“Introduction to gvSIG 2.1” workshop

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Distribution Lists

- User List. Here you can leave your comments on the operation: detected problems, doubts using gvSIG and everything that could have a place in a user list. To subscribe to the user list go to:

  http://listserv.gva.es/mailman/listinfo/gvsig_internacional

- Developers list: It is oriented for those who are interested in the developed gvSIG. To subscribe to the developer list go to:

  http://listserv.gva.es/mailman/listinfo/gvsig_desarrolladores

Translation made by Elena Sánchez and Francisco Solís.

Contents

1 INTRODUCTION

1.1. gvSIG Desktop, the free Geographic Information System

gvSIG Desktop is a powerful, easy to use, interoperable and used by thousands of users worldwide.
It is easy to work with gvSIG Desktop with all formats, vector and raster files, databases and remote services. All kinds of tools are available to analyze and manage geographic information.

It is designed to be easily extensible, allowing continuous improvement and custom made solutions.
gvSIG Desktop is free software, GNU / GPL license, which allows free use, distribution, study and improvement .

Download gvSIG from Desktop Project Site and start using it!

1.2. What is the aim of this workshop?

This workshop aims to establish an overview of gvSIG 2.1. Although it will aim to focus on these news, for those who have never worked with earlier versions of gvSIG there will be basic exercises.

We will see just a minor proportion of the possibilities offered by gvSIG. PostGIS (vectorial and raster) and scripting with Python won't be included in these workshop, they are aimed at more advanced users.

So this is an introduction workshop and it is precisely its objective: gvSIG introduction and get started with this new version.

1.3. Minimum system requirements

The minimum system requirements for running gvSIG are:

- Intel -compatible CPU (i486 or higher).
- Minimum: 256 MB RAM; Recommended: 512 MB RAM.
- Compatible graphics card with SVGA standard.

1.4. gvSIG user interface

gvSIG is comprised of a series of items, accessible from the Project Manager window. Each item provides access to a number of functions through menus and buttons. Although some plugins added additional data views, the main sections are:

- View: To create a new data view.
- Table: to manage alphanumeric information.
- Map: allow us to prepare a graphical output for the printer.
- Charts: we will be able to generate various charts (bars, pies, ...) .

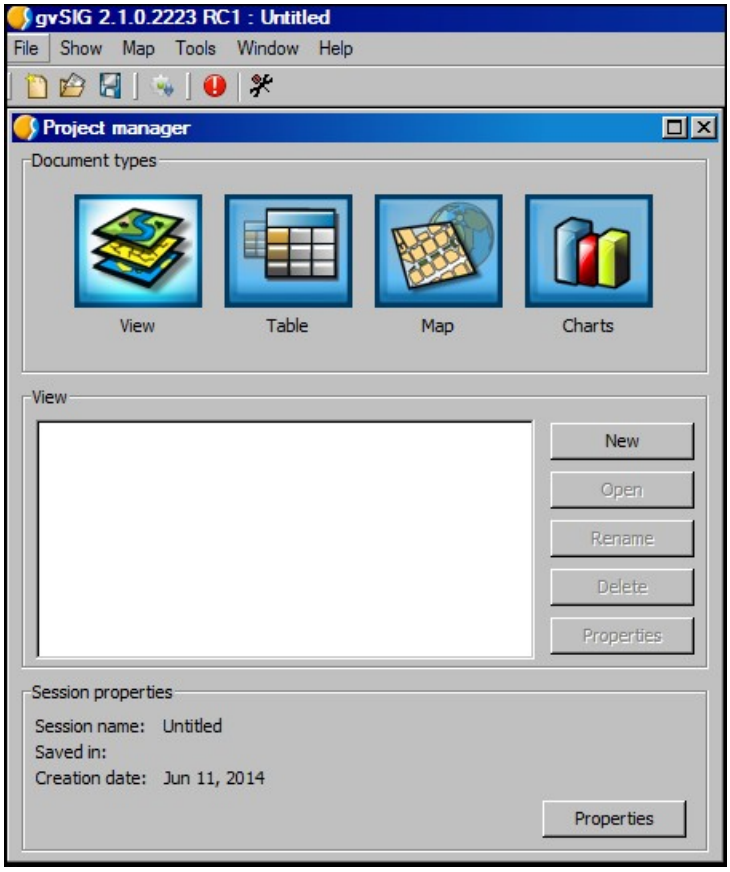
1.5. gvSIG Version

This workshop has been developed using gvSIG 2.1 RC1 (Release Candidate 1)

2. FIRST EXERCISES

2.1. Getting Started with Data View

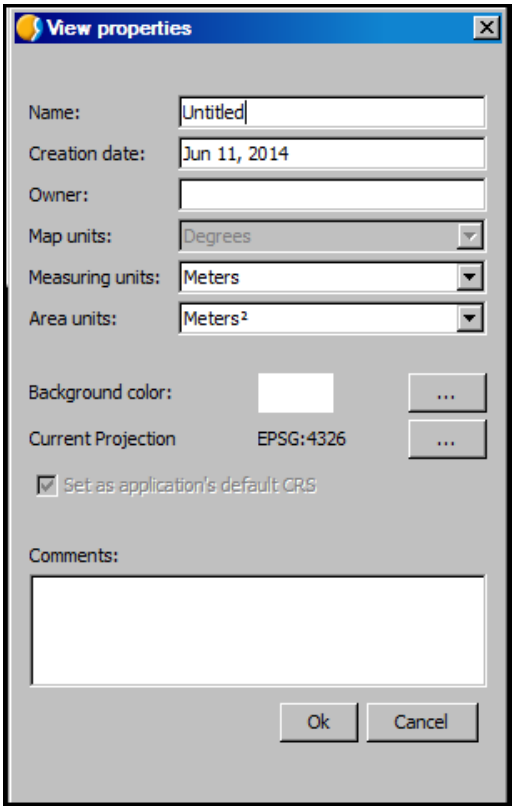
Opening gvSIG, we are directly in the Project Manager Window (if we need to re-open this window, click in the Window / Project Manager menu).



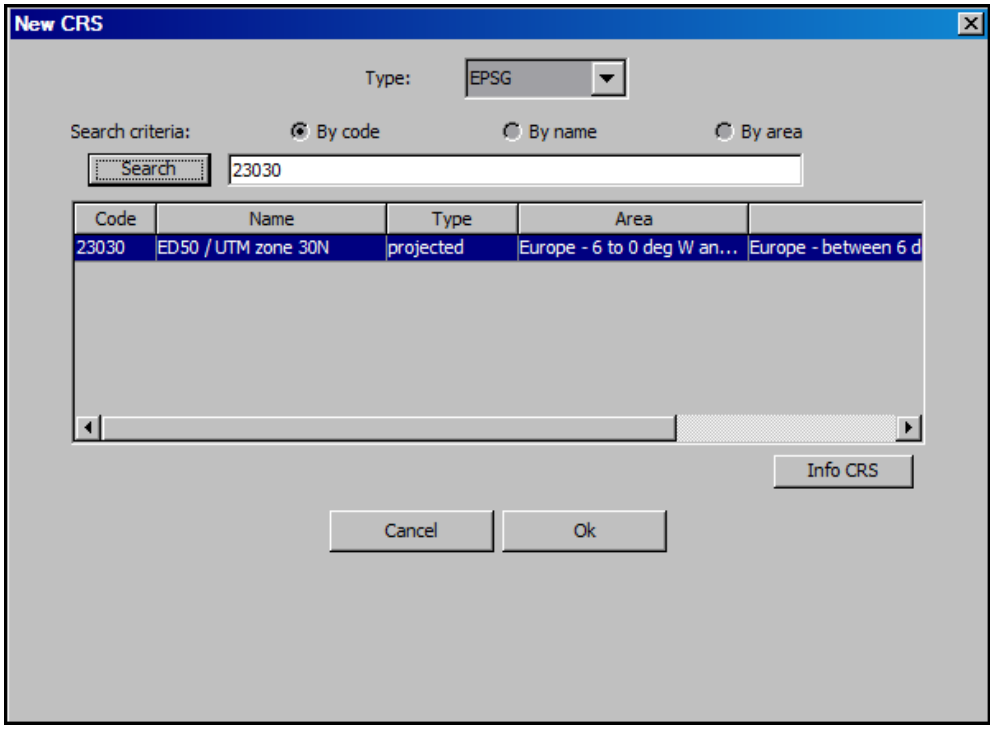
- Select the type of document View in the Project Manager then we click New. The new data view has been created. It has EPSG: 4326 reference system by default.

- Firstly we will change the spatial reference system (CRS) from EPSG : 4326 to EPSG: 23030. This is the CRS in which we have the layers we will need for the first exercise. To do this, click on View / Properties or directly on the Properties button from the View section in Project Manager Window. A new

window will be open where you can change the CRS. The Current Projection property defines the CRS for the data view. You can change it clicking on the CRS to choose between different databases.



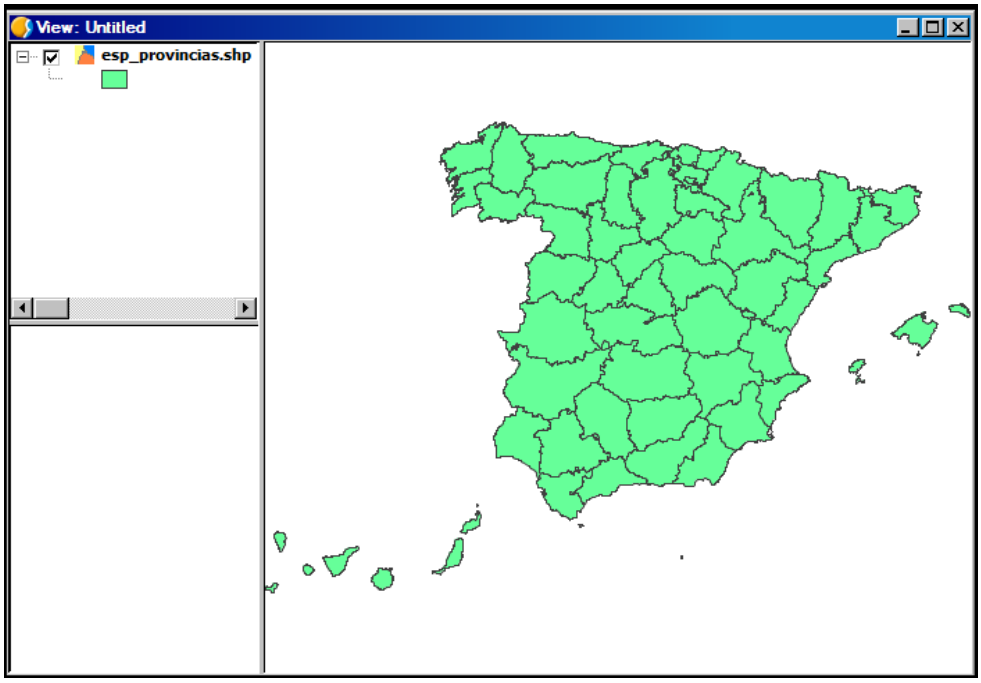
- In the window similar to the image below, making a selection from the Type dropdown box, list to choose database projection EPSG. The search criteria will be by Code, indicate number 23030 and press the Search button. Select the result and click OK. We have our Data View in EPSG: 23030 (it is visible in Data View status bar).



Trick: We can change the data view spatial reference system displayed by default in the gvSIG Preferences dialog (to be found under “Window>Preferences”)

- The data view contains three empty areas. On the right, the geographical view, at the top left area the TOC (Table of Contents) where we have the added data layers and an overview map area below it. All these areas can be easily modified clicking and dragging the mouse on the boundaries between them.
- We use the Add Layer tool , to find this tool go to View / Add Layer menu or the shortcut key Alt + O. It is common to find same order in menus, buttons and shortcuts. In this workshop we will refer only to the buttons, once memorized it is the most common form of access.
- A new window will appear where we can choose different options to add to our data view .In the File tab, active by default, we click the Add button. In the new window we just navigate to the layer to add, select it and click the Open button. In our case, we select **esp_provincias.shp,** inside **Spain** folder. We could add as many layers as we want at once (press the Control key while selecting)

- We will have a similar layer to the following image:



- Now let's add a locator. It is an overview map that shows the work area (we already have it in the main data view). So we go to the menu View / Configure locator set up. In the new window that appears click the Add Layer button and follow the same described above, selecting **Spain / esp localizador.shp**

- Once the locator is added, the area marked in the locator box will change when we navigate the geographical main data view. We can also go through the locator and see the changes in the geographic main data view.

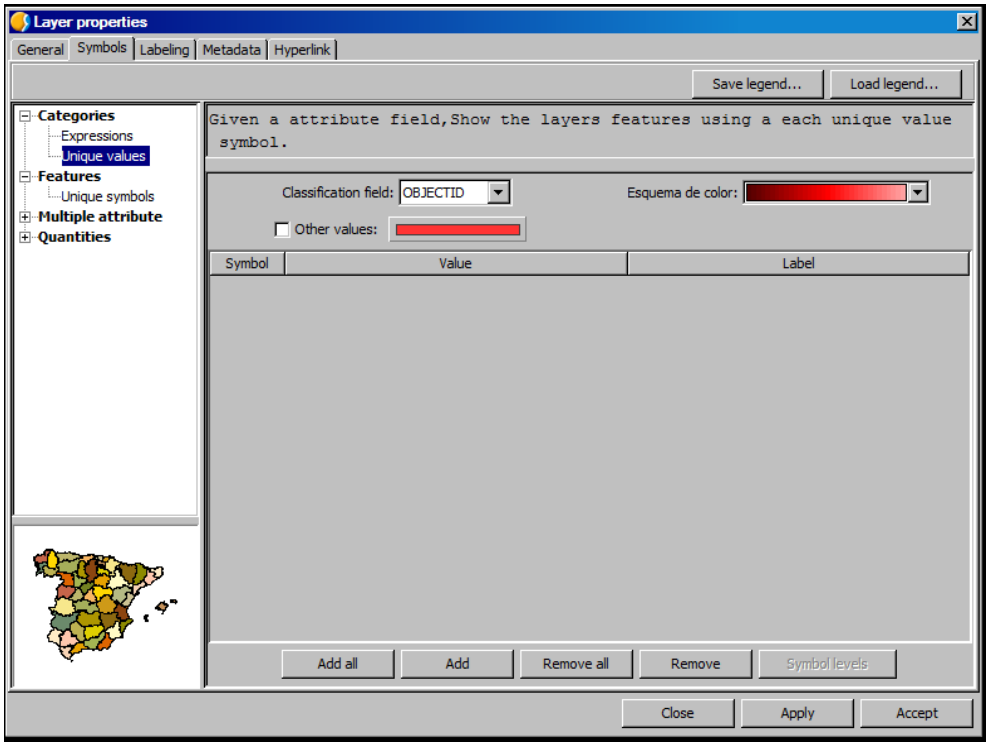
2.2. Our first legend

In addition to menus and buttons, we can find contextual menus by pressing the right mouse button at certain times (for example, editing tools). To access the layer properties, among which is the symbology, the fastest way is clicking the right mouse button on the layer in the TOC (it must be active, to activate a layer select it with the left -button).

- After **esp_provincias.shp** layer has been activated, (the layer appears in bold to indicate it), click the right button and select the Properties button.

- From the different tabs we have in the layer properties window select Symbols. In this tab we have available all types of possible legends for vector layers using a tree where legends are classified by their main feature (Legends of Quantities, Categories, Multiple Attributes and Features). Each style has its own options and a picture on the bottom left of the window shows the results given by the selected legend.

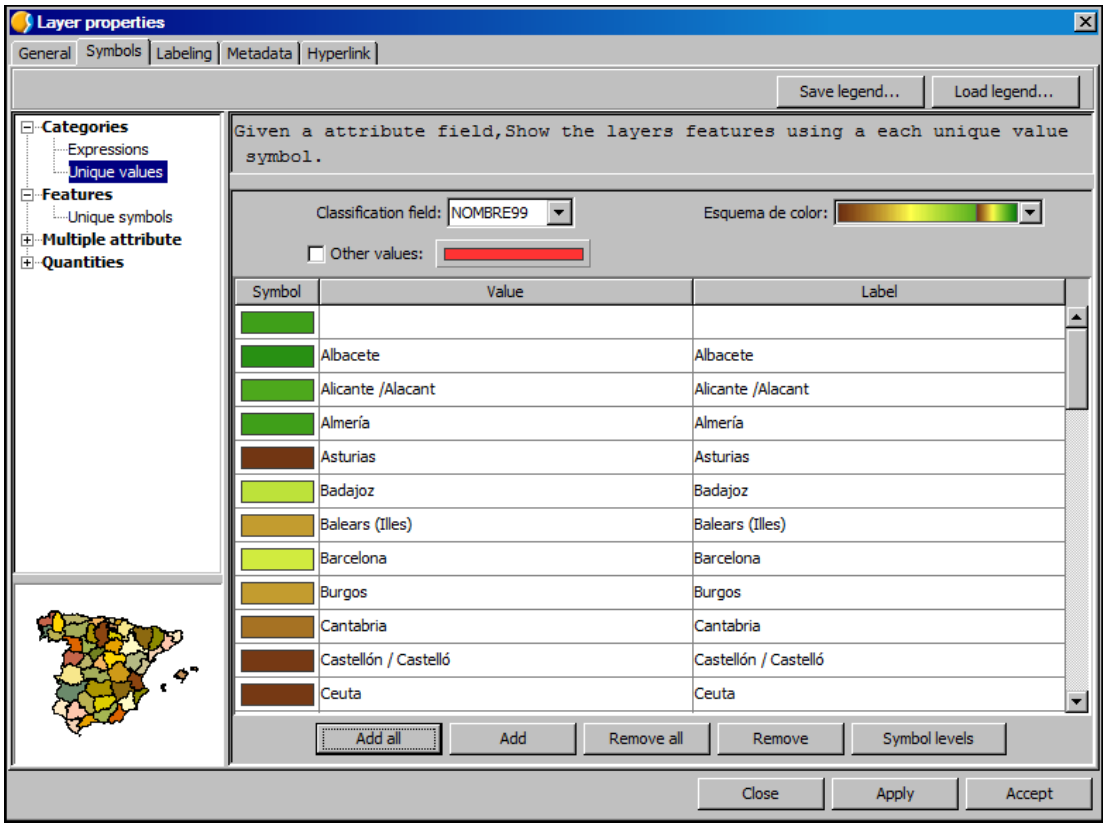
- We select Categories/Unique Values. This type of legend assigns a symbol for each unique value of the indicated attribute.



- Select the field you want to make the legend, in our case **NOMBRE99**, which contains the names of Spain's provinces. Select a Colour Scheme available in the drop-down menu Colour Scheme; some of them have a greater range of colours than others... try different Colour Schemes until you find the most appropriate one.

- To change the symbol, click on it. A new window will open, where you access the Symbol Library to change it. For example, in this case we could change the colour, transparency, turn off filled, change the border colour, thickness increase ...

- Also know that we can edit the labels, they have the values founded in the attribute table by default. These labels are then displayed in the TOC . For example, you can edit the " **Alicante / Alacant** " tab, leaving only the Castilian name **" Alicante"** .



• Once the legend has been configured, press apply button to confirm changes to the layer.

Trick: Symbols levels allow us to indicate that a symbol is displayed above others. It is very useful for elements such as roads where symbol for main roads needs to be displayed above secondary.

2.3. Our first labelling

There are two main ways of labelling in gvSIG: a basic one to label in a quick way and other advanced where we can configure setting options. The first block of exercise we will see contains basic labelling exercises.

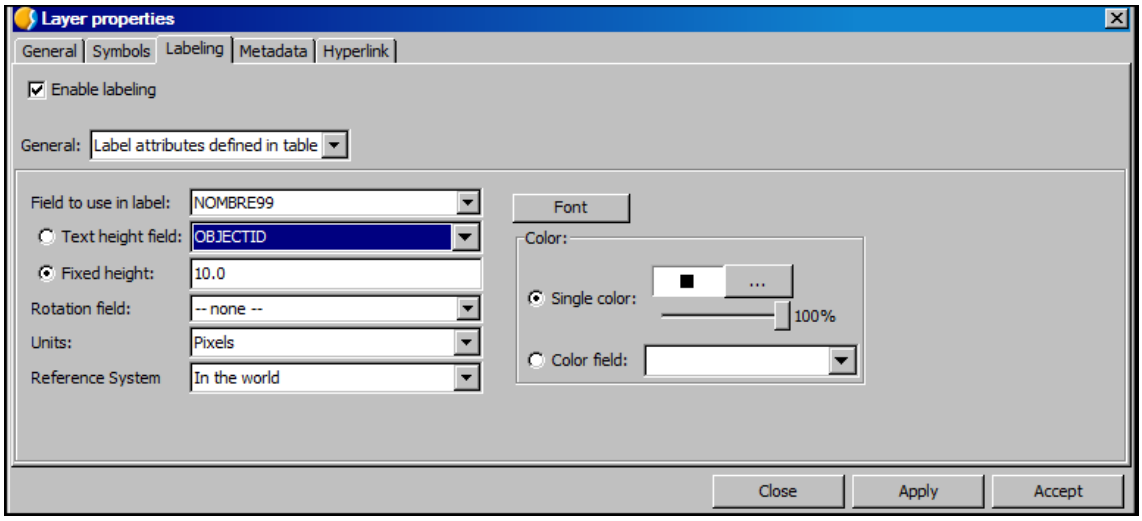
• Active **esp_provincias.shp** layer. Click the right button and select the Properties. Select Labelling tab.

•Firstly, We must check Enable Labelling box. Once labelling is defined, we just have to enable / disable this box to display or hide the label layer in Data View (this setting is saved and doesn't need to be set every time).

• Select the option Label Attributes defined in table.

• Select the Field to use in label, in our case **NOMBRE99** and a fixed height of **10**, leave remaining settings as default. It is important to realize that the pixel option in the world makes label will not scale as you zoom in or out on your map, that is, they stay the same size on the page regardless of the map scale.

- Click Apply and check the result automatically in Data View.



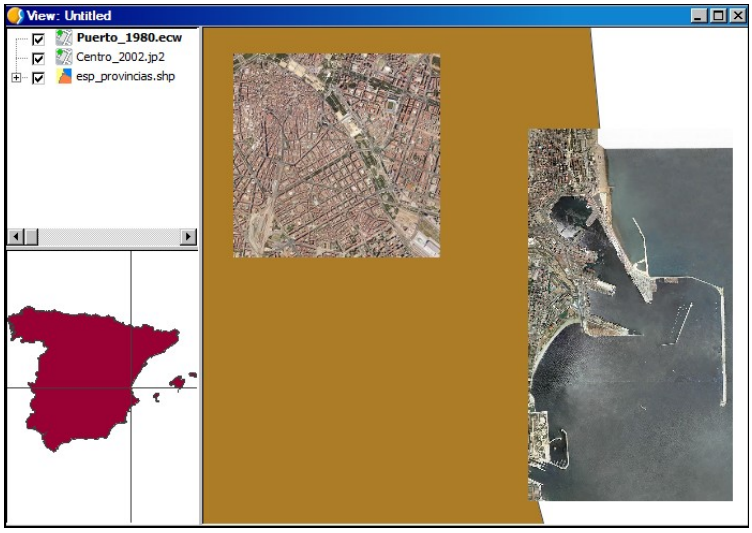
2.4. Frame Manager

The spatial bookmarks can be very useful to quickly identify a particular geographic location or workspace. In this exercise we will work with 2 different raster format (JPEG 200 and ECW) files.

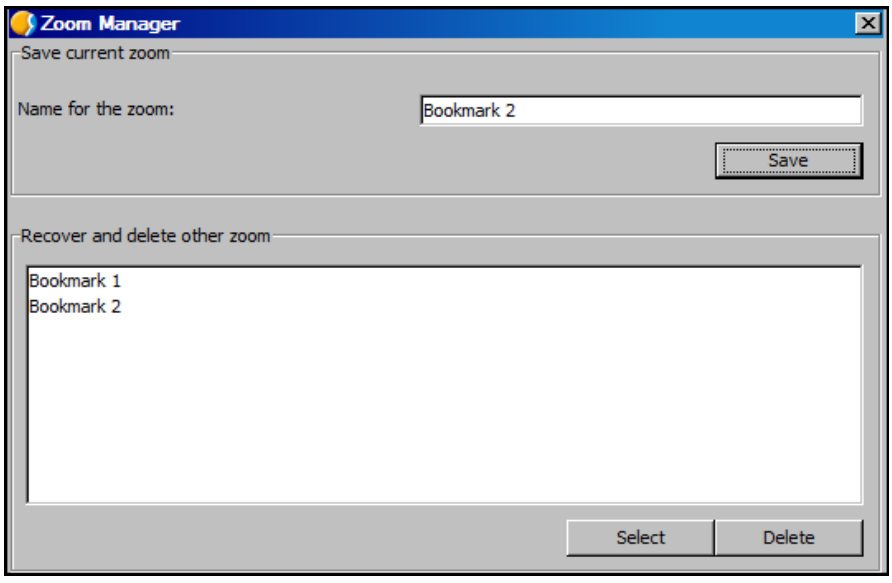
- We added 2 layers which are located in Valencia folder**: Centro_2002.jp2** and **Puerto_1980.ecw**

- To add the files we have to choose to tiled them or not. In this case, we choose "normally" way because there is no need to tiled.

- Once we have added the layers to the TOC, to quickly locate them, select both clicking on each one with shift key (Capital letters) pressed and click the right mouse button selecting Zoom to layer option.



- Now we can zoom in (zoom window, for example) to the centre of one of the images. Let us assume that this is an area or place we have identified to return to it at any time.
- It's time to use the Frame Manager by clicking the appropriate button. 
- On the window that opens up, we'll define an identification name for the bookmark, for example *Bookmark 1* and press Save.
- Now we select another area of the image and repeat the same process as before saving the bookmark as **Bookmark 2.**



- Now we can close the window and open it at any time selecting the name of the frame and press Select to navigate the selected area.

2.5. Locating by attributes

Although Locator by the attribute button  is a little-known tool, it is very useful to quickly navigate to the geographic elements with a specific attribute.

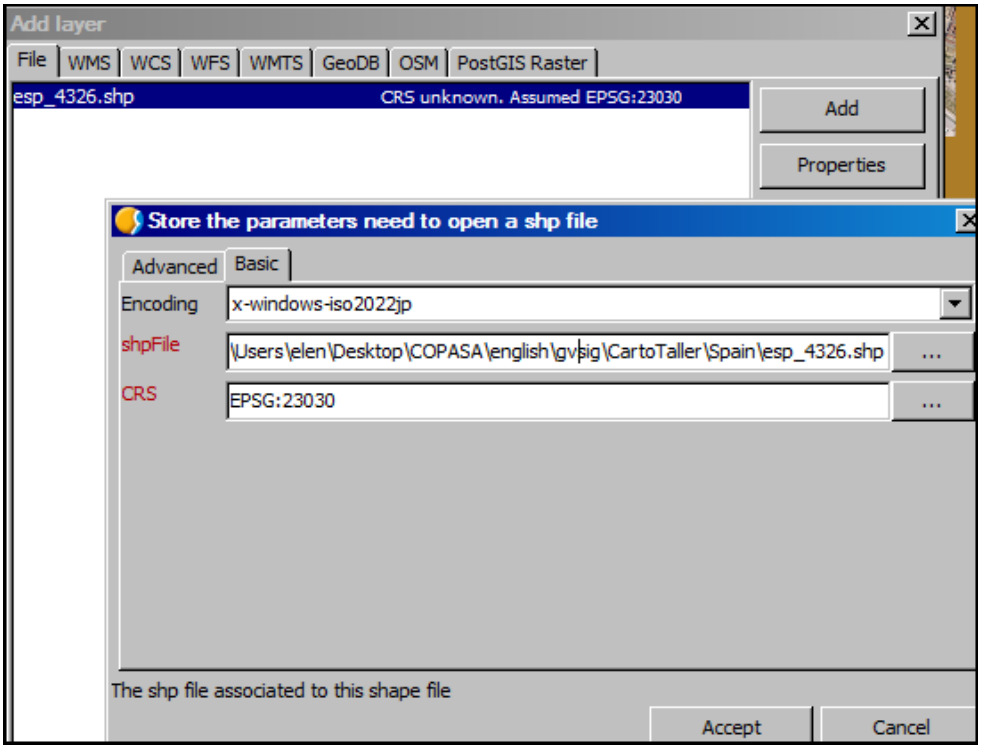
- Pressing Location by the attribute button a new window opens up where select Layer (**esp_provincias.shp**) and Search Field (**NOMBRE99**). In Value field will have a dropdown list with all the different field values indicated in the layer attribute table. We will select some of them and pressing Go to navigate to the area.

2.6. Reprojection

gvSIG allows us reproject layers on the fly (both, vector and raster layers). Each time you add a layer, except those containing CRS (Spatial Reference System) layer information, the message "Unknown CRS" appears. By default, is assumed EPSG: (CRS code Data View). When we add the layer we can change the EPSG (if it is different from the data view) and therefore reproject the layer .

- In the current data view (EPSG: 23030), we add the layer **Spain esp_4326** (**Spain** folder). This layer is in EPSG 4326.

- To change the EPSG, in the same Add layer window, click on the Properties button. A new window is opened containing 2 tabs, in the Basic tab you find the option CRS where you can indicate that our EPSG is 4326 .



- Once the right EPSG is selected, click on Accept in the Add layer window to correctly reproject the layer in the Data View.

2.7. Create a user CRS

There are situations in which we want to use a CRS not available in the gvSIG databases projections.Take, for example, INEGI of Mexico CRS.

There is no available projection in the EPSG database of gvSIG for INEGI cartography published at national level on its website. (it uses a variation of " Lambert Conformal Conic " projection). As a result, a new user-defined CRS may be needed to be created to loaded and viewed correctly these layers in gvSIG 2.1.

- As we have done in the first exercise, we create a new data view from the Project Manager ,select the newly data view and click on the Properties button. In the Properties dialog box click on "... " button from the current projection .

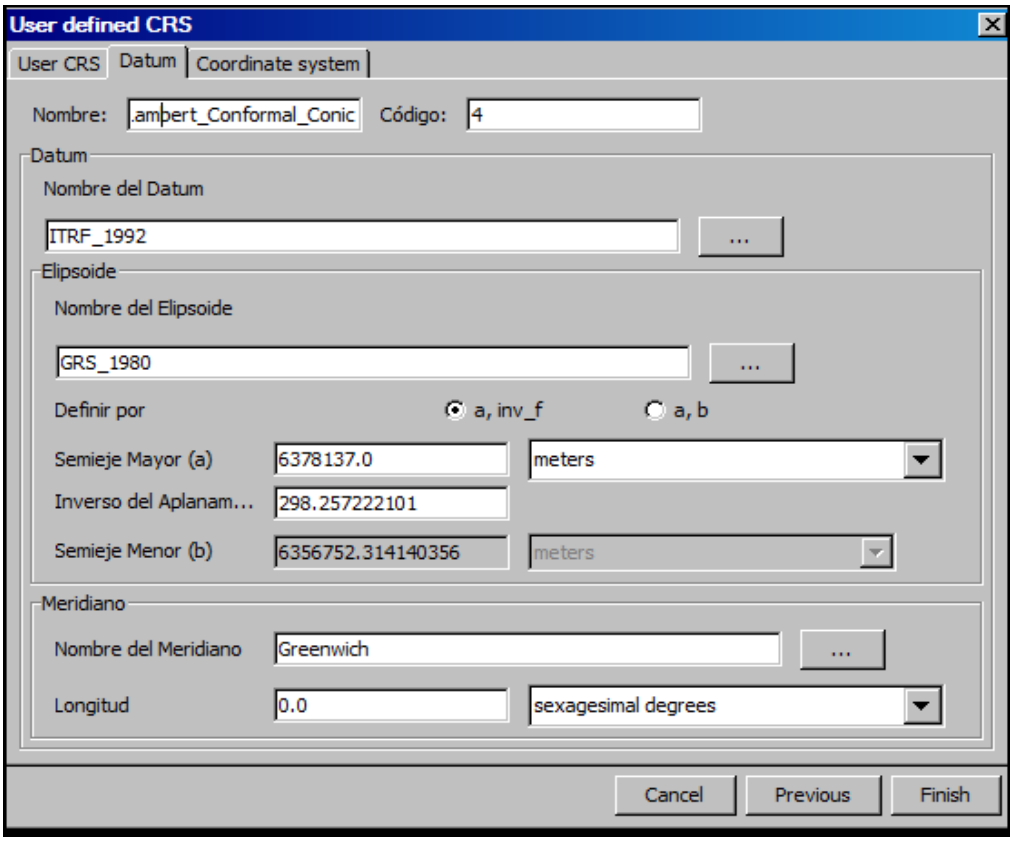
- In the new dialog box (New CRS) select user CRS in the Type option and click on the New button.

- A new window will be displayed which allow us to define de user CRS. Select "From a WKT" string and copy this string of characters (with Control+V) in the box:

PROJCS["North_America_Lambert_Conformal_Conic",GEOGCS["GCS_ITRF_1992",DATUM["ITRF_1992",SPHEROID["GRS_1980",6378137.0,298.257222101]],PRIMEM["Greenwich",0.0],UNIT["Degree",0.0174532925199433]],PROJECTION["Lambert_Conformal_Conic_2SP"],PARAMETER["False_Easting",2500000.0],PARAMETER["False_Northing",0.0],PARAMETER["Central_Meridian",-102.0],PARAMETER["Standard_Parallel_1",17.5],PARAMETER["Standard_Parallel_2",29.5],PARAMETER["Latitude_Of_Origin",12.0],UNIT["Meter",1.0]]

• We click the Next button. We have automatically filled in all the details CRS .

• Click on Next. The CRS data is automatically transferred to all the fields.



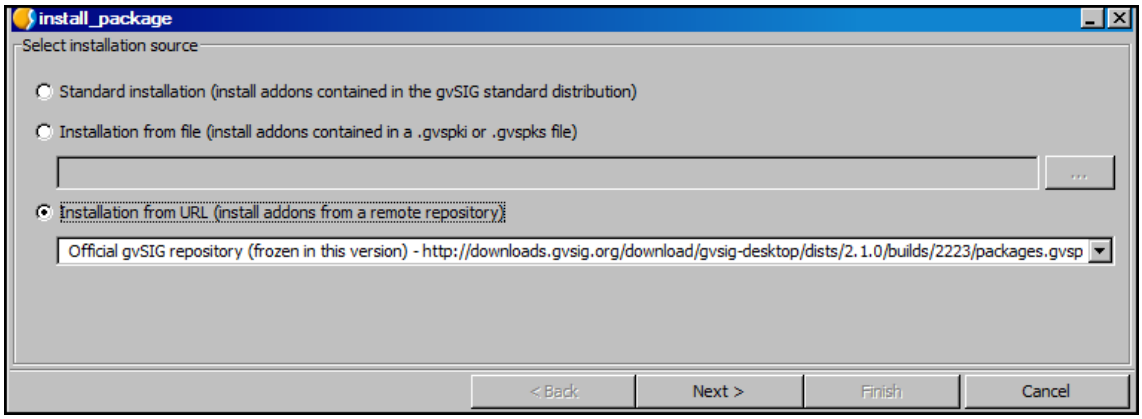
• Click on the Finish button. Back to the previous window New CRS, select the new CRS and click on OK. Also, in Data View Properties click on "OK".
Finally, we have the right projection for the data view and we can add INEGI layers. The urban geostatistics cartography can be downloaded from this website: http://www.inegi.org.mx/geo/contenidos/urbana/

3 SIMBOLOGY AND LABELLING IMPROVEMENTS

3.1 Add libraries from the Plugin Manager

One of the main innovations of gvSIG 2.1 is the opportunity to download new plugins) to add new functionalities or updates to existing plugins in a transparent and user-friendly way. To do this, click on Tools Menu/Install package. New functionalities plugin can be added easily, in addition, other plugins such as symbol libraries can be added. In the next exercise, we are going to add two symbol libraries from gvSIG official server.

- Make sure that you are connected to the internet and then choose Tools menu/Install package. The next window is displayed:

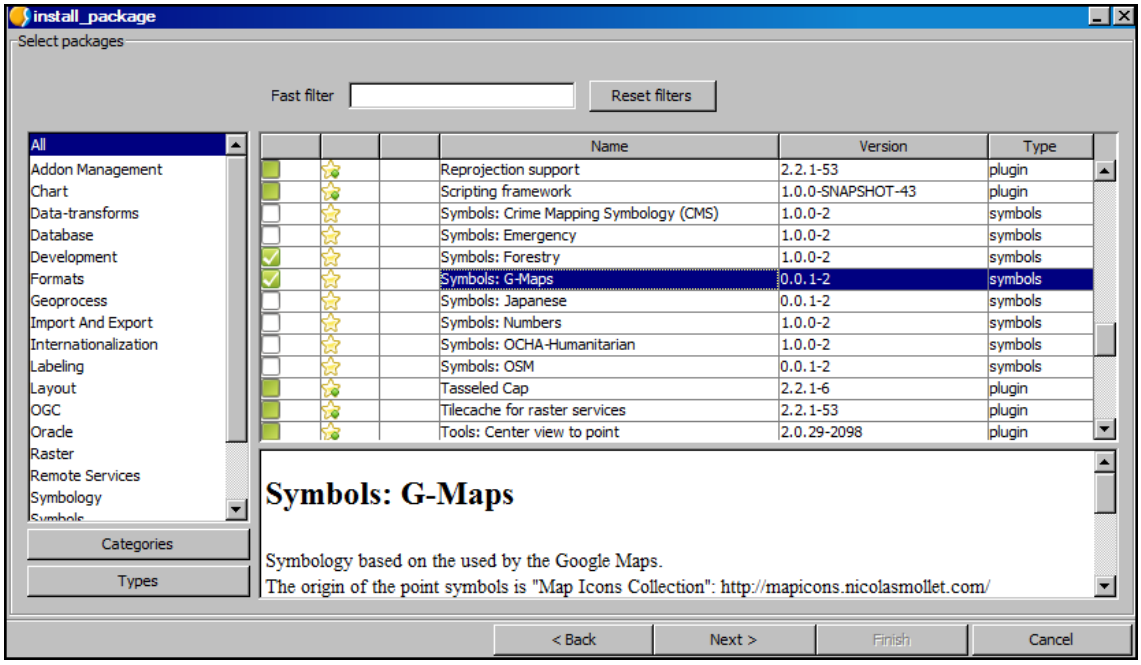


- There are three options to choose from:
  - The first of them – standard installation- displays available packages in gvSIG installer (not all of them are installed by default in the standard distribution of gvSIG) .
  - The second - Install from file- allow us to install all available packages or extensions from a file (this can be useful if there is not internet connection and we have previously downloaded the extension or , as we shall see , upload a package symbology (or functionality) we have created before and it isn't necessarily available on a server.

- The third –install from URL- is the most widely used option (internet connection required). In this case we connect to gvSIG repository and we have access to all available extensions. Select this option and click Next.

- A new window displaying all available packages. To the left we have a list of categories. This enable us to filter plugins to display. Select Symbols to only display symbol libraries

- Select 2 of the available options: Forestry and G- Maps,(containing forestry symbols and symbology based on the used by the Google Maps).



- Click on Next and click on the Start downloading button. We shall see how the files will begin to download. Click on Next for installing after downloading them. After the download process is complete click on the Finish button

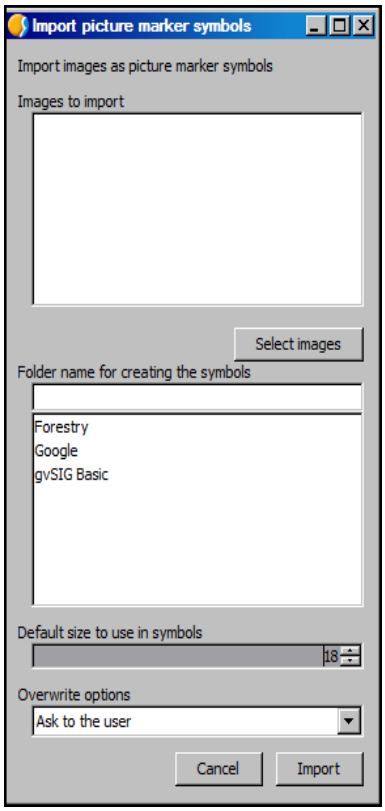
Trick: Close the warning message window by clicking OK. Although the window indicates to reset gvSIG , this is not the case. Just reset it if we install a new functionality.

- It is easy to check the symbols correct installation without the need to generate the legend of a layer. We access the menu Tools / Symbols / Symbol browser access a library of symbols browser, where we can review the type of symbol (point, line and filling) we just have installed.

3.2. Creating our own libraries

Now let's see another innovation in gvSIG 2.1, the point symbols importer. Let's see how easily to create our own symbol libraries.

- We access the menu Tools / Symbols / Import image as picture marker symbols to open the symbols importer.



First of all, we will generate a symbols library relating to health (Let's imagine we are managing the hospital grounds with gvSIG). Click on Select images and navigate to the Symbol / Medical folder. Select all symbols (the quickest way is press Control + A).Once selected, click on the Select the images button.

Trick: Notice that each symbol in this folder have another symbol with same name but ending in "_SEL". In this way, we tell gvSIG to use a different symbol when the item is selected. In our case it is the same icon but with yellow background instead of white.

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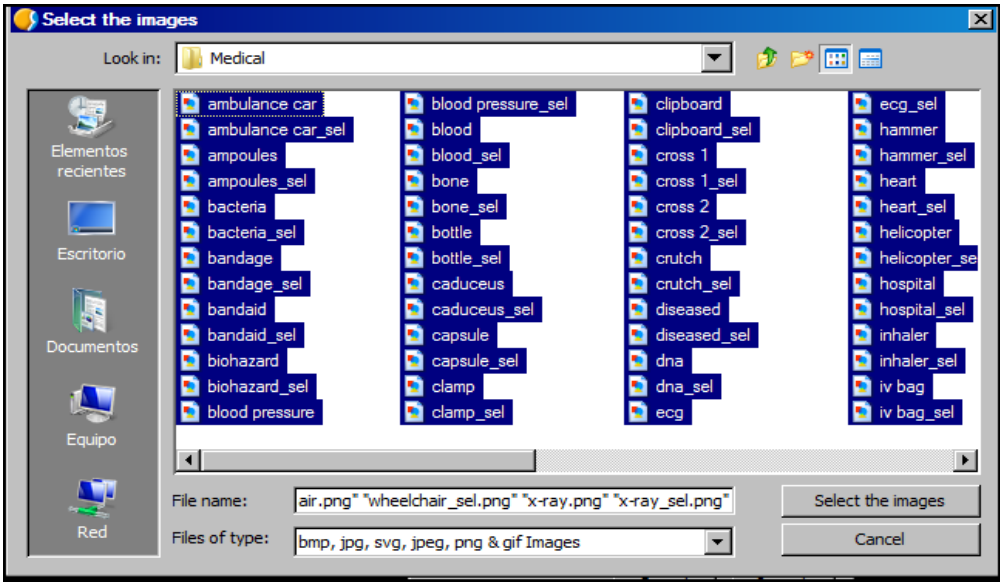
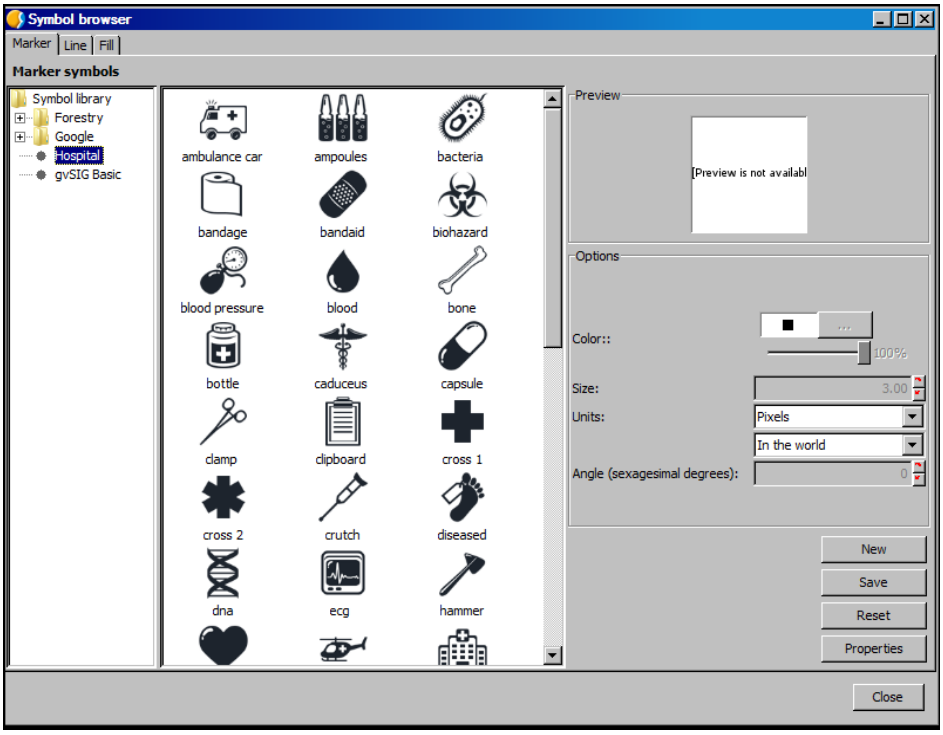


- All the images have been added. Now we must indicate the folder name in which place the symbols, in our case it will be named **Hospital** and default size to use for new symbols will be **24**. Click on the Import button to automatically generate the new symbol library.

- If we go to the symbol browser we can check these symbols are already available.



We do the same as before with the symbols in the **Pol Maki** folder. These symbols are very appropriate to mark points of interest in urban areas. In this case, "`**Pol**" will be the name of the library and a size of **18**.

- Lastly, we will create a symbol library structured with subfolders. To do so, we will use a few standard weather symbols, grouped by **Cloud** and **Pressure** folders.

- Follow the same process as before to import symbols, fist of all navigate to the **Symbol / Weather / Cloud** folder and select the folder where the symbols are saved, in our case, **Weather / Nubosidad**. Therefore, the first step is to create the library, the second one is to create a subfolder within it. The size is 24.

- We do the same as before, in this case navigate to **Weather / Pressure**, adding available images on **Symbol / Weather / Pressure.**

- If we go to symbols browser we can check there is a library with two subfolders.

- Finally, we could generate a package to share and installed using the Plugin Manager. It seems as easy as going to Tools / Symbols / Create package menu, select the library to package , fill in metadata (not mandatory) and lastly , indicate where to save the file. Check out the link below for helpful information:

http://blog.gvsig.org/2013/05/03/gvsig-2-0-how-to-create-symbol-libraries-ii/

3.3. Legends

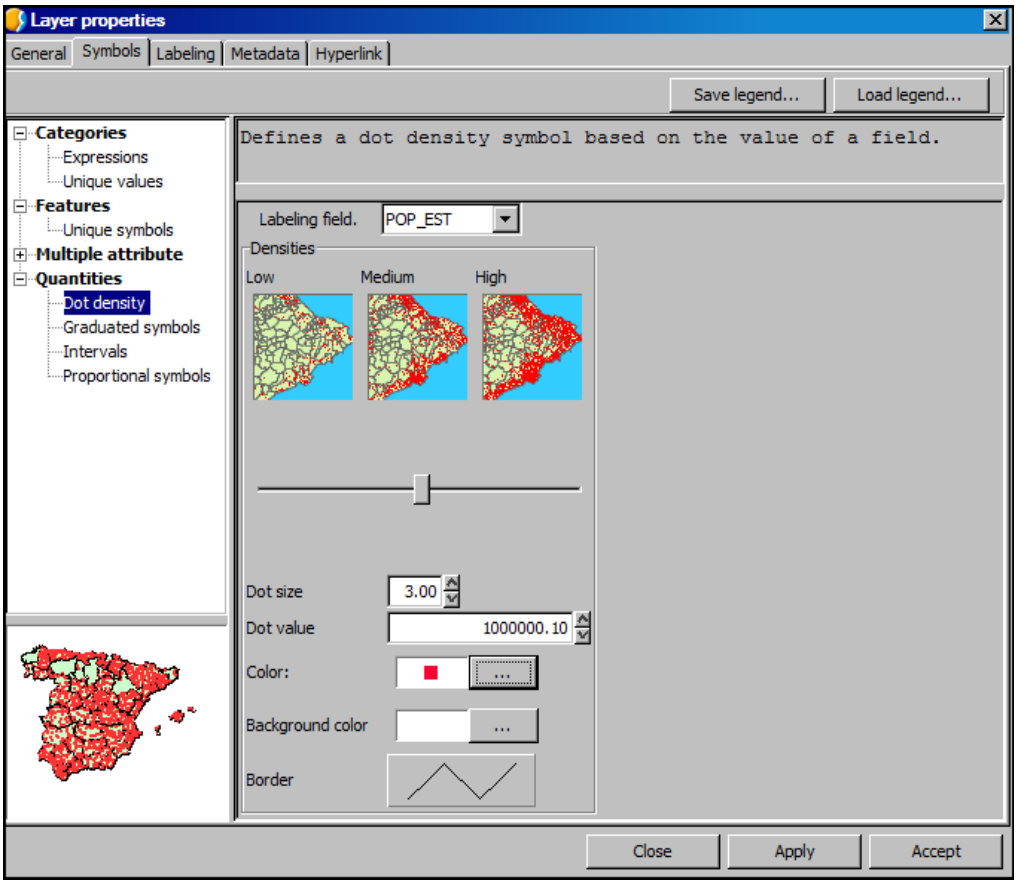
Let us now the same attribute with different types of legends. All the available legends from older versions have been migrated, adding new legends and improving existing ones.

• Create a new Data View without modify the default EPSG: 4326. Add the layer **ne_10m_admin_0_countries.shp (NaturalEarth** folder).

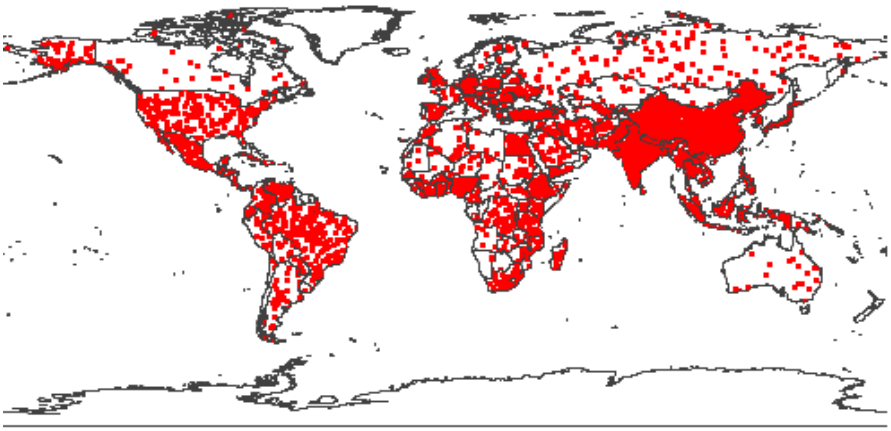
• As seen above, layer properties are available through the context menu on right mouse click. On Symbols tab of layer properties we find different types of legends to use.

• First, we will create a legend of Quantities / Dot density These legends would enable us to see the amount of a specific attribute according to the density of points represented in each geographic feature. For the labelling field use **POP_EST** provides the estimated population. The dot size will be **3** and the dot value considering that we are working with the population of the

countries, leave in **1,000,000** (draw a point per million inhabitants). The point colour can be red, what is most visible, leaving the background colour on white.

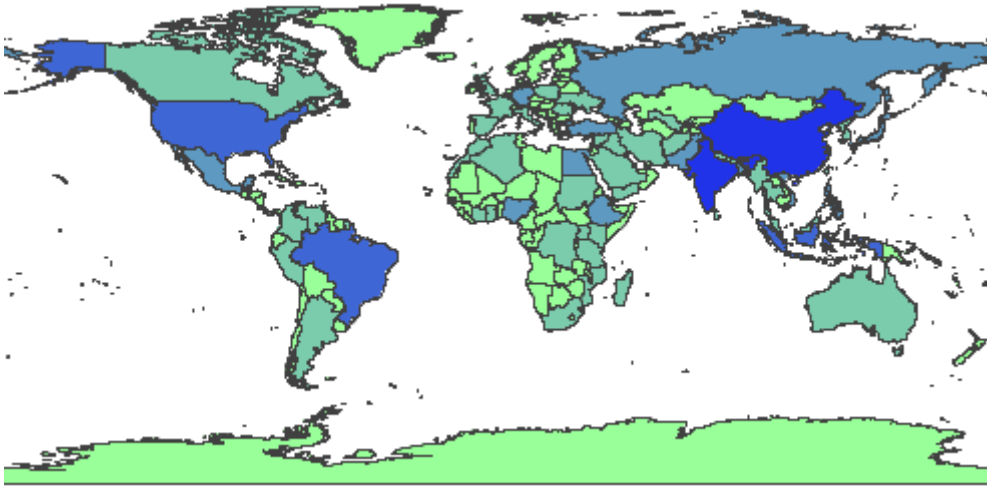


- The result is a map like that one shown on the picture:

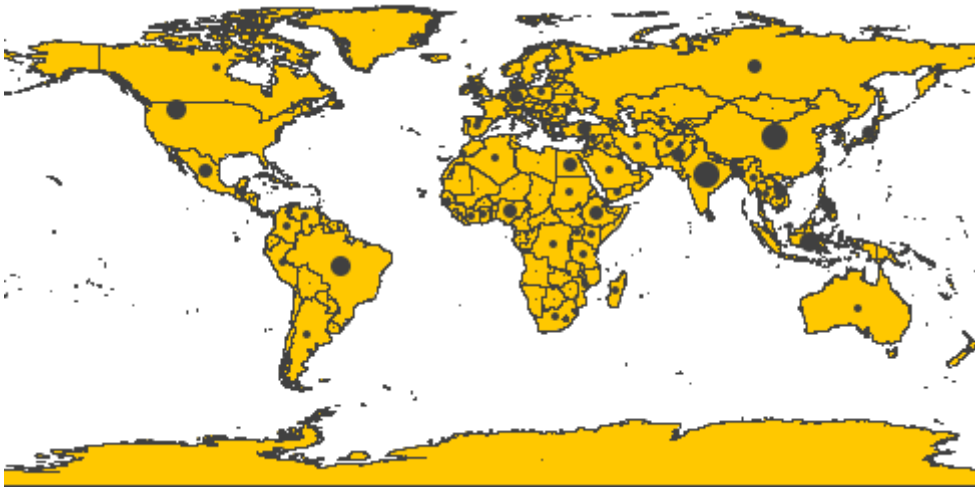


We will use the same labelling field **POP_EST** to create an intervals legend. Leave the default values of interval types (Natural intervals) and the Intervals Number (5) as they are and change the Begin Colour red to light green. Click Compute Intervals button and gvSIG generates them automatically (intervals can be edited to round them off).Press Apply to see the changes in our data view.

- The results have indeed changed. The firs legend reflects the population density highlighting the most populous countries. It is possible to see the difference by looking at countries like Russia.

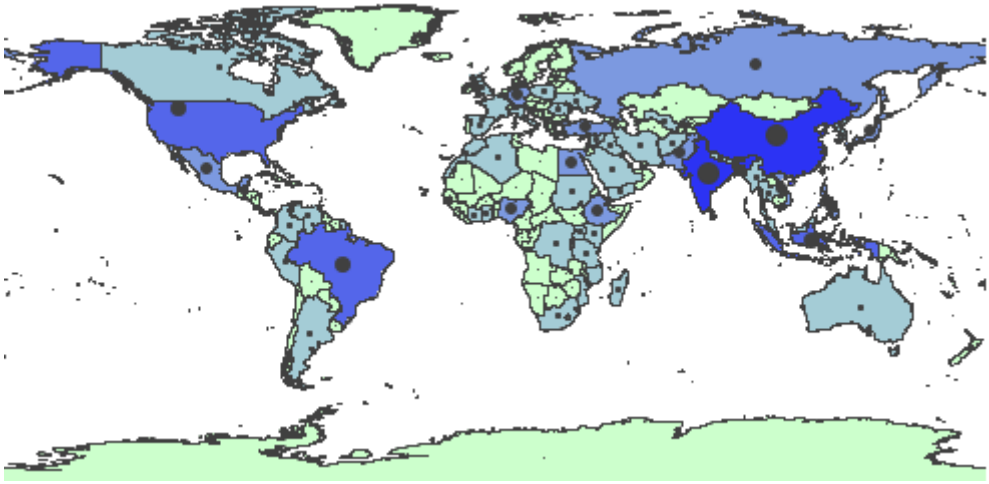


- Now let's see how to make a Graduated symbols legend. Once selected, use the labelling field **POP_EST** , Interval type: Natural Intervals, Interval Numbers: 5 and size symbol from 1to17 . Press Calculate Intervals button and we will have our new legend ready to Apply.

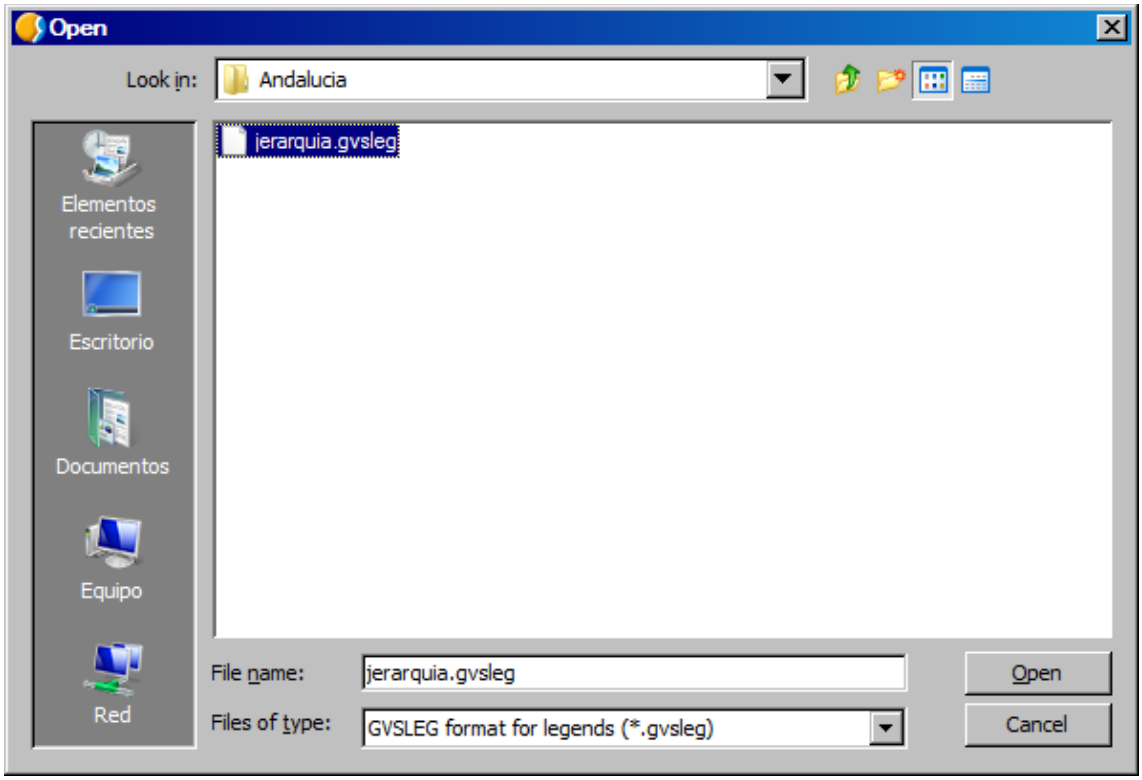


- Lastly, we will see how to make a Multiple attribute legend, more specifically, a Quantity by category legend. We often use these types of legends to represent more than one attribute in a single legend. On the one hand, we make an intervals legend (by colours) and on the other hand a graduated symbols legend. In our case, we will use population field in any case. Therefore, select **POP_EST** in both fields: Colour and Symbol .field

- Now we define each of the legends. Select **POP_EST** as classification field in colours ramp field and use 5 intervals. In Symbols field used the same intervals. Once both legends are defined, click the Apply button to see a combination of both in the same layer.



- Finally we will see how to retrieve and save a legend has already been created, whether in gvSIG legend format or SLD (styled layer descriptor) standard. To do this, we create a new data view from the Project Manager, in **EPSG: 23030** and add layer **hidro_andalucia.shp** from **Andalucia** folder. Now we go to the Symbols tab and click on Load legend, select file type: **GVSLEG** format and navigate to the file **jerarquia.gvsleg,** available in **Andalucia folder**

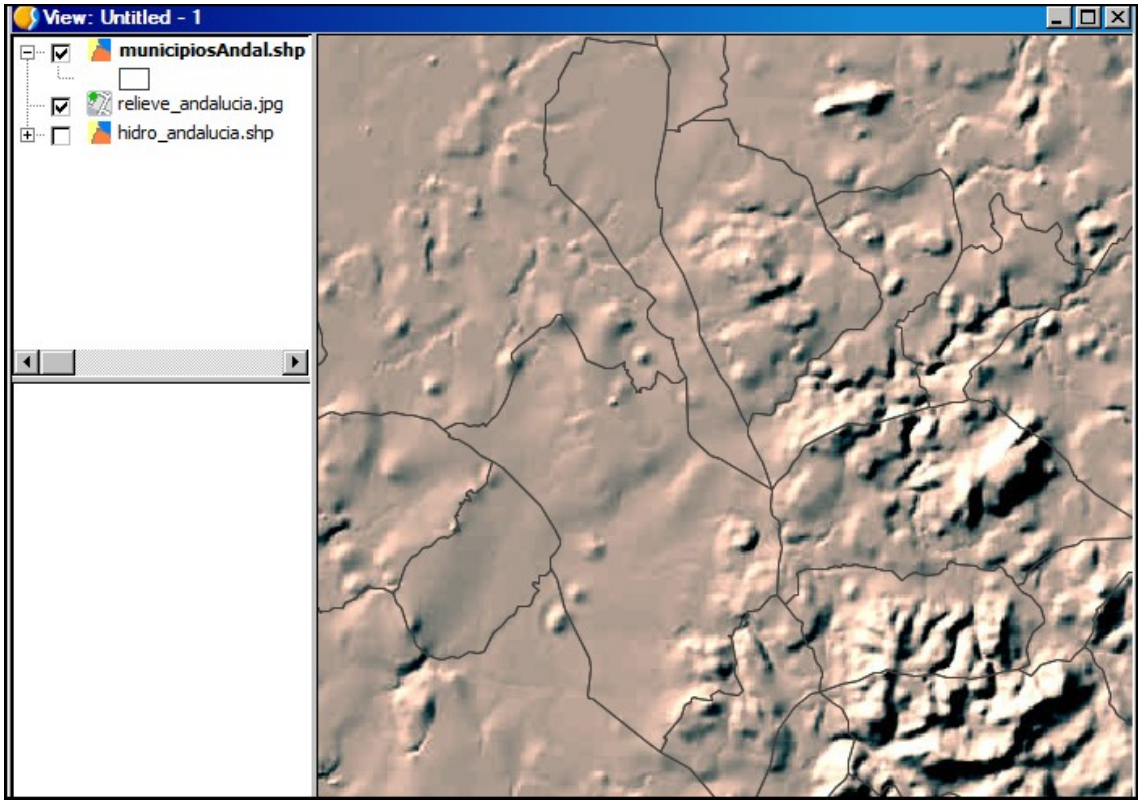


- Now, we do the reverse procedure. Click Save Legend button to have legend in SLD format. Once we have saved it, we can change our legend layer and check we can load it.

3.4. Advanced Labelling

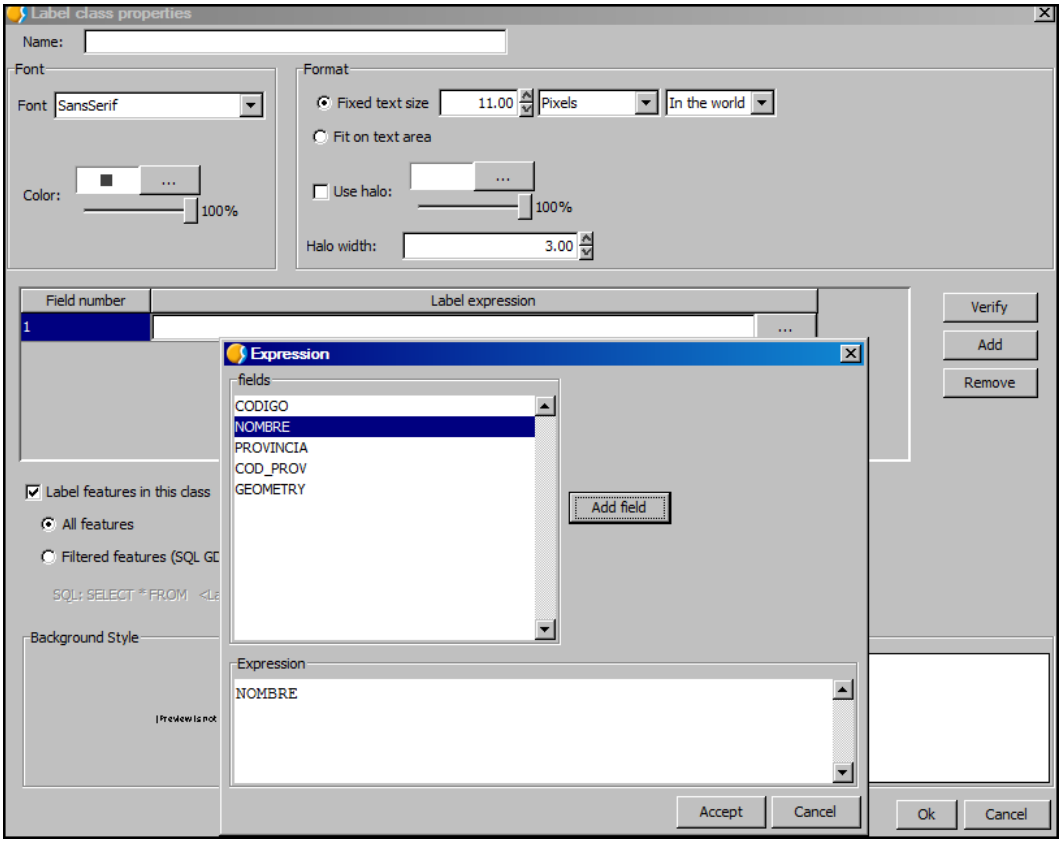
In this exercise, we will review some options for advanced labeling in gvSIG.

- We return to the previous view to make **hidro_andalucia.shp** layer invisible and add 2 new layers: **municipiosAndal.shp** and **relieve_andalucia.jpg** . We remove the fill colour of the municipal boundaries layer to make sure we can see the relief of the terrain. Click on Zoom Window in order to see several municipalities , as shown in the picture below:

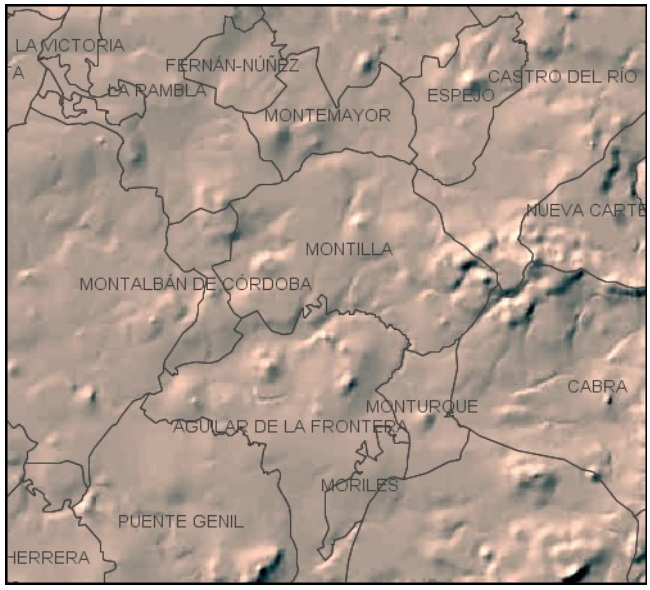


- Select **municipiosAndal.shp,** click the right button and select the Properties. Select Labelling tab. Check the option enable labelling and select user-defined labels in the General drop-down menu. From the available Methods, select Label features in the same way

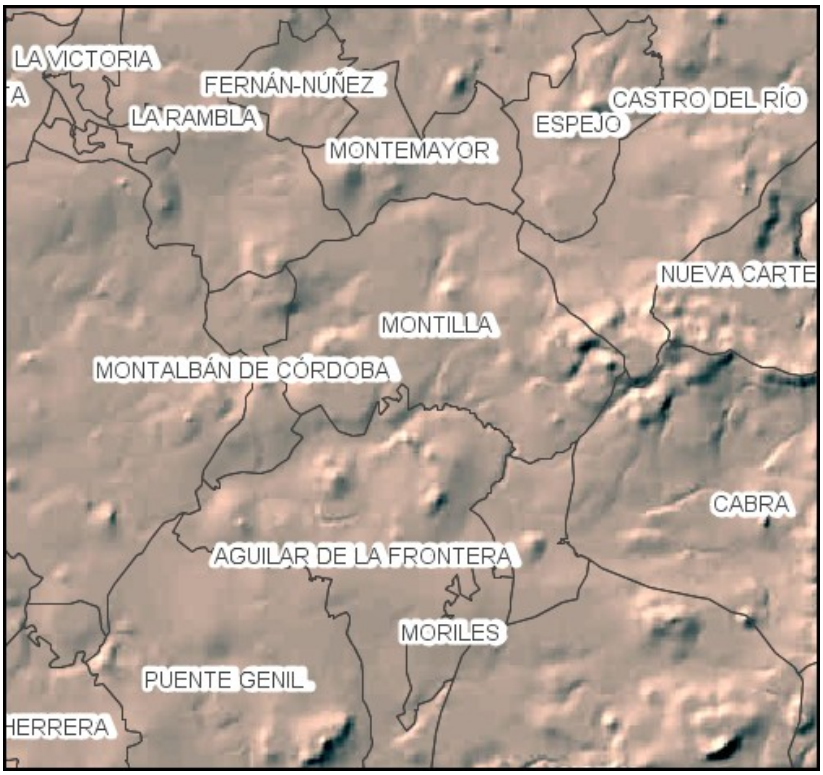
- Click on Properties button to open a dialog box where you can define the properties of the labelling class to apply. We leave almost all options by default; only change the fixed text size to **11**. Click on " ... " in Label Expression field to open a new window and in the new window with field **NOMBRE** selected, we click in *add field.* We have already completed our definition of labelling. Now, we just need to click on the Apply button and see the result.



- The label text doesn't display properly in the resulting map because the terrain label is below it.



- Now, we will apply the halo to solve the problem, another novelty in the gvSIG 2.1 version. Go to Labelling Properties window and tick the Use Halo check box. Leave the halo width by default (3) and colour (default is white).



- Another option is to use a background style, in properties. We have to select one and they are available in gvSIG Basic library. In properties, we indicate what position the label will occupy. We can check it, but the result is better with the halo

- When you click in *placement, we can use new characteristics in the label, like the orientation: always horizontal or always straight. In polygonal features* are routinely used to always horizontal, but usually better than linear text follow the direction of the line. We also have other interesting choices as fit inside polygon. It is recommended to try different options and check the changes.

- These options can change depending on the type of layer. We can see with the layer **hidro_andalucia** or **puertos_andalucia** (it is a punctual feature).

4 REMOTE SERVICES

4.1. We had this…

When we add a layer in gvSIG we can access to different data sources: files, Spatial databases, PostGIS raster and including the various OGC data access services. In previous versions of gvSIG, WMS, WFS and WCS services were available. Now we will see the new acces to remoting information. They are standard (WMTS) and OpenStreetMap´s tiles services.

4.2. WMTS

Users who regularly access WMS layers are well aware that the response time, every time we change the frame or scaling, is not negligible. If we load several WMS layers, this response time is multiplied many times. The support of WMTS (Web Map Tile Service) minimizes this problem.

WMTS service in an OGC standard that it aims is to solve the problems just mentioned when we are using tiles in a WMS service. The tiles are portions of image that provides the server and stored on your hard disk, leaving from the time available to the application, which will not need to reconnect to the server in the future to charge an area we have already previously displayed, where the charging rate increases.

- We create a new view and use EPSG:4326. Click button Add layer y click in WMTS tab. We see all the default services that they are stored in gvSIG and we connect.

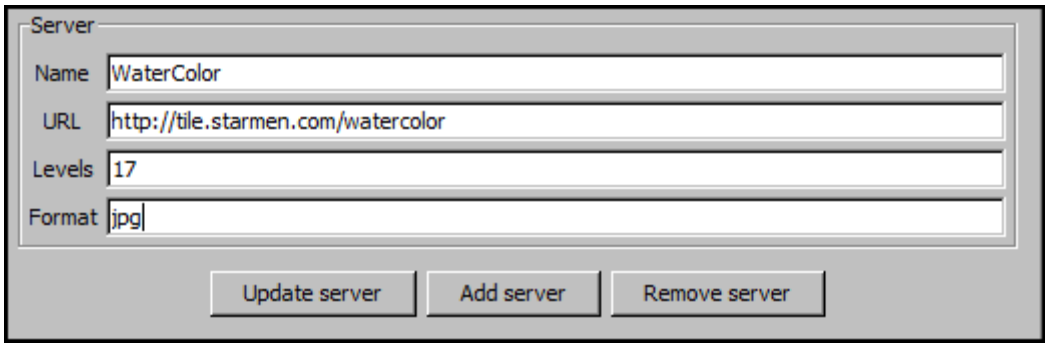
  http://maps.opengeo.org/geowebcache/service/wmts

- When we click in Connect. After several seconds, we will see the button Next is active because of the service is connected. Click and select the layer what we want to load. We indicate the first one (**bluemarble**) and click Add. In Styles tab there are not different options and in Formats tab we select **image/png** and CRS **4326.** Click OK.

4.3. OSM

In gvSIG 2.1 we can find in add layer, the possibility to access to OpenStreetMap server. There are four default configured servers with the layers: Map Quest, Map Quest Open Aerial, Open cycle Map y Mapnik. In the same interface add layer you can add new servers.

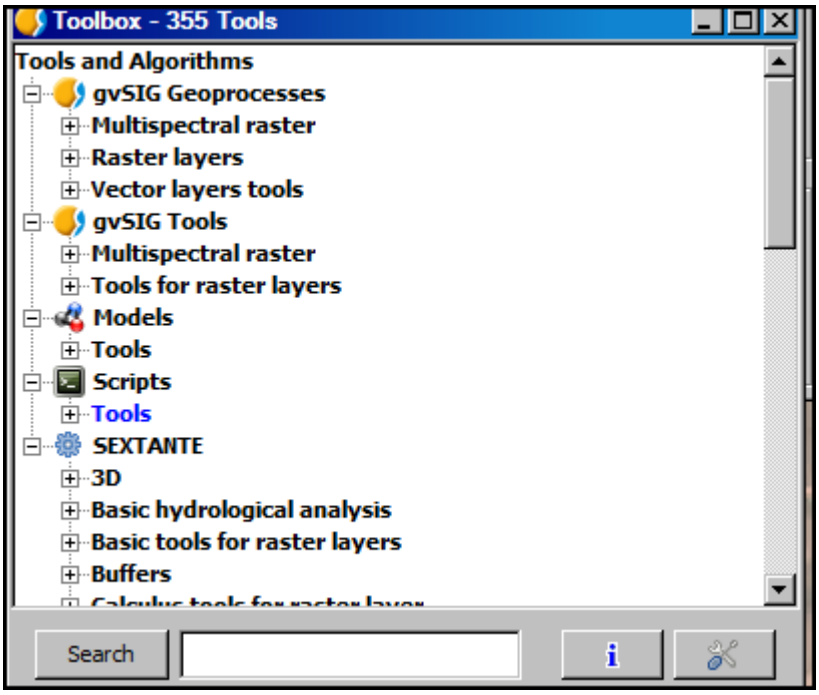
- We create a new view and the CRS is **3857-WGS84/Pseudo-Mercator** [note: OpenStreetMap´s CRS doesn´t exist in EPSG data base of gvSIG 2.1. so we added this CRS like a user CRS.
- Add layer, we select OSM tab and the server what we want to access, for example **Map Quest**, and click OK. OSM Layer will be loaded in our view.
- If you want to try adding a new OSM service, we can put the follow dates and click Add server



5 GEOPROCESSING

Another novelty of gvSIG 2.1 is the union of all geoprocesses in a single framework, called "Toolbox". We access to geoprocesses pressing the Toolbox button .

In Tools/Geoprocessing /Toolbox we access to all related functions, like modeler, history…



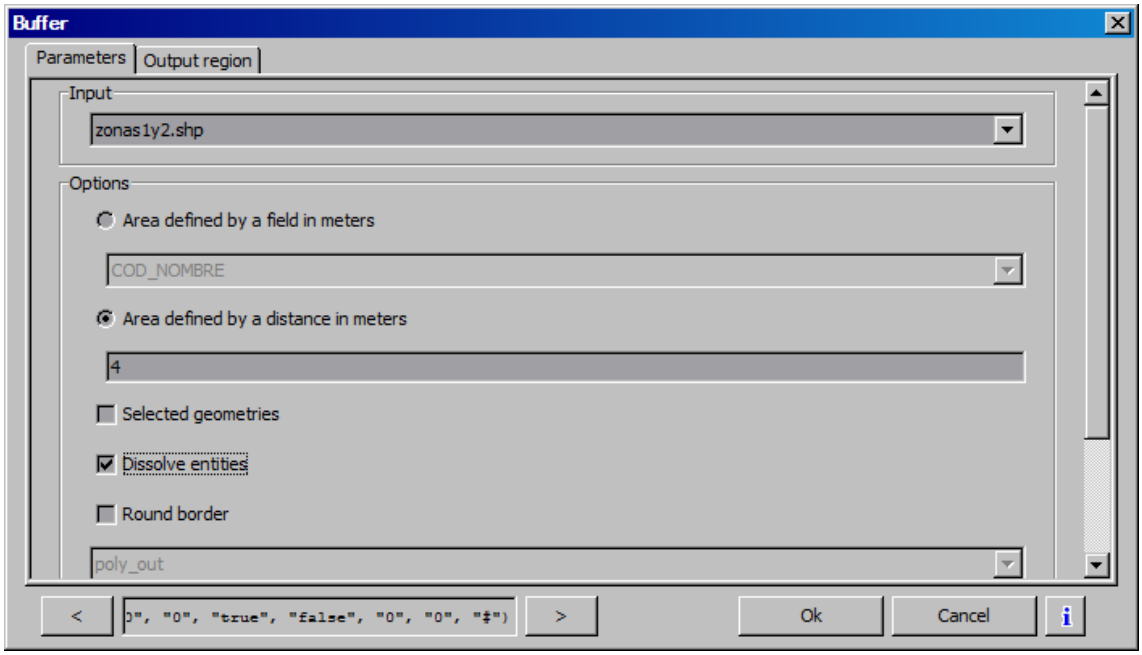
The different geoprocesses are directly searched in Geoprocces tree or with the searcher that is included in the toolbox

5.1. Working with vectorial geoprocesses

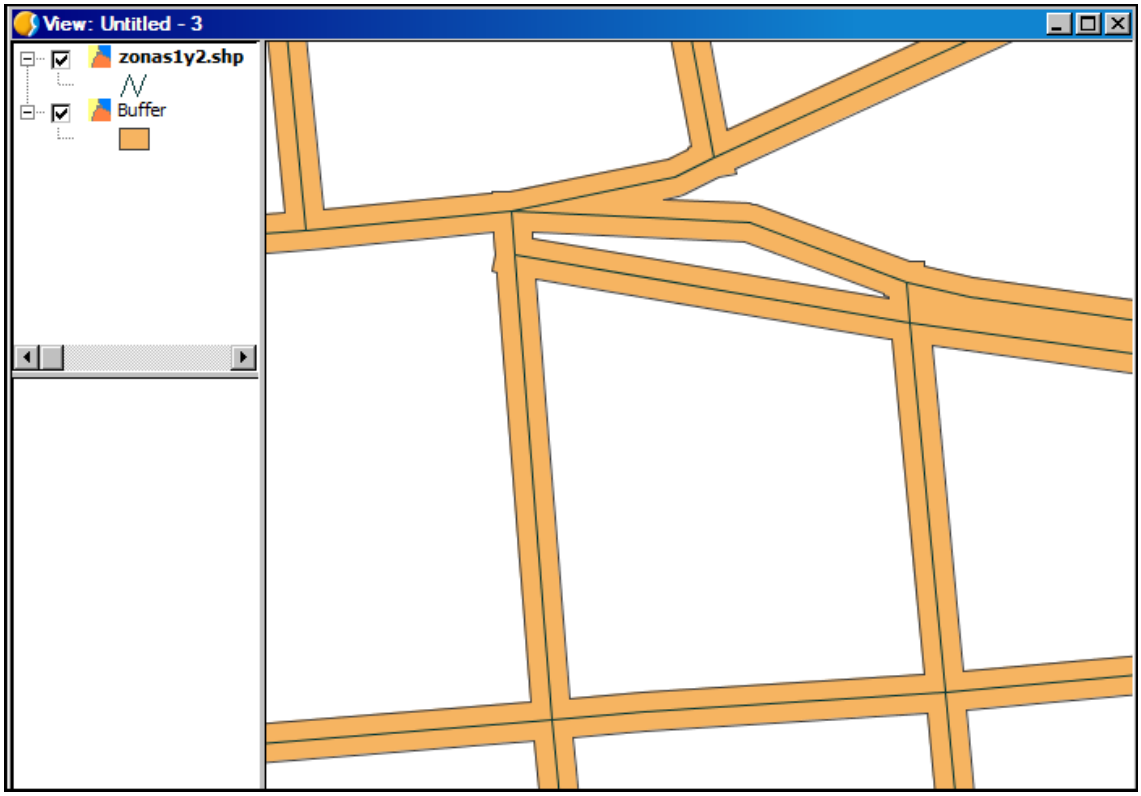
We want to see a vectorial geoprocess and we are going to do an exercise with the aim to have a layer with block of houses in an area of Montevideo.

- We create a new view, with **EPSG:31996**
- We add **zonas1y2.shp** layer. This file is located in **Uruguay** folder
- Open toolbox and use Buffer. To run a geoprocess click twice in the button or with the right button in the mouse and option Run.

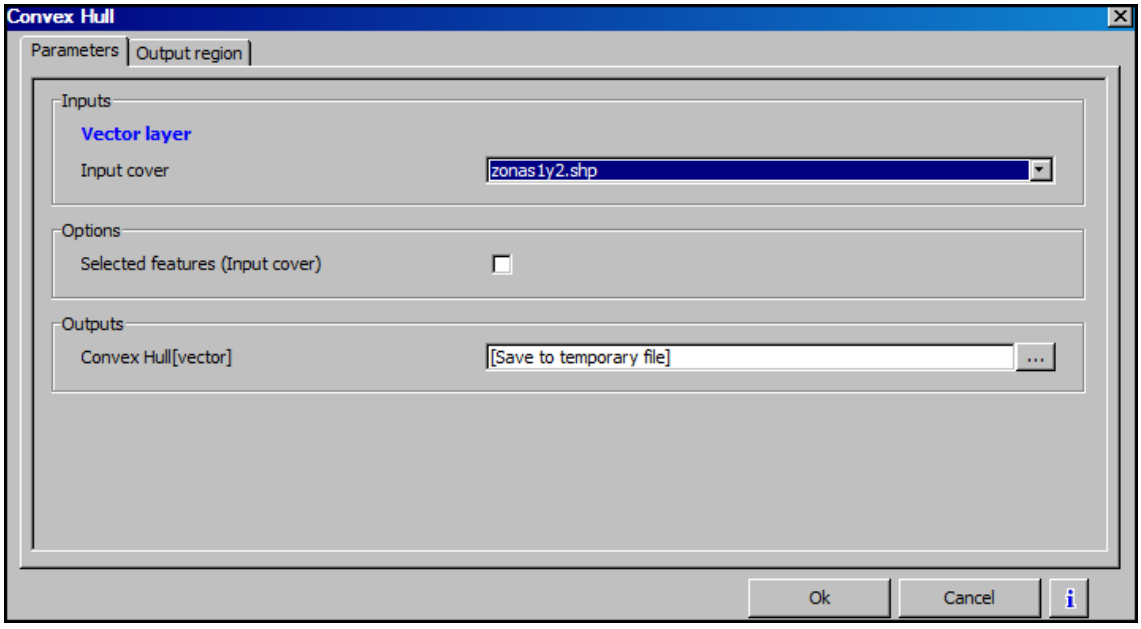
- Input layer will be **zonas1y2.shp** with value=4 in buffer defined by a distance in meters. This means that for a four meters buffer the area of the buffer will be 8. Mark “Dissolve entities” because we want one polygon.



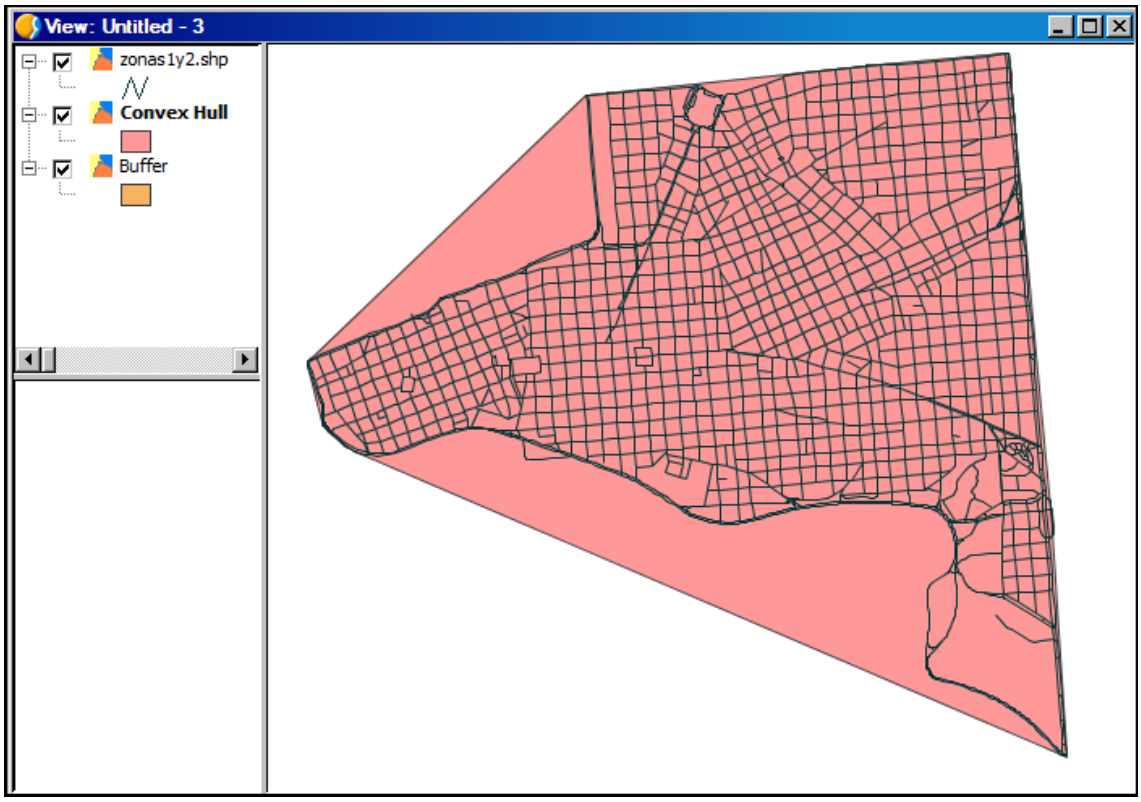
- Zoom and we see the result



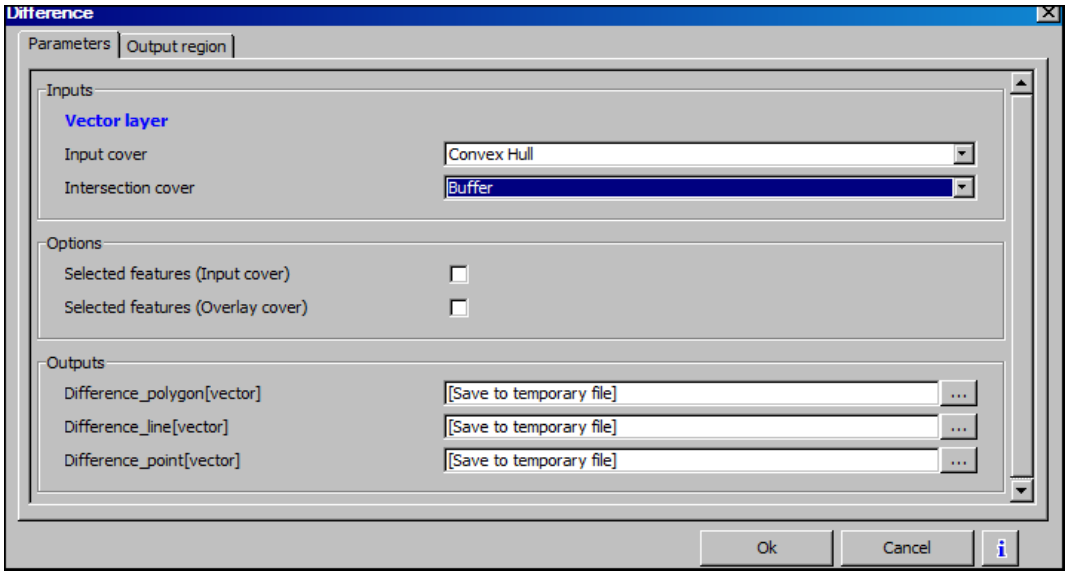
- Run convex hull, with this process we want to obtain a polygon that includes all features in the **layer zonas1y2.shp**. We only indicate the layer.



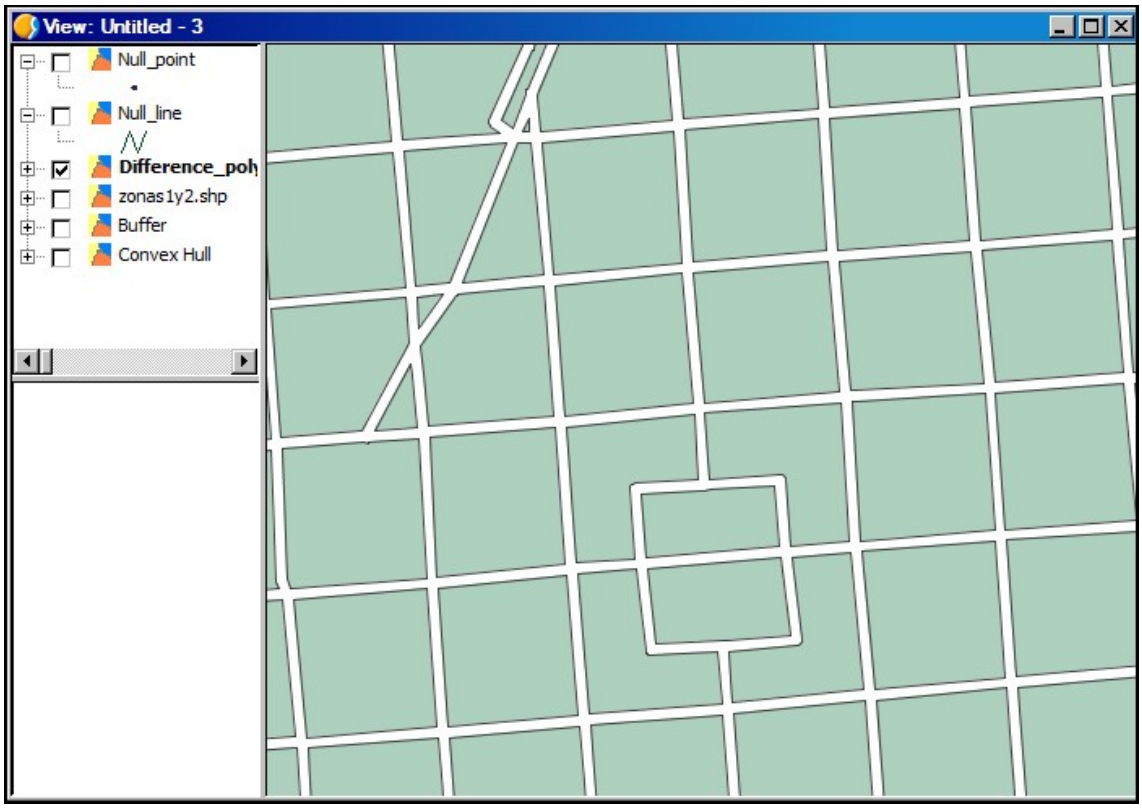
- The result will be similar to this one:



- We have two layers and now we can run the geoprocess. To get the opposite to the clip area, run *Difference.* Input layer is convex hull result and clip cover is buffer result



- Now we have three layers, but we are only interested in polygon one. We can delete the rest. If we zoom to layer we will see the result



- Note: when we run a geoprocess, we have two options: we can save the output layer or we can use a temporary layer.

5.2. Digital terrain model.

We are going to do some geoprocess more oriented to work with raster data and specifically with DTM (Digital Terrain Models). It is interesting to note that this type of geoprocessing can serve to make terrain maps or any other maps, for example environmental pollution.

For this first exercise we use a curved level (vector layer) to generate our DTM.

- Create a new View, with user CRS with it chain WKT (which can be found in the **Yacare.txt** file). Paste the WKT:

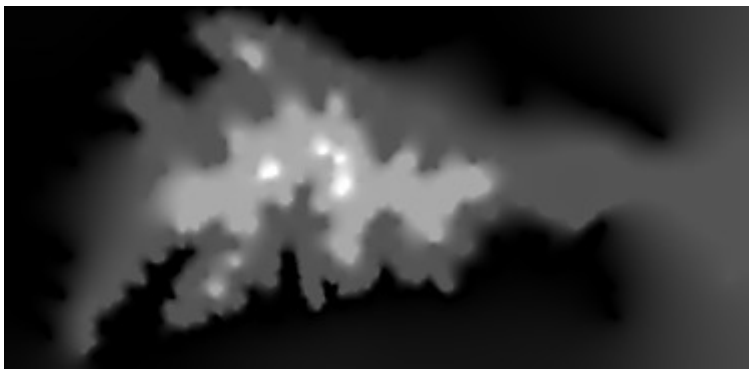
PROJCS["ROU_USAMS",GEOGCS["GCS_Yacare",DATUM["D_Yacare",SPHEROID["International_1924",6378388.0,297.0]],PRIMEM["Greenwich",0.0],UNIT["Degree",0.0174532925199433]],PROJECTION["Transverse_Mercator"],PARAMETER["False_Easting",500000.0],PARAMETER["False_Northing",10002288.299],PARAMETER["Central_Meridian",-55.80],PARAMETER["Scale_Factor",1.0],PARAMETER["Latitude_Of_Origin",-0],UNIT["Meter",1.0]]

- Add **alalti_trozo.shp**, this layer is contained in **DTM** folder. We can open your table (right click on the layer and select the “Attribute Table“ option) and verify that it contains a field named COTA.

- The first step will be rasterized the layer. If we use the searcher on the tool box, when you put "**rasterize**" we can see that the result is "Rasterize vector layer". We run it. The vector layer will be **alalti_trozo.shp**, the field will be COTA. We must be careful to check the details of region of analysis tab. In our case we'll select “use extent from layer“, selecting the **alalti_trozo.shp**, and the cell size we will fix at 15. As a result we obtain the raster layer contours.

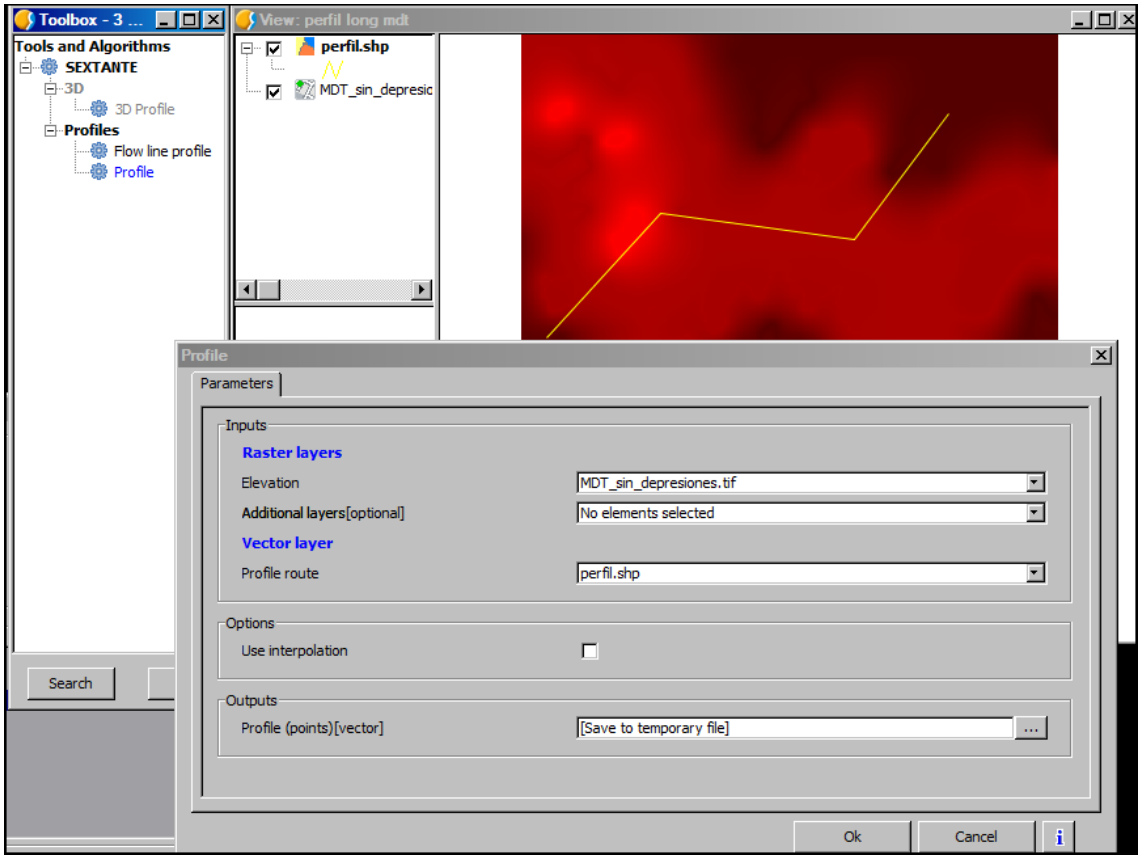
- Our next step is to fill the cells that don´t have data COTA; there are 2 methods, one method is neighborhood. It is not the most appropriate in this case, so we use the second method " fill cells without data." We run to generate the DTM interpolation. The input layer will be the last you created (the raster, a TIF). The voltage threshold is 0.5

- The result is:

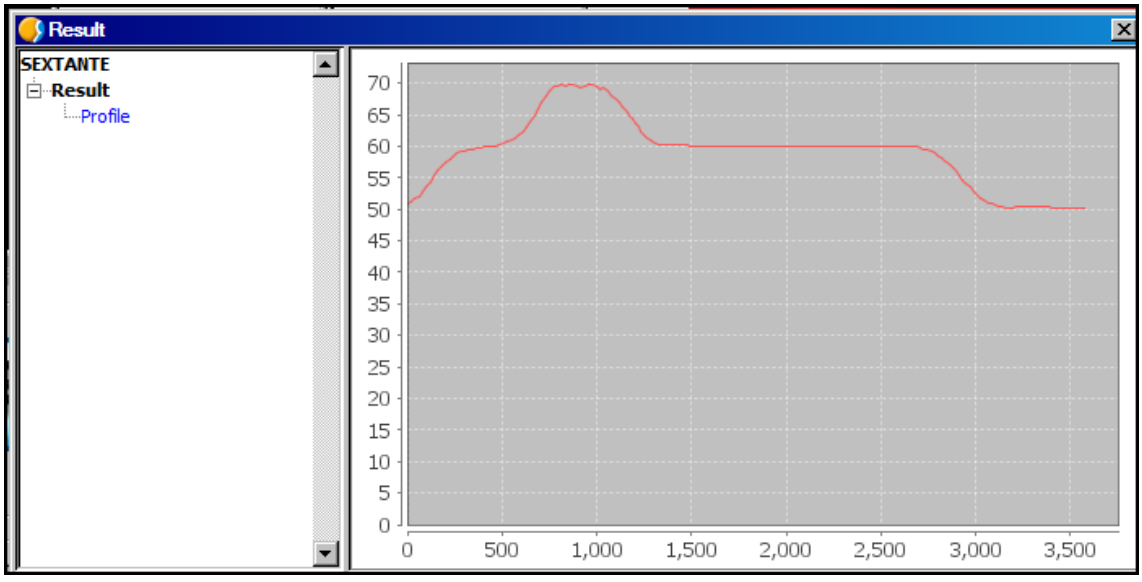


- We do another exercise to see the result of applying a cross section in a DTM. We create a new view with **EPSG: 23030** and add the layers **perfil.shp** and **MDT_sin_depresiones.tif**, both in **MDT** folder.

- Run the geoprocess Profile, selecting as MDE the layer **MDT_sin_depresiones.tif**. and **perfil.shp** as Profile route.



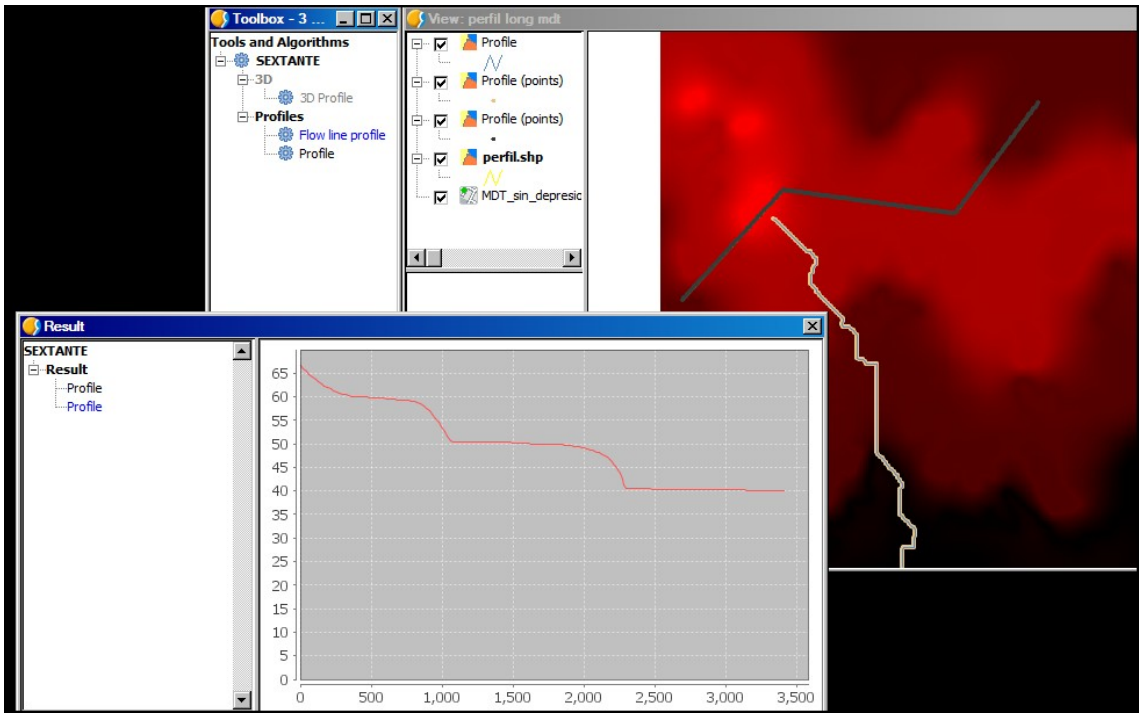
- The result is:



- This cross section we can save like an image (click on Outputs/ Profile with right button and save option). Click on the draw of the cross section if you can acces to the options for editing.

- Finally, on the same DTM we run “Perfil segun linea de flujo“. They want an origin point of the flow line. We put this coordinates to this point: 480733/6204952

- We will obtain the cross section and a new layer that represents the flow line:

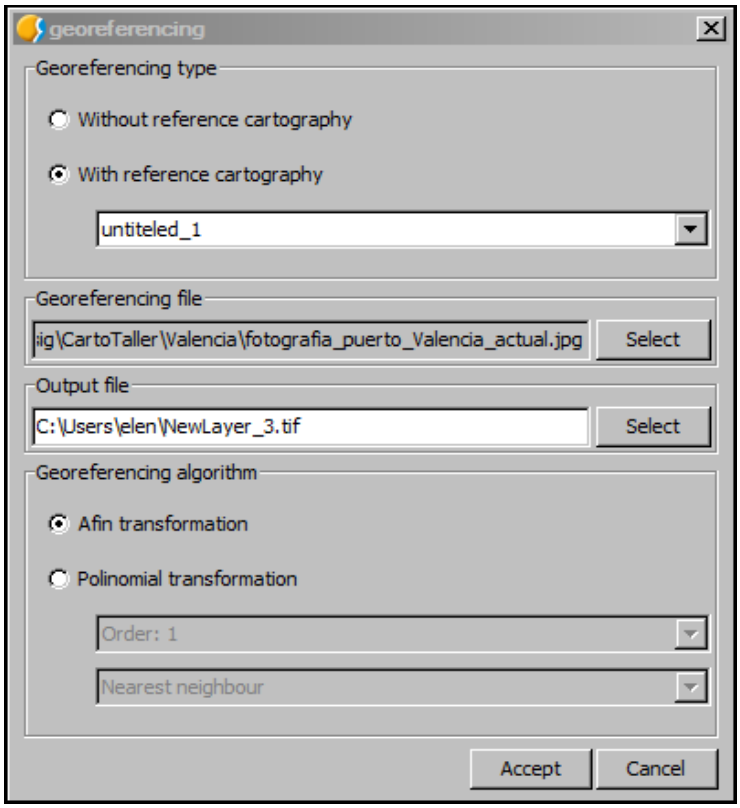


6 WORK WITH RASTER DATA

In gvSIG 2.1 we find a lot of raster tools (filters, tasseled cap, projection,).Now, we are going to do some exercises to see how we can use this kind of data.

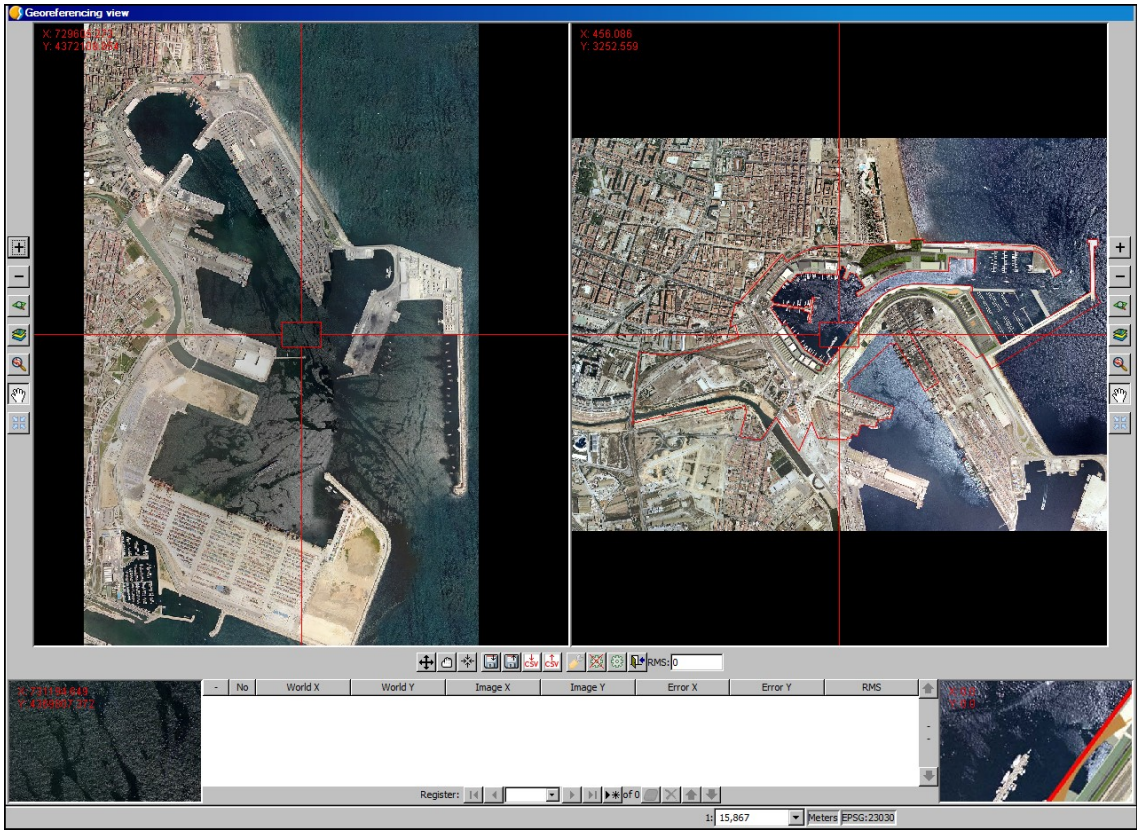
6.1. Georeferencing

- We create a new view with **EPSG:23030**
- We add **Puerto_2002.ecw** layer. This is the georeferenced image that we will use as reference cartography.
-  Raster buttons are 2 displayed bars. The first one displays a toolbox in the second one. We select “Geographic transformations“ in the first one and “Georeferencing“ in the second one
- A new window is opened. In this one we indicate reference view and the image that we want to georeference. This image is **fotografia_puerto_Valencia_actual.jpg** and you can find it in **Valencia** folder. We indicate in which folder we want to save this layer and the type of the transformation. We will use afin transformation.



- In polynomial transformation. You choose a minimum number of control points depending of the grade of the polynomial. You can calculate the number of this kind of points with this formula [(order + 1) * (order + 2) / 2], for example for a polynomial of second grade we need six points. If we select Afin, this is the afin transformation calculated from these control points, is assigned to flight in the visualization and the output file. The result is a gorreferencied file, without resampling of the radiometric values

- We accept and work environment opens up.



- This configuration has 2 views; in the left one we have the reference image with real coordinates, in the right one we have the image to georeference. Its coordinates are in pixels. Both images have navigation and zoon tools. We have zoom, where we can see the continent of each view, and control points panel where each point is a new line. They show us information about transformation mistakes; we can save the control points, too.

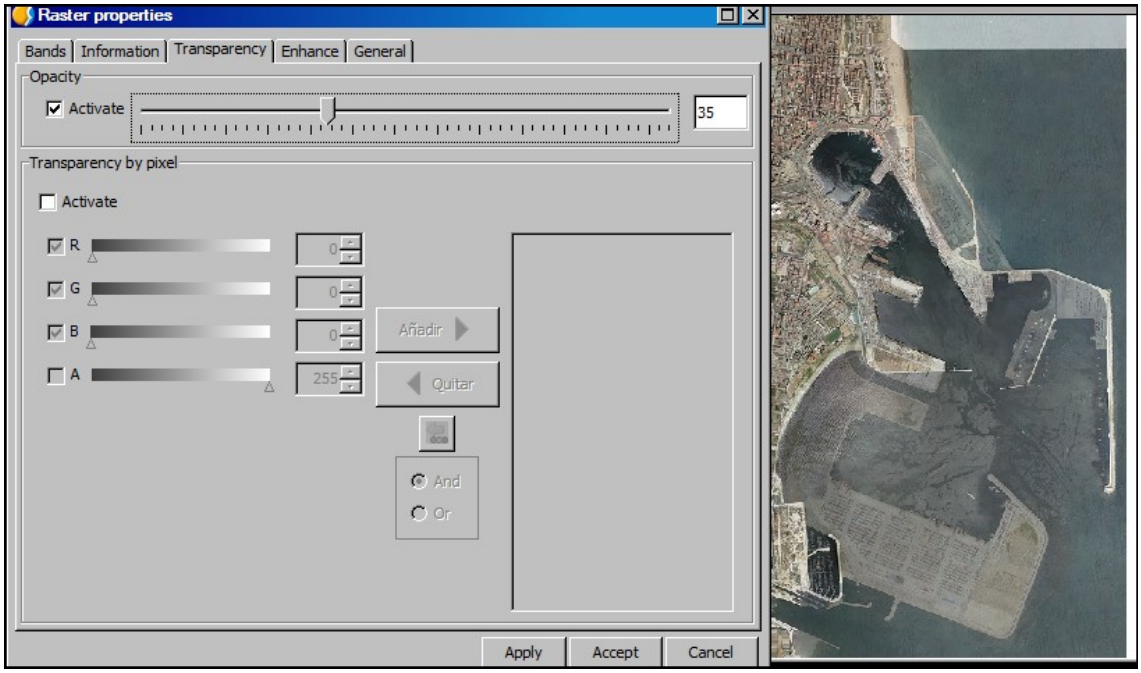
- To create a new control point, we must click in “New“ . A new line will be added in the table. This point links homologous coordinates in both images. We identify the zones in both views. Click in the image to georeference and it

homologous one in the georeferencing image. We can use zoom to search for the most interesting zone. We can move a point in this view.

- It is recommended don't follow a straight line with the control points and distribute them over the surface
- Once you have defined the points with an acceptable level of error in order to check the georeferenciation, we use "Test georeferencing" , and we load the image with the transformation applied in the reference cartograpfy view.
- Now, we save the table in the hard disk in a *.csv file, with the tool "Export table of points into a text file", that we can open for example, with a spreadsheet file.
- If the test is ok, we click about "End test", in this case the provisory layer disappear in the TOC. We click in "Exit to georeferencing" . We click yes, save an load the view
- We get the following result:

6.2. Opacity

- We add **puerto_2002.ecw** and **Puerto_1980.ecw** with EPSG:23030, where the 1st one is up in the TOC
- In the layer **Puerto_2002.ecw**, click right button and click in “raster properties“.
- Click in “transparency“ tab and we activate “opacity“. The value will be **35**
- Click in “Apply“ and we see how the opacity is aplicated on the layer **Puerto_2002**. So, we can see the evolution of the port from 1980 until now.



6.3. Clipping, save view to georeferenced raster, save as and export view

Inside of the buttons of raster, we have “export to raster“  , with this button we can export raster data in different ways. We comment and try some ones:

- Clipping: We apply a georeferenced clip to our currently view. There are several ways to delimit the clip area. One of this is that you can do it if you draw the clipping area window.

- Save view to georeferenced raster: with this step we can save the current view to a georeferenced image. When you run this option we have to draw the area which we want to save to georeferenced raster.

- Save as: we can change the format image

- Export view to image: in this case gvsig saves the view like a print screen. It is not a georeferenced image.

7 TABLES AND CHARTS

7.1. From CSV to event layer

- We create a new View with **EPSG:23030**
- Let's go to Table document in Project Manager and we add the table **torrent_4.csv** clicking in new
- If we click in properties in Add layer we will see that we can define the characteristics of CSV file. In this case we leave the default values.
- Our new table contains fields with the coordinates X & Y and we use them to adding as an event layer.

torrent_4

Puntos	X	Y	Z	Cod
B1	1,000	1,000	100	BASE
B2	1,000	1,035.52	100.05	BASE
1	990.85	1,001.39	100.05	B
2	993.55	998.12	100	B
3	996.54	997.97	99.98	B
4	1,002.73	1,003.59	100.03	B
5	1,001.83	1,011.03	100.04	B
6	1,000.77	1,020.22	100.03	B
7	999.56	1,030.58	100.05	B
8	998.69	1,037.88	100.11	B
9	991.45	1,036.37	100.04	B
10	982.6	1,034.56	99.86	B
11	991.27	1,001.27	99.99	C
12	991.3	1,001.27	99.89	P
13	991.32	1,001.29	99.9	C
14	991.35	1,001.28	99.7	C
15	993.65	998.43	99.94	P
16	993.66	998.46	99.84	C
17	993.69	998.5	99.83	C
18	993.69	998.53	99.58	P
19	996.22	998.33	99.94	C
20	996.19	998.33	99.7	P
21	995.67	998.36	99.7	C
22	995.66	998.4	99.38	P
23	998.25	1,000.09	99.91	C
24	998.23	1,000.12	99.69	P

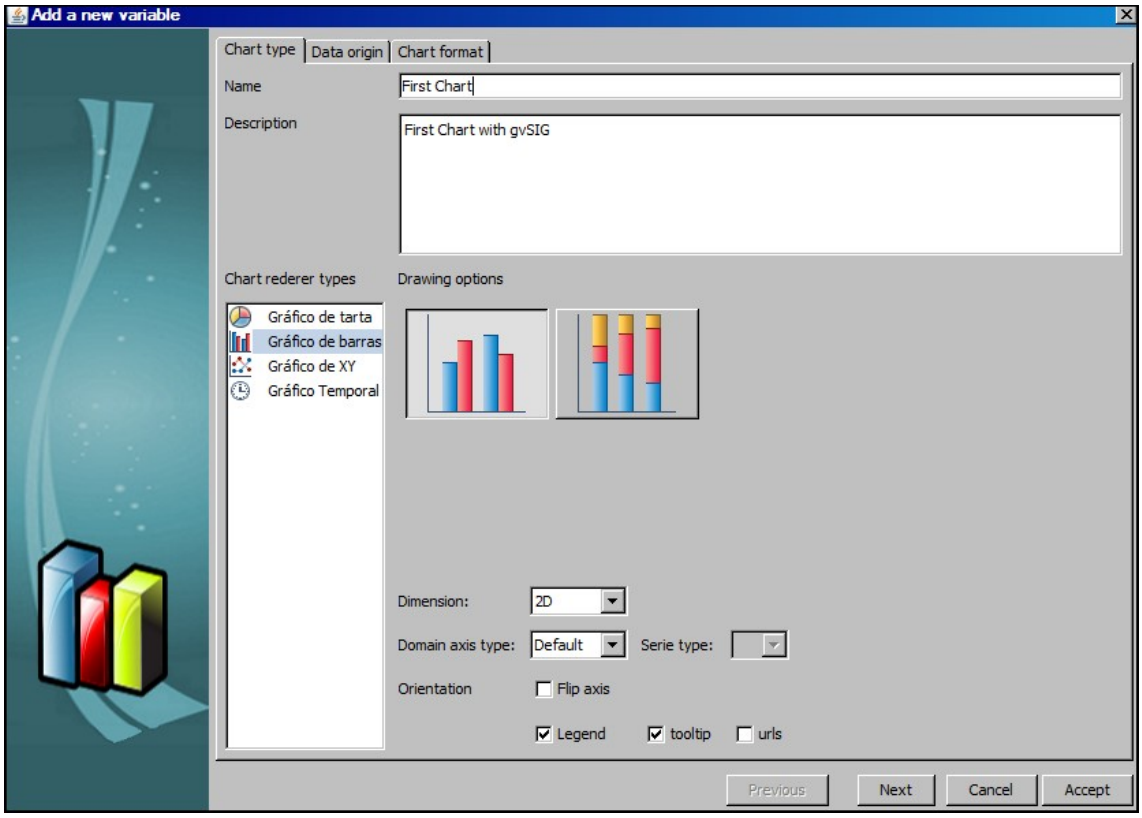
0 / 378 Total of selected records.

- Open the new view and click in "Add event layers".  .

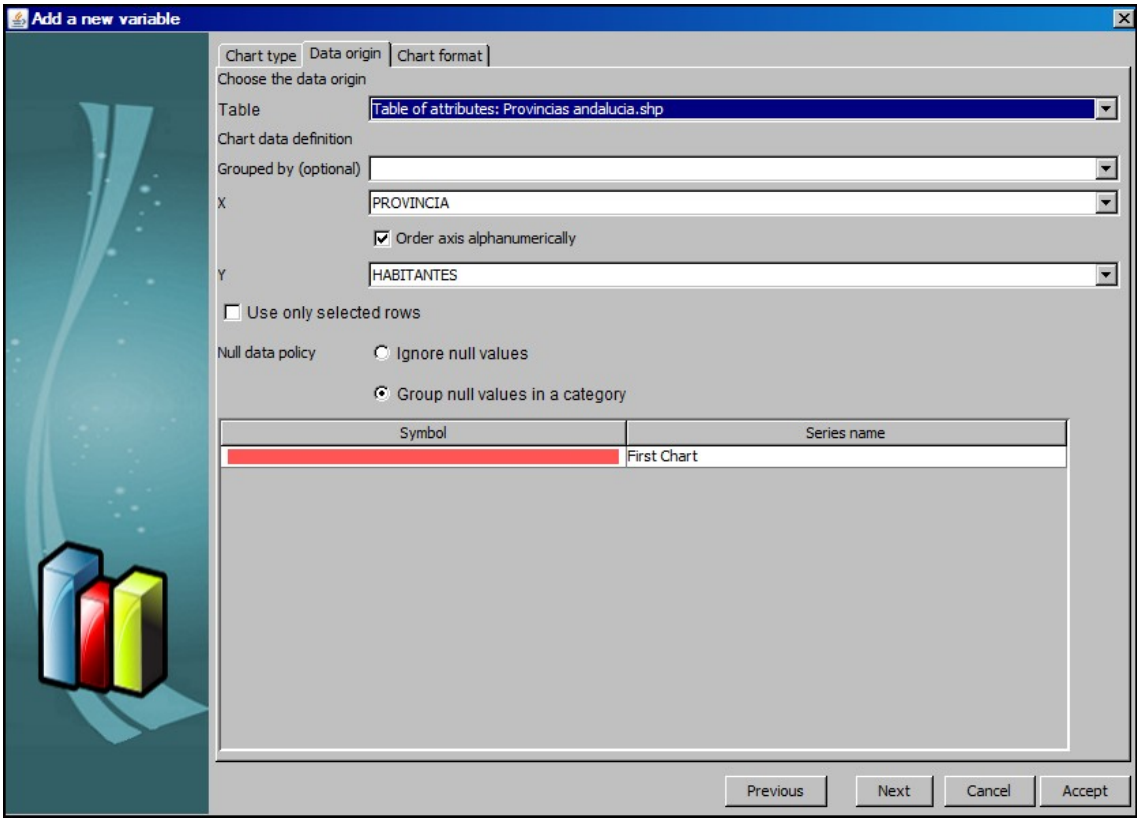
- In the new window, we indicate X and Y field. Add the new layer to the view, in this way a new points layer will be created.

7.2. Our first chart

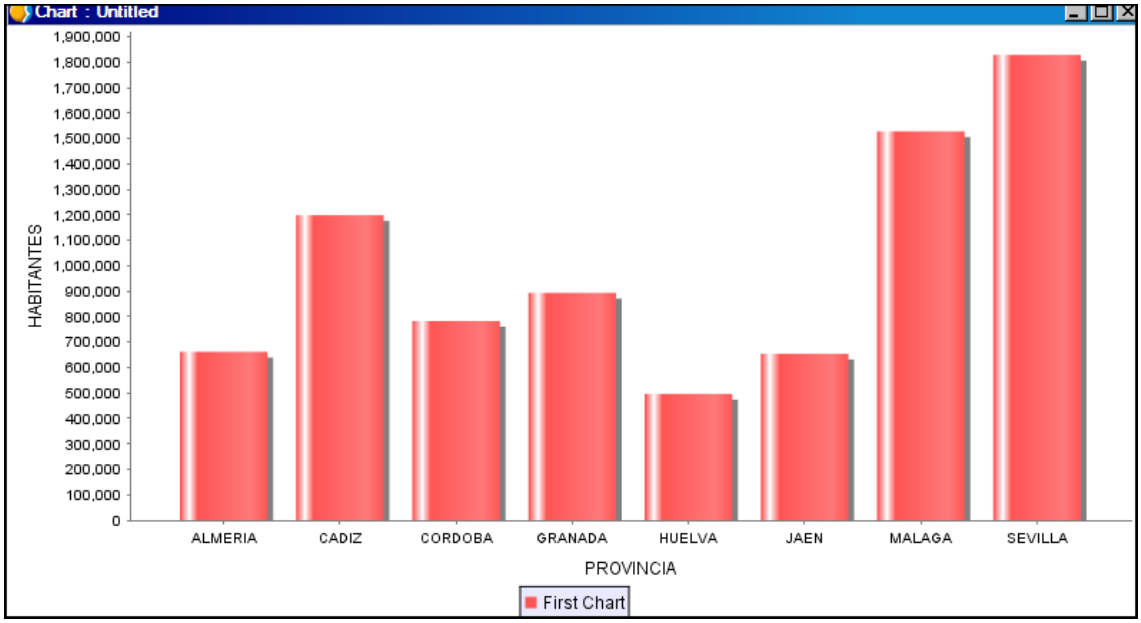
- We add **Provincias andalucia.shp** layer from the **Andalucia** folder to a new view and with **EPSG:23030**. Open attributes table.
- This table has a field called HABITANTES. This one will be use to create the chart.
- Chart in Project manager and we create a new chart (new). A white window is opened.
- Click on "Create a new plot".  .
- A new dialog box is opened and in this one we can configure the chart:



- Select "Gráfico de barras" and click next. In data origin tab we indicate **Provincias** in x field and **habitantes** in Y field



- In “Chart format“ tab we can make our chart. We leave the default values and accept.
- Chart will be as follows:



- Note: charts in gvSIG 2.1 can be added to Map documents