Characteristics.....	123
Multi Resolution Characteristics.....	125
Importing Multiple Raster Data.....	126
Data Characteristics.....	126
Geographical Characteristics.....	127
Storage Characteristics.....	128
Multi Resolution Characteristics.....	129
Importing a Point Table.....	130
Importing PostGIS Data.....	133
Vector Layers Export.....	134
Vectorial Export.....	135
Vectorial Themes Export.....	136
Vectorial Grouping Export.....	137
Exporting Multiple Raster Themes.....	138
Exporting to a FTP server.....	140
Copying Layers between Databases.....	142
Changing the Cell Layer.....	144
Creating a New Cell Layer.....	144
Changing the Active Cell Layer.....	145
Updating Project Setups.....	146
Removing Layers.....	149
Clear Layer Data.....	151
Deleting Specific Objects of a Layer.....	152
Locking Layers.....	153
Index Manager.....	154
Attribute Table Maintenance.....	155
Column Tab.....	156
Update Tab.....	158
Advanced Tab.....	160
13 Backup & Restore Databases.....	161
Creating a Backup.....	162
Restoring a Backup File.....	163
Appendix A.....	164
TerraAmazon Installation .....	164
Running TerraAmazon Installer.....	164
Setting up a Client-Server Environment.....	165
Possible Setups.....	165
Appendix B.....	167
Configuring a PostgreSQL server.....	167
Defining ips with access to server .....	168
Authentication.....	169
Opening PostgreSQL port in the windows Firewall.....	170

Appendix C.....	171
TerraAmazon Data Model.....	171
Table summary of TerraAmazon 4.x model.....	171
Relation table of user group entities and processing phases.....	171
Relation table of user and user group.....	172
Relation table of project and scene entities.....	172
Relation table of used scene by user and revision process.....	172
Relation table of topological rule and input layer to the selected spatial operation....	173
Relation table of rules and topological rule set.....	173
Relation table of project and associated rule set.....	173
Relation table of task and projec.....	174
Relation table of task and tasklog (task execution time).....	174
Appendix D.....	175
User Structures: before and after the Conceptual Model.....	175
Appendix E.....	177
Composing Restrictions.....	177
Appendix F.....	179
Shapefile Size Limitation.....	179
Abbreviations and Acronyms.....	180
Bibliography.....	181

## Preface

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### 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 work time records for project control. It's functionalities are extensible through plugins, such as the already existing TerraImage (DIP) 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 it's 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 trainings 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](http://www.gnu.org).

TerraAmazon is available for download at [www.terraamazon.org](http://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](http://www.inpe.br)

**INPE CRA**, *Amazon Regional Center*, is an INPE unit settled in Belém, State of Pará, 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](http://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, estimation of GHG emissions due to land use and land cover change as well as many others. FUNCATE has relations with Brazilian research partners, such as INPE and others. FUNCATE is involved with TerraAmazon by programming the software, developing and enhancing tools, testing, writing the user's guides, developing and maintaining the website as well as other related activities.

[www.funcate.org.br](http://www.funcate.org.br)



## TerraAmazon Documentation

TerraAmazon has the following documentation available for download at [www.terraamazon.org](http://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.

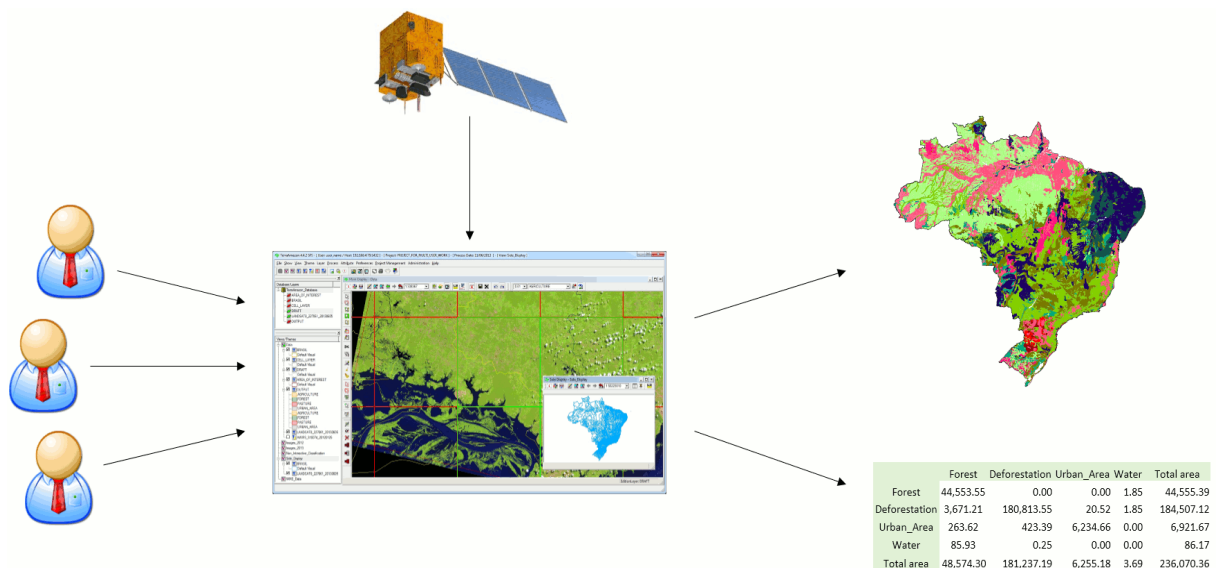
# 1 Introduction to TerraAmazon

WHAT IS TERRAAMAZON	1
TERRAAMAZON MODEL	2
STARTING WITH TERRAAMAZON	9
PRESENTING THE MAIN INTERFACE	10
ADMINISTRATOR ROLES	11

## 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 was entirely produced under the same methodology.

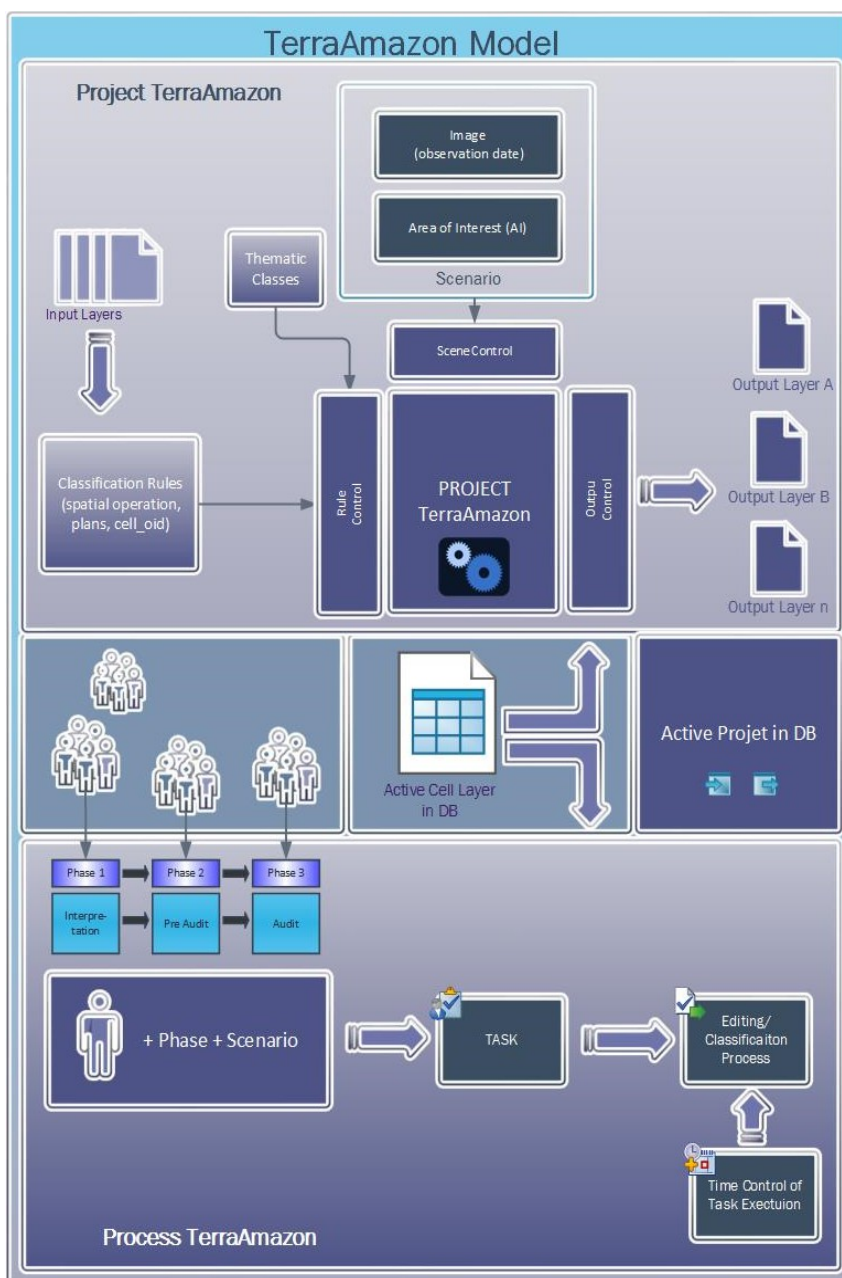
The spatial operations between vector data allow transitions analysis among other applications.

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](http://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. The internal structure of tables is the subject of Appendix C, page 171.



### Access Control, Users and User Groups

TerraAmazon has two user levels: Administrator and Operator. The Administrator User has full access to all the menus, while the Operator User has not. Through the definition of users, each with a cryptographic password, and user groups it is possible to control the access to different system functionalities.

Users can only be created in databases that have the conceptual model. Without it, only DBMS users have access to the database.

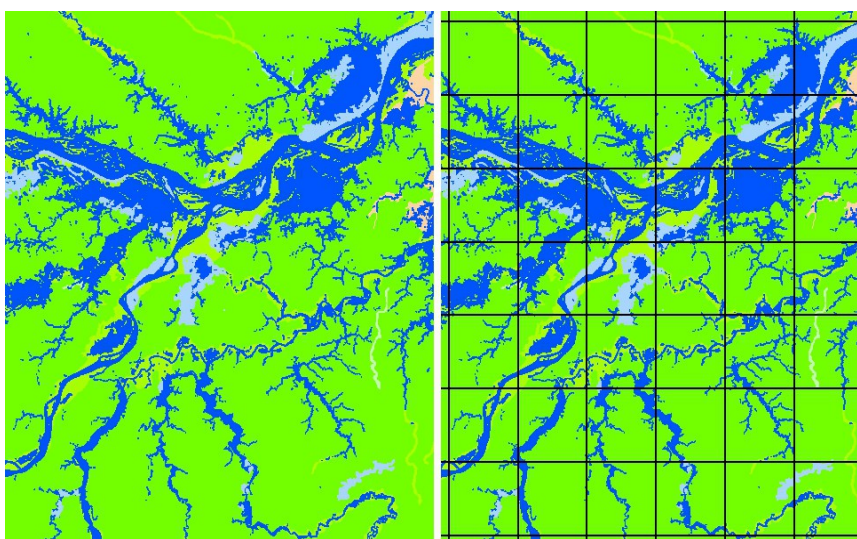
DBMS users open connections as Administrator Users, unless configured otherwise in the DBMS. For that reason, it is strongly advised to keep DBMS users & passwords under protection in corporate environments. This type of user is not a TerraAmazon user.

## Cell Layer

Vector layer with a different type of representation: cell. TerraAmazon requires the existence of a cell layer for project configuration and for most of the spatial operations available. There are several reasons for that:

1. Reduction of data complexity: vector data can be extremely complex since TerraAmazon allows projects to have geographic working areas of continental size. By using a cell layer, the data is cut into tiles, greatly reducing the complexity of polygons.

The left side of the following figure shows an area 175km wide in the Amazon region (Lat. -3:20 Long. -58:45) in which there are complex polygons covering large areas. The right side shows the same area cut into square tiles 28km wide by a cell layer. Even though this increases the number of polygons, their complexity is greatly reduced, resulting in a significant gain in performance.



2. Enable multi-user vectorial edition: vector data can be edited by different users at the same time within the same project due to cell cut in data. During vectorial edition, each Operator User locks one or more cells to work on. Once a cell has been locked by a user, no other user can edit the data within that cell, but all of them can visualize it and edit the data in unlocked neighbor cells. A user sees his own locked cells with a green border line and the cells locked by other users with a red border line.

When a cell is locked by a user for a vectorial edition, and the first polygon classification is executed, TerraAmazon stores all contents of that cell in the local computer. The changes made are stored in the database each time classification is executed.

This guarantees that only one user at a time works within the boundaries of each cell. Once that user unlocks the cell, then any other user can lock it and work on it as well. This also reduces the frequency of access to the server during work.

The entire amount of data within the boundaries of the selected cells are first stored in local memory at the moment of the first classification, which occurs when the user clicks on one of the two classification tools, or . This means that if the user has 20 selected cells, the first classification will store in local memory the contents of the 20 cells, even if they are not all being visualized in the display area. In order to prevent that, the Administrator User must define for each project a limit of cells to be simultaneously selected by each user.

3. Spatial operation optimization: most of the spatial operations available in TerraAmazon require that the input data is first submitted to an intersection with the cell layer. This contributes to optimizing the operation time since TerraAmazon only compares data carrying the same cell identification.

## Class

Classes are the attributes that will be applied to polygons through the classification process. They can be a 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 specifically within the edition through projects.

## Database

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

## Conceptual Model

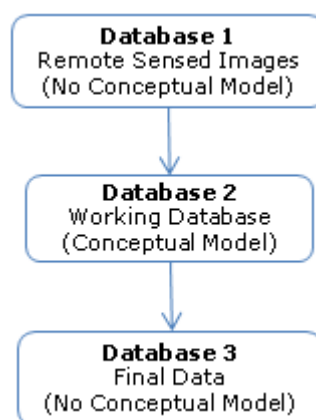
The database used by TerraAmazon has the model for storing geographical data proposed by TerraLib, inheriting its conceptual model. In TerraAmazon, the act of creating the conceptual model refers to a simple administrator procedure that results in the creation of an internal structure of tables, enabling every multi-user and project configuration (Refer to Appendix D, page 175, for details on user structure change due to the conceptual model). Such procedure also involves the creation of a cell layer.

The conceptual model is not automatically created because TerraAmazon must be able to connect to databases built by other TerraFamily applications, such as TerraView, without causing them changes. For that reason, TerraAmazon requires that the conceptual model is intentionally created when needed.

In TerraAmazon the creation of the conceptual model is required only if there is the intention of performing advanced vectorial editions in the database.

If a database is created exclusively for storage and visualization, then the conceptual model is not necessary. This type of database is useful to store final products or remote sensed images to be accessed through another database for multi-user vectorial edition. Using this type of database is part of an advanced working method that has advantages when applied to corporate environments. It increases database security and decreases the total time needed for database backup.

The following figure shows a scheme of this method of working with independent TerraAmazon databases and the need of the conceptual model in each one.



Database 1 is a database storing only remote sensed images and is not meant for any sort of vectorial edition. This type of database does not need the conceptual model. The lack of the internal structure of tables built by the conceptual model is good in this case, reducing the size of the database and the time needed for backup.

Database 2 is the working database. It needs the full project configuration for multi-user advanced vectorial editions. This type of database requires the existence of the conceptual model.

Database 3 is a database created exclusively for storing the final products. This is good for organizing the data and for increasing data security. This type of database does not need the conceptual model. The lack of the internal structure of tables reduces the size of the database and the time needed for backup.

### **Edition Layer (or Input Layer)**

Layer used as a draft in the classification process. A theme pointing to an input layer must be active to enable the edition mode. Once the user has opened the edition mode, every geometry created in it is instantly stored in the draft layer. It is necessary to trigger the classification process through one of the classification tools in order to store the classified output data in the output 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 enabled 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 and its attributes must be applied to each polygon by typing the values in the attribute pop-up interface, activated by the menu *Attribute* → *Show Attribute Window*. In this case, the classification tools are not functional and nothing happens if 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 10).

Vector data can have three types of representation: polygons, lines or points. Inside the database, each vector layer has two tables: geometries and attributes tables. The geometries table stores the geometric information of each polygon while the attributes table stores the attributes associated to each polygon stored on the geometries table. Both tables have one column in common which is the link between them.

However, TerraAmazon SFS version has a different structure of tables for vector data: complying with the Simple Feature Specification model, geometries and attributes are stored in the same table.

Advanced: on the TerraAmazon SFS version, the table, containing geometries and attributes, has the same name as the layer. As for the other versions, the attributes table has the same name as the layer, but the name of the geometry table is composed by *polygons* + *<layer\_id>*, where *layer\_id* is found in the table *te\_layer* or in the field *Infolayer Identifier* of the layer's properties accessed by the right-click on the layer. For example, a layer with "layer\_id = 3" will have a geometry table named "polygons3".



As for raster layers, the amount of tables for each layer depends on some conditions, varying from 2 to 4 tables. Refer to TerraLib documentation for further details on tables at [www.terralib.org](http://www.terralib.org). Raster data are stored the same way on both SFS and non-SFS versions.

Layers are visible to all users.

## Output Layer

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

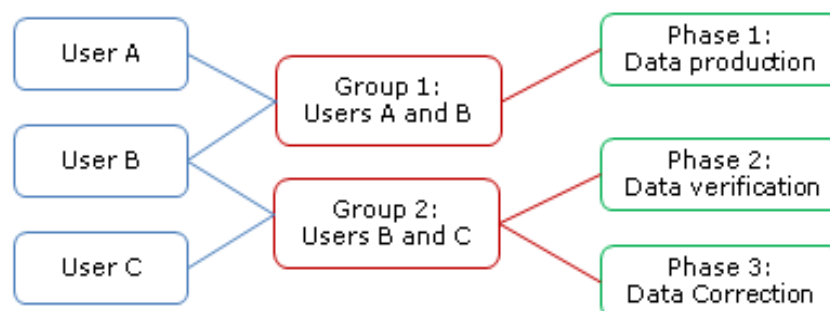
- Vector or raster processed and saved by the TA operation, for example, creating a buffer.
- Destination layer for the resulting output of the classification process in a project. Different classes can have different output layers. Output layers cannot be used to access the edition mode.

## 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.

Phases are related to users through user groups: every user belonging to a user group related to a certain phase can perform vectorial editions in that phase.

The following figure is an example of phase association with user groups and users.



User A is allowed to perform vectorial editions only in Data Production phase (Phase 1) since he belongs exclusively to Group 1 which is only associated to phase 1.

User B is allowed to perform vectorial editions in all phases since he belongs to both user groups.

User C is allowed to perform vectorial editions in Data Verification phase (Phase 2) and Data Correction phase (Phase 3).

As an example of this method of working with phases, a project could be executed with the following stages: User A producing the data while User C would verify the results; User B could either help User A with data production or help User C with the verification. If at some point there is the need of correcting data without stopping User A, then Users B and C could do that.

## Project

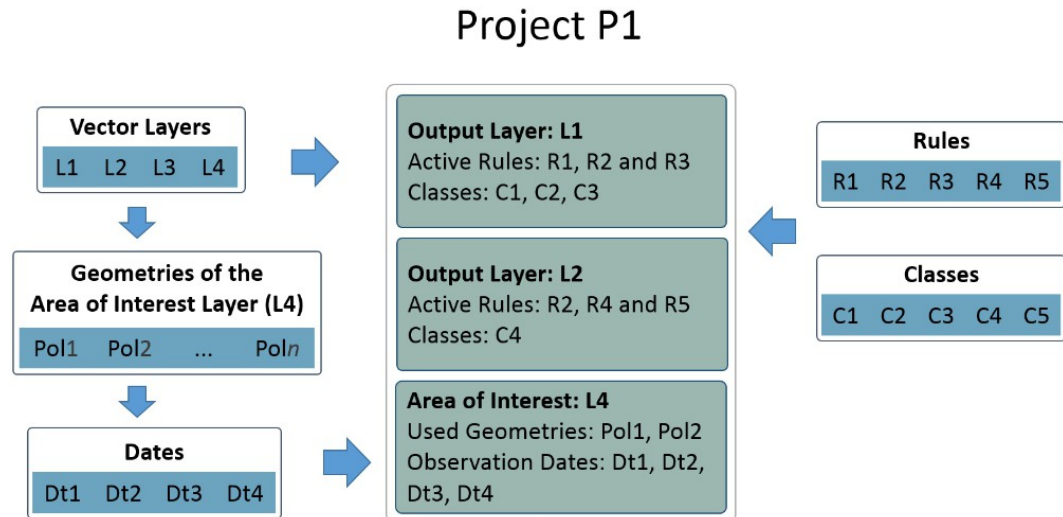
In TerraAmazon, a project is a package that identifies:

- the *set of rules* that will be active in the classification process
- the *classes* involved
- the *output layers*
- the *interest area* layer and the geometries in use

- the *dates* available for interpretation

Besides the vectorial edition through projects, no other procedure in TerraAmazon requires the existence of a project.

The following figure shows the package identified by a project.



Each project can have more than one *output layer* for the classification process (in this example there are two: *L1* and *L2*).

For each output layer, a set of rules and a set of classes must be configured.

The rule can be associated to more than one output layer. In the example above, the rules *R2* is associated with both output layers available. For the definition of Rule, refer to page 7.

Classes can only be associated to one output layer each. When a polygon is classified with that class, the resulting polygon will be stored in the output layer with which the class is associated. For example, if the class *C1* is selected in the project presented in the figure above, the resulting geometry will be stored in the output layer *L1*. If, however, *C4* is selected, then the output layer will be *L2*.

Notice that the class *C5* is not used in this project. The layer *L3* is not used either. Also, in the Area of Interest layer, only the first two geometries are used. This is possible because a project is composed of independent structures stored in the database. They can be associated to one or more projects.

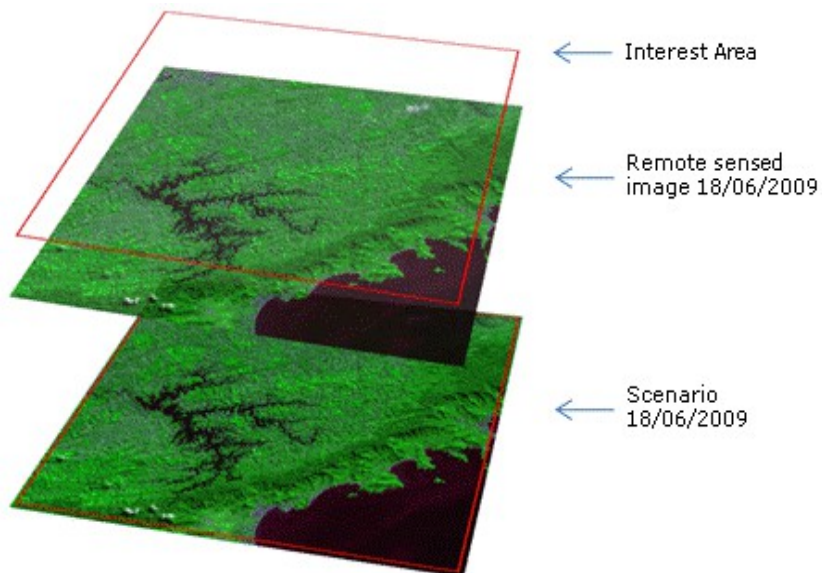
## Rule

A rule defines a spatial operation to be applied to input geometries during the classification process. The spatial operations available for rules are intersection, difference, union, identity, and areas suppression.

## Scenario

A scenario is composed by an interest area and an observation date assigned to it. As an example, if a certain satellite grid is used as an interest area, then the observation date of the image to be used must be assigned to the area of interest. This is not an automatic process: it is necessary that an Administrator User assigns the correct date to the Interest Area.





A Scenario does not attach an image to an Interest Area, 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

---

To start using TerraAmazon for the very first time, execute the installation package. So far, TerraAmazon is available only for Microsoft Windows® OS. Follow the steps to set the destination folder and other installation options, such as PlugIns and Tutorials.

The installation process is very simple and is described in Appendix A, page 164. However, a DBMS must also be installed and a client-server environment configured (Appendix B, page 167). On a corporate environment, the DBSM should be installed on the server machine, while the local computer should have TerraAmazon installed.

It is possible to have both DBMS and TerraAmazon running locally, that is, in the same computer.

This manual was developed using the free open source DBMS PostgreSQL ([www.postgres.org](http://www.postgres.org)). TerraAmazon is not related with PostgreSQL.

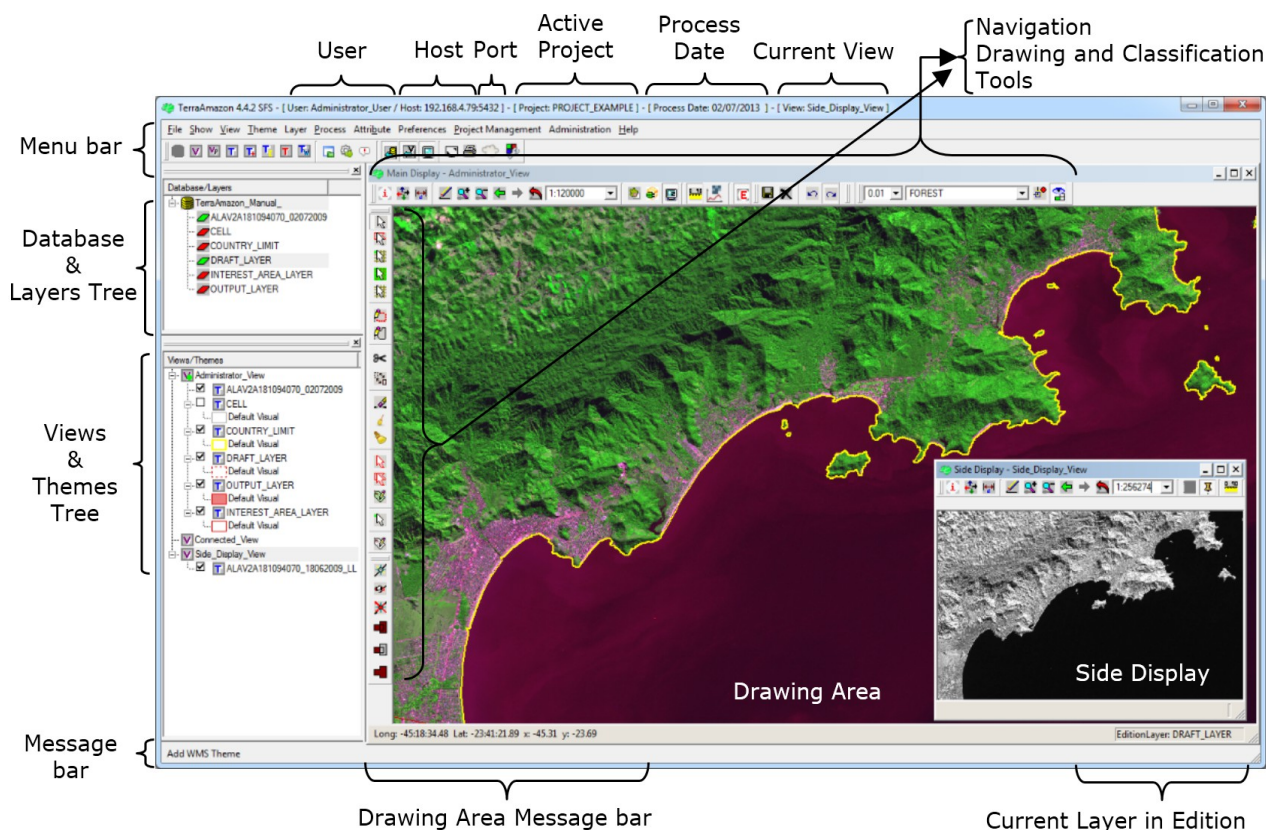




TerraAmazon is pen tablet friendly.



## 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.

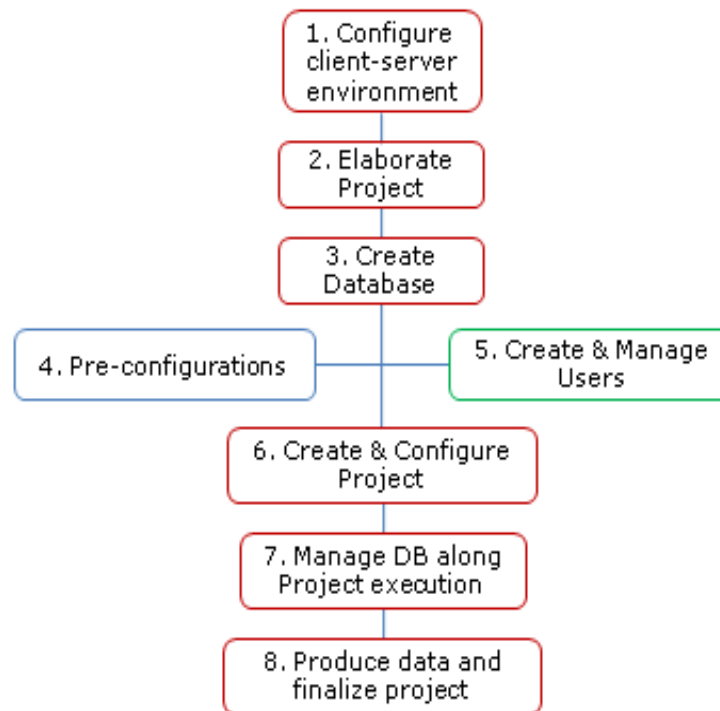
## Administrator Roles



Administrator roles are defined in two different natures: the activities required by the system, such as setting the client-server environment, elaborating and configuring projects, creating users and managing the entire database; and the activities related to producing data, such as performing spatial operations between data and managing all data as needed in each situation.

This User's Guide presents the use of every interface involved in the activities required by the system. However, the activities related to producing data are determined by each situation and are not the objective of this document.

The following scheme presents the basic groups of administrator roles.



**Box 1:** installation of the DBMS on the server (Appendix B, page 167) and TerraAmazon on the client machine (Appendix A, page 164). To work on the local computer, both DBMS and TerraAmazon must be installed in the same machine. This procedure is done only at the first use of the system. After that, it will only be necessary on eventual maintenance procedures, such as changing the operational system and updating TerraAmazon.

**Box 2:** database elaboration stage. This involves the development of a plan for the project execution, defining the necessary steps to bring the raw data to the final product and other details, such as defining the working projection and other particularities according to each case. This is not part of the objectives of this User's Guide. Nevertheless, the administrator user should find all the information needed for project elaboration distributed along this document.

**Box 3:** database creation and connection (chapter 2, pg13). See more on the next scheme.

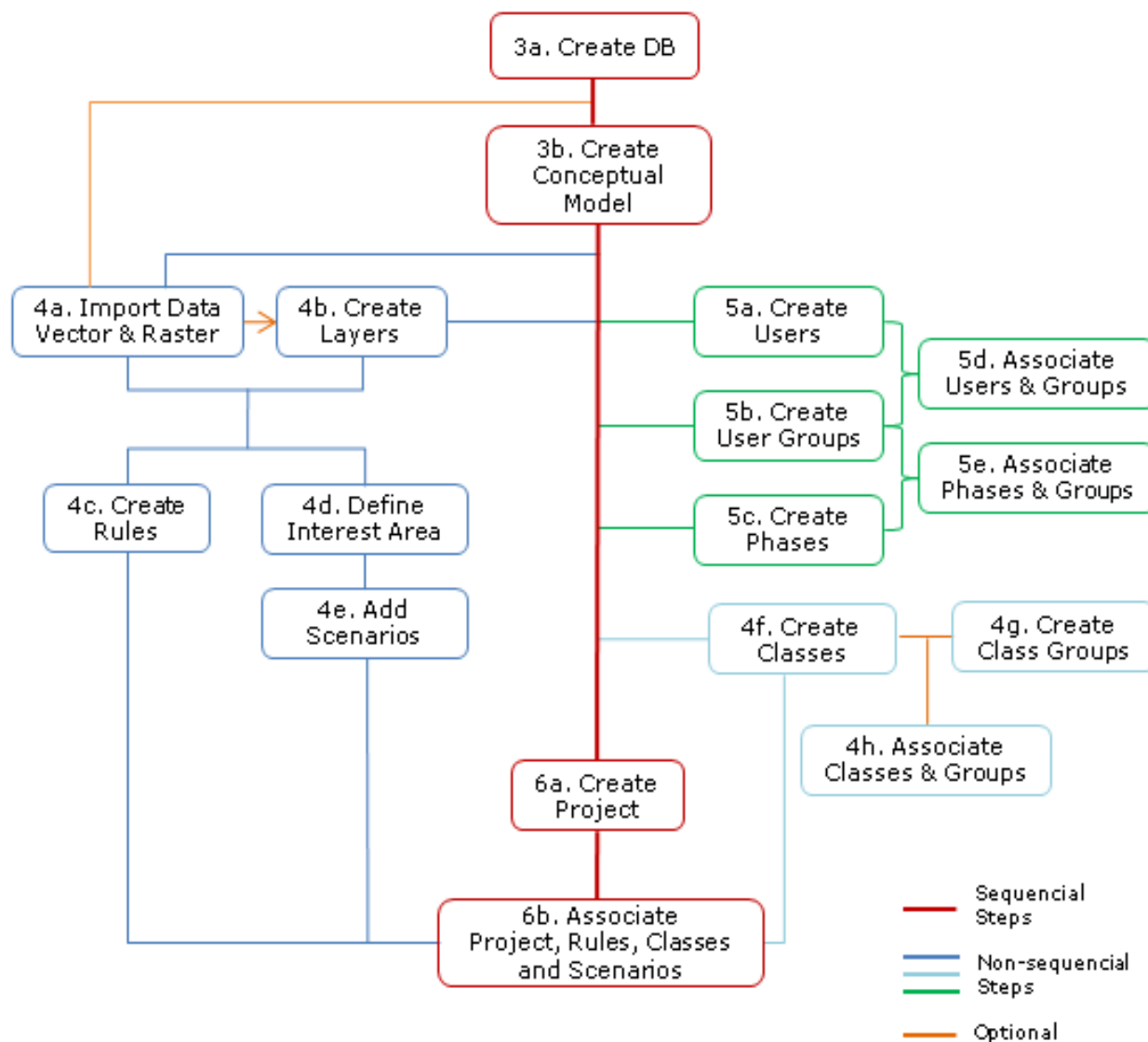
**Box 4:** all procedures that should be done before actually creating a project, such as populating the database with raw data, creating working layers and configuring the base structure for projects (chapters 6, 7, 10 and 12). See more on the next scheme.

**Box 5:** creation of user names in the database and all user related procedures (chapters 3 and 4). See more on the next scheme.

**Box 6:** project creation and all project related configurations (chapters 5 and 8). See more on the next scheme.

**Box 7:** all procedures required along the execution of the project. These procedures will be determined by each situation and the choice of which one to use is also an administrator role. However, it is not part of the objectives of this User's Guide. Nevertheless, the administrator user should find all the information needed for choosing the best procedure distributed along this document.

**Box 8:** final procedures, such as cleaning output layers, removing unnecessary columns on attribute tables and all procedures related to preparing final data for delivery. They are determined by each situation and the identification of the necessary procedures is also an administrator role. However, it is not part of the objectives of this User's Guide. Nevertheless, the administrator user should find all the information needed for choosing the best procedures distributed along this document.



The next scheme expands the contents of boxes 3 to 6.

This map has a main line of procedures that must be executed in a sequence from the top to the bottom, but also has non-sequential groups of procedures that can be executed and re-executed at any time after the step **3b**. For example, it is possible to create layers (box **4b**), then create classes (box **4f**), then create user groups (box **5b**), then define an Interest Area (box **4d**) and so on; but it is not possible to define an Interest Area before creating layer (or importing data, box **4a**), nor create a project (box **6a**) before having the conceptual model (box **3b**).

There are also some optional steps that may be executed or ignored if unnecessary.

## 2 Accessing the Database


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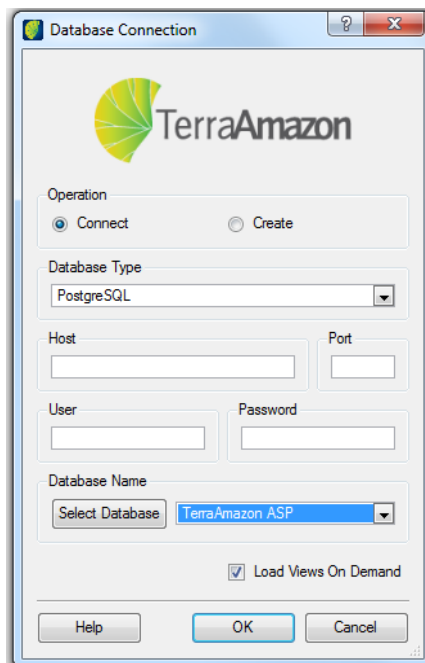
CREATING A DATABASE	14
CREATING THE CONCEPTUAL MODEL	16
CONNECTING TO A DATABASE	21

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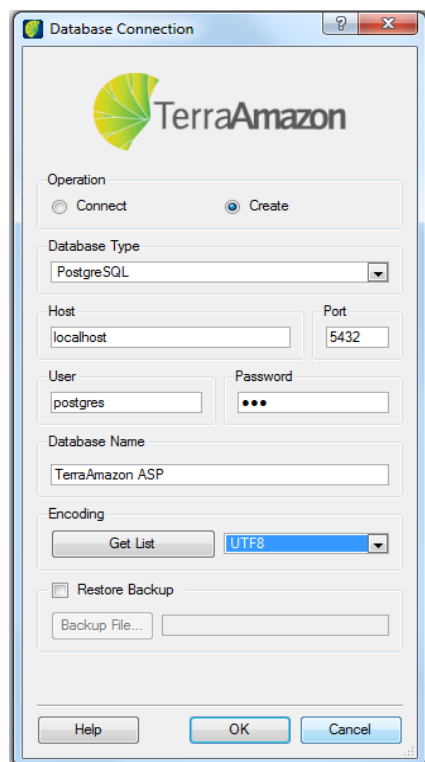
This chapter presents the steps to create a database in PostGIS (PostgreSQL with the spatial extension PostGIS) and the Conceptual Model.

## Creating a Database

Access the interface by clicking on the icon  or by going to the menu FILE → OPEN DATABASE. This is the interface to create new databases, connect to existing ones and restore backup files (for backup and restore, refer to Backup & Restore Databases, page 161).



Select the *Create* option to enable the database creation mode, as shown in the following figure.



*Database Type*: select which DBMS will be used to create the database. It is suggested to use the free DBMS PostgreSQL with its spatial extension PostGIS. This manual was developed using PostgreSQL/PostGIS. TerraAmazon is not related to PostgreSQL.

*Host*: inform the IP address or the name of the server where the DBMS is installed. If the server is the local computer, type in localhost or leave the field empty. In the example above, the IP address was used.

**Note:** On Microsoft Windows® OS, there are different ways of finding out the IP address. If working directly on the computer in which the DBMS is installed, just open the Command Prompt and type *ipconfig* and search for the *IPv4* address. If working on a corporate environment, check with someone responsible for the network to inform you.

*Port*: inform the DBMS connection port, the one defined during its installation. If there is only one port defined for the DBMS, it is possible to leave this field empty. When using PostgreSQL/PostGIS, you can verify the port number by opening the file *postgresql.conf* and searching for the word “*port*”. This must be done directly on the server where PostgreSQL is installed.

*User and Password*: when creating a new database, these fields refer to the Administrator user of the DBMS. This user is created during the DBMS installation. This should be clear to the TerraAmazon Administrator: the user required when creating a new database is NOT a TerraAmazon user, but the DBMS Administrator user. In this manual, such user’s name is postgres. TerraAmazon users exist only after creating the database and the conceptual model. Find more details on TerraAmazon users on chapter 3 and on Appendix D, page 175.

*Database Name*: provide a name for the database. Do not to use accents, empty spaces or special characters of any kind.

*Encoding*: the client encoding is what allows TerraAmazon to display correctly the text information stored in your data. Different languages may have different characters and each one has one or more client encodings that display them correctly. If your data has different characters, find out which encoding is the best for that group of characters. It is necessary to keep the compatibility with the encoding defined for the *DBMS*. Encoding types are not related with TerraAmazon.

Click on the **Get List** button and select the encoding.

Click on the **OK** button to create the database. After creating the database, TerraAmazon will automatically connect to it. If the encoding is not compatible with the *DBMS* system, use *UTF8*. Also, if no encoding is selected, *UTF8* will be automatically used.

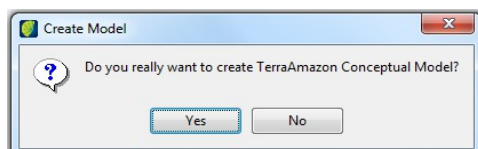


## Creating the Conceptual Model

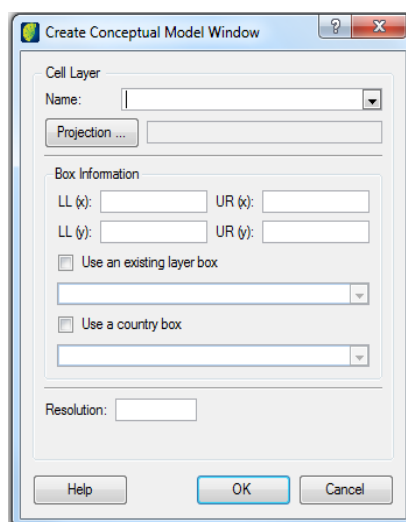
Creating the Conceptual Model is necessary when there is the intention of performing advanced vectorial editions in the database (Conceptual Model, page 4).

**Note:** TerraAmazon does not automatically create the Conceptual Model given that the size of the box of the cells layer created in the process depends on the area in which there is the need to work on.

To create the Conceptual Model, go to the menu ADMINISTRATION → CREATE CONCEPTUAL MODEL.



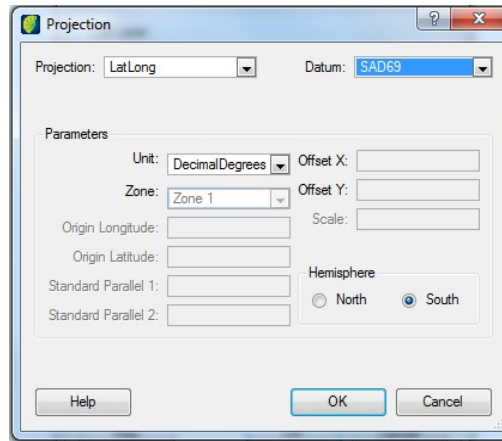
Confirm the operation to access the interface to create the cells layer.



Many TerraAmazon operations are based on the existence of this layer, such as the entire classification process. Its dimensions depend on the user's needs.

*Name:* provide a name for the cell layer.

*Projection:* access the projection setting interface, shown in the next figure.



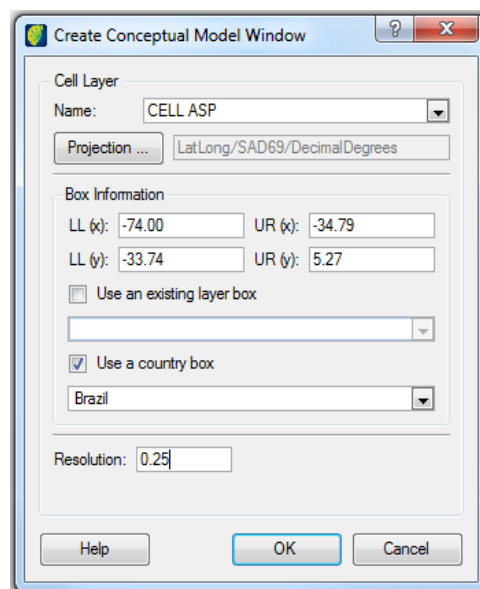
Choose the projection and the datum. Fill up the remaining enabled fields according to the chosen projection. Click OK to return to the previous interface.

**Note:** The cell layer and the layers involved in the classification rules must all have the same projection.

Back in the Conceptual Model interface, type the box extents for the cells layer by filling the fields  $LL(x)$ ,  $UR(x)$ ,  $LL(y)$ ,  $UR(y)$ ,  $Res X$ , and  $Res Y$ , being LL = “lower left”, UR = “upper right”.

*Resolution:* provide a resolution, or width, for the cells. This resolution is the same on horizontal e vertical directions since cells are square geometries.

In this resolution field, the measurement unit is defined by the selected projection, as informed in the *Unit* field of the Projection interface. It can be verified at the right of the **Projection** button. In this example, the unit is Decimal Degrees.



*Use an existing layer box:* select this option to use the box of an existing layer without having to type it. Select the layer on the combo right under it.

*Use a Country Box:* use this option to choose the box by selecting a country name.

**Note:** The values provided for the countries are originally in LatLong/WGS84 Spherical. When the conceptual model must be created in a different projection, use the **Projection** button as usual. The original values of the countries' box will be submitted to reprojection after the creation of the layer is triggered. Additionally, if there is a need to update values of the country boxes, users can edit the file *country\_box.csv* found in the folder where TerraAmazon has been installed.

Click on the **OK** button to apply the informed values and trigger the creation of the Conceptual Model.

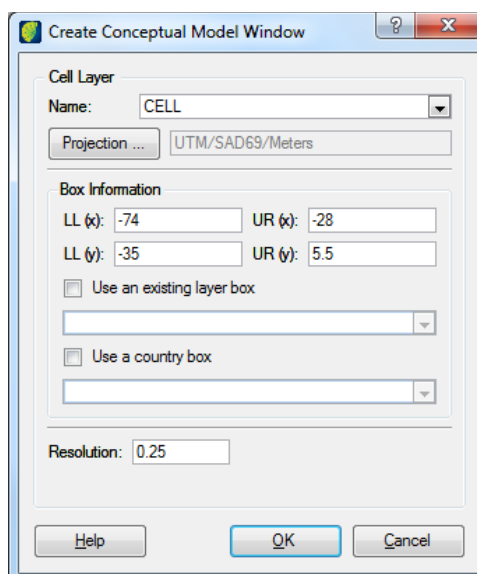
If necessary, it is possible to create a new cell layer by accessing the menu LAYER → CREATE CELL LAYER. Even though it is possible to create as many cell layers as needed, only one of them can be active on the database. That will be the layer used by the classification process and must have the same projection as the other layers involved in the classification rules. If necessary, change the active cell layer by right clicking on the desired cell layer and selecting the option *Set As Cell Layer*. This update takes effect immediately. Refer to Changing the Cell Layer, page 144 for the full procedure.

## Using an Existing Cells Layer

It is also possible to create the Conceptual Model using an existing cells layer. To have an existing cells layer on the database you can either copy it from another database (find more about data copying at Copying Layers between Databases, page 142) or create it using the method on the previous note.

Proceed to the creation of the Conceptual Model at the menu ADMINISTRATION → CREATE CONCEPTUAL MODEL.

On the *Name* field, select the cells layer to be used and click OK



Inform which column contains the cell identification (cell OID = cell object identification). This is a column from the layer's attributes table.

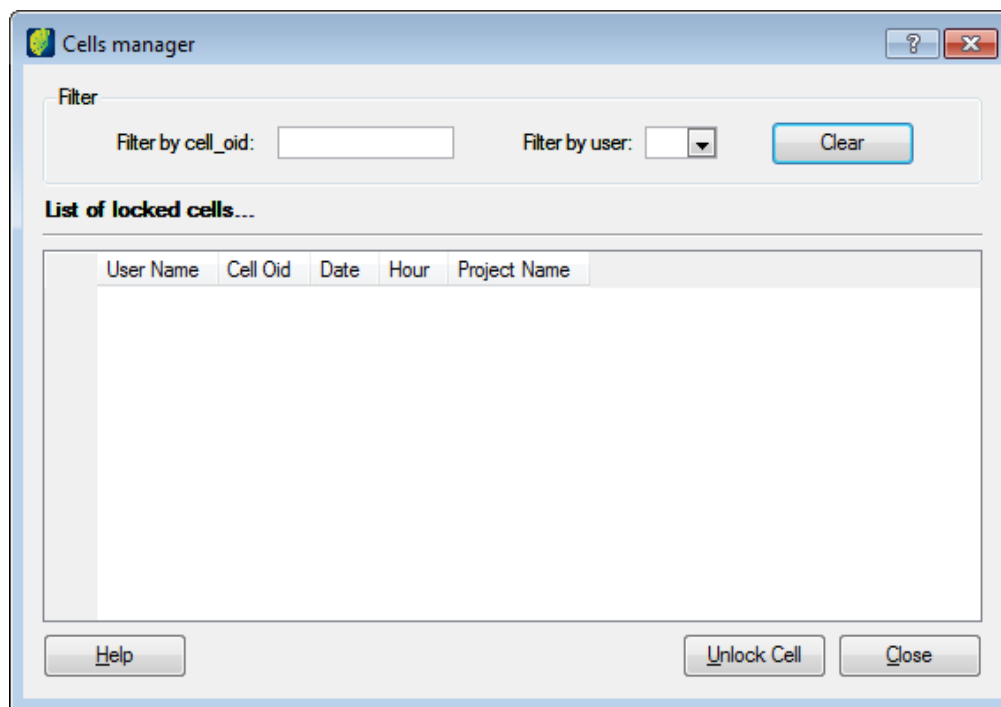
Click on the **OK** button to create the Conceptual Model.

**Note:** It is necessary that the user informs the cell column because there are other softwares from the Terra family that can also generate cells layers, but with different column names. So far, it is important to keep compatibility between them. However, cells layers generated with TerraAmazon always have the cell column named as *cell\_oid*.

## Checking cell status

The user can get a list with all locked cells.


Click on PROCESS → CELLS MANAGER.

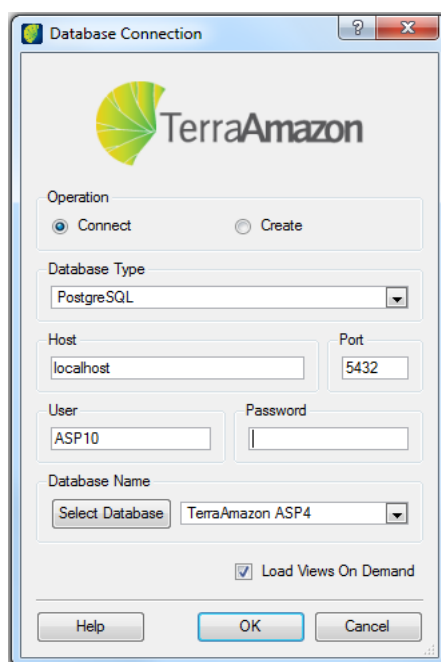


*Filter:* enter conditions to filter the by cell name or by user.

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

## 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. Choose the DBMS in the *Database Type* field. For this manual, the DBMS PostgreSQL was used.

*Host*: indicate the server where the database can be found. Type *localhost* or leave the field empty to work locally. Or type the server's IP address to connect to a corporate network server. On the example above, the IP address was used.

*Port*: Inform the DBMS connection port, the one defined during its installation. In PostgreSQL case, you can verify the port number by opening the file *postgresql.conf* and searching for the word “*port*”. This must be done directly on the server where PostgreSQL is installed.

Fill the *User* and *Password* fields with any TerraAmazon administrator user. Non-administrator TerraAmazon users connect the same way, but will have no access to the administration procedures presented in this manual. If the Conceptual Model has not yet been created, then only the DBMS Administrator user can be used for connections.

Next, click on the **Select Database** button and select the desired database.

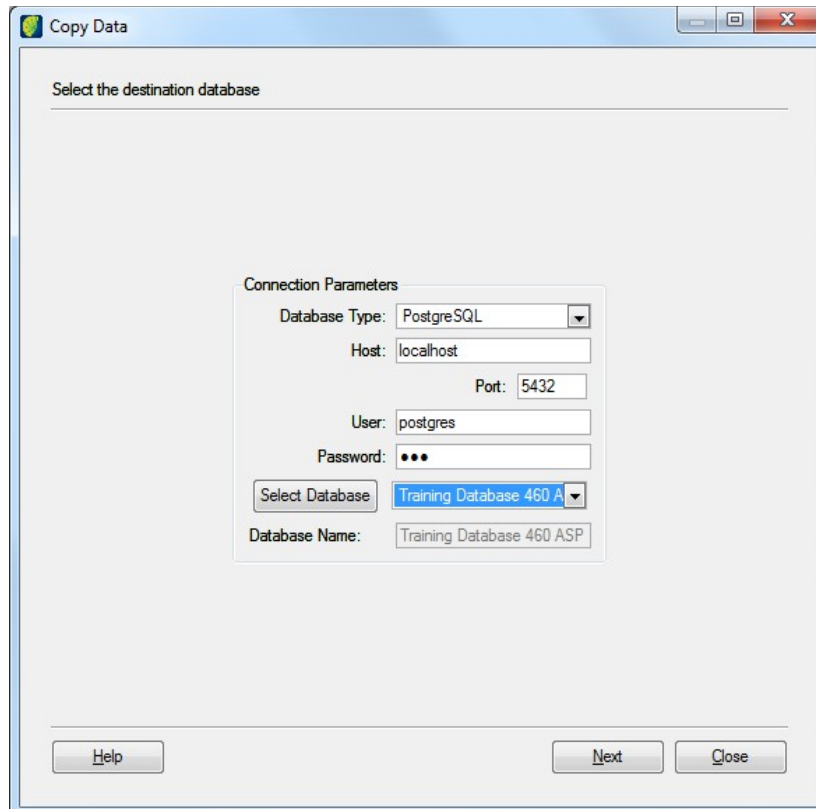
The option *Load Views On Demand* exists because a TerraAmazon database may contain many views and the time required to complete the connection depends on the amount of information necessary to be loaded. Therefore, TerraAmazon provides the option to load all views when connecting or by demand by clicking on the desired view on the Views and Themes Tree after the connection has been established.

Check or uncheck this option according to each case and click on the **OK** button to connect.

**Note:** The top bar of the main interface identifies the current user, host, port and the selected view. However, the bar will not show the port number when it is not informed, as well as the selected view when there is no view selected.

## Copying the database

Select PROJECT MANAGEMENT → COPY DATA in the menu.



Copy Data

Select the destination database

Connection Parameters

Database Type: PostgreSQL

Host: localhost

Port: 5432

User: postgres

Password: ●●●

Select Database Training Database 460 A

Database Name: Training Database 460 ASP

Help Next Close

Connection Parameters:

*Database Type:* choose the type of copied destination database

*Host:* enter the IP number of database host

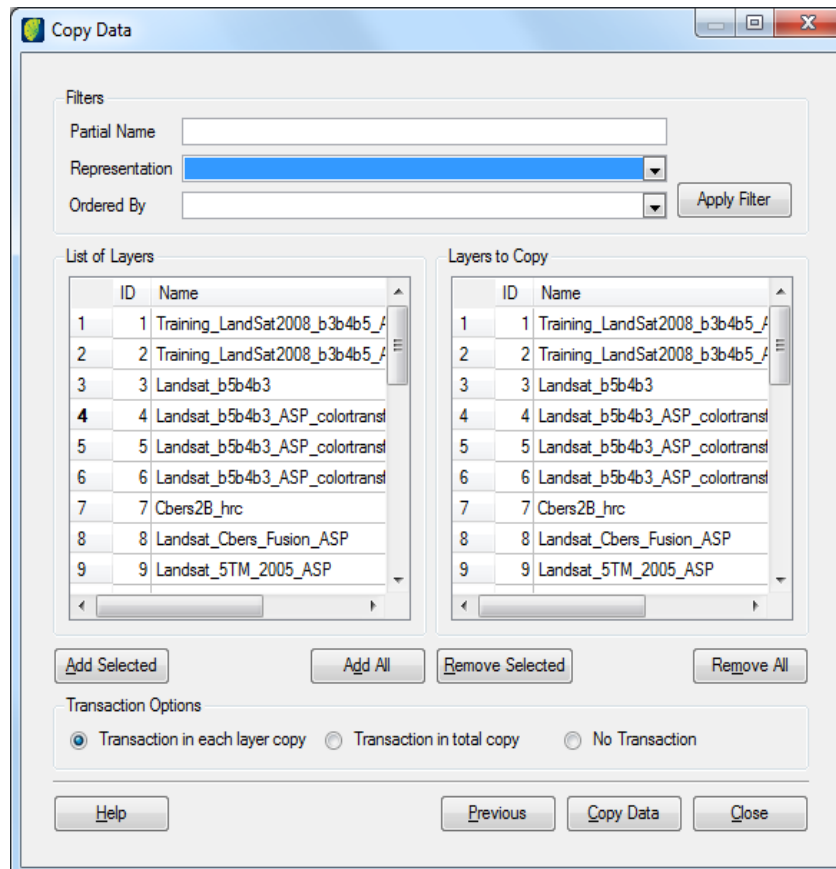
*Port:* enter the port number

*User:* enter user name (normally an administrator)

*Password:* enter user password

*Select Database:* click on this button and application will look for available databases. Select the database to copy from the list.

Click on the **Next** button.



*Filters:* for specific layer selection filter options can be selected

*Partial Name:* enter part of layer name

*Representation:* choose the representation type to filter

*Ordered by:* choose the list order

Click on the **Apply Filter** button.

Select one or more layer to copy in the left list and click on the **Add Selected** button. Layers move to the right list.

Click on the **Add All** button to copy all layers.

To remove one or more layer in the left list, choose the layer and click on the **Remove Selected** button.

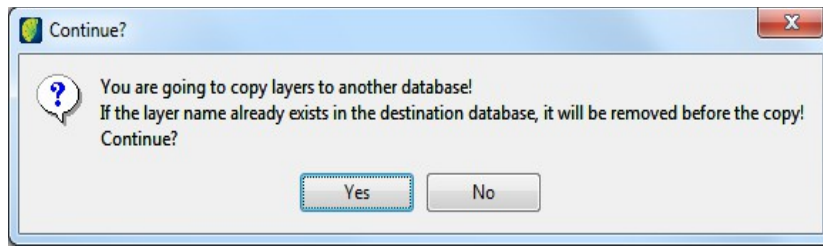
To remove all at the same time click on the **Remove All** button.

Transaction options

Select one option that will be used in the copy.

Click on **Copy Data** button.

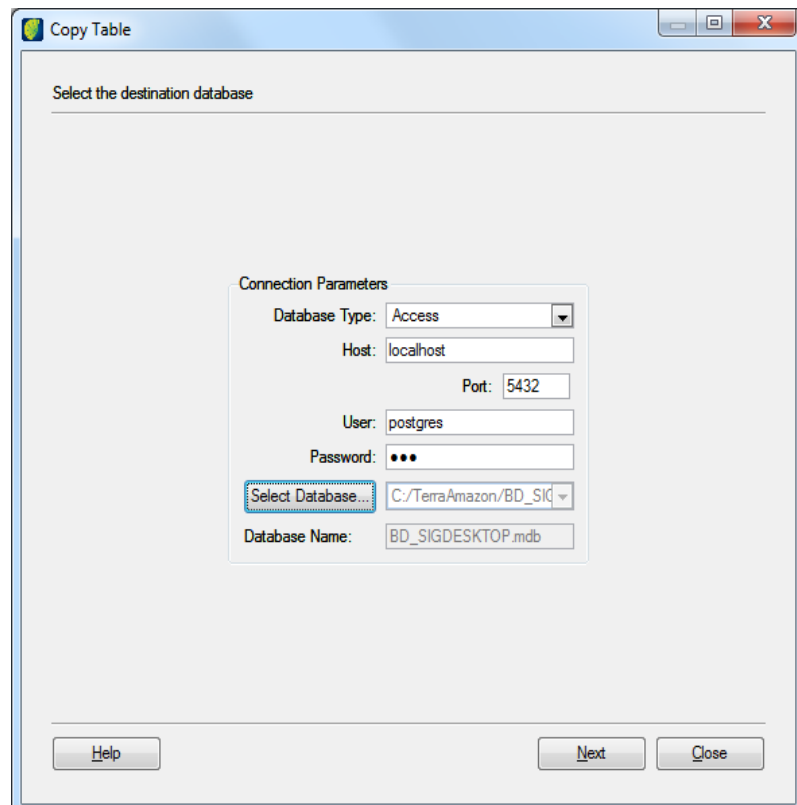




A warning pop-up will ask the user to continue. Be sure that copy process will not remove layer in destiny database.

## Copying table

Select PROJECT MANAGEMENT → COPY TABLE in the menu



### Connection Parameters

*Database Type*: choose the type of destination database

*Host*: enter the IP number of destination host

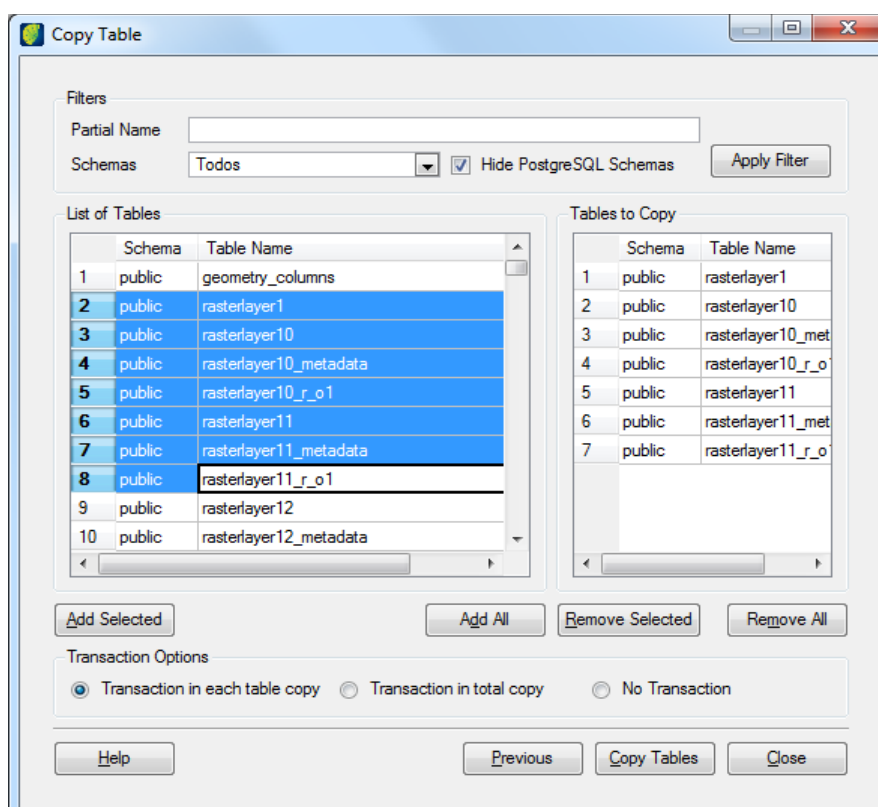
*Port*: enter the port number

*User*: enter the user name

*Password*: enter the user password

*Select Database*: click on this button to choose the destination database

Click on the **Next** button.



## Filters

*Partial Name*: enter part of table name to filter

*Schema*: select one or all.

Click on the **Apply Filter** button.

Choose one or more tables to copy from the left list and click on the **Add Selected** button. Tables move to the right list.

If all tables will be copied click on the **Add All** button.

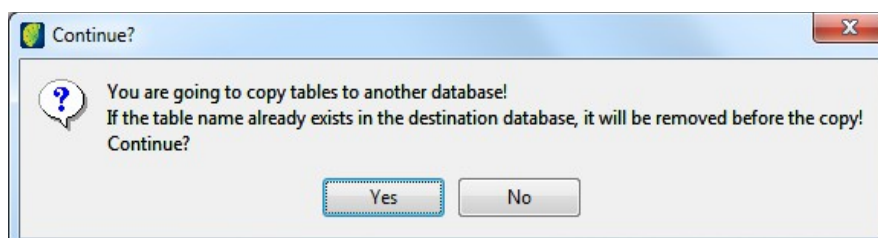
To remove tables from left list choose one or more and click on the **Remove Selected** button.

To remove all tables from the left list click on the **Remove All** button.

## Transaction Options

Select one of the three transaction types.

Click on the **Copy Tables** button.



A warning pop-up will ask the user to continue. Be sure that copy process will not remove table in destiny database.

## Copying a project

Select Project Management → Copy Project in the menu.

Copy Project

Create a new database. The database will be created and filled with the conceptual model and the copied data.

Connection Parameters

Database Type: PostgreSQL

Host: localhost

Port: 5432

User: postgres

Password: ●●●

New Database Name: Training Database 460 ASP from 451

Encoding: Get List UTF8

Help < Back Next > Cancel

### Connection Parameters

*Database Type*: choose the type of destination database

*Host*: enter the IP number of destination host

*Port*: enter the port number

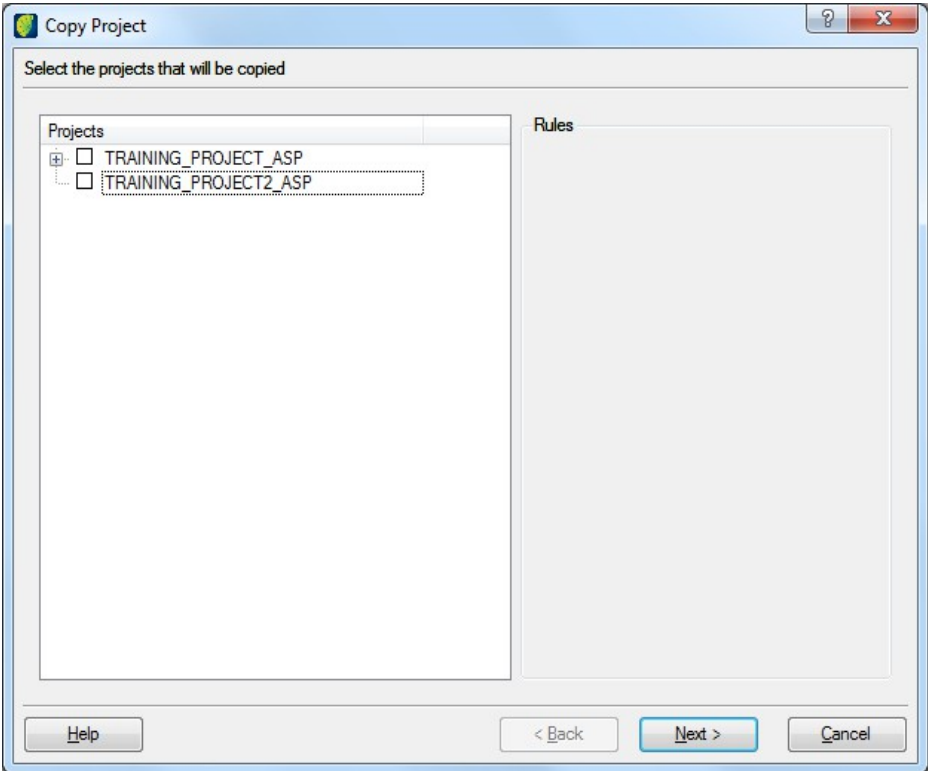
*User*: enter the user name

*Password*: enter the user password

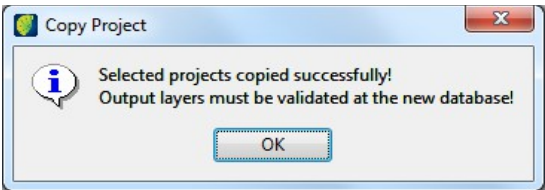
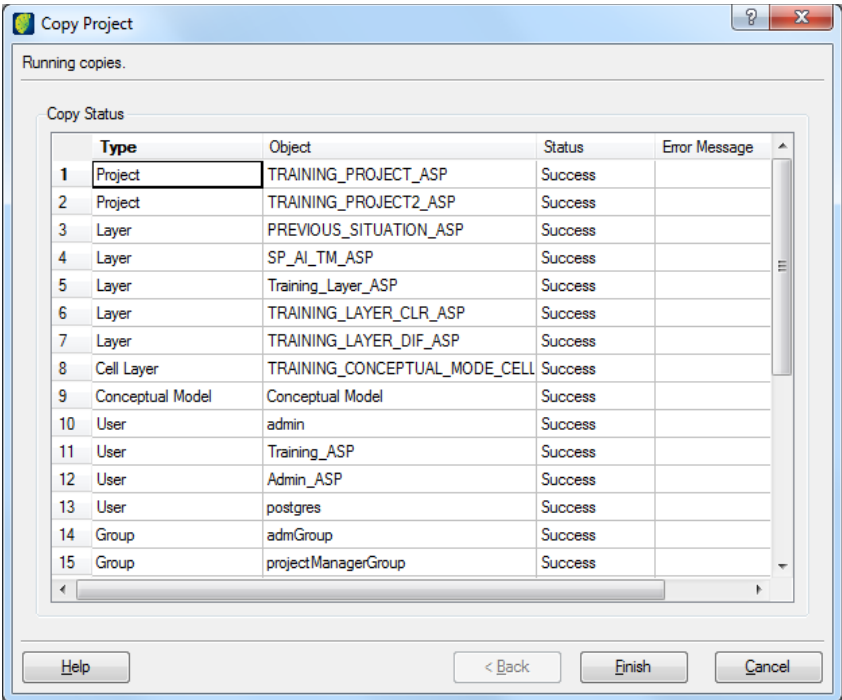
*New Database Name*: enter the new name

*Encoding*: click on the **Get List** button and choose the proper encoding table.

Click on the **Next** button.



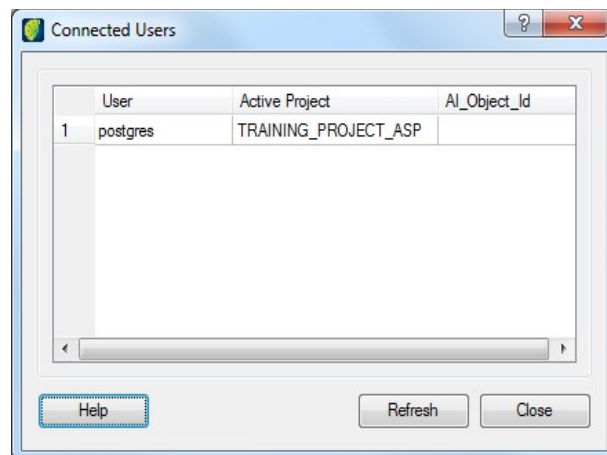
Select on or more projects to copy and click on the **Next** button.



## Checking connected users

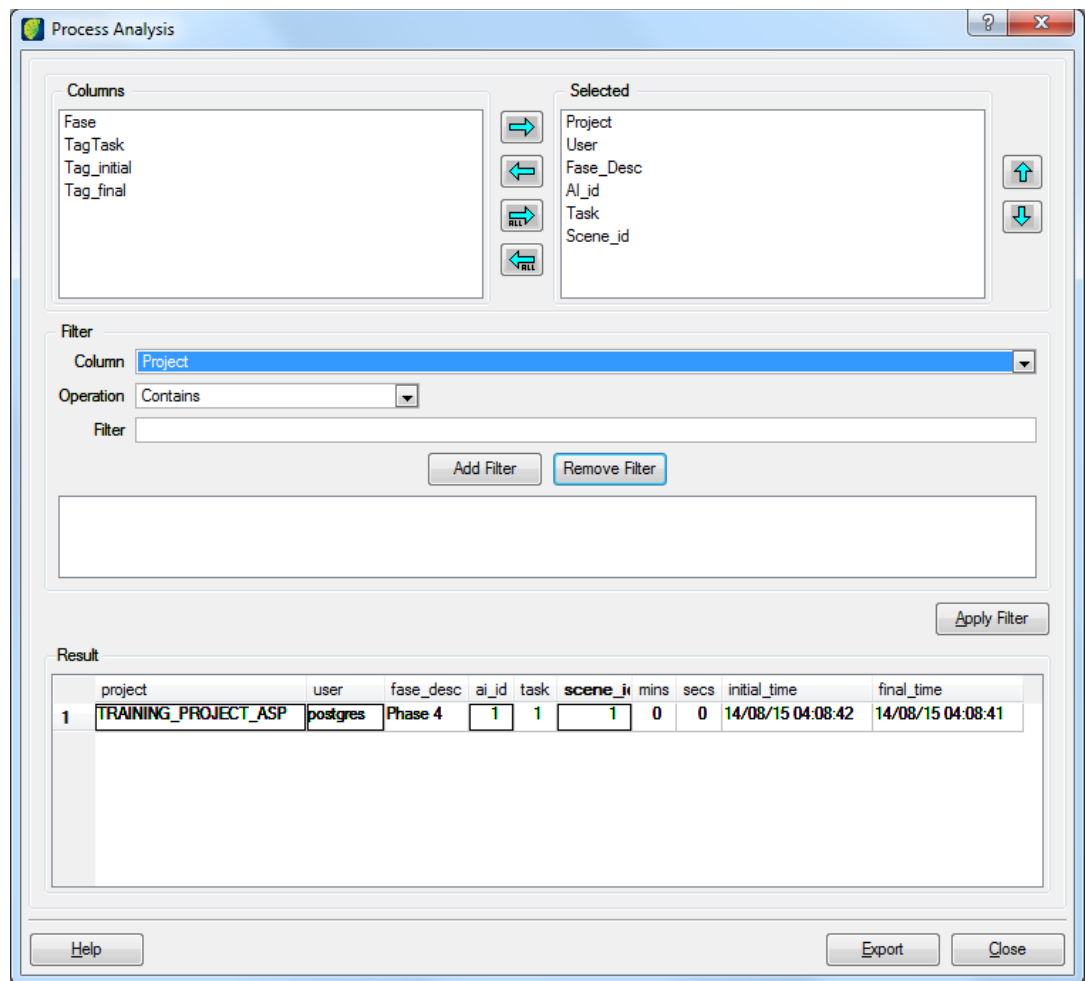
Select Project Management → Connected Users in the menu.

A list of users will be shown.



Process Analysis

Select Project Management → Process Analysis



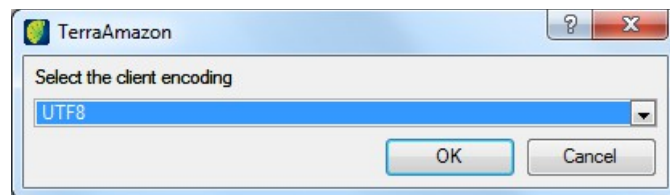
Select the columns to be listed in result in the left list and click on the right arrow. Selected columns will move to the right list.

Filter: is some specific condition is to be searched insert filter parameter and click on the **Add Filter** button.

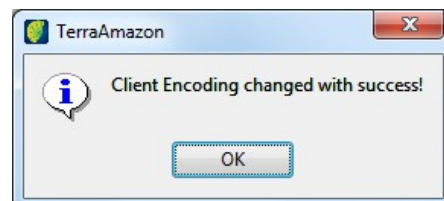
Export: click on this button to export the result to a file.

## Changing user encoding

Select Administration → Change Client Encoding in the menu.



Choose the new encoding in the list and click on the **OK** button.

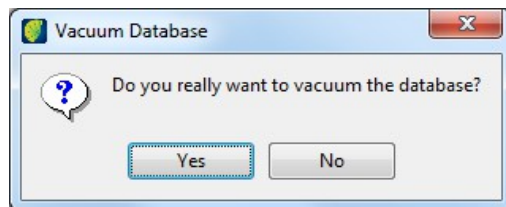




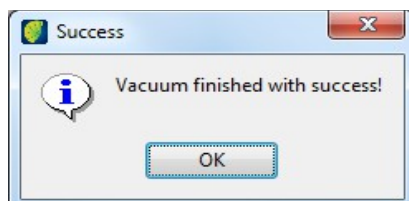
## Cleaning the database

Processing images can generate temporary files and slow down performance. To clean up there are two operations in TerraAmazon.

Select ADMINISTRATION → VACUUM in the menu.



Confirm the cleaning clicking in **Yes** button.



**Note:** VACUUM reclaims storage occupied by dead tuples. In normal PostgreSQL operation, tuples that are deleted or obsoleted by an update are not physically removed from their table; they remain present until a VACUUM is done. Therefore, it's necessary to do VACUUM periodically, especially on frequently-updated tables.

Select ADMINISTRATION → VACUUM FULL in the menu.

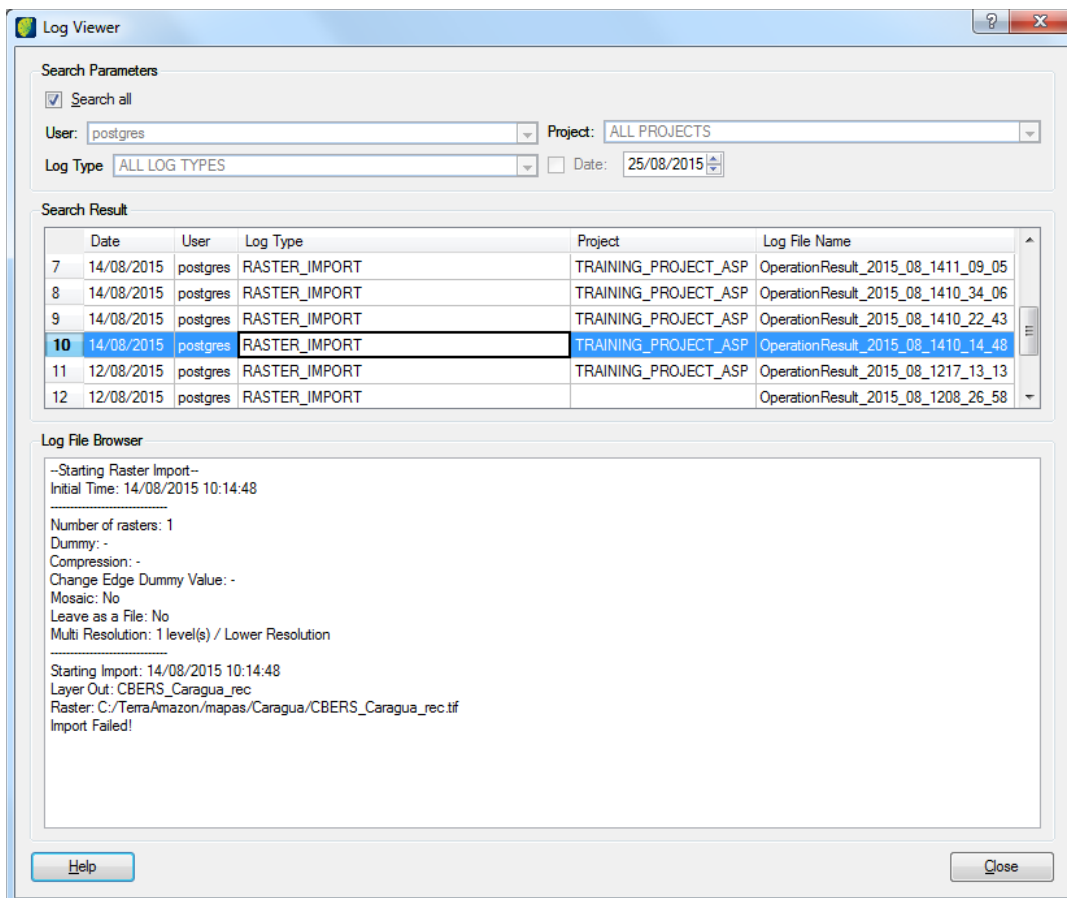
Proceed the same as Vacuum

**Note:** Vacuum full can reclaim more space, but takes much longer and exclusively locks the table.

**Note:** TerraAmazon data and parameters will not be affected.

## Viewing the activities history

Select PROCESS → LOG\_VIEWER in the menu.



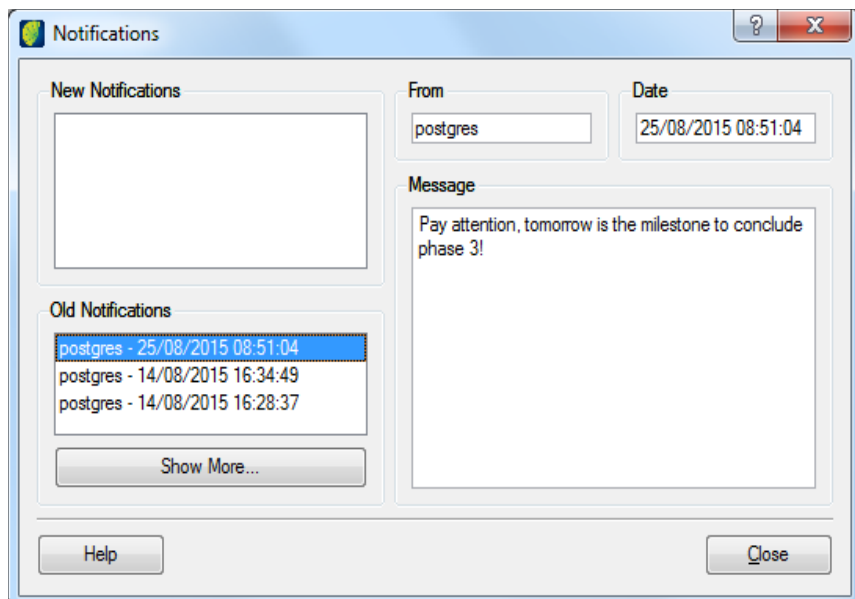
*Search Parameters:* enter the conditions to a specific search or click on the box to search all.

Choose one activity in result list to see more information in log file browser.

## Viewing notifications

New and old notification can be viewed anytime.

Select PROCESS → NOTIFICATION in the menu.



## 3 Users and User Groups

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CREATING USERS	36
REMOVING USERS	37
CHANGING PASSWORD	38
CREATING GROUPS	39
REMOVING GROUPS	41
ASSOCIATING USERS & GROUPS	42

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This chapter presents the user access maintenance procedures.

TerraAmazon has a multi-user environment. Many users can simultaneously access and work on the same database. In order to increase security for the database, TerraAmazon has two user levels in terms of access privileges: Operator and Administrator.

The Administrator User has full access to all the menus. Every database has at least one Administrator, created along with the Conceptual Model (page 16). This is the user that creates Operator Users, as well as other Administrator Users. He is responsible for every procedure presented on this User's Guide. This role should be attributed only to trained personnel since the Administrator user can cause permanent data loss if a mistake is made.

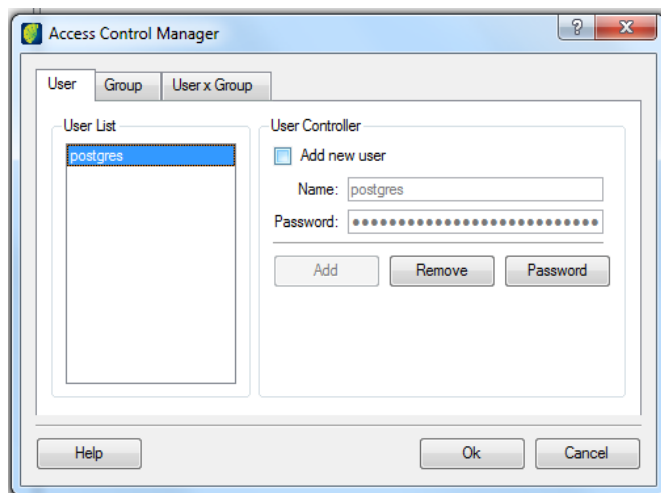
The Operator User has limited access to the database. There is no access to the entire Administration menu and to some options from the layer's menu, opened by the right-click on layers. This user cannot remove layers, edit locked vectorial layers or delete objects from layers. Operator users have access to spatial operations with layers (treated on the Operator User's Manual), layer creation from themes (page 115) and can only perform vectorial editions on the active projects or unlocked layers.

The correct attribution of roles among the users is one of the keys to database security.

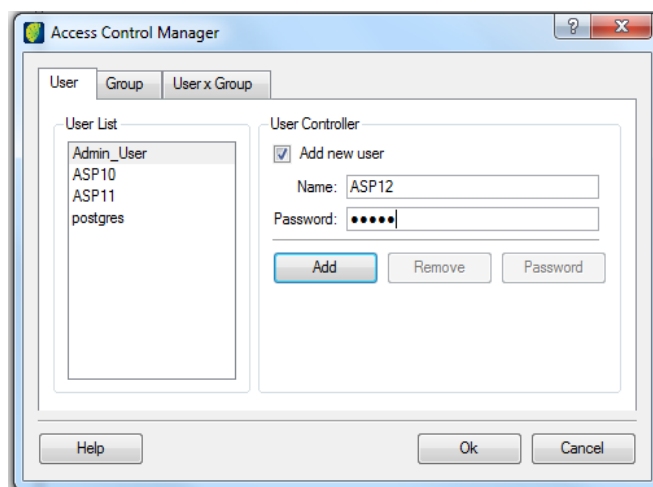
## Creating Users

Creating users in TerraAmazon is possible at any time after the creation of the Conceptual Model, described on page 16.

Access the interface by going to the menu PROJECT MANAGEMENT → ACCESS CONTROL.



Note that there is an user already in the *User List*, called *postgres* in this example. This is due to the creation of the conceptual model, which generates an user with administrator privileges inheriting the name and password of the DBMS user employed to create TerraAmazon (Refer to Appendix D, page 175, for details on user structure change due to the conceptual model).



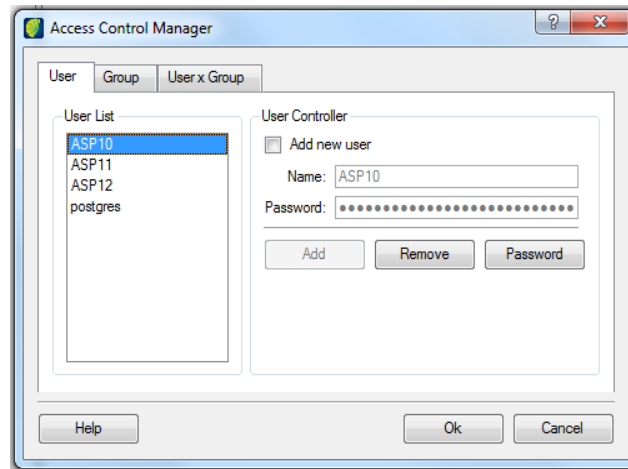
Tick the *Add new user* option and type in the desired user name in the *Name* field. In this example, the user name is *Administrator\_User*. Type in a password in the *Password* field. Later, users may change their own passwords.

Click on the **Add** button to create the user. Repeat this procedure until all users are created.

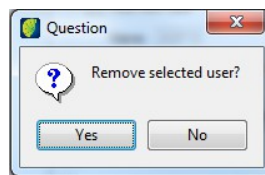
The created users are shown in the *User List* field.

## Removing Users

To remove an user, select the user name on the *User List* and click on the **Remove** button.



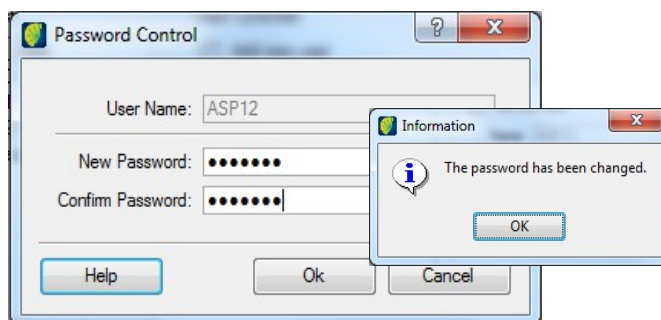
Confirm the operation to remove it.



**Note:** An user can only be removed until he adds a task. After that, the removal is no longer allowed and the user becomes part of the log of database activities.

## Changing Password

The Administrator can change the password of any user at any time. Just select the user on the *User List* and click on the **Password** button. Type in and confirm the new password and click on the **OK** button.



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

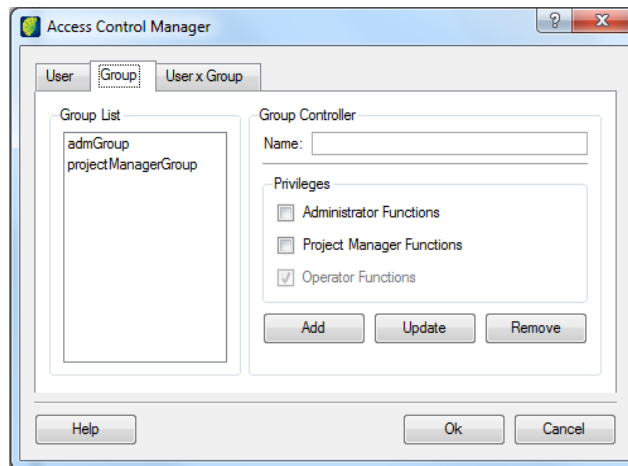


The difference between the methods is that the Operator user needs to inform the old password and the Administrator does not, which means that if an Operator user forgets his password, the Administrator can set a new one.

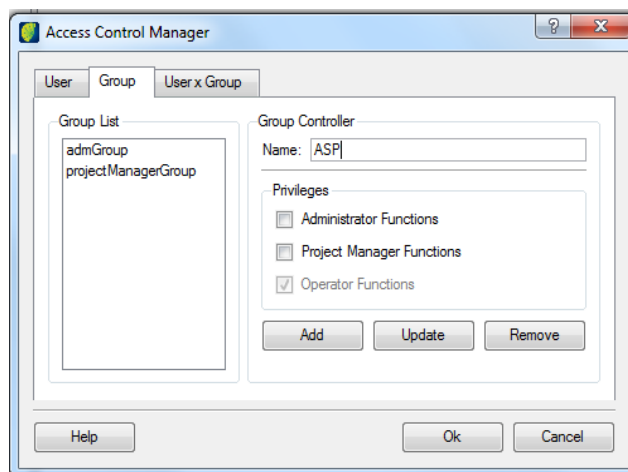
## Creating Groups

TerraAmazon uses a structure of groups to define user privileges, as well as to allow them to activate projects and execute vectorial edition tasks.

Click on the *Group* tab. Note that there are already two groups, which were created by the Conceptual Model. The *admGroup* has the privilege of *Administrator Functions* and the *projectManagerGroup* has the privilege of *Project Manager Functions*.



To create a new group, type the group name in the *Name* field and check the desired privilege option to the new group. In this example, the group to be created is called *Operator\_Group* and has the privilege of *Operator Functions*.



Click on the **Add** button to add the group to the database.

When creating or updating a group, the option *Operator Functions*, at the privilege box, cannot be unchecked to ensure the basic interactions for TerraAmazon users.

*Operator Functions* disallows the access to the entire *Project Management* and *Administration* menus and to the following functions, which would be available on the context menu by right clicking on a layer:

- Add Representation
- Change Projection
- Update Box
- Delete Objects from Layer
- Lock and Unlock Layers



- Rename Layer

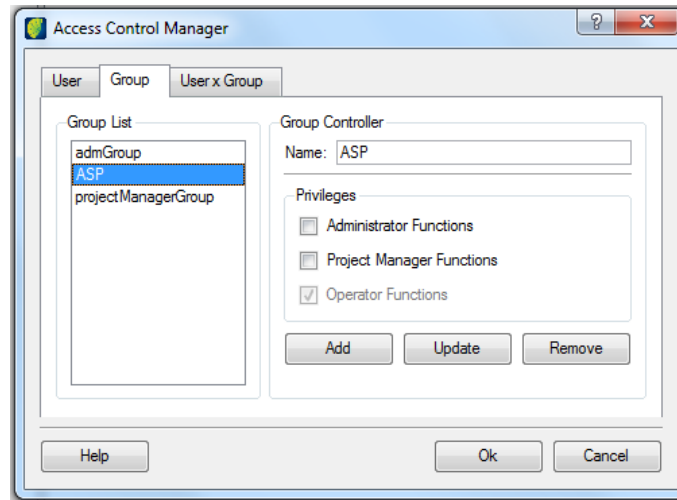
*Project Manager Functions*, besides the *Operator Functions*, will also allow the access to the *Project Management* menu, which provides access to: *Access Control*, *Classification Control*, *Interest Area*, *Connected Users*, etc.

*Administrator Functions* gives full control to the user, allowing access to all menus and system operations.

**Note:** Users that do not belong to any group cannot activate projects, add tasks, nor execute vectorial editions through projects. However, it is possible to execute simple vectorial edition on layers that are not locked for edition. This type of edition does not execute any spatial operation on data, allowing only the user to create polygons and type values in the class fields manually for each polygon.

## Removing Groups

To remove a group, just select the desired group, then click on the **Remove** button.



At least one group with *Administrator Functions* privilege must exist on the database. Groups with *Project Management Functions* privilege are not required to exist, they can be removed.

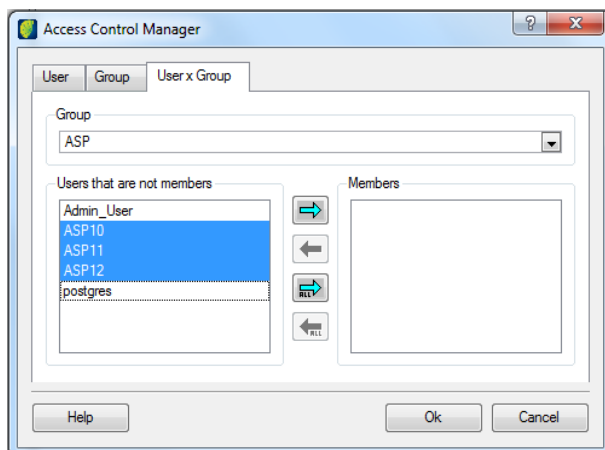
While a group has users associated, it cannot be removed. When this case, it is necessary to undo the existing user associations with the selected group to be able to remove it. The same thing will happen if there is any phase associated with the group. It is necessary to remove the existing phase associations with the selected group in order to be able to remove it.

**Note:** A group can be removed until one of the users creates a task with a phase associated with the group. After this, it is no longer possible to remove the group, even if all users and phases associations are removed from the group.

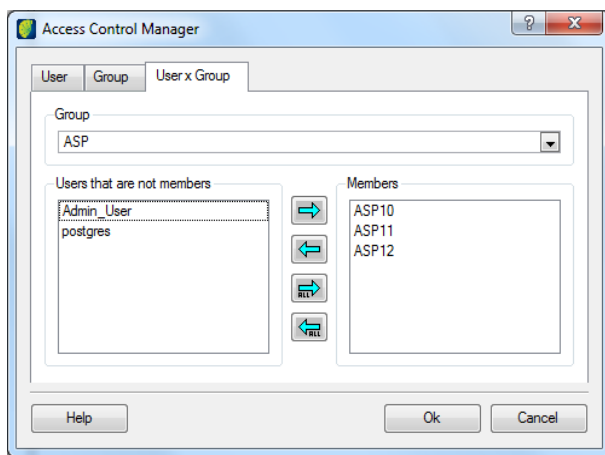
## Associating Users & Groups

Select the *User x Group* tab. In the *Group* field, select the group to which users will be added. Then choose the desired users in the *Users are Not Members* list and click on the right arrow to add the users as a member of the selected group. It is possible to select more than one user at once.

In the example below, the users *Operator\_Auditor\_User* and *Operator\_Interpreter\_User* are selected to be added to the *Operator\_Group*.



In the following figure, the selected users were already added to the group.



Users can be associated to as many groups as needed.

## 4 Phases

---

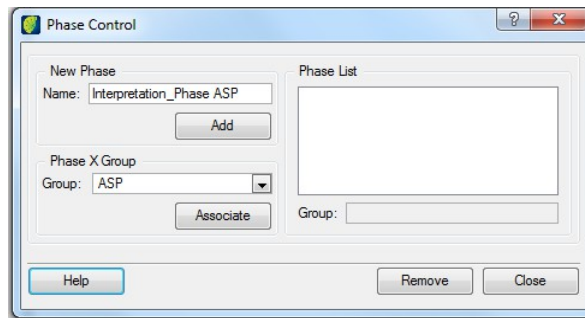
CREATING PHASES	44
ASSOCIATING PHASES & GROUPS	45
REMOVING A PHASE	46

---

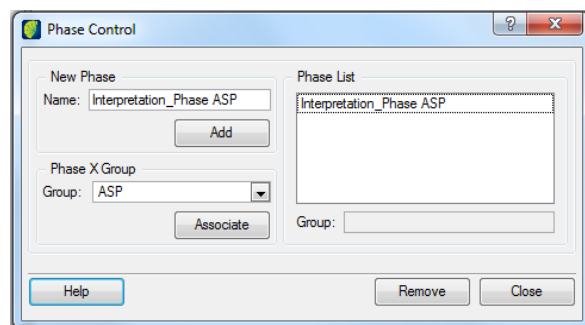
In TerraAmazon, a phase represents a stage in the execution of a project. Creating a good set of phases is important for project development and for keeping track of project evolution. Phases must be associated with the group of users who will execute them. Find more about phases on page 6.

## Creating Phases

Go to the PROJECT MANAGEMENT → PHASE CONTROL menu. Type in the name of the phase in *Name* field.

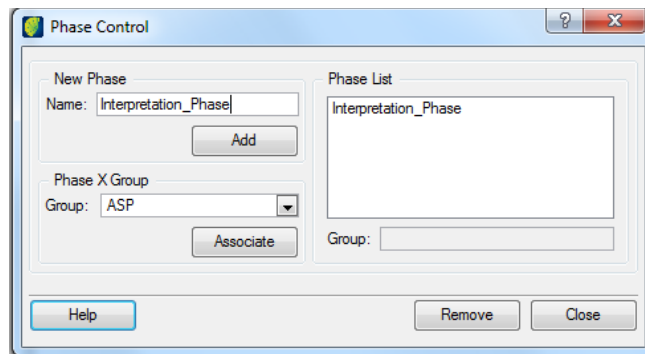


Click on the **Add** button to create a phase.

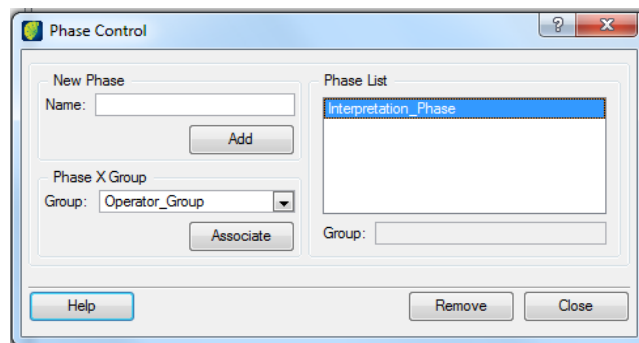


## Associating Phases & Groups

Associating a phase with a group defines which step of the project each group of users will execute. In Phase X Group area, select a group of users and then click on the name of the desired phase.



Click on the **Associate** button to apply the association. In this example, the *Operator\_Group* group was associated with the *Interpretation\_Phase* phase.

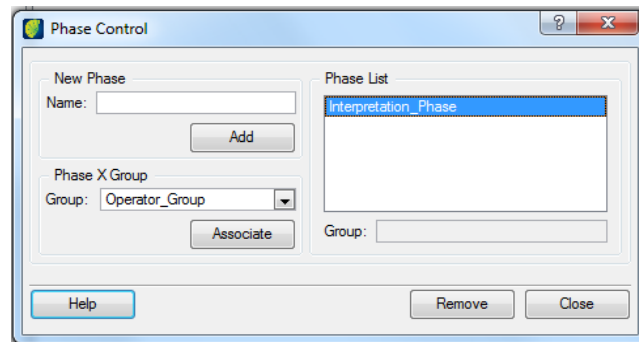


**Note:** Users that do not belong to any group or that belong to groups not associated with any phase can not add tasks and, therefore, they can not execute vectorial editions in any project. Users added or removed from groups associated with phases need to restart the database connection through the menu FILE → RESTART DATABASE in order to be able to add a task with updated phases.

## Removing a Phase

---

To remove a phase, select it on the *Phase List* and click on the ***Remove*** button.



Phases with associated tasks can not be removed.

## 5 Project

---

CREATING, UPDATING AND REMOVING A PROJECT	48
DEFINING PROJECT WORK SCALE RANGE	50
DEFINING TAGS	51

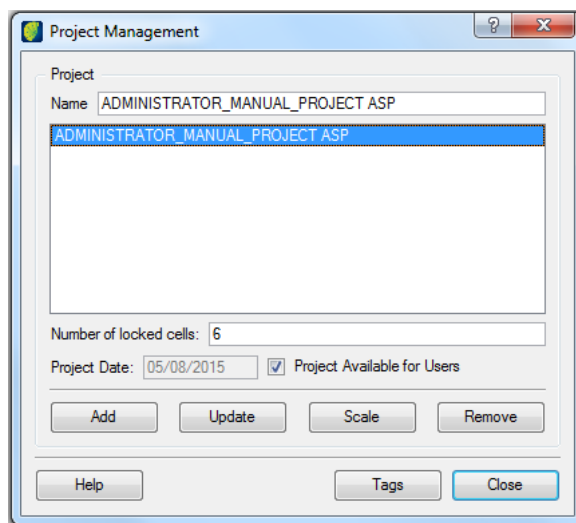
---

In TerraAmazon, a project identifies an active set of rules in the vectorial edition process. It is possible to have more than one project in the same database; however, only one of them can be active on each TerraAmazon instance.



## Creating, Updating and Removing a Project

Click on the menu PROJECT MANAGEMENT → CLASSIFICATION CONTROL → PROJECT MANAGEMENT to access the interface to manage projects.



In the *Name* field, type the name of the project.

Define the number of cells in the *Number of Locked Cells* field. See more about locked cells at Cell Layer, page 3.

The *Project Date* is filled automatically with the date displayed on your computer when the project is created. It is not possible to change this information.

Use the check box *Project Available for Users* to define the availability of the project. Making a project available for users means that Operator Users will be able to activate it to work on by performing vectorial editions (such activation is made in the *Project Activation* interface by the operator users). It is advisable to keep the project in the unavailable state while it is being configured or going through maintenance. After the procedures are finished, return to this interface and make the project available by checking this box and clicking on Update.

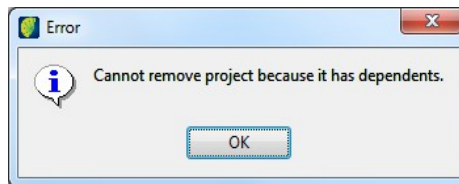
Click on the **Add** button to create the project.

Click on the **Update** button to update if changes are applied to a name, a number of cells, or active/inactive status.

Updates take effect immediately. However, there are exceptions to that when updates are made while other users are performing vectorial editions.

When an Operator User activates a project, the information of which project was activated is stored in the database. TerraAmazon verifies that information every time the user tries to classify polygons. Being so, if a project is deactivated by an Administrator user while an Operator User is working on it, then the next time the Operator user tries to classify polygons, TerraAmazon will identify that the project has been deactivated and classification will no longer be possible.

To remove a project, select the project and click on the **Remove** button. If the project has associated rules, it can not be removed and the following message will be displayed:



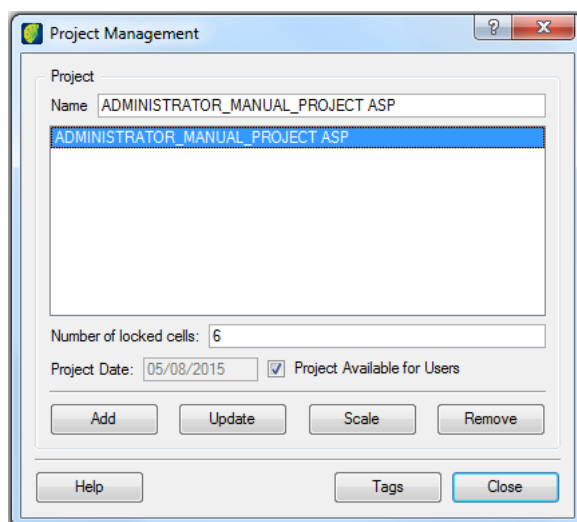
In this case, it is necessary to disassociate all rules and scenarios in order to remove the project. Refer to chapters 8 and 10 for disassociation procedures.

**Note:** A project can be removed until the first task is created by any of its users. After that, the project will be part of the log of executed projects of the database and can no longer be removed.

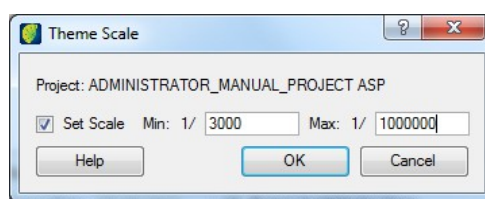
## Defining Project Work Scale Range

Defining the work scale range for a project guarantees that Operator Users will perform interpretation work only within the scale defined by this range. This definition is not required by the system. By default, every project is created without scale restriction values.

Go to the menu PROJECT MANAGEMENT → CLASSIFICATION CONTROL → PROJECT MANAGEMENT to access the interface for creating and managing projects.



Click on the **Scale** button. On the new interface, check the *Set Scale* box to enable the scale fields. Type the desired values on each field and click OK



To disable this setting, come back to this interface at any time and uncheck the *Set Scale* box.

Changes on these values can also be done at any time. Just type the new values and click OK

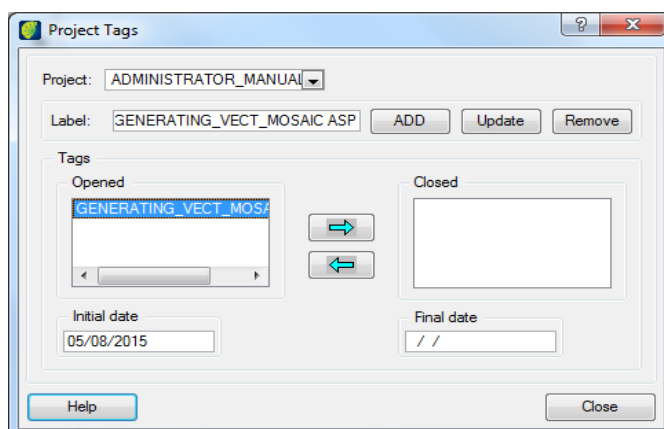
**Note:** Updates on this setting take effect immediately unless there are users performing vectorial editions at the time the updates are made. In that case, the administrator must require such users to restart the edition mode. When not executing vectorial editions, Operator Users can reach scale values beyond the range defined on this interface. This scale restriction only takes effect when the user opens the edition mode.

## Defining Tags

On TerraAmazon, the use of tags is meant to keep a custom log of the activities executed along the project. For example, in the need of generating a mosaic of imported vector data, a new tag can be created to store in the database the initial and final dates of this activity. Tags are useful to keep track of activities made without the automatic time control of the edition mode. Refer to chapter 11 for how to retrieve tags information as a project report.

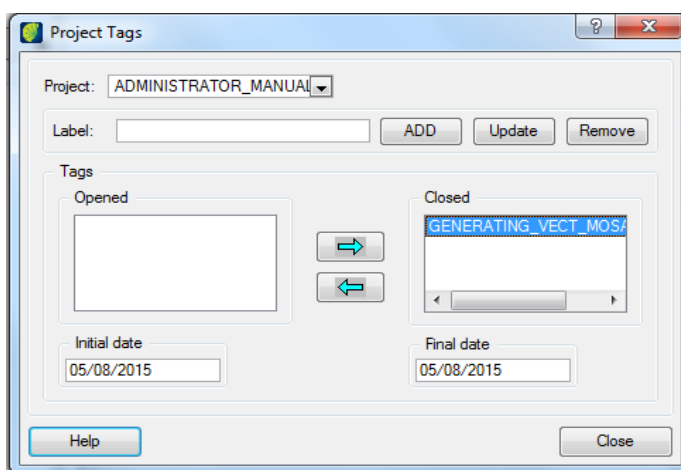
Click on the **Tags** button in the *Project Management* interface of the previous item to access the *Project Tags* interface.

In the *Label* field, type the name of the tag. Click on the **Add** button to create it. The created tag will be displayed in the *Opened* list. The *Initial Date* is filled automatically with the date displayed on your computer when the tag is created. It is not possible to change this date.



Use the arrow to the right to close the selected tag. The *Final date* is filled automatically with the date displayed on your computer when the tag is closed. It is not possible to manually set this date.

To reopen a tag, select it on the *Closed* list and use the arrow to the left. The final date previously stored is removed and remains empty until the tag is closed again.



In the figure above, a tag was created on 05/08/2015 to log that on that day procedures to generate a mosaic of vector data were started. On 05/08/2015, the activity was finished and the tag was closed.

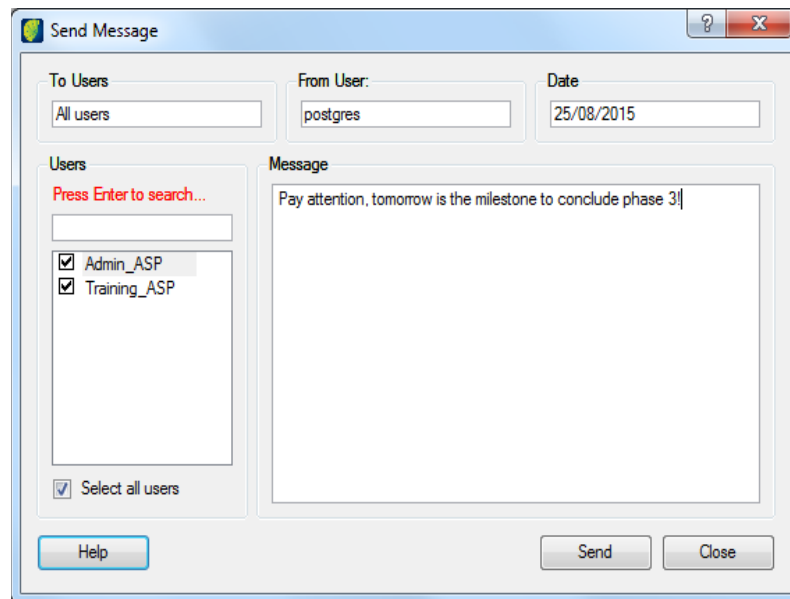
Use the **Update** button to rename tags. It is only possible to rename opened tags. Reopen if a closed tag must be renamed.

Use the **Remove** button to permanently delete tags. It is only possible to remove opened tags. Reopen if a closed tag must be removed.

## Sending message


One can send a message to one or more users.

Select Project Management → Send Message in the menu.



Select users, write the message and click on the **Send** button.

**Note:** the message can only be sent if a conceptual model is created.

After sending a message, a flashing icon  will appear in the menu when the user connects in the database.

## 6 Classes

---

CREATING AND UPDATING CLASSES	54
CREATING CLASS GROUPS	55
INSERTING CLASSES INTO CLASS GROUPS	56
EXPORTING AND IMPORTING CLASSES	57
IMPORTING LAND COVER CLASSIFICATION SYSTEM (LCCS) FILES	58
ASSOCIATING LOADED LCCS CLASSES	59

---

Classes in TerraAmazon are not defined for one specific project, but for the entire database. Each class can be associated with as many projects as needed, or even be left out of all of them for future use.

## Creating and Updating Classes

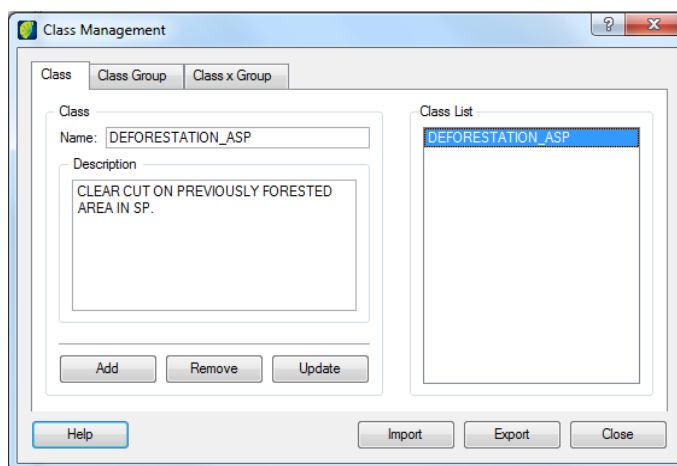
Click on the menu PROJECT MANAGEMENT → *CLASSIFICATION CONTROL* → *CLASS MANAGEMENT* to access the interface to create classes.

In the *Name* field of the *Class* tab, type the name of the class.

If needed, use the *Description* field to add a short description of the class to be created.

Click on the **Add** button to create the class.

The created classes are shown in the *Class List*.



Use the **Remove** button to permanently delete a class. Select the class in the *Class List* and remove it. Classes associated to class groups or to projects cannot be removed. Undo all the existing associations before attempting to remove it.

Use **Update** button to perform updates on classes names or descriptions.

**Note:** Classes can be updated at any time. However, updating classes does not change data already stored in the database, that is, the previously classified polygons, since TerraAmazon treats classes as polygon attributes and stores this information in a column of the attributes table. The updated class will only be attributed to polygons created through classification after the update. Polygons classified before the update will not have their classes automatically updated: this update must be made manually directly on the attribute table (see more about manual maintenance on attribute tables at page 155).

## Creating Class Groups

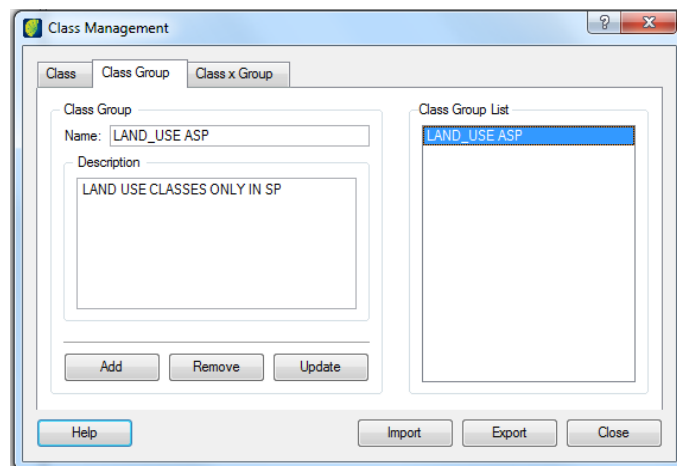
Class groups are meant for organizing classes for easier project configuration. Class groups are not required by the system for the classification process to work perfectly. It is only to enhance organization, once TerraAmazon allows many projects on the same database, each having their own classes.

Click on the *Class Group* tab.

In the field *Name*, type in the name of the class group to be created.

If needed, use the *Description* field to add a short description for the group.

Use the **Add** button to create the group. The created groups are shown in the *Class Group List*.



Use the **Remove** button to permanently delete a group. Select the group in the *Class Group List* and remove it. Groups with associated classes cannot be removed. Undo all the existing associations before attempting to remove it.

The **Update** button updates the name and description information.

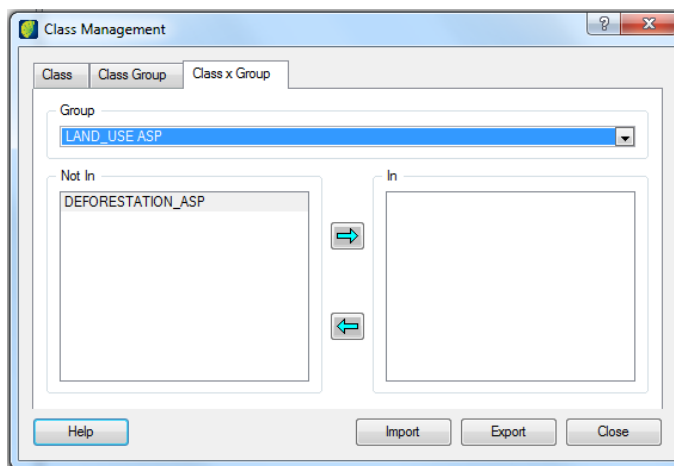


## Inserting Classes into Class Groups

---

Click on the *Class x Group* tab.

Select a Group, click on the class to add and move it from the *Not In* list to the *In* list using the arrows.



The objective of *Class Groups* is to facilitate the choice of many classes for a project in the *Rules Control* settings.

**Note:** Classes can be inserted or removed **from class groups** at any time without causing changes to project configurations.

## Exporting and Importing Classes

---

Classes defined in a database can be exported to a text file for later use in other databases. The structure of this file is as follows:

```
<GROUP="GROUP NAME">
<CLASS> Class 1 Name </CLASS>
<DESCRIPTION> Class 1 Description </DESCRIPTION>

<CLASS> Class 2 Name </CLASS>
<DESCRIPTION> Class 2 Description </DESCRIPTION>

</GROUP>
<DESCRIPTION> Group Description </DESCRIPTION>
```

The result of the examples in this chapter would be:

```
<GROUP=" LAND_USE ASP">

<CLASS> DEFORESTATION_ASP </CLASS>
<DESCRIPTION>CLEAR CUT ON PREVIOUSLY FORESTED AREA IN SP.</DESCRIPTION>

</GROUP>

<DESCRIPTION>LAND USE CLASSES ONLY IN SP</DESCRIPTION>
```

To import classes, the input file must have this same format.

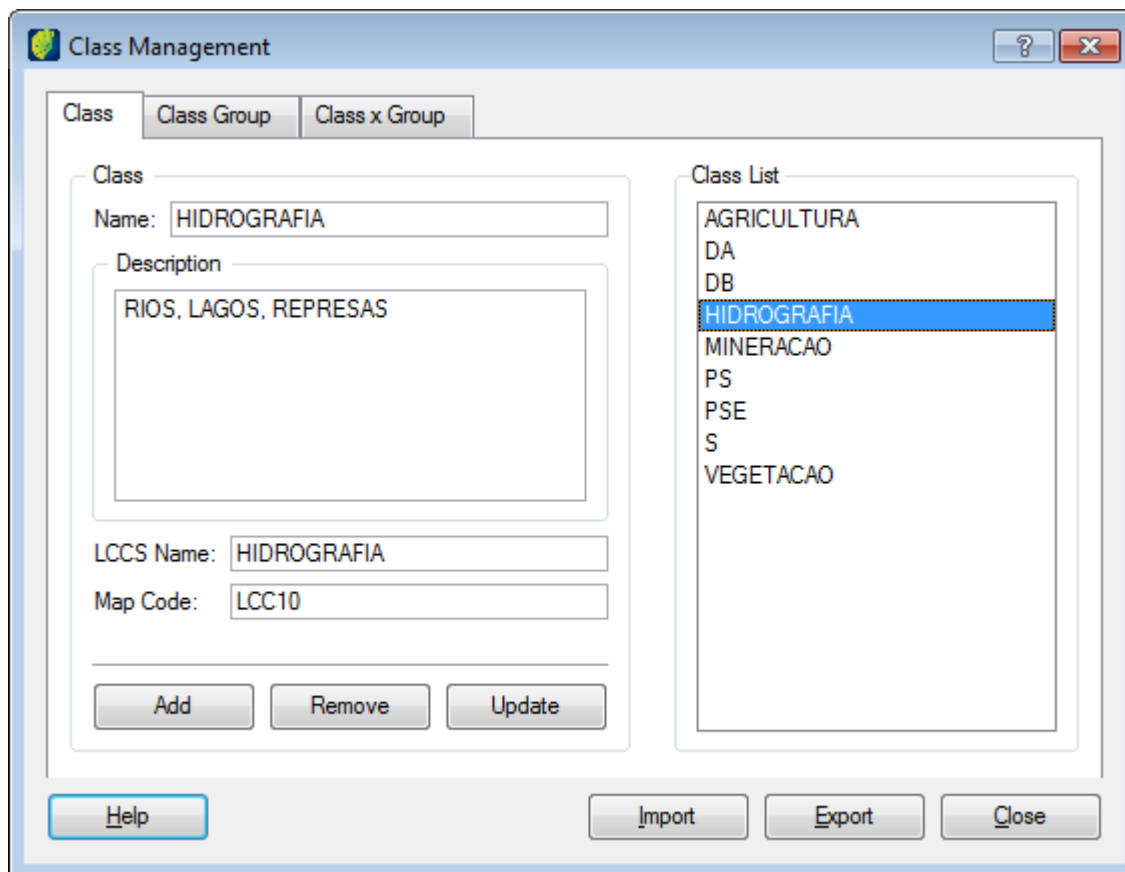
If there is no group, the file presents only the existing classes and their description:

```
<CLASS> DEFORESTATION_ASP </CLASS>
<DESCRIPTION>CLEAR CUT ON PREVIOUSLY FORESTED AREA IN SP.</DESCRIPTION>
```

## Importing Land Cover Classification System (LCCS) files

Click on the menu PROJECT MANAGEMENT → *CLASSIFICATION CONTROL* → *CLASS MANAGEMENT* to access the interface to create classes.

Click on the **Import** button and select the file type .lccs. Browse to the folder where the file is located and click on the file.



Once the file is imported note that two new fields appears in the Class tab: LCCS Name and Map Code.

If you select one class in the Class List, its information will be displayed on these fields and they are not editable but you can change Name and Description fields if needed.

**Note:** Use of .lccs classes will require that a conceptual mode, project, scenario, area of interest and rules control are configured. For further information on how to prepare these conditions refer to Administrator Roles, box 8.

**Note:** To generate .lccs files before importing to TerraAmazon the user should install the LCCS3 software. It can be downloaded from <http://www.geovis.net/Home.htm> and instruction to use the software can be found in its tutorial after installed in HELP → TUTORIAL.

## Associating loaded LCCS classes

After creating a project and its dependencies (see chapter 9 TerraAmazon Project Wizard) it is also necessary to draw an Area of Interest to execute the polygons in the cell(s).

**Area of Interest**

**Layer Definition**

Layer: AOI Add... Remove

**Search**

Column: linkcolumn Operation: Contains Filter: Apply

**AI Geometries List**

	linkcolumn	cell_oid	class_name	scene_id	task_id	geocodig_m	uf	nome
1	1							

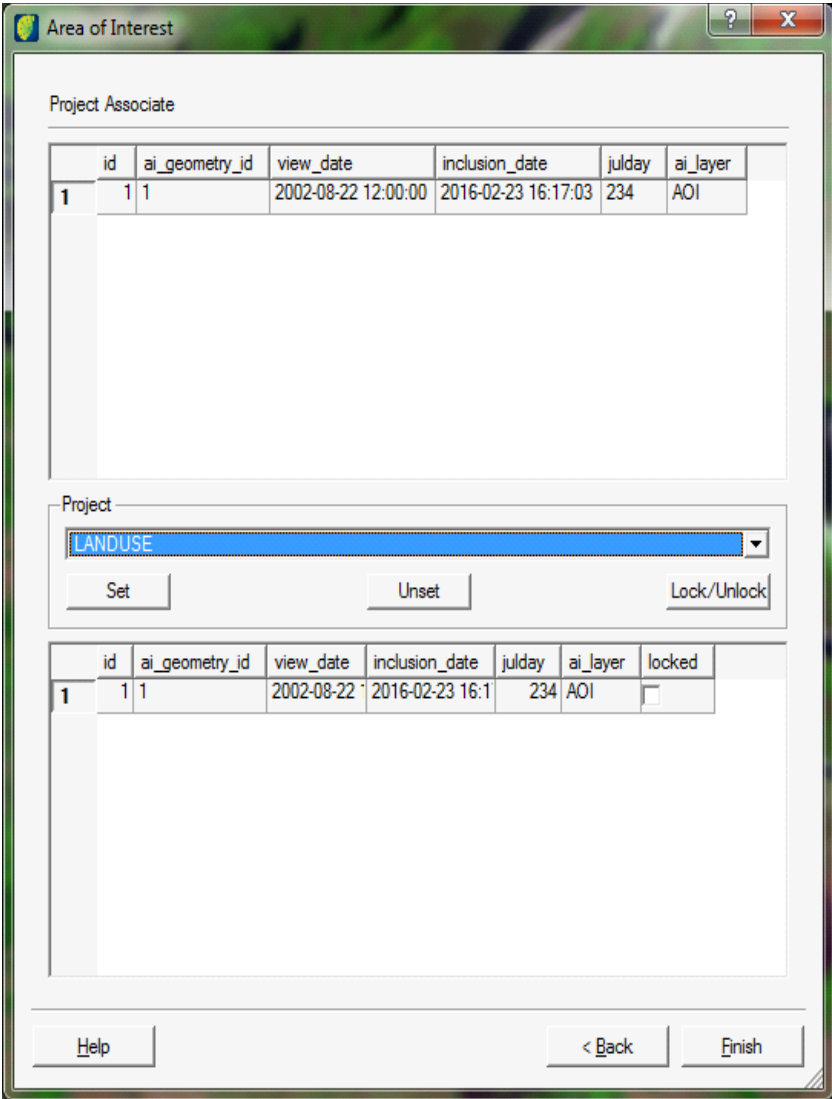
**Parameters**

View Date (DD/MM/YYYY): 22/08/2002 Add

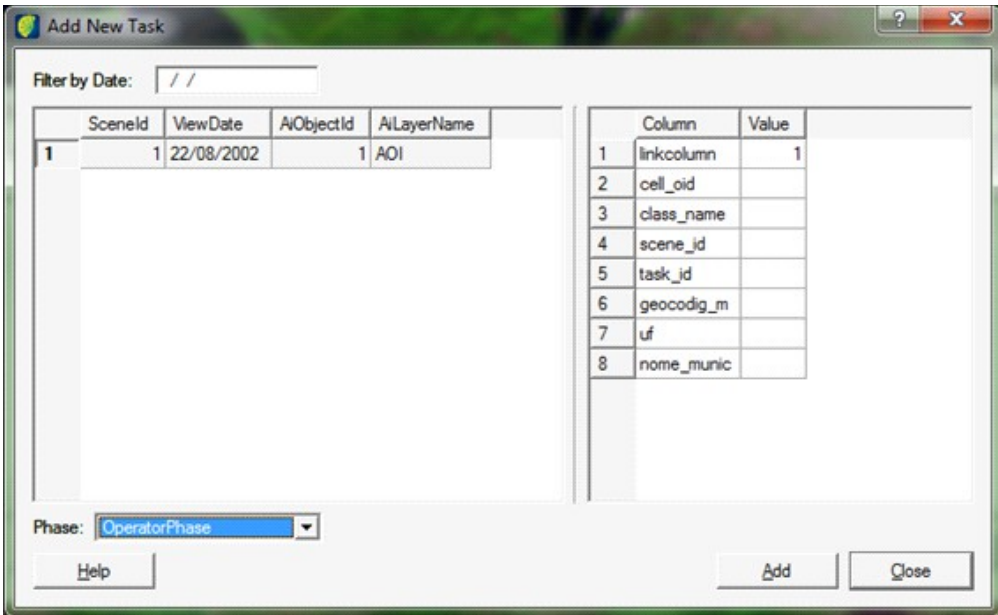
Help Next > Finish

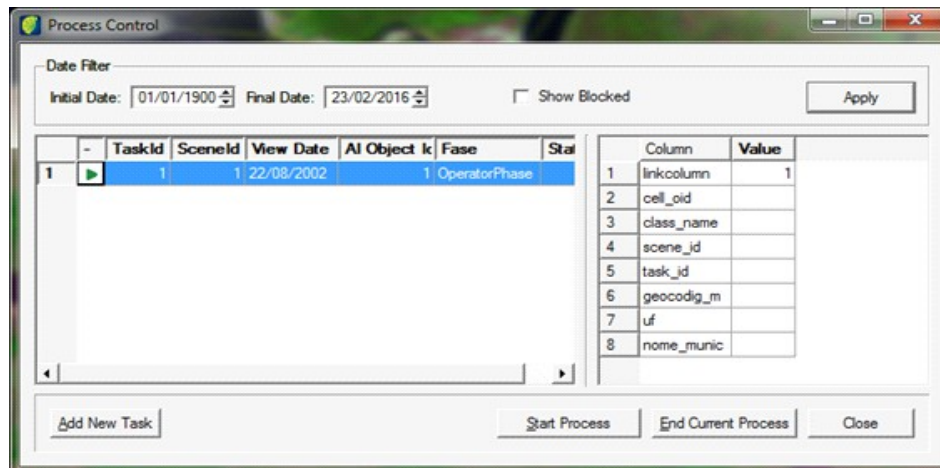
Click on the **Next** button.


Select the project association, click on the **Next** button and on the **Finish** button to conclude.

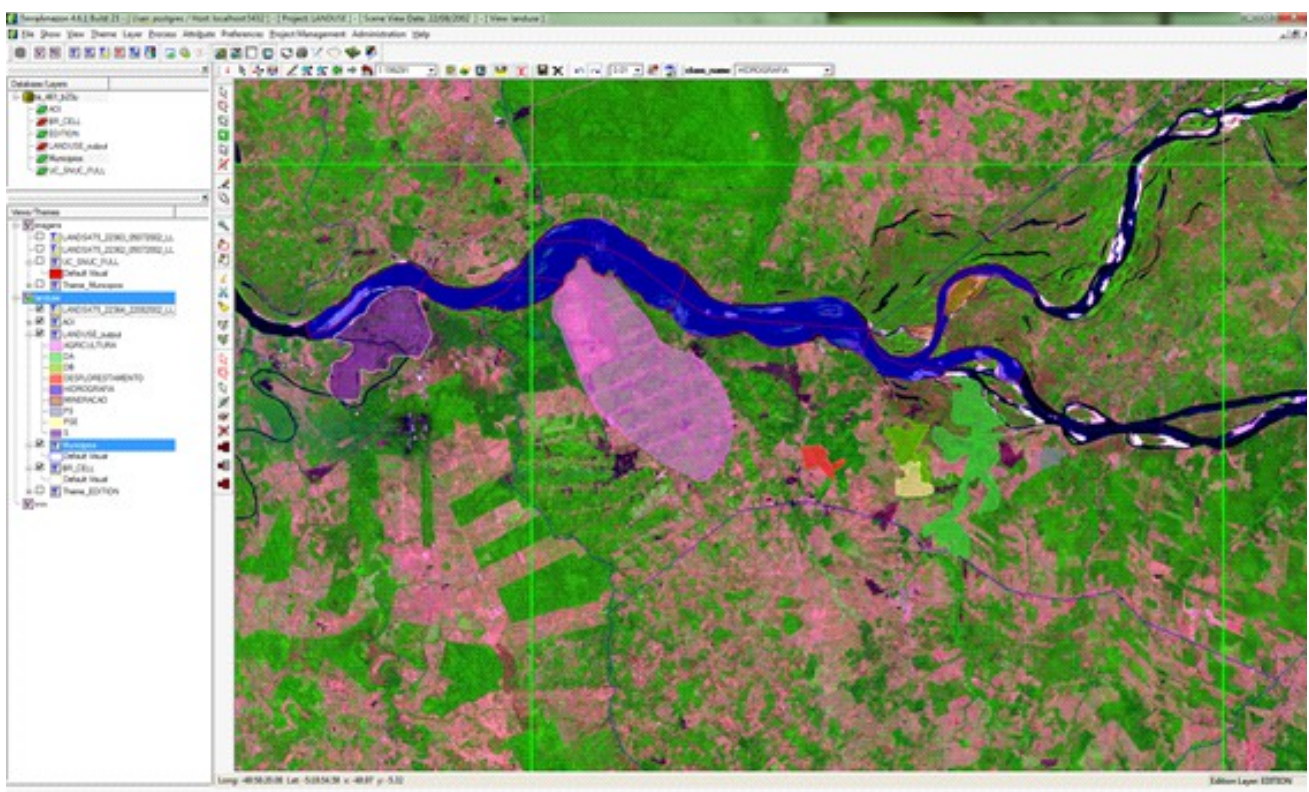


Add a task to the project and start the process.



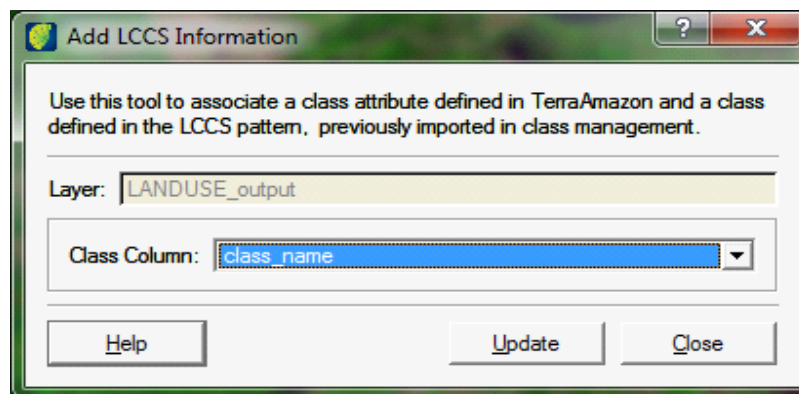


Go to the created project view and enter the Edition mode clicking on the icon  and use the edition tools to select or draw polygons on the view window and classify each one according to available classes.



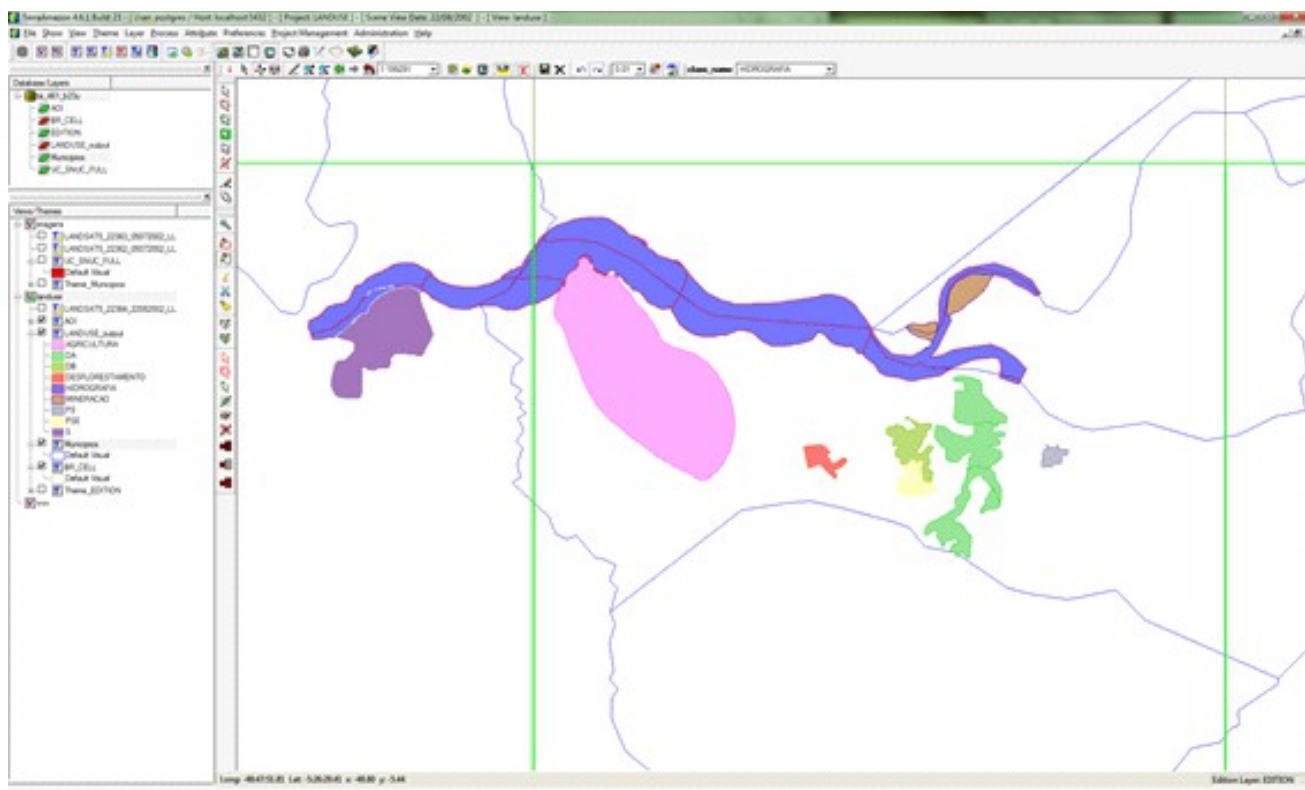
To add LCCS class to an output layer click with mouse right-button on it and select *Add LCCS information....*

Select the the class attribute to be associated to the LCCS pattern in *Class Column* field.



Click on the **Update** button.

Open the output layer and check the result.



Check in the attributes table and its association with selected LCCS class.



Layer Query Window

Queries saved:  Remove

Layer Name: LANDUSE\_output Search...

Query Type: SUM MIN MAX Count(\*)

Attributes:

- linkcolumn
- cell\_oid
- class\_name
- scene\_id
- task\_id
- geocodig\_m
- uf
- nome\_munic
- lccs\_name
- lccs\_mapcode**

Selected Attributes:

- CLASS\_NAME
- NOME\_MUNIC
- LCCS\_NAME
- LCCS\_MAPCODE

☒ Grouping Restriction

Resulting Query:

```
SELECT CLASS_NAME, NOME_MUNIC, LCCS_NAME, LCCS_MAPCODE FROM LANDUSE_OUTPUT GROUP BY CLASS_NAME, NOME_MUNIC, LCCS_NAME, LCCS_MAPCODE ORDER BY CLASS_NAME, NOME_MUNIC, LCCS_NAME, LCCS_MAPCODE
```

Result:

	class_name	nome_munic	lccs_name	lccs_mapcode
1	AGRICULTURA	São João do Araguaia	AGRICULTURA	LCC3
2	DA	São Domingos do Araguaia	DA	LCC1
3	DA	São João do Araguaia	DA	LCC1
4	DB	São João do Araguaia	DB	LCC2
5	DESFLORESTAMENTO	São João do Araguaia		
6	HIDROGRAFIA	Bom Jesus do Tocantins	HIDROGRAFIA	LCC10
7	HIDROGRAFIA	Esperantina	HIDROGRAFIA	LCC10
8	HIDROGRAFIA	Marabá	HIDROGRAFIA	LCC10
9	HIDROGRAFIA	São João do Araguaia	HIDROGRAFIA	LCC10
10	HIDROGRAFIA	São Pedro da Água Branca	HIDROGRAFIA	LCC10
11	MINERACAO	Esperantina	MINERACAO	LCC5
12	MINERACAO	São Pedro da Água Branca	MINERACAO	LCC5
13	PS	São João do Araguaia	PS	LCC4
14	PSE	São João do Araguaia	PSE	LCC6
15	S	Marabá	S	LCC9

Save Query Query Export Results Close



# 7 Rules

---

OPERATIONS AVAILABLE FOR THE RULES	65
CREATING RULES	67
INTERSECTION RULE	68
DIFFERENCE RULE	69
CLEAN RULE	70
EXPORTING RULES	71

---

TerraAmazon defines the output of the classification process by applying topological rules to the input polygons.

A rule defines the spatial operation that input polygons will be submitted to during the classification and the layer that will be used for such operation.

A rule requires three layers to work:

- Edition layer (Input Layer): necessary to open the edition mode. It works as a draft for vectorial edition (for more, refer to Edition Layer (or Input Layer) page 5).
- Rule layer: identified by the rule.
- Destination layer (Output Layer): receives output the data from the set of rules executed by the classification process.

The classification process may execute many consecutive rules before storing the result in the destination layer.

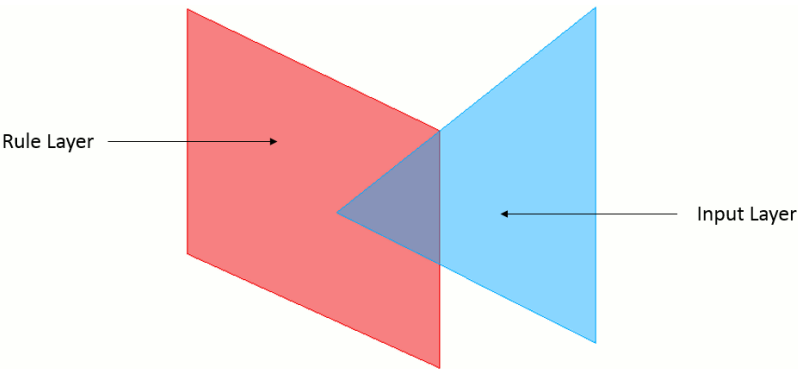
## Operations Available for the Rules

---

In TerraAmazon there are three spatial operations that can be selected to compose a rule:

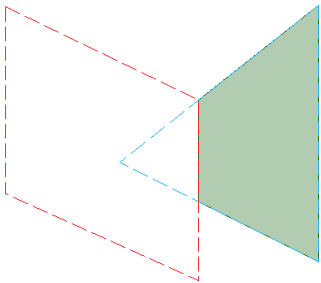
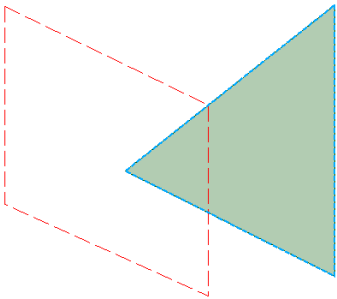
- Difference
- Intersection
- Clean

The following data will be used as an example to present the result of each one of the three operations listed.

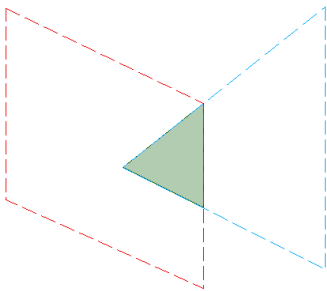


The following table presents the result of each of these operations.

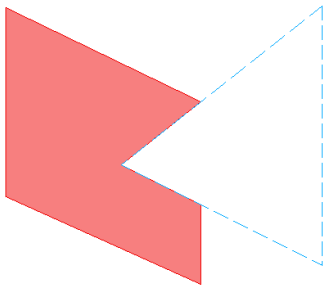
No Rules (Not possible for edition through Projects)    Difference



Intersection



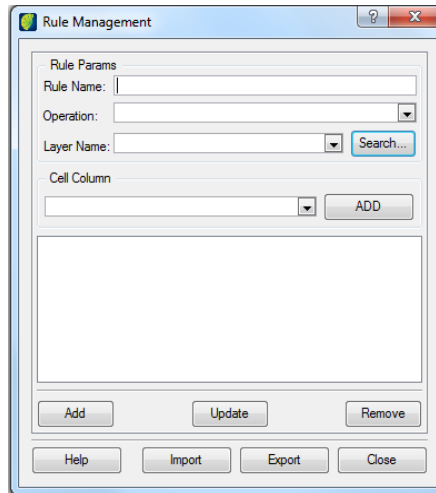
Clean (Considering the red polygon was in the Output Layer)



**Note:** TerraAmazon stores in the output layer only the result of the spatial operations defined by the active rules of the current project. This means that the final polygon stored can be geometrically different than the input one, depending only on the active rules of the project.

## Creating Rules

Go to the menu PROJECT MANAGEMENT → CLASSIFICATION CONTROL → RULE MANAGEMENT.



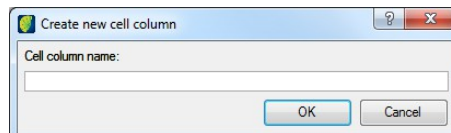
*Rule Name*: type the name of the rule.

*Operation*: select a spatial operation among the ones available: intersection, difference or clear. See details on each operation next in this chapter.

*Layer Name*: choose the rule layer. Use the **Search** button if necessary.

Click on the **Add** button to create the rule.

*Cell Column*: inform the column that has the cell information (find more about cells at page 3). If the layer has no cell column, use the **Add** button at the right side of the *Cell Column* field to create it. Just type the name for the cell column in the pop-up interface and click on the **OK** button.



It is possible to create rules without cell columns, however, this will affect the processing performance depending on the amount of data and users in the concurrent activity.

**Note:** The *Cell Column* field is disabled when the rule layer is defined as a destination layer for any project in the Rules Control interface (See chapter 8).

## Intersection Rule

The Intersection rule results in the area that is common to the edited polygons and the ones that already exist in the rule layer.

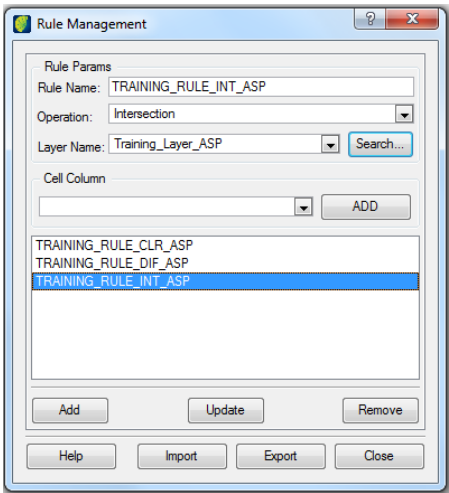
**Note:** Applications: this rule is used when it is necessary to limit the editable area or to insert in the output layer values that are found in other layers. For example, if there is a column in layer **A** that must be inserted in the data before it is stored in the output layer, then an intersection rule with **A** layer will be required (Associating Attributes with an Output Layer, page 79).

*Rule Name:* type in a name for the rule to be created. In this example, a name identifying easily that the rule is related to an intersection with SOME\_DATA layer was selected. This method facilitates the following procedures to associate rules with projects. However, the selection is up to the user.

*Operation:* select the *Intersection* operation.

*Layer Name:* select the rule layer to define the input geometries.

*Cell Column:* inform which layer column was chosen to contain the cell information. It is possible to keep this field empty, however, this may affect the processing performance depending on the data quantity and users in the concurrent activity.

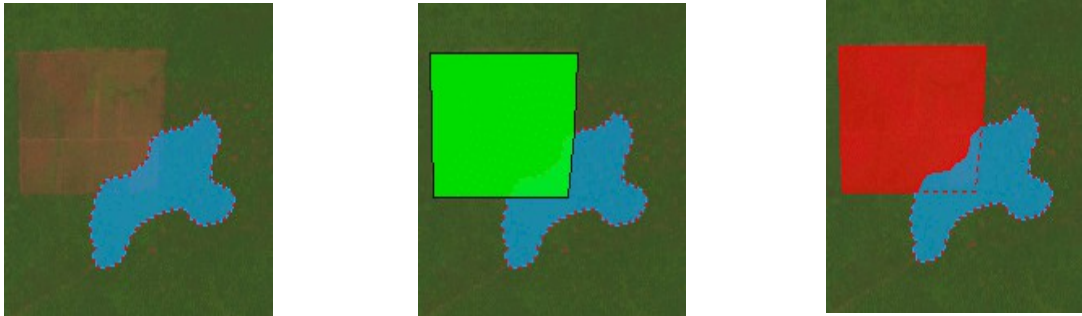


## Difference Rule

---

The difference rule removes from the edition layer the areas of intersection with the rule layer before storing the result in the destination layer.

This prevents the existence of overlaid areas. The figure below shows a blue cloud polygon that already exists in the rule layer. A new polygon, green, was drawn in the edition layer and the classification process eliminated the overlaid area. The red polygon is the one that was stored in the output layer.



**Note:** The main use of this rule is to prevent the existence of overlaid areas (obtained by a difference rule where the rule layer is the same as the destination layer). However, there are many ways of using it. For example. It can be used to prevent users from classifying polygons on forbidden areas, according to the project.

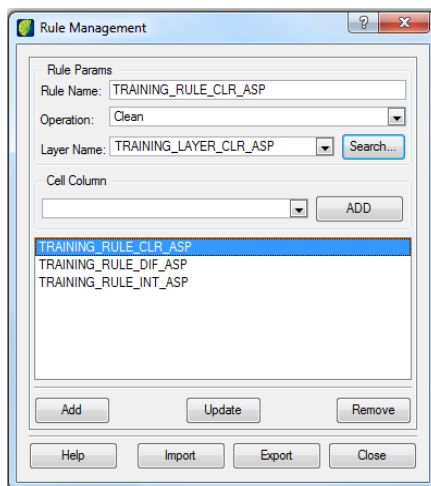
## Clean Rule

A clean type rule is necessary when it is necessary to allow the user to remove existing data of a layer.

*Rule Name:* type in the name of the rule to be created. In this example, a name that easily identifies the rule as one dealing with the OUTPUT layer was selected. In this way, the following procedures to associate rules with a project is facilitated; however it is a user's choice.

*Operation:* select the *Clean* operation.

*Layer Name:* select the layer that will have the geometry changed.



Click on the **Add** button to create a rule.

*Cell Column:* inform which layer column was chosen to store the cell information. It is possible to keep this field empty, however, this may affect the processing performance depending on the data quantity and users in the concurrent activity.

The *Cell Column* field is disabled when the selected layer is defined as an output layer, even if it is not active in any project (Defining Output Layers, page 76). If it is necessary to change the cell column of an output layer, use the Define Output Layer interface, accessed by the Rules Control.

## Exporting Rules

---

The rules defined in the database can be exported to a text file using the following format:

```
<RULE="RULE_NAME">
<LAYER>LAYER_NAME</LAYER>
<OPERATION>OPERATION</OPERATION>
</RULE>
```

The example below shows two rules: DIF\_OUTPUT and CLEAN\_OUTPUT. For instance:

```
<RULE="DIFFERENCE_WITH_OUTPUT">
<LAYER>OUTPUT_LAYER</LAYER>
<OPERATION>Difference</OPERATION>
</RULE>

<RULE="CLEAN_OUTPUT">
<LAYER>OUTPUT_LAYER</LAYER>
<OPERATION>Clean</OPERATION>
</RULE>
```

To import, use a file with the same format.



## Rules Control

---

DEFINING OUTPUT LAYERS	76
ASSOCIATING OUTPUT LAYERS WITH A PROJECT	77
ASSOCIATING RULES WITH AN OUTPUT LAYER	78
ASSOCIATING ATTRIBUTES WITH AN OUTPUT LAYER	79
ASSOCIATING CLASSES WITH OUTPUT LAYERS	82
ASSOCIATING CLEAN RULES WITH AN OUTPUT LAYER	83
VALIDATING AN OUTPUT LAYER	84

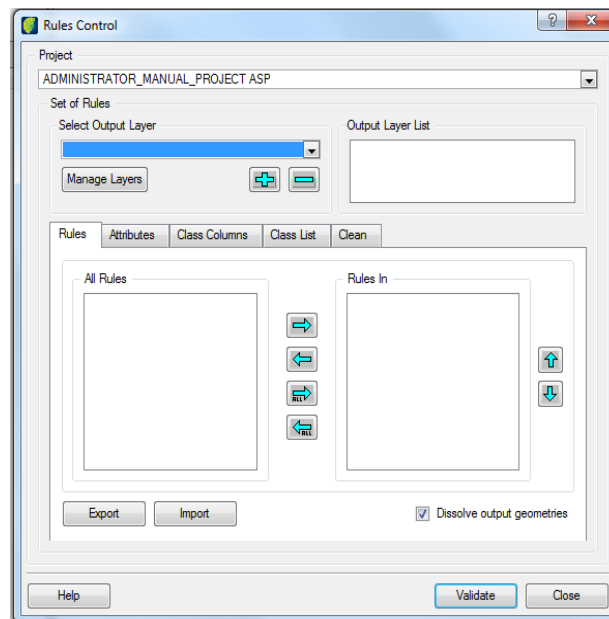
---

This chapter presents the relationships among project, rules and classes. Therefore, it is necessary for the database to already have all the configurations described on chapter 5, 6 and 7 before continuing.



## Rules Control Parameters

Go to PROJECT MANAGEMENT → CLASSIFICATION CONTROL → RULES CONTROL.



A description of the interface fields is presented next:

1. *Project*: shows a list of existing projects in the current database.
2. *Select Output Layer*: shows a list of the layers added as Output layers in the database.
3. *Output Layer List*: shows the Output layers defined for the selected project.

Note that this interface has five tabs described next and that each one of them must be separately configured for each Output layer defined for the project. The configuration of these tabs for one Output layer is valid for all projects where such layer is active as an Output.

4. *Rules*: association between the spatial rules and the selected Output layer in the Output layer List field.
5. *Attributes*: association of the attributes of the layers involved in the rules associated to the selected project on the previous tab.
6. *Class Columns*: the user can insert more than one column to receive the classification result but the class list will be the same to all defined columns in this tab. The user needs to define which column will be the main one and which will be additional.
7. *Class List*: association between classes and the selected Output layer. It shows all the existing classes in the database.
8. *Clean*: association between the existing *clean* rules in the database and the selected Output layer.
9. *Validate*: verifies if the Output layers have the columns required for the classification process, such as the column to receive class information, scene identification and cell. It also verifies if the Output layer contains the polygons representation.

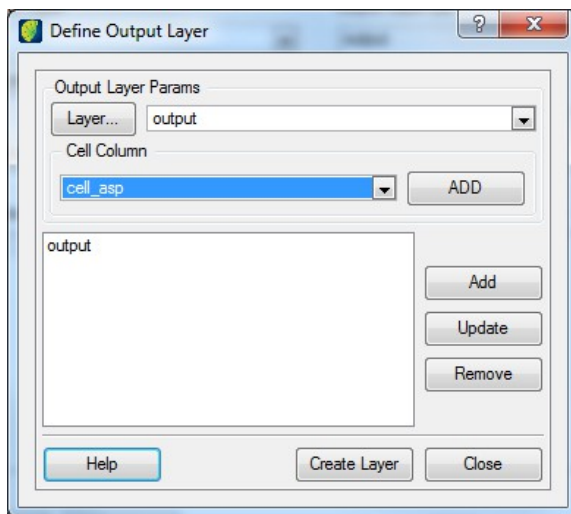
The procedures presented in this chapter can be changed or fully rewarded at any time, including during classification work. This makes the maintenance procedure of configurations of this interface very easy.

**Warning:** any change is instantaneously updated in the database. Therefore, in order to avoid inconsistencies in the data, execute maintenance procedure only when there is no edition being carried out. It is advisable to ask users to disconnect from the database. Also, deactivate the project in the PROJECT MANAGEMENT interface while maintenance is going on. When finished, reactivate it.

**Note:** If any edition or classification is executed during the maintenance procedures of this interface, the result stored in the output layer will follow the rules and active configurations in the instant of classification and can be different from the expected result, creating inconsistencies in the data saved in the database. If this happens, it will be necessary to correct the inconsistent data. This can be done by the same interpreter user after maintenance is finished, through a reclassification. In some cases, the administrator can make corrections directly on the attributes table through the table maintenance interface, accessed by the ADMINISTRATION → ATTRIBUTE TABLE MAINTENANCE menu.

## Defining Output Layers

To set a vector layer as an output layer, click on *Manage Layers*, on the *Rules Control* interface.



Click on the **Layer** button to search for layers in the database.

Use the *Cell Column* field to indicate the cell column present in the chosen layer. If a cell column is missing, use the **Add** button to create one.

Click on the **Add** button to set the chosen layer as an Output layer in the database.

To remove a layer from the *Output Layers* list, select it and click on the **Remove** button.

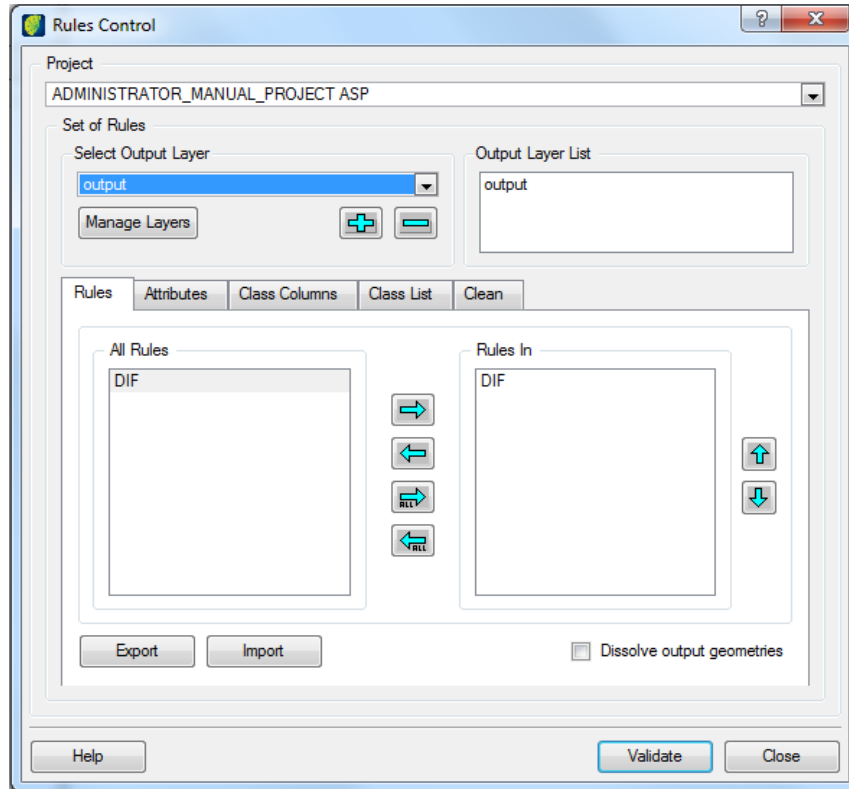
**Note:** Layers defined as Output Layer, that have an association with Projects and Rules cannot be removed. In this case, it will be shown a message asking for the dependencies removal. Only the association with the project and union rule, if the output layer has, will be removed.



It is possible to create new layers by clicking on **Create Layer** button. This is a shortcut to the method of creating layer described on *Creating Layers*, page 109.

Close this interface and go back to the *Rules Control* to manage output layers defining the desired ones for the selected Project.

## Associating Output Layers with a Project

In the *Project* field, select the desired project.



Select an Output layer in the *Select Output Layer* field. Use the button  to define the selected Output layer as an output layer for the selected project. Use the button  to remove it. If the box is empty, or if it is not showing the desired layer, click on *Manage Layers* to search for layers.

**Note:** At any time, Output Layers can be associated with a project or dissociated, regardless of the active tab in this interface.

## Associating Rules with an Output Layer

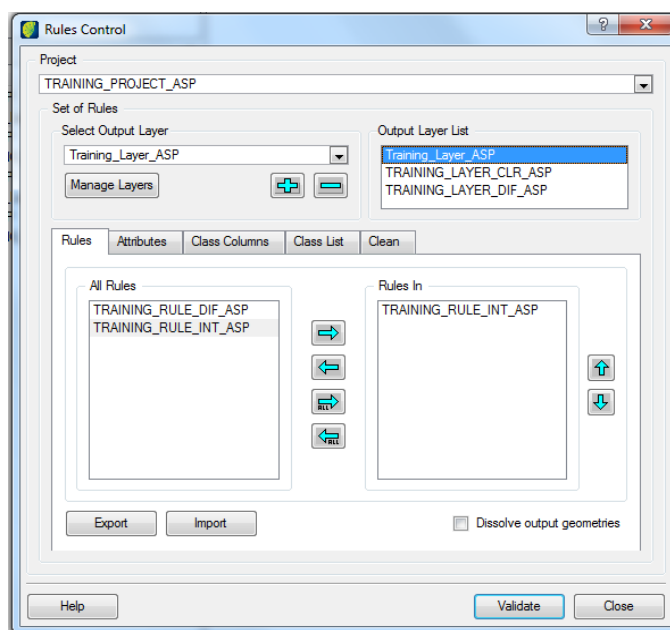
After associating Output layers with a project, it is necessary to define the rules that will be associated with each of the Output layers.

The *Rules* tab shows two lists: one with all the rules defined in the database (*All Rules*) and the other with the rules associated with the selected Output layer in the Output layer List (*Rules In*).

To insert or remove rules, use the arrows.

If the option *Dissolve output geometries* is selected, the dissolve operation will be done considering the columns:

- *class column*
- *scene\_id*
- *task\_id*
- *cell\_oid*
- other columns associated at the *Attributes* tab. See about associating attributes with an Output layer on page 79.



In the example above, the selected project is called TRAINING\_PROJECT\_ASP and the output layer associated with it is called Training\_Layer\_ASP. The *Output Layer List* field shows the Training\_Layer\_ASP highlighted, indicating that it is selected to be configured. All configurations executed in this situation will be effective only for this Output Layer until another one is defined for the project and selected instead.

The *Rules In* list shows that the TRAINING\_RULE\_INT\_ASP rule is already associated with this Output layer.

This configuration means that polygons under the classification process will be submitted to an intersection operation with those polygons already existing in the Training\_Layer\_ASP, which is the Rule Layer used in the TRAINING\_RULE\_INT\_ASP rule.

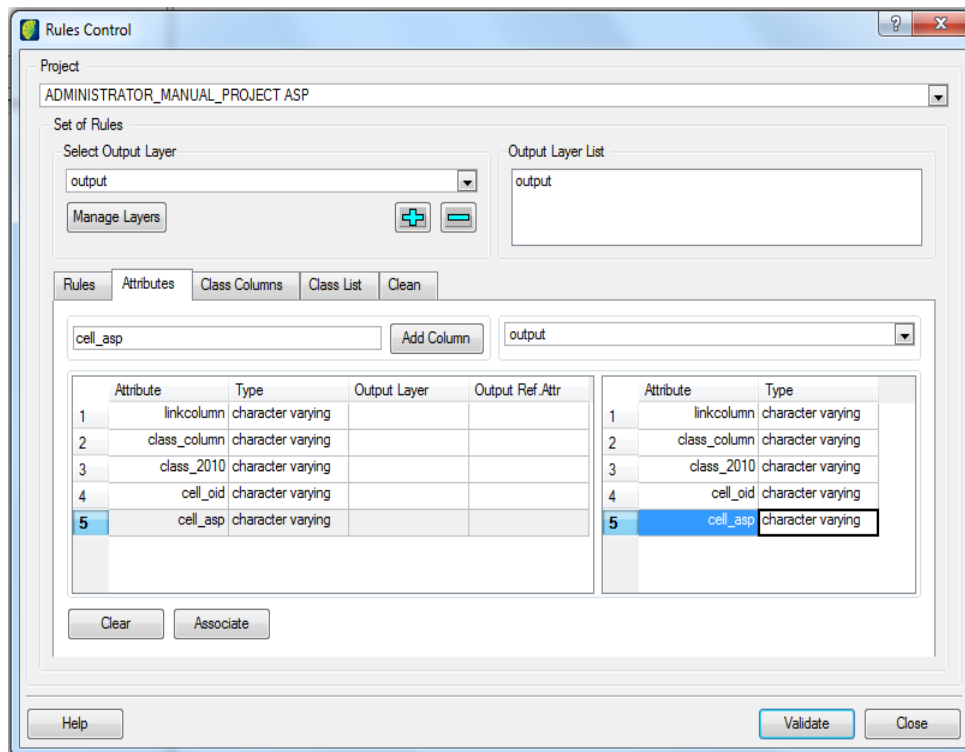
After that, the resulting polygons will be stored on the OUTPUT\_LAYER layer.

## Associating Attributes with an Output Layer

The attributes association allows aggregating information from other layers to the new polygons created through the classification process.

For this to be possible, it is required that an intersection rule is defined with the layer that contains the desired information. This rule must be associated to the Output layer that will receive the polygons with such information.

Click on the *Attributes* tab.



The *Attributes* tab shows the columns of the Output layer and the data type that they contain.

In the box at the right of the button **Add Column**, select the layer that has the information you need. If the desired layers are not shown on that list, you must associate with the current Output layer an intersection rule with the missing layer, so it will show up on this box.

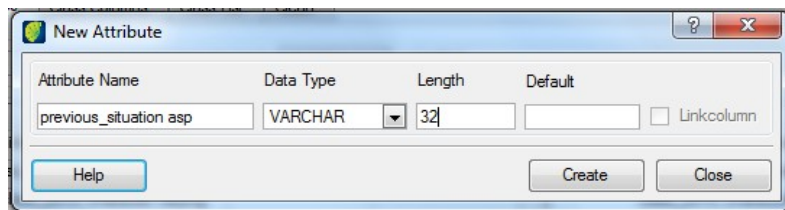
In the figure above, the selected layer is called PREVIOUS\_SITUATION, as a layer that contains a previous situation of the area of the current project.

Under the layer box, the interface shows its columns and their data type.

Associate the columns by selecting one in each table, followed by clicking on the **Associate** button.

If the Output layer does not have a column to receive the data, create a new column by clicking on the **Add Column** button. Type the name of the column, select the data type and length if necessary. It is not required that columns have the same name, but the data type must be the same.

To remove the association, select the column and click on the **Clear** button.



Attribute Name	Data Type	Length	Default
previous_situation asp	VARCHAR	32	

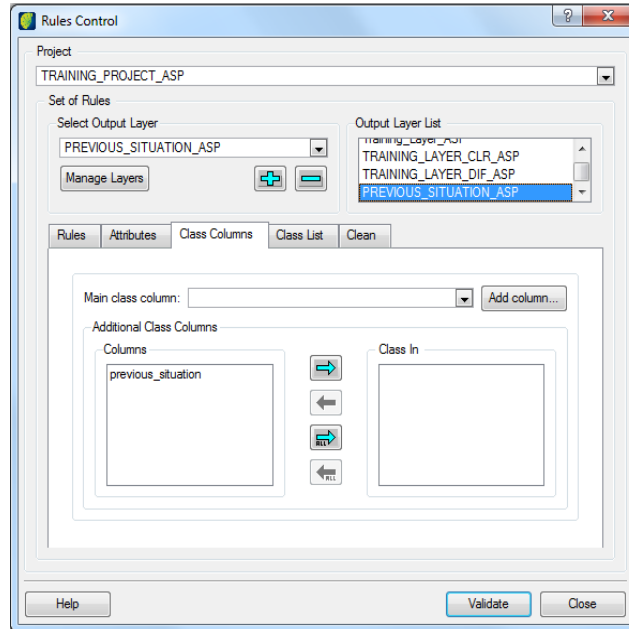
☐ Linkcolumn

Help Create Close

**Note:** The association made in this interface is valid only for the classification with the classes assigned to the selected Output layer in the *Output Layer List*. See more about associating rules with Output layers on page 78 and associating classes with Output layers on page 82.

## Associating Class Columns with Output Layer

The selection of class columns to be presented in this list is done in the *Class Column* tab of the Rules Control interface. In this tab there are two lists: one with all columns defined in the database that have no association with any Output layer (*Columns*) and another with the active classes for the selected Output layer only (*Classes In*).



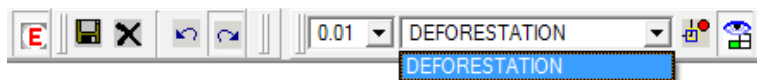
Select the column in the *Columns* list and use the arrows to associate them with the selected Output layer.

Use the *Main Class Column* field to select the column and if not available click on the **Add Column** button to create a new one.

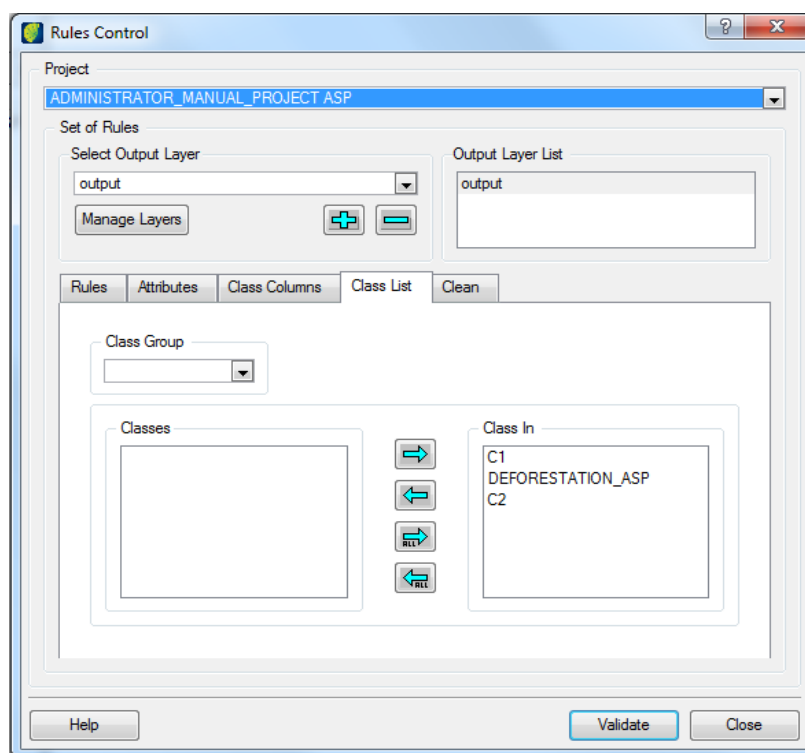


## Associating Classes with Output Layers

In TerraAmazon, classes are special attributes in the classification process. When a user activates a project and opens the edition mode, a list of the classes of this project is presented as shown in the figure below.



The selection of classes to be presented in this list is done in the *Class List* tab of the Rules Control interface. In this tab there are two lists: one with all classes defined in the database that have no association with any Output layer (*Classes*) and another with the active classes for the selected Output layer only (*Classes In*).



Select the classes in the *Classes* list and use the arrows to associate them with the selected Output layer.

Use the *Class Group* to locate classes easier. It is important to define groups when there are too many classes defined in the database. This is only possible when class groups were created as presented on page 55. The use of class groups is not required.

When there are groups defined, just select the desired group and the *Classes* list will be populated by the classes belonging that group.

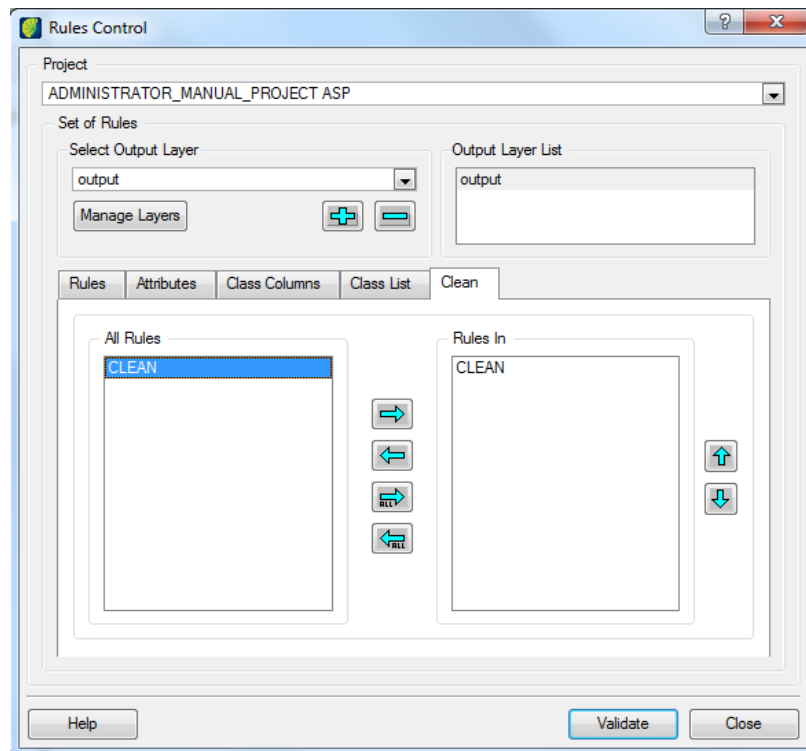
**Note:** The classes associated in this tab will be shown in the list of classes when a user opens the edition mode. It is important to understand that polygons classified with these classes through the classification process will be subjected to the rules associated in the *Rules* tab and the result will be stored in the Output layer.

## Associating Clean Rules with an Output layer

Clean rules are necessary to allow reclassification and removal of already classified polygons. Each Output layer there must have its own clean rule.

In the *Clean* tab there are two lists: one with all the clean rules defined in the database (All Rules), and another with the ones associated with the selected Output layer only (Rules In).

Use the arrows to associate the rules as necessary. The up and down arrows change the order in which the rules are applied to polygons.



The clean rule acts without being subjected to other rules. This allows the removal of data when difference rules prevent the edition. It is only possible to block certain data against clean rules by sending this data to a new layer which does not have a clean rule.

In the edition process, these rules are put in action through the *Clear* and *Reclassify* tools.

**Note:** The reclassification of a new polygon or of polygons selected by the *Select Geometries* tool or by the *Select by Drawing Area* tool operates executing a clean rule followed by a usual classification. Therefore, if there are no clean rules associated with the Output layer, it will not be possible to reclassify any data.

## Validating an Output Layer

---

The validation of the selected Output layers is necessary to ensure that they have the columns required to receive the result of classifications. This validation verifies the existence of cell and class columns, in addition to creating the scene identification column.

Each Output layer must be validated separately after finishing the association in the Rules Control interface.

Click on the **Validate** button to execute the validation.

The interface confirms the validation success. If the absence of any columns is detected or if the Output layer does not have the polygon representation, the interface will show a warning indicating the missing item.

The time length of validation depends on the quantity of data stored in the layer since the validation also creates indexes for its tables.

## 9 TerraAmazon Project Wizard

---

STARTING TERRAAMAZON PROJECT WIZARD

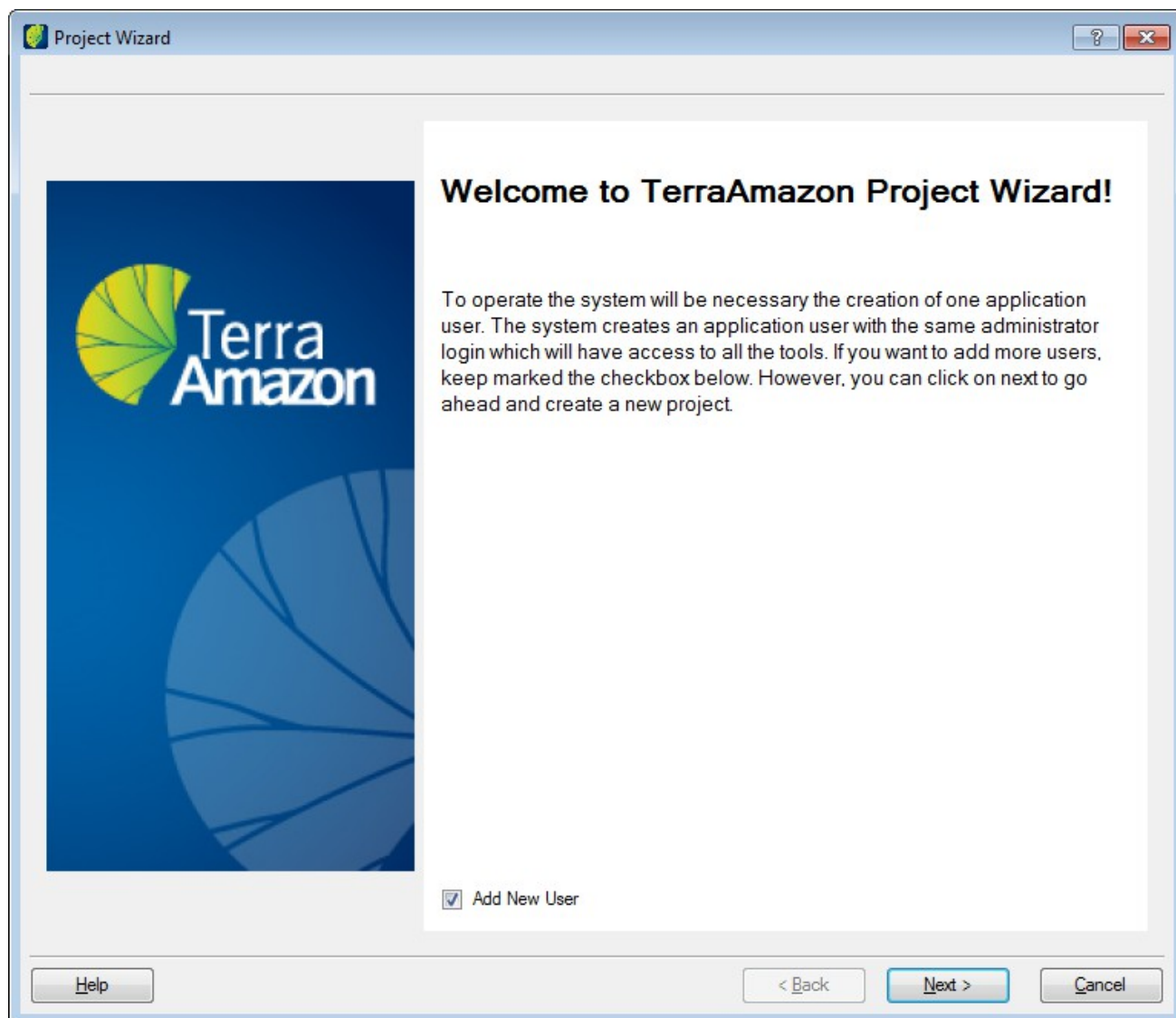
---

86

## Starting TerraAmazon Project Wizard

To optimize and speed up the initial setup of TerraAmazon and project creation it has a wizard.

To start up the tool click on PROJECT MANAGEMENT → PROJECT WIZARD.



In this first interface user select if addition of a new user is necessary. If so, click on the box *Add New User*.

Click on the **Next** button.

## Creating users

The screenshot shows the 'Project Wizard' window for TerraAmazon. The title bar says 'Project Wizard'. Inside, there's a blue sidebar on the left with the TerraAmazon logo and a list of steps. The main area has a heading 'User' and a 'User Controller' section. The 'User List' contains 'postgres', 'ASP', and 'operator'. The 'User Controller' has a checked 'Add new user' box, input fields for 'Name' and 'Password', and buttons for 'Add', 'Remove', and 'Password'. At the bottom are 'Help', '< Back', 'Next >', and 'Cancel' buttons.

To insert a new user application in the TerraAmazon database, check on "Add new user", and fill in the login information.

**User**

**User List**

- postgres
- ASP
- operator

**User Controller**

☒ Add new user

Name:

Password:

**Step**

- 1: Insert new User
- 2: Insert new Group
- 3: Associate User and Group
- 4: Create new Project
- 5: Create Rules of the project
- 6: Associate Rules to Output Layer
- 7: Associate Attributes
- 8: Create new Classes and associate to Output Layer

Check *Add new user* box.

*Name*: enter the name of the new user

*Password*: enter the password.

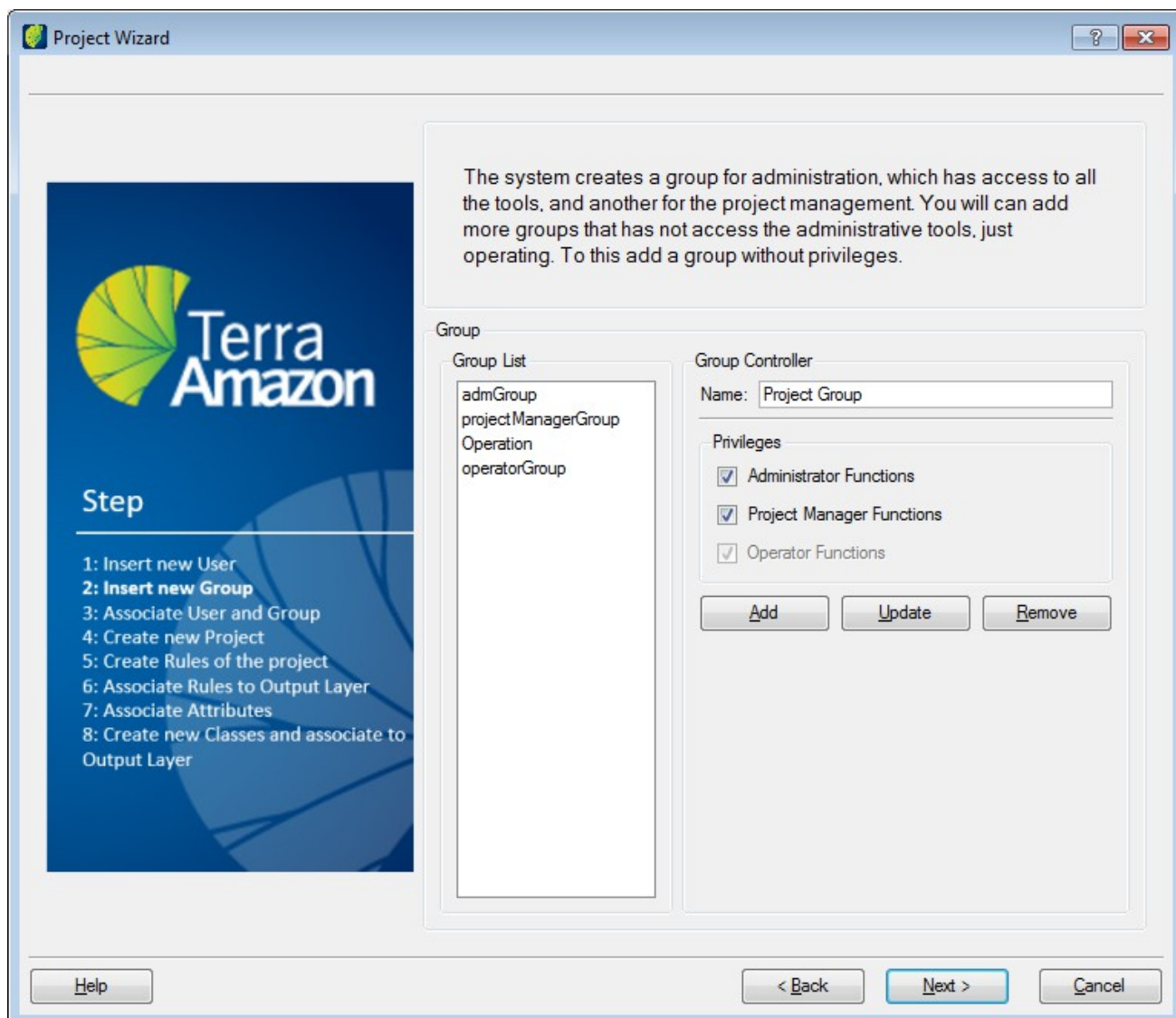
To remove a user select one in the User List and click on the **Remove** button.

To change a user password select one in the User List and click on the **Password** button.

Click on the **Next** button.

For more information go to Users and User Groups.

## Group



The screenshot shows the 'Project Wizard' window with the 'Group' tab selected. On the left, a blue sidebar contains the TerraAmazon logo and a list of steps: 1: Insert new User, 2: **Insert new Group**, 3: Associate User and Group, 4: Create new Project, 5: Create Rules of the project, 6: Associate Rules to Output Layer, 7: Associate Attributes, 8: Create new Classes and associate to Output Layer. The main area has a text box explaining that the system creates administrative and project management groups, and users can add more groups with or without privileges. Below this, the 'Group' section includes a 'Group List' with 'admGroup', 'projectManagerGroup', 'Operation', and 'operatorGroup'. The 'Group Controller' section has a 'Name' field set to 'Project Group' and 'Privileges' checked for 'Administrator Functions', 'Project Manager Functions', and 'Operator Functions'. At the bottom are 'Add', 'Update', and 'Remove' buttons. The window footer has 'Help', '< Back', 'Next >', and 'Cancel' buttons.

Name: enter the name for the new group.

Privileges: check the proper box according to the group level function.

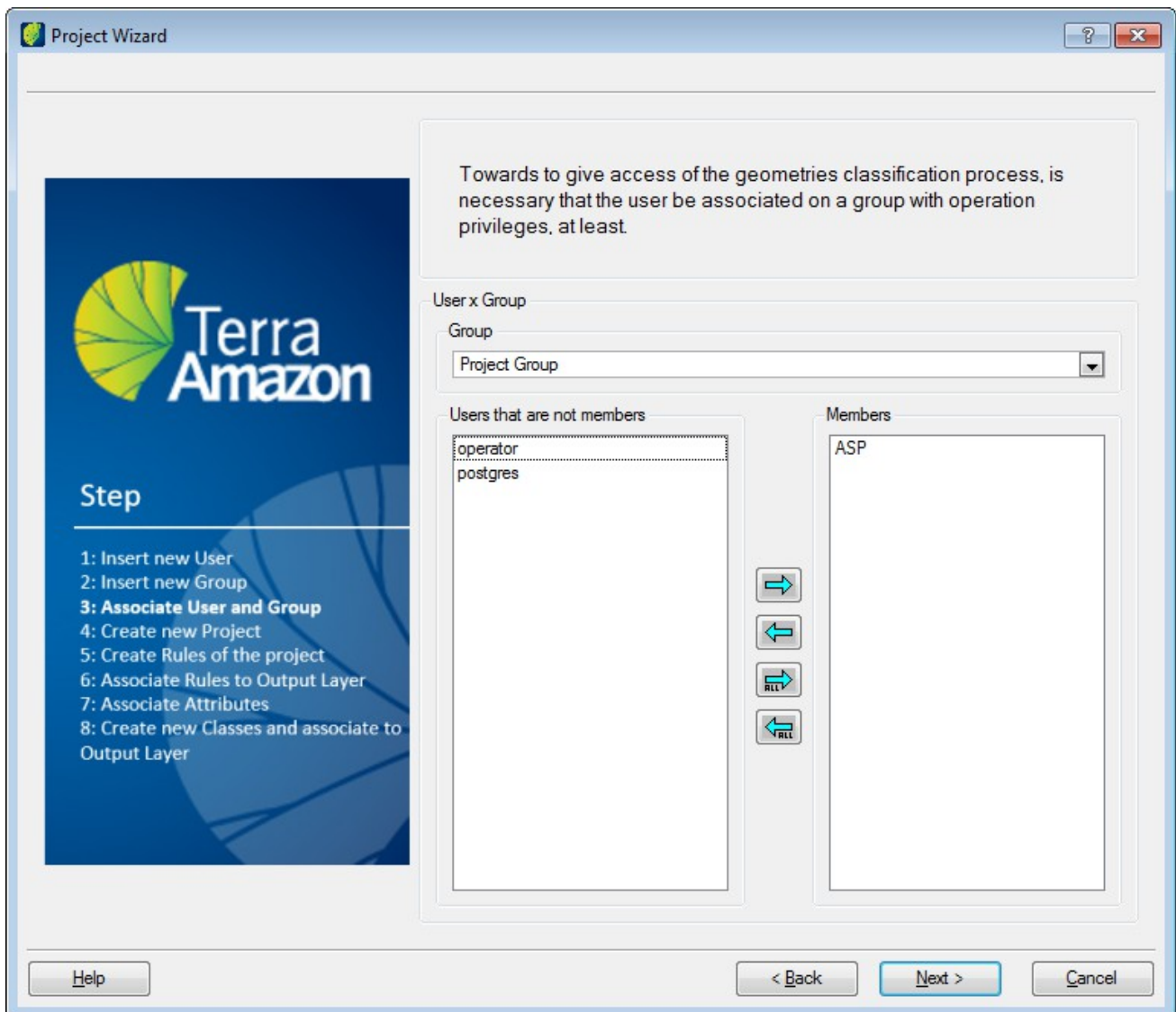
To delete a group select one in the *Group List* and click on the **Remove** button.

To update group setup select one in the *Group List*, change privileges and click on the **Update** button.

Click on the **Next** button.

For more information go to Users and User Groups.

## User x Group



Group: select the group to associate users.

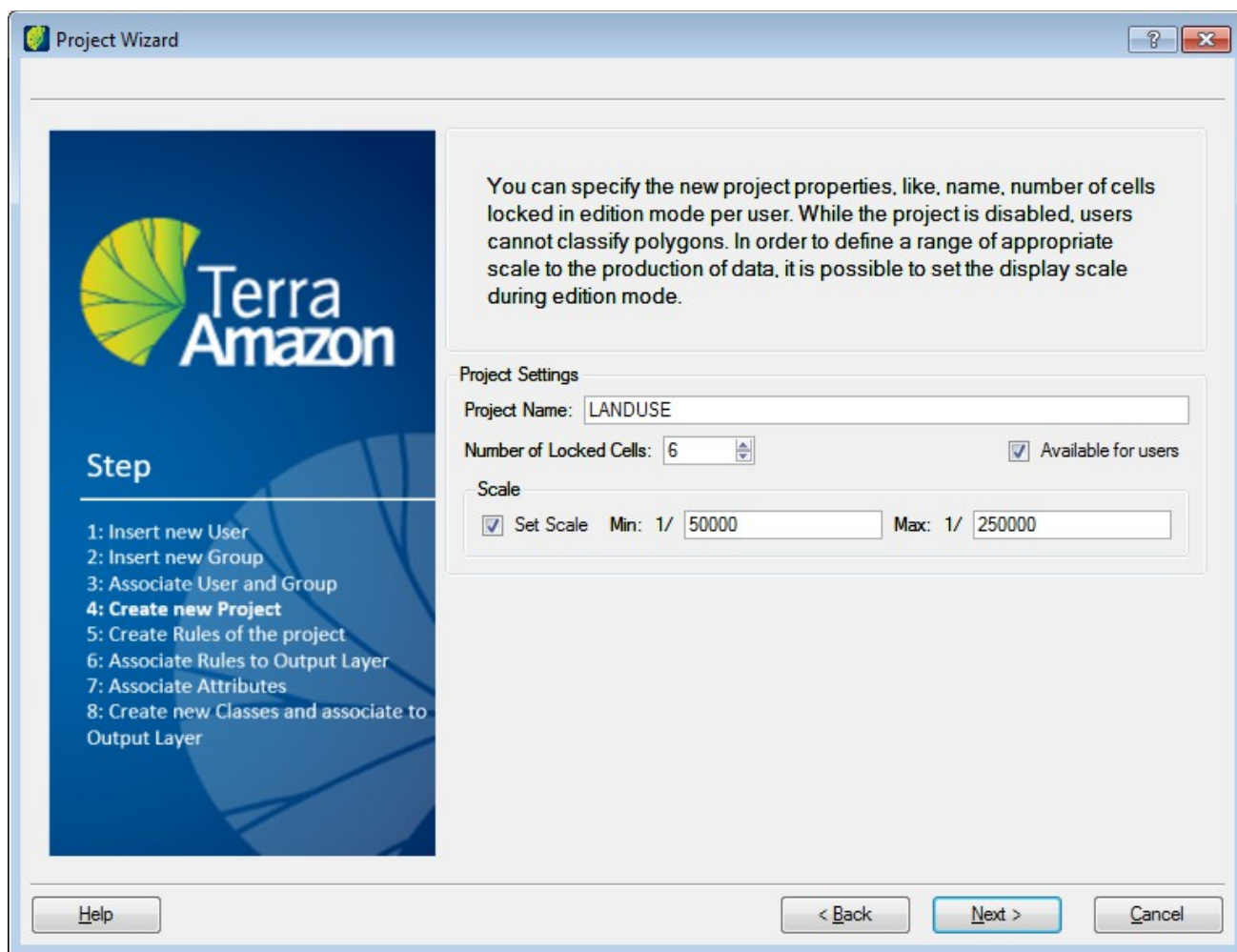
Select one or more users in the left list and click in right arrow button to transfer them to members list.

To disassociate do the opposite operation.

Click on the **Next** button.



## Project settings



The screenshot shows the 'Project Wizard' window with the title bar 'Project Wizard'. On the left is a blue sidebar with the TerraAmazon logo and a list of steps. Step 4, 'Create new Project', is highlighted. The main area has a text box explaining project settings and a 'Project Settings' section with input fields for Project Name, Number of Locked Cells, and Scale. The 'Next >' button is highlighted in blue.

**Project Wizard**

You can specify the new project properties, like, name, number of cells locked in edition mode per user. While the project is disabled, users cannot classify polygons. In order to define a range of appropriate scale to the production of data, it is possible to set the display scale during edition mode.

**Project Settings**

Project Name:

Number of Locked Cells:  ☒ Available for users

**Scale**

☒ Set Scale Min: 1/  Max: 1/

Step

- 1: Insert new User
- 2: Insert new Group
- 3: Associate User and Group
- 4: Create new Project**
- 5: Create Rules of the project
- 6: Associate Rules to Output Layer
- 7: Associate Attributes
- 8: Create new Classes and associate to Output Layer

Help < Back Next > Cancel

*Project Name:* enter the name of the new project.

*Number of Locked Cells:* select or enter the number of cells.

*Available for users:* check the box if project can be available for regular users.

*Scale:* check in this box to setup project scale and enter minimum and maximum values.

Click on the **Next** button.

For more information go to Project.

## Creating rules of the project

Project: LAND\_USE

Layer Selection

☐ Create Layer  GAS2000/DecimalDegrees

☒ Municipios

ID	Layer name	Output	Cell Column	Rule
1	7 LANDUSE_output	<input checked="" type="checkbox"/> yes	cell_oid	Difference
2	8 Municipios	<input type="checkbox"/> yes		Intersection

Buttons: Help, < Back, Next >, Cancel

### Layer Selection:

First option is to enter a new layer name and including its projection (click on **Projection** button).

The second option is to select a existing layer from the list. If not available click on **Search** button to find the needed layer.

Click on the **Add to project** button.

The layer appears on the list below. You can complete configuration by choosing if it is output layer, name of column and type of rule.

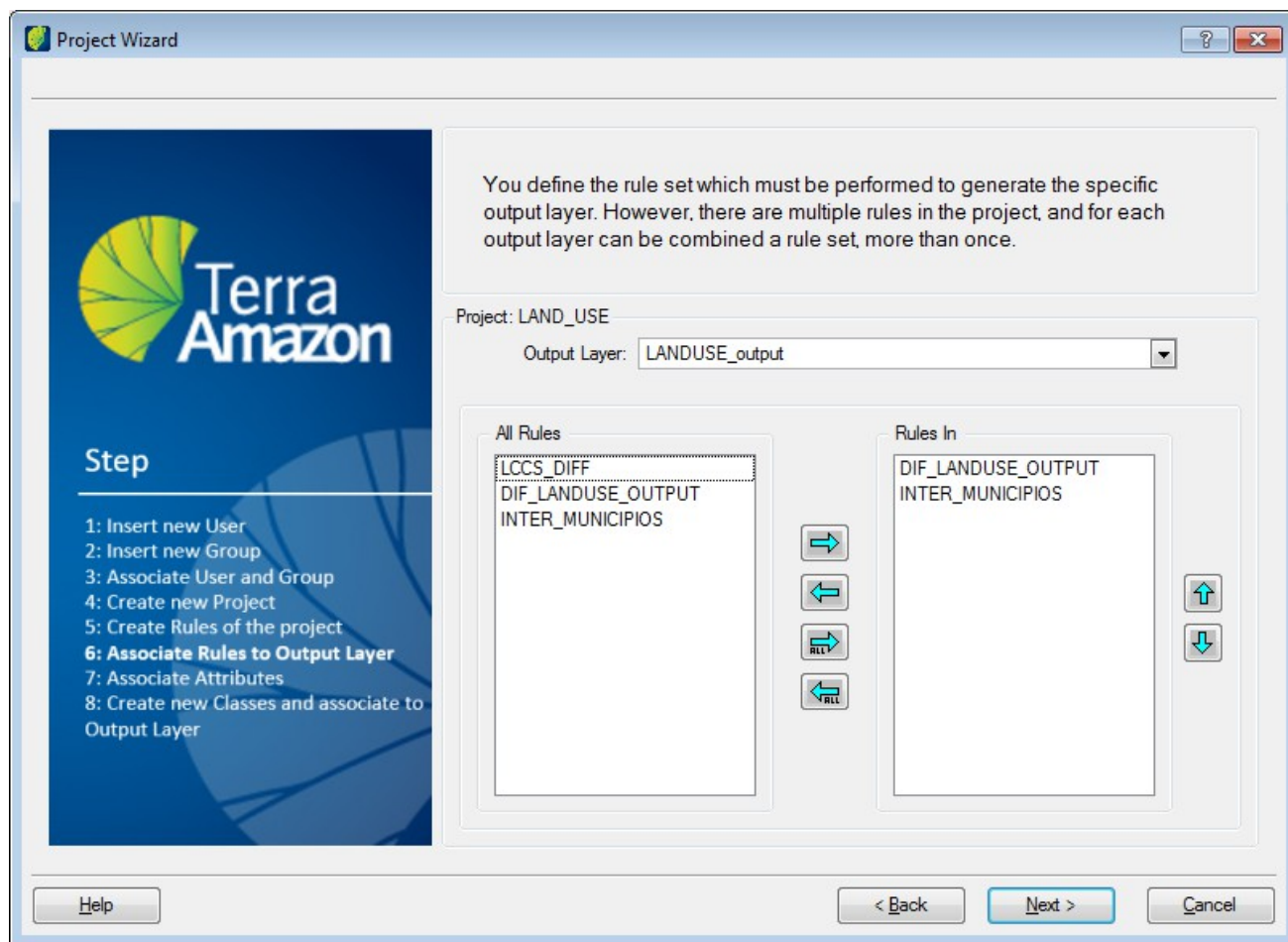
To delete a layer from the list scroll right and click on delete icon in the end of the line.

**Note:** If the layer will use a intersection rule the wizard will request to configure the step *Associate Attributes*. If no layers in the list has intersection rule the wizard will skip this step.

Click on the **Next** button.

For more information go to Project.

## Associating rules to the output layer



Select the output layer and the rules to apply to it in the right list.

Click on the right arrow button to transfer to *Rules In* list.

Click on **Next** button.

For more information go to Rules.

## Associating attributes to output layer

**Project Wizard**

In this procedure, you can associate a field of an input layer to a field in the output layer. During the classification process, the input information is copied to the output field when the layers have intersection. Columns must be of the same type.

Project: LAND\_USE

Output Layer: LANDUSE\_output

Intersection Layer: VEG\_PRET\_3municipios

Attribute: volradam Add Column

	Out Attribute	Input Layer	In Attribute Column	
1	c_pret	LANDUSE_output	c_pret	*
2	folnome	LANDUSE_output	folnome	*
3	volradam	LANDUSE_output	volradam	*

Step

- 1: Insert new User
- 2: Insert new Group
- 3: Associate User and Group
- 4: Create new Project
- 5: Create Rules of the project
- 6: Associate Rules to Output Layer
- 7: Associate Attributes**
- 8: Create new Classes and associate to Output Layer

Help < Back Next > Cancel

If needed output and intersection layers can be changed selecting in the lists.

Select the attribute and click in **Add Column** button.

Click on **Next** button.

## Creating new classes

The screenshot shows the 'Project Wizard' window for a project named 'LAND\_USE'. It is at Step 8: 'Create new Classes and associate to Output Layer'. The interface includes a sidebar with a list of steps, a main area with instructions and configuration fields, and a bottom bar with navigation buttons.

**Project:** LAND\_USE

**Definitions**

Output Layer: LANDUSE\_output

Class Column: folnome | **Set** You must set class column!

**Add Class**

Class Column:  | **+** **-**

**Selected Class Column**

**folnome**

**Class**

**All Class**

**Class in**

DA  
DB  
AGRICULTURA  
PS  
MINERACAO  
PSE  
S

**Buttons:** Help, < Back, Finish, Cancel

*Output Layer:* choose the layer from the list.

*Class Column:* choose one from the list and click on **Set** button.

*Add Class:* to add more classes enter the name in this field and click on plus button.

Select the wanted classes in the *All Class* list and click on the right arrow button to transfer them to the *Class In* list.

To conclude the wizard configuration click on the **Finish** button.

**Note:** every clicked **Next** button in each interface saves the correspondent configuration.

For more information go to Classes.

# 10

## Defining AI and Scenarios

---

DEFINING AI LAYER AND SCENARIOS	96
CHANGING A SCENARIO DATE	99
LOCKING A SCENARIO	100

---

An area of interest (AI) is a spatial delimitation of a geographic region. Inside its boundaries, it is possible to execute vectorial edition.

A scenario is composed by an area of interest and an observation date assigned to it. The layer added as an AI ensures that any vectorial edition executed outside its boundaries will be discarded in the classification process.



## Defining AI Layer and Scenarios

Go to PROJECT MANAGEMENT → AREA OF INTEREST.

To define an AI layer, select it in the *Layer* combo. Initially, only the Rule layers are shown in this list. If the desired layer is not showing, use the **Add** button to find it. Output layers cannot be defined as AI layer.

If necessary, use the **Remove** button to remove the unnecessary layers from the list. This operation does not delete the layer with its data, but only removes its name from the AI options list.

The *Search* area helps to locate specific geometries in the AI layer for scenario composition.

**Area of Interest**

Layer Definition

Layer: SP\_AI\_TM\_ASP

Add... Remove

Search

Column: LINKCOLUMN

Operation: Contains

Filter:

Apply

AI Geometries List

	linkcolumn	tm_path	tm_row	jul_i	jul_f	status	area_clo
1	00157	001	57	334	68		0.51290909253
2	00158	001	58	334	68		1.11531571428
3	00159	001	59	334	68		1.38659672425
4	00160	001	60	212	303		2.23416666705
5	00161	001	61	212	303		2.2340502879
6	00162	001	62	181	272		2.23406874677
7	00163	001	63	151	242		2.23384856522
8	00164	001	64	151	242		2.23384856522

Parameters

View Date (DD/MM/YYYY): 14/08/2015

Add

Help Next > Finish

The *AI Geometries List* shows the geometries in the layer selected in the AI list. When using the Search filter, this list shows only the geometries that satisfy the search condition.

Once the desired geometry is found, it is necessary to assign a date to it, composing the scenario. This date must identify when the data to be worked was observed. In the following example, the selected geometry was the boundary of the ALOS satellite grid relative to the scene 2A181094070 and assigned date must be 18/06/2009, since this is the date of acquisition of this satellite image.

Select the located polygon by clicking on it in the table, type the date and click on the **Add** button to assign the date to the geometry.

The assignment of a date to this geometry establishes the creation of a scenario. It is possible to create many scenarios for the same geometry by assigning different dates to it.

**Note:** Once a geometry has a *View Date*, it will not be possible to remove or edit this geometry.

Click on *Next*. The interface goes to the next step and shows in its lower part the list of all scenarios inserted in the database.

The screenshot shows a window titled "Area of Interest". At the top, there is a "Filter" section with a "Column:" dropdown set to "id", an "Operation:" dropdown set to ">", and an empty "Filter:" text box. Below this is a table with the following columns: id, ai\_geometry\_id, view\_date, inclusion\_date, julday, and ai\_layer. The first row of the table is highlighted with a blue background and contains the values: 1, 1, 2015-08-14 12:00:00, 2015-08-14 15:19:47, 226, and SP\_AI\_TM\_ASF. At the bottom of the window, there are five buttons: "Help", "Update", "< Back", "Next >", and "Finish".

id	ai_geometry_id	view_date	inclusion_date	julday	ai_layer
1	1	2015-08-14 12:00:00	2015-08-14 15:19:47	226	SP_AI_TM_ASF

Find in this list the desired scenario and click on it in the list to select it. It is possible to select more than one at a time. It is necessary to choose in this list the scenario to be worked in order to associate them with their respective projects in the next step.

This scenario list grows as the project is executed. When needed, use the *Filter* to locate the desired scenarios. For that, select the *Column* to be searched, the type of *Operation* and then type the desired value at the *Filter* field. The search will run as you type. It is possible to order the result by clicking on the title of the desired column.

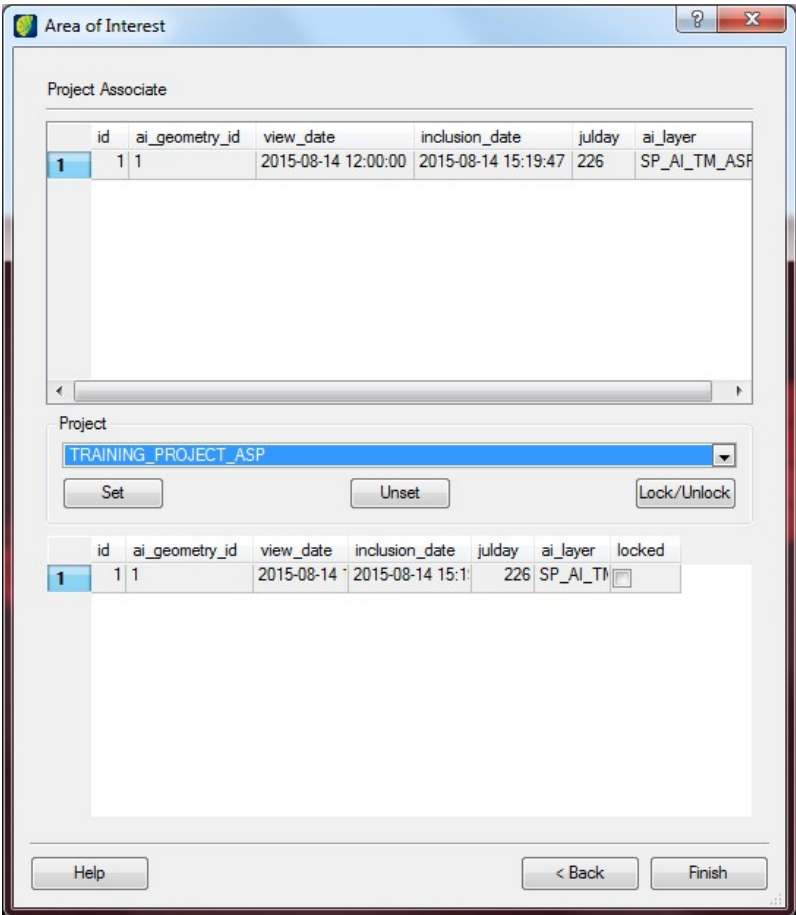
If no filter is informed, then all scenarios will be shown.

**Note:** About this part of the interface: the column *id* is the scenario identification generated when a *view\_date* is inserted; the column *ai\_geometry\_id* is the link column between attributes and geometries tables of the AI layer; the *view\_date* is the date in which the satellite took the picture; the *inclusion\_date* is the date in which the *view\_date* was inserted in the database through the step before of this interface; the *ai\_layer* is the name of the AI layer used in this scenario.

Select the scenarios to add to the project and click on the **Next** button.

In this final step, the *Project Associate* field shows in a list all the selected scenarios in the previous step. Select the desired scenario in this list and the desired project in the *Project* field. Click on the **Set** button to associate the scenario with the project.





Use the **Unset** button to remove it the selected scenario from this list.

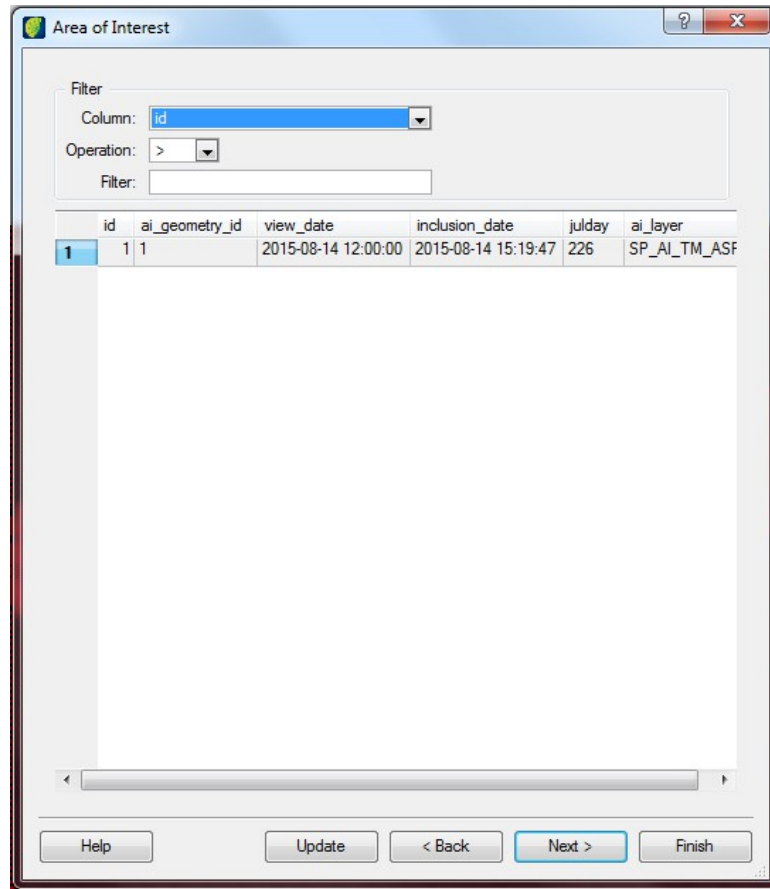
A scenario may be added to many projects.

Click on the **Finish** button to conclude the procedure and close the interface.

Refer to page 100 for instructions on the use of the *Locked* check box.

## Changing a Scenario Date

To change the scenario date, follow the interface until the scenarios search step, shown in the figure below.



Select the scenario to be updated and click on the **Update** button:



Change the date and click on the **Update** button to apply the modification.

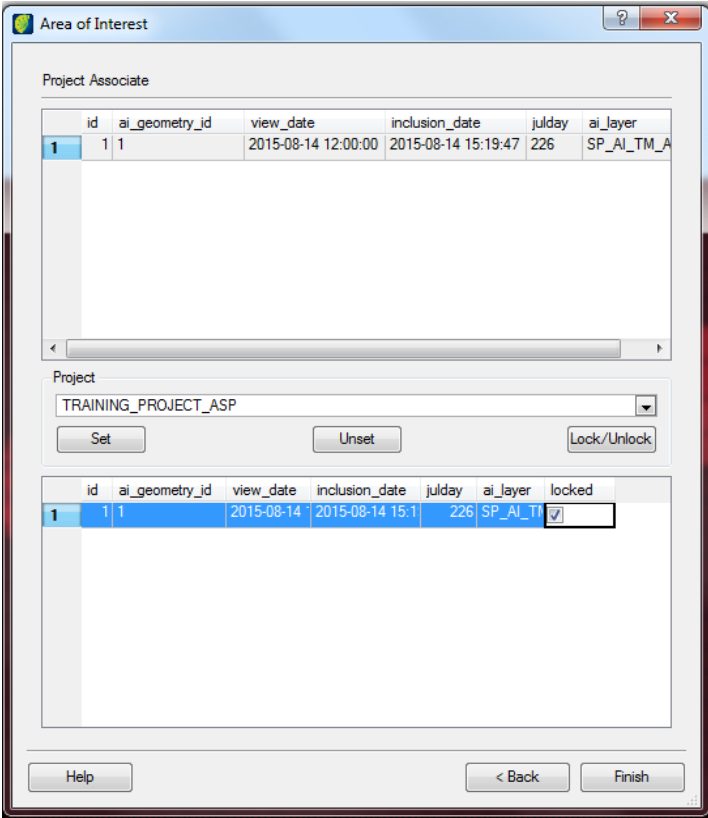
## Locking a Scenario

Locking a scenario prevents it from being used in the vectorial edition. This is possible given that in order for Operator users to execute edition, they must create and activate a process for each scenario to be worked. It is not possible to create a new process with a locked scenario; also it is not possible to activate an already existing process for locked scenarios.

Scenario lockage is effective only for the selected project. That way it is possible to have the same scenario enabled in a project and blocked in another one.

To lock a scenario, follow the interface until the last step, where the association between scenarios and projects is made, without executing any selection of the previous steps.

Select the desired project in the *Project* field.



Next, select the scenario to be locked in the bottom list and click on the **Lock/Unlock** button. In the example above, the single existing scenario of the ADMINISTRATOR\_MANUAL\_PROJECT project was locked.

**Note:** Locking scenarios prevents the current vectorial edition only after the users have closed their respective processes. If a user does not close his process, he can continue with the edition. Therefore, it is necessary that the Administrator asks users to end their processes.

# 11

## Project Dependencies

---

CONSULTING PROJECT DEPENDENCIES	102
UNDERSTANDING THE DEPENDENCIES LIST	104

---

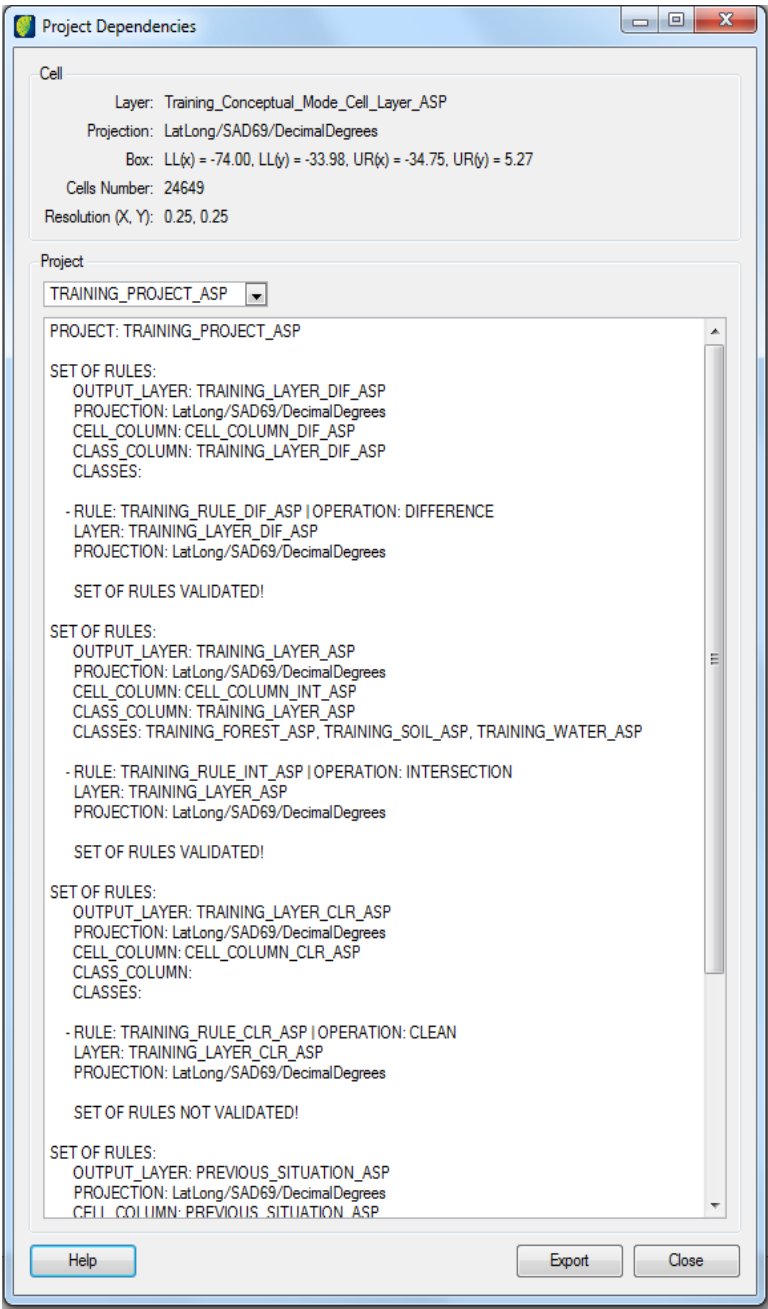
Once a project is fully set up, by following the procedures from chapter 5 to 10, it is possible to verify all its dependencies at once and save them as a text file.

## Consulting Project Dependencies

The Cell area on this interface shows the active cell layer on the current database. Such cell layer is not a project setting and will be the same for every existing project in the database. It is possible to change the active cell layer at any time, as presented on the note at page 18.

In the Project area, select the name of the project in the combo box. The list of the project's dependencies will automatically be displayed.

Go to the menu PROJECT MANAGEMENT → PROJECT DEPENDENCIES.



The Associated Attribute Columns listed are the ones configured in the Attributes tab of the Rules Control interface, page 79. However, when the option *Dissolve output geometries* is selected to the project, page 78, the Associated Attribute Columns will be part of the dissolve output geometries rules set.

```

CLASSES: DEFORESTATION
DISSOLVE OUTPUT GEOMETRIES BY:
  some_column = SOME_DATA.some_column
  scene_id = OUTPUT_LAYER.scene_id
  task_id = OUTPUT_LAYER.task_id
  classification_output = OUTPUT_LAYER.classification_output

```

Also, a rule of union with the output layer will be included in the rules set.

```

PROJECTION: LatLong/SAD69/DecimalDegrees
- RULE: UNION_RS_OUTPUT_LAYER | OPERATION: UNION
LAYER: OUTPUT_LAYER
PROJECTION: LatLong/SAD69/DecimalDegrees
RULE CLEAN OUTPUT | OPERATION: CLEAN

```

The Interest Areas Information includes the following counters:

- **NUMBER OF POLYGONS:** a number of polygons existing in the interest area layer.
- **NUMBER OF ASSOCIATED POLYGONS:** a number of polygons with an observation date assigned and associated with the selected project.
- **NUMBER OF USED POLYGONS:** number of polygons whose tasks were already added by at least one of the users.

Use the **Export** button to save it as a text file.

## Understanding the Dependencies List

The Dependencies List is merely informative. It summarizes the entire project configuration. The following table relates each part of the dependencies list with its corresponding setup interface, all of which are accessed by the menu PROJECT MANAGEMENT. If any changes are needed, go to the setup interface and update.

For details on update procedures, refer to the corresponding chapter on this manual.

Dependencies List Item	Setup Interface
PROJECT: ADMINISTRATOR_MANUAL_PROJECT	Project Management, page 47
SET OF RULES: OUTPUT_LAYER: OUTPUT_LAYER CELL_COLUMN: CELL	Output layers, page 77 Cell column, page 67
CLASS_COLUMN: CLASSIFICATION_OUTPUT CLASSES: DEFORESTATION	Rules Control\ Class List, page 82 Class Management, page 54
ASSOCIATED ATTRIBUTE COLUMNS: some_column = SOME_DATA.some_column	Rules Control\ Attributes, page 79
DISSOLVE OUTPUT GEOMETRIES BY: some_column = SOME_DATA.some_column scene_id = OUTPUT_LAYER.scene_id task_id = OUTPUT_LAYER.task_id classification_output = OUTPUT_LAYER.classification_output	Rules Control\ Rules, page 78
- RULE: DIFFERENCE_WITH_OUTPUT   OPERATION: DIFFERENCE LAYER: OUTPUT_LAYER PROJECTION: LatLong/SAD69/DecimalDegrees - RULE: INTER_WITH_SOME_DATA   OPERATION: INTERSECTION LAYER: SOME_DATA PROJECTION: LatLong/SAD69/DecimalDegrees - RULE: UNION_RS_OUTPUT_LAYER   OPERATION: UNION LAYER: OUTPUT_LAYER PROJECTION: LatLong/SAD69/DecimalDegrees - RULE: CLEAN_OUTPUT   OPERATION: CLEAN LAYER: OUTPUT_LAYER PROJECTION: LatLong/SAD69/DecimalDegrees	Rules Control\ Rules, page 78 Rule Management, page 67
SET OF RULES VALIDATED!	Rules Control, page 84

<p>TAGS INFORMATIONS:</p> <p>GENERATING_VECT_MOSAIC: 14/04/2011   14/04/2011</p>	Project Management\ Tags, page 51
<p>INTEREST AREAS INFORMATION:</p> <p>LAYER: INTEREST_AREA_layer</p> <p>PROJECTION: LatLong/SAD69/DecimalDegrees</p> <p>BOX: LL(x) = -45.84, LL(y) = -23.77, UR(x) = -44.97, UR(y) = -22.99</p> <p>NUMBER OF POLYGONS: 3</p> <p>NUMBER OF ASSOCIATED POLYGONS: 2</p> <p>NUMBER OF USED POLYGONS: 1</p>	Set Interest Area, page 95



# 12

## Database Handling

---

CREATING LAYERS	109
IMPORTING VECTOR DATA	116
IMPORTING SINGLE RASTER DATA	121
IMPORTING MULTIPLE RASTER DATA	126
VECTOR LAYERS EXPORT	134
EXPORTING MULTIPLE RASTER THEMES	138
COPYING LAYERS BETWEEN DATABASES	142
CHANGING THE CELL LAYER	144
REMOVING LAYERS	149
CLEAR LAYER DATA	151
DELETING SPECIFIC OBJECTS OF A LAYER	152
LOCKING LAYERS	153
INDEX MANAGER	154
ATTRIBUTE TABLE MAINTENANCE	155

---

Populating and managing the database. Creating layers by different methods and importing data is possible at all times. Some of these procedures can also be performed by Operator users.

One important concept when it comes to vectorial data layers in TerraAmazon is the layer's *box*. In TerraAmazon, the box of a vectorial data layer is dynamic. It has an initial value attributed to it at the moment of its storage in the database, which can be either at importation or at layer creation. But as new data is added to the layer, the size of the box changes to include it.

That means that in TerraAmazon the box of vectorial data layers does not limit the geographic area where it is possible to store data, since data can be added outside the box, changing its size.

Otherwise, if data was removed from the layer, it is possible to decrease and readjust the layer box through the function *Update Box*. Decrease the box size helps the drawing process making the fit theme tool correct the visualization area. This is an operation that must be done by the user. There is not any automatic routine to decrease the layer box.

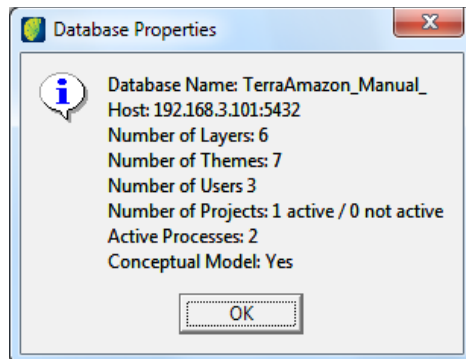
The box of raster layer data is fixed. However, TerraAmazon allows the change of raster layer box in one situation: raster import. For that to be possible, the first raster data of the sequence must be imported as *expansible*, and then the next ones can be added to that same layer, automatically changing the box after each importation. Find more details on that procedure at *Importing Single Raster Data*, page 121.

## Database Properties

---

The *Database Properties* tool provides an overview of the state of the database.

To access the *Database Properties* right-click on the database name at the *Database/Layers* tree and select the option *Properties*.



*Database Name:* The name of the current database.

*Host:* Shows the IP address and the port of the current DBMS.

*Number of layers:* Shows a number of existing layers in the current database.

*Number of Themes:* Shows a number of existing themes, from all users, in the current database.

*Number of Users:* Shows how many users are registered on the database.

*Number of projects:* Shows a number of active and not active projects.

*Active Processes:* Show how many processes are active.

*Conceptual Model:* Indicates whether the Conceptual Model was created or not.

## Creating Layers

There are three different methods to create layers in TerraAmazon:

- New Layer: user must define all the parameters and attribute columns
- New Layer Based on Another Layer: parameters are fully or partially inherited from another layer
- Create Layer from Theme: full copy of the contents of the Theme into a new layer

Besides these methods, it is also possible to generate new layers through spatial operations. The subject of spatial operations is not part of this User's Guide.

The following chart compares the three methods of creating layers.

	New Layer (page 110)	New Layer Based on Another Layer (page 113)	Create Layer from Theme (page 115)
Custom Projection	Yes User defined.	No Inherits from layer.	Yes User defined or Inherits from View or Layer.
Attributes Table Structure Control	Yes User Defined.	No Inherits from layer.	No Inherits from layer.
Stores Data	No Layer is created without geometries or attributes.	Yes/No Layer can be empty or bring geometries and/or attributes from base layer.	Yes Storage based on Theme Restriction.
Choose Representation *	Yes Polygons, Lines and Point.	Yes Polygons, Lines and Point.	No Inherits from layer.
Custom Box	Yes User defined or based on existing layer.	No Inherits from layer.	No Inherits from layer.

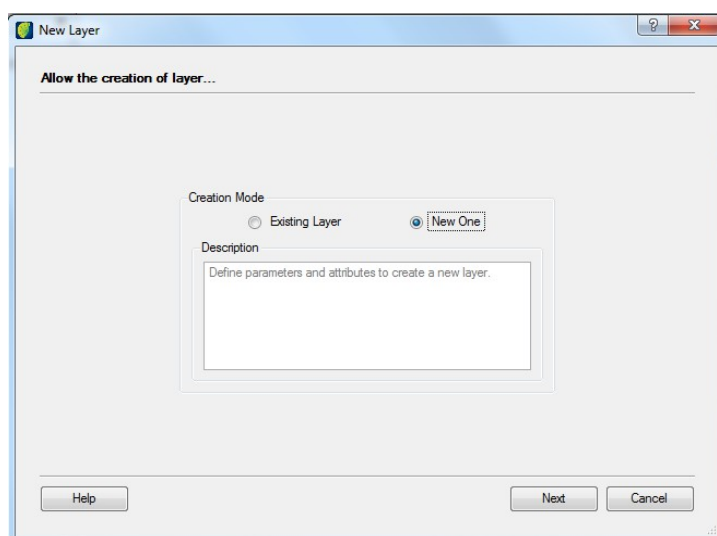
\* Representations can be added to layers at any time after its creation by right-clicking on the layer and selecting *Add Representation*.

**Note:** Operator users only have access to creating layers based on existing themes.

## New Layer

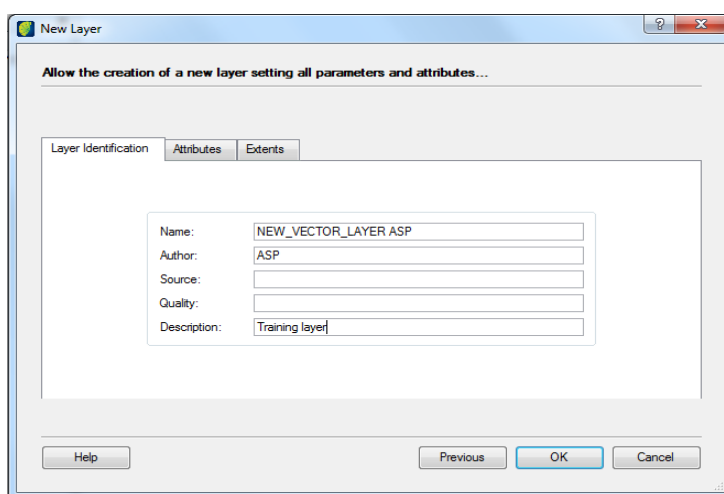
This method creates a layer with parameters fully defined by the user.

Go to the menu LAYER → CREATE LAYER to open the interface.



Select the option *New One* and click on the **Next** button.

## Layer Identification Tab



*Name*: type a name for the layer to be created.

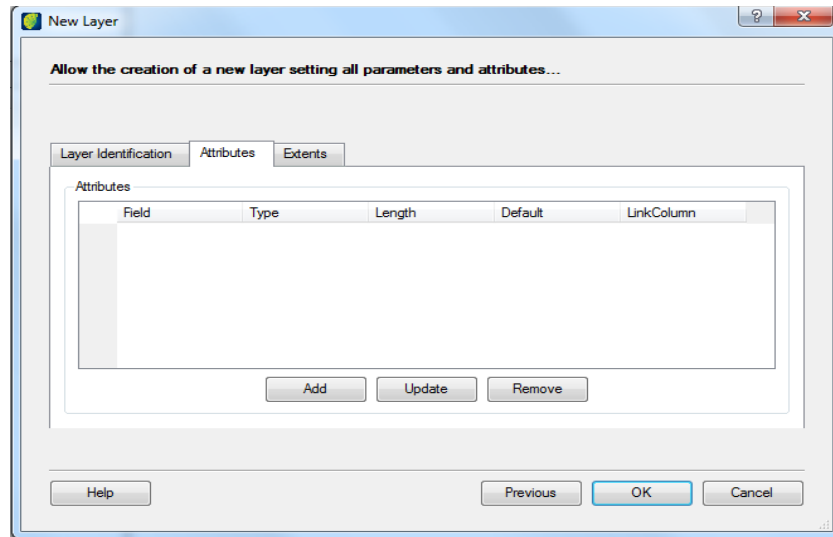
*Author*, *Source*, *Quality* and *Description*: type the desired information. Filling these fields is not required to create layers.

After you are done with this tab, go to the *Attributes* tab.

## Attributes Tab

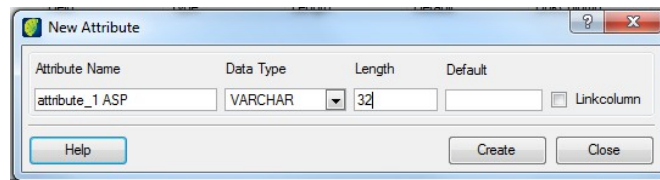
Use this tab to add attribute columns to the layer that will be created. This tab should be empty when first accessed for each new layer since there are no columns yet.

**Note:** Creating layers does not require attribute columns. It is possible to add new columns, change their properties or remove them at any time through the Attribute Table Maintenance interface (refer to page 155).



Click on the **Add** button to insert a column.

Fill up the fields in the *New Attribute* window (refer to page 156 for details). To create a link column, proceed the same way, but select the data type VARCHAR and check the *Linkcolumn* box:



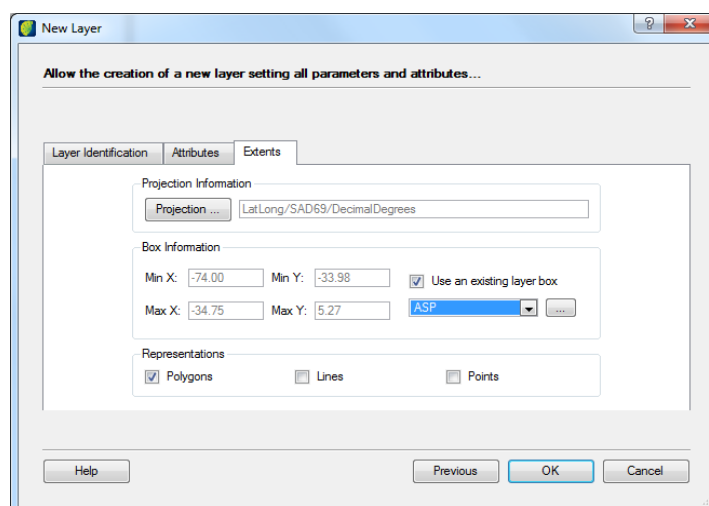
Click on the **Create** button to add the column.

*Update*: select one of the columns already added and click on this button to change its settings.

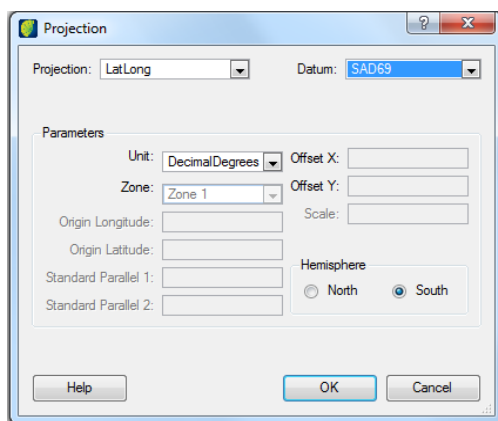
*Remove*: click on this button to remove already added columns.

## Extents Tab

Use this tab to define the projection, the initial box extension and the representation.



Click on the **Projection** button to access the projection setting interface.



Choose the projection and the datum. Fill up the remaining enabled fields according to the chosen projection. Click OK to return to the previous interface.

In the *Box Information* area, insert the values as needed or use the extension of another layer by checking the box *Use an existing layer* box.

In the *Representations* area, select the desired representation. It is possible to select more than one representation for each layer.

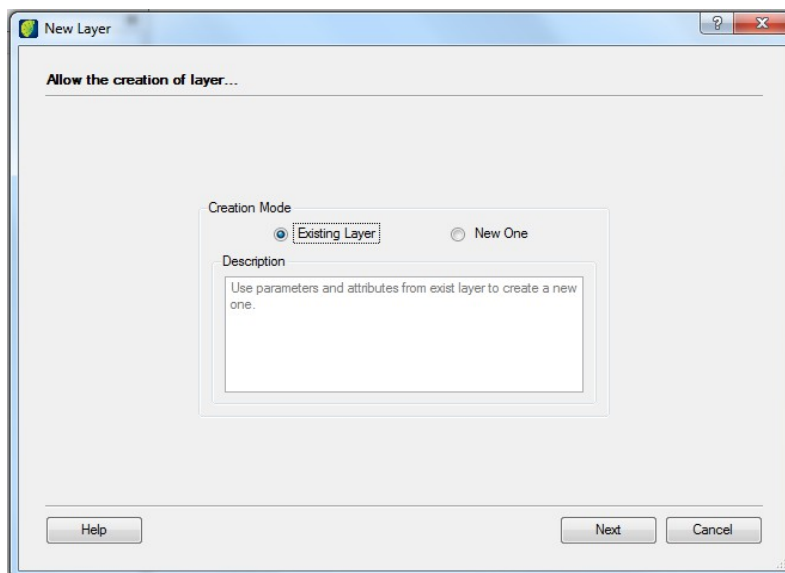
The **OK** button triggers the layer creation.

**Note:** These box values are initial, given that they will update automatically as new data is inserted.

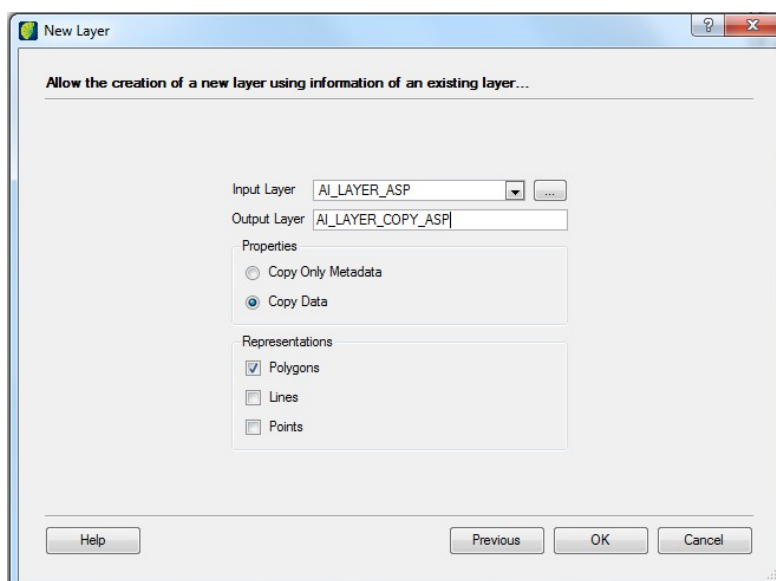
## New Layer Based on Another Layer

This method creates a new layer from an existing one using its parameters, such as projection, representation, box, and the structure of the attributes table. The new layer may inherit the entire set of contents of the source layer, or just the metadata, depending on the choice made.

Go to the menu LAYER → CREATE LAYER to open the interface.



Select the option *Existing Layer* and click on the **Next** button.



*Input Layer*: select the layer to be used as a basis to create the new layer.

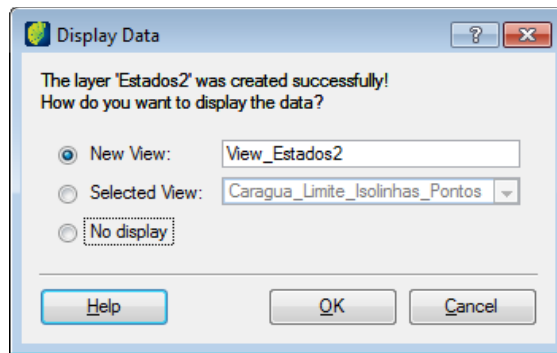
*Output Layer*: type the name of the new layer to be created.

*Copy Only Metadata*: copies into the new layer only the structure of the source layer, that is, its parameters and attribute columns. No data will be copied to the new layer.

*Copy Data*: creates a full copy of the source layer, including both data and metadata.

*Representations*: select the representations for the new layer. In the figure above, the new layer will have the polygons representation only. It is possible to have more than one representation on each layer.

Click on the **OK** button to create the layer.



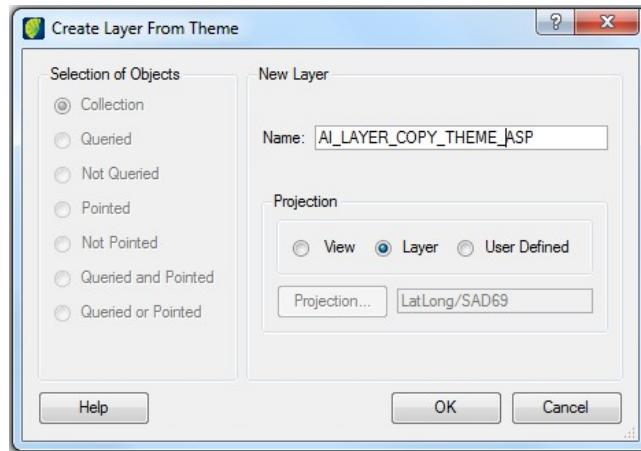
The user can create a new layer by entering a new name, choose a selected view or not create a theme by selecting no display.

Click on the **OK** button.



## Create Layer from Theme

This method creates a layer based on a theme. Just click on the theme with the right button and select the option *Create Layer From Theme*.



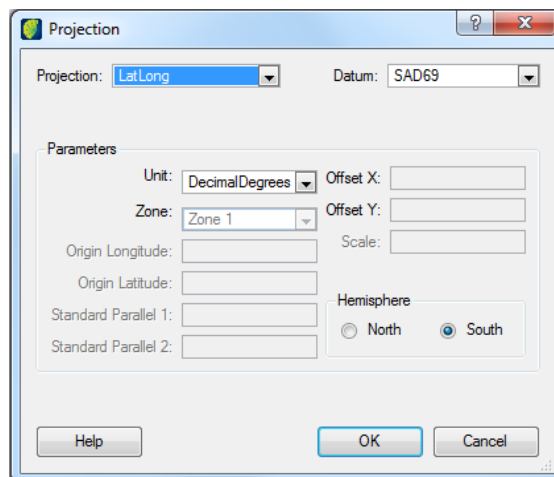
Type the name of the new layer on the field *Name*.

On the *Projection* area, select the projection that the new layer should inherit.

The option *View* will result in a new layer with the same projection as the view in which the theme is, even if the layer that contains the data pointed by the theme has a different projection. In that case, the data will be reprojected before storage.

The option *Layer* will result in a new layer with the same projection as the original layer.

The option *User Defined* allows the user to define the desired projection for the new theme by clicking on the **Projection** button and filling up the fields of the *Projection* interface according to the chosen projection. In this case, the data will also be reprojected before storage.

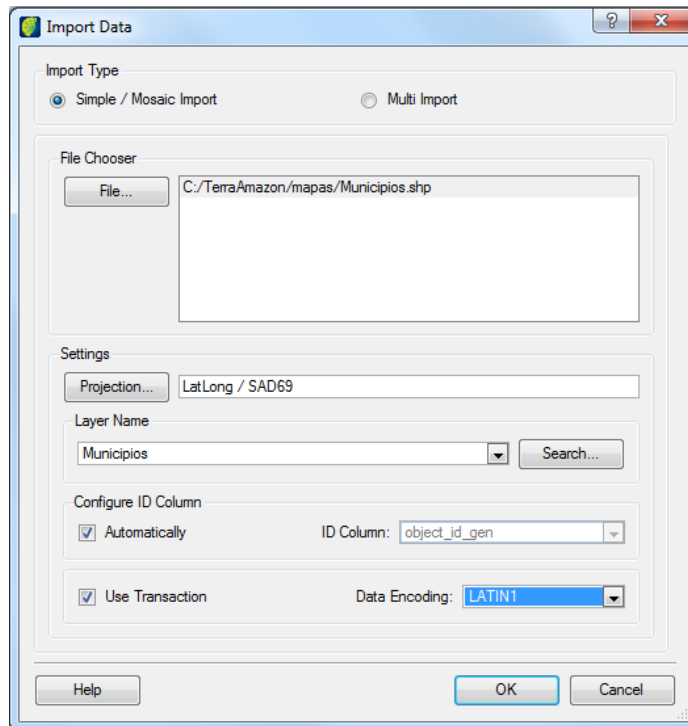


The fact that the new layer is created based on a theme and that themes can be created with data restriction gives the user full control over what will be stored on the new layer. Refer to the Operator User's Manual for details on creating themes with restriction.

## Importing Vector Data

---

Go to the FILE → IMPORT DATA menu.



This interface provides three different ways to the import vector data into the database:

- Simple Import
- Mosaic Import
- Multi Import

The following table presents a comparison between these methods:

	Simple / Mosaic Import	Multi Import
Single File Import	Yes	Yes
Multiple Files Import	Yes, if columns and projection match. Creates a mosaic.	Yes
Maximum Layers Created	One	Several
Mosaic	Yes	Yes

### Simple Import and Mosaic Import

Select this option to import a single vector file or several files to create a mosaic. In either case, only one layer will be created.

The kind of importation to be done will be defined by a number of files selected:

- When only one file is chosen, the Simple Import will be executed
- If more than one file is chosen, a Mosaic will be created

### Simple Import

Click on the **File** button to locate the desired file.

*Projection*: inform the data projection. TerraAmazon only identifies projections of data that have the projection information with it. In case the file does not have that, it will be necessary to inform it.

*Layer Name*: type in the desired name for the layer that will be created for the imported data. This field will be automatically filled with the name of the file, without the extension. This name will be displayed in the layers tree. The **Search** button allows the user to use names that already exist in the database, which helps to standardize layer names.

**Note:** If an already existing layer name is selected (and left unchanged), the incoming layer will be added to it as a mosaic. That will only be possible if their columns are compatible (names and types).

The area *Configure ID Column* provides two options related to the column that contains the id of the geometries. If the *Automatically* option is selected, TerraAmazon will generate a new column while the *ID Column* option allows the user to indicate one column among the existing ones.

*Use Transaction*: defines that the data input will be permanent only at the end of the transfer; if any error occurs during the importation, nothing will be stored in the database. However, more memory is required. When importing large files, uncheck this option.

*Data Encoding*: allows the importation of files that have text information with a character encoding different than that of the database. In such case, the importation runs normally, but the characters will not be displayed correctly since the database has a different encoding.

To remove a File from the list, right-click on it and select the *Remove* option.

**Note:** Operator users can also import vector data.

### **Mosaic Import**

Click on the **File** *button* to locate the desired files. Although more than a file will be imported, only one layer will be created. For the importation to be done with success, the name and the type of the columns must be the same on every file.

*Projection:* all the selected files must have the same projection.

*Layer Name:* type in the desired name for the mosaic layer that will be created.

*ID Column:* all the selected files must have the same column name.

Set up the other settings in the same way of the Simple Import.

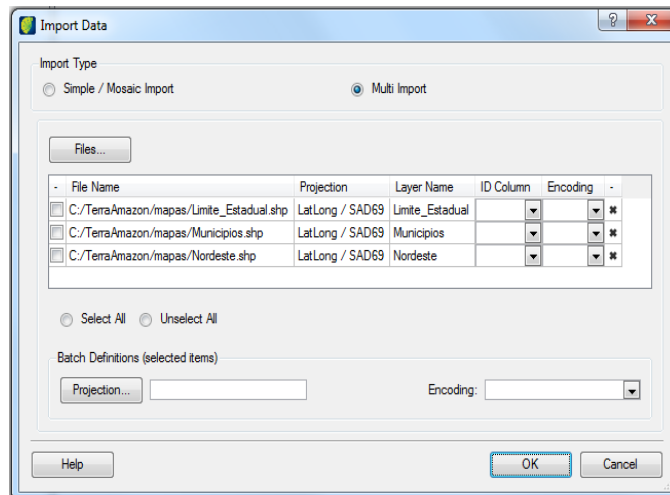
To remove a File from the list, right-click on it and select the *Remove* option.

## Multi Import

The *Multi Import* option allows the importation of many files at once.

By default, a layer will be created for each imported file. However, mosaics can be made with some or all of the selected files.

Select the *Multi Import* option.



*Files*: select the files that will be imported. The selected files will be displayed inside a table. Click directly on the columns to configure the *Projection*, *Layer Name*, *ID Column* and *Encoding* for each file.

*File Name*: shows the location of the selected files.

*Projection*: presents the projection of the file. To change it, double click on it and select the desired values.

*ID Column*: select the column that contains the id of the geometries.

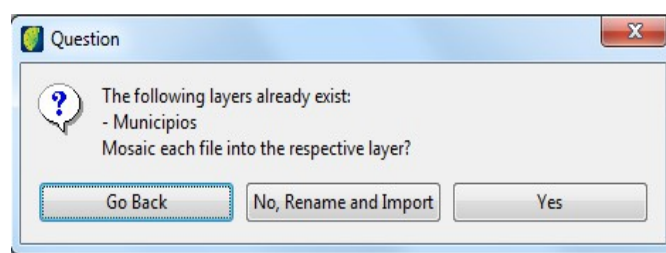
*Encoding*: select the character encoding of the data. Necessary only when the encoding of the data differs from the encoding of the database.

*Layer Name (column)*: the name of the layer that will be created. A mosaic will happen when:

- the same layer name is given to more than one of the selected files
- the name of a layer that already exists in the database is informed

In this case, a message will pop up with the following options:

- *Go back*: return for the *Import Vector Data* interface, showing only the files that were not imported until that moment so that the necessary changes can be made
- *No, Rename and Import*: TerraAmazon will automatically insert a sequential number at the end of the *Layer Name* to distinguish the layers and avoid a mosaic
- *Yes*: TerraAmazon will mosaic the layers that have the same name (given that their columns are compatible in names and types)



Use the fields in the *Batch Definitions* area to define the *Projection* and *Encoding* for several files at the same time.

Use the check boxes on the first column to select the files to which the *Batch Definitions* will be applied.

Check the files that will be modified. There are the options *Select All* and *Unselect All* to ease the selection of the files. With the desired files checked, select the new values for *Projection* or *Encoding* at the *Batch Definitions* box, these settings will be applied to all selected files.

To remove a file from the table of files, click on ✖.

## Importing Single Raster Data

To import raster data go to FILE → IMPORT RASTER.

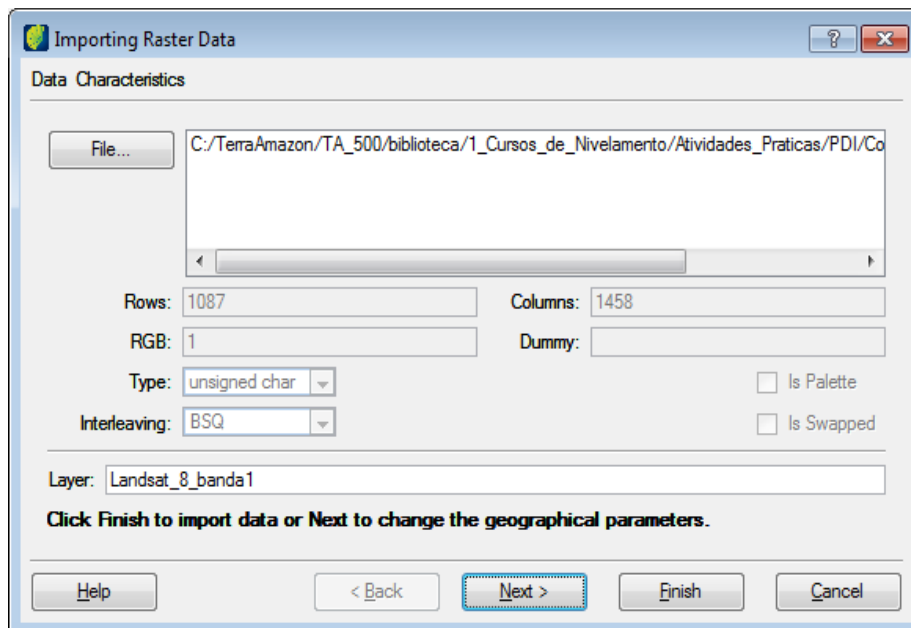
Operator users can also import raster data.

### Data Characteristics

Click on the **File** button to locate the desired file. The interface informs the number of *Rows*, *Columns*, and *Bands*.

*Dummy*: type the value to be considered as a dummy. Pixels with such value on all of its bands will be displayed as transparent. For example, an image composed of 3 bands with dummy value informed as being 0 (zero) will set as transparent every pixel that has 0 (zero) on all 3 bands (3,3,3).

*Layer*: provide a name for the layer that will be created for the imported image.



Click on the **Next** button to proceed to other setups, or click on the **Finish** button to trigger importation skipping the other steps.

## Geographical Characteristics

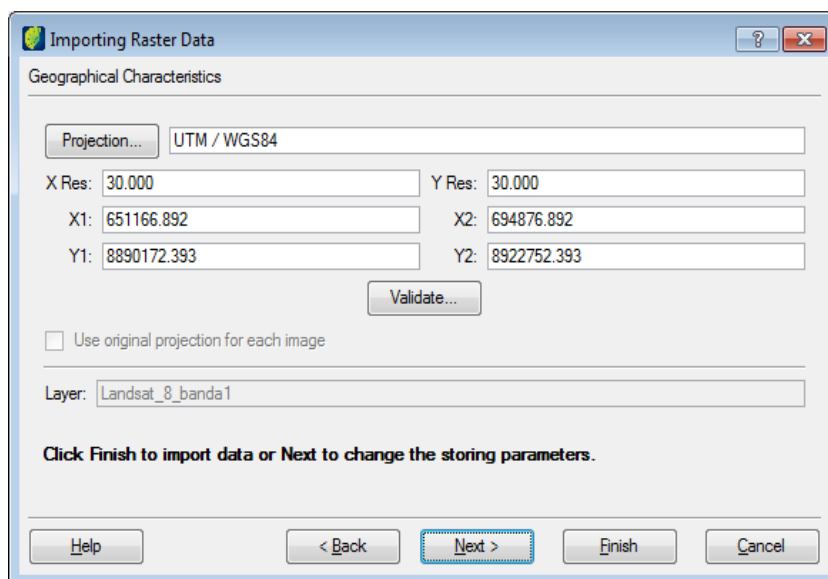
Some types of files may not bring information of projection, resolution or box. In such cases, manually insert the values as follows. This is only available when importing one single raster data.

*Projection*: click to inform the file's projection.

*X Res. and Y Res.*: type spatial resolution of the image.

*X1 and Y1*: type the values for the initial point of the image.

*X2 and Y2*: type the values for the final point of the image.



**Importing Raster Data**

Geographical Characteristics

Projection... UTM / WGS84

X Res: 30.000 Y Res: 30.000

X1: 651166.892 X2: 694876.892

Y1: 8890172.393 Y2: 8922752.393

Validate...

☐ Use original projection for each image

Layer: Landsat\_8\_banda1

Click Finish to import data or Next to change the storing parameters.

Help < Back Next > Finish Cancel

*Validate*: use this button in case you have to manually set one or more of these values. If they are automatically recognized, it is not necessary to use it.

Click on the **Next** button to proceed to other setups. Or click *Finish* to trigger importation skipping the other steps.



## Storage Characteristics

*Compression*: use this box to select among the available compression options, if desired.

*Expansible*: check this option, if there is the intention of a future mosaic composition on this image. This option will update the layer box of the image when a mosaic is done.

*Dummy Value*: shows the dummy value of the image. Pixels with such value on all of its bands will be displayed as transparent. For example, an image composed of 3 bands with dummy value informed as being 0 (zero) will set as transparent every pixel that has 0 (zero) on all 3 bands (3,3,3).

*Change Edge Dummy Value*: check this option when there is the need of changing the dummy value initially present on the image. Refer to the next item for more (Change Edge Dummy Value, page 123).

*Leave as a File*: when this option is checked, the image will not be stored in the database. It will be read directly from the selected file.

*Mosaic Images* and *Keep Images Separated*: available only when importing multiple raster data (refer to Importing Multiple Raster Data, page 126).

Click *Next* to proceed to other setups. Or click *Finish* to trigger importation skipping the final step.

## Change Edge Dummy Value

This option is very useful when the image that will be imported contains pixels with the same value as the one set as a dummy.

In this case, setting just the *Dummy* value, will possibly result in an image with holes inside since every pixel with such value will be transparent.

That can be avoided by setting the *Change Edge Dummy Value*.

When that is done, the following two things will happen:

- TerraAmazon will replace the value of the pixels inside the image (non-edge) by its *current value minus one* (value - 1). When that value is zero, it will be increased by one (value + 1).
- The image will be swept row by row from left to right, replacing the value of the dummy pixels by the value defined in the user in the interface at the field *Change Edge Dummy Value*. This will continue until a pixel with different value is found. When the bottom of the image is reached, the rows of the image will be swept from right to the left.

This way the image will be imported without the dummy pixels and with no holes.  
Click on the **Next** button.

## Multi Resolution Characteristics

Multi resolution is a method for improving the speed of data visualization. It generates levels with different resolutions for the image. When displaying the image, TerraAmazon will use different levels of resolution depending on the visualization scale.



*Number of Levels:* select the number of levels from the ones available.

*Multi Resolution Method:* select the method to generate the different resolutions for each level.

Click on the **Finish** button to trigger the importation.

## Importing Multiple Raster Data

Multiple raster files can be imported together either to create one layer for each file or to create a mosaic. The interface is the same one used for the single raster data importation

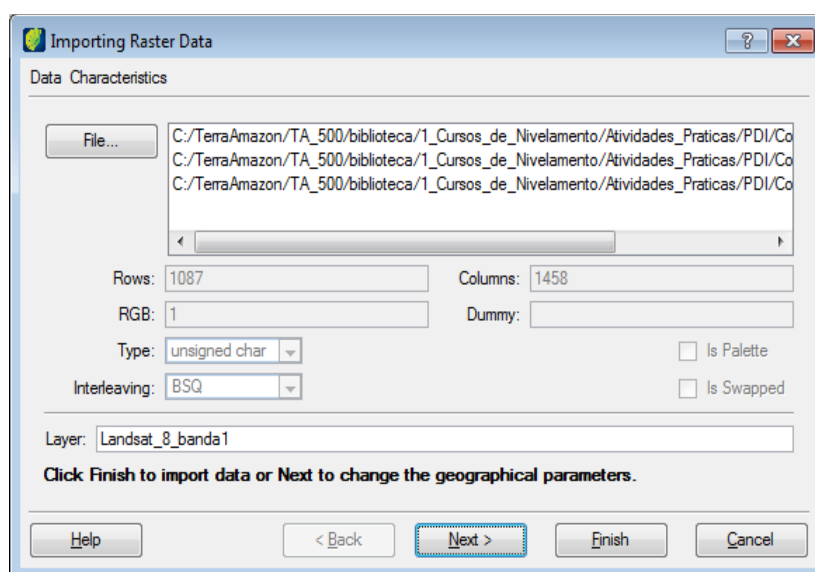
Go to the menu FILE → IMPORT RASTER.

**Note:** Operator users can also import multiple raster data.

### Data Characteristics

Click on the **File** button to locate the desired files. Select all the files at once. After the selection, the files are listed in the interface.

The interface informs the number of *Rows*, *Columns*, and *Bands* for the **first file of the list**.



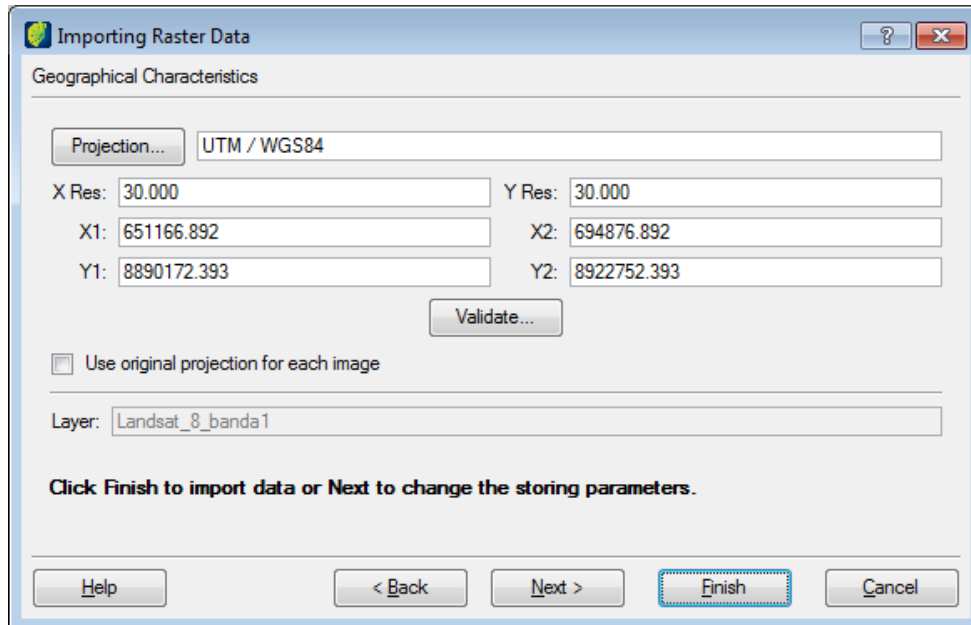
*Dummy*: type the value to be considered as a dummy. This value will be applied to all the images selected for importation.

*Layer*: type a prefix to the layer names. Each layer created will have a name starting with this given prefix followed by the name of the file.

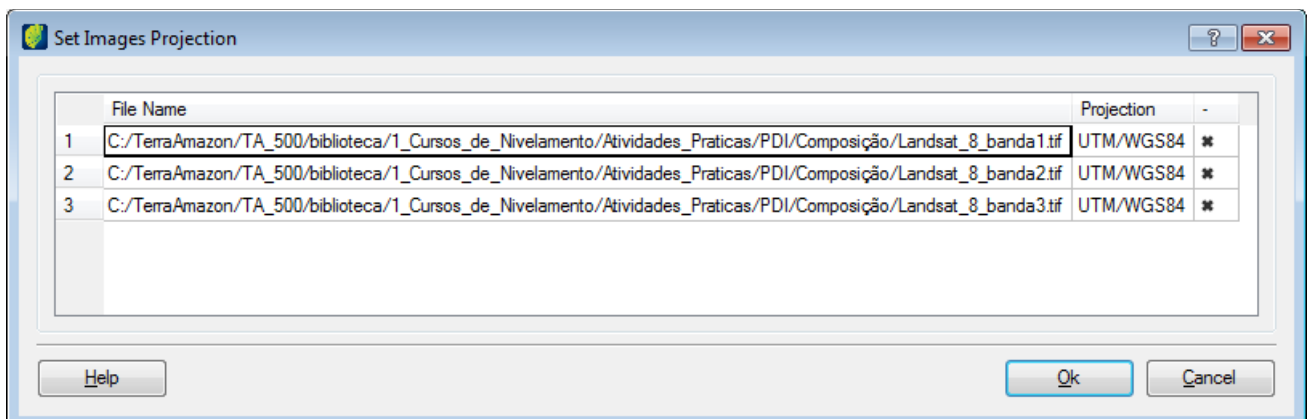
Click on the **Next** button to proceed to other setups. Or click *Finish* to trigger importation skipping the other steps.

## Geographical Characteristics

This step contains projection configuration information.



When importing several raster files they may not have the same projection but it can be configured clicking on the *Use original projection for each image* check box.



Double click on the projection of the wanted row and the projection window will open to setup the the new projection.

After changing the projection click on the **OK** button to confirm the changes.

Back to the Geographical Characteristics window click on the **Next** button.

## Storage Characteristics

This step of the interface contains several settings that are optional to the import procedure. Change those options that are necessary or just click on the **Next** button to skip this part.

*Name & Object Id*: unavailable for multiple raster import.

*Compression*: use this box to select among the available compression options, if desired. The choice made will be applied to all files imported.

*Expansible*: selection unavailable for multiple raster import.

*Mosaic Images*: generates one layer with a mosaic of the selected raster files. The first file of the import list will define the projection of the resulting mosaic layer. Any file with different projection will be reprojected before the mosaic is done.

*Keep Images Separated*: generates one layer for each raster file.

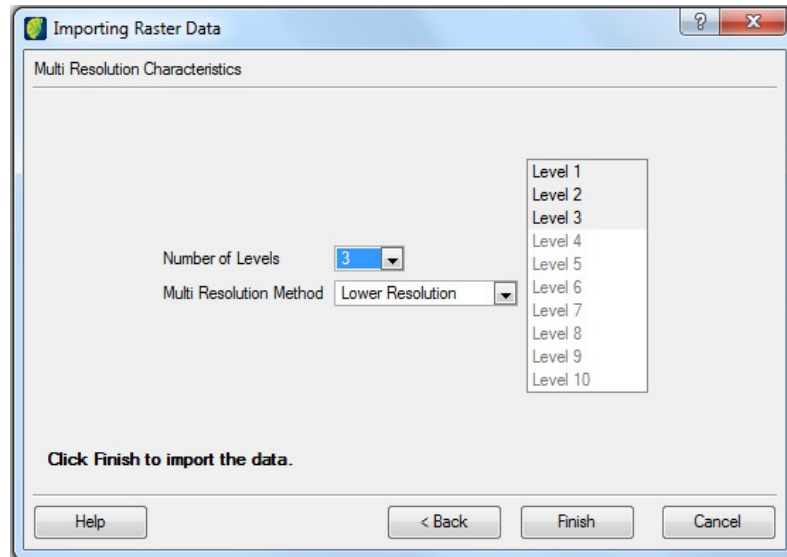
*Leave as a File*: generates layers without storing the files in the database.

Click on the **Next** button to proceed to other setups. Or click *Finish* to trigger the importation skipping the final step.

## Multi Resolution Characteristics

Multi resolution is a method for improving the speed of data visualization. It generates levels with different resolutions for each image. When displaying the image, TerraAmazon will use different levels of resolution depending on the visualization scale.

The number of levels is defined by the user.



*Number of Levels:* select the number of levels from the ones available. On multi import, this number of levels will be applied to all the selected images.

*Multi Resolution Method:* select the method to generate the different resolutions for each level.

Click on the **Finish** button to trigger the importation.

## Importing a Point Table

It is possible to import points from a .csv file and use of data exported by CollectEarth.

Go to the menu FILE → IMPORT POINT TABLE.

**Import Points Table**

Informations Table

File... C:/TerraAmazon/mapas/testPlots1.csv

Separator

☒ Comma ☐ Semicolon ☐ Space ☐ Tab ☐ Other

☒ First Line has header information.

Preview Table

	ID	YCOORD	XCOORD	ELEVATION	SLOPE	ASPECT	ADM1
1	70	-30.1	-57	63	0.48915	71.56505	Artigas
2	119	-30.2	-57.6	41	0.21876	225	Artigas
3	124	-30.2	-57.1	69	2.30612	219.55966	Artigas
4	125	-30.2	-57	73	0.76561	45	Artigas
5	126	-30.2	-56.9	122	0.83295	111.80141	Artigas
6	127	-30.2	-56.8	108	1.86201	176.361	Artigas

Column Information

Name:

Type: CHARACTER Length:

Geometry Information

Coord X:

Coord Y:

Next

Help Ok Cancel

Click on the **File** button to locate the desired file.

*Separator*: select the separator character used in the origin file. If the csv file has a header file check in the box to inform that.

To identify coordinates column, click on the column with X coordinate value and column information fields become available for configuration.

*Name*: column name showed in preview table.

*Type*: select the proper character type for coordinate column, normally is “Double”.

*Coord X*: select the X coordinate column.

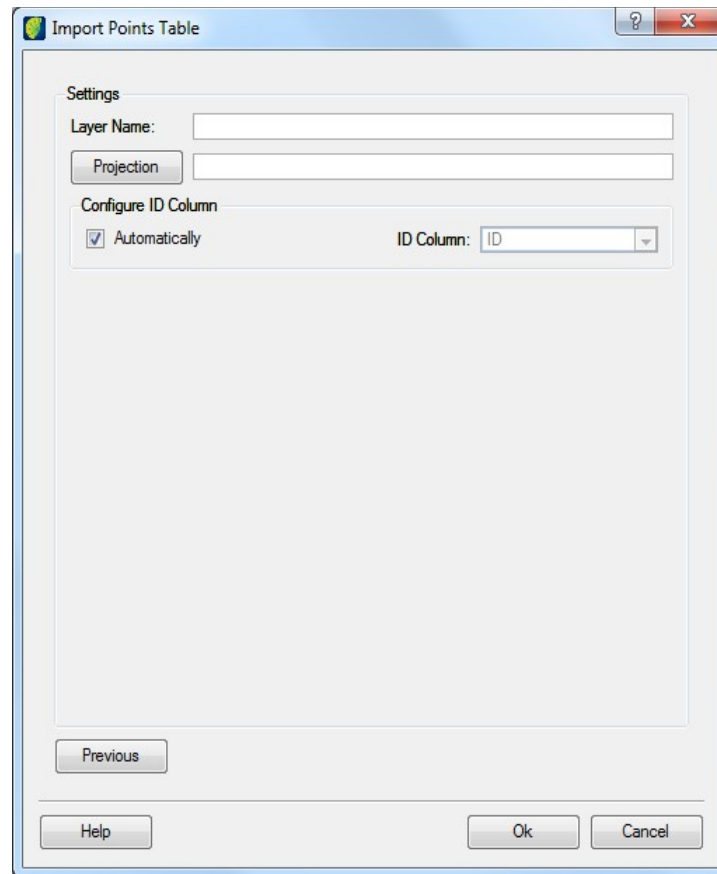
Click on Y coordinate column in preview list.

*Type*: select the proper character type for coordinate column, normally is “Double”.

*Coord Y*: select the Y coordinate column.

Click on the **Next** button.



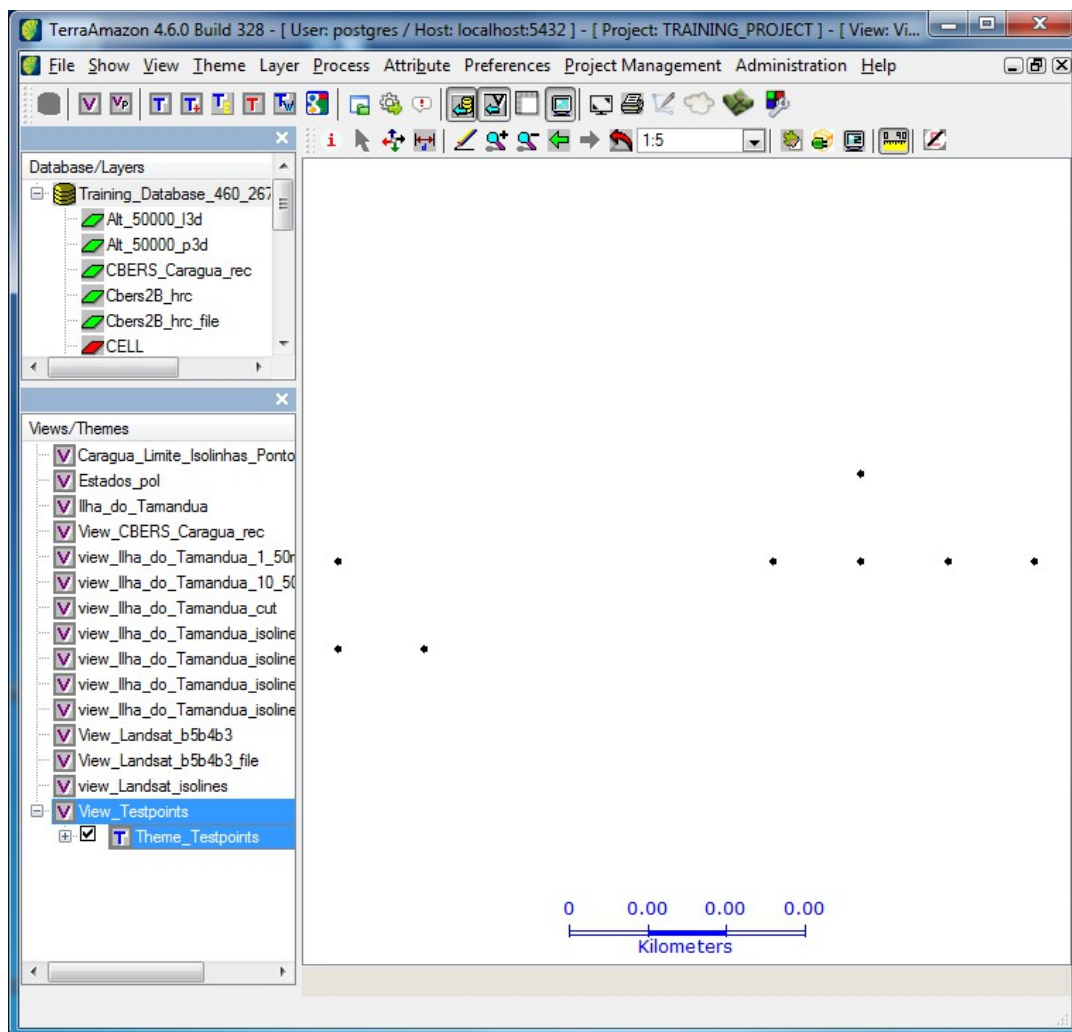


*Layer Name:* enter the name for the created layer

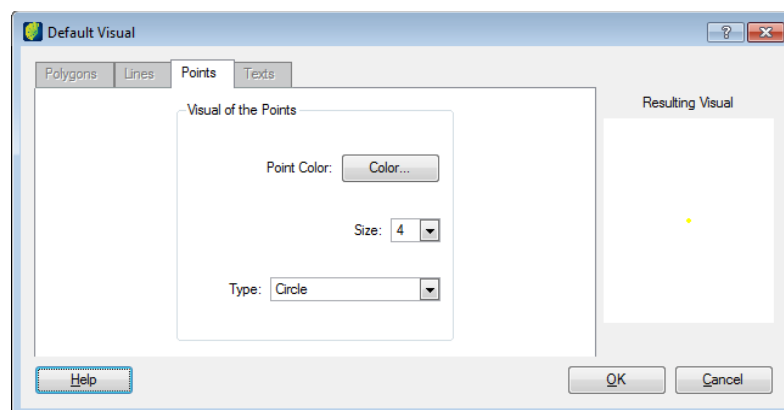
*Projection:* click on this button to setup projection parameters.

**Note:** If the new view will be used with a raster view for comparison be sure to setup point table projection accordingly.

Click on the **OK** button.



If user will need a different point color select the point view, click with mouse right button and choose VISUAL → DEFAULT.



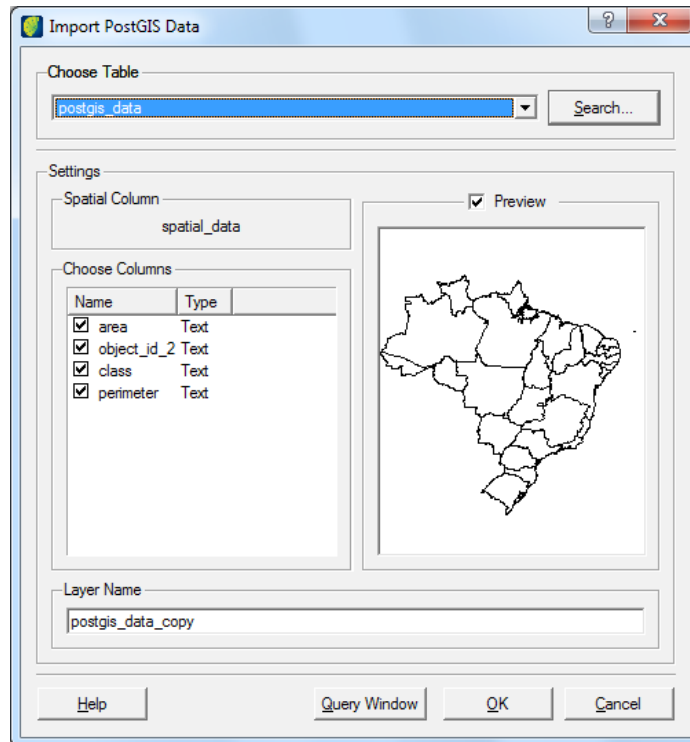
Click on **Color** button and adjust the desired color.

## Importing PostGIS Data

It is possible to import the data from a PostGIS table to a new layer.

Go to the menu FILE/ IMPORT POSTGIS DATA.

**Note:** The option Import PostGIS Data is available only to projects that are using PostGIS.



*Choose Table:* Select the PostGIS table that will be imported. It is possible to use the *Search* to locate the desired table.

*Spatial Column:* Shows the column in which the geometries are stored.

*Choose Columns:* Select the columns that should be imported.

*Preview:* Draw the geometries that will be imported.

*Layer Name:* Enter with the name of the new layer.

*Query Window:* It is possible to consult the data of PostGIS tables and existing layers.

## Vector Layers Export

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There are three different ways of exporting vector data stored in a TerraAmazon database:

- Vectorial Export (page 135)
- Vectorial Themes Export (page 136)
- Vectorial Grouping Export (page 137)

The following table presents a comparison among these methods:

	Vectorial Export	Themes Export	Grouping Export
Full layer export to single file	Yes	Yes (Selecting one simple theme)	No*
Multiple layer export	No	Yes (Selecting multiple themes)	No
Partial export	No	Yes (through theme restriction)	Yes (chosen attribute)

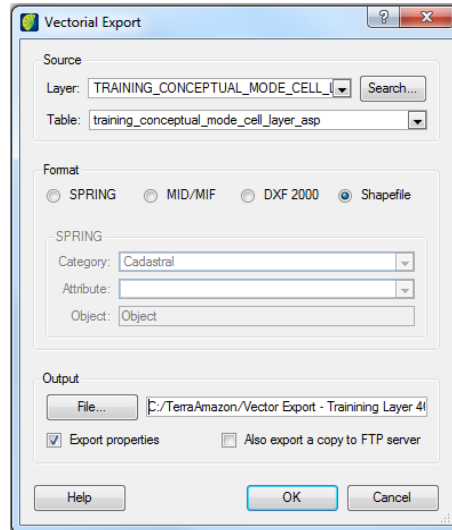
\* Eventually possible, depending on the existing attributes.

**Note:** There is an important limitation about vectorial export: the specification of *shapefiles* declares a size limit of 2Gb to each of the component files. That means that, even though TerraAmazon can manage large layers consistently, it is not possible to export one large layer to a single *shapefile* if it reaches that size limit. For this reason, TerraAmazon will generate sequential files until the entire data has been exported. As an alternative, one can also use *Vectorial Themes Export* or *Vectorial Grouping Export* to define smaller groups of data and so allow the traditional vectorial exportation. Refer to Appendix F, page 179, for further information on Shapefile Size Limitation.

## Vectorial Export

This simple method of exporting a vector data stored in a TerraAmazon database results in a single *shapefile* containing all the data from the original layer.

Go to the menu FILE → VECTORIAL EXPORT.



*Layer*: select the layer to be exported. When the interface is accessed, this field shows the layer selected in the layers tree.

*Table*: displays the name of the table stored in the database. It may be different than the name of the layer if the layer has been renamed.

*Format area*: select the file type for the output file.

*Output File*: select the path to store the output file.

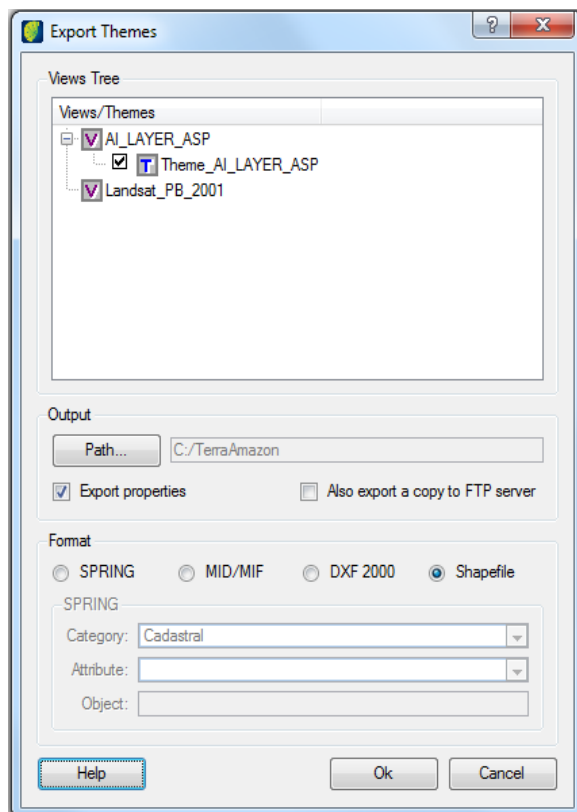
*Export Properties*: generates a text file containing the properties of the exported layer.

*Also export a copy to FTP server*: uploads the exported files to an FTP server. Refer to Exporting to a FTP server, page 140.

## Vectorial Themes Export

This method of exporting a vector data from many themes at once. One output file will be created for each selected theme.

Go to the menu FILE / VECTORIAL THEMES EXPORT.



When opened, the *Export Themes* interface will show the views and their themes. However, only the views that have been selected at the *View/Themes* tree in the main interface will be loaded. If there are no views to be shown, the message “Load at least one View!” will be displayed and the *Export Theme* interface will not be loaded.

*Views/Themes* tree: select the themes that will be exported. All checked themes will be exported, including those in non-expanded views. Only themes of vector layers will be displayed. Themes from different views can be selected to be exported at once.

**Note:** Empty layers will not be exported.

*Path*: select the path to store the output files.

*Export Properties*: generates a text file containing the properties of the exported layer.

*Also export a copy to FTP server*: uploads the exported files to an FTP server. Refer to Exporting to a FTP server, page 140.

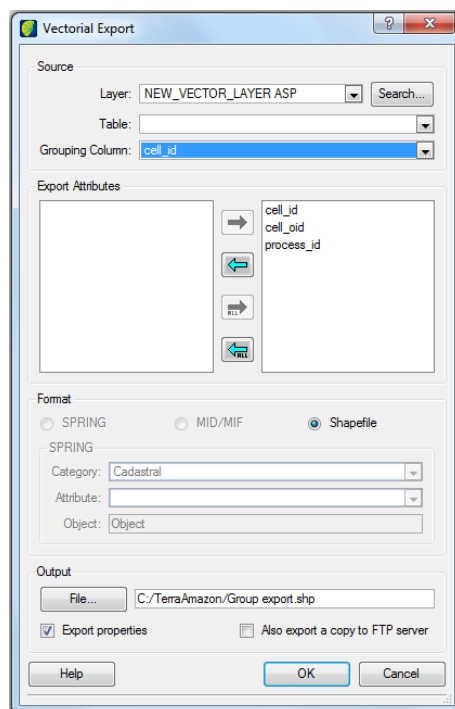
*Format* area: select the file type for the output file.

## Vectorial Grouping Export

This method of exporting vector data from a layer is based on grouping its contents by a determined attribute.

TerraAmazon will generate a file for each set of objects that has the same value in the column selected for the grouping.

Go to the menu FILE → VECTORIAL GROUPING EXPORT.



*Layer:* select the layer that will be exported. When the interface is accessed, this field shows the layer selected in the layers tree.

*Table:* select the table that contains the attribute column that will be used for the grouping of the data. The name may be different than the name of the layer if the layer has been renamed.

*Grouping Column:* select the column by which the data will be grouped.

*Export Attributes:* select the attribute columns that will be exported.

*Format:* select the file type for the exported file.

*File:* select the path to store the exported files and type the name of the files. The name of the generated files will be composed by the typed name followed by the value of the selected grouping attribute.

*Export properties:* generates a text file containing the properties of the exported layer.

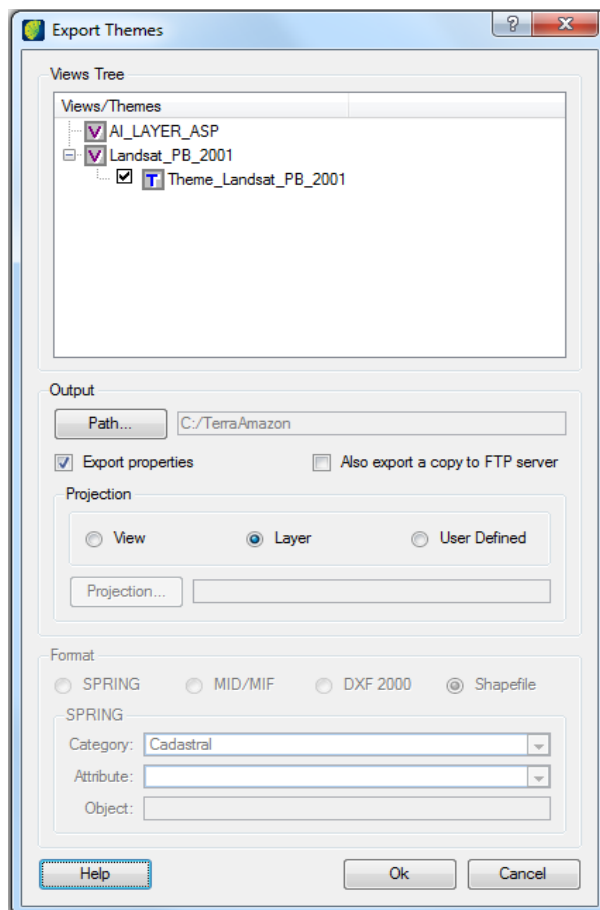
*Also export a copy to FTP server:* uploads the exported files to an FTP server. Refer to Exporting to a FTP server, page 140.

## Exporting Multiple Raster Themes

Exporting multiple raster themes is currently available only for TerraAmazon 4.2.0 or higher.

Go to the menu FILE → RASTER THEMES EXPORT.

Open the desired views and check the raster themes to be exported.



When opened, the *Export Themes* interface will show the views and their themes. However, only the views that have been selected at the *View/Themes* tree in the main interface will be loaded.

*Views/Themes* tree: select the themes that will be exported. All checked themes will be exported, including those in non-expanded views. Only themes of vector layers will be displayed. Themes from different views can be selected to be exported at once.

**Note:** Empty layers will not be exported.

*Path*: select the path to store the output files. All the exported raster data will be saved in the indicated folder.

*Export Properties*: generates a text file containing the properties of the exported layer.

*Also export a copy to FTP server*: uploads the exported files to an FTP server. Refer to Exporting to a FTP server, page 140.

*Projection*: Select projection definition to be used.

*Format* area: select the file type for the output fill

Click on the **OK** button to trigger the exportation.



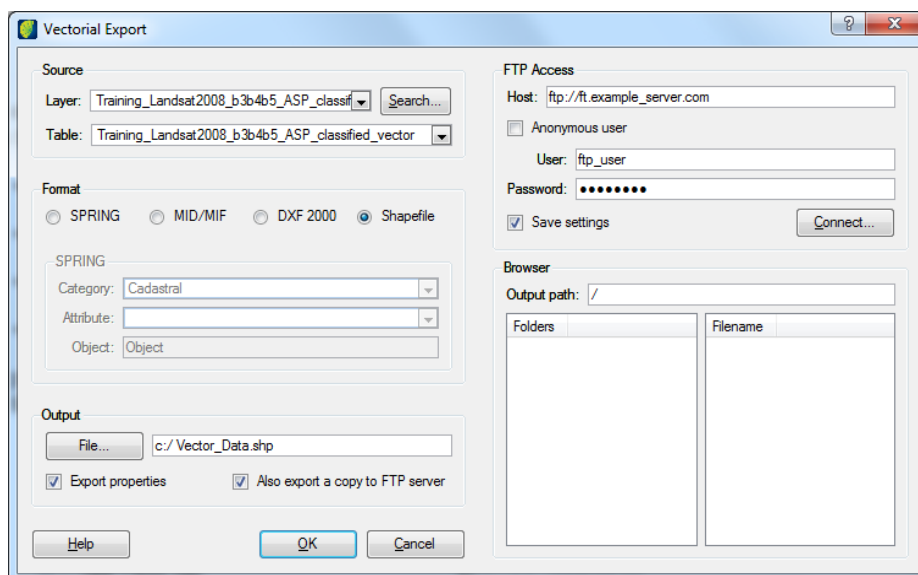
**Note:** When opened, the interface shows only the loaded views. If the view that contains the desired themes does not appear on the list, close the *Export Themes* interface, load the view by clicking on it and then resume themes exportation by going back to the menu FILE → RASTER THEMES EXPORT.

## Exporting to a FTP server

The option *Also export a copy to FTP server* automatically uploads the exported file to a defined FTP server. This functionality is present at the interfaces:

- Vectorial Export (Select File → Vectorial Export in the menu.)
- Vectorial Theme Export (Select File → Vectorial Themes Export in the menu)
- Vectorial Grouping Export (Select File → Vectorial Grouping Export in the menu)
- Raster Export (Select File → Raster Themes Export in the menu)

The procedure of copying the output files to the FTP server is the same for all the above-mentioned interfaces. The following example shows it in the *Vectorial Export* interface.



By checking the option *Also export a copy to FTP server*, the current interface will be extended and also will show the interface to connect to an FTP server and browse through its folders.

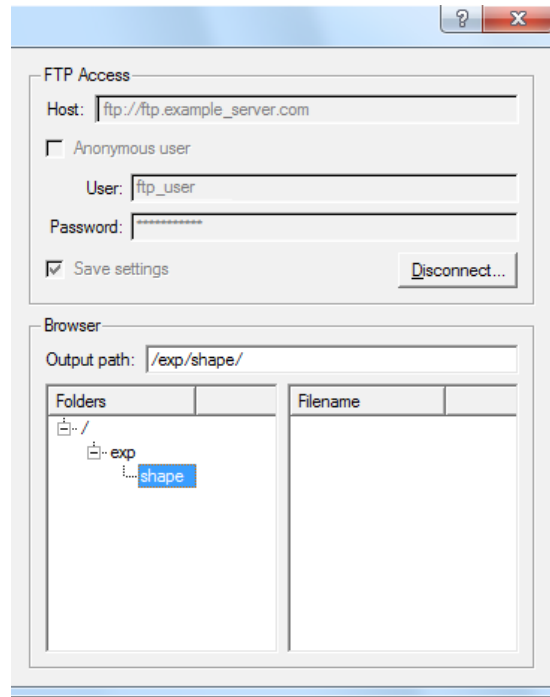
*Host*: provide the address of the FTP server.

*Anonymous user*: check this option when the connection does not require authentication (user and password).

*User and Password (Anonymous user unchecked)*: type the FTP user and password.

*Save settings*: save the entered information to load it in future connections.

After filling up the fields, click on the **Connect** button. The *Browser* area will be loaded and it will be possible to select the desired folder to upload the exported files in.



After selecting the destination of the exported files, click on the **OK** button, to start the exportation.

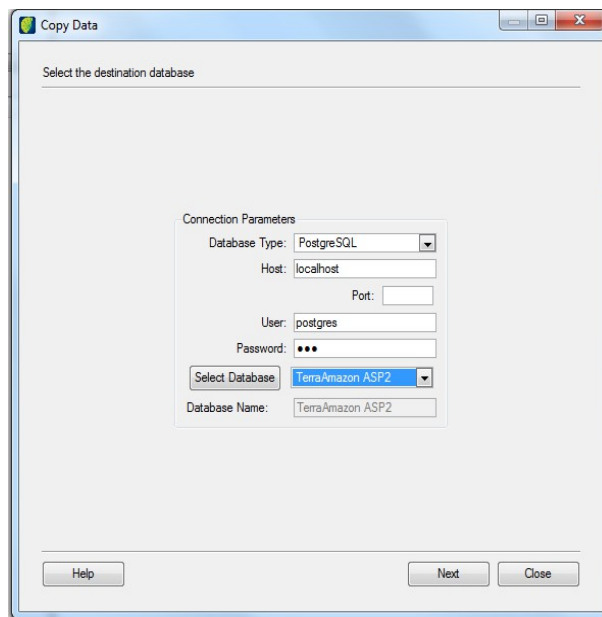
**Note:** This process saves the exported files into the local file system before uploading them to the FTP server. Therefore, the path for the *Output File* is always required, along with the *Output path* from FTP server.

## Copying Layers between Databases

TerraAmazon allows layers to be transferred between databases without using import/export tools. Click on the PROJECT MANAGEMENT → COPY DATA menu.

**Note:** This tool operates by *sending* a copy of the layer to the destination database. Therefore, the user must connect to the database where the data is stored and then send it to the desired database.

Select the destination connection, the user must be from the DBMS instead of the TerraAmazon user.

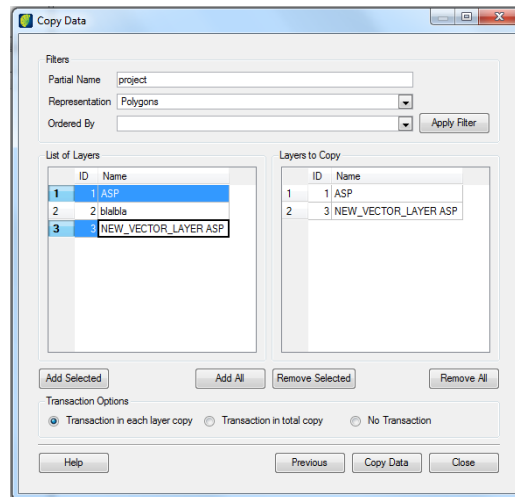


Click on the **Next** button. After the connection is established, the next step in the interface displays the layers list of the source database. Filters can be used to speed up the search of desired layers. This search can be made through the layer name or part of it, or through the representation type (points, lines, polygons, text, cells, or raster). It is possible to order the result by layer\_id or by layer name. The layer\_id is a layer identifier and it is unique and cumulative, in such way that the most recent layers will have higher numbered layer\_id. Use the **Apply Filter** button to list the search.

Select one or more layers in the left side list (*List of Layers*) and send them to the right side list (*Layers to Copy*) using the **Add Selected** button. With the **Add All** button is possible to transfer all list layers without having to select.

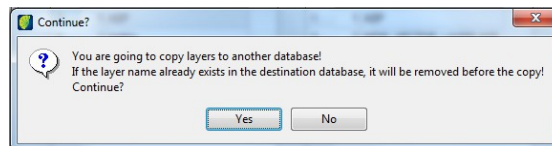
In the *Transaction Options* field, define the type of transaction. When the source layer has too many data, over 500Mb, it is suggested to not use transaction during a transfer, since many servers will not have enough memory to complete the transfer. By default, use the transaction for each copied layer to ensure that the layer will be consistent in a transfer.

In the example below, the search was made for layers with part of the name containing “project” and with polygon representation. The result was ordered by layer\_id, observed in the *ID* column of the resulting list of the search, presented in the *List of Layers*. Of the four layers resulting from the search, three were sent to the list of layers to copy. The transfer was executed without the transaction since the *No Transaction* option was selected.

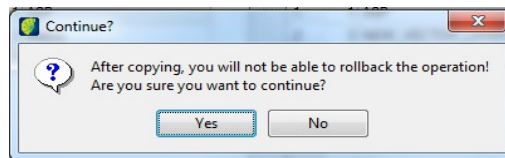


Click on the **Copy Data** button to start the transfer.

The interface displays the warning message shown below, advising that if the destination layer has any layer with the same name of the source layer, the already existing layer will be removed and the new layer will be copied next. It is not possible to undo this operation.



A second warning message appears informing that after copying data it will not be possible to rollback the operation.



**Note:** The layer generated by copying raster data with multi-resolution will not have multi-resolution. It must be reapplied through the Multi-resolution tool in the PDI plugin.

## Changing the Cell Layer

Cell layers can be created at any time. It is a simple procedure. However, changing the active cell layer in a database which already has projects configured will require specific procedures.

### Creating a New Cell Layer

Access the menu LAYER → CREATE CELL LAYER.

Proceed with the interface as when creating the conceptual model (page 16).

Click OK to create the cell layer.

If the conceptual model is already created, all the new cell layers will be created blocked. Even the ones created by the tools Copy Data, page 142, and Create Layer From Theme, page 115.

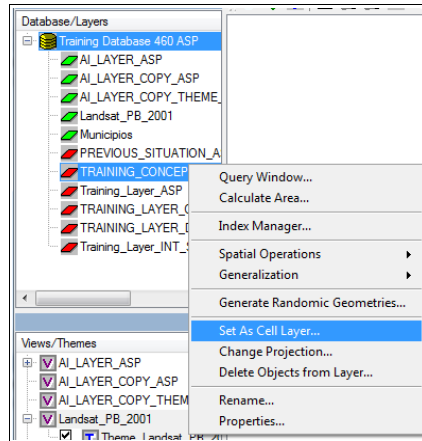
**Note:** This procedure only creates a new cell layer. If there is the intention of using this new layer in the classification process, it must be set as the active cell layer in the database. Refer to Changing the Active Cell Layer, page 145.

## Changing the Active Cell Layer

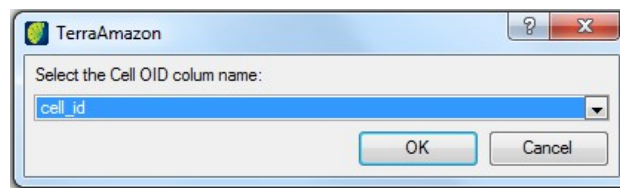
The active cell layer is the one used by the classification process.

There is no limitation to the number of cell layers in the database. However, only one of them can be active.

To set a cell layer as the active cell layer in the database, right-click on it in the layers tree and select the option *Set As Cell Layer*.



Select the column name and click on the **OK** button.



This update takes effect immediately.

**Note:** Changing the active cell layer may require updates in the layers used by the classification process. Refer to Updating Project Setups, page 146.

## Updating Project Setups

After changing the active cell layer in a database, some verifications must be made.

In a cell layer, each cell has an identifier which is stored in the geometries after they are classified.

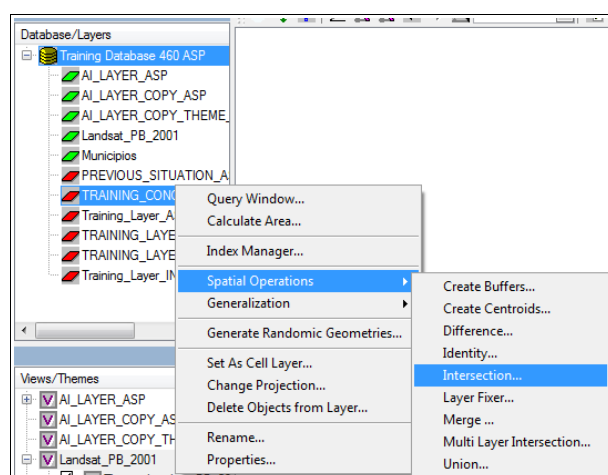
This identifier is used in the classification process when the final polygons are stored and when applying the rules that have a cell column informed (refer to Creating Rules, page 67).

In order to the classification process to work properly, this identifier must be the same in all the layers involved in the active rules of the current project, as well as in the output layers.

Being so, when the active cell layer is changed, it is necessary to update this identifier in all the layers involved in the classification process. Not doing so, may cause the classification to stop working.

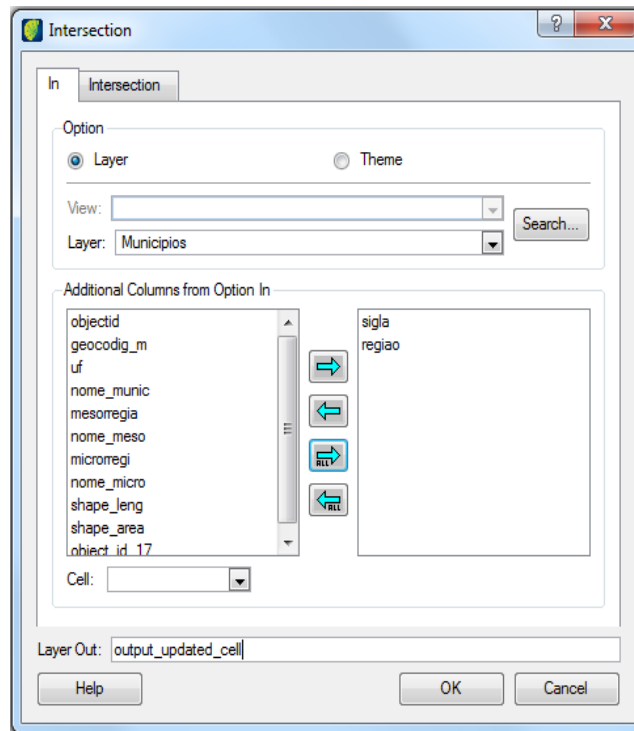
This update is made by running an intersection operation between the new cell layer and each one of the layers involved. The figure below shows the intersection between an output layer and the new cell layer.

Click with right bottom on the active cell layer and select *Spatial Operations* → *Intersection*



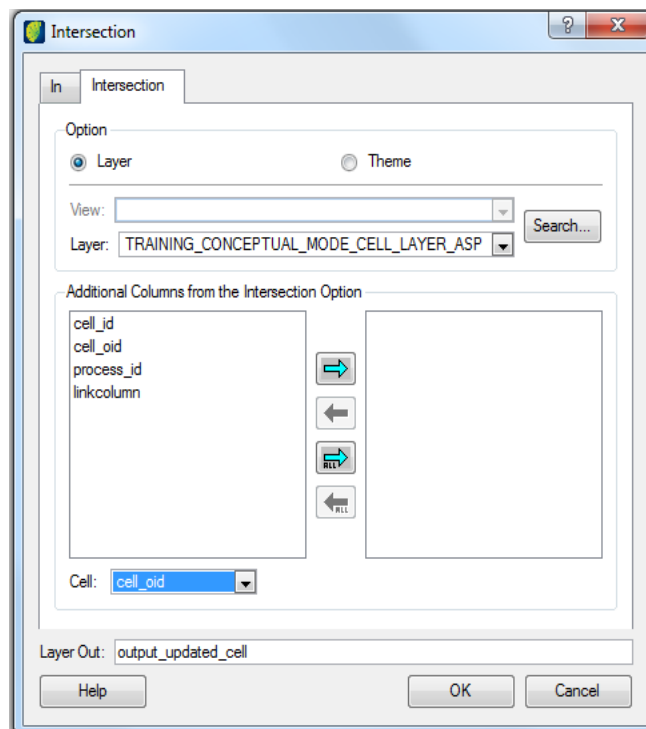
Intersection window opens.





In this intersection, select the output layer in the *In* tab.

Select the column which is used by the classification process to store the class values and the *scene\_id* column. Do not inform a cell column in the *Cell* field.



In the *Intersection* tab, select the new cell layer and the column *cell\_oid*.

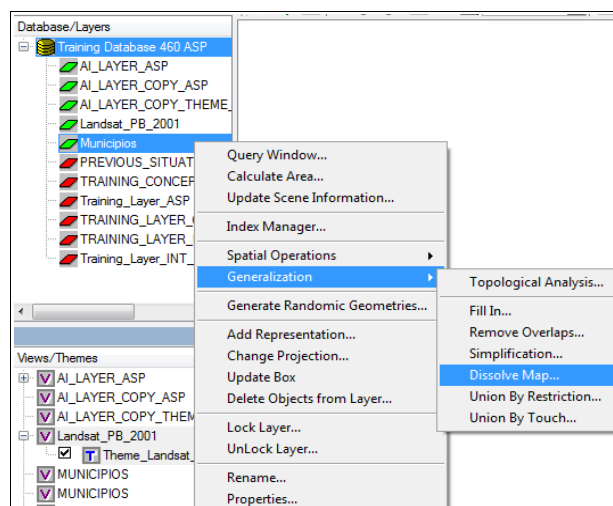
In the field *Cell*, inform the column *cell\_oid* as being the cell column.

In *Layer Out*, type a name for the resulting layer.

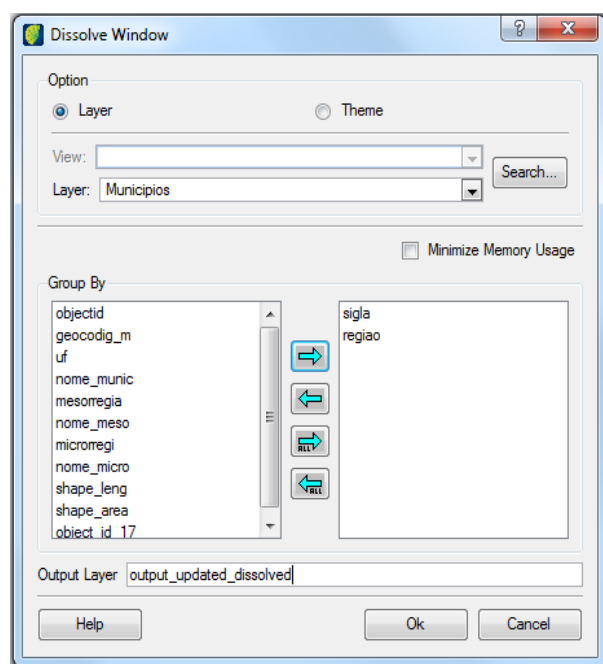
This operation will generate a new layer. Visualize the result and verify its columns using the Query Window. After making sure the operation was successful, define this final layer as the new output layer in the *Rules Control* interface (Associating Output Layers with a Project, page 77)

For complex data, consider running a Dissolve operation to reduce complexity, as the shows the following figure. Select the columns used in the intersection above and the *cell\_oid* column.

Click with the left button on active cell layer and select *Generalization* → *Dissolve Map*.



*Dissolve Windows* opens.



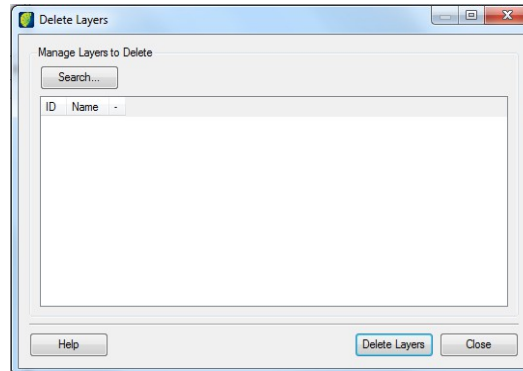
Proceed this same way for the layers of the rules that have a cell column informed. Select the necessary columns according to the project requirements in the *In* tab. In the end, define the final layer as the new layer for the rule.

**Note:** Nothing should be done with the layers used in rules created without informing the cell column. It is this way because when the cell column is not informed, TerraAmazon will run the rule based on spatial information only. This means that such rules will work but will not count with the advantages of having cellular tiling.

## Removing Layers

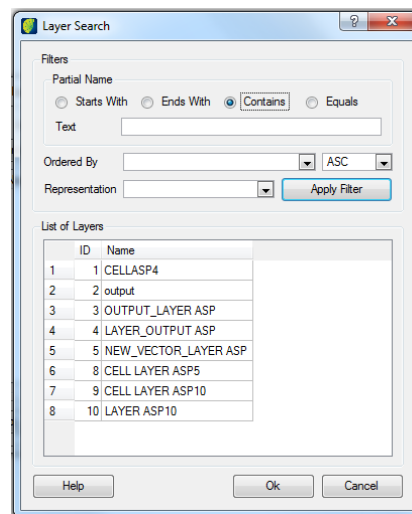
This tool is used to delete permanently one or more layers of the current database.

Go to ADMINISTRATION → DELETE LAYERS.



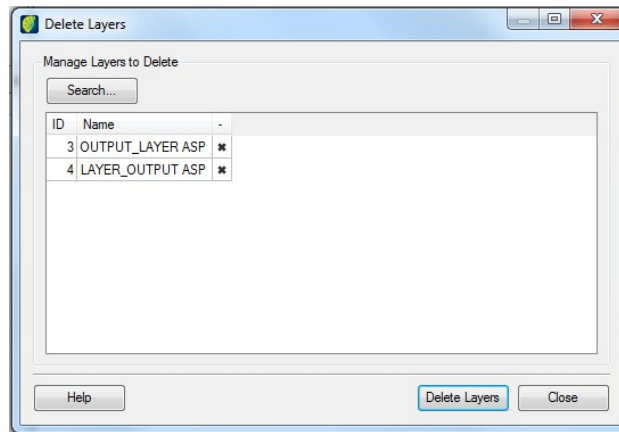
The interface is empty when accessed. It is necessary to add the desired layers to the list of layers to delete. To do that, click on the **Search** button.

A new interface opens allowing the user to choose the layers to be deleted. The layers selected by the user in this interface will be added to the deletion list on the previous interface. It is possible to select more than one layer by clicking on one of them and holding down the click while moving the mouse over the other desired layers or by Ctrl and clicking on layers one by one.



After selecting the desired layers for deletion, click on the **OK** button to insert them in the list of layers to be deleted on the previous interface.

**Note:** Clicking on OK in the search interface does not delete the layers, it just inserts them in the list of layers to be deleted.



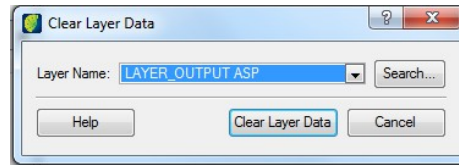
If a layer should be removed from the deletion list, click on **x** .

Click on the **Delete Layers** button to finally delete the layers. The interface does not ask for confirmation in this operation.

**Note:** The icon **x** **does not** delete data from the database, they just remove from the deletion list the name of the selected layers. Only the **Delete Layers** button deletes the layers permanently.

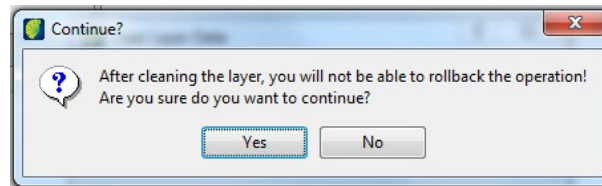
## Clear Layer Data

Use this tool to delete ALL contents of a layer. Click on the ADMINISTRATION → CLEAR LAYER DATA in menu.



Select the desired layer directly on the floating menu or use the **Search** button.

Click on the **Clear Layer Data** button. Confirmation will be requested.



**Note:** The Layer keeps all definition of metadata, projection, and box. Only the layer objects will be permanently deleted. This operation can not be undone.

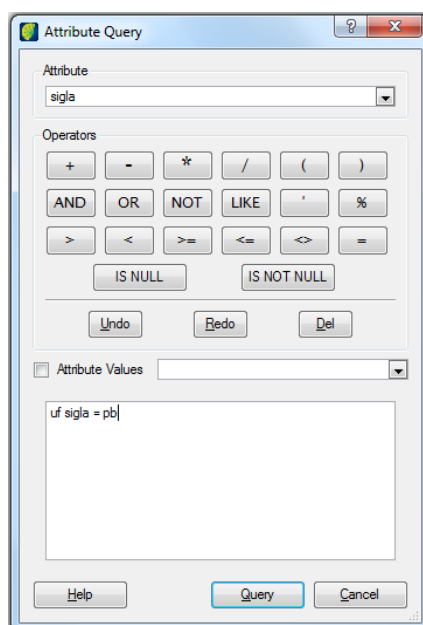
## Deleting Specific Objects of a Layer

Use this tool to delete specific contents through a query on the selected layer. Right-click on the desired layer in the layers tree, select DELETE OBJECTS FROM LAYER.

In *Attribute* field select the column to execute the query. Next, choose the most suited operator. Check the *Attribute Values* option and use the floating menu to select a value among the ones existing in the layer or type the desired value directly in the white space. For details on the interface, refer to Composing Restrictions, page 177.

It is possible to type in the full query directly in the white space, without using the buttons and interface options.

In the example below, every polygon with “sigla” equal to “pb” will be deleted from the layer.



Click on the **Query** button execute the data deletion.

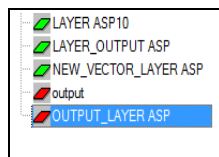
## Locking Layers

On TerraAmazon every vector layer is born eligible for a vectorial edition. However, it is possible to protect layers against edition, in such a way to ensure that data will not be accidentally changed. The use of this feature is very important to protect data in a multi-user environment.

Right-click on the layer and select the *Lock Layer* option.

- Layers defined as output layers are automatically locked and may only receive incoming vector data resulting from the classification process.
- Cell layers are always locked unless the database does not have the conceptual model.

Locked layers appear red in the layers tree.



**Note:** Locked layers may only receive incoming vector data resulting from a merge operation executed by a project manager or an administrator user. Also, only such user can remove data from a locked layer (refer to Deleting Specific Objects of a Layer, page 152).

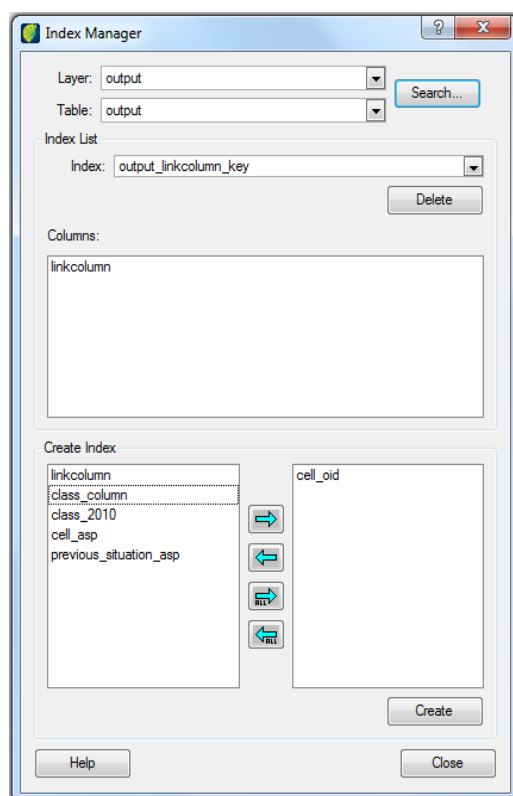
## Index Manager

Since TerraAmazon data is stored in databases, it is possible to create indexes on attribute tables. This results on a faster processing of spatial operations.

When dealing with a large amount of data, it is important to keep layers indexed.

Before performing spatial operations, verify the existence of indexes on the involved layers. If missing, create at least one.

Click on the layer and select *Index Manager*.



In the *Create Index*, select the desired column. Use the arrows to send it to the list at the right.

Click on the **Create** button.

The resulting indexes are presented in the *Index List* area. It is possible to have more than one index for each layer.

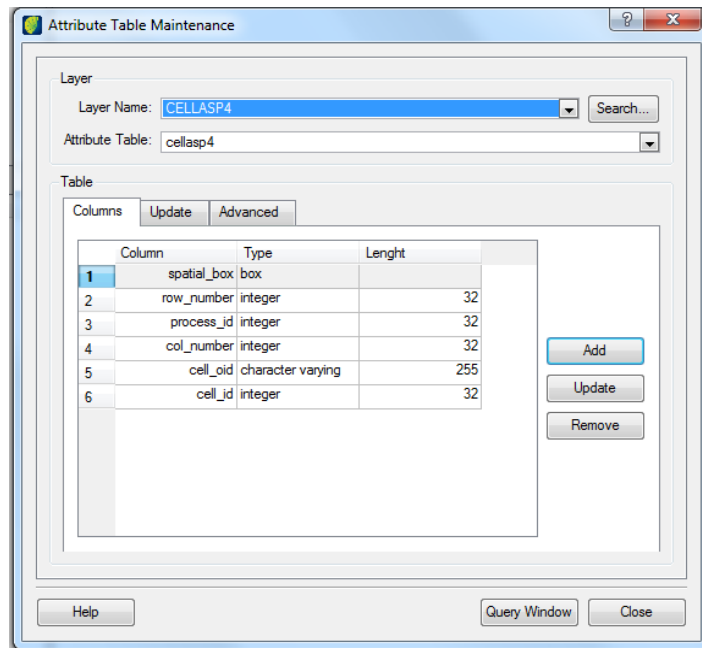


## Attribute Table Maintenance

TerraAmazon provides a built-in tool for table maintenance. This tool allows the Administrator User to add and remove columns, update their values and run SQL statements for advanced maintenance.

Acts on vector data only.

Go to ADMINISTRATION → ATTRIBUTE TABLE MAINTENANCE.



This interface does not act on the layer selected on the Layers Tree: all actions made through this interface will take effect on the layer chosen in the area *Layer*. Use the *Search* to locate the desired layer.

The area *Table* has three tabs:

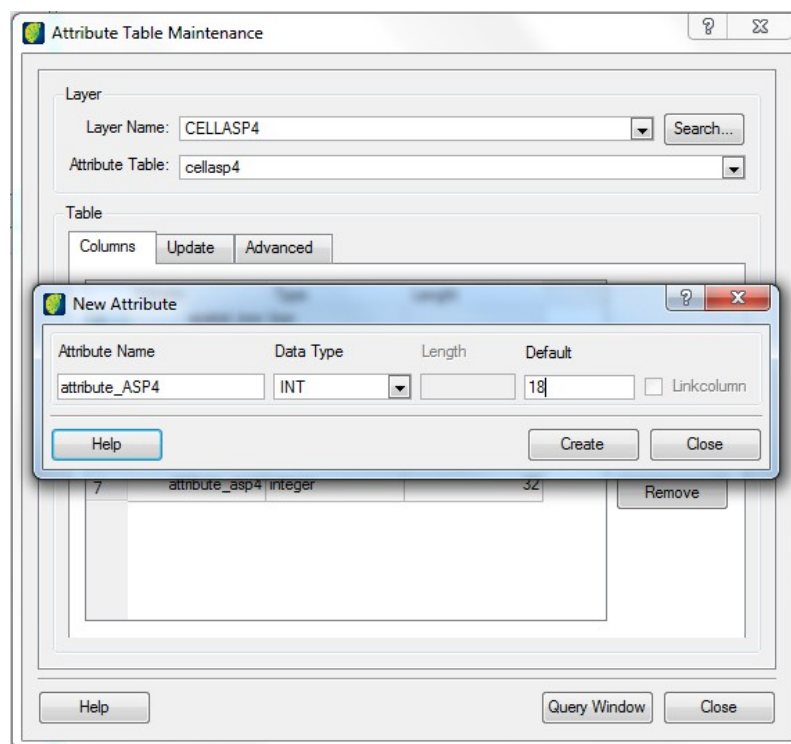
- *Column*: add and remove columns, as well as change their properties
- *Update*: change values on columns
- *Advanced*: maintenance through SQL statements

At any time use the **Query Window** button to access such window directly from this interface.

## Column Tab

The *Column* tab allows the Administrator user to create and remove columns, as well as change their properties, such as name, type and length.

Add: use this button to create a new column on the table of the chosen layer.



On the *New Attribute* interface:

*Attribute*: type the name for the column that will be created. Do not use any special characters. This field is not case sensitive: all characters will be stored in lower case.

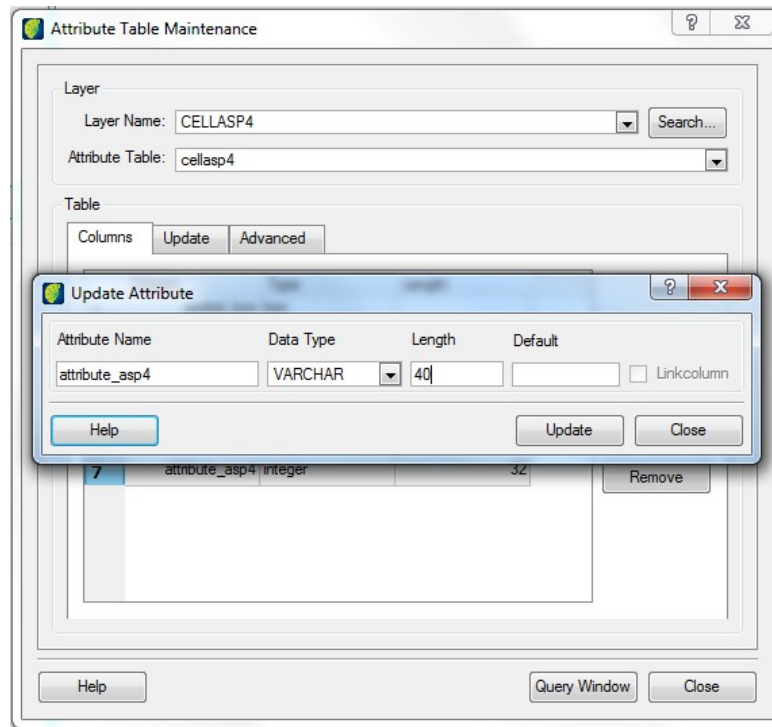
*Data Type*: consider the information that will be stored in this column and chose one of the possible types of data (character, varchar, int, double or bool).

*Default*: if necessary, use this field to define a default value for every new entrance in the table. As an example, with the setting above, each new polygon will carry the value '18' in the column 'attribute\_2'.

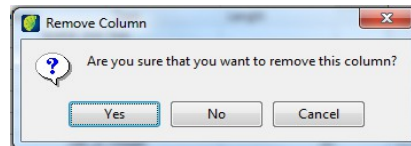
Click on the **Create** button.

The new column will appear in the tab Column along with the previous ones.

**Update:** use this button to change any of the column's properties (Name, Data Type, Length and Default). In the following example, only the length is being changed. The main interface in the back shows the current length 32 and the Update Attribute window shows the new length to be applied: 40.



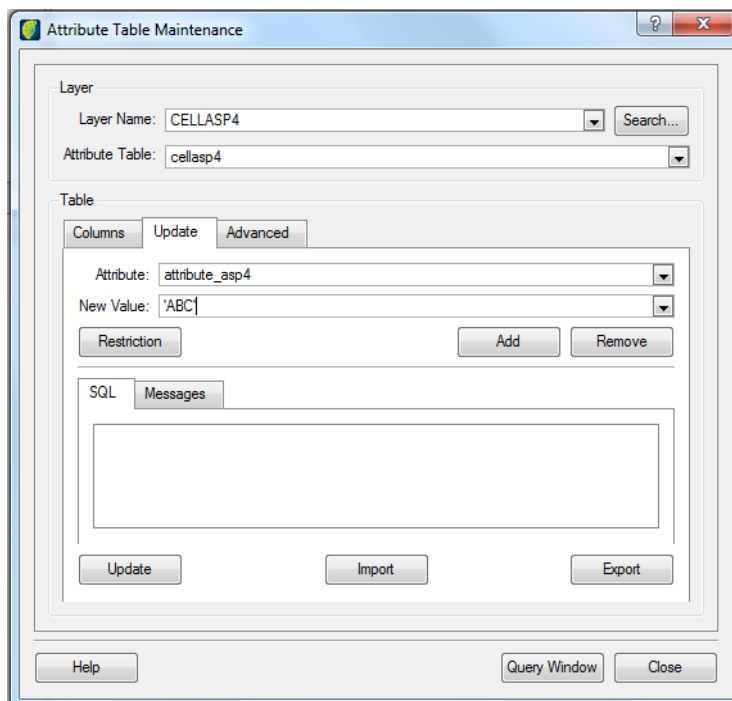
**Remove:** select the column to be removed and click on this button. Confirmation is required.



## Update Tab

The *Update* tab allows the Administrator user to update values in attribute columns. The user may restrict the updates to take effect only on specific geometries or group of geometries.

Operations in this tab do not require SQL expertise, however, basic concepts are useful.



*Attribute*: select the column to be updated. Necessary restrictions are added later.

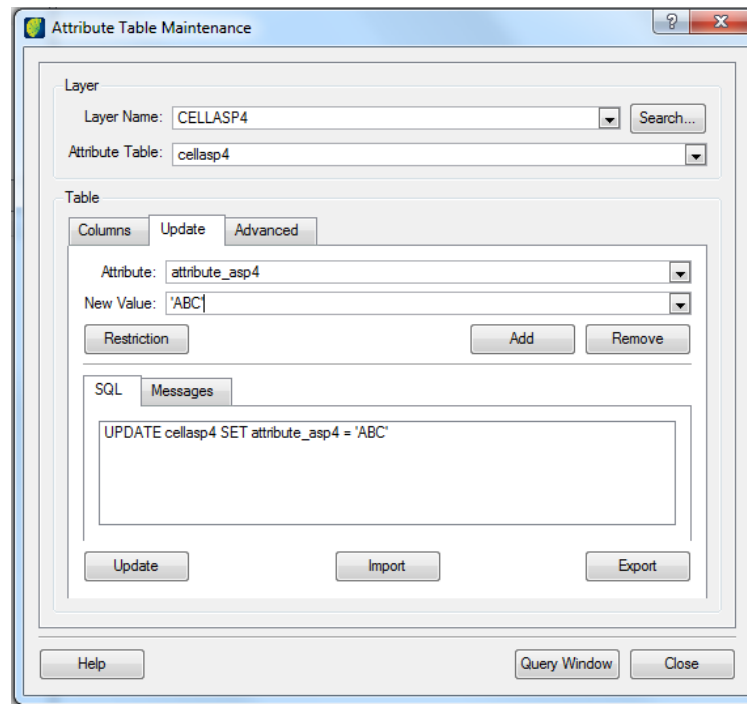
*New Value*: type the value that will be applied to the geometries involved in the procedure.

The way to enter values in this field will depend on the column's type of data.

Examples:

- Character, accepts only one character: 'a'
- Varying Characters (VARCHAR): 'text'
- Integer numbers (INT): 5
- Double Precision numbers (DOUBLE): 5.62547
- Boolean (BOOL), accepts true, false, '0', '1'. When typing false (or '0'), the letter “f” is stored in the database. When typing true (or '1'), the letter “t” is stored.

Click on the **Add** button to have the interface generate the SQL for the update, as shown in the next figure.



After clicking on *Add*, if necessary, use the **Restriction** button to insert a restriction to the generated SQL. Refer to Appendix E, page 177, for composing restrictions.

Click on the **Update** button to run the final statement.

*Remove*: to remove generated statements, select it in the SQL sub tab and click on this button.

*Message* sub tab: displays success/error messages after running the update.

*Export/Import*: use these buttons to export/import the SQL statements. Contents are saved in a text file.

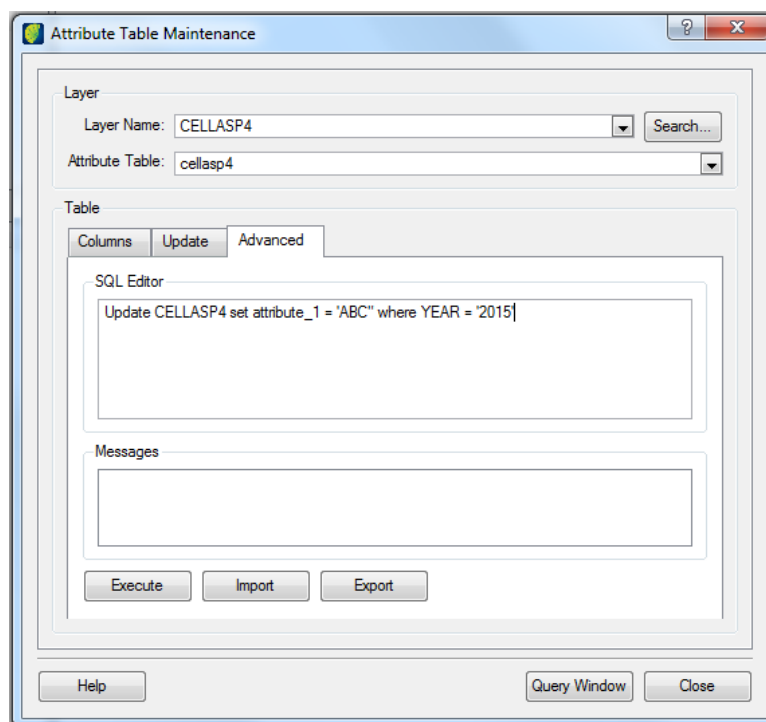
## Advanced Tab

Allows the Administrator user to run advanced maintenance procedures using SQL statements. SQL expertise is required.

It is not possible to rollback operations after they are executed.

This interface accepts *update*, *alter table* and *insert* commands. For *select* queries, click on the **Query Window** button.

When using the command “BEGIN;” every statement run in this interface and in the Query Window will be in the same transaction until you run “COMMIT;”. If there is an SQL error during the procedure, you must commit and star over.



*.SQL Editor:* simply type the desired update SQL and click on the **Execute** button.

*Output:* displays success/error messages.

Export/Import: use these buttons to export/import the SQL statements. Contents are saved in a text file. The *Output* messages are not saved.

# 13

## Backup & Restore Databases

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CREATING A BACKUP	162
RESTORING A BACKUP FILE	163

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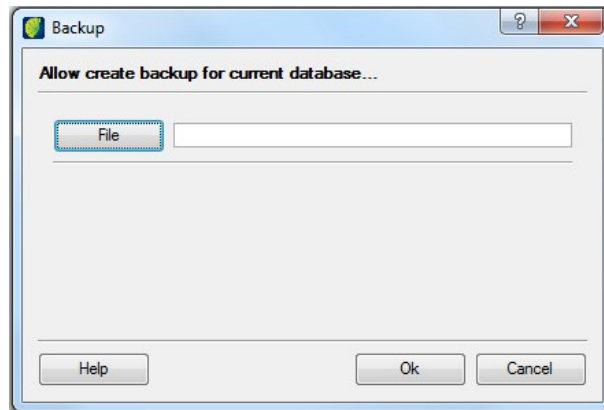
TerraAmazon has backup & restore tools for its databases.

## Creating a Backup

---

Creating backup files in TerraAmazon a simple task.

Go to PROJECT MANAGEMENT → CREATE BACKUP.



Click on the **File** button, browse to the path where the backup file will be saved and type a name for the file and click on the **OK** button.

The time spent to generate a database backup depends on the amount of data stored in it.

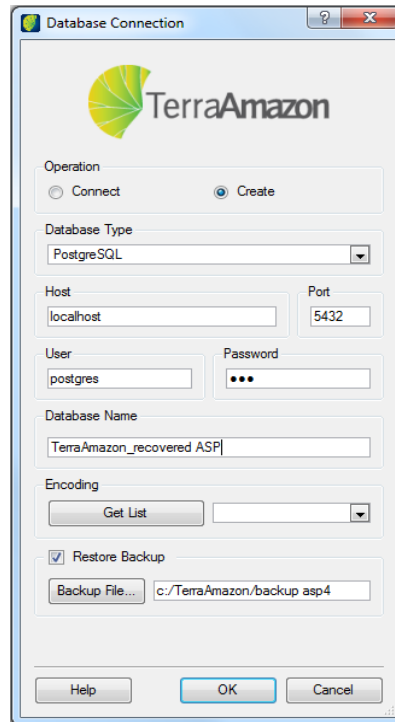


## Restoring a Backup File

The restoration of a backup file is done in the connection interface, the same one used to create and connect to databases.

This procedure creates a new database using the backup file. For this reason, it is not possible to restore a database while still connected to another one.

Open TerraAmazon and click on the icon  or go to FILE → OPEN DATABASE.



Select the *Create* option.

*Database Type*: must be the same type as the database that originated the backup.

*Host, Port, User and Password*: these fields must be filled with the values corresponding to the server in which the DB will be restored. After the restoring, you will be automatically connected to the database. For details, refer to Creating a Database, page 14.

**Note:** If the user from the current DBMS does not exist in the original database (or has a different password), the message “Invalid TerraAmazon user” will be shown after the restoration is complete. In this case, select the option *Connect* and proceed as usual with a valid user from the original database.

*Database Name*: provide a name for the database that will be created. This name does not have to be the same as the backup file. Do not use accents, empty spaces or special characters of any kind.

*Restore Backup*: select this option and click on the **Backup File** button to choose the file to be restored.

Click OK to trigger the restoration.

The time spent to restore a database backup depends on the amount of data stored in it.

### TerraAmazon Installation

---

Installing TerraAmazon is quite simple however it requires a client-server environment setup with a database management system (DBMS).

#### Running TerraAmazon Installer

Download the latest version of TerraAmazon installer at: [www.terraamazon.org](http://www.terraamazon.org)

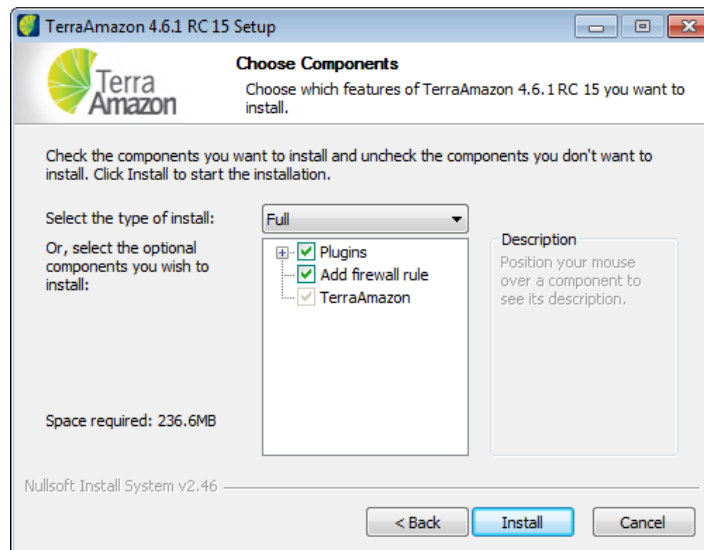
Execute the installer and follow the steps.



If desired, change the installation folder or the location of the shortcuts.

Also, on the last step, you can choose to install or not the following items:

- the plugins
- the firewall rules (without which the firewall may block the port of access to the server)
- Visual C++ Package (which updates Windows® registry to allow the system to work)



Administrator privileges on Windows® might be necessary.

## Setting up a Client-Server Environment

A client-server environment is composed of computers playing two different parts: client computer(s) accessing the server computer(s).

Although server computer setups can become very complex, the simplest configuration possible is very easy and requires only that a database management system (DBMS) be installed.

This manual presents only the basic set up necessary. For that, please refer to Appendix B, page 167.

**Note:** The client and the server computers are usually different computers that communicate with each other by an intranet. However, alternatively, they can be the same computer playing both parts (refer to Possible Setups, page 165).

## Possible Setups

It is possible to setup TerraAmazon environment for different purposes.

### For Trying out TerraAmazon or for Learning or Testing Purposes

For these purposes, you may want to have both client and server applications running in the same computer.

This setup is indicated specially if you intend to:

- try TerraAmazon and find out what you can do with it
- learn how it works
- execute a small project

In these cases, you can use a regular desktop or a laptop running Windows® XP or above.

To implement this setup, install TerraAmazon and the DBMS on you computer. Refer to TerraAmazon Installation , page 164, and Appendix B, page 167.

TerraAmazon homologation is made with the minimum configuration running Windows® XP and above, at least of a version 4.5. It will run on 32 bit system, generally runs fine on 64-bit Windows.

## **For Corporate Project Purposes**

TerraAmazon was conceived to run projects in corporate environments with large amounts of data being simultaneously edited by a multi-user team.

For this purpose, a server is necessary, along with a client computer for each user.

In this set up, client computers can be either desktops or laptops. Servers should be more powerful computers to provide a good result.

Install TerraAmazon on the client computers (refer to TerraAmazon Installation , page 164) and install the DBMS on the server computer (refer to Appendix B, page 167).

TerraAmazon homologation is made with the minimum configuration below:

1. Client computers: Windows® XP and above
2. Main Server can run Windows® or Linux. DBMS. For homologation was PostgreSQL 8.4 32 or 64 bits, PostgreSQL 9.1, 9.2, 9.3 e 9.4 and PostGIS 1.5, Postgis 2.0.
3. Server running Windows®: Windows® Server 2008 R2 Enterprise Intel Xeon 4Gb 64-bits 2.0GHz (8 processors)
4. Server running Linux: Red Hat, Intel Xeon 16Gb 64-bits 1.6GHz (8 processors)

### Configuring a PostgreSQL server

---

Download the recommended version of the PostgreSQL DBMS directly in the official website:

[www.postgresql.org/](http://www.postgresql.org/)

After installing, it is necessary to configure the range of IP addresses of the client machines that will access the server and the authentication method.

In order to do this, edit the `pg_hba.conf` file; in postgres version 8.4 the file is in this directory: `postgresql\8.4\data`.

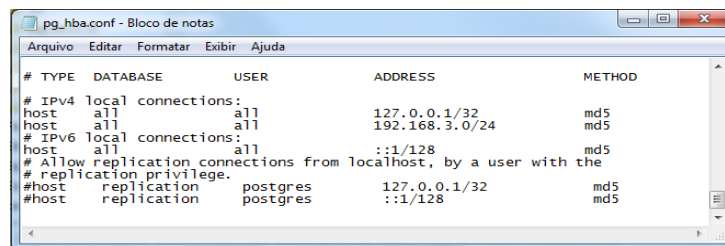
Each record identifies the connection type, a range of Client IP addresses, a database name, a user name, and the authentication method;

- *Type*: Connection (local, host, hostssl, hostnossl)
- *Database*: Specifies which databases this record corresponds to. The **all** value corresponds to all databases;
- *User*: Specifies which PostgreSQL users this record corresponds to. The **all** corresponds to all users.
- *CIDR Address*: Specifies the range of client machines IP addresses this record corresponds to;
- *Authentication method*: Specifies the authentication method to be used to connect using this record.

**Note:** Restart the service whenever this file is changed.

*CIDR\_ADDRESS*: Standard notation with dots, and CIDR mask length. The mask indicates the number of bits that identifies the network address.

A typical address is `172.20.143.89/32` for one host only, or `172.20.143.0/24` for a network.



This field is only valid for type=host, hostssl e hostnossl.

## Defining *ips* with access to server

---

Add in the *#IPv4 local connections* item

<i>TYPE</i>	<i>DATABASE</i>	<i>USER</i>	<i>CIDR-ADDRESS</i>	<i>METHOD</i>
host	all	all	127.0.0.1/32	md5
host	all	all	192.168.1.0/24	md5

<network addresses> = 192.168.1.0/24

This means that all machines with IP address containing 192.168.1.X will have access to the postgres server.

Another approach is to indicate the exact IP address of each client machine; in order to do this, just indicate each one of them in CIDR ADDRESS finishing with /32, accordingly to the example below:

<i>TYPE</i>	<i>DATABASE</i>	<i>USER</i>	<i>CIDR-ADDRESS</i>	<i>METHOD</i>
host	all	all	127.0.0.1/32	md5
host	all	all	192.168.1.1/32	Md5
host	all	all	192.168.1.5/32	Md5
host	all	all	192.168.1.10/32	Md5
host	all	all	192.168.254.1/32	md5

The row in blue is enabling access to the DBMS by a machine located in another network.

## Authentication

---

It is the process where the server establishes the client identity and defines if the client application has permission to connect using the provided user name.

*Method*: indicates the authentication method.

*md5*, *crypt* and *password* are based on a password and differ on how the password is sent through the connection. The *md5* is the only one to support encrypted passwords.

*trust*, any user connected to the server is authorized to access the database without authentication.

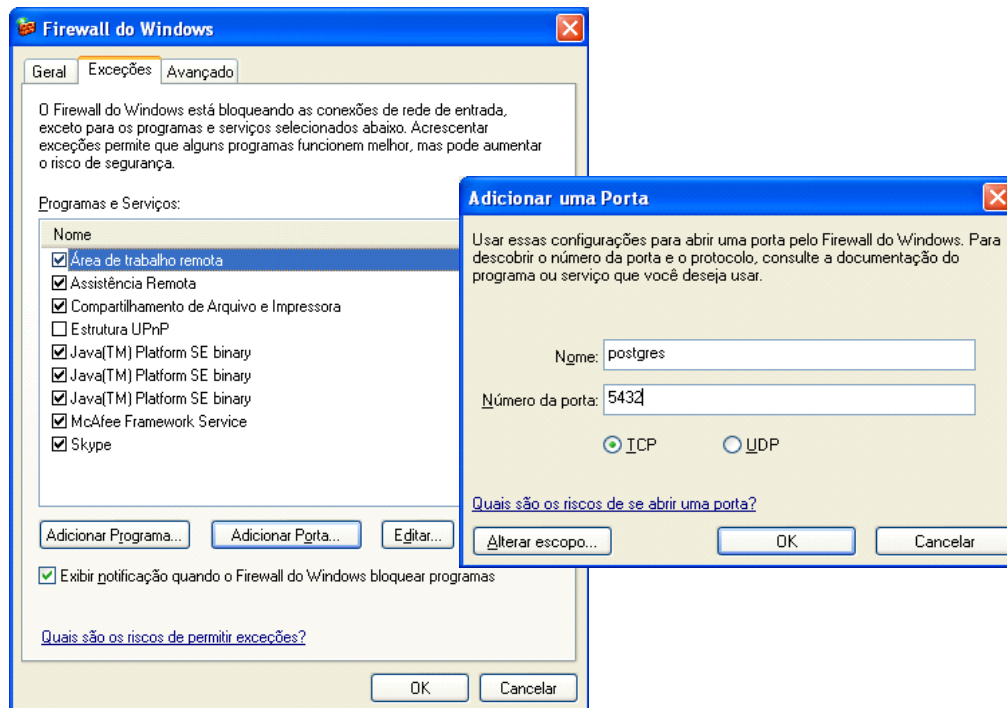
*Reject*, the connection is rejected unconditionally. It rejects by filtering some hosts of a group.

*Krb5*, Kerberos v5 is used to authenticate the user and it is available for TCP/IP connections only. (This is a safe system, suitable for distributed computing on public networks.)

*Ident*, the user name of the client operating system is obtained: (for TCP/IP connections) contacting the identification server in the client and (for local connection) from the operating system.

## Opening PostgreSQL port in the windows Firewall

For a PostgreSQL windows server to be visible by client machines on the network, it is necessary to enable the access to the port in the firewall.



Click on Control Panel → Conexões de rede e (Network Connections and) Internet → Firewall do Windows® (Windows® Firewall)

1. Select the Exceções (Exceptions) tab
2. Click on the Adicionar Porta (Add Port)
3. Insert the postgres name
4. Provide the postgres service port, by default 5432
5. Click on the Adicionar Porta (Add Port)
6. Select TCP and click on the OK button

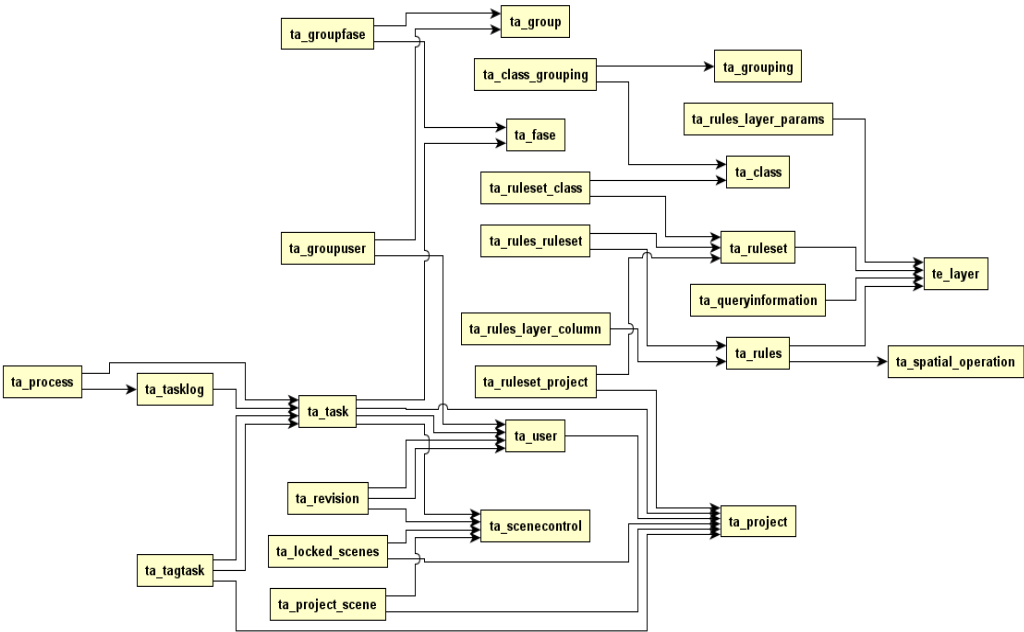
In later Windows® versions click on Control Panel → Firewall do Windows → Programas Permitidos.

Check if “Area de Trabalho Remota” and PostgreSQL server -5432 have remote access selected.

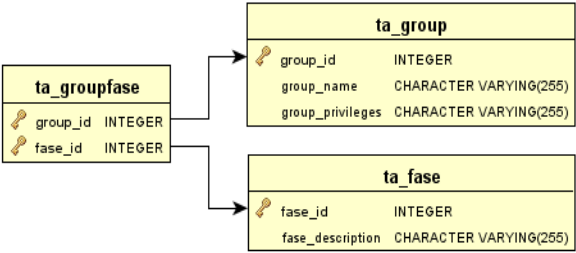


TerraAmazon Data Model

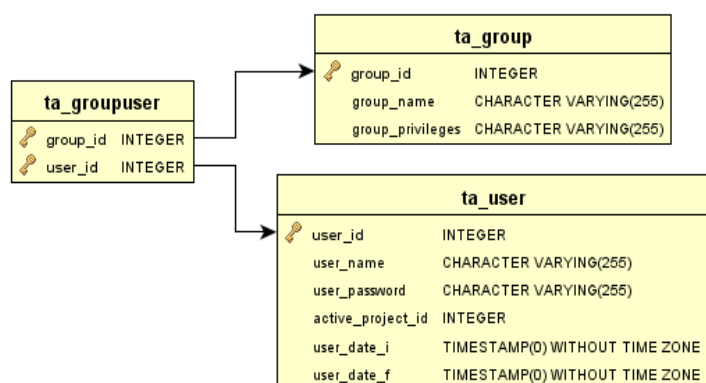
Table summary of TerraAmazon 4.x model



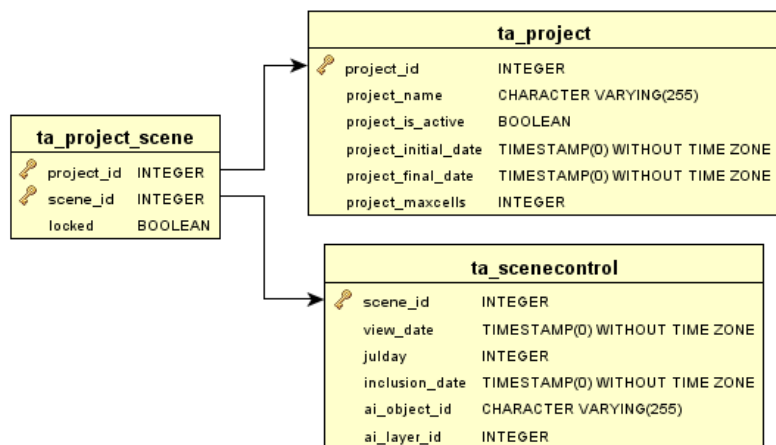
Relation table of user group entities and processing phases



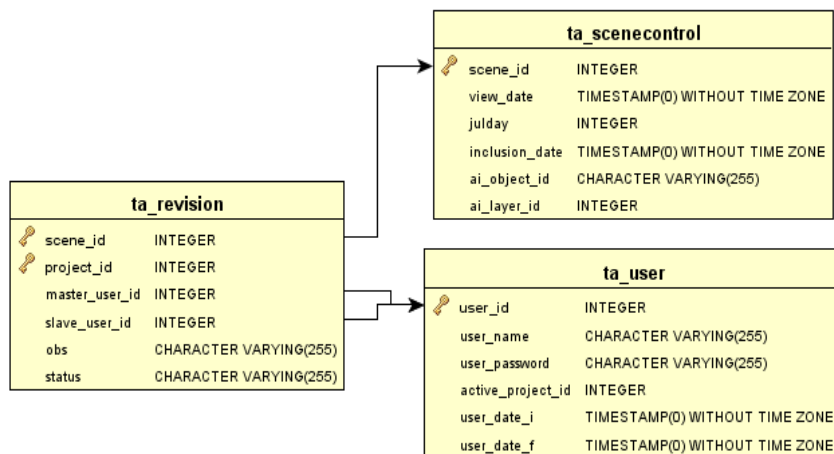
## Relation table of user and user group



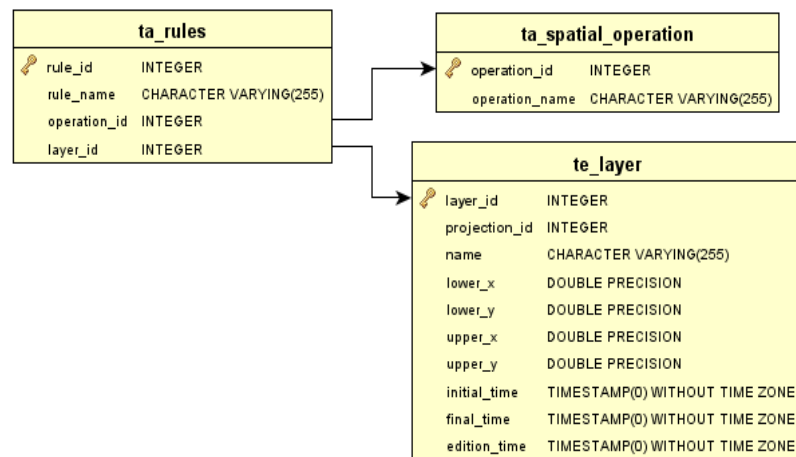
## Relation table of project and scene entities



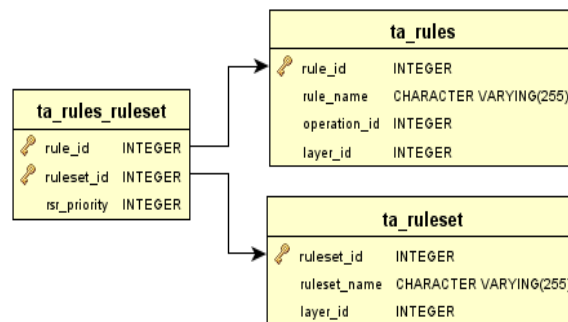
## Relation table of used scene by user and revision process



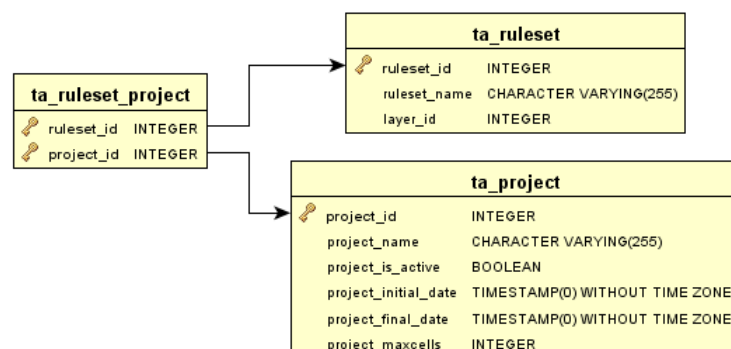
## Relation table of topological rule and input layer to the selected spatial operation



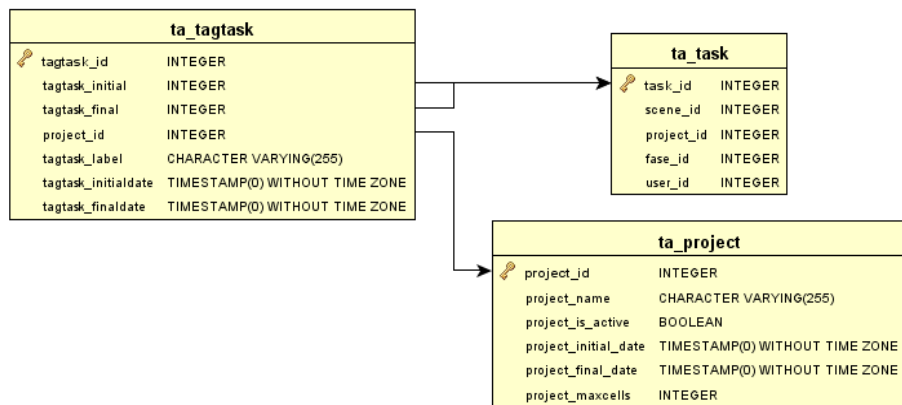
## Relation table of rules and topological rule set



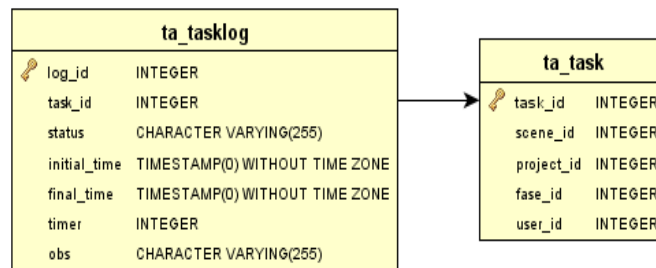
## Relation table of project and associated rule set



## Relation table of task and projec



## Relation table of task and tasklog (task execution time)



### User Structures: before and after the Conceptual Model

---

Creating the conceptual model in a TerraAmazon database changes the internal user structure. When a new database is created, it is not yet a TerraAmazon database, but a TerraLib model database. A TerraLib database can be accessed by every TerraFamily software.

Once the conceptual model is created, the database becomes a TerraAmazon model database. It is still possible to access such database with other TerraFamily software, but TerraAmazon features will not be available, such as users and projects, among others.

Two concepts of users must be described for best understanding user structure changes: *DBMS Users* and *DB Users*.

- *DBMS Users*: taking PostgreSQL DBMS as an example, a DBMS User is a login role defined inside PostgreSQL. The PostgreSQL installation creates one DBMS user and after that, new DBMS users can be created and removed inside PostgreSQL at any time without any relation with TerraAmazon.
- *DB Users*: TerraAmazon database users are created inside TerraAmazon and their user names and passwords are stored in a table inside the database. DB Users only exist after creating the conceptual model. Removing an entire TerraAmazon database also removes its DB Users, but does not remove DBMS Users.

Only DBMS Users can create new databases. Before the conceptual model is created, they are also the only ones with access to the database. They log in TerraAmazon with Administrator privileges.

As a result of the creation of the conceptual model, the first DB User is created with the same user name and password of the DBMS user that created the conceptual model. Since this user is not the DBMS user, the password can be changed afterwards through the proper interface without having any sort of effect on the DBMS user that created the conceptual model (page 38). After that, only this first DB user and those created by him can access the database.

The following scheme shows how the user structure changes.

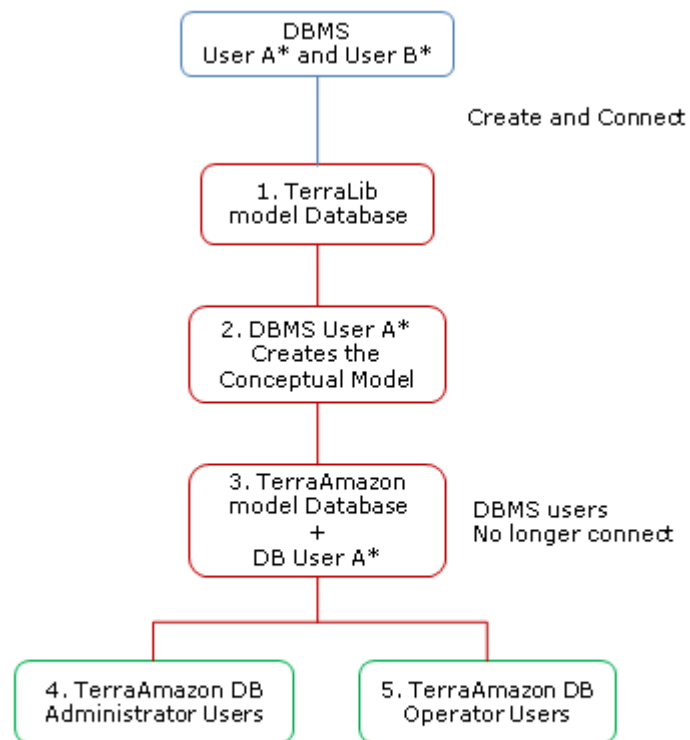
**Box 1:** To understand the scheme, consider a DBMS with two users: *User A* and *User B*. Both users can either create or connect to new TerraLib databases through TerraAmazon interface (page 14). DBMS Users *A* and *B* log in TerraAmazon with Administrator privileges.

**Box 2:** As an example, consider that *User A* creates the conceptual model.

**Box 3:** as a result from the previous box, the TerraLib database changes to a TerraAmazon model database and the first DB user is created also named *User A*. From this point on, the DBMS users *User A* and *User B* can no longer connect to the database. The new DB *User A* also has administrator privileges and can create other Administrator Users as well as Operator Users.

**Box 4:** Administrator users created by the first DB user *User A* can also create users.

**Box 5:** Operator users are created by any administrator user after the creation of the conceptual model.



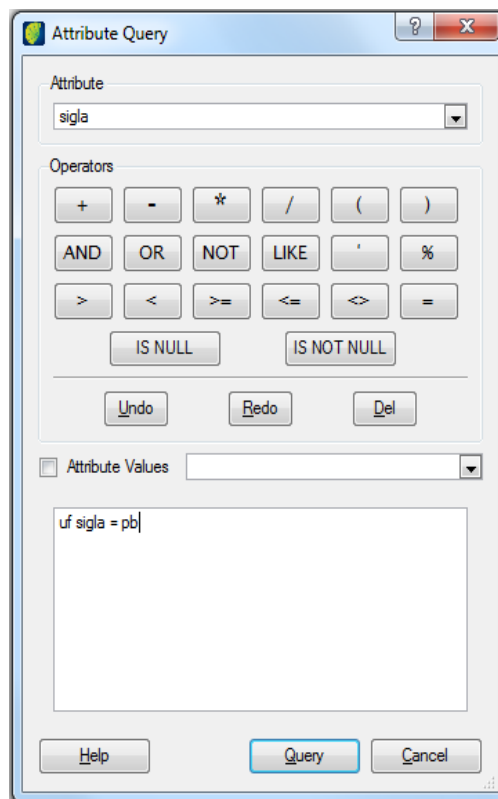
\* Administrator Privileges

### 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, or when finding geometries); sometimes it comes alone (such as when applying restrictions to themes grouped by attribute, or when Deleting Specific Objects of a Layer, page 152), 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.

**Note:** 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 (m<sup>2</sup>).

This restriction will result in the polygons classified as “DEFORESTATION” that have areas larger or equal to 62500 m<sup>2</sup>.



## Appendix F

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### Shapefile Size Limitation

During the exportation of vector data, TerraAmazon generates the following component files:

- shp
- shx
- dbf
- prj
- xml (if the option *Export properties* from exporting interfaces is checked)

According to the specification set by ESRI to the *shapefile* files, there is a size limitation: none of the individual component files may exceed the size of 2GB, especially the .dbf and .shp, the only files that are likely to become huge. The total size from all the component files may exceed 2 GB.

## Abbreviations and Acronyms

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CCD	Charge Coupled Devide
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
TERRACCLASS	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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## Alphabetical Index

Box.....	107, 109, 112, 113, 151
Cell layer.....	16
Cells layer.....	16
Class.....	4
Class Group.....	55, 82
Classes.....	53, 54, 56, 57, 82
Conceptual Model.....	16, 18, 21, 36, 39
Dependencies.....	101, 102, 104
Operator User.....	35, 115
Operator User's Manual.....	35, 115
Password.....	15, 21, 36, 38, 169
Password .....	38
Passwords.....	36
Pen tablet.....	9
Phase.....	6
Phases.....	43, 44, 46
Project.....	6, 47, 48, 50, 51, 74, 77, 97, 100, 101, 102, 104
Rules Control.....	56, 67, 73, 74, 76, 81, 82, 84, 104, 148
Wizard.....	86