QGIS User Guide

Release 2.8

QGIS Project

July 30, 2016

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Preambul

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CHAPTER 2

Convenii

Această seciune descrie stilurile uniforme care vor fi folosite pe parcursul acestui manual.

2.1 Conveniile GUI

Stilurile convenite pentru GUI sunt destinate imitării aspectului unui GUI. În general, un stil va reflecta aspectul non-hover, astfel încât un utilizator poate scana vizual GUI-ul, pentru a găsi ceva care arată similar instruciunilor din manual.

- Opiuni de Meniu: *Layer* → *Add a Raster Layer* or *Settings* → *Toolbars* → *Digitizing*
- Tool:  Add a Raster Layer
- Buton : **[Salvare ca Implicit]**
- Titlul Casetei de Dialog: *Layer Properties*
- Fila: *General*
- Caseta de bifare:  *Render*
- Radio Button:  *Postgis SRID*  *EPSG ID*
- Select a number: 

- Select a string: 
- Browse for a file: 
- Select a color: 

- Cursor: 
- Input Text: 

O umbră indică o componentă GUI pe care se poate face clic.

2.2 Convenii pentru Text i Tastatură

This manual also includes styles related to text, keyboard commands and coding to indicate different entities, such as classes or methods. These styles do not correspond to the actual appearance of any text or coding within QGIS.

- Hiperlegături: http://qgis.org
- Combinaii de taste: Apăsarea combinaiei `Ctrl+B`, înseamnă inerea apăsată a tastei Ctrl i apoi apăsarea tastei B.

- Numele Fiierului: `lakes.shp`
- Numele Clasei: **NewLayer**
- Metoda: *classFactory*
- Server: *myhost.de*
- Text Utilizator: `qgis --help`

Liniile de cod sunt indicate printr-un font cu lăime fixă:

```
PROJCS["NAD_1927_Albers",
  GEOGCS["GCS_North_American_1927",
```

2.3 Instruciuni specifice platformelor

GUI sequences and small amounts of text may be formatted inline: Click *File* *QGIS → Quit to close QGIS*. This indicates that on Linux, Unix and Windows platforms, you should click the File menu first, then Quit, while on Macintosh OS X platforms, you should click the QGIS menu first, then Quit.

Cantităi mai mari de text pot fi formatate ca o listă:

- Facei asta
- Facei aia
- Facei altceva

sau ca paragrafe:

Facei acest lucru i asta i asta. Apoi facei acest lucru i asta i asta, i asta i asta i asta, i asta i asta i asta.

Facei aia. Apoi facei acest lucru i aia i aia, i aia i aia i aia, i aia i aia i aia, i aia i aia i aia, i aia i aia i aia.

Capturile care apar în ghidul de utilizare au fost create pe platforme diferite; platforma este indicat printr-o pictogramă specifică, poziionată la sfâritul titlului figurii.

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CHAPTER 3

Cuvânt înainte

Bine ai venit în lumea minunată a Sistemelor de Informaii Geografice (GIS)!

QGIS is an Open Source Geographic Information System. The project was born in May of 2002 and was established as a project on SourceForge in June of the same year. We've worked hard to make GIS software (which is traditionally expensive proprietary software) a viable prospect for anyone with basic access to a personal computer. QGIS currently runs on most Unix platforms, Windows, and OS X. QGIS is developed using the Qt toolkit (http://qt.digia.com) and C++. This means that QGIS feels snappy and has a pleasing, easy-to-use graphical user interface (GUI).

QGIS aims to be a user-friendly GIS, providing common functions and features. The initial goal of the project was to provide a GIS data viewer. QGIS has reached the point in its evolution where it is being used by many for their daily GIS data-viewing needs. QGIS supports a number of raster and vector data formats, with new format support easily added using the plugin architecture.

QGIS is released under the GNU General Public License (GPL). Developing QGIS under this license means that you can inspect and modify the source code, and guarantees that you, our happy user, will always have access to a GIS program that is free of cost and can be freely modified. You should have received a full copy of the license with your copy of QGIS, and you also can find it in Appendix *Licena Publică Generală GNU*.

Tip: Documentaie la-zi

The latest version of this document can always be found in the documentation area of the QGIS website at http://www.qgis.org/en/docs/.

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CHAPTER 4

Funciuni

QGIS offers many common GIS functionalities provided by core features and plugins. A short summary of six general categories of features and plugins is presented below, followed by first insights into the integrated Python console.

4.1 Vizualizarea datelor

Putei vizualiza i suprapune datele raster i vectoriale în diferite formate i proiecii, fără conversia într-un format intern sau comun. Formatele acceptate includ:

- Tabelele i vederile activate spaial folosesc PostGIS, SpatiaLite, MS SQL Spatial i Oracle Spatial, formate vectoriale acceptate de biblioteca OGR, inclusiv fiiere shape ESRI, MapInfo, SDTS, GML i multe altele. Vedei seciunea *Lucrul cu Datele Vectoriale*.
- Formatele raster i imaginile acceptate de biblioteca GDAL (Geospatial Data Abstraction Library), cum ar fi GeoTIFF, ERDAS IMG, ArcInfo ASCII GRID, JPEG, PNG i multe altele. Vedei seciunea *Lucrul cu Datele Raster*.
- Date raster i vectoriale GRASS din bazele de date GRASS (locaie/set de hări). Parcurgei seciunea *Integrarea GRASS GIS*.
- Date spaiale online, servite de Servicii Web OGC, inclusiv WMS, WMTS, WCS, WFS, i WFS-T. Parcurgei seciunea *Lucrul cu date OGC*.

4.2 Explorarea datelor i compunerea hărilor

Putei compune hări, apoi să explorai în mod interactiv datele spaiale prin intermediul interfeei grafice prietenoase. Printre cele mai multe instrumente utile disponibile în GUI se includ:

- QGIS browser
- Reproiectarea Din-Zbor
- DB Manager
- Compozitorul de Hări
- Panoul de Vizualizare
- Semne de carte Spaiale
- Instrumente de adnotare
- Identificarea/selectarea entităilor
- Editarea/vizualizarea/căutarea atributelor
- Data-defined feature labeling

- Instrumente de simbologie definită cu ajutorul datelor, pentru rastere i vectori
- Compoziia hărilor pentru atlas, folosind straturile cu graticule
- Săgeata Nordului, scara grafică i eticheta drepturilor de autor pentru hări
- Suport pentru salvarea i restaurarea proiectelor

4.3 Crearea, editarea, gestionarea i exportul datelor

You can create, edit, manage and export vector and raster layers in several formats. QGIS offers the following:

- Instrumente de digitizare pentru formatele acceptate de OGR i straturile vectoriale GRASS
- Abilitatea de a crea i edita fiiere shape i straturi vectoriale GRASS
- Plugin-ul de georefereniere pentru geocodarea imaginelor
- Instrumente GPS de import i de export pentru formatul GPX, i de convertit alte formate GPS în GPX, sau de descărcat/încărcat direct într-o unitate GPS (Pe Linux, s-a adăugat usb: la lista de dispozitive GPS.)
- Suport pentru salvarea i editarea datelor OpenStreetMap
- Abilitatea de a crea tabele de baze de date spaiale din fiierele shape, cu ajutorul plugin-ului DB Manager
- Gestionarea îmbunătăită a tabelelor bazei de date spaiale
- Instrumente pentru gestionarea tabelelor cu atribute vectoriale
- Opiunea de a salva capturile de ecran ca imagini georefereniate
- Instrumentul DXF-Export cu capacităi sporite pentru exportul stilurilor i a plugin-urilor pentru a efectua funcii similare CAD

4.4 Analyse data

You can perform spatial data analysis on spatial databases and other OGR- supported formats. QGIS currently offers vector analysis, sampling, geoprocessing, geometry and database management tools. You can also use the integrated GRASS tools, which include the complete GRASS functionality of more than 400 modules. (See section *Integrarea GRASS GIS*.) Or, you can work with the Processing Plugin, which provides a powerful geospatial analysis framework to call native and third-party algorithms from QGIS, such as GDAL, SAGA, GRASS, fTools and more. (See section *Introducere*.)

4.5 Publicarea hărilor de pe Internet

QGIS can be used as a WMS, WMTS, WMS-C or WFS and WFS-T client, and as a WMS, WCS or WFS server. (See section *Lucrul cu date OGC*.) Additionally, you can publish your data on the Internet using a webserver with UMN MapServer or GeoServer installed.

4.6 Extend QGIS functionality through plugins

QGIS can be adapted to your special needs with the extensible plugin architecture and libraries that can be used to create plugins. You can even create new applications with C++ or Python!

4.6.1 Plugin-uri de bază

Plugin-urile de bază includ:

1. Captura Coordonatelor (Captura coordonatelor mouse-ului în CRS-uri diferite)
2. DB Manager (Exchange, edit and view layers and tables; execute SQL queries)
3. Convertorul Dxf2Shp (Conversia fiierelor DXF în fiiere shape)
4. eVIS (Vizualizarea evenimentelor)
5. fTools (Analiza i gestionarea datelor vectoriale)
6. GDALTools (Integrate GDAL Tools into QGIS)
7. Georeferenţiere GDAL(Adăugarea în rastere a informaiilor de proiecie folosind GDAL)
8. Instrumente GPS (Încărcarea i importul datelor GPS)
9. GRASS (Integrarea GRASS GIS)
10. Hări calorice (Generarea hărilor calorice raster, din datele de tip punct)
11. Plugin-ul de Interpolare (Interpolarea bazată pe vertecii unui strat vectorial)
12. Metasearch Catalogue Client
13. Editarea Offline (Permite editarea offline şi sincronizarea cu baza de date)
14. Oracle Spatial GeoRaster
15. Processing (fostul SEXTANTE)
16. Analiza Terenurilor Raster (Analiza terenurilor geomorfologice raster)
17. Plugin-ul Road Graph (Analiza celei mai scurte căi dintr-o reea)
18. Pluginul de Interogare spaţială
19. SPIT (Import shapefiles to PostgreSQL/PostGIS)
20. Verificatorul de Topologie (Găsirea erorilor topologice din straturile vectoriale)
21. Plugin-ul de Statistici Zonale (Calculează numărul, suma, i valoarea medie a unui raster, pentru fiecare poligon al unui strat vectorial)

4.6.2 Plugin-urile Externe Python

QGIS offers a growing number of external Python plugins that are provided by the community. These plugins reside in the official Plugins Repository and can be easily installed using the Python Plugin Installer. See Section *Dialogul Plugin-urilor*.

4.7 Consola Python

For scripting, it is possible to take advantage of an integrated Python console, which can be opened from menu: *Plugins* → *Python Console*. The console opens as a non-modal utility window. For interaction with the QGIS environment, there is the `qgis.utils.iface` variable, which is an instance of `QgsInterface`. This interface allows access to the map canvas, menus, toolbars and other parts of the QGIS application. You can create a script, then drag and drop it into the QGIS window and it will be executed automatically.

For further information about working with the Python console and programming QGIS plugins and applications, please refer to *PyQGIS-Developer-Cookbook*.

4.8 Probleme Cunoscute

4.8.1 Limitarea numărului de fiiere deschise

Dacă deschidei un proiect QGIS mare i suntei sigur că toate straturile sunt valide, dar unele straturi sunt marcate ca fiind eronate, putei gestiona, probabil, această problemă. Linux (i alte sisteme de operare, de asemenea) are o limită pentru fiierele deschise de către un proces. Limitele resurselor sunt per-proces i sunt motenite. Comanda internă `ulimit`, modifică limitele numai pentru procesul curent; noua limită va fi motenită de către orice proces copil.

Putei vedea toate informaiile ulimit curente, tastând

```
user@host:~$ ulimit -aS
```

You can see the current allowed number of opened files per proccess with the following command on a console

```
user@host:~$ ulimit -Sn
```

Pentru a modifica limitele pentru o **sesiune existentă** , ai putea utiliza ceva de genul

```
user@host:~$ ulimit -Sn #number_of_allowed_open_files
user@host:~$ ulimit -Sn
user@host:~$ qgis
```

Pentru a remedia definitiv problema

Pe majoritatea sistemelor Linux, limitele resurselor sunt stabilite de modulul `pam_limits`, în conformitate cu setările coninute în `/etc/security/limits.conf` sau `/etc/security/limits.d/*.conf`. Ar trebui să putei edita acele fiiere dacă avei privilegiul de root (de asemenea, prin intermediul sudo), dar va trebui să vă conectai din nou pentru ca schimbările să aibă efect.

Mai multe informaii:

http://www.cyberciti.biz/faq/linux-increase-the-maximum-number-of-open-files/ http://linuxaria.com/article/open-files-in-linux?lang=en

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CHAPTER 5

What's new in QGIS 2.8

Această versiune conine noi caracteristici i extinde interfaa programatică faă de versiunile anterioare. Vă recomandăm să folosii această versiune în locul versiunilor anterioare.

This release includes hundreds of bug fixes and many new features and enhancements that will be described in this manual. You may also review the visual changelog at http://qgis.org/en/site/forusers/visualchangelog28/index.html.

5.1 Application

- **Map rotation**: A map rotation can be set in degrees from the status bar
- **Bookmarks**: You can share and transfer your bookmarks
- **Expressions**:
  - when editing attributes in the attribute table or forms, you can now enter expressions directly into spin boxes
  - the expression widget is extended to include a function editor where you are able to create your own Python custom functions in a comfortable way
  - in any spinbox of the style menu you can enter expressions and evaluate them immediately
  - a get and transform geometry function was added for using expressions
  - a comment functionality was inserted if for example you want to work with data defined labeling
- **Joins**: You can specify a custom prefix for joins
- **Layer Legend**: Show rule-based renderer's legend as a tree
- **DB Manager**: Run only the selected part of a SQL query
- **Attribute Table**: support for calculations on selected rows through a 'Update Selected' button
- **Measure Tools**: change measurement units possible

5.2 Data Providers

- **DXF Export tool improvements**: Improved marker symbol export
- **WMS Layers**: Support for contextual WMS legend graphics
- **Temporary Scratch Layers**: It is possible to create empty editable memory layers

5.3 Digitizing

- **Advanced Digitizing**:
  - digitise lines exactly parallel or at right angles, lock lines to specific angles and so on with the advanced digitizing panel (CAD-like features)
  - simplify tool: specify with exact tolerance, simplify multiple features at once ...
- **Snapping Options**: new snapping mode 'Snap to all layers'

5.4 Map Composer

- **Composer GUI improvements**: hide bounding boxes, full screen mode for composer toggle display of panels
- **Grid improvements**: You now have finer control of frame and annotation display
- **Label item margins**: You can now control both horizontal and vertical margins for label items. You can now specify negative margins for label items.
- optionally store layer styles
- **Attribute Table Item**: options 'Current atlas feature' and 'Relation children' in Main properties

5.5 Plugins

- **Python Console**: You can now drag and drop python scripts into the QGIS window

5.6 QGIS Server

- Python plugin support

5.7 Symbology

- live heatmap renderer creates dynamic heatmaps from point layers
- raster image symbol fill type
- more data-defined symbology settings: the data-defined option was moved next to each data definable property
- support for multiple styles per map layer, optionally store layer styles

5.8 User Interface

- **Projection**: Improved/consistent projection selection. All dialogs now use a consistent projection selection widget, which allows for quickly selecting from recently used and standard project/QGIS projections

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Noiuni de bază

This chapter gives a quick overview of installing QGIS, some sample data from the QGIS web page, and running a first and simple session visualizing raster and vector layers.

6.1 Instalare

Installation of QGIS is very simple. Standard installer packages are available for MS Windows and Mac OS X. For many flavors of GNU/Linux, binary packages (rpm and deb) or software repositories are provided to add to your installation manager. Get the latest information on binary packages at the QGIS website at http://download.qgis.org.

6.1.1 Instalarea de la sursă

If you need to build QGIS from source, please refer to the installation instructions. They are distributed with the QGIS source code in a file called `INSTALL`. You can also find them online at http://htmlpreview.github.io/?https://raw.github.com/qgis/QGIS/master/doc/INSTALL.html

6.1.2 Instalarea pe un suport extern

QGIS allows you to define a `--configpath` option that overrides the default path for user configuration (e.g., `~/.qgis2` under Linux) and forces **QSettings** to use this directory, too. This allows you to, for instance, carry a QGIS installation on a flash drive together with all plugins and settings. See section *Meniul Sistemului* for additional information.

6.2 Date eantion

The user guide contains examples based on the QGIS sample dataset.

The Windows installer has an option to download the QGIS sample dataset. If checked, the data will be downloaded to your `My Documents` folder and placed in a folder called `GIS Database`. You may use Windows Explorer to move this folder to any convenient location. If you did not select the checkbox to install the sample dataset during the initial QGIS installation, you may do one of the following:

- Utilizai datele GIS pe care le avei deja
- Download sample data from http://qgis.org/downloads/data/qgis_sample_data.zip
- Uninstall QGIS and reinstall with the data download option checked (only recommended if the above solutions are unsuccessful)

For GNU/Linux and Mac OS X, there are not yet dataset installation packages available as rpm, deb or dmg. To use the sample dataset, download the file `qgis_sample_data` as a ZIP archive from http://qgis.org/downloads/data and unzip the archive on your system.

The Alaska dataset includes all GIS data that are used for examples and screenshots in the user guide; it also includes a small GRASS database. The projection for the QGIS sample dataset is Alaska Albers Equal Area with units feet. The EPSG code is 2964.

```
PROJCS["Albers Equal Area",
GEOGCS["NAD27",
DATUM["North_American_Datum_1927",
SPHEROID["Clarke 1866",6378206.4,294.978698213898,
AUTHORITY["EPSG","7008"]],
TOWGS84[-3,142,183,0,0,0,0],
AUTHORITY["EPSG","6267"]],
PRIMEM["Greenwich",0,
AUTHORITY["EPSG","8901"]],
UNIT["degree",0.0174532925199433,
AUTHORITY["EPSG","9108"]],
AUTHORITY["EPSG","4267"]],
PROJECTION["Albers_Conic_Equal_Area"],
PARAMETER["standard_parallel_1",55],
PARAMETER["standard_parallel_2",65],
PARAMETER["latitude_of_center",50],
PARAMETER["longitude_of_center",-154],
PARAMETER["false_easting",0],
PARAMETER["false_northing",0],
UNIT["us_survey_feet",0.3048006096012192]]
```

If you intend to use QGIS as a graphical front end for GRASS, you can find a selection of sample locations (e.g., Spearfish or South Dakota) at the official GRASS GIS website, http://grass.osgeo.org/download/sample-data/.

6.3 Sample Session

Now that you have QGIS installed and a sample dataset available, we would like to demonstrate a short and simple QGIS sample session. We will visualize a raster and a vector layer. We will use the `landcover` raster layer, `qgis_sample_data/raster/landcover.img`, and the `lakes` vector layer, `qgis_sample_data/gml/lakes.gml`.

6.3.1 Start QGIS

- Start QGIS by typing "QGIS" at a command prompt, or if using a precompiled binary, by using the Applications menu.
- Start QGIS using the Start menu or desktop shortcut, or double click on a QGIS project file.
- Double click the icon in your Applications folder.

6.3.2 Load raster and vector layers from the sample dataset

1. Click on the Add Raster Layer icon.
2. Răsfoii folderul `qgis_sample_data/raster/`, selectând fiierul `landcover.img` i făcând clic pe **[Deschidere]**.
3. If the file is not listed, check if the *Files of type* combo box at the bottom of the dialog is set on the right type, in this case "Erdas Imagine Images (*.img, *.IMG)".
4. Now click on the Add Vector Layer icon.
5. *File* should be selected as *Source Type* in the new *Add vector layer* dialog. Now click **[Browse]** to select the vector layer.

6. Browse to the folder `qgis_sample_data/gml/`, select 'Geography Markup Language [GML] [OGR] (.gml,.GML)' from the *Filter* combo box, then select the GML file `lakes.gml` and click **[Open]**. In the *Add vector layer* dialog, click **[OK]**. The *Coordinate Reference System Selector* dialog opens with *NAD27 / Alaska Alberts* selected, click **[OK]**.
7. Zoom in a bit to your favorite area with some lakes.
8. Dublu clic pe stratul `lakes` din legenda hării pentru a deschide fereastra de dialog *Properties*.
9. Clic pe fila *Stil*, apoi selectai albastru ca i culoare de umplere.
10. Click on the *Labels* tab and check the *Label this layer with* checkbox to enable labeling. Choose the "NAMES" field as the field containing labels.
11. To improve readability of labels, you can add a white buffer around them by clicking "Buffer" in the list on the left, checking *Draw text buffer* and choosing 3 as buffer size.
12. Clic **[Aplicare]**. Verificai dacă rezultatul arată bine, iar apoi facei clic pe **[OK]**.

You can see how easy it is to visualize raster and vector layers in QGIS. Let's move on to the sections that follow to learn more about the available functionality, features and settings, and how to use them.

6.4 Starting and Stopping QGIS

In section *Sample Session* you already learned how to start QGIS. We will repeat this here, and you will see that QGIS also provides further command line options.

- Assuming that QGIS is installed in the PATH, you can start QGIS by typing `qgis` at a command prompt or by double clicking on the QGIS application link (or shortcut) on the desktop or in the Applications menu.
- Start QGIS using the Start menu or desktop shortcut, or double click on a QGIS project file.
- Double click the icon in your Applications folder. If you need to start QGIS in a shell, run `/path-to-installation-executable/Contents/MacOS/Qgis`.

To stop QGIS, click the menu option *File* *QGIS* → *Quit*, or use the shortcut `Ctrl+Q`.

6.5 Opiunile liniei de comandă

QGIS supports a number of options when started from the command line. To get a list of the options, enter `qgis --help` on the command line. The usage statement for QGIS is:

```
qgis --help
QGIS - 2.6.0-Brighton 'Brighton' (exported)
QGIS is a user friendly Open Source Geographic Information System.
Usage: /usr/bin/qgis.bin [OPTION] [FILE]
OPTION:
      [--snapshot filename]   emit snapshot of loaded datasets to given file
      [--width width] width of snapshot to emit
      [--height height]       height of snapshot to emit
      [--lang language]       use language for interface text
      [--project projectfile] load the given QGIS project
      [--extent xmin,ymin,xmax,ymax]  set initial map extent
      [--nologo]      hide splash screen
      [--noplugins]   don't restore plugins on startup
      [--nocustomization]     don't apply GUI customization
      [--customizationfile]   use the given ini file as GUI customization
      [--optionspath path]    use the given QSettings path
      [--configpath path]     use the given path for all user configuration
      [--code path]   run the given python file on load
```

```
      [--defaultui]   start by resetting user ui settings to default
      [--help]                this text

FILE:
  Files specified on the command line can include rasters,
  vectors, and QGIS project files (.qgs):
   1. Rasters - supported formats include GeoTiff, DEM
      and others supported by GDAL
   2. Vectors - supported formats include ESRI Shapefiles
      and others supported by OGR and PostgreSQL layers using
      the PostGIS extension
```

Tip: Exemplu de folosire a argumentelor în linia de comandă

You can start QGIS by specifying one or more data files on the command line. For example, assuming you are in the `qgis_sample_data` directory, you could start QGIS with a vector layer and a raster file set to load on startup using the following command: `qgis ./raster/landcover.img ./gml/lakes.gml`

Opiunea liniei de comandă `--snapshot`

Această opiune vă permite să creai o captură, în format PNG, a vizualizării curente. Acest lucru este foarte util atunci când avei o mulime de proiecte i dorii să generai capturi din datele proprii.

În prezent, se generează un fiier PNG cu 800x600 pixeli. Acest lucru se poate face din linia de comandă utilizând argumentele `--width` and `--height`. Un nume de fiier poate fi adăugat după `--snapshot`.

Opiunea liniei de comandă `--lang`

Based on your locale, QGIS selects the correct localization. If you would like to change your language, you can specify a language code. For example, `--lang=it` starts QGIS in italian localization.

Opiunea liniei de comandă `--project`

Starting QGIS with an existing project file is also possible. Just add the command line option `--project` followed by your project name and QGIS will open with all layers in the given file loaded.

Opiunea liniei de comandă `--extent`

Pentru a începe cu o extindere de hartă specifică, folosii această opiune. Trebuie să adăugai valorile casetei de încadrare, separate prin virgulă, în ordinea următoare:

```
--extent xmin,ymin,xmax,ymax
```

Opiunea liniei de comandă `--nologo`

This command line argument hides the splash screen when you start QGIS.

Opiunea liniei de comandă `--noplugins`

Dacă avei probleme la pornire cu plugin-urile, putei evita încărcarea lor la lansare, folosind această opiune. Acestea vor fi în continuare disponibile din Managerul de Plugin-uri.

Opiunea liniei de comandă `--customizationfile`

Folosind acest argument în linia de comandă, putei defini un fiier de personalizare GUI, care va fi utilizat la pornire.

Opiunea liniei de comandă `--nocustomization`

Folosind acest argument în linia de comandă, personalizarea existentă a GUI-ului nu va fi aplicată la pornire.

Opiunea liniei de comandă `--optionspath`

You can have multiple configurations and decide which one to use when starting QGIS with this option. See *Opţiuni* to confirm where the operating system saves the settings files. Presently, there is no way to specify a file to write settings to; therefore, you can create a copy of the original settings file and rename it. The option specifies path to directory with settings. For example, to use /path/to/config/QGIS/QGIS2.ini settings file, use option:

```
--optionspath /path/to/config/
```

Opiunea liniei de comandă `--configpath`

This option is similar to the one above, but furthermore overrides the default path for user configuration (`~/.qgis2`) and forces **QSettings** to use this directory, too. This allows users to, for instance, carry a QGIS installation on a flash drive together with all plugins and settings.

Opiunea liniei de comandă `--code`

This option can be used to run a given python file directly after QGIS has started.

De exemplu, atunci când avei un fiier Python numit `load_alaska.py`, cu următorul cuprins:

```
from qgis.utils import iface
raster_file = "/home/gisadmin/Documents/qgis_sample_data/raster/landcover.img"
layer_name = "Alaska"
iface.addRasterLayer(raster_file, layer_name)
```

Assuming you are in the directory where the file `load_alaska.py` is located, you can start QGIS, load the raster file `landcover.img` and give the layer the name 'Alaska' using the following command: `qgis --code load_alaska.py`

6.6 Proiecte

The state of your QGIS session is considered a project. QGIS works on one project at a time. Settings are considered as being either per-project or as a default for new projects (see section *Opţiuni*). QGIS can save the state of your workspace into a project file using the menu options *Project* → *Save* or *Project* → *Save As...*.

Load saved projects into a QGIS session using *Project* → *Open...*, *Project* → *New from template* or *Project* → *Open Recent* →.

If you wish to clear your session and start fresh, choose *Project* → *New*. Either of these menu options will prompt you to save the existing project if changes have been made since it was opened or last saved.

Tipurile de informaii salvate într-un fiier proiect includ:

- Straturile adăugate
- Straturile care pot fi interogate
- Proprietăile stratului, inclusiv simbolizarea i stilurile
- Proiecia pentru vizualizarea hării
- Ultima extindere vizualizată
- Compozitoare de Hări
- Elementele Compozitorului de Hări cu setări
- Setările Atlasului Compozitorului de Hări
- Setări de digitizare
- Relaiie Tabelei
- Macrocomenzile Proiectului
- Stiluri implicite ale proiectului
- Setările Plugin-urilor
- Setările QGIS server din fila de setări OWS a proprietăilor proiectului
- Interogările stocate în DB Manager

The project file is saved in XML format, so it is possible to edit the file outside QGIS if you know what you are doing. The file format has been updated several times compared with earlier QGIS versions. Project files from older QGIS versions may not work properly anymore. To be made aware of this, in the *General* tab under *Settings* → *Options* you can select:

- *Prompt to save project and data source changes when required*
- *Warn when opening a project file saved with an older version of QGIS*

Whenever you save a project in QGIS a backup of the project file is made with the extension ~.

6.7 Rezultat

There are several ways to generate output from your QGIS session. We have discussed one already in section *Proiecte*, saving as a project file. Here is a sampling of other ways to produce output files:

- Menu option *Project* → Save as Image opens a file dialog where you select the name, path and type of image (PNG,JPG and many other formats). A world file with extension PNGW or JPGW saved in the same folder georeferences the image.
- Menu option *Project* → *DXF Export ...* opens a dialog where you can define the 'Symbology mode', the 'Symbology scale' and vector layers you want to export to DXF. Through the 'Symbology mode' symbols from the original QGIS Symbology can be exported with high fidelity.
- Menu option *Project* → *New Print Composer* opens a dialog where you can layout and print the current map canvas (see section *Compozitorul de Hări*).

.

QGIS GUI

When QGIS starts, you are presented with the GUI as shown in the figure (the numbers 1 through 5 in yellow circles are discussed below).

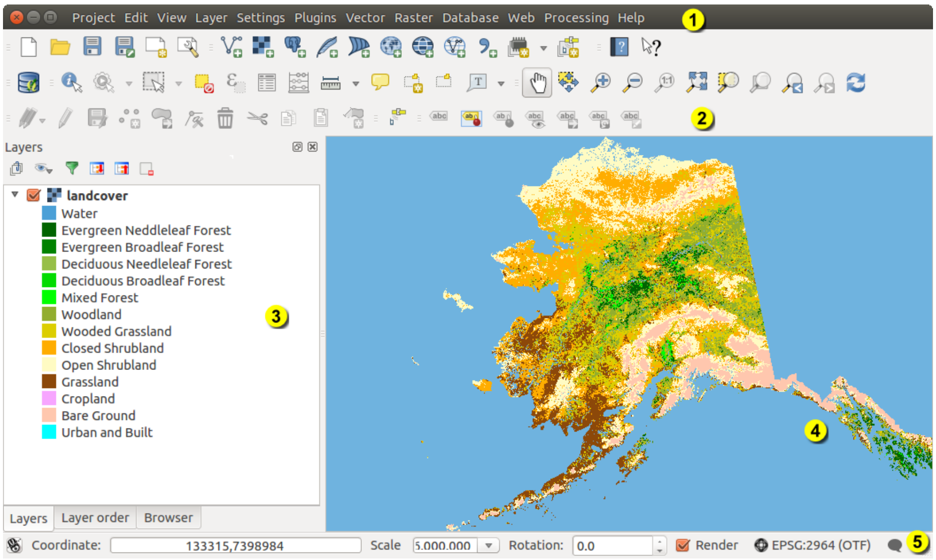

Figure 7.1: QGIS GUI with Alaska sample data

Note: Aspectul ferestrelor (bara de titlu, etc) poate fi diferit, în funcie de sistemul de operare i de managerul de ferestre.

The QGIS GUI is divided into five areas:

1. Bara de Meniuri
2. Tool Bar
3. Map Legend
4. Vizualizare Hartă
5. Bara de Stare

These five components of the QGIS interface are described in more detail in the following sections. Two more sections present keyboard shortcuts and context help.

7.1 Bara de Meniuri

The menu bar provides access to various QGIS features using a standard hierarchical menu. The top-level menus and a summary of some of the menu options are listed below, together with the associated icons as they appear on the toolbar, and keyboard shortcuts. The shortcuts presented in this section are the defaults; however, keyboard shortcuts can also be configured manually using the *Configure shortcuts* dialog, opened from *Settings → Configure Shortcuts...*.

Dei cele mai multe opiuni de meniu au un instrument corespunzător i invers, meniurile nu sunt organizate similar barelor de instrumente. Bara de instrumente care conine instrumentul este listată după fiecare opiune de meniu, sub formă de casetă de bifare. Unele opiuni de meniu apar numai dacă pluginul corespunzător este încărcat. Pentru mai multe informaii despre instrumentele i barele de instrumente, vedei seciunea *Bara de Instrumente*.

7.1.1 Proiect

Meniul Opiunilor	Scurtătură	Referină	Bara de Instrumente
New	`Ctrl+N`	vedei *Proiecte*	*Proiect*
Open	`Ctrl+O`	vedei *Proiecte*	*Proiect*
Nou după ablon →		vedei *Proiecte*	*Proiect*
Open Recent →		vedei *Proiecte*	
Save	`Ctrl+S`	vedei *Proiecte*	*Proiect*
Save As...	`Ctrl+Shift+S`	vedei *Proiecte*	*Proiect*
Save as Image...		vedei *Rezultat*	
DXF Export ...		vedei *Rezultat*	
New Print Composer	`Ctrl+P`	vedei *Compozitorul de Hări*	*Proiect*
Composer manager ...		vedei *Compozitorul de Hări*	*Proiect*
Compozitoare de Hări →		vedei *Compozitorul de Hări*	
Exit QGIS	`Ctrl+Q`		

7.1.2 Editare

Meniul Opiunilor	Scurtătură	Referină	Bara de Instrumente
Undo	`Ctrl+Z`	vedei *Digitizare avansată*	*Digitizare Avansată*
Redo	`Ctrl+Shift+Z`	vedei *Digitizare avansată*	*Digitizare Avansată*
Cut Features	`Ctrl+X`	vedei *Digitizarea unui strat vectorial existent*	*Digitizare*
Copy Features	`Ctrl+C`	vedei *Digitizarea unui strat vectorial existent*	*Digitizare*
Paste Features	`Ctrl+V`	vedei *Digitizarea unui strat vectorial existent*	*Digitizare*
Lipete entităile ca →		vedei *Working with the Attribute Table*	
Add Feature	`Ctrl+.`	vedei *Digitizarea unui strat vectorial existent*	*Digitizare*
Move Feature(s)		vedei *Digitizarea unui strat vectorial existent*	*Digitizare*
Delete Selected		vedei *Digitizarea unui strat vectorial existent*	*Digitizare*
Rotate Feature(s)		vedei *Digitizare avansată*	*Digitizare Avansată*
Simplify Feature		vedei *Digitizare avansată*	*Digitizare Avansată*
Add Ring		vedei *Digitizare avansată*	*Digitizare Avansată*
Add Part		vedei *Digitizare avansată*	*Digitizare Avansată*
Fill Ring		vedei *Digitizare avansată*	*Digitizare Avansată*
Delete Ring		vedei *Digitizare avansată*	*Digitizare Avansată*
Delete Part		vedei *Digitizare avansată*	*Digitizare Avansată*
Reshape Features		vedei *Digitizare avansată*	*Digitizare Avansată*
Offset Curve		vedei *Digitizare avansată*	*Digitizare Avansată*
Split Features		vedei *Digitizare avansată*	*Digitizare Avansată*
Split Parts		vedei *Digitizare avansată*	*Digitizare Avansată*
Merge Selected Features		vedei *Digitizare avansată*	*Digitizare Avansată*
Merge Attr. of Selected Features		vedei *Digitizare avansată*	*Digitizare Avansată*
Node Tool		vedei *Digitizarea unui strat vectorial existent*	*Digitizare*

After activating Toggle editing mode for a layer, you will find the `Add Feature` icon in the *Edit* menu depending on the layer type (point, line or polygon).

7.1.3 Editare (extra)

Meniul Opiunilor	Scurtătură	Referină	Bara de Instrumente
Add Feature		vedei *Digitizarea unui strat vectorial existent*	*Digitizare*
Add Feature		vedei *Digitizarea unui strat vectorial existent*	*Digitizare*
Add Feature		vedei *Digitizarea unui strat vectorial existent*	*Digitizare*

7.1.4 Vizualizare

Meniul Opiunilor	Scurtătură	Referină	Bara de Instrumente
Pan Map			*Navigare în interiorul hării*
Pan Map to Selection			*Navigare în interiorul hării*
Zoom In	`Ctrl++`		*Navigare în interiorul hării*
Zoom Out	`Ctrl+-`		*Navigare în interiorul hării*
Selectare →		see *Salvarea i deselectarea entităilor*	*Atribute*
Identify Features	`Ctrl+Shift+I`		*Atribute*
Măsurare →		vedei *Măsurarea*	*Atribute*
Zoom Full	`Ctrl+Shift+F`		*Navigare în interiorul hării*
Zoom To Layer			*Navigare în interiorul hării*
Zoom To Selection	`Ctrl+J`		*Navigare în interiorul hării*
Zoom Last			*Navigare în interiorul hării*
Zoom Next			*Navigare în interiorul hării*
Zoom Actual Size			*Navigare în interiorul hării*
Decoraii →		see *decoraii*	
Mod de previzualizare →			
Map Tips			*Atribute*
New Bookmark	`Ctrl+B`	vedei *Semne de Carte Spaiale*	*Atribute*
Show Bookmarks	`Ctrl+Shift+B`	vedei *Semne de Carte Spaiale*	*Atribute*
Refresh	`F5`		*Navigare în interiorul hării*

7.1.5 Strat

Meniul Opiunilor	Scurtătură	Referină	Bara de Instrumente
Creează Strat →		vedei *Crearea noillor straturi Vectoriale*	*Gestiune Straturi*
Adaugă Strat →			*Gestiune Straturi*
Embed Layers and Groups ...		see *Imbricarea Proiectelor*	
Add from Layer Definition File ...			
Copy style		see *Meniul Stilului*	
Paste style		see *Meniul Stilului*	
Open Attribute Table		vedei *Working with the Attribute Table*	*Atribute*
Toggle Editing		vedei *Digitizarea unui strat vectorial existent*	*Digitizare*
Save Layer Edits		vedei *Digitizarea unui strat vectorial existent*	*Digitizare*
Current Edits →		vedei *Digitizarea unui strat vectorial existent*	*Digitizare*
Save as...			
Save as layer definition file...			
Remove Layer/Group	`Ctrl+D`		
Duplicate Layers (s)			
Setează Vizibilitatea Scării Straturilor			
Set CRS of Layer(s)	`Ctrl+Shift+C`		
Set project CRS from Layer			
Properties ...			
Query...			
Labeling			
Add to Overview	`Ctrl+Shift+O`		*Gestiune Straturi*
Add All To Overview			
Remove All From Overview			
Show All Layers	`Ctrl+Shift+U`		*Gestiune Straturi*
Hide All Layers	`Ctrl+Shift+H`		*Gestiune Straturi*
Show selected Layers			
Hide selected Layers			

7.1.6 Setări

Meniul Opiunilor	Scurtătură	Referină	Bara de Instrumente
Panouri →		a se vedea *Panels and Toolbars*	
Bare de Instrumente →		a se vedea *Panels and Toolbars*	
Toggle Full Screen Mode	F 11		
Project Properties ...	Ctrl+Shift+P	vedei *Proiecte*	
Custom CRS ...		vedei *Sistem Personalizat de Coordonate de Referină*	
Managerul de stiluri...		vedei *Presentation*	
Configure shortcuts ...			
Customization ...		vedei *Personalizare*	
Options ...		vedei *Opţiuni*	
Snapping Options ...			

7.1.7 Plugin-uri

Meniul Opiunilor	Scurtătură	Referină	Bara de Instrumente
Manage and Install Plugins ...		vedei *Dialogul Plugin-urilor*	
Python Console	Ctrl+Alt+P		

When starting QGIS for the first time not all core plugins are loaded.

7.1.8 Vector

Meniul Opiunilor	Scurtă-tură	Referină	Bara de Instrumente
Open Street Map →		vedei *Încărcarea Vectorilor OpenStreetMap*	
Instrumente de Analiză →		vedei *Plugin-ul fTools*	
Instrumente de Cercetare →		vedei *Plugin-ul fTools*	
Instrumente de Geoprocesare →		vedei *Plugin-ul fTools*	
Instrumente de Geometrie →		vedei *Plugin-ul fTools*	
Instrumente de Managementul Datelor →		vedei *Plugin-ul fTools*	

When starting QGIS for the first time not all core plugins are loaded.

7.1.9 Raster

Meniul Opiunilor	Scurtătură	Referină	Bara de Instrumente
Raster calculator ...		see *Calculatorul Raster*	

When starting QGIS for the first time not all core plugins are loaded.

7.1.10 Bază de date

Meniul Opiunilor	Scurtătură	Referină	Bara de Instrumente
Bază de Date →		vedei *Plugin-ul DB Manager*	*Baza de Date*

When starting QGIS for the first time not all core plugins are loaded.

7.1.11 Web

Meniul Opiunilor	Scurtătură	Referină	Bara de Instrumente
Metasearch		vedei *MetaSearch Catalogue Client*	*Web*

When starting QGIS for the first time not all core plugins are loaded.

7.1.12 Procesare

Meniul Opiunilor	Scurtătură	Referină	Bara de Instrumente
Toolbox		vedei *Instrumentarul*	
Graphical Modeler ...		vedei *Modelatorul grafic*	
History and log ...		vedei *Managerul istoricului*	
Options ...		vedei *Configurarea cadrului de procesare*	
Results viewer ...		vedei *Configurarea Aplicaiilor Externe*	
Commander	`Ctrl+Alt+M`	vedei *QGIS Commander*	

When starting QGIS for the first time not all core plugins are loaded.

7.1.13 Ajutor

Meniul Opiunilor	Scurtătură	Referină	Bara de Instrumente
Help Contents	`F1`		*Ajutor*
What's This?	`Shift+F1`		*Ajutor*
API Documentation			
Need commercial support?			
QGIS Home Page	`Ctrl+H`		
Check QGIS Version			
About			
QGIS Sponsors			

Please note that for Linux, the menu bar items listed above are the default ones in the KDE window manager. In GNOME, the *Settings* menu has different content and its items have to be found here:

Custom CRS	*Edit*
Style Manager	*Edit*
Configure Shortcuts	*Edit*
Customization	*Edit*
Options	*Edit*
Snapping Options ...	*Edit*

7.2 Bara de Instrumente

Bara de instrumente oferă acces la cele mai multe dintre funcii ca i meniurile, plus câteva instrumente suplimentare pentru a interaciona cu harta. Fiecare element din bara de instrumente are disponibilă o fereastră de tip pop-up. inei mouse-ul deasupra elementului i va fi afiată o scurtă descriere a funcionalităii instrumentului.

Every menu bar can be moved around according to your needs. Additionally, every menu bar can be switched off using your right mouse button context menu, holding the mouse over the toolbars (read also *Panels and Toolbars*).

Tip: Restaurare bare de instrumente

If you have accidentally hidden all your toolbars, you can get them back by choosing menu option *Settings* → *Toolbars* →. If a toolbar disappears under Windows, which seems to be a problem in QGIS from time to time, you have to remove key `\HKEY_CURRENT_USER\Software\QGIS\qgis\UI\state` in the registry. When you restart QGIS, the key is written again with the default state, and all toolbars are visible again.

7.3 Map Legend

The map legend area lists all the layers in the project. The checkbox in each legend entry can be used to show or hide the layer. The Legend toolbar in the map legend are list allow you to **Add group**, **Manage Layer Visibility** of all layers or manage preset layers combination, **Filter Legend by Map Content**, **Expand All** or **Collapse All** and **Remove Layer or Group**. The button allows you to add **Presets** views in the legend. It means that you can choose to display some layer with specific categorization and add this view to the **Presets** list. To add a preset view just click on , choose *Add Preset...* from the drop down menu and give a name to the preset. After that you will see a list with all the presets that you can recall pressing on the button.

Toate presetările adăugate sunt, de asemenea, prezente în harta compozitorului, pentru a vă permite să creai un aspect al hării pe baza opiniilor dumneavoastră (a se vedea *Proprietăi principale*).

Un strat poate fi selectat i deplasat în sus sau în jos în legendă, pentru a schimba ordinea Z. Ordinea Z stabilete că straturile enumerate mai aproape de partea de sus a legendei sunt desenate peste straturile enumerate mai jos.

Note: This behaviour can be overridden by the 'Layer order' panel.

Layers in the legend window can be organised into groups. There are two ways to do this:

1. Press the icon to add a new group. Type in a name for the group and press `Enter`. Now click on an existing layer and drag it onto the group.
2. Selectai mai multe straturi, facând clic dreapta în fereastra legendei i alegei *Grupul Selectat*.

Pentru a scoate un strat dintr-un grup, putei să-l tragei în afară, sau să facei clic dreapta pe el i să alegei *Make to toplevel item*. Grupurile pot fi, de asemenea, imbricate în interiorul altor grupuri.

Caseta grupului va afia sau ascunde toate straturile din grup cu un singur clic.

The content of the right mouse button context menu depends on whether the selected legend item is a raster or a vector layer. For GRASS vector layers, Toggle editing is not available. See section *Digitizarea i editarea unui strat vectorial GRASS* for information on editing GRASS vector layers.

Right mouse button menu for raster layers

- *Zoom to Layer*
- *Show in overview*
- *Zoom to Best Scale (100%)*
- *Remove*

- *Duplicate*
- *Setează Vizibilitatea Scării Stratului*
- *Set Layer CRS*
- *Obine CRS-ul Proiectului din Strat*
- *Stiluri →*
- *Save as ...*
- *Save As Layer Definition File ...*
- *Proprietăi*
- *Redenumire*

Additionally, according to layer position and selection

- *Mută la primul nivel*
- *Grup Selectat*

Right mouse button menu for vector layers

- *Zoom to Layer*
- *Show in overview*
- *Remove*
- *Duplicate*
- *Setează Vizibilitatea Scării Stratului*
- *Set Layer CRS*
- *Obine CRS-ul Proiectului din Strat*
- *Stiluri →*
- *Open Attribute Table*
- *Toggle Editing* (not available for GRASS layers)
- *Save As ...*
- *Save As Layer Definition Style*
- *Filtru*
- *Show Feature Count*
- *Proprietăi*
- *Redenumire*

Additionally, according to layer position and selection

- *Mută la primul nivel*
- *Grup Selectat*

Right mouse button menu for layer groups

- *Zoom to Group*
- *Remove*
- *Set Group CRS*
- *Redenumire*
- *Add Group*

Este posibilă selectarea mai multor straturi sau grupuri, în acelai timp, inând apăsată tasta `Ctrl` în timp ce selectai straturile cu butonul din stânga al mouse-ului. Putei muta apoi toate straturile selectate într-un nou grup, în acelai timp.

You may also delete more than one layer or group at once by selecting several layers with the `Ctrl` key and pressing `Ctrl+D` afterwards. This way, all selected layers or groups will be removed from the layers list.

7.3.1 Lucrul cu ordonarea independentă a straturilor din Legendă

There is a panel that allows you to define an independent drawing order for the map legend. You can activate it in the menu *Settings* → *Panels* → *Layer order*. This feature allows you to, for instance, order your layers in order of importance, but still display them in the correct order (see figure_layer_order). Checking the *Control rendering order* box underneath the list of layers will cause a revert to default behavior.

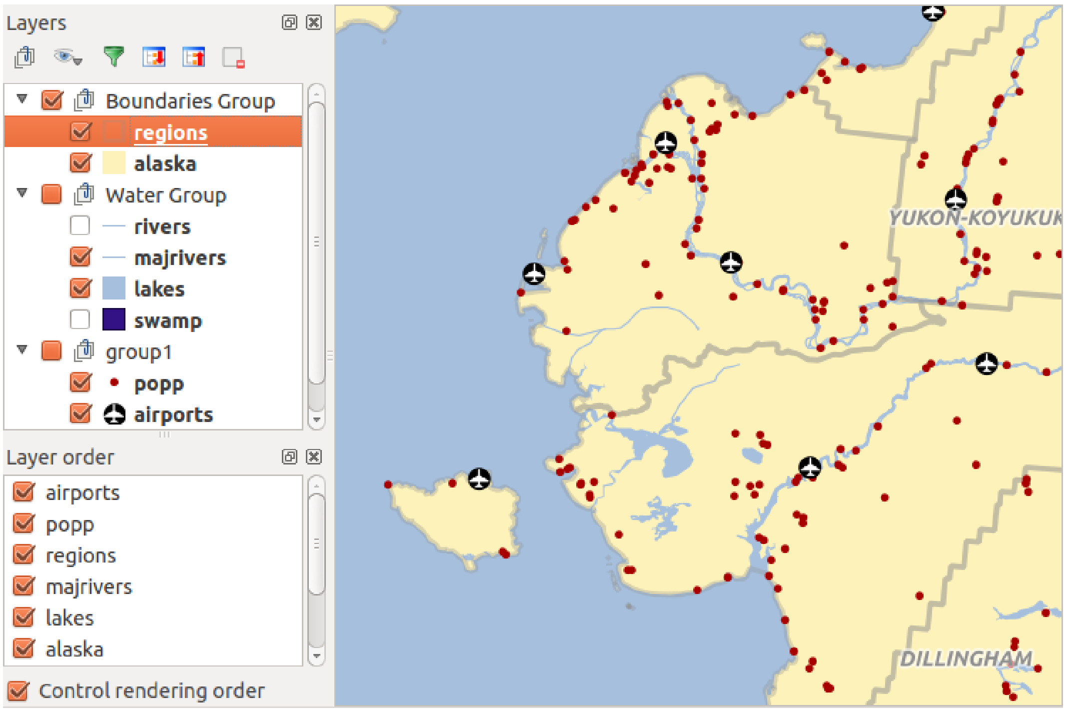

Figure 7.2: Define a legend independent layer order

7.4 Vizualizare Hartă

This is the "business end" of QGIS — maps are displayed in this area! The map displayed in this window will depend on the vector and raster layers you have chosen to load (see sections that follow for more information on how to load layers). The map view can be panned, shifting the focus of the map display to another region, and it can be zoomed in and out. Various other operations can be performed on the map as described in the toolbar description above. The map view and the legend are tightly bound to each other — the maps in view reflect changes you make in the legend area.

Tip: Mărirea Hării folosind Rotia Mouse-ului

Putei utiliza rotia mouse-ului pentru a mări sau a micora harta. Plasai cursorul mouse-ului în interiorul hării, i micai rotia înainte (dinspre dvs.) pentru a mări, i înapoi (înspre dvs.) pentru a micora. Transfocarea are loc din poziia cursorului mouse-ului. Putei personaliza comportamentul de transfocare al rotiei mouse-ului folosind meniul filei *Map tools* de sub *Settings* → *Options*.

Tip: Deplasarea Hării folosind Săgeile i Bara de Spaiu

Putei utiliza tastele cu săgei pentru a deplasa harta. Plasai cursorul mouse-ului în interiorul hării i apăsai tasta săgeii din dreapta pentru deplasarea înspre est, tasta săgeii din stânga pentru deplasarea înspre vest, tasta săgeii de sud pentru deplasarea înspre nord i tasta săgeii din jos pentru deplasarea înspre sud. Putei deplasa harta folosind bara de spaiu sau rotia mouse-ului: este suficient să mutai mouse-ul în timp ce inei apăsată bara de spaiu sau inând apăsată rotia mouse-ului.

7.5 Bara de Stare

The status bar shows you your current position in map coordinates (e.g., meters or decimal degrees) as the mouse pointer is moved across the map view. To the left of the coordinate display in the status bar is a small button that will toggle between showing coordinate position or the view extents of the map view as you pan and zoom in and out.

Next to the coordinate display you will find the scale display. It shows the scale of the map view. If you zoom in or out, QGIS shows you the current scale. There is a scale selector, which allows you to choose between predefined scales from 1:500 to 1:1000000.

În partea dreaptă a scării se poate defini o rotaie în sensul acelor de ceasornic, pentru vizualizarea hării, în grade.

A progress bar in the status bar shows the progress of rendering as each layer is drawn to the map view. In some cases, such as the gathering of statistics in raster layers, the progress bar will be used to show the status of lengthy operations.

If a new plugin or a plugin update is available, you will see a message at the far left of the status bar. On the right side of the status bar, there is a small checkbox which can be used to temporarily prevent layers being rendered to the map view (see section *Randare* below). The icon immediately stops the current map rendering process.

To the right of the render functions, you find the EPSG code of the current project CRS and a projector icon. Clicking on this opens the projection properties for the current project.

Tip: Calculează Scara Corectă a Canevasului Hării

When you start QGIS, the default units are degrees, and this means that QGIS will interpret any coordinate in your layer as specified in degrees. To get correct scale values, you can either change this setting to meters manually in the *General* tab under *Settings* → *Project Properties*, or you can select a project CRS clicking on the Current CRS: icon in the lower right-hand corner of the status bar. In the last case, the units are set to what the project projection specifies (e.g., '+units=m').

.

Instrumente generale

8.1 Combinaii de taste

QGIS provides default keyboard shortcuts for many features. You can find them in section *Bara de Meniuri*. Additionally, the menu option *Settings* → *Configure Shortcuts..* allows you to change the default keyboard shortcuts and to add new keyboard shortcuts to QGIS features.

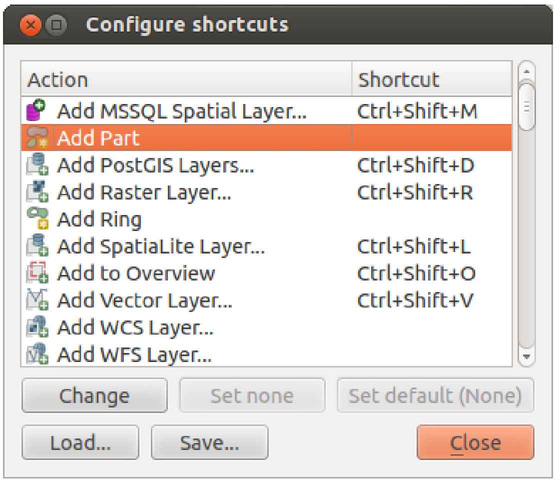

Figure 8.1: Define shortcut options (Gnome)

Configuration is very simple. Just select a feature from the list and click on **[Change]**, **[Set none]** or **[Set default]**. Once you have finished your configuration, you can save it as an XML file and load it to another QGIS installation.

8.2 Ajutor contextual

Când avei nevoie de ajutor pe un anumit subiect, putei accesa ajutorul contextual prin intermediul butonului **[Ajutor]**, disponibil in cele mai multe dialoguri — vă rugăm să reinei că plugin-urile tere pot avea pagini web dedicate.

8.3 Randare

By default, QGIS renders all visible layers whenever the map canvas is refreshed. The events that trigger a refresh of the map canvas include:

- Adăugarea unui strat

- Deplasare i transfocare
- Resizing the QGIS window
- Schimbarea vizibilităii unuia sau mai multor straturi

QGIS allows you to control the rendering process in a number of ways.

8.3.1 Randarea Dependentă de Scară

Randarea dependentă de scară vă permite să specificai scările minimă i maximă la care un strat va fi vizibil. Pentru a seta o randare dependentă de scară, deschidei *Properties* printr-un dublu-clic pe stratul din legendă. În fila *General*, facei clic pe caseta :guilabel:'Scale dependent visibility'pentru a activa funcia, apoi setai valorile pentru scările minimă.i maximă.

You can determine the scale values by first zooming to the level you want to use and noting the scale value in the QGIS status bar.

8.3.2 Controarea Randării Hărilor

Map rendering can be controlled in the various ways, as described below.

Suspendarea Randării

To suspend rendering, click the *Render* checkbox in the lower right corner of the status bar. When the *Render* checkbox is not checked, QGIS does not redraw the canvas in response to any of the events described in section *Randare*. Examples of when you might want to suspend rendering include:

- Adăugarea mai multor straturi i simbolizarea lor înainte de desenare
- Adăugarea unuia sau a mai multor straturi mari, i stabilirea dependenei de scară înainte de desenare
- Adăugarea unuia sau a mai multe straturi mari, i transfocarea la o vizualizare specifică înainte de desenare
- Orice combinaie a celor de mai sus

Bifarea casetei *Randare* activează randarea i provoacă o reîmprospătare imediată a canevasului hării.

Setarea Opiunilor de Adăugare a Stratului

Putei seta o opiune pentru a încărca mereu noi straturi, fără a le desena. Acest lucru înseamnă că stratul va fi adăugat la hartă, dar caseta sa de vizibilitate din legendă va fi debifată din oficiu. Pentru a seta această opiune, selectai opiunea de meniu *Settings* → *Options*, apoi facei clic pe fila *Rendering*. Debifai caseta *În mod implicit, straturile nou adăugate pe hartă ar trebui să fie vizibile*. Orice strat adăugat ulterior pe harta va fi stins (invizibil), în mod implicit.

Oprirea Randării

Pentru a opri desenarea hării, apăsai tasta `ESC`. Acest lucru va opri reîmprospătarea canevasului, lăsând harta parial desenată. Este posibil să dureze ceva timp între apăsarea tastei `ESC` i momentul în care desenarea hării se oprete.

Note: În acest moment nu este posibilă oprirea randării — acest lucru a fost dezactivat în portarea de Qt4, din cauza problemelor i a defectelor Interfeei cu Utilizatorul (UI).

Updating the Map Display During Rendering

You can set an option to update the map display as features are drawn. By default, QGIS does not display any features for a layer until the entire layer has been rendered. To update the display as features are read from the datastore, choose menu option *Settings* → *Options* and click on the *Rendering* tab. Set the feature count to an appropriate value to update the display during rendering. Setting a value of 0 disables update during drawing (this is the default). Setting a value too low will result in poor performance, as the map canvas is continually updated during the reading of the features. A suggested value to start with is 500.

Influenarea Calităii Randării

To influence the rendering quality of the map, you have two options. Choose menu option *Settings* → *Options*, click on the *Rendering* tab and select or deselect following checkboxes:

- *Make lines appear less jagged at the expense of some drawing performance*
- *Fix problems with incorrectly filled polygons*

Accelerează randarea

There are two settings that allow you to improve rendering speed. Open the QGIS options dialog using *Settings* → *Options*, go to the *Rendering* tab and select or deselect the following checkboxes:

- *Enable back buffer*. This provides better graphics performance at the cost of losing the possibility to cancel rendering and incrementally draw features. If it is unchecked, you can set the *Number of features to draw before updating the display*, otherwise this option is inactive.
- *Se folosete memoria tampon, acolo unde este posibil, pentru a se accelera redesenarea*

8.4 Măsurarea

Measuring works within projected coordinate systems (e.g., UTM) and unprojected data. If the loaded map is defined with a geographic coordinate system (latitude/longitude), the results from line or area measurements will be incorrect. To fix this, you need to set an appropriate map coordinate system (see section *Lucrul cu Proiecii*). All measuring modules also use the snapping settings from the digitizing module. This is useful, if you want to measure along lines or areas in vector layers.

To select a measuring tool, click on and select the tool you want to use.

8.4.1 Measure length, areas and angles

Measure Line: QGIS is able to measure real distances between given points according to a defined ellipsoid. To configure this, choose menu option *Settings* → *Options*, click on the *Map tools* tab and select the appropriate ellipsoid. There, you can also define a rubberband color and your preferred measurement units (meters or feet) and angle units (degrees, radians and gon). The tool then allows you to click points on the map. Each segment length, as well as the total, shows up in the measure window. To stop measuring, click your right mouse button. Note that you can interactively change the measurement units in the measurement dialog. It overrides the *Preferred measurement units* in the options. There is an info section in the dialog that shows which CRS settings are being used during measurement calculations.

Measure Area: Areas can also be measured. In the measure window, the accumulated area size appears. In addition, the measuring tool will snap to the currently selected layer, provided that layer has its snapping tolerance set (see section *Setarea Toleranei Acroării i Căutarea Razei*). So, if you want to measure exactly along a line

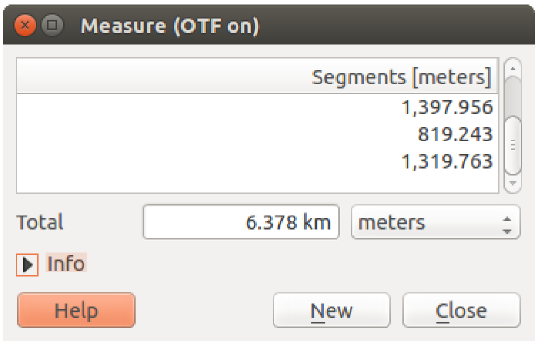

Figure 8.2: Measure Distance (Gnome)

feature, or around a polygon feature, first set its snapping tolerance, then select the layer. Now, when using the measuring tools, each mouse click (within the tolerance setting) will snap to that layer.

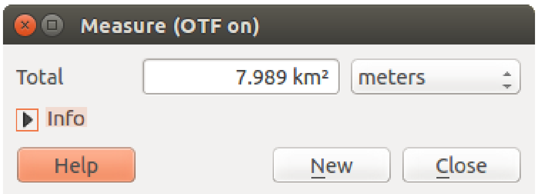

Figure 8.3: Measure Area (Gnome)

Measure Angle: You can also measure angles. The cursor becomes cross-shaped. Click to draw the first segment of the angle you wish to measure, then move the cursor to draw the desired angle. The measure is displayed in a pop-up dialog.

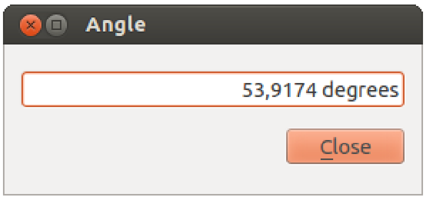

Figure 8.4: Measure Angle (Gnome)

8.4.2 Salvarea i deselectarea entităilor

The QGIS toolbar provides several tools to select features in the map canvas. To select one or several features, just click on and select your tool:

- Select Single Feature
- Select Features by Rectangle
- Select Features by Polygon
- Select Features by Freehand
- Select Features by Radius

To deselect all selected features click on Deselect features from all layers.

Select feature using an expression allow user to select feature using expression dialog. See *Expresii* chapter for some example.

Users can save features selection into a **New Memory Vector Layer** or a **New Vector Layer** using *Edit* → *Paste Feature as ...* and choose the mode you want.

8.5 Identificare entităi

The Identify tool allows you to interact with the map canvas and get information on features in a pop-up window. To identify features, use *View* → *Identify features* or press `Ctrl + Shift + I`, or click on the Identify features icon in the toolbar.

If you click on several features, the *Identify results* dialog will list information about all the selected features. The first item is the number of the layer in the list of results, followed by the layer name. Then, its first child will be the name of a field with its value. The first field is the one selected in *Properties* → *Display*. Finally, all information about the feature is displayed.

Această fereastră poate fi setată pentru a afia câmpuri personalizate, dar, în mod implicit, ea va afia trei tipuri de informaii:

- Actions: Actions can be added to the identify feature windows. When clicking on the action label, action will be run. By default, only one action is added, to view feature form for editing.
- Derived: This information is calculated or derived from other information. You can find clicked coordinate, X and Y coordinates, area in map units and perimeter in map units for polygons, length in map units for lines and feature ids.
- Data attributes: This is the list of attribute fields from the data.

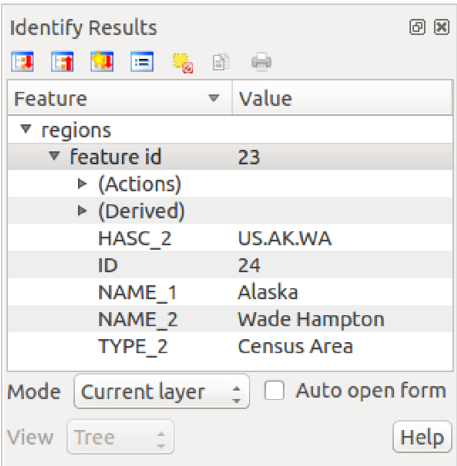

Figure 8.5: Identify feaures dialog (Gnome)

At the top of the window, you have five icons:

- Expand tree
- Collapse tree
- Default behaviour
- Copy attributes
- Print selected HTML response

At the bottom of the window, you have the *Mode* and *View* comboboxes. With the *Mode* combobox you can define the identify mode: 'Current layer', 'Top down, stop at first', 'Top down' and 'Layer selection'. The *View* can be set as 'Tree', 'Table' and 'Graph'.

The identify tool allows you to auto open a form. In this mode you can change the feautures attributes.

Alte funcii pot fi găsite în meniul contextual al elementului identificat. De exemplu, din meniul contextual putei:

- Vizualiza formularul entităii
- Transfocare pe entitate
- Copia entităi: Copierea tuturor entităilor geometrice i a atributelor
- Toggle feature selection: adds identified feature to selection
- Copia valoarea atributului: Copie doar valoarea atributului pe care facei clic
- Copy feature attributes: Copy only attributes
- terge rezultatele: Elimină rezultatele din fereastră
- Elimina evidenierea: Anulează evidenierea entităilor de pe hartă
- Evideniază tot
- Evideniere strat
- Activa stratul: Alegei un strat pentru a fi activat
- Afia proprietăile straturilor: Deschide fereastra de proprietăi a unui strat
- Expandează tot
- Restrânge tot

8.6 Decoraiuni

The Decorations of QGIS include the Grid, the Copyright Label, the North Arrow and the Scale Bar. They are used to 'decorate' the map by adding cartographic elements.

8.6.1 Grilă

Grid vă permite să adăugai o reea de coordonate i să coordonai adnotările din canevasul hării.

1. Selectai din meniul *View* → *Decorations* → *Grid*. Se va lansa dialogul (vedei figure_decorations_1).
2. Activează caseta *Enable grid* i stabilii definiii de grile în funcie de straturile încărcate în canevasul hării.
3. Activai caseta *Draw annotations* i stabilii definiiile adnotărilor în conformitate cu straturile încărcate în canevasul hării.
4. Click **[Apply]** to verify that it looks as expected.
5. Click **[OK]** to close the dialog.

8.6.2 Eticheta Drepturilor de Autor

Copyright label adds a copyright label using the text you prefer to the map.

1. Selectai din meniul *View* → *Decorations* → *Copyright Label*. Se va lansa dialogul (see figure_decorations_2).
2. Introducei textul pe care dorii să-l plasai pe hartă. Putei folosi HTML, aa cum se arată în exemplu.

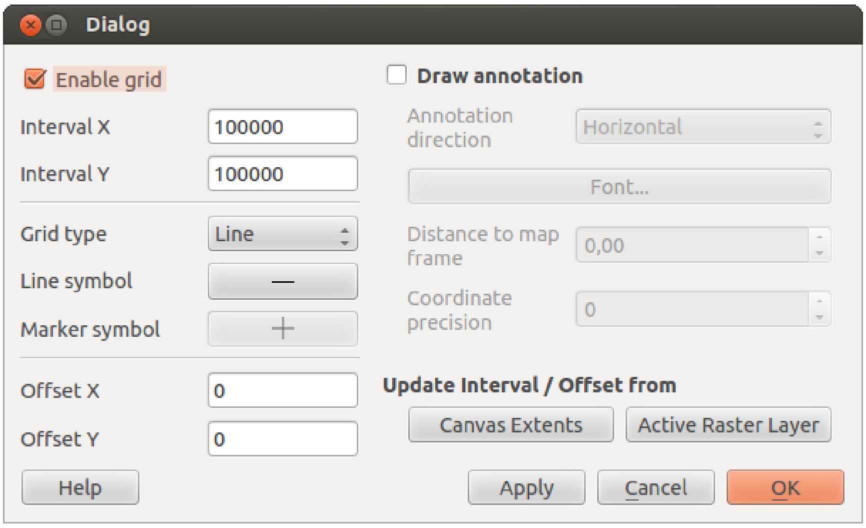

Figure 8.6: The Grid Dialog

Figure 8.7: The Copyright Dialog

3. Choose the placement of the label from the *Placement* combo box.
4. Asigurai-vă că este bifată caseta *Enable Copyright Label*.
5. Click **[OK]**.

In the example above, which is the default, QGIS places a copyright symbol followed by the date in the lower right-hand corner of the map canvas.

8.6.3 Săgeata Nordului

North Arrow places a simple north arrow on the map canvas. At present, there is only one style available. You can adjust the angle of the arrow or let QGIS set the direction automatically. If you choose to let QGIS determine the direction, it makes its best guess as to how the arrow should be oriented. For placement of the arrow, you have four options, corresponding to the four corners of the map canvas.

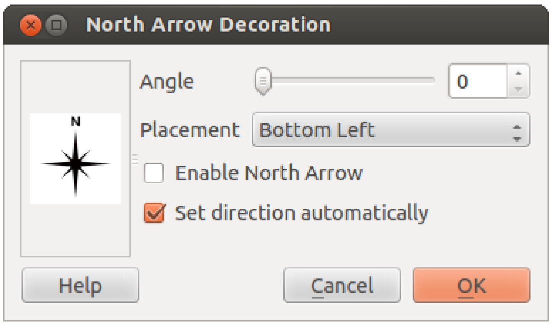

Figure 8.8: The North Arrow Dialog

8.6.4 Scara Grafică

Scale Bar adds a simple scale bar to the map canvas. You can control the style and placement, as well as the labeling of the bar.

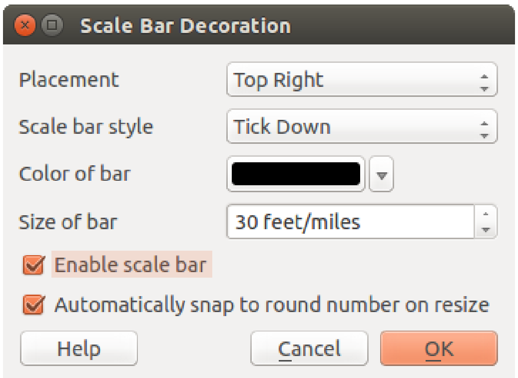

Figure 8.9: The Scale Bar Dialog

QGIS only supports displaying the scale in the same units as your map frame. So if the units of your layers are in meters, you can't create a scale bar in feet. Likewise, if you are using decimal degrees, you can't create a scale bar to display distance in meters.

Pentru a adăuga o scară grafică:

1. Selectai meniul *View* → *Decorations* → *Scale Bar*. Fereastra de dialog se lansează (vedei figure_decorations_4).
2. Choose the placement from the *Placement* combo box.
3. Choose the style from the *Scale bar style* combo box.
4. Select the color for the bar *Color of bar* Border or use the default black color.
5. Set the size of the bar and its label *Size of bar* 1,00.
6. Asigurai-vă că este bifată caseta *Enable scale bar*.
7. Optionally, check *Automatically snap to round number on resize*.
8. Click **[OK]**.

Tip: Setările Decoraiunilor

Când salvai un proiect `.qgs`, orice modificări pe care le-ai adus Grilei, Săgeii Nordului, Scării Grafice i drepturilor de autor, vor fi salvate în cadrul proiectului i vor fi restaurate data viitoare când încărcai proiectul.

8.7 Instrumente de Adnotare

The Text Annotation tool in the attribute toolbar provides the possibility to place formatted text in a balloon on the QGIS map canvas. Use the *Text Annotation* tool and click into the map canvas.

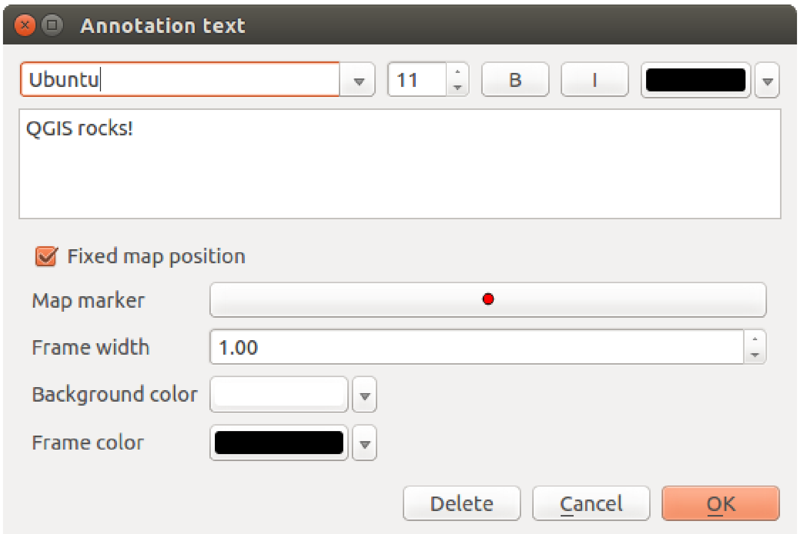

Figure 8.10: Annotation text dialog

Efectuând dublu clic pe element se va deschide un dialog cu diverse opiuni. Cu ajutorul editorului de text se va introduce textul formatat i alte setări de elemente. De exemplu, apare opiunea de a poziiona elementul pe hartă (atribuindu-i un simbol de marcare) sau de a-l poziiona pe ecran (neavând legătură cu harta). Elementul poate fi deplasat prin poziionarea pe hartă (prin glisarea marcajului) sau prin deplasarea numai a balonului. Pictogramele sunt parte a temei GIS, ele fiind utilizate, în mod implicit, i în alte teme.

The Move Annotation tool allows you to move the annotation on the map canvas.

8.7.1 Adnotări de tip html

The Html Annotation tools in the attribute toolbar provides the possibility to place the content of an html file in a balloon on the QGIS map canvas. Using the *Html Annotation* tool, click into the map canvas and add the path to the html file into the dialog.

8.7.2 Adnotări SVG

The SVG Annotation tool in the attribute toolbar provides the possibility to place an SVG symbol in a balloon on the QGIS map canvas. Using the *SVG Annotation* tool, click into the map canvas and add the path to the SVG file into the dialog.

8.7.3 Adnotări de tip formular

Additionally, you can also create your own annotation forms. The Form Annotation tool is useful to display attributes of a vector layer in a customized Qt Designer form (see figure_custom_annotation). This is similar to the designer forms for the *Identify features* tool, but displayed in an annotation item. Also see this video https://www.youtube.com/watch?v=0pDBuSbQ02o from Tim Sutton for more information.

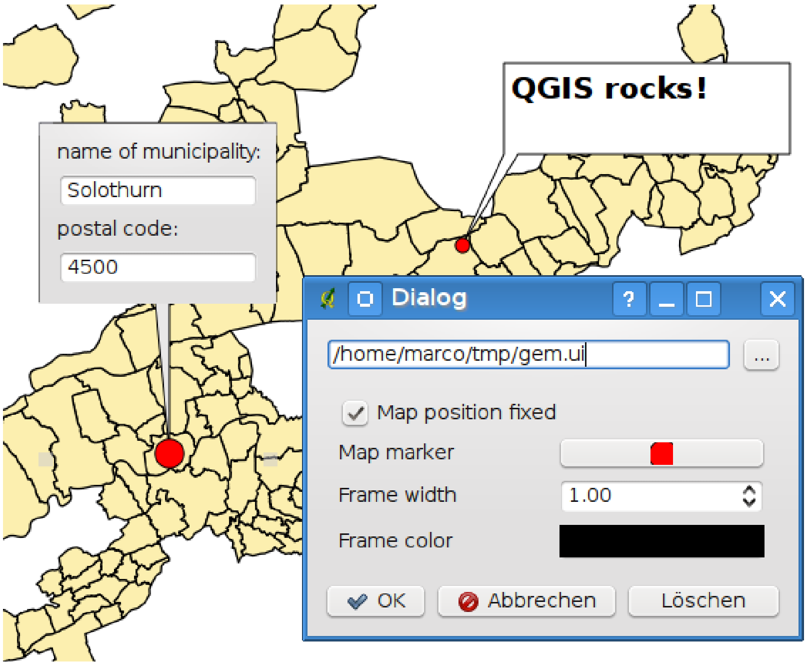

Figure 8.11: Customized qt designer annotation form

Note: Dacă apăsai `Ctrl+T`, atât timp cât instrumentul *Annotation* este activ (deplasare adnotare, adnotare text, formular de adnotare), starea de vizibilitate a elementelor este inversată.

8.8 Semne de Carte Spaiale

Spatial Bookmarks allow you to "bookmark" a geographic location and return to it later.

8.8.1 Crearea unui Semn de Carte

Pentru a crea un semn de carte:

1. Deplasare sau transfocare în zona de interes.
2. Select the menu option *View* → *New Bookmark* or press `Ctrl-B`.
3. Introducei un nume descriptiv pentru marcaj (până la 255 de caractere).
4. Press `Enter` to add the bookmark or **[Delete]** to remove the bookmark.

Reinei că putei avea mai multe marcaje cu acelai nume.

8.8.2 Lucrul cu Marcaje

To use or manage bookmarks, select the menu option *View* → *Show Bookmarks*. The *Geospatial Bookmarks* dialog allows you to zoom to or delete a bookmark. You cannot edit the bookmark name or coordinates.

8.8.3 Zooming to a Bookmark

From the *Geospatial Bookmarks* dialog, select the desired bookmark by clicking on it, then click **[Zoom To]**. You can also zoom to a bookmark by double-clicking on it.

8.8.4 Deleting a Bookmark

To delete a bookmark from the *Geospatial Bookmarks* dialog, click on it, then click **[Delete]**. Confirm your choice by clicking **[Yes]**, or cancel the delete by clicking **[No]**.

8.8.5 Import or export a bookmark

To share or transfer your bookmarks between computers you can use the *Share* pull down menu in the *Geospatial Bookmarks* dialog.

8.9 Imbricarea Proiectelor

Dacă dorii să încorporai coninutul din alte fiiere de proiect în proiectul dumneavoastră, putei alege *Layer* → *Embed Layers and Groups*.

8.9.1 Încapsularea straturilor

Urmatorul dialog vă permite să încorporai straturile din alte proiecte. Iată un mic exemplu:

1. Press  to look for another project from the Alaska dataset.
2. Select the project file `grassland`. You can see the content of the project (see figure_embed_dialog).
3. Press `Ctrl` and click on the layers `grassland` and `regions`. Press **[OK]**. The selected layers are embedded in the map legend and the map view now.

Atât timp cât straturile încapsulate sunt editabile, nu le putei schimba proprietăile, cum ar fi stilul i etichetarea.

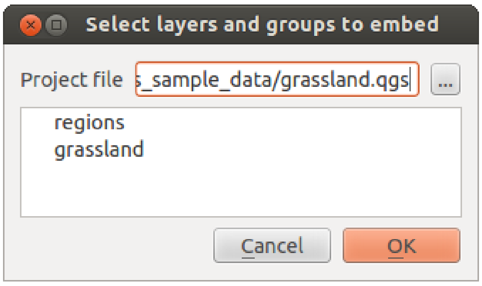

Figure 8.12: Select layers and groups to embed

8.9.2 Eliminare straturi încapsulate

Right-click on the embedded layer and choose Remove.

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QGIS Configuration

QGIS is highly configurable through the *Settings* menu. Choose between Panels, Toolbars, Project Properties, Options and Customization.

Note: QGIS follows desktop guidelines for the location of options and project properties item. Consequently related to the OS you are using, location of some of items described above could be located in the *View* menu (Panels and Toolbars) or in *Project* for Options.

9.1 Panels and Toolbars

In the *Panels*→ menu, you can switch on and off QGIS widgets. The *Toolbars*→ menu provides the possibility to switch on and off icon groups in the QGIS toolbar (see figure_panels_toolbars).

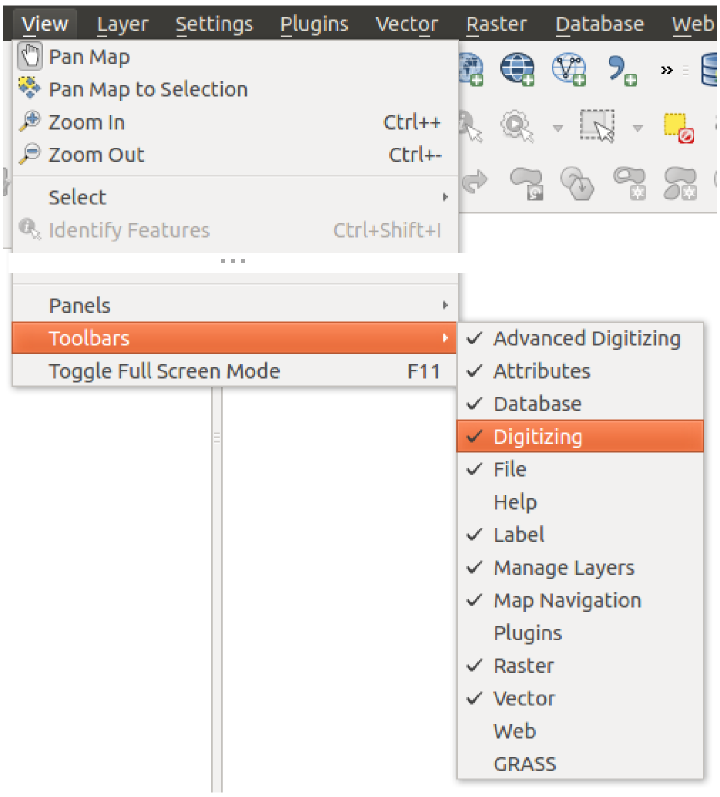

Figure 9.1: The Panels and Toolbars menu

Tip: Activating the QGIS Overview

In QGIS, you can use an overview panel that provides a full extent view of layers added to it. It can be selected under the menu *Settings* → *Panels* or *View* → *Panels*. Within the view is a rectangle showing the current map extent. This allows you to quickly determine which area of the map you are currently viewing. Note that labels are not rendered to the map overview even if the layers in the map overview have been set up for labeling. If you click and drag the red rectangle in the overview that shows your current extent, the main map view will update accordingly.

Tip: Show Log Messages

It's possible to track the QGIS messages. You can activate *Log Messages* in the menu *Settings* → *Panels* or *View* → *Panels* and follow the messages that appear in the different tabs during loading and operation.

9.2 Proprietăţi Proiect

In the properties window for the project under *Settings* → *Project Properties* (kde) or *Project* → *Project Properties* (Gnome), you can set project-specific options. These include:

- In the *General* menu, the project title, selection and background color, layer units, precision, and the option to save relative paths to layers can be defined. If the CRS transformation is on, you can choose an ellipsoid for distance calculations. You can define the canvas units (only used when CRS transformation is disabled) and the precision of decimal places to use. You can also define a project scale list, which overrides the global predefined scales.
- The *CRS* menu enables you to choose the Coordinate Reference System for this project, and to enable on-the-fly re-projection of raster and vector layers when displaying layers from a different CRS.
- With the third *Identify layers* menu, you set (or disable) which layers will respond to the identify tool (see the "Map tools" paragraph from the *Opţiuni* section to enable identifying of multiple layers).
- The *Default Styles* menu lets you control how new layers will be drawn when they do not have an existing `.qml` style defined. You can also set the default transparency level for new layers and whether symbols should have random colours assigned to them. There is also an additional section where you can define specific colors for the running project. You can find the added colors in the drop down menu of the color dialog window present in each renderer.
- The tab *OWS Server* allows you to define information about the QGIS Server WMS and WFS capabilities, extent and CRS restrictions.
- The *Macros* menu is used to edit Python macros for projects. Currently, only three macros are available: `openProject()`, `saveProject()` and `closeProject()`.
- Meniul *Relaiilor* este folosit pentru a defini relaiile 1:n. Relaiile sunt definite în fereastra proprietăilor proiectului. O dată ce există relaii pentru un strat, un nou element de interfaă cu utilizatorul, de tip formular (de exemplu, atunci când se identifică o entitate i se deschide formularul acesteia) va lista entităile aferente. Acest lucru oferă o modalitate puternică de a exprima, de exemplu, istoria inspeciilor de-a lungul unei conducte sau a unui segment de drum. Putei afla mai multe despre suportul pentru relaiile 1:n în Seciunea *Creating one to many relations*.

9.3 Opţiuni

Some basic options for QGIS can be selected using the *Options* dialog. Select the menu option *Settings* → *Options*. The tabs where you can customize your options are described below.

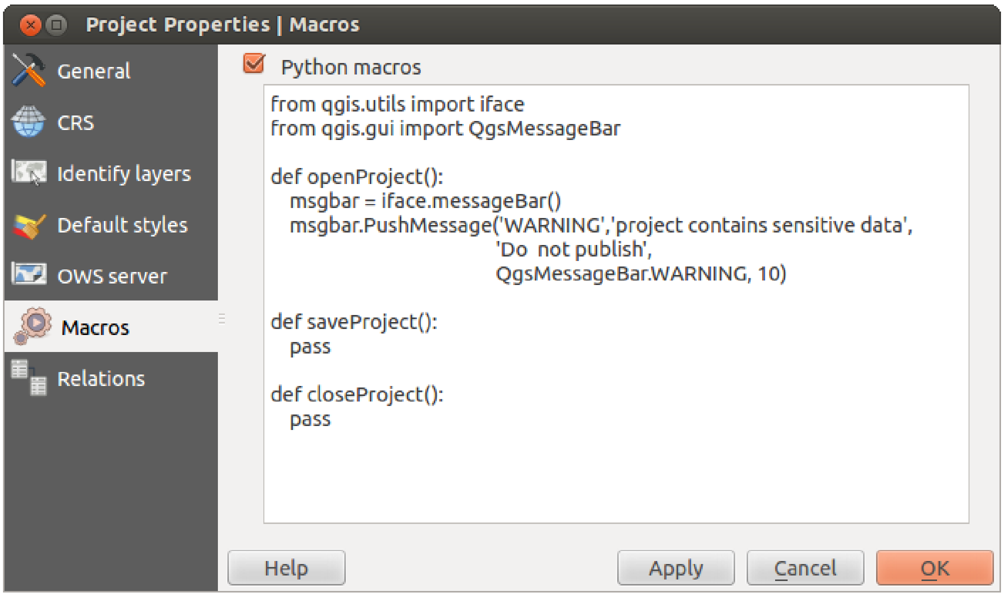

Figure 9.2: Macro settings in QGIS

9.3.1 Meniu General

Aplicaie

- Select the *Style (QGIS restart required)* and choose between 'Oxygen','Windows','Motif','CDE', 'Plastique' and 'Cleanlooks' ().
- Define the *Icon theme* . Currently only 'default' is possible.
- Define the *Icon size* .
- Define the *Font*. Choose between *Qt default* and a user-defined font.
- Change the *Timeout for timed messages or dialogs* .
- *Ascundere fereastră de întâmpinare*
- *Afiează sfaturi la pornire*
- *Titluri îngroate pentru casetele grupurilor*
- *Stilizare QGIS pentru casetele grupurilor*
- *Se folosete fereastra nativă de alegere a culorii*
- *Se folosete fereastra interactivă de alegere a culorii*
- *Custom side bar style*
- *Suport experimental de rotaie a canevasului (este necesar restartul)*

Fiierele proiectului

- *Open project on launch* (choose between 'New', 'Most recent' and 'Specific'). When choosing 'Specific' use the to define a project.
- *Create new project from default project*. You have the possibility to press on *Set current project as default* or on *Reset default*. You can browse through your files and define a directory where you find your

user-defined project templates. This will be added to *Project → New From Template*. If you first activate *Create new project from default project* and then save a project in the project templates folder.

- :guilabel:'Se solicită salvarea modifcărilor din proiect i din sursa de date, atunci când este necesar
- *Se solicită confirmarea atunci când un strat va fi eliminat*
- *Avertizare la deschiderea unui fier de proiect salvat cu o versiune de QGIS mai veche*
- *Enable macros* . This option was created to handle macros that are written to perform an action on project events. You can choose between 'Never', 'Ask', 'For this session only' and 'Always (not recommended)'.

9.3.2 Meniul Sistemului

Mediu

Variabilele de mediu ale sistemului pot fi acum vizualizate, iar multe dintre ele pot fi configurate în grupul **Environment** (v. figure_environment_variables). Acest lucru este util pentru platforme, cum ar fi Mac, unde interfaa unei aplicaii nu motenete în mod obligatoriu variabilele de mediu ale utilizatorului. De asemenea, este util i la stabilirea/vizualizarea variabilelor de mediu pentru seturile de instrumente externe, controlate de instrumentele Processing (ex.: SAGA, GRASS), i pentru a depana ieirile provenite din anumite seciuni ale codului sursă.

- *Use custom variables (restart required - include separators)*. You can **[Add]** and **[Remove]** variables. Already-defined environment variables are displayed in *Current environment variables*, and it's possible to filter them by activating *Show only QGIS-specific variables*.

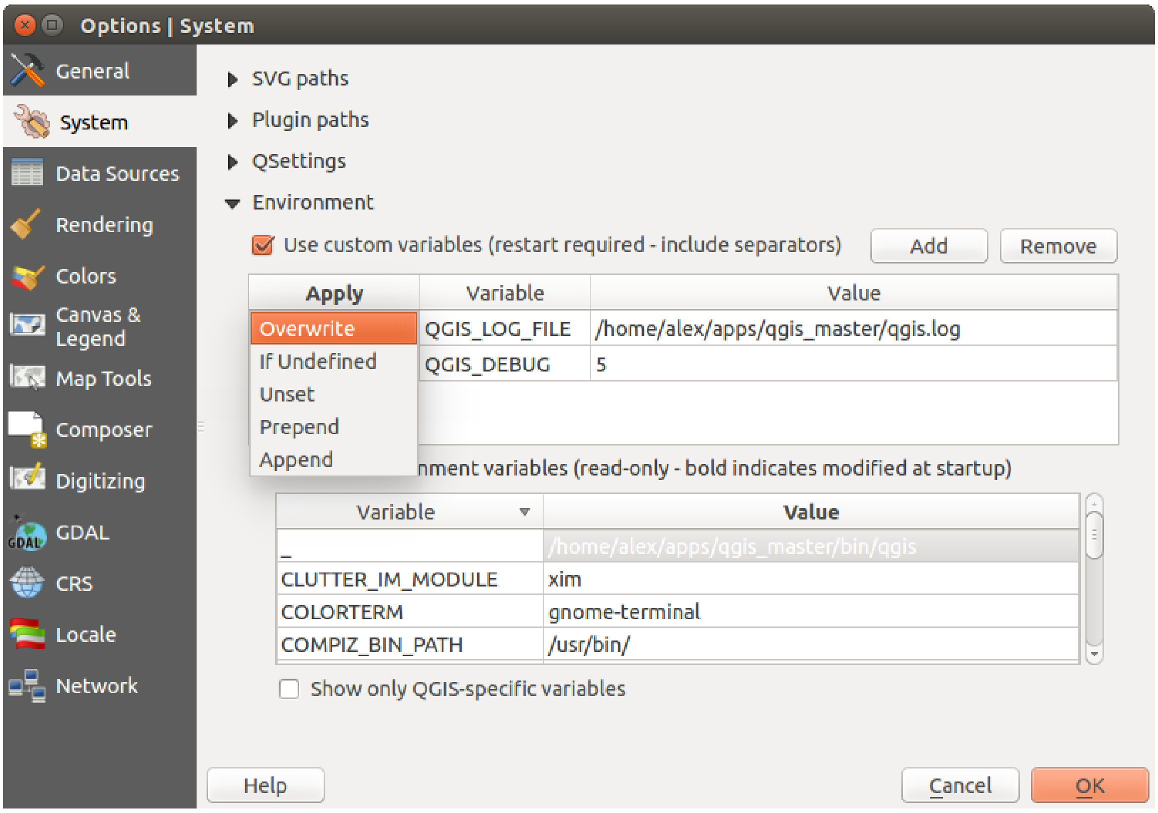

Figure 9.3: System environment variables in QGIS

Căile plugin-urilor

[Adăugai] sau **[Eliminai]** :Căil(e) către bibliotecile suplimentare cu plugin-uri C++'

9.3.3 Meniul Surselor de Date

Atributele şi tabela entitãii

- *Deschidere tabelă de atribute într-o fereastră detaabilă (este necesară restartarea QGIS)*
- *Copy geometry in WKT representation from attribute table*. When using Copy selected rows to clipboard from the *Attribute table* dialog, this has the result that the coordinates of points or vertices are also copied to the clipboard.
- *Attribute table behaviour* . There are three possibilities: 'Show all features', 'Show selected features' and 'Show features visible on map'.
- *Attribute table row cache* 1,00. This row cache makes it possible to save the last loaded N attribute rows so that working with the attribute table will be quicker. The cache will be deleted when closing the attribute table.
- *Representation for NULL values*. Here, you can define a value for data fields containing a NULL value.

Gestiunea surselor de date

- *Scan for valid items in the browser dock* . You can choose between 'Check extension' and 'Check file contents'.
- *Scan for contents of compressed files (.zip) in browser dock* . 'No', 'Basic scan' and 'Full scan' are possible.
- *Prompt for raster sublayers when opening*. Some rasters support sublayers — they are called subdatasets in GDAL. An example is netCDF files — if there are many netCDF variables, GDAL sees every variable as a subdataset. The option allows you to control how to deal with sublayers when a file with sublayers is opened. You have the following choices:
  - 'Always': Always ask (if there are existing sublayers)
  - 'If needed': Ask if layer has no bands, but has sublayers
  - 'Never': Never prompt, will not load anything
  - 'Load all': Never prompt, but load all sublayers
- *Ignore shapefile encoding declaration*. If a shapefile has encoding information, this will be ignored by QGIS.
- *Adăugare straturi PostGIS printr-un dublu clic i selectarea modului extins*
- *Adăugare straturi Oracle printr-un dublu clic i selectarea modului extins*

9.3.4 Meniul de Randare

Rendering behaviour

- *În mod implicit, noile straturi adăugate hării ar trebui să fie afiate*
- *Se folosete memoria tampon, acolo unde este posibil, pentru a se accelera redesenarea*
- *Straturile se randează în paralel, utilizând mai multe nuclee CPU*
- *Max cores to use*
- *Map update interval (default to 250 ms)*
- *Enable feature simplication by default for newly added layers*
- *Pragul de Simplificare*

- *Simplificarea are loc la furnizor, dacă este posibil*
- *Scara maximă la care stratul ar trebui să fie simplificat*

Calitatea randării

- *Liniile vor apărea mai puin zimate, cu preul unei pierderi de performanță la desenare*

Rastere

- With *RGB band selection*, you can define the number for the Red, Green and Blue band.

Îmbunătăţirea contrastului

- *Single band gray* . A single band gray can have 'No stretch', 'Stretch to MinMax', 'Stretch and Clip to MinMax' and also 'Clip to MinMax'.
- *Multi band color (byte/band)* . Options are 'No stretch', 'Stretch to MinMax', 'Stretch and Clip to MinMax' and 'Clip to MinMax'.
- *Multi band color (>byte/band)* . Options are 'No stretch', 'Stretch to MinMax', 'Stretch and Clip to MinMax' and 'Clip to MinMax'.
- *Limits (minimum/maximum)* . Options are 'Cumulative pixel count cut', 'Minimum/Maximum', 'Mean +/- standard deviation'.
- *Limitele reducerii numărului cumulat de pixeli*
- *Multiplicator pentru Abaterea Standard*

Depanare

- *Map canvas refresh*

9.3.5 Meniul Culorilor

This menu allows you to add some custom color that you can find in each color dialog window of the renderers. You will see a set of predefined colors in the tab: you can delete or edit all of them. Moreover you can add the color you want and perform some copy and paste operations. Finally you can export the color set as a `gpl` file or import them.

9.3.6 Meniul Canevasului i Legendei

Default map appearance (overridden by project properties)

- Definirea *Seleciei culorii* i a *Culorii Fundalului*.

Legenda stratului

- *Double click action in legend* . You can either 'Open layer properties' or 'Open attribute table' with the double click.
- The following *Legend item styles* are possible:
  - *Capitalizarea Numelor Straturilor*
  - *Nume de straturi îngroate*
  - *Nume de grupuri îngroate*
  - *Afiează numele atributului de clasificare*
  - *Creează pictogramele rasterului (poate dura mult)*

9.3.7 Meniul Instrumentelor pentru Hartă

This menu offers some options regarding the behaviour of the *Identify tool*.

- *Search radius for identifying and displaying map tips* is a tolerance factor expressed as a percentage of the map width. This means the identify tool will depict results as long as you click within this tolerance.
- *Highlight color* allows you to choose with which color should features being identified are to be highlighted.
- *Buffer* expressed as a percentage of the map width, determines a buffer distance to be rendered from the outline of the identify highlight.
- *Minimum width* expressed as a percentage of the map width, determines how thick should the outline of a highlighted object be.

Instrumentul de măsură

- Definete *Culoarea benzii elastice* a instrumentelor de măsurare
- Definire *Număr de zecimale*
- *Keep base unit*
- *Preferred measurements units* ('Meters', 'Feet', 'Nautical Miles' or 'Degrees')'
- *Preferred angle units* ('Degrees', 'Radians' or 'Gon')

Deplasare i transfocare

- Define *Mouse wheel action* ('Zoom', 'Zoom and recenter', 'Zoom to mouse cursor', 'Nothing')
- Definire *Factor de mărire* pentru rotia mouse-ului

Scări predefinite

Here, you find a list of predefined scales. With the **[+]** and **[-]** buttons you can add or remove your individual scales.

9.3.8 Meniul Compozitorului

Valori implicite pentru compoziie

You can define the *Default font* here.

Aspectul grilei

- Define the *Grid style* ('Solid', 'Dots', 'Crosses')
- Definii *Culoarea grilei*

Grilă i de ghidaje implicite

- Define the *Grid spacing* 1,00
- Define the *Grid offset* 1,00 for x and y
- Define the *Snap tolerance* 1,00

9.3.9 Meniul de Digitizare

Creare entitate

- *Suppress attributes pop-up windows after each created feature*
- *Se reutilizează ultimele valori introduse ale atributelor*

- *Validate geometries*. Editing complex lines and polygons with many nodes can result in very slow rendering. This is because the default validation procedures in QGIS can take a lot of time. To speed up rendering, it is possible to select GEOS geometry validation (starting from GEOS 3.3) or to switch it off. GEOS geometry validation is much faster, but the disadvantage is that only the first geometry problem will be reported.

Bandă elastică

- Define Rubberband *Line width* and *Line color*

Acroare

- *Deschidere opiuni de acroare într-o fereastră detaabilă (este necesară restartarea QGIS)*
- Define *Default snap mode* ('To vertex', 'To segment', 'To vertex and segment', 'Off')
- Define *Default snapping tolerance* in map units or pixels
- Definete *Raza de căutare pentru editarea vertecilor*, în unităi de hartă sau în pixeli

Simbolurile vertexului

- *Arată simbolurile numai pentru entităile selectate*
- Define vertex *Marker style* ('Cross' (default), 'Semi transparent circle' or 'None')
- Definete *Dimensiunea simbolului* pentru vertex

Instrument pentru curba de decalare

The next 3 options refer to the Offset Curve tool in *Digitizare avansată*. Through the various settings, it is possible to influence the shape of the line offset. These options are possible starting from GEOS 3.3.

- *Îmbinare stiluri*
- *Segmentele cvadrantului*
- *Miter limit*

9.3.10 Meniul GDAL

GDAL is a data exchange library for raster files. In this tab, you can *Edit create options* and *Edit Pyramids Options* of the raster formats. Define which GDAL driver is to be used for a raster format, as in some cases more than one GDAL driver is available.

9.3.11 Meniul CRS-ului

CRS-ul implicit pentru noile proiecte

- *Don't enable 'on the fly' reprojection*
- *Automatically enable 'on the fly' reprojection if layers have different CRS*
- *Enable 'on the fly' reprojection by default*
- Select a CRS and *Noile proiecte vor începe întotdeauna cu acest CRS*

CRS-ul pentru noile straturi

This area allows you to define the action to take when a new layer is created, or when a layer without a CRS is loaded.

- *Prompt for CRS*
- *Use project CRS*
- *Use default CRS*

Transformări de datum implicite

- *Cerere de transformare a datum-ului, atunci când nu este definit unul implicit*
- If you have worked with the 'on-the-fly' CRS transformation you can see the result of the transformation in the window below. You can find information about 'Source CRS' and 'Destination CRS' as well as 'Source datum transform' and 'Destination datum transform'.

9.3.12 Meniul Limbii

- *Overwrite system locale* and *Locale to use instead*
- Informaţii despre limba sistemului activ

9.3.13 Meniul Reţelei

Generalităi

- Define *WMS search address*, default is `http://geopole.org/wms/search?search=\%1\&type=rss`
- Definire *Timpul de ateptare pentru cererile de reea (ms)* - implicit este 60000
- Definire *Perioada de expirare prestabilită pentru plăcuele WMS-C/WMTS (ore)* - implicit este 24
- Define *Maximum de încercări, în cazul erorilor de obinere a plăcuei*
- Definire *User-Agent*

Setările memoriei tampon

Definirea *Directorului* i a unei *Dimensiuni* pentru memoria tampon.

- *Use proxy for web access* and define 'Host', 'Port', 'User', and 'Password'.
- Set the *Proxy type* according to your needs.
  - *Default Proxy*: Proxy is determined based on the application proxy set using
  - *Socks5Proxy*: Generic proxy for any kind of connection. Supports TCP, UDP, binding to a port (incoming connections) and authentication.
  - *HttpProxy*: Implemented using the "CONNECT" command, supports only outgoing TCP connections; supports authentication.
  - *HttpCachingProxy*: Implemented using normal HTTP commands, it is useful only in the context of HTTP requests.
  - *FtpCachingProxy*: Implemented using an FTP proxy, it is useful only in the context of FTP requests.

Excluding some URLs can be added to the text box below the proxy settings (see Figure_Network_Tab).

If you need more detailed information about the different proxy settings, please refer to the manual of the underlying QT library documentation at http://doc.trolltech.com/4.5/qnetworkproxy.html#ProxyType-enum.

Tip: Folosirea Proxi-urilor

Using proxies can sometimes be tricky. It is useful to proceed by 'trial and error' with the above proxy types, to check to see if they succeed in your case.

You can modify the options according to your needs. Some of the changes may require a restart of QGIS before they will be effective.

- Settings are saved in a text file: `$HOME/.config/QGIS/QGIS2.conf`
- X You can find your settings in: `$HOME/Library/Preferences/org.qgis.qgis.plist`

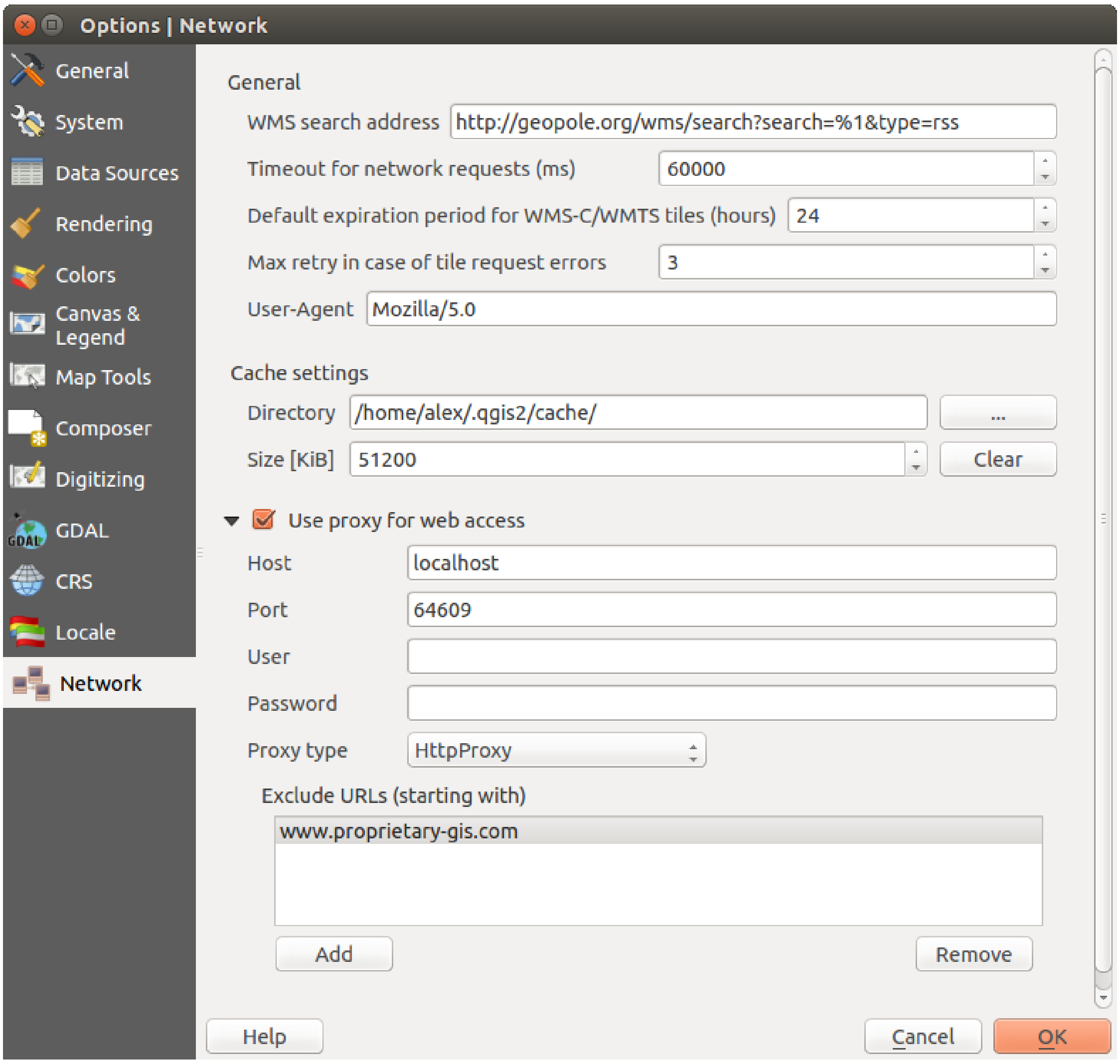

Figure 9.4: Proxy-settings in QGIS

- Settings are stored in the registry under: `HKEY\CURRENT_USER\Software\QGIS\qgis`

9.4 Personalizare

The customization tool lets you (de)activate almost every element in the QGIS user interface. This can be very useful if you have a lot of plugins installed that you never use and that are filling your screen.

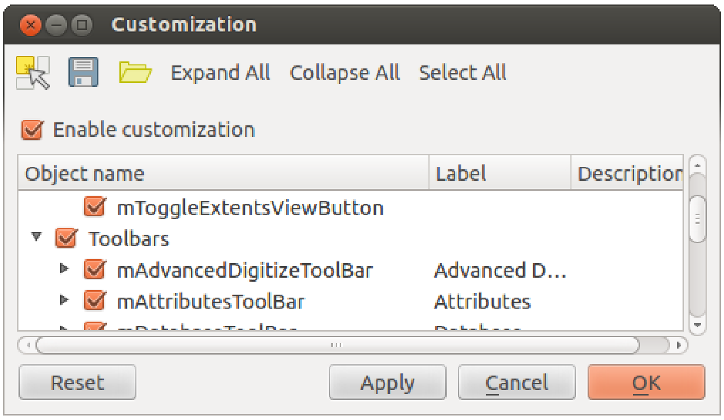

Figure 9.5: The Customization dialog

QGIS Customization is divided into five groups. In *Menus*, you can hide entries in the Menu bar. In *Panels*, you find the panel windows. Panel windows are applications that can be started and used as a floating, top-level window or embedded to the QGIS main window as a docked widget (see also *Panels and Toolbars*). In the *Status Bar*, features like the coordinate information can be deactivated. In *Toolbars*, you can (de)activate the toolbar icons of QGIS, and in *Widgets*, you can (de)activate dialogs as well as their buttons.

With Switch to catching widgets in main application, you can click on elements in QGIS that you want to be hidden and find the corresponding entry in Customization (see figure_customization). You can also save your various setups for different use cases as well. Before your changes are applied, you need to restart QGIS.

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CHAPTER 10

Lucrul cu Proiecii

QGIS allows users to define a global and project-wide CRS (coordinate reference system) for layers without a pre-defined CRS. It also allows the user to define custom coordinate reference systems and supports on-the-fly (OTF) projection of vector and raster layers. All of these features allow the user to display layers with different CRSs and have them overlay properly.

10.1 Privire de ansamblu asupra Suportului Proieciei

QGIS has support for approximately 2,700 known CRSs. Definitions for each CRS are stored in a SQLite database that is installed with QGIS. Normally, you do not need to manipulate the database directly. In fact, doing so may cause projection support to fail. Custom CRSs are stored in a user database. See section *Sistem Personalizat de Coordonate de Referină* for information on managing your custom coordinate reference systems.

The CRSs available in QGIS are based on those defined by the European Petroleum Search Group (EPSG) and the Institut Geographique National de France (IGNF) and are largely abstracted from the spatial reference tables used in GDAL. EPSG identifiers are present in the database and can be used to specify a CRS in QGIS.

In order to use OTF projection, either your data must contain information about its coordinate reference system or you will need to define a global, layer or project-wide CRS. For PostGIS layers, QGIS uses the spatial reference identifier that was specified when the layer was created. For data supported by OGR, QGIS relies on the presence of a recognized means of specifying the CRS. In the case of shapefiles, this means a file containing the well-known text (WKT) specification of the CRS. This projection file has the same base name as the shapefile and a `.prj` extension. For example, a shapefile named `alaska.shp` would have a corresponding projection file named `alaska.prj`.

Whenever you select a new CRS, the layer units will automatically be changed in the *General* tab of the *Project Properties* dialog under the *Project* (Gnome, OS X) or *Settings* (KDE, Windows) menu.

10.2 Specificaii Globale de Proiecie

QGIS starts each new project using the global default projection. The global default CRS is EPSG:4326 - WGS 84 (`proj=longlat +ellps=WGS84 +datum=WGS84 +no_defs`), and it comes predefined in QGIS. This default can be changed via the **[Select...]** button in the first section, which is used to define the default coordinate reference system for new projects, as shown in figure_projection_1. This choice will be saved for use in subsequent QGIS sessions.

When you use layers that do not have a CRS, you need to define how QGIS responds to these layers. This can be done globally or project-wide in the *CRS* tab under *Settings* → *Options*.

Opiunile prezentate în figure_projection_1 sunt:

- *Prompt for CRS*
- *Use project CRS*

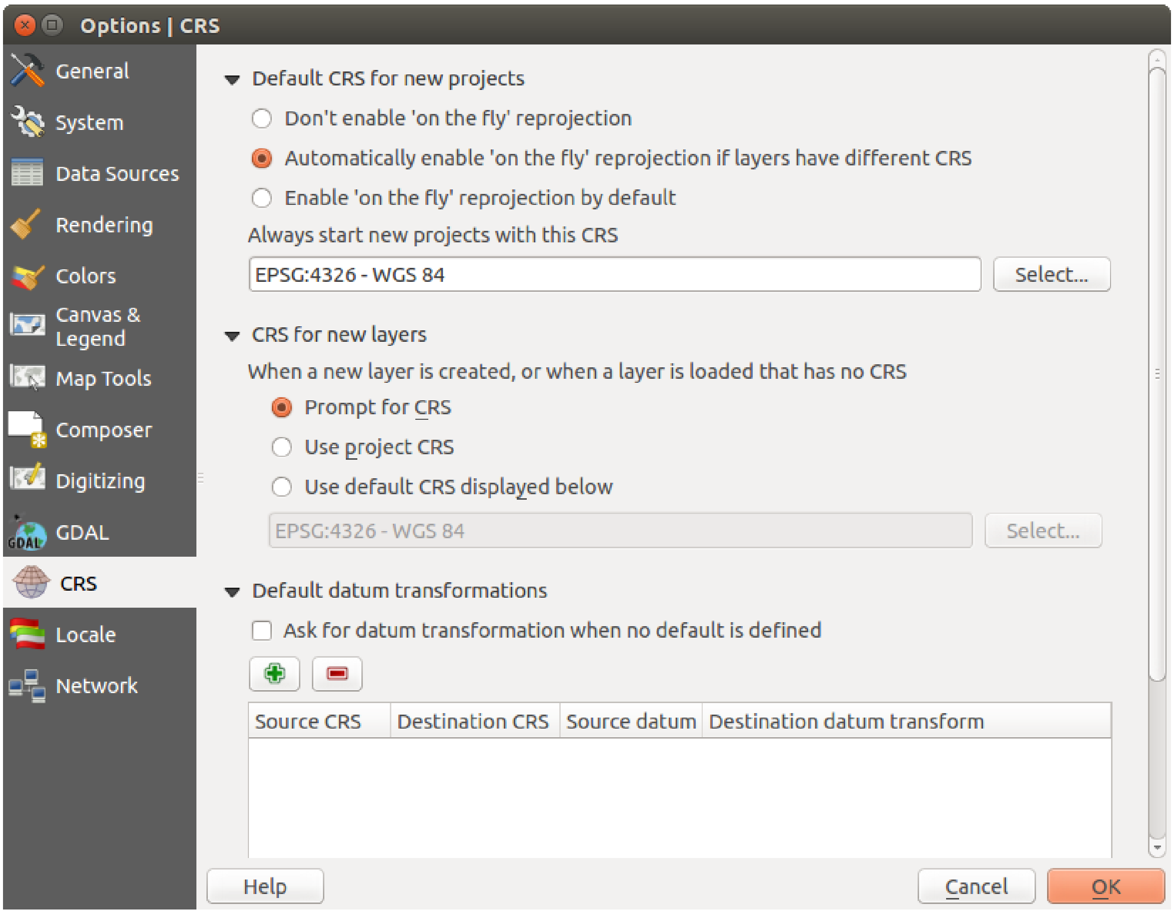

Figure 10.1: CRS tab in the QGIS Options Dialog

- *Use default CRS displayed below*

If you want to define the coordinate reference system for a certain layer without CRS information, you can also do that in the *General* tab of the raster and vector properties dialog (see *Meniu General* for rasters and *Meniu General* for vectors). If your layer already has a CRS defined, it will be displayed as shown in *Vector Layer Properties Dialog* .

Tip: CRS-ul din Legenda Hării

Right-clicking on a layer in the Map Legend (section *Map Legend*) provides two CRS shortcuts. *Set layer CRS* takes you directly to the Coordinate Reference System Selector dialog (see figure_projection_2). *Set project CRS from Layer* redefines the project CRS using the layer's CRS.

10.3 Definirea Din Zbor (OTF) a Reproiectării

QGIS supports OTF reprojection for both raster and vector data. However, OTF is not activated by default. To use OTF projection, you must activate the *Enable on the fly CRS transformation* checkbox in the *CRS* tab of the *Project Properties* dialog.

Există trei căi de a face asta:

1. Select *Project Properties* from the *Project* (Gnome, OSX) or *Settings* (KDE, Windows) menu.
2. Clic pe pictograma CRS status, din colul din dreapta-jos al barei de stare.
3. Turn OTF on by default in the *CRS* tab of the *Options* dialog by selecting *Enable 'on the fly' reprojection by default* or *Automatically enable 'on the fly' reprojection if layers have different CRS*.

If you have already loaded a layer and you want to enable OTF projection, the best practice is to open the *CRS* tab of the *Project Properties* dialog, select a CRS, and activate the *Enable 'on the fly' CRS transformation* checkbox. The CRS status icon will no longer be greyed out, and all layers will be OTF projected to the CRS shown next to the icon.

The *CRS* tab of the *Project Properties* dialog contains five important components, as shown in Figure_projection_2 and described below:

1. **Enable 'on the fly' CRS transformation** — This checkbox is used to enable or disable OTF projection. When off, each layer is drawn using the coordinates as read from the data source, and the components described below are inactive. When on, the coordinates in each layer are projected to the coordinate reference system defined for the map canvas.
2. **Filter** — If you know the EPSG code, the identifier, or the name for a coordinate reference system, you can use the search feature to find it. Enter the EPSG code, the identifier or the name.
3. **Recently used coordinate reference systems** — If you have certain CRSs that you frequently use in your everyday GIS work, these will be displayed in this list. Click on one of these items to select the associated CRS.
4. **Coordinate reference systems of the world** — This is a list of all CRSs supported by QGIS, including Geographic, Projected and Custom coordinate reference systems. To define a CRS, select it from the list by expanding the appropriate node and selecting the CRS. The active CRS is preselected.
5. **PROJ.4 text** — This is the CRS string used by the PROJ.4 projection engine. This text is read-only and provided for informational purposes.

Tip: Dialogul cu Proprietăţile Proiectului

If you open the *Project Properties* dialog from the *Project* menu, you must click on the *CRS* tab to view the CRS settings.

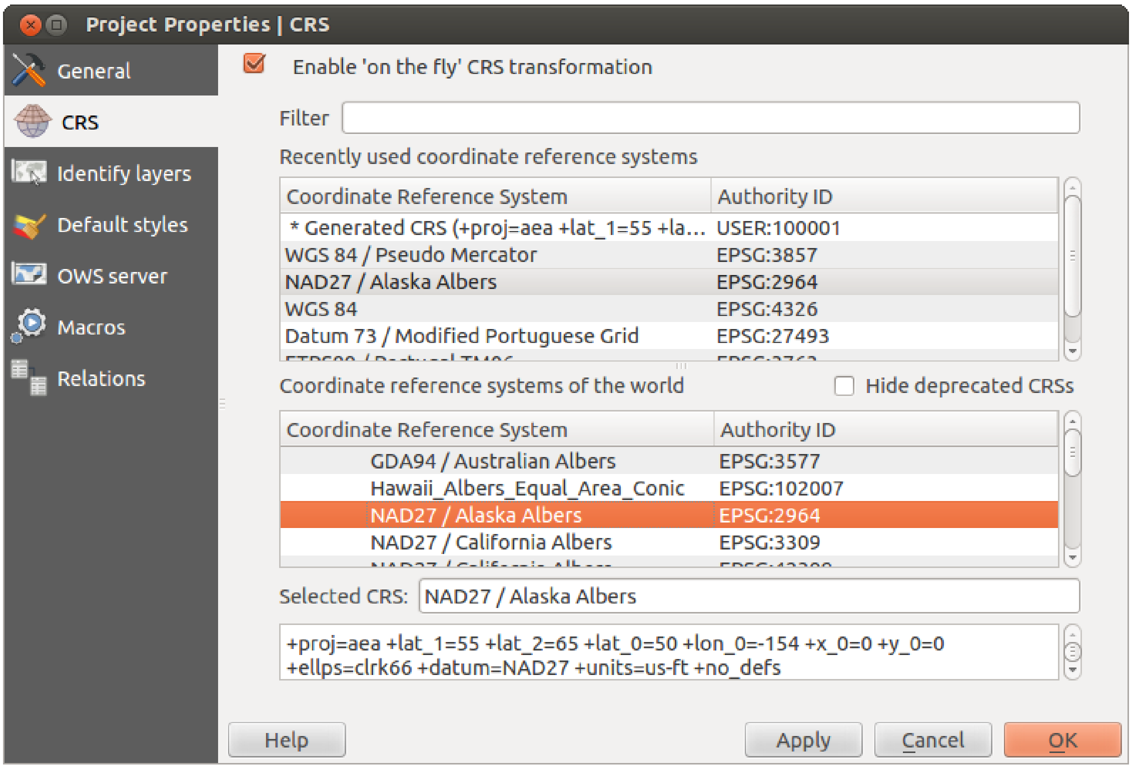

Figure 10.2: Project Properties Dialog

Opening the dialog from the CRS status icon will automatically bring the *CRS* tab to the front.

10.4 Sistem Personalizat de Coordonate de Referină

If QGIS does not provide the coordinate reference system you need, you can define a custom CRS. To define a CRS, select *Custom CRS...* from the *Settings* menu. Custom CRSs are stored in your QGIS user database. In addition to your custom CRSs, this database also contains your spatial bookmarks and other custom data.

Defining a custom CRS in QGIS requires a good understanding of the PROJ.4 projection library. To begin, refer to "Cartographic Projection Procedures for the UNIX Environment - A User's Manual" by Gerald I. Evenden, U.S. Geological Survey Open-File Report 90-284, 1990 (available at ftp://ftp.remotesensing.org/proj/OF90-284.pdf).

This manual describes the use of the `proj.4` and related command line utilities. The cartographic parameters used with `proj.4` are described in the user manual and are the same as those used by QGIS.

P entru a defini un utilizator CRS, dialogul de *Definire a Sistemului de Coordonate de Referină* necesită doar doi parametri:

1. Un nume descriptiv
2. Parametrii cartografici în format PROJ.4

To create a new CRS, click the Add new CRS button and enter a descriptive name and the CRS parameters.

Notai că *Parametrii* trebuie să înceapă cu un bloc `+proj=`, pentru a reprezenta noul sistem de coordonate.

You can test your CRS parameters to see if they give sane results. To do this, enter known WGS 84 latitude and longitude values in *North* and *East* fields, respectively. Click on **[Calculate]**, and compare the results with the known values in your coordinate reference system.

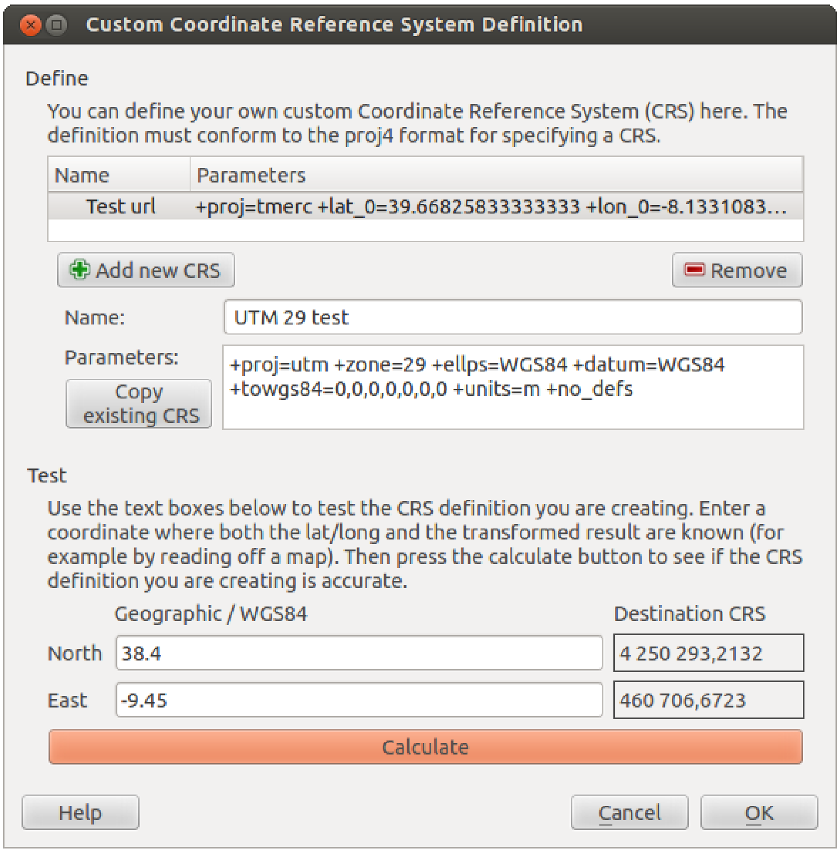

Figure 10.3: Custom CRS Dialog

10.5 Transformări de datum implicite

OTF depends on being able to transform data into a 'default CRS', and QGIS uses WGS84. For some CRS there are a number of transforms available. QGIS allows you to define the transformation used otherwise QGIS uses a default transformation.

In the *CRS* tab under *Settings* → *Options* you can:

- set QGIS to ask you when it needs define a transformation using *Ask for datum transformation when no default is defined*
- editarea unei liste de transformări de datum implicite.

QGIS asks which transformation to use by opening a dialogue box displaying PROJ.4 text describing the source and destination transforms. Further information may be found by hovering over a transform. User defaults can be saved by selecting *Remember selection*.

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CHAPTER 11

QGIS Browser

The QGIS Browser is a panel in QGIS that lets you easily navigate in your filesystem and manage geodata. You can have access to common vector files (e.g., ESRI shapefiles or MapInfo files), databases (e.g., PostGIS, Oracle, SpatiaLite or MS SQL Spatial) and WMS/WFS connections. You can also view your GRASS data (to get the data into QGIS, see *Integrarea GRASS GIS*).

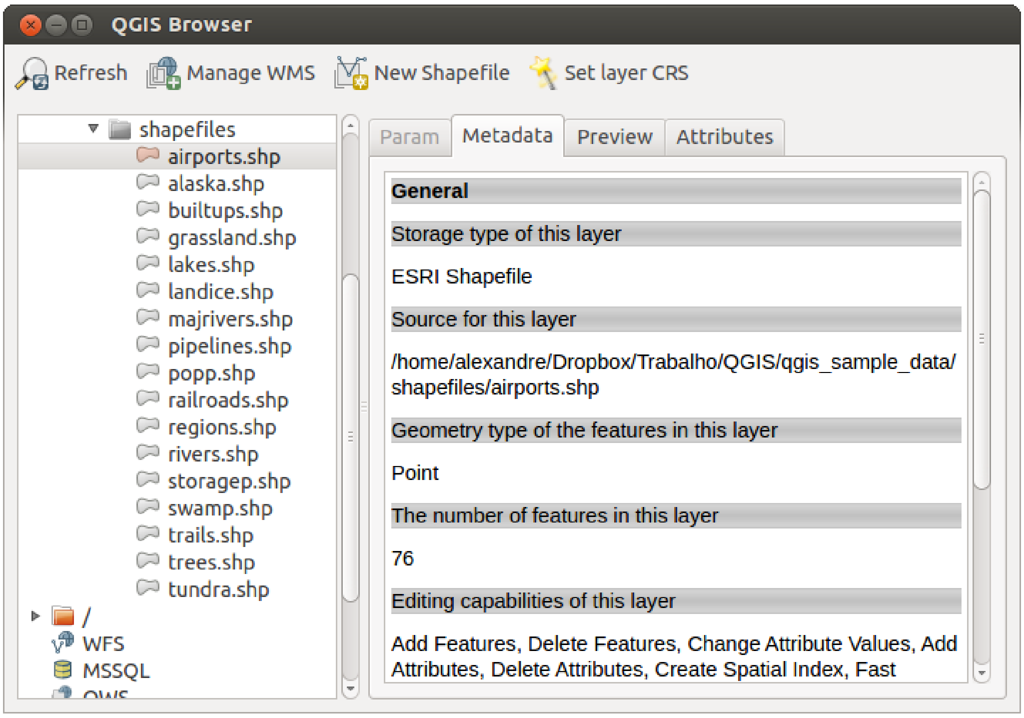

Figure 11.1: QGIS browser as a stand alone application

Use the QGIS Browser to preview your data. The drag-and-drop function makes it easy to get your data into the map view and the map legend.

1. Activate the QGIS Browser: Right-click on the toolbar and check *Browser* or select it from *Settings* → *Panels*.
2. Drag the panel into the legend window and release it.
3. Click on the *Browser* tab.
4. Browse in your filesystem and choose the `shapefile` folder from `qgis_sample_data` directory.
5. Press the `Shift` key and select the `airports.shp` and `alaska.shp` files.
6. Press the left mouse button, then drag and drop the files into the map canvas.
7. Right-click on a layer and choose *Set project CRS from layer*. For more information see *Lucrul cu Proiecii*.

8. Click on Zoom Full to make the layers visible.

There is a second browser available under *Settings* → *Panels*. This is handy when you need to move files or layers between locations.

1. Activate a second QGIS Browser: Right-click on the toolbar and check *Browser (2)*, or select it from *Settings* → *Panels*.
2. Drag the panel into the legend window.
3. Navigate to the *Browser (2)* tab and browse for a shapefile in your file system.
4. Select a file with the left mouse button. Now you can use the Add Selected Layers icon to add it into the current project.

QGIS automatically looks for the coordinate reference system (CRS) and zooms to the layer extent if you work in a blank QGIS project. If there are already files in your project, the file will just be added, and in the case that it has the same extent and CRS, it will be visualized. If the file has another CRS and layer extent, you must first right-click on the layer and choose *Set Project CRS from Layer*. Then choose *Zoom to Layer Extent*.

The Filter files function works on a directory level. Browse to the folder where you want to filter files and enter a search word or wildcard. The Browser will show only matching filenames – other data won't be displayed.

It's also possible to run the QGIS Browser as a stand-alone application.

Startai navigatorul QGIS

- Introducei "qbrowser" în linia de comandă.
- Start the QGIS Browser using the Start menu or desktop shortcut.
- The QGIS Browser is available from your Applications folder.

In figure_browser_standalone_metadata, you can see the enhanced functionality of the stand-alone QGIS Browser. The *Param* tab provides the details of your connection-based datasets, like PostGIS or MSSQL Spatial. The *Metadata* tab contains general information about the file (see *Meniu Metadate*). With the *Preview* tab, you can have a look at your files without importing them into your QGIS project. It's also possible to preview the attributes of your files in the *Attributes* tab.

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Lucrul cu Datele Vectoriale

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12.1 Formatele de Date Acceptate

QGIS uses the OGR library to read and write vector data formats, including ESRI shapefiles, MapInfo and MicroStation file formats, AutoCAD DXF, PostGIS, SpatiaLite, Oracle Spatial and MSSQL Spatial databases, and many more. GRASS vector and PostgreSQL support is supplied by native QGIS data provider plugins. Vector data can also be loaded in read mode from zip and gzip archives into QGIS. As of the date of this document, 69 vector formats are supported by the OGR library (see OGR-SOFTWARE-SUITE in *Literatură i Referine Web*). The complete list is available at http://www.gdal.org/ogr/ogr_formats.html.

Note: Not all of the listed formats may work in QGIS for various reasons. For example, some require external commercial libraries, or the GDAL/OGR installation of your OS may not have been built to support the format you want to use. Only those formats that have been well tested will appear in the list of file types when loading a vector into QGIS. Other untested formats can be loaded by selecting `*.*`.

Lucrul cu datele vectoriale GRASS este descris în Seciunea *Integrarea GRASS GIS*.

This section describes how to work with several common formats: ESRI shapefiles, PostGIS layers, SpatiaLite layers, OpenStreetMap vectors, and Comma Separated data (CSV). Many of the features available in QGIS work the same, regardless of the vector data source. This is by design, and it includes the identify, select, labeling and attributes functions.

12.1.1 Fiierele shape ESRI

The standard vector file format used in QGIS is the ESRI shapefile. Support is provided by the OGR Simple Feature Library (http://www.gdal.org/ogr/).

Un shapefile constă de fapt din mai multe fiiere. Următoarele trei sunt necesare:

1. fiierul `.shp` care conine geometriile entităii
2. fiierul `.dbf` care conine atributele în format dBase
3. fiierul index `.shx`

Shapefiles also can include a file with a `.prj` suffix, which contains the projection information. While it is very useful to have a projection file, it is not mandatory. A shapefile dataset can contain additional files. For further details, see the ESRI technical specification at http://www.esri.com/library/whitepapers/pdfs/shapefile.pdf.

Loading a Shapefile

To load a shapefile, start QGIS and click on the Add Vector Layer toolbar button, or simply press `Ctrl+Shift+V`. This will bring up a new window (see figure_vector_1).

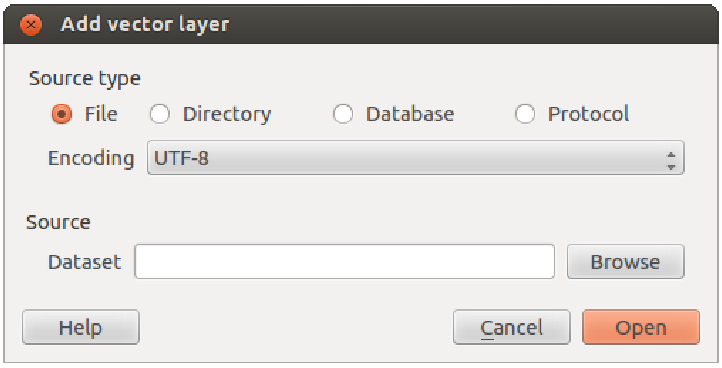

Figure 12.1: Add Vector Layer Dialog

From the available options check *File*. Click on **[Browse]**. That will bring up a standard open file dialog (see figure_vector_2), which allows you to navigate the file system and load a shapefile or other supported data source. The selection box *Filter* allows you to preselect some OGR-supported file formats.

You can also select the encoding for the shapefile if desired.

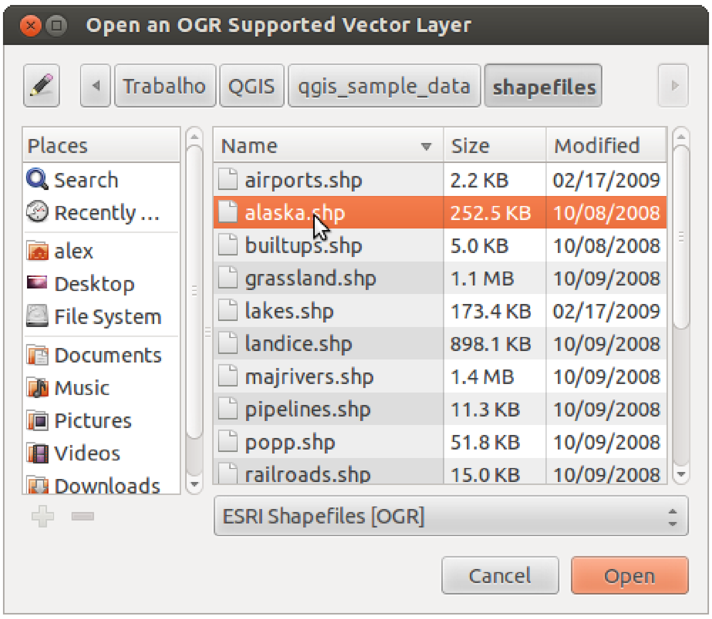

Figure 12.2: Open an OGR Supported Vector Layer Dialog

Selecting a shapefile from the list and clicking **[Open]** loads it into QGIS. Figure_vector_3 shows QGIS after loading the `alaska.shp` file.

Tip: Culorile Stratului

Când adăugai un strat de hartă, acestuia i se atribuie o culoare aleatorie. La adăugarea mai multor straturi, fiecăruia i se atribuie culori diferite.

Once a shapefile is loaded, you can zoom around it using the map navigation tools. To change the style of a layer, open the *Layer Properties* dialog by double clicking on the layer name or by right-clicking on the name in

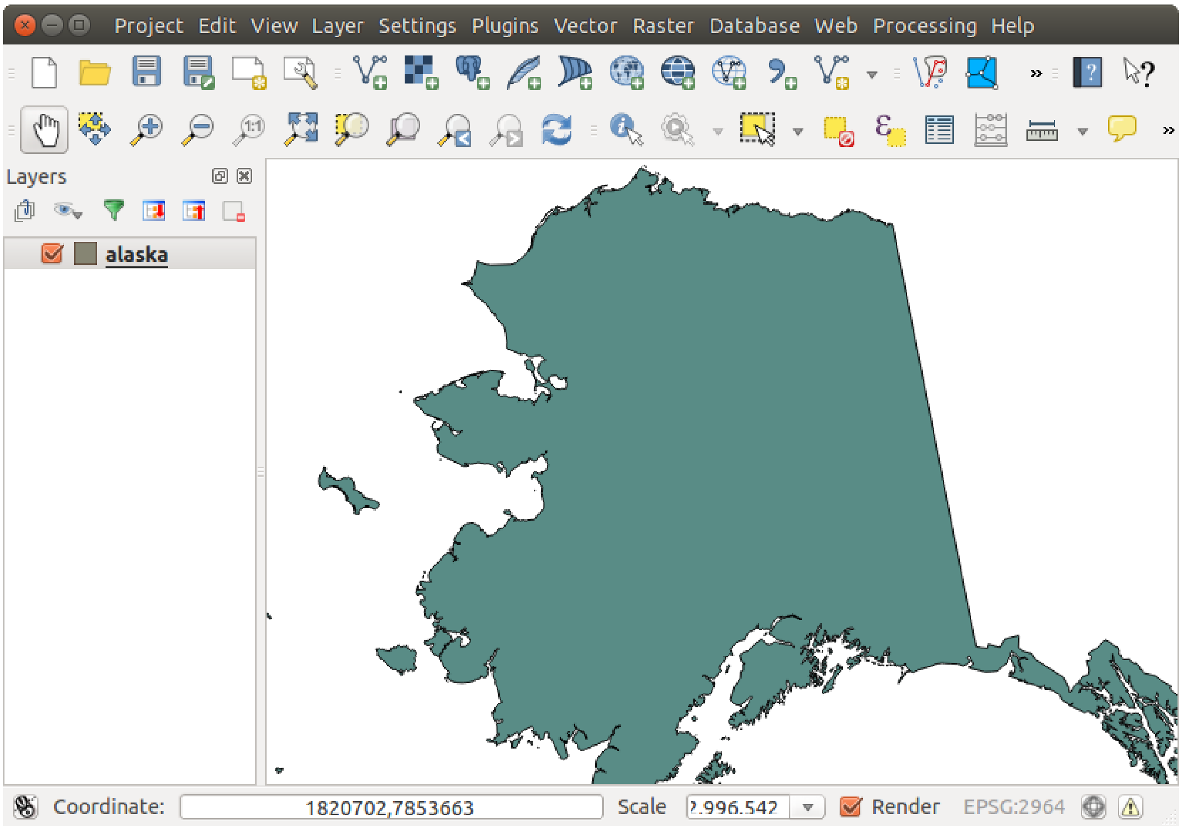

Figure 12.3: QGIS with Shapefile of Alaska loaded

the legend and choosing *Properties* from the context menu. See section *Meniul Stilului* for more information on setting symbology of vector layers.

Tip: Încărcai stratul i proiectul din unităile externe, montate pe OS X

On OS X, portable drives that are mounted beside the primary hard drive do not show up as expected under *File* → *Open Project*. We are working on a more OSX-native open/save dialog to fix this. As a workaround, you can type `/Volumes` in the *File name* box and press `Enter`. Then you can navigate to external drives and network mounts.

Improving Performance for Shapefiles

To improve the performance of drawing a shapefile, you can create a spatial index. A spatial index will improve the speed of both zooming and panning. Spatial indexes used by QGIS have a `.qix` extension.

Folosii aceti pai pentru a crea indexul:

- Load a shapefile by clicking on the Add Vector Layer toolbar button or pressing `Ctrl+Shift+V`.
- Open the *Layer Properties* dialog by double-clicking on the shapefile name in the legend or by right-clicking and choosing *Properties* from the context menu.
- În fila *General*, facei clic pe butonul **[Create Spatial Index]**.

Problem loading a shape .prj file

If you load a shapefile with a `.prj` file and QGIS is not able to read the coordinate reference system from that file, you will need to define the proper projection manually within the *General* tab of the *Layer Properties* dialog of the layer by clicking the **[Specify...]** button. This is due to the fact that `.prj` files often do not provide the complete projection parameters as used in QGIS and listed in the *CRS* dialog.

For the same reason, if you create a new shapefile with QGIS, two different projection files are created: a `.prj` file with limited projection parameters, compatible with ESRI software, and a `.qpj` file, providing the complete parameters of the used CRS. Whenever QGIS finds a `.qpj` file, it will be used instead of the `.prj`.

12.1.2 Loading a MapInfo Layer

To load a MapInfo layer, click on the Add Vector Layer toolbar button; or type `Ctrl+Shift+V`, change the file type filter *Files of type* : to 'Mapinfo File [OGR] (*.mif *.tab *.MIF *.TAB)' and select the MapInfo layer you want to load.

12.1.3 Loading an ArcInfo Binary Coverage

To load an ArcInfo Binary Coverage, click on the Add Vector Layer toolbar button or press `Ctrl+Shift+V` to open the *Add Vector Layer* dialog. Select *Directory* as *Source type*. Change the file type filter *Files of type* to 'Arc/Info Binary Coverage'. Navigate to the directory that contains the coverage file, and select it.

Similarly, you can load directory-based vector files in the UK National Transfer Format, as well as the raw TIGER Format of the US Census Bureau.

12.1.4 Fiiere cu Text Delimitat

Tabular data is a very common and widely used format because of its simplicity and readability – data can be viewed and edited even in a plain text editor. A delimited text file is an attribute table with each column separated by a defined character and each row separated by a line break. The first row usually contains the column names. A common type of delimited text file is a CSV (Comma Separated Values), with each column separated by a comma.

Astfel de fiiere de date pot conine, de asemenea, informaii poziionale, în două forme principale:

- Ca i coordonate ale punctelor din coloane separate
- Ca i reprezentare Well-Known Text (WKT) a unei geometrii

QGIS allows you to load a delimited text file as a layer or ordinal table. But first check that the file meets the following requirements:

1. Fiierul trebuie să aibă un rând antet delimitat, de nume de câmpuri. Aceasta trebuie să fie prima linie din fiierul text.
2. Rândul antet trebuie să conină câmp(urile) cu definiia geometriei. Aceste câmp(uri) pot avea orice nume.
3. Coordonatele X i Y (dacă geometria este definită prin coordonate) trebuie să fie specificate ca numere. Sistemul de coordonate nu este important.

As an example of a valid text file, we import the elevation point data file `elevp.csv` that comes with the QGIS sample dataset (see section *Date eantion*):

```
X;Y;ELEV
-300120;7689960;13
-654360;7562040;52
1640;7512840;3
[...]
```

Unele elemente de reinut despre fiierul text:

1. Exemplul de fiier text folosete `;` (punct i virgulă) ca delimitator. Orice caracter poate fi folosit pentru a delimita câmpurile.

2. Primul rând constituie antetul. Acesta conine câmpurile `X`, `Y` i `ELEV`.
3. Nu se folosesc ghilimele (`"`) pentru delimitarea câmpurilor de text.
4. Coordonatele X sunt coninute în câmpul `X`.
5. Coordonatele Y sunt coninute în câmpul `Y`.

Încărcarea unui fiier cu texte delimitate

Click the toolbar icon Add Delimited Text Layer in the *Manage layers* toolbar to open the *Create a Layer from a Delimited Text File* dialog, as shown in figure_delimited_text_1.

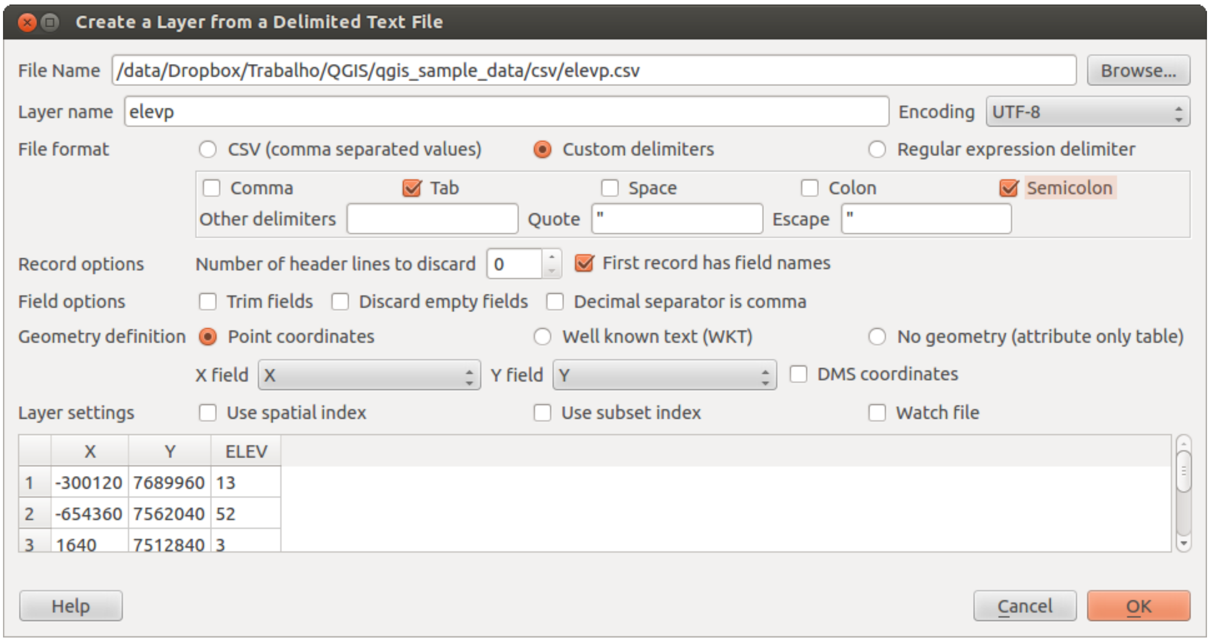

Figure 12.4: Delimited Text Dialog

First, select the file to import (e.g., `qgis_sample_data/csv/elevp.csv`) by clicking on the **[Browse]** button. Once the file is selected, QGIS attempts to parse the file with the most recently used delimiter. To enable QGIS to properly parse the file, it is important to select the correct delimiter. You can specify a delimiter by activating *Custom delimiters*, or by activating *Regular expression delimiter* and entering text into the *Expression* field. For example, to change the delimiter to tab, use `\t` (this is a regular expression for the tab character).

Once the file is parsed, set *Geometry definition* to *Point coordinates* and choose the `X` and `Y` fields from the dropdown lists. If the coordinates are defined as degrees/minutes/seconds, activate the *DMS coordinates* checkbox.

Finally, enter a layer name (e.g., `elevp`), as shown in figure_delimited_text_1. To add the layer to the map, click **[OK]**. The delimited text file now behaves as any other map layer in QGIS.

There is also a helper option that allows you to trim leading and trailing spaces from fields — *Trim fields*. Also, it is possible to *Discard empty fields*. If necessary, you can force a comma to be the decimal separator by activating *Decimal separator is comma*.

If spatial information is represented by WKT, activate the *Well Known Text* option and select the field with the WKT definition for point, line or polygon objects. If the file contains non-spatial data, activate *No geometry (attribute only table)* and it will be loaded as an ordinal table.

Additionaly, you can enable:

- *Se folosete un index spaial* pentru a îmbunătăi performana afiării i pentru selectarea spaială a entităilor.
- *Folosete indexul subsetului.*
- *Watch file* to watch for changes to the file by other applications while QGIS is running.

12.1.5 Date OpenStreetMap

In recent years, the OpenStreetMap project has gained popularity because in many countries no free geodata such as digital road maps are available. The objective of the OSM project is to create a free editable map of the world from GPS data, aerial photography or local knowledge. To support this objective, QGIS provides suppport for OSM data.

Încărcarea Vectorilor OpenStreetMap

QGIS integrates OpenStreetMap import as a core functionality.

- To connect to the OSM server and download data, open the menu *Vector → Openstreetmap → Load data*. You can skip this step if you already obtained an `.osm` XML file using JOSM, Overpass API or any other source.
- The menu *Vector → Openstreetmap → Import topology from an XML file* will convert your `.osm` file into a SpatiaLite database and create a corresponding database connection.
- The menu *Vector → Openstreetmap → Export topology to SpatiaLite* then allows you to open the database connection, select the type of data you want (points, lines, or polygons) and choose tags to import. This creates a SpatiaLite geometry layer that you can add to your project by clicking on the Add SpatiaLite Layer toolbar button or by selecting the *Add SpatiaLite Layer...* option from the *Layer* menu (see section *Straturile SpatiaLite*).

12.1.6 Straturi PostGIS

PostGIS layers are stored in a PostgreSQL database. The advantages of PostGIS are the spatial indexing, filtering and query capabilities it provides. Using PostGIS, vector functions such as select and identify work more accurately than they do with OGR layers in QGIS.

Crearea unei conexiuni stocate

The first time you use a PostGIS data source, you must create a connection to the PostgreSQL database that contains the data. Begin by clicking on the Add PostGIS Layer toolbar button, selecting the *Add PostGIS Layer...* option from the *Layer* menu, or typing `Ctrl+Shift+D`. You can also open the *Add Vector Layer* dialog and select *Database*. The *Add PostGIS Table(s)* dialog will be displayed. To access the connection manager, click on the **[New]** button to display the *Create a New PostGIS Connection* dialog. The parameters required for a connection are:

- **Name**: Un nume pentru această conexiune. Acesta poate fi identic cu cel al *Bazei de Date*.
- **Service**: Service parameter to be used alternatively to hostname/port (and potentially database). This can be defined in `pg_service.conf`.
- **Host**: Name of the database host. This must be a resolvable host name such as would be used to open a telnet connection or ping the host. If the database is on the same computer as QGIS, simply enter *'localhost'* here.
- **Port**: Numărul portului pe care îl ascultă serverul bazei de date PostgreSQL. Portul implicit este 5432.
- **Database**: Numele bazei de date.

- **SSL mode**: How the SSL connection will be negotiated with the server. Note that massive speedups in PostGIS layer rendering can be achieved by disabling SSL in the connection editor. The following options are available:
  - Disable: Se încearcă doar o conexiune SSL necriptată.
  - Allow: Se încearcă o conexiune SSL. Dacă aceasta nu reuete, se încearcă o conexiune non-SSL.
  - Prefer (implicit): Se încearcă o conexiune SSL. Dacă aceasta nu reuete, se încearcă o conexiune non-SSL.
  - Require: Se încearcă doar o conexiune SSL.
- **Username**: Numele utilizatorului care va fi utilizat pentru conectarea la o bază de date.
- **Password**: Parola utilizată împreună cu *Numele de utilizator* pentru conectarea la baza de date.

Opional, putei activa următoarele casete:

- *Salvare Nume de utilizator*
- *Salvare Parolă*
- *Căutare numai în coloanele_de_geometrie ale tabelului*
- *Nu se rezolvă tipul coloanelor nerestricionate (GEOMETRY)*
- *Căutare numai în schema 'public'*
- *De asemenea, se listează tabelele fără geometrie*
- *Folosete metadatele tabelei de estimare*

După ce s-au setat toi parametrii i toate opiunile, putei testa conexiunea, făcând clic pe butonul **[Test Connect]**.

Încărcarea unui strat PostGIS

Once you have one or more connections defined, you can load layers from the PostgreSQL database. Of course, this requires having data in PostgreSQL. See section *Importarea Datelor în PostgreSQL* for a discussion on importing data into the database.

Pentru a încărca un strat PostGIS, efectuai următorii pai:

- If the *Add PostGIS layers* dialog is not already open, selecting the *Add PostGIS Layer...* option from the *Layer* menu or typing `Ctrl+Shift+D` opens the dialog.
- Alegei conexiunea din lista verticală i facei clic pe **[Connect]**.
- Selectai sau deselectai *De asemenea, se listează tabelele fără geometrie*.
- Optionally, use some *Search Options* to define which features to load from the layer, or use the **[Build query]** button to start the *Query builder* dialog.
- Găsii strat(urile) pe care dorii să le adăugai în lista de straturi disponibile.
- Select it by clicking on it. You can select multiple layers by holding down the `Shift` key while clicking. See section *Constructorul de Interogări* for information on using the PostgreSQL Query Builder to further define the layer.
- Clic pe butonul **[Add]** pentru a adăuga stratul la hartă.

Tip: Straturi PostGIS

Normally, a PostGIS layer is defined by an entry in the geometry_columns table. From version 0.9.0 on, QGIS can load layers that do not have an entry in the geometry_columns table. This includes both tables and views.

Defining a spatial view provides a powerful means to visualize your data. Refer to your PostgreSQL manual for information on creating views.

Unele detalii despre straturile PostgreSQL

This section contains some details on how QGIS accesses PostgreSQL layers. Most of the time, QGIS should simply provide you with a list of database tables that can be loaded, and it will load them on request. However, if you have trouble loading a PostgreSQL table into QGIS, the information below may help you understand any QGIS messages and give you direction on changing the PostgreSQL table or view definition to allow QGIS to load it.

QGIS requires that PostgreSQL layers contain a column that can be used as a unique key for the layer. For tables, this usually means that the table needs a primary key, or a column with a unique constraint on it. In QGIS, this column needs to be of type int4 (an integer of size 4 bytes). Alternatively, the ctid column can be used as primary key. If a table lacks these items, the oid column will be used instead. Performance will be improved if the column is indexed (note that primary keys are automatically indexed in PostgreSQL).

If the PostgreSQL layer is a view, the same requirement exists, but views do not have primary keys or columns with unique constraints on them. You have to define a primary key field (has to be integer) in the QGIS dialog before you can load the view. If a suitable column does not exist in the view, QGIS will not load the layer. If this occurs, the solution is to alter the view so that it does include a suitable column (a type of integer and either a primary key or with a unique constraint, preferably indexed).

QGIS offers a checkbox **Select at id** that is activated by default. This option gets the ids without the attributes which is faster in most cases. It can make sense to disable this option when you use expensive views.

Tip: Se copiază baza de date PostGIS, care conine straturile salvate de QGIS

If you want to make a backup of your PostGIS database using the `pg_dump` and `pg_restore` commands the default layer styles as saved by QGIS are failing to restore afterwards. You need to set the XML option to `DOCUMENT` and the restore will work.

12.1.7 Importarea Datelor în PostgreSQL

Data can be imported into PostgreSQL/PostGIS using several tools, including the SPIT plugin and the command line tools shp2pgsql and ogr2ogr.

DB Manager

QGIS comes with a core plugin named DB Manager. It can be used to load shapefiles and other data formats, and it includes support for schemas. See section *Plugin-ul DB Manager* for more information.

shp2pgsql

PostGIS includes an utility called **shp2pgsql** that can be used to import shapefiles into a PostGIS-enabled database. For example, to import a shapefile named `lakes.shp` into a PostgreSQL database named `gis_data`, use the following command:

```
shp2pgsql -s 2964 lakes.shp lakes_new | psql gis_data
```

This creates a new layer named `lakes_new` in the `gis_data` database. The new layer will have a spatial reference identifier (SRID) of 2964. See section *Lucrul cu Proiecii* for more information on spatial reference systems and projections.

Tip: Exportarea seturilor de date din PostGIS

Like the import tool **shp2pgsql**, there is also a tool to export PostGIS datasets as shapefiles: **pgsql2shp**. This is shipped within your PostGIS distribution.

---

ogr2ogr

Besides **shp2pgsql** and **DB Manager**, there is another tool for feeding geodata in PostGIS: **ogr2ogr**. This is part of your GDAL installation.

Pentru a importa un strat în PostGIS, efectuai următorii pai:

```
ogr2ogr -f "PostgreSQL" PG:"dbname=postgis host=myhost.de user=postgres
password=topsecret" alaska.shp
```

This will import the shapefile `alaska.shp` into the PostGIS database *postgis* using the user *postgres* with the password *topsecret* on host server *myhost.de*.

Note that OGR must be built with PostgreSQL to support PostGIS. You can verify this by typing (in)

```
ogrinfo --formats | grep -i post
```

If you prefer to use PostgreSQL's **COPY** command instead of the default **INSERT INTO** method, you can export the following environment variable (at least available on and):

```
export PG_USE_COPY=YES
```

ogr2ogr does not create spatial indexes like **shp2pgsl** does. You need to create them manually, using the normal SQL command **CREATE INDEX** afterwards as an extra step (as described in the next section *Îmbunătăirea Performanei*).

Îmbunătăirea Performanei

Retrieving features from a PostgreSQL database can be time-consuming, especially over a network. You can improve the drawing performance of PostgreSQL layers by ensuring that a PostGIS spatial index exists on each layer in the database. PostGIS supports creation of a GiST (Generalized Search Tree) index to speed up spatial searches of the data (GiST index information is taken from the PostGIS documentation available at http://postgis.refractions.net).

Sintaxa pentru crearea unui index GIST este:

```
CREATE INDEX [indexname] ON [tablename]
  USING GIST ( [geometryfield] GIST_GEOMETRY_OPS );
```

Note that for large tables, creating the index can take a long time. Once the index is created, you should perform a `VACUUM ANALYZE`. See the PostGIS documentation (POSTGIS-PROJECT *Literatură i Referine Web*) for more information.

Următorul este un exemplu de creare a unui index GIST:

```
gsherman@madison:~/current$ psql gis_data
Welcome to psql 8.3.0, the PostgreSQL interactive terminal.

Type:  \copyright for distribution terms
       \h for help with SQL commands
       \? for help with psql commands
       \g or terminate with semicolon to execute query
       \q to quit

gis_data=# CREATE INDEX sidx_alaska_lakes ON alaska_lakes
gis_data-# USING GIST (the_geom GIST_GEOMETRY_OPS);
CREATE INDEX
gis_data=# VACUUM ANALYZE alaska_lakes;
```

```
VACUUM
gis_data=# \q
gsherman@madison:~/current$
```

12.1.8 Straturile vectoriale traversează 180 |grade| longitudine

Many GIS packages don't wrap vector maps with a geographic reference system (lat/lon) crossing the 180 degrees longitude line (http://postgis.refractions.net/documentation/manual-2.0/ST_Shift_Longitude.html). As result, if we open such a map in QGIS, we will see two far, distinct locations, that should appear near each other. In Figure_vector_4, the tiny point on the far left of the map canvas (Chatham Islands) should be within the grid, to the right of the New Zealand main islands.

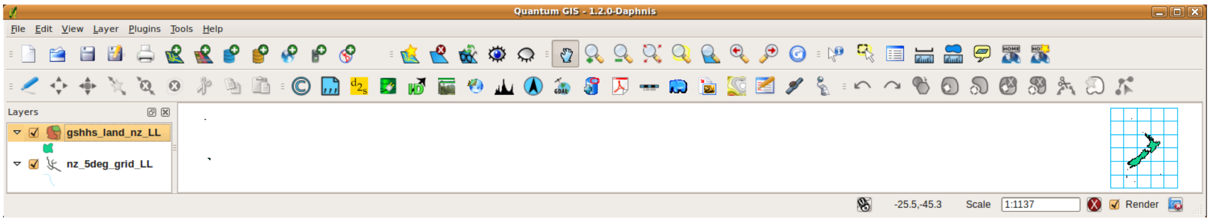

Figure 12.5: Map in lat/lon crossing the 180° longitude line

A work-around is to transform the longitude values using PostGIS and the **ST_Shift_Longitude** function. This function reads every point/vertex in every component of every feature in a geometry, and if the longitude coordinate is < 0°, it adds 360° to it. The result is a 0° - 360° version of the data to be plotted in a 180°-centric map.

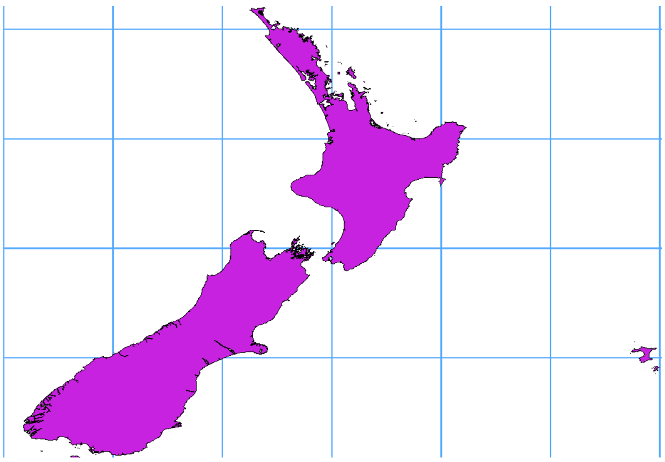

Figure 12.6: În cazul trecerii peste 180 |grade| longitudine se aplică funcia **ST_Shift_Longitude**

Utilizare

- Importai datele în PostGIS (*Importarea Datelor în PostgreSQL*) folosind, de exemplu, plugin-ul DB Manager.
- Use the PostGIS command line interface to issue the following command (in this example, "TABLE" is the actual name of your PostGIS table): `gis_data=# update TABLE set the_geom=ST_Shift_Longitude(the_geom);`
- If everything went well, you should receive a confirmation about the number of features that were updated. Then you'll be able to load the map and see the difference (Figure_vector_5).

12.1.9 Straturile SpatiaLite

The first time you load data from a SpatiaLite database, begin by clicking on the Add SpatiaLite Layer toolbar button, or by selecting the *Add SpatiaLite Layer...* option from the *Layer* menu, or by typing `Ctrl+Shift+L`. This will bring up a window that will allow you either to connect to a SpatiaLite database already known to QGIS, which you can choose from the drop-down menu, or to define a new connection to a new database. To define a new connection, click on **[New]** and use the file browser to point to your SpatiaLite database, which is a file with a `.sqlite` extension.

If you want to save a vector layer to SpatiaLite format, you can do this by right clicking the layer in the legend. Then, click on *Save as..*, define the name of the output file, and select 'SpatiaLite' as format and the CRS. Also, you can select 'SQLite' as format and then add `SPATIALITE=YES` in the OGR data source creation option field. This tells OGR to create a SpatiaLite database. See also http://www.gdal.org/ogr/drv_sqlite.html.

QGIS also supports editable views in SpatiaLite.

Crearea unui nou strat SpatiaLite

Dacă dorii să creai un nou strat SpatiaLite, vă rugăm să consultai seciunea *Crearea unui nou strat SpatiaLite*.

Tip: Plugin-urile de gestionare a datelor SpatiaLite

For SpatiaLite data management, you can also use several Python plugins: QSpatiaLite, SpatiaLite Manager or DB Manager (core plugin, recommended). If necessary, they can be downloaded and installed with the Plugin Installer.

12.1.10 Straturile MSSQL Spatial

QGIS also provides native MS SQL 2008 support. The first time you load MSSQL Spatial data, begin by clicking on the Add MSSQL Spatial Layer toolbar button or by selecting the *Add MSSQL Spatial Layer...* option from the *Layer* menu, or by typing `Ctrl+Shift+M`.

12.1.11 Straturile Oracle Spatial

The spatial features in Oracle Spatial aid users in managing geographic and location data in a native type within an Oracle database. QGIS now has support for such layers.

Crearea unei conexiuni stocate

The first time you use an Oracle Spatial data source, you must create a connection to the database that contains the data. Begin by clicking on the Add Orcale Spatial Layer toolbar button, selecting the *Add Orcale Spatial Layer...* option from the *Layer* menu, or typing `Ctrl+Shift+O`. To access the connection manager, click on the **[New]** button to display the *Create a New Oracle Spatial Connection* dialog. The parameters required for a connection are:

- **Name**: Un nume pentru această conexiune. Poate fi identic cu cel al *Bazei de Date*.
- **Database**: SID-ul sau SERVICE_NAME-ul instanei Oracle.
- **Host**: Name of the database host. This must be a resolvable host name such as would be used to open a telnet connection or ping the host. If the database is on the same computer as QGIS, simply enter *'localhost'* here.
- **Port**: Numărul portului pe care îl monitorizează serverul bazei de date Oracle. Portul implicit este 1521.

- **Username**: Numele utilizatorului care va fi utilizat pentru conectarea la baza de date.
- **Password**: Parola utilizată împreună cu *Numele de utilizator* pentru conectarea la baza de date.

Opional, putei activa următoarele casete:

- *Save Username* Indicates whether to save the database username in the connection configuration.
- *Save Password* Indicates whether to save the database password in the connection settings.
- *Only look in meta data table* Restricts the displayed tables to those that are in the all_sdo_geom_metadata view. This can speed up the initial display of spatial tables.
- *Only look for user's tables* When searching for spatial tables, restrict the search to tables that are owned by the user.
- *De asemenea, se listează tabelele fără geometrie* Indică faptul că, de asemenea, tabelele fără geometrie ar trebui să fie enumerate în mod implicit.
- *Use estimated table statistics for the layer metadata* When the layer is set up, various metadata are required for the Oracle table. This includes information such as the table row count, geometry type and spatial extents of the data in the geometry column. If the table contains a large number of rows, determining this metadata can be time-consuming. By activating this option, the following fast table metadata operations are done: Row count is determined from `all_tables.num_rows`. Table extents are always determined with the SDO_TUNE.EXTENTS_OF function, even if a layer filter is applied. Table geometry is determined from the first 100 non-null geometry rows in the table.
- *Listează doar tipurile de geometrie existente* Va lista doar tipurile de geometrie existente i nu propune adăugarea altora.

După ce s-au setat toi parametrii i toate opiunile, putei testa conexiunea, făcând clic pe butonul **[Test Connect]**.

Tip: Securitatea i Setările Utilizatorilor QGIS

Depending on your computing environment, storing passwords in your QGIS settings may be a security risk. Passwords are saved in clear text in the system configuration and in the project files! Your customized settings for QGIS are stored based on the operating system:

- Setările sunt stocate în directorul de casă din `~/.qgis2`.
- Setările sunt stocate în registru.

Încărcarea Stratului Oracle Spatial

Once you have one or more connections defined, you can load layers from the Oracle database. Of course, this requires having data in Oracle.

Pentru a încărca un strat Oracle Spatial, efectuai următorii pai:

- If the *Add Oracle Spatial layers* dialog is not already open, click on the Add Oracle Spatial Layer toolbar button.
- Alegei conexiunea din lista verticală i facei clic pe **[Connect]**.
- Selectai sau deselectai *De asemenea, se listează tabelele fără geometrie*.
- Optionally, use some *Search Options* to define which features to load from the layer or use the **[Build query]** button to start the *Query builder* dialog.
- Găsii strat(urile) pe care dorii să le adăugai în lista de straturi disponibile.

- Select it by clicking on it. You can select multiple layers by holding down the `Shift` key while clicking. See section *Constructorul de Interogări* for information on using the Oracle Query Builder to further define the layer.
- Clic pe butonul **[Add]** pentru a adăuga stratul la hartă.

Tip: Straturile Oracle Spatial

În mod normal, un strat Oracle Spatial este definit printr-o intrare în tabela **USER_SDO_METADATA**.

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12.2 Biblioteca Simbolurilor

12.2.1 Presentation

The Symbol Library is the place where users can create generic symbols to be used in several QGIS projects. It allows users to export and import symbols, groups symbols and add, edit and remove symbols. You can open it with the *Settings* → *Style Library* or from the **Style** tab in the vector layer's *Properties*.

Share and import symbols

Users can export and import symbols in two main formats: qml (QGIS format) and SLD (OGC standard). Note that SLD format is not fully supported by QGIS.

share item displays a drop down list to let the user import or export symbols.

Grupuri obinuite i grupuri inteligente

Groups are categories of Symbols and smart groups are dynamic groups.

To create a group, right-click on an existing group or on the main **Groups** directory in the left of the library. You can also select a group and click on the add item button.

To add a symbol into a group, you can either right click on a symbol then choose *Apply group* and then the group name added before. There is a second way to add several symbols into group: just select a group and click and choose **Group Symbols**. All symbols display a checkbox that allow you to add the symbol into the selected groups. When finished, you can click on the same button, and choose **Finish Grouping**.

Create **Smart Symbols** is similar to creating group, but instead select **Smart Groups**. The dialog box allow user to choose the expression to select symbols in order to appear in the smart group (contains some tags, member of a group, have a string in its name, etc.)

Add, edit, remove symbol

With the *Style manager* from the **[Symbol]** menu you can manage your symbols. You can add item, edit item, remove item and share item. 'Marker' symbols, 'Line' symbols, 'Fill' patterns and 'colour ramps' can be used to create the symbols. The symbols are then assigned to 'All Symbols', 'Groups' or 'Smart groups'.

Pentru fiecare tip de simboluri, vei găsi întotdeauna aceeai structură de dialog:

- at the top left side a symbol representation
- under the symbol representation the symbol tree show the symbol layers
- at the right you can setup some parameter (unit,transparency, color, size and rotation)

- under these parameters you find some symbol from the symbols library

The symbol tree allow adding, removing or protect new simple symbol. You can move up or down the symbol layer.

More detailed settings can be made when clicking on the second level in the *Symbol layers* dialog. You can define *Symbol layers* that are combined afterwards. A symbol can consist of several *Symbol layers*. Settings will be shown later in this chapter.

Tip: Note that once you have set the size in the lower levels of the *Symbol layers* dialog, the size of the whole symbol can be changed with the *Size* menu in the first level again. The size of the lower levels changes accordingly, while the size ratio is maintained.

12.2.2 Simbolurile Marcajului

Simbolurile marcajului au mai multe tipuri de straturi simbol:

- Simbol elipsoidal
- Simbol de tip caracter
- Simbol simplu (implicit)
- Simbol SVG
- Simbolul câmpului vectorial

The following settings are possible:

- *Symbol layer type*: Avei opiunea de a utiliza markeri Ellipse, markeri de fonturi, markeri Simpli, markeri SVG i markeri Vector Field.
- *culori*
- *Dimensiune*
- *Stilul conturului*
- *Lăţimea conturului*
- *Unghiul*
- *Offset X,Y*: Putei schimba simbolul din direciile X sau Y.
- *Punctul de ancorare*
- *Proprietăi definite cu ajutorul datelor ...*

12.2.3 Simbolurile Liniei

Simbolurile marcajului linie au numai două tipuri de strat simbol:

- Linia marcajului
- Linie simplă (implicită)

The default symbol layer type draws a simple line whereas the other display a marker point regularly on the line. You can choose different location vertex, interval or central point. Marker line can have offset along the line or offset line. Finally, *rotation* allows you to change the orientation of the symbol.

The following settings are possible:

- *culoare*
- *Lăimea peniei*
- *Decalaj*

- *Stilul peniei*
- *Îmbinare stiluri*
- *Stilul capătului*
- *Se foloseşte un model de haşurare predefinit*
- *Unitatea modelului de haşurare*
- *Proprietăi definite cu ajutorul datelor ...*

12.2.4 Simboluri Poligonale

Simbolurile marcajelor poligonale conin, de asemenea, mai multe tipuri de straturi simbol:

- Umplere de tip centroid
- Umplere cu gradient
- Umplere cu model din linii
- Umplere cu model din puncte
- Umplere cu imagine raster
- Umplere cu SVG
- Umplere de tip shapeburst
- Umplere simplă (implicită)
- Conturul: Linia marcajului (la fel ca marcajul liniei)
- Conturul: Linie simplă (la fel ca marcajul liniei)

The following settings are possible:

- *Culori* pentru margine i umplere.
- *Stilul de umplere*
- *Stilul marginii*
- *Lăimea marginii*
- *Decalaj X,Y*
- *Proprietăi definite cu ajutorul datelor ...*

Using the color combo box, you can drag and drop color for one color button to another button, copy-paste color, pick color from somewhere, choose a color from the palette or from recent or standard color. The combo box allow you to fill in the feature with transparency. You can also just click on the button to open the palettte dialog. Note that you can import color from some external software like GIMP.

Folosind 'Umplere cu o imagine raster' putei acopri un poligon cu o imagine raster divizată în plăci. Opiunile includ numele de fiier (definit cu ajutorul datelor), opacitate, dimensiunea imaginii (în pixeli, mm sau unităi de hartă), modul coordonatelor (entitate sau vizualizare), i rotaia.

'Gradient Fill' *Symbol layer type* allows you to select between a *Two color* and *Color ramp* setting. You can use the *Feature centroid* as *Referencepoint*. All fills 'Gradient Fill' *Symbol layer type* is also available through the *Symbol* menu of the Categorized and Graduated Renderer and through the *Rule properties* menu of the Rule-based renderer. Other possibility is to choose a 'shapeburst fill' which is a buffered gradient fill, where a gradient is drawn from the boundary of a polygon towards the polygon's centre. Configurable parameters include distance from the boundary to shade, use of color ramps or simple two color gradients, optional blurring of the fill and offsets.

Este posibilă desenarea liniilor unui poligon doar în interiorul altui poligon. Folosind 'Contur: Linie simplă ', bifai *Desenează liniile numai în interiorul poligonului*.

12.2.5 Color ramp

You can create a custom color ramp choosing *New color ramp...* from the *color ramp* drop-down menu. A dialog will prompt for the ramp type: Gradient, Random, colorBrewer, or cpt-city. The first three have options for number of steps and/or multiple stops in the color ramp. You can use the *Invert* option while classifying the data with a color ramp. See figure_symbology_3 for an example of custom color ramp and figure_symbology_3a for the cpt-city dialog.

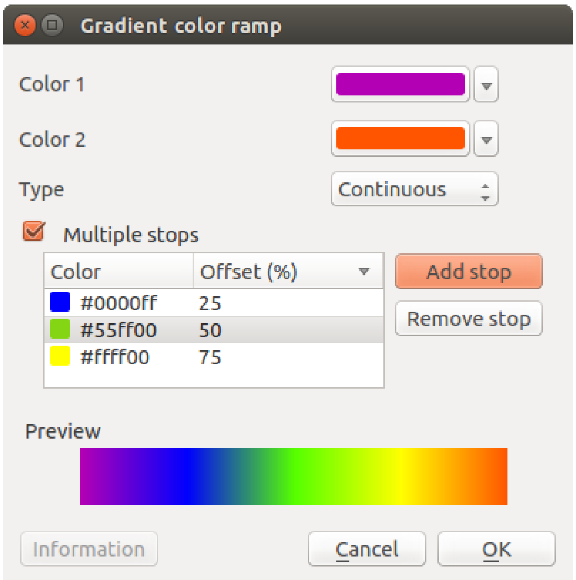

Figure 12.7: Example of custom gradient color ramp with multiple stops

Opiunea cpt-city deschide un nou dialog cu sute de teme incluse 'din start'.

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12.3 Dialogul Proprietăilor Vectoriale

The *Layer Properties* dialog for a vector layer provides information about the layer, symbology settings and labeling options. If your vector layer has been loaded from a PostgreSQL/PostGIS datastore, you can also alter the underlying SQL for the layer by invoking the *Query Builder* dialog on the *General* tab. To access the *Layer Properties* dialog, double-click on a layer in the legend or right-click on the layer and select *Properties* from the pop-up menu.

12.3.1 Meniul Stilului

The Style menu provides you with a comprehensive tool for rendering and symbolizing your vector data. You can use *Layer rendering* → tools that are common to all vector data, as well as special symbolizing tools that were designed for the different kinds of vector data.

Renderers

The renderer is responsible for drawing a feature together with the correct symbol. There are four types of renderers: single symbol, categorized, graduated and rule-based. There is no continuous color renderer, because it is in fact only a special case of the graduated renderer. The categorized and graduated renderers can be created by specifying a symbol and a color ramp - they will set the colors for symbols appropriately. For point layers, there is a point displacement renderer available. For each data type (points, lines and polygons), vector symbol layer

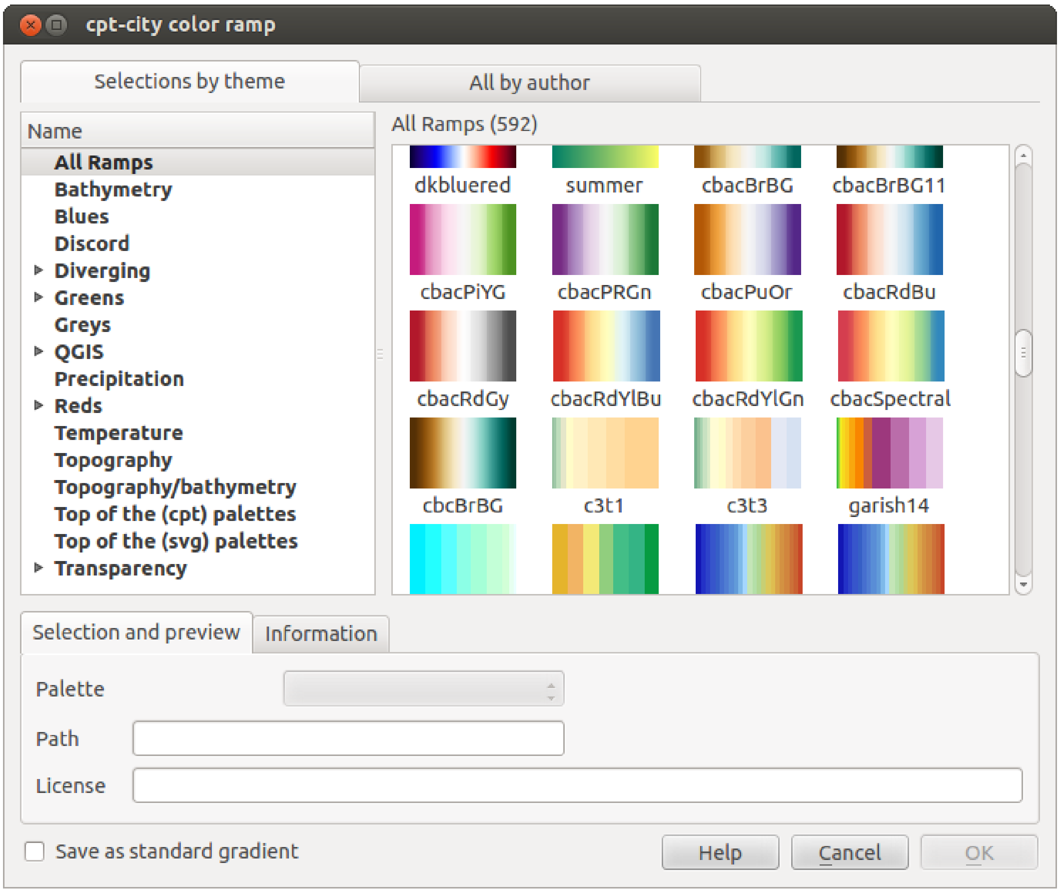

Figure 12.8: cpt-city dialog with hundreds of color ramps

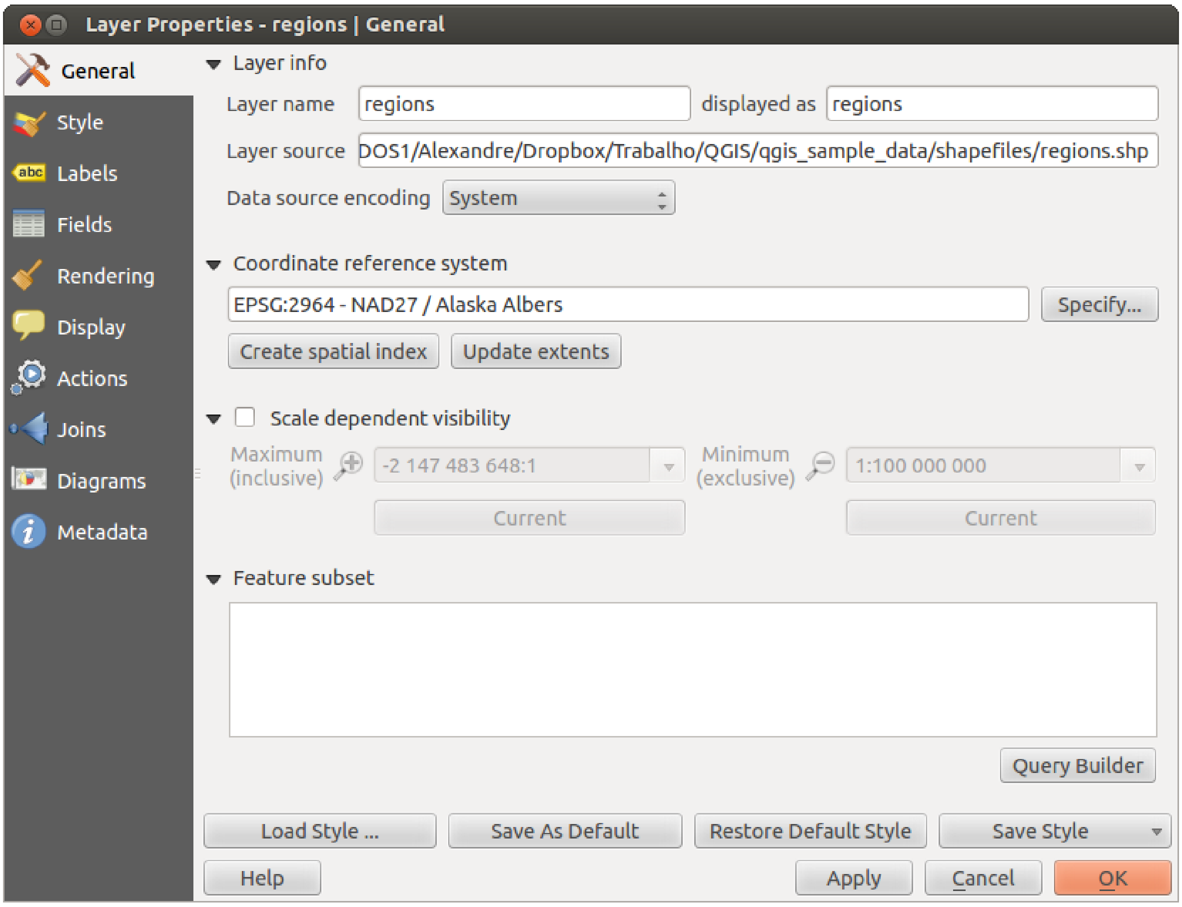

Figure 12.9: Vector Layer Properties Dialog

types are available. Depending on the chosen renderer, the *Style* menu provides different additional sections. On the bottom right of the symbology dialog, there is a **[Symbol]** button, which gives access to the Style Manager (see *Presentation*). The Style Manager allows you to edit and remove existing symbols and add new ones.

After having made any needed changes, the symbol can be added to the list of current style symbols (using **[Symbol]** *Save in symbol library*), and then it can easily be used in the future. Furthermore, you can use the **[Save Style]** button to save the symbol as a QGIS layer style file (.qml) or SLD file (.sld). SLDs can be exported from any type of renderer – single symbol, categorized, graduated or rule-based – but when importing an SLD, either a single symbol or rule-based renderer is created. That means that categorized or graduated styles are converted to rule-based. If you want to preserve those renderers, you have to stick to the QML format. On the other hand, it can be very handy sometimes to have this easy way of converting styles to rule-based.

If you change the renderer type when setting the style of a vector layer the settings you made for the symbol will be maintained. Be aware that this procedure only works for one change. If you repeat changing the renderer type the settings for the symbol will get lost.

If the datasource of the layer is a database (PostGIS or Spatialite for example), you can save your layer style inside a table of the database. Just click on *Save Style* comboxbox and choose **Save in database** item then fill in the dialog to define a style name, add a description, an ui file and if the style is a default style. When loading a layer from the database, if a style already exists for this layer, QGIS will load the layer and its style. You can add several style in the database. Only one will be the default style anyway.

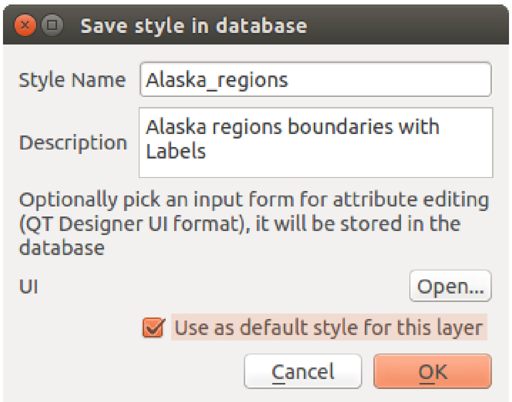

Figure 12.10: Save Style in database Dialog

Tip: Selectează i modifică simboluri multiple

The Symbology allows you to select multiple symbols and right click to change color, transparency, size, or width of selected entries.

Single Symbol Renderer

The Single Symbol Renderer is used to render all features of the layer using a single user-defined symbol. The properties, which can be adjusted in the *Style* menu, depend partially on the type of layer, but all types share the following dialog structure. In the top-left part of the menu, there is a preview of the current symbol to be rendered. On the right part of the menu, there is a list of symbols already defined for the current style, prepared to be used by selecting them from the list. The current symbol can be modified using the menu on the right side. If you click on the first level in the *Symbol layers* dialog on the left side, it's possible to define basic parameters like *Size*, *Transparency*, *color* and *Rotation*. Here, the layers are joined together.

In any spinbox in this dialog you can enter expressions. E.g. you can calculate simple math like multiplying the existing size of a point by 3 without resorting to a calculator.

If you click on the second level in the *Symbol layers* dialog a 'Data-defined override' for nearly all settings is possible. When using a data-defined color one may want to link the color to a field 'budged'. Here a comment functionality is inserted.

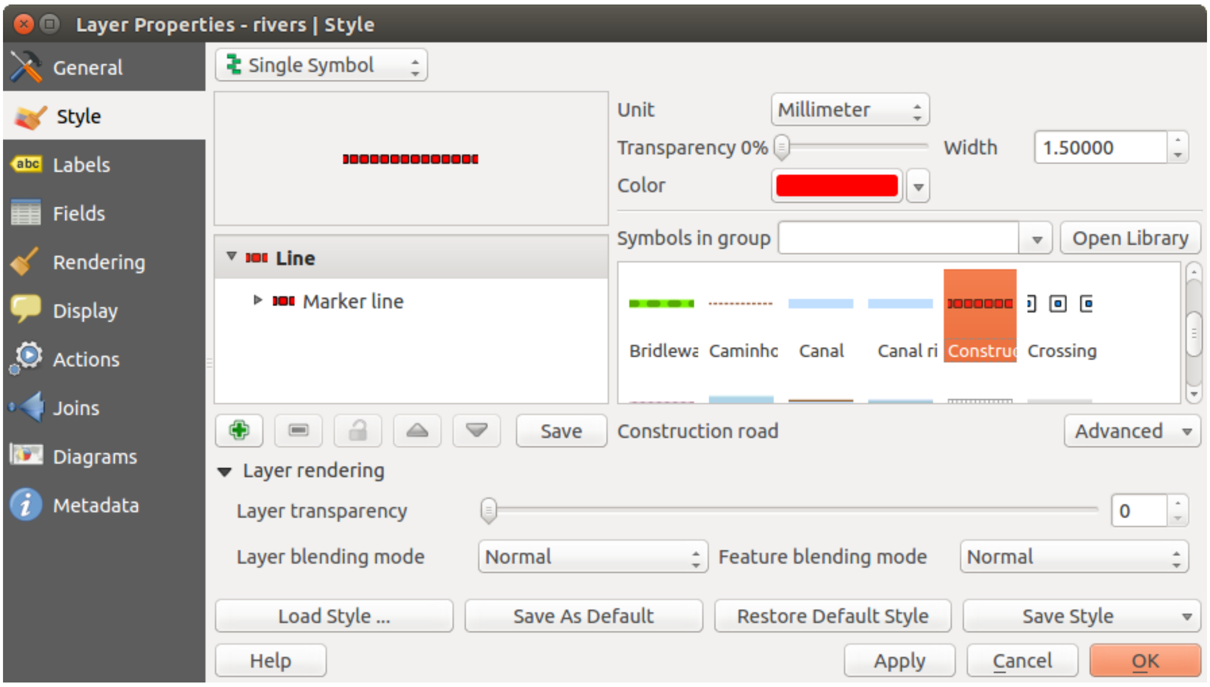

Figure 12.11: Single symbol line properties

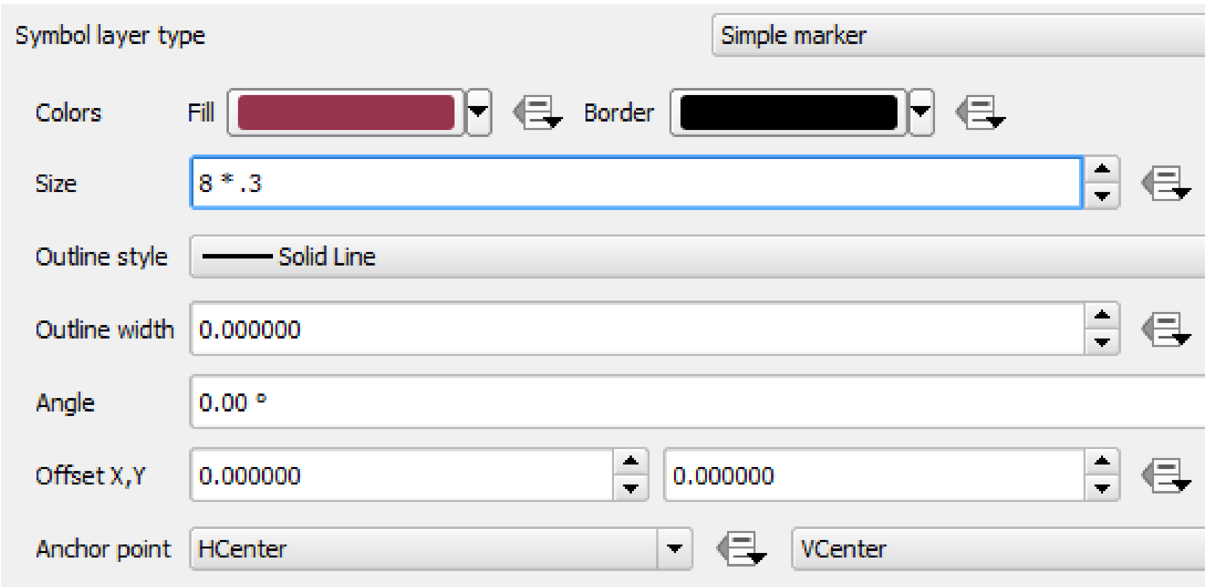

Figure 12.12: Expression in Size spinbox

```
/* This expression will return a color code depending on the field value.
 * Negative value: red
 * 0 value: yellow
 * Positive value: green
 */
CASE
  WHEN value < 0 THEN '#DC143C' -- Negative value: red
  WHEN value = 0 THEN '#CCCC00' -- Value 0: yellow
  ELSE '#228B22'                -- Positive value: green
END
```

static/user_manual/working_with_vector/symbol_data_defi

Figure 12.13: Data-defined symbol with Edit... menu

Categorized Renderer

The Categorized Renderer is used to render all features from a layer, using a single user-defined symbol whose color reflects the value of a selected feature's attribute. The *Style* menu allows you to select:

- The attribute (using the Column listbox or the *Set column expression* function, see *Expresii*)
- The symbol (using the Symbol dialog)
- The colors (using the color Ramp listbox)

Then click on **Classify** button to create classes from the distinct value of the attribute column. Each classes can be disabled unchecking the checkbox at the left of the class name.

You can change symbol, value and/or label of the class, just double click on the item you want to change.

Right-click shows a contextual menu to **Copy/Paste**, **Change color**, **Change transparency**, **Change output unit**, **Change symbol width**.

The **[Advanced]** button in the lower-right corner of the dialog allows you to set the fields containing rotation and size scale information. For convenience, the center of the menu lists the values of all currently selected attributes together, including the symbols that will be rendered.

The example in figure_symbology_6 shows the category rendering dialog used for the rivers layer of the QGIS sample dataset.

Graduated Renderer

The Graduated Renderer is used to render all the features from a layer, using a single user-defined symbol whose color reflects the assignment of a selected feature's attribute to a class.

Like the Categorized Renderer, the Graduated Renderer allows you to define rotation and size scale from specified columns.

Also, analogous to the Categorized Renderer, the *Style* tab allows you to select:

- The attribute (using the Column listbox or the *Set column expression* function, see *Expresii* chapter)
- The symbol (using the Symbol Properties button)
- The colors (using the color Ramp list)

Additionally, you can specify the number of classes and also the mode for classifying features within the classes (using the Mode list). The available modes are:

- Equal Interval: each class has the same size (e.g. values from 0 to 16 and 4 classes, each class has a size of 4);

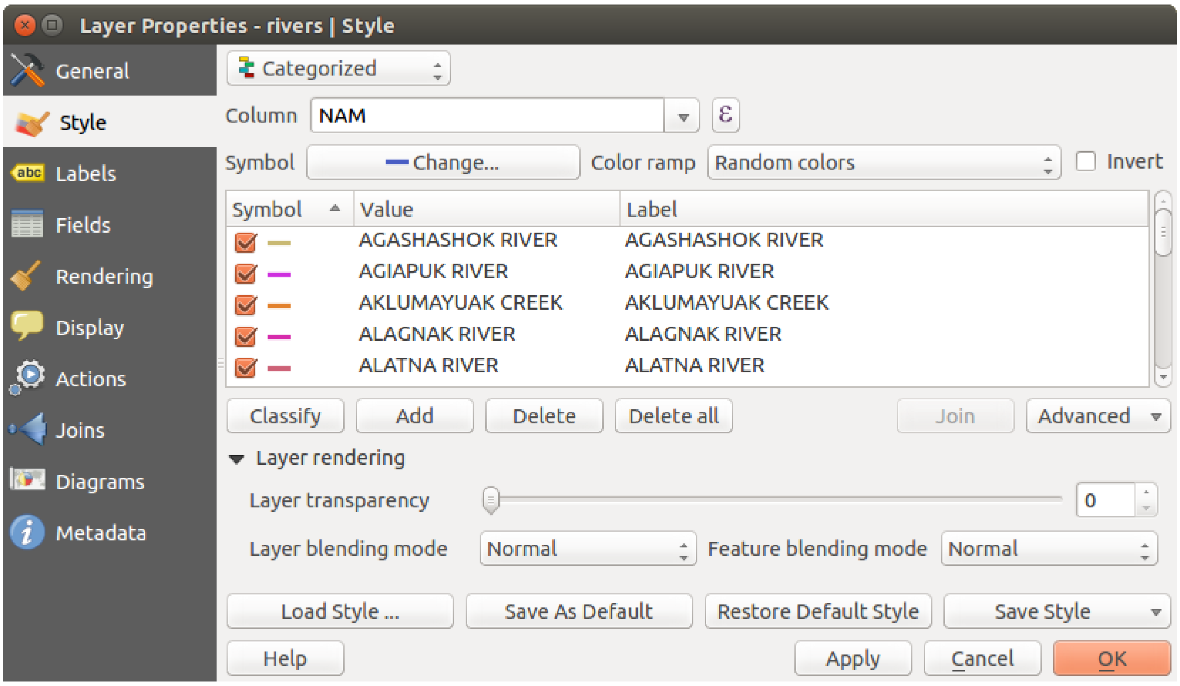

Figure 12.14: Categorized Symbolizing options

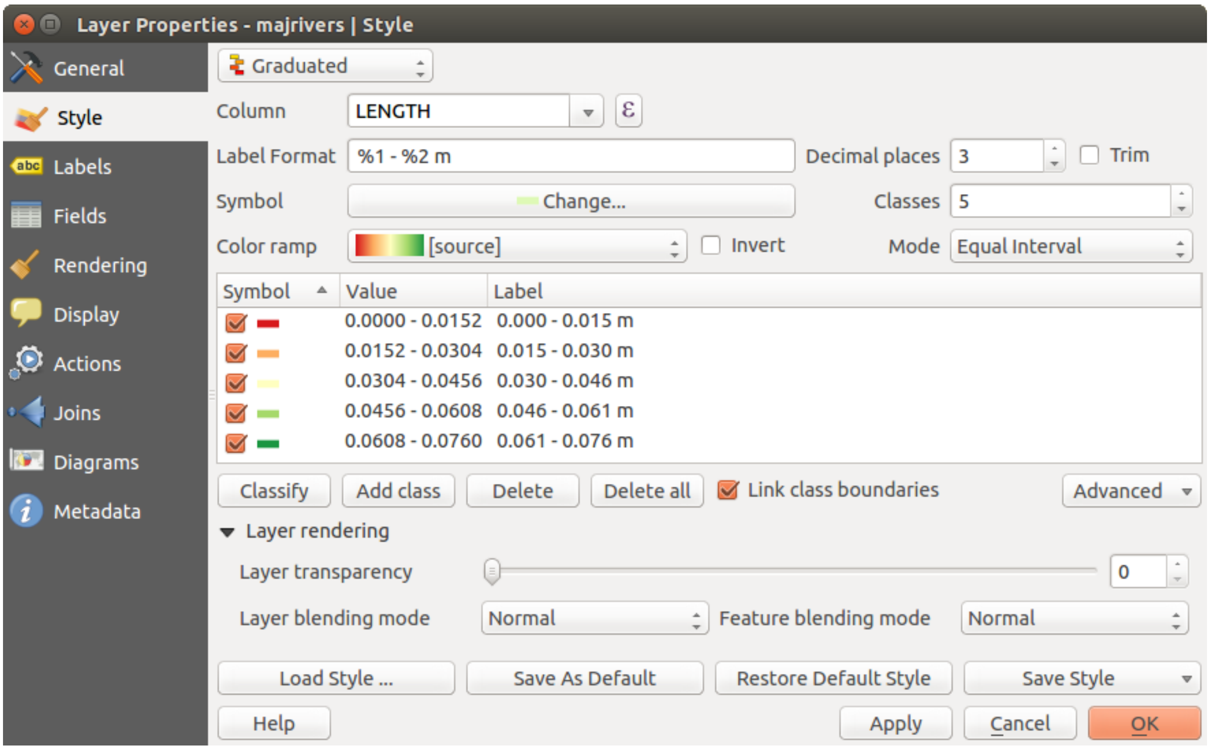

Figure 12.15: Graduated Symbolizing options

- Quantile: each class will have the same number of element inside (the idea of a boxplot);
- Natural Breaks (Jenks): the variance within each class is minimal while the variance between classes is maximal;
- Standard Deviation: classes are built depending on the standard deviation of the values;
- Pretty Breaks: the same of natural breaks but the extremes number of each class are integers.

The listbox in the center part of the *Style* menu lists the classes together with their ranges, labels and symbols that will be rendered.

Click on **Classify** button to create classes using the choosen mode. Each classes can be disabled unchecking the checkbox at the left of the class name.

You can change symbol, value and/or label of the clic, just double clicking on the item you want to change.

Right-click shows a contextual menu to **Copy/Paste**, **Change color**, **Change transparency**, **Change output unit**, **Change symbol width**.

The example in figure_symbology_7 shows the graduated rendering dialog for the rivers layer of the QGIS sample dataset.

Tip: Hări tematice bazate pe expresii

Categorized and graduated thematic maps can now be created using the result of an expression. In the properties dialog for vector layers, the attribute chooser has been augmented with a *Set column expression* function. So now you no longer need to write the classification attribute to a new column in your attribute table if you want the classification attribute to be a composite of multiple fields, or a formula of some sort.

Rule-based rendering

The Rule-based Renderer is used to render all the features from a layer, using rule based symbols whose color reflects the assignment of a selected feature's attribute to a class. The rules are based on SQL statements. The dialog allows rule grouping by filter or scale, and you can decide if you want to enable symbol levels or use only the first-matched rule.

The example in figure_symbology_8 shows the rule-based rendering dialog for the rivers layer of the QGIS sample dataset.

To create a rule, activate an existing row by double-clicking on it, or click on '+' and click on the new rule. In the *Rule properties* dialog, you can define a label for the rule. Press the ... button to open the expression string builder. In the **Function List**, click on *Fields and Values* to view all attributes of the attribute table to be searched. To add an attribute to the field calculator **Expression** field, double click its name in the *Fields and Values* list. Generally, you can use the various fields, values and functions to construct the calculation expression, or you can just type it into the box (see *Expresii*). You can create a new rule by copying and pasting an existing rule with the right mouse button. You can also use the 'ELSE' rule that will be run if none of the other rules on that level match. Since QGIS 2.8 the rules appear in a tree hierarchy in the map legend. Just double-klick the rules in the map legend and the Style menu of the layer properties appears showing the rule that is the background for the symbol in the tree.

Point displacement

The Point Displacement Renderer works to visualize all features of a point layer, even if they have the same location. To do this, the symbols of the points are placed on a displacement circle around a center symbol.

Tip: Exportare simbologie vectorială

You have the option to export vector symbology from QGIS into Google *.kml, *.dxf and MapInfo *.tab files. Just open the right mouse menu of the layer and click on *Save selection as* → to specify the name of the output file and its format. In the dialog, use the *Symbology export* menu to save the symbology either as *Feature symbology* → or as *Symbol layer symbology* →. If you have used symbol layers, it is recommended to use the second setting.

Inverted Polygon

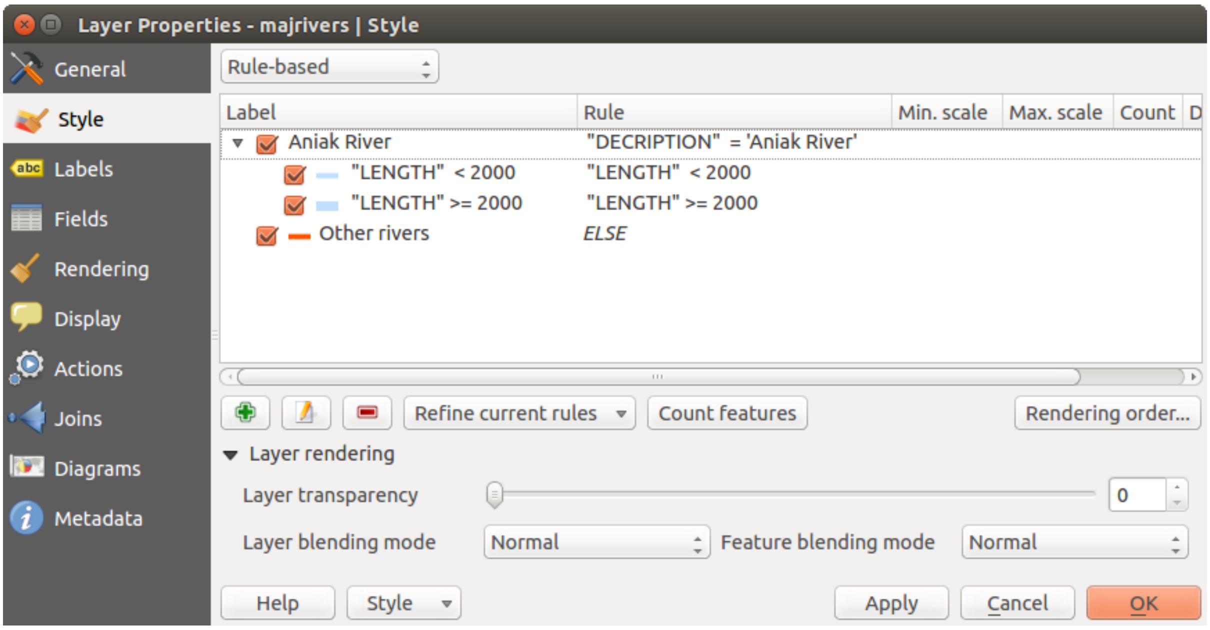

Figure 12.16: Rule-based Symbolizing options

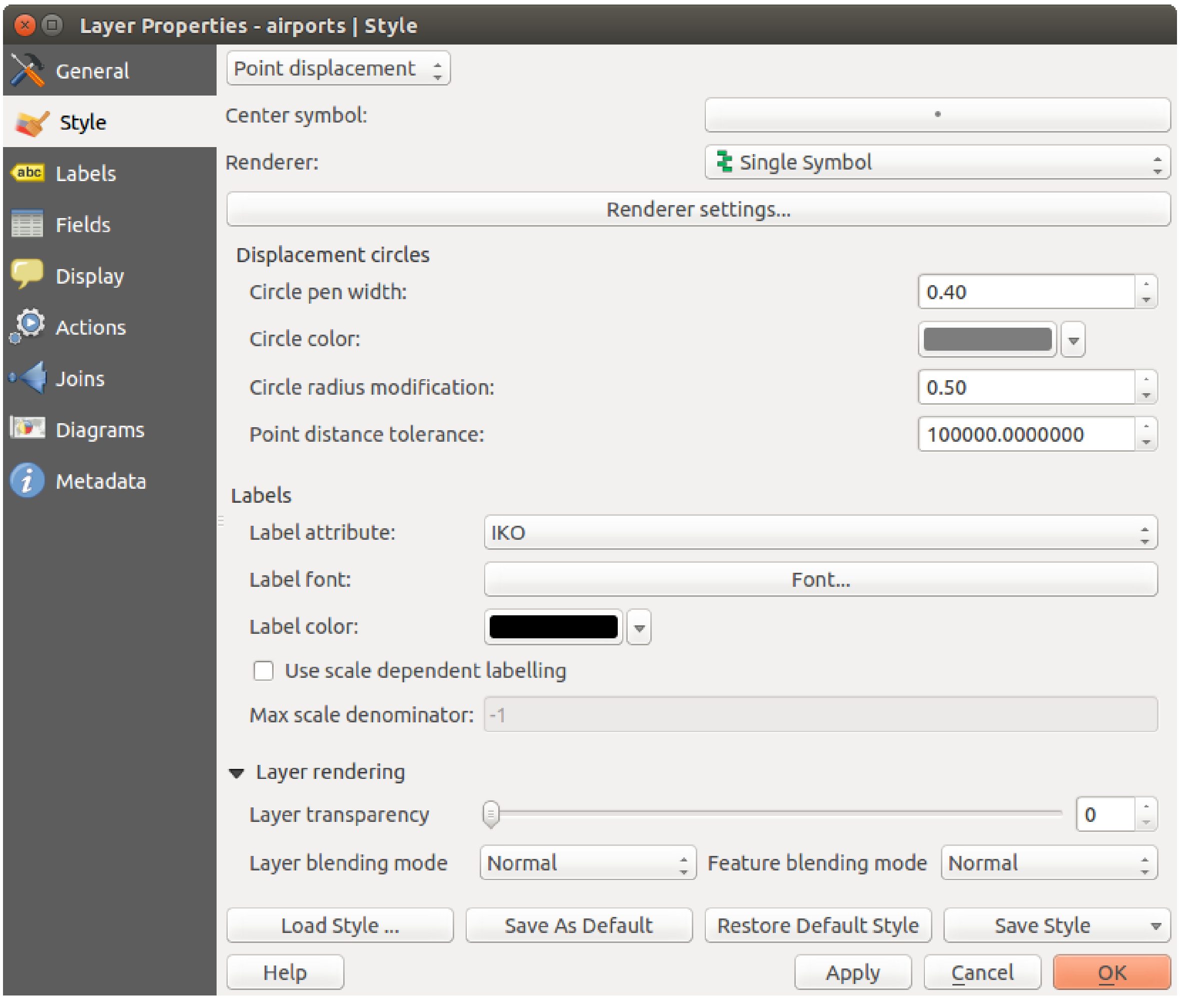

Figure 12.17: Point displacement dialog

Inverted polygon renderer allows user to define a symbol to fill in outside of the layer's polygons. As before you can select subrenderers. These subrenderers are the same as for the main renderers.

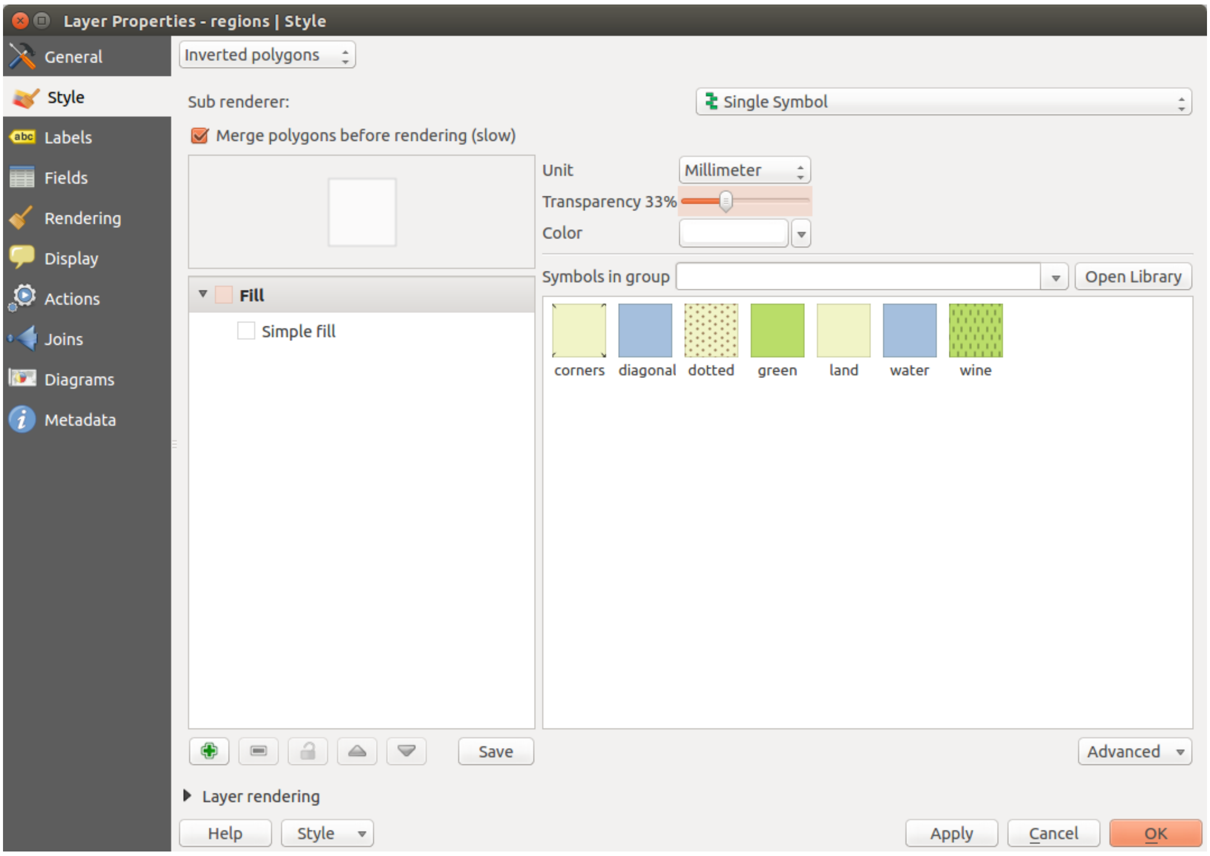

Figure 12.18: Inverted Polygon dialog

Tip: Switch quickly between styles

Once you created one of the above mentioned styles you can right-klick on the layer and choose *Styles* → *Add* to save your style. Now you can easily switch between styles you created using the *Styles* → menu again.

Heatmap

With the Heatmap renderer you can create live dynamic heatmaps for (multi)point layers. You can specify the heatmap radius in pixels, mm or map units, choose a color ramp for the heatmap style and use a slider for selecting a tradeoff between render speed and quality. When adding or removing a feature the heatmap renderer updates the heatmap style automatically.

Color Picker

Regardless the type of style to be used, the *select color* dialog will show when you click to choose a color - either border or fill color. This dialog has four different tabs which allow you to select colors by color ramp, color wheel, color swatches or color picker.

Whatever method you use, the selected color is always described through color sliders for HSV (Hue, Saturation, Value) and RGB (Red, Green, Blue) values. There is also an *opacity* slider to set transparency level. On the lower left part of the dialog you can see a comparison between the *current* and the *new* color you are presently selecting and on the lower right part you have the option to add the color you just tweaked into a color slot button.

With color ramp or with color wheel, you can browse to all possible color combinations. There are other

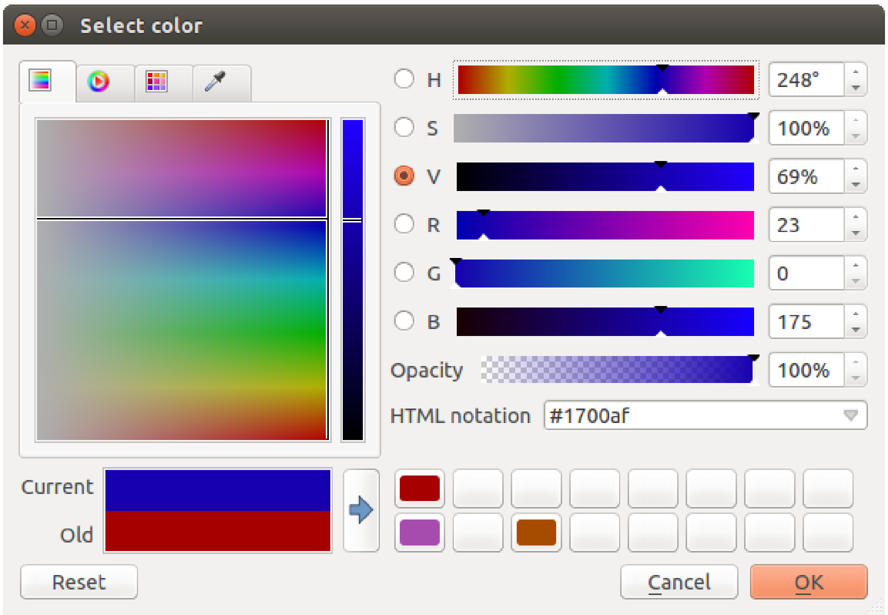

Figure 12.19: Color picker ramp tab

possibilities though. By using *color swatches* you can choose from a preselected list. This selected list is populated with one of three methods: *Recent colors*, *Standard colors* or *Project colors*

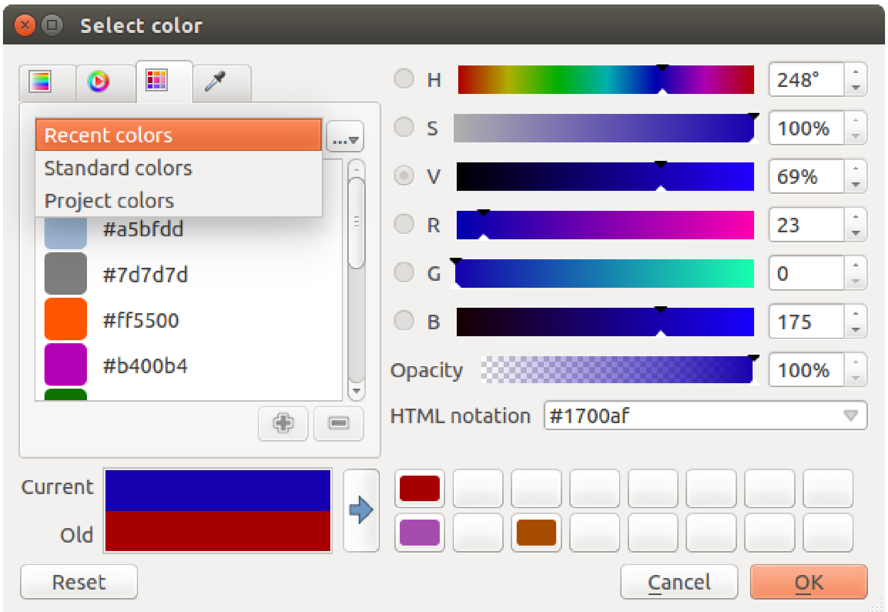

Figure 12.20: Color picker swatcher tab

Another option is to use the color picker which allows you to sample a color from under your mouse pointer at any part of QGIS or even from another application by pressing the space bar. Please note that the color picker is OS dependent and is currently not supported by OSX.

Tip: quick color picker + copy/paste colors

You can quickly choose from *Recent colors*, from *Standard colors* or simply *copy* or *paste* a color by clicking the drop-down arrow that follows a current color box.

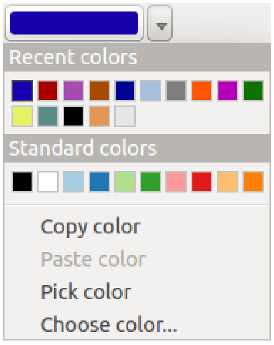

Figure 12.21: Quick color picker menu

Randarea stratului

- *Layer transparency* : You can make the underlying layer in the map canvas visible with this tool. Use the slider to adapt the visibility of your vector layer to your needs. You can also make a precise definition of the percentage of visibility in the the menu beside the slider.
- *Layer blending mode* and *Feature blending mode*: You can achieve special rendering effects with these tools that you may previously only know from graphics programs. The pixels of your overlaying and underlaying layers are mixed through the settings described below.
  - Normal: This is the standard blend mode, which uses the alpha channel of the top pixel to blend with the pixel beneath it. The colors aren't mixed.
  - Lighten: This selects the maximum of each component from the foreground and background pixels. Be aware that the results tend to be jagged and harsh.
  - Screen: Light pixels from the source are painted over the destination, while dark pixels are not. This mode is most useful for mixing the texture of one layer with another layer (e.g., you can use a hillshade to texture another layer).
  - Dodge: Dodge will brighten and saturate underlying pixels based on the lightness of the top pixel. So, brighter top pixels cause the saturation and brightness of the underlying pixels to increase. This works best if the top pixels aren't too bright; otherwise the effect is too extreme.
  - Addition: This blend mode simply adds pixel values of one layer with the other. In case of values above one (in the case of RGB), white is displayed. This mode is suitable for highlighting features.
  - Darken: This creates a resultant pixel that retains the smallest components of the foreground and background pixels. Like lighten, the results tend to be jagged and harsh.
  - Multiply: Here, the numbers for each pixel of the top layer are multiplied with the corresponding pixels for the bottom layer. The results are darker pictures.
  - Burn: Darker colors in the top layer cause the underlying layers to darken. Burn can be used to tweak and colorise underlying layers.
  - Overlay: This mode combines the multiply and screen blending modes. In the resulting picture, light parts become lighter and dark parts become darker.
  - Soft light: This is very similar to overlay, but instead of using multiply/screen it uses color burn/dodge. This is supposed to emulate shining a soft light onto an image.
  - Hard light: Hard light is also very similar to the overlay mode. It's supposed to emulate projecting a very intense light onto an image.
  - Difference: Difference subtracts the top pixel from the bottom pixel, or the other way around, to always get a positive value. Blending with black produces no change, as the difference with all colors is zero.

   – Subtract: This blend mode simply subtracts pixel values of one layer from the other. In case of negative values, black is displayed.

12.3.2 Meniul Etichetelor

The Labels core application provides smart labeling for vector point, line and polygon layers, and it only requires a few parameters. This new application also supports on-the-fly transformed layers. The core functions of the application have been redesigned. In QGIS, there are a number of other features that improve the labeling. The following menus have been created for labeling the vector layers:

- Text
- Formatare
- Tampon
- Fundal
- Umbră
- Poziionare
- Randare

Let us see how the new menus can be used for various vector layers. **Labeling point layers**

Start QGIS and load a vector point layer. Activate the layer in the legend and click on the Layer Labeling Options icon in the QGIS toolbar menu.

The first step is to activate the *Label this layer with* checkbox and select an attribute column to use for labeling. Click if you want to define labels based on expressions - See labeling_with_expressions.

The following steps describe a simple labeling without using the *Data defined override* functions, which are situated next to the drop-down menus.

You can define the text style in the *Text* menu (see Figure_labels_1). Use the *Type case* option to influence the text rendering. You have the possibility to render the text 'All uppercase', 'All lowercase' or 'Capitalize first letter'. Use the blend modes to create effects known from graphics programs (see blend_modes).

In the *Formatting* menu, you can define a character for a line break in the labels with the 'Wrap on character' function. Use the *Formatted numbers* option to format the numbers in an attribute table. Here, decimal places may be inserted. If you enable this option, three decimal places are initially set by default.

To create a buffer, just activate the *Draw text buffer* checkbox in the *Buffer* menu. The buffer color is variable. Here, you can also use blend modes (see blend_modes).

If the *color buffer's fill* checkbox is activated, it will interact with partially transparent text and give mixed color transparency results. Turning off the buffer fill fixes that issue (except where the interior aspect of the buffer's stroke intersects with the text's fill) and also allows you to make outlined text.

In the *Background* menu, you can define with *Size X* and *Size Y* the shape of your background. Use *Size type* to insert an additional 'Buffer' into your background. The buffer size is set by default here. The background then consists of the buffer plus the background in *Size X* and *Size Y*. You can set a *Rotation* where you can choose between 'Sync with label', 'Offset of label' and 'Fixed'. Using 'Offset of label' and 'Fixed', you can rotate the background. Define an *Offset X,Y* with X and Y values, and the background will be shifted. When applying *Radius X,Y*, the background gets rounded corners. Again, it is possible to mix the background with the underlying layers in the map canvas using the *Blend mode* (see blend_modes).

Use the *Shadow* menu for a user-defined *Drop shadow*. The drawing of the background is very variable. Choose between 'Lowest label component', 'Text', 'Buffer' and 'Background'. The *Offset* angle depends on the orientation of the label. If you choose the *Use global shadow* checkbox, then the zero point of the angle is always oriented to the north and doesn't depend on the orientation of the label. You can influence the appearance of the shadow with the *Blur radius*. The higher the number, the softer the shadows. The appearance of the drop shadow can also be altered by choosing a blend mode (see blend_modes).

Choose the *Placement* menu for the label placement and the labeling priority. Using the *Offset from point* setting, you now have the option to use *Quadrants* to place your label. Additionally, you can alter the angle of the label placement with the *Rotation* setting. Thus, a placement in a certain quadrant with a certain rotation is possible. In the *priority* section you can define with which priority the labels are rendered. It interacts with labels of the other vector layers in the map canvas. If there are labels from different layers in the same location then the label with the higher priority will be displayed and the other will be left out.

In the *Rendering* menu, you can define label and feature options. Under *Label options*, you find the scale-based visibility setting now. You can prevent QGIS from rendering only selected labels with the *Show all labels for this layer (including colliding labels)* checkbox. Under *Feature options*, you can define whether every part of a multipart feature is to be labeled. It's possible to define whether the number of features to be labeled is limited and to *Discourage labels from covering features*.

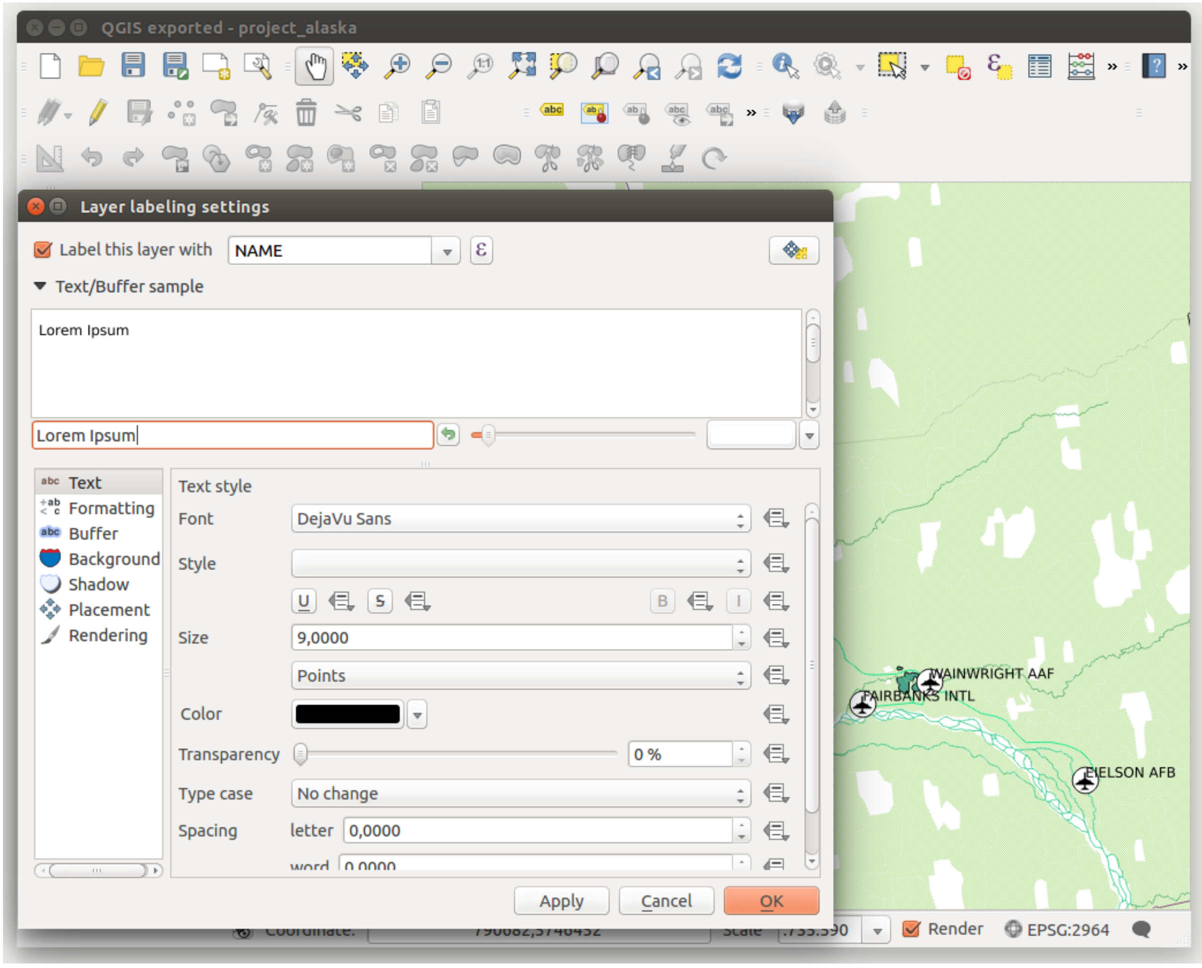

Figure 12.22: Smart labeling of vector point layers

Labeling line layers

The first step is to activate the *Label this layer* checkbox in the *Label settings* tab and select an attribute column to use for labeling. Click if you want to define labels based on expressions - See labeling_with_expressions.

After that, you can define the text style in the *Text* menu. Here, you can use the same settings as for point layers.

Also, in the *Formatting* menu, the same settings as for point layers are possible.

The *Buffer* menu has the same functions as described in section labeling_point_layers.

The *Background* menu has the same entries as described in section labeling_point_layers.

Also, the *Shadow* menu has the same entries as described in section labeling_point_layers.

In the *Placement* menu, you find special settings for line layers. The label can be placed *Parallel*, *Curved* or *Horizontal*. With the *Parallel* and *Curved* option, you can define the position *Above line*, *On line* and *Below line*. It's possible to select several options at once. In that case, QGIS will look for the optimal position of the label. Remember that here you can also use the line orientation for the position of the label. Additionally, you can define a *Maximum angle between curved characters* when selecting the *Curved* option (see Figure_labels_2).

You can set up a minimum distance for repeating labels. Distance can be in mm or in map units.

Some Placement setup will display more options, for example, *Curved* and *Parallel* Placements will allow the user to set up the position of the label (above, below or on the line), *distance* from the line and for *Curved*, the user can also setup inside/outside max angle between curved label. As for point vector layers you have the possibility to define a *Priority* for the labels.

The *Rendering* menu has nearly the same entries as for point layers. In the *Feature options*, you can now *Suppress labeling of features smaller than*.

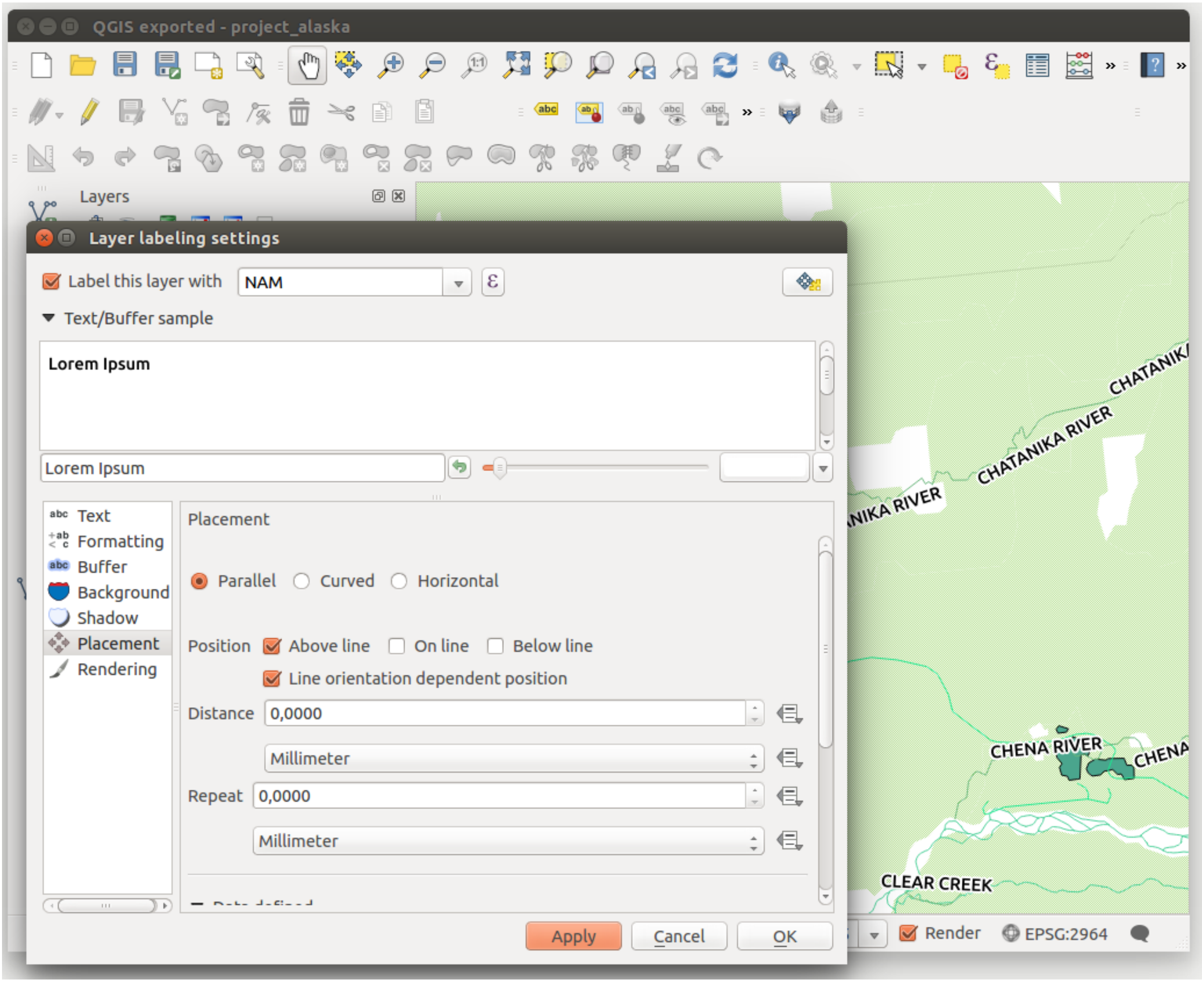

Figure 12.23: Smart labeling of vector line layers

Labeling polygon layers

The first step is to activate the *Label this layer* checkbox and select an attribute column to use for labeling. Click if you want to define labels based on expressions - See labeling_with_expressions.

In the *Text* menu, define the text style. The entries are the same as for point and line layers.

The *Formatting* menu allows you to format multiple lines, also similar to the cases of point and line layers.

As with point and line layers, you can create a text buffer in the *Buffer* menu.

Use the *Background* menu to create a complex user-defined background for the polygon layer. You can use the menu also as with the point and line layers.

The entries in the *Shadow* menu are the same as for point and line layers.

In the *Placement* menu, you find special settings for polygon layers (see Figure_labels_3). *Offset from centroid*, *Horizontal (slow)*, *Around centroid*, *Free* and *Using perimeter* are possible.

In the *Offset from centroid* settings, you can specify if the centroid is of the *visible polygon* or *whole polygon*. That means that either the centroid is used for the polygon you can see on the map or the centroid is determined for the whole polygon, no matter if you can see the whole feature on the map. You can place your label with the quadrants here, and define offset and rotation. The *Around centroid* setting makes it possible to place the label around the centroid with a certain distance. Again, you can define *visible polygon* or *whole polygon* for the centroid. With the *Using perimeter* settings, you can define a position and a distance for the label. For the position, *Above line*, *On line*, *Below line* and *Line orientation dependent position* are possible.

Related to the choice of Label Placement, several options will appear. As for Point Placement you can choose the distance for the polygon outline, repeat the label around the polygon perimeter.

As for point and line vector layers you have the possibility to define a *Priority* for the polygon vector layer.

The entries in the *Rendering* menu are the same as for line layers. You can also use *Suppress labeling of features smaller than* in the *Feature options*. **Define labels based on expressions**

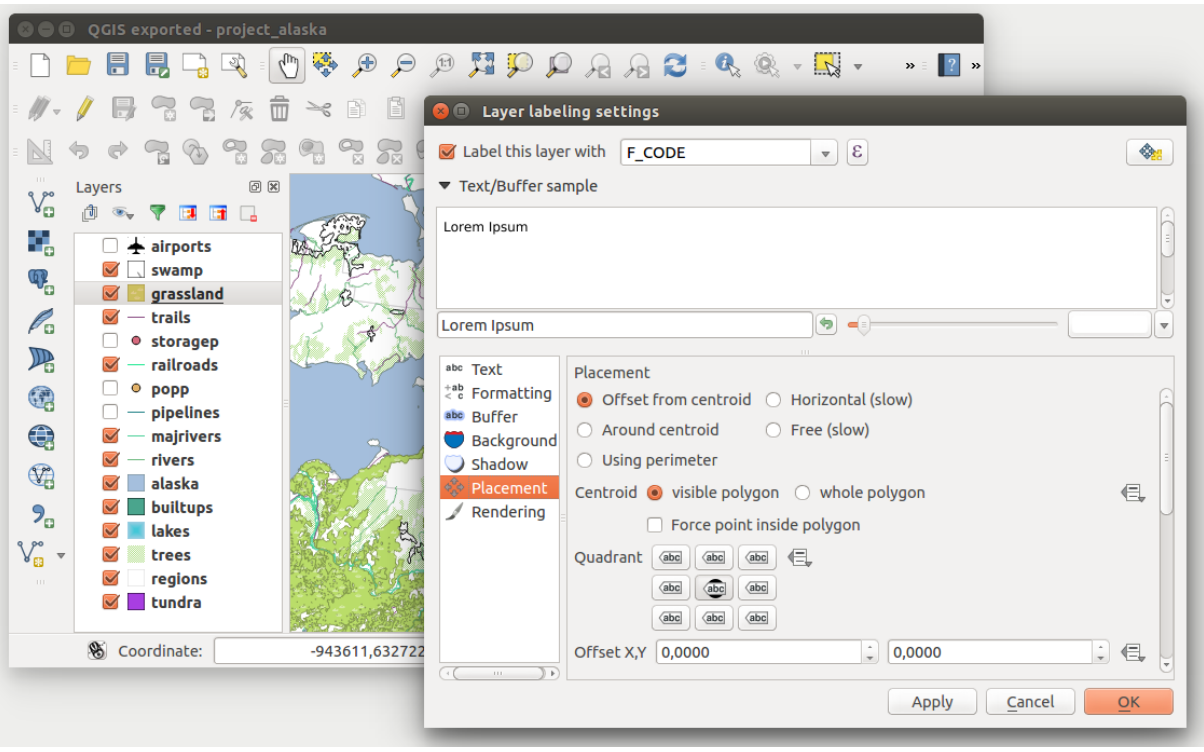

Figure 12.24: Smart labeling of vector polygon layers

QGIS allows to use expressions to label features. Just click the icon in the Labels menu of the properties dialog. In figure_labels_4 you see a sample expression to label the alaska regions with name and area size, based on the field 'NAME_2', some descriptive text and the function '$area()' in combination with 'format_number()' to make it look nicer.

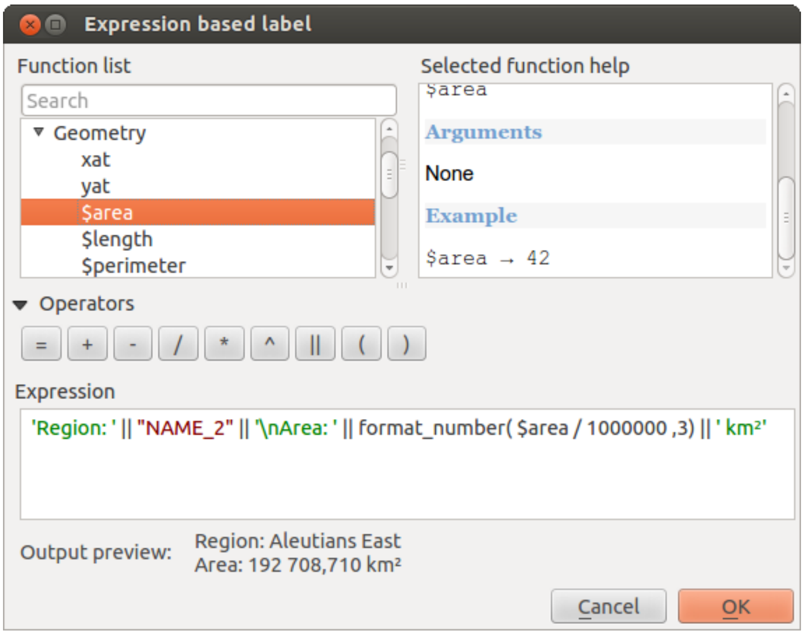

Figure 12.25: Using expressions for labeling

Expression based labeling is easy to work with. All you have to take care of is, that you need to combine all elements (strings, fields and functions) with a string concatenation sign '||' and that fields a written in "double quotes" and strings in 'single quotes'. Let's have a look at some examples:

```
# label based on two fields 'name' and 'place' with a comma as separater
"name" || ', ' || "place"

-> John Smith, Paris

# label based on two fields 'name' and 'place' separated by comma
'My name is ' || "name" || 'and I live in ' || "place"

-> My name is John Smith and I live in Paris

# label based on two fields 'name' and 'place' with a descriptive text
# and a line break (\n)
'My name is ' || "name" || '\nI live in ' || "place"

-> My name is John Smith
   I live in Paris

# create a multi-line label based on a field and the $area function
# to show the place name and its area size based on unit meter.
'The area of ' || "place" || 'has a size of ' || $area || 'm²'

-> The area of Paris has a size of 105000000 m²

# create a CASE ELSE condition. If the population value in field
# population is <= 50000 it is a town, otherwise a city.
'This place is a ' || CASE WHEN "population <= 50000" THEN 'town' ELSE 'city' END

-> This place is a town
```

As you can see in the expression builder, you have hundreds of functions available to create simple and very complex expressions to label your data in QGIS. See *Expresii* chapter for more information and examples on expressions.

Using data-defined override for labeling

With the data-defined override functions, the settings for the labeling are overridden by entries in the attribute table. You can activate and deactivate the function with the right-mouse button. Hover over the symbol and you see the information about the data-defined override, including the current definition field. We now describe an example using the data-defined override function for the Move label function (see figure_labels_5).

1. Import `lakes.shp` from the QGIS sample dataset.
2. Double-click the layer to open the Layer Properties. Click on *Labels* and *Placement*. Select *Offset from centroid*.
3. Look for the *Data defined* entries. Click the icon to define the field type for the *Coordinate*. Choose 'xlabel' for X and 'ylabel' for Y. The icons are now highlighted in yellow.
4. Transfocare către un lac.
5. Go to the Label toolbar and click the icon. Now you can shift the label manually to another position (see figure_labels_6). The new position of the label is saved in the 'xlabel' and 'ylabel' columns of the attribute table.

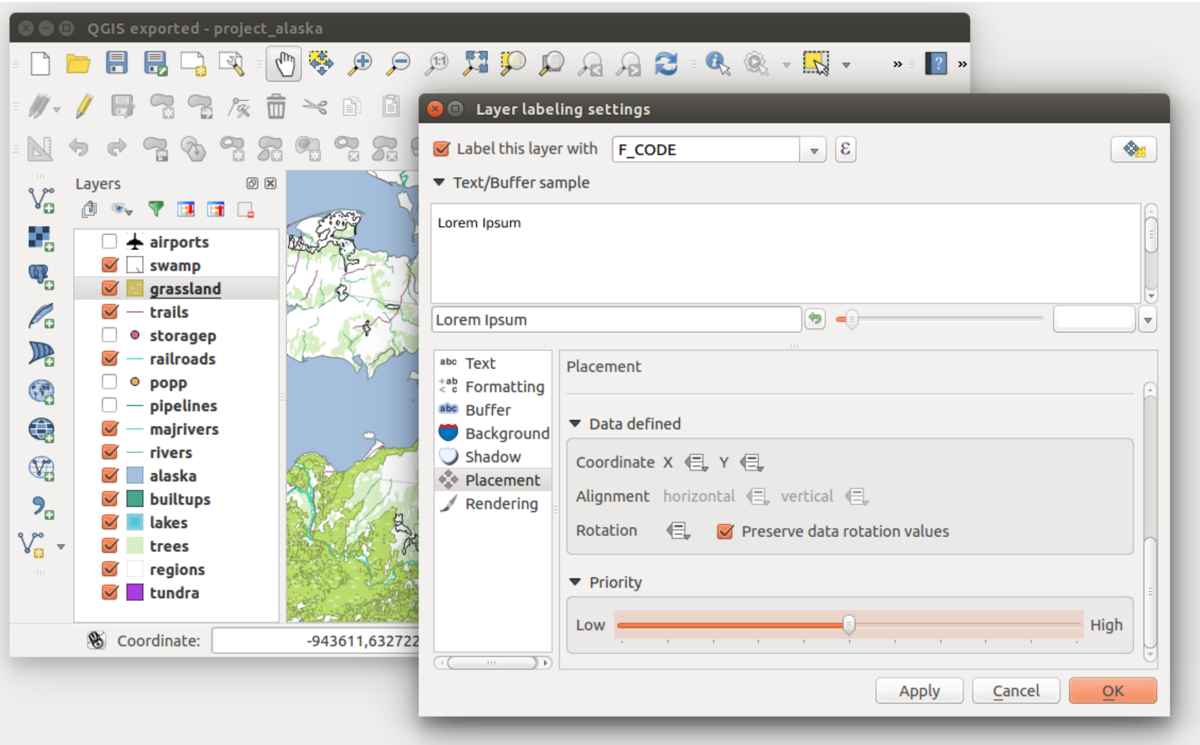

Figure 12.26: Labeling of vector polygon layers with data-defined override

12.3.3 Meniul Câmpurilor

Within the *Fields* menu, the field attributes of the selected dataset can be manipulated. The buttons New Column and Delete Column can be used when the dataset is in Editing mode.

Widget de Editare

Within the *Fields* menu, you also find an **edit widget** column. This column can be used to define values or a range of values that are allowed to be added to the specific attribute table column. If you click on the **[edit widget]**

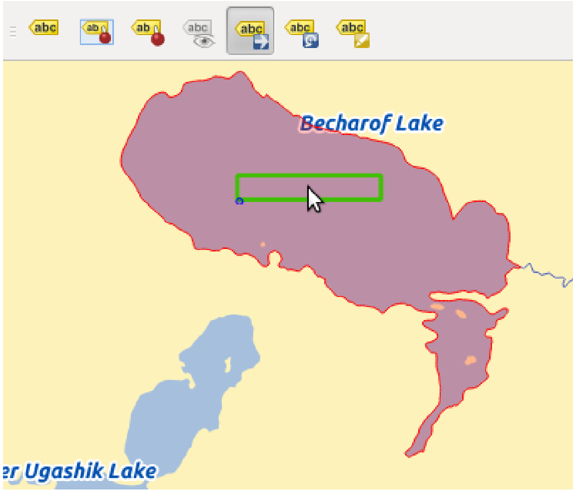

Figure 12.27: Move labels

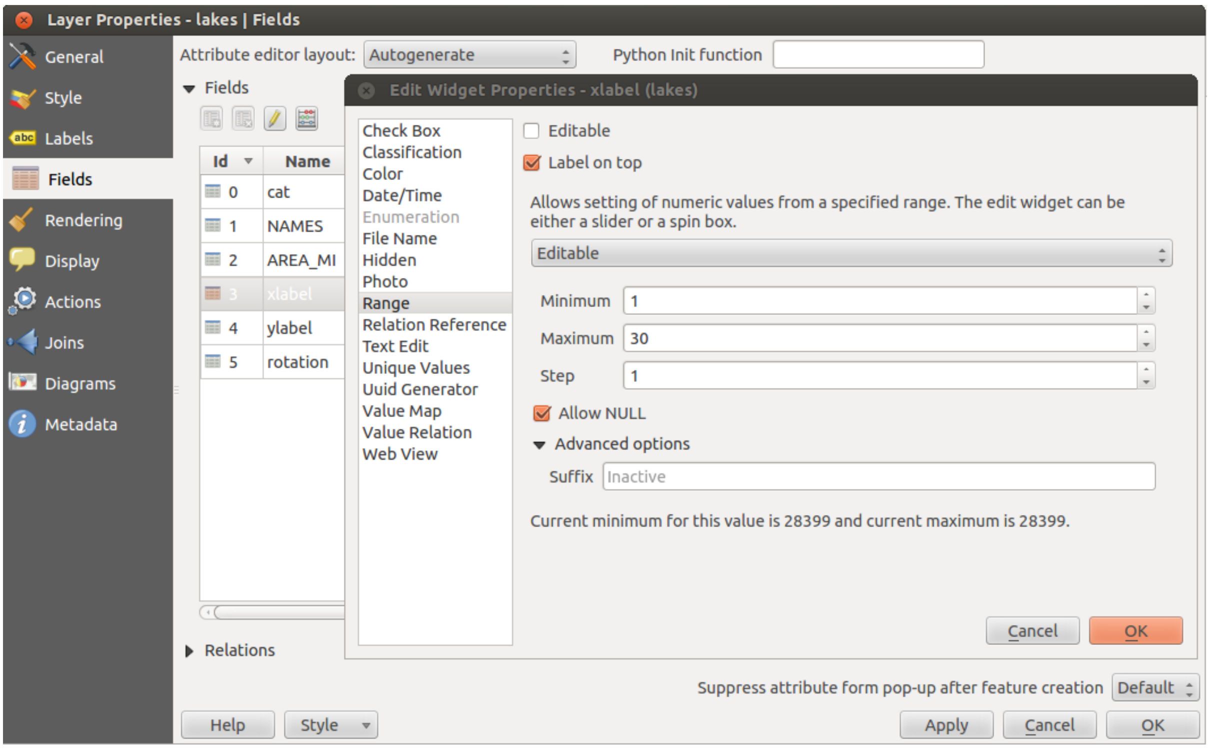

Figure 12.28: Dialog to select an edit widget for an attribute column

button, a dialog opens, where you can define different widgets. These widgets are:

- **Checkbox**: Displays a checkbox, and you can define what attribute is added to the column when the checkbox is activated or not.
- **Classification**: Displays a combo box with the values used for classification, if you have chosen 'unique value' as legend type in the *Style* menu of the properties dialog.
- **Color**: Displays a color button allowing user to choose a color from the color dialog window.
- **Date/Time**: Displays a line field which can open a calendar widget to enter a date, a time or both. Column type must be text. You can select a custom format, pop-up a calendar, etc.
- **Enumeration**: Opens a combo box with values that can be used within the columns type. This is currently only supported by the PostgreSQL provider.
- **File name**: Simplifies the selection by adding a file chooser dialog.
- **Hidden**: A hidden attribute column is invisible. The user is not able to see its contents.
- **Photo**: Field contains a filename for a picture. The width and height of the field can be defined.
- **Range**: Allows you to set numeric values from a specific range. The edit widget can be either a slider or a spin box.
- **Relation Reference**: This widged lets you embed the feature form of the referenced layer on the feature form of the actual layer. See *Creating one to many relations*.
- **Text edit** (default): This opens a text edit field that allows simple text or multiple lines to be used. If you choose multiple lines you can also choose html content.
- **Unique values**: You can select one of the values already used in the attribute table. If 'Editable' is activated, a line edit is shown with autocompletion support, otherwise a combo box is used.
- **UUID Generator**: Generates a read-only UUID (Universally Unique Identifiers) field, if empty.
- **Value map**: A combo box with predefined items. The value is stored in the attribute, the description is shown in the combo box. You can define values manually or load them from a layer or a CSV file.
- **Value Relation**: Offers values from a related table in a combobox. You can select layer, key column and value column.
- **Webview**: Field contains a URL. The width and height of the field is variable.

Note: QGIS has an advanced 'hidden' option to define your own field widget using python and add it to this impressive list of widgets. It is tricky but it is very well explained in following excellent blog that explains how to create a real time validation widget that can be used like described widgets. See http://blog.vitu.ch/10142013-1847/write-your-own-qgis-form-elements

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With the **Attribute editor layout**, you can now define built-in forms (see figure_fields_2). This is usefull for data entry jobs or to identify objects using the option auto open form when you have objects with many attributes. You can create an editor with several tabs and named groups to present the attribute fields.

Choose 'Drag and drop designer' and an attribute column. Use the icon to create a category to insert a tab or a named group (see figure_fields_3). When creating a new category, QGIS will insert a new tab or named group for the category in the built-in form. The next step will be to assign the relevant fields to a selected category with the icon. You can create more categories and use the same fields again.

Other options in the dialog are 'Autogenerate' and 'Provide ui-file'.

- 'Autogenerate' just creates editors for all fields and tabulates them.
- The 'Provide ui-file' option allows you to use complex dialogs made with the Qt-Designer. Using a UI-file allows a great deal of freedom in creating a dialog. For detailed information, see http://nathanw.net/2011/09/05/qgis-tips-custom-feature-forms-with-python-logic/.

QGIS dialogs can have a Python function that is called when the dialog is opened. Use this function to add extra logic to your dialogs. An example is (in module MyForms.py):

```
def open(dialog,layer,feature):
geom = feature.geometry()
control = dialog.findChild(QWidged,"My line edit")
```

Reference in Python Init Function like so: MyForms.open

MyForms.py must live on PYTHONPATH, in .qgis2/python, or inside the project folder.

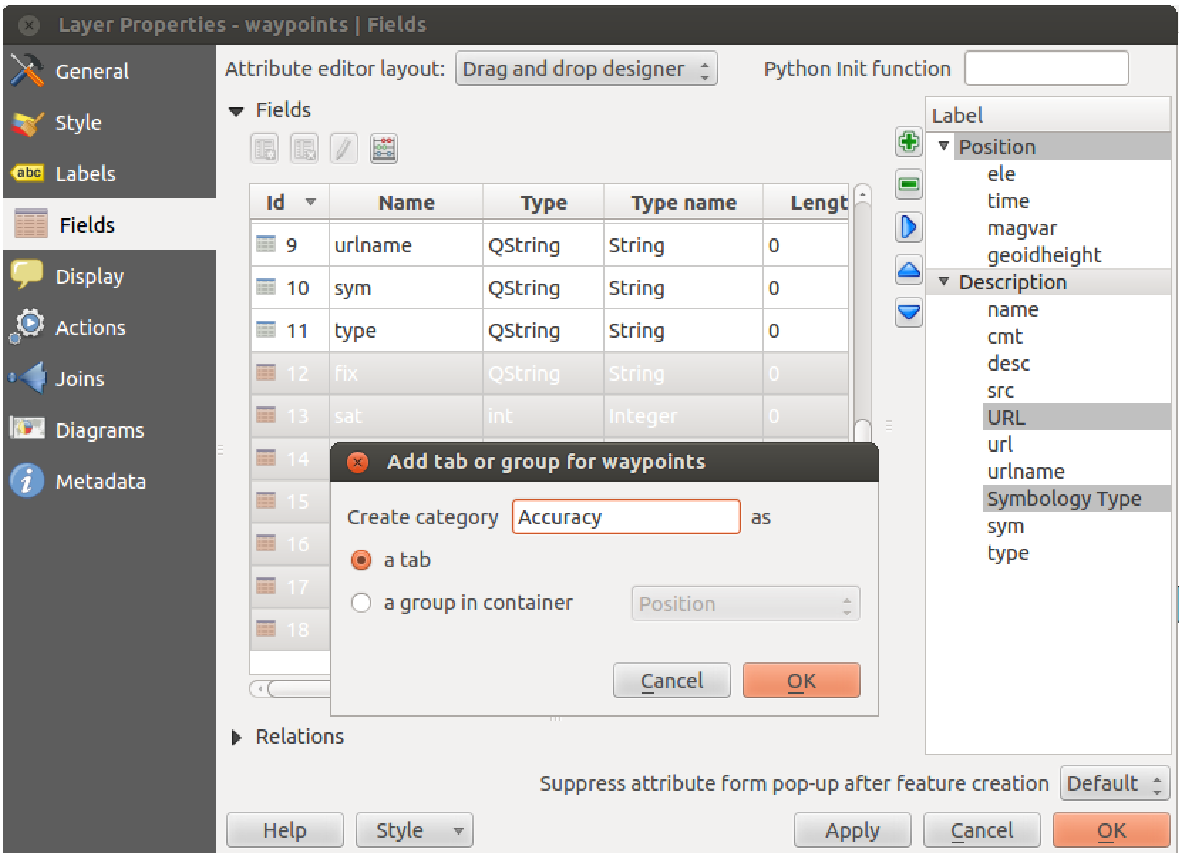

Figure 12.29: Dialog to create categories with the **Attribute editor layout**

12.3.4 Meniu General

 Use this menu to make general settings for the vector layer. There are several options available:

Informaii despre strat

- Change the display name of the layer in *displayed as*
- Define the *Layer source* of the vector layer
- Define the *Data source encoding* to define provider-specific options and to be able to read the file

Sistem de Coordonate de Referină

- *Specify* the coordinate reference system. Here, you can view or change the projection of the specific vector layer.
- Create a *Spatial Index* (only for OGR-supported formats)
- *Update Extents* information for a layer

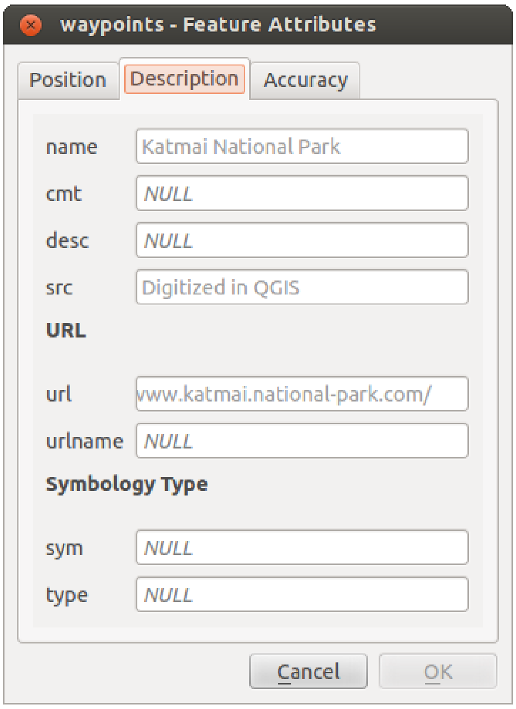

Figure 12.30: Resulting built-in form with tabs and named groups

- View or change the projection of the specific vector layer, clicking on *Specify* ...

Scale dependent visibility

- You can set the *Maximum (inclusive)* and *Minimum (exclusive)* scale. The scale can also be set by the **[Current]** buttons.

Feature subset

- With the **[Query Builder]** button, you can create a subset of the features in the layer that will be visualized (also refer to section *Constructorul de Interogări*).

12.3.5 Meniul de Randare

QGIS 2.2 introduces support for on-the-fly feature generalisation. This can improve rendering times when drawing many complex features at small scales. This feature can be enabled or disabled in the layer settings using the *Simplify geometry* option. There is also a new global setting that enables generalisation by default for newly added layers (see section *Opţiuni*). **Note**: Feature generalisation may introduce artefacts into your rendered output in some cases. These may include slivers between polygons and inaccurate rendering when using offset-based symbol layers.

12.3.6 Meniul de Afiare

This menu is specifically created for Map Tips. It includes a new feature: Map Tip display text in HTML. While you can still choose a *Field* to be displayed when hovering over a feature on the map, it is now possible to insert HTML code that creates a complex display when hovering over a feature. To activate Map Tips, select the menu option *View* → *MapTips*. Figure Display 1 shows an example of HTML code.

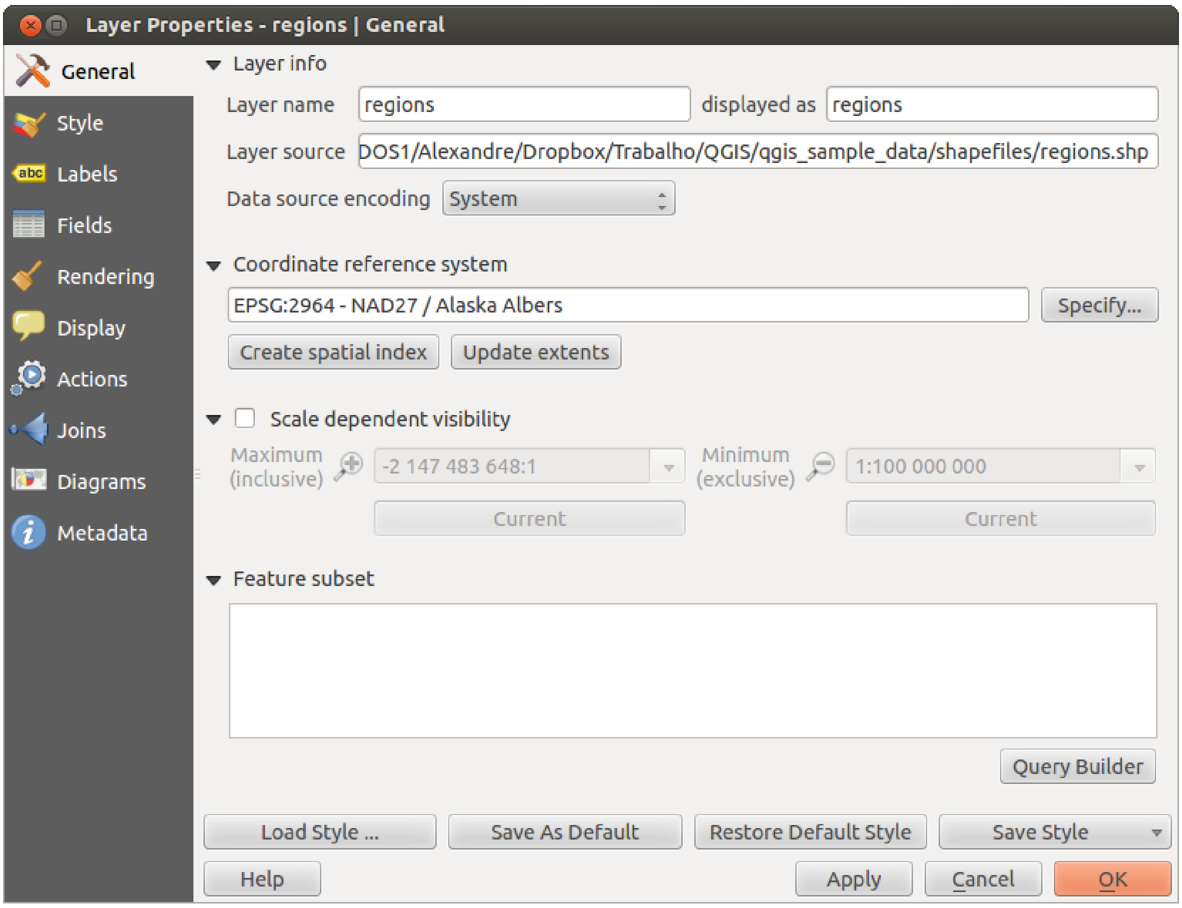

Figure 12.31: General menu in vector layers properties dialog

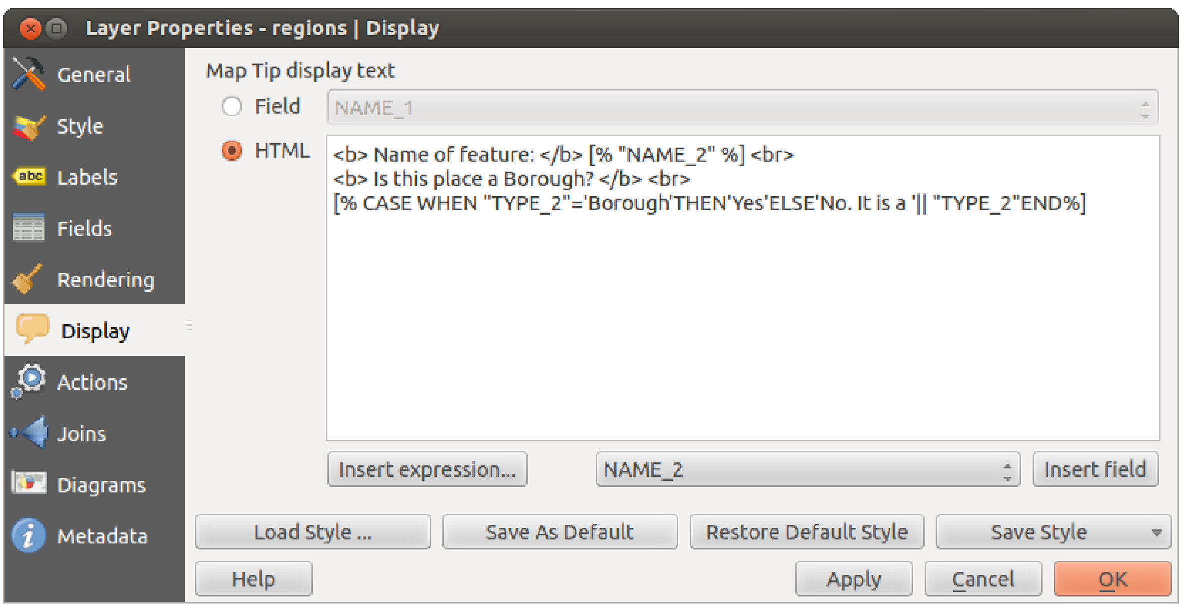

Figure 12.32: HTML code for map tip

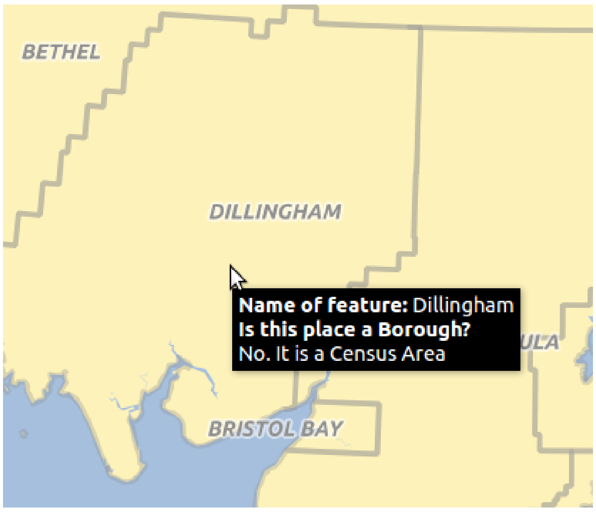

Figure 12.33: Map tip made with HTML code

12.3.7 Meniul Acţiunilor

QGIS provides the ability to perform an action based on the attributes of a feature. This can be used to perform any number of actions, for example, running a program with arguments built from the attributes of a feature or passing parameters to a web reporting tool.

Actions are useful when you frequently want to run an external application or view a web page based on one or more values in your vector layer. They are divided into six types and can be used like this:

- Generic, Mac, Windows and Unix actions start an external process.
- Python actions execute a Python expression.
- Generic and Python actions are visible everywhere.
- Mac, Windows and Unix actions are visible only on the respective platform (i.e., you can define three 'Edit' actions to open an editor and the users can only see and execute the one 'Edit' action for their platform to run the editor).

There are several examples included in the dialog. You can load them by clicking on **[Add default actions]**. One example is performing a search based on an attribute value. This concept is used in the following discussion.

Defining Actions

Attribute actions are defined from the vector *Layer Properties* dialog. To define an action, open the vector *Layer Properties* dialog and click on the *Actions* menu. Go to the *Action properties*. Select 'Generic' as type and provide a descriptive name for the action. The action itself must contain the name of the application that will be executed when the action is invoked. You can add one or more attribute field values as arguments to the application. When the action is invoked, any set of characters that start with a `%` followed by the name of a field will be replaced by the value of that field. The special characters %% will be replaced by the value of the field that was selected from the identify results or attribute table (see using_actions below). Double quote marks can be used to group text into a single argument to the program, script or command. Double quotes will be ignored if preceded by a backslash.

If you have field names that are substrings of other field names (e.g., `col1` and `col10`), you should indicate that by surrounding the field name (and the % character) with square brackets (e.g., `[%col10]`). This will prevent the `%col10` field name from being mistaken for the `%col1` field name with a `0` on the end. The brackets will be removed by QGIS when it substitutes in the value of the field. If you want the substituted field to be surrounded by square brackets, use a second set like this: `[[%col10]]`.

Using the *Identify Features* tool, you can open the *Identify Results* dialog. It includes a *(Derived)* item that contains information relevant to the layer type. The values in this item can be accessed in a similar way to the other fields by preceeding the derived field name with `(Derived).`. For example, a point layer has an `X` and `Y` field, and

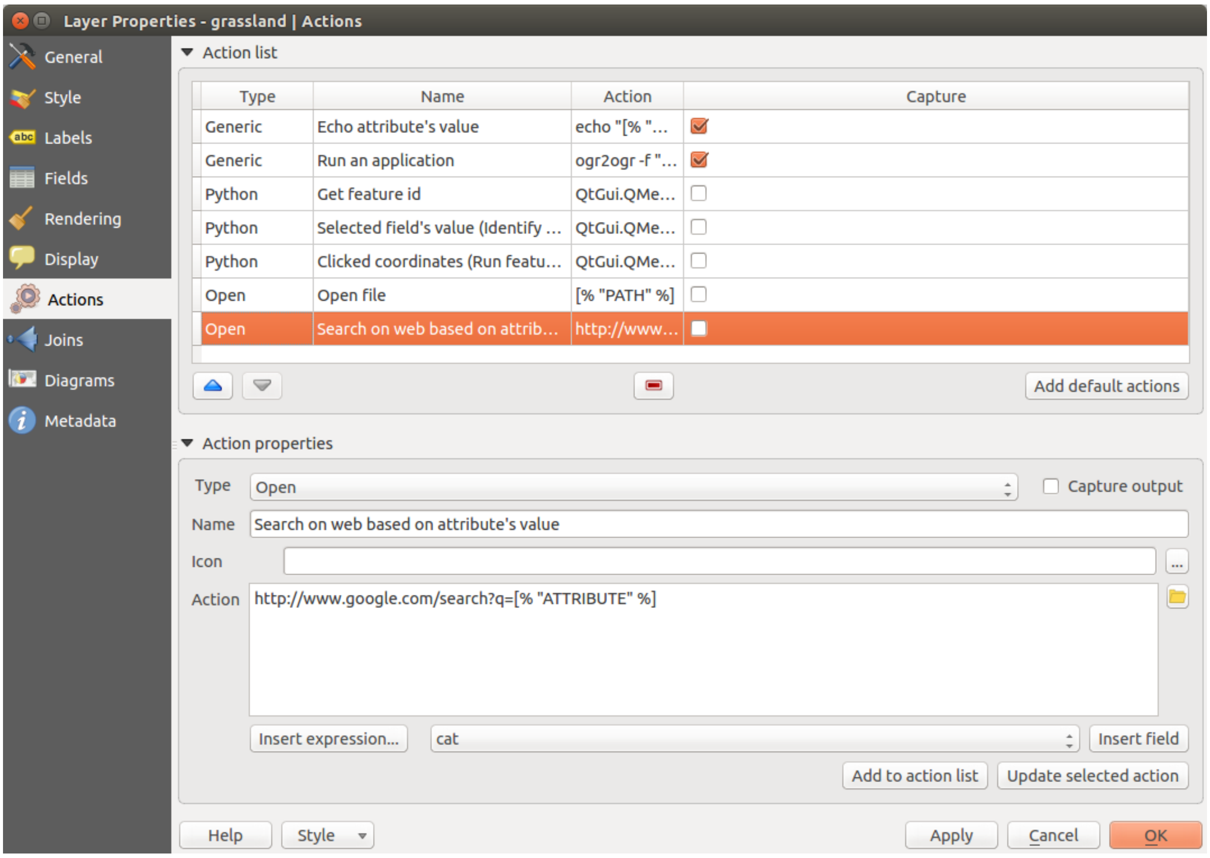

Figure 12.34: Overview action dialog with some sample actions

the values of these fields can be used in the action with `%(Derived).X` and `%(Derived).Y`. The derived attributes are only available from the *Identify Results* dialog box, not the *Attribute Table* dialog box.

Two example actions are shown below:

- `konqueror http://www.google.com/search?q=%nam`
- `konqueror http://www.google.com/search?q=%%`

In the first example, the web browser konqueror is invoked and passed a URL to open. The URL performs a Google search on the value of the `nam` field from our vector layer. Note that the application or script called by the action must be in the path, or you must provide the full path. To be certain, we could rewrite the first example as: `/opt/kde3/bin/konqueror http://www.google.com/search?q=%nam`. This will ensure that the konqueror application will be executed when the action is invoked.

The second example uses the %% notation, which does not rely on a particular field for its value. When the action is invoked, the %% will be replaced by the value of the selected field in the identify results or attribute table.

Using Actions

Actions can be invoked from either the *Identify Results* dialog, an *Attribute Table* dialog or from *Run Feature Action* (recall that these dialogs can be opened by clicking Identify Features or Open Attribute Table or Run Feature Action). To invoke an action, right click on the record and choose the action from the pop-up menu. Actions are listed in the popup menu by the name you assigned when defining the action. Click on the action you wish to invoke.

If you are invoking an action that uses the `%%` notation, right-click on the field value in the *Identify Results* dialog or the *Attribute Table* dialog that you wish to pass to the application or script.

Here is another example that pulls data out of a vector layer and inserts it into a file using bash and the `echo` command (so it will only work on or perhaps). The layer in question has fields for a species name `taxon_name`, latitude `lat` and longitude `long`. We would like to be able to make a spatial selection of localities and export these field values to a text file for the selected record (shown in yellow in the QGIS map area). Here is the action to achieve this:

```
bash -c "echo \"%taxon_name %lat %long\" >> /tmp/species_localities.txt"
```

After selecting a few localities and running the action on each one, opening the output file will show something like this:

```
Acacia mearnsii -34.0800000000 150.0800000000
Acacia mearnsii -34.9000000000 150.1200000000
Acacia mearnsii -35.2200000000 149.9300000000
Acacia mearnsii -32.2700000000 150.4100000000
```

As an exercise, we can create an action that does a Google search on the `lakes` layer. First, we need to determine the URL required to perform a search on a keyword. This is easily done by just going to Google and doing a simple search, then grabbing the URL from the address bar in your browser. From this little effort, we see that the format is http://google.com/search?q=qgis, where `QGIS` is the search term. Armed with this information, we can proceed:

1. Asigurai-vă că stratul `lakes` este încărcat.
2. Open the *Layer Properties* dialog by double-clicking on the layer in the legend, or right-click and choose *Properties* from the pop-up menu.
3. Clic pe meniul *Actions*.
4. Introducei un nume pentru aciune, cum ar fi `Google Search`.
5. For the action, we need to provide the name of the external program to run. In this case, we can use Firefox. If the program is not in your path, you need to provide the full path.
6. Following the name of the external application, add the URL used for doing a Google search, up to but not including the search term: `http://google.com/search?q=`
7. The text in the *Action* field should now look like this: `firefox http://google.com/search?q=`
8. Click on the drop-down box containing the field names for the `lakes` layer. It's located just to the left of the **[Insert Field]** button.
9. From the drop-down box, select 'NAMES' and click **[Insert Field]**.
10. Aciunea textului dvs. acum arată astfel:

    `firefox http://google.com/search?q=%NAMES`
11. Pentru a finaliza aciunea, facei clic pe butonul **[Add to action list]**.

This completes the action, and it is ready to use. The final text of the action should look like this:

```
firefox http://google.com/search?q=%NAMES
```

We can now use the action. Close the *Layer Properties* dialog and zoom in to an area of interest. Make sure the `lakes` layer is active and identify a lake. In the result box you'll now see that our action is visible:

When we click on the action, it brings up Firefox and navigates to the URL http://www.google.com/search?q=Tustumena. It is also possible to add further attribute fields to the action. Therefore, you can add a + to the end of the action text, select another field and click on **[Insert Field]**. In this example, there is just no other field available that would make sense to search for.

You can define multiple actions for a layer, and each will show up in the *Identify Results* dialog.

There are all kinds of uses for actions. For example, if you have a point layer containing locations of images or photos along with a file name, you could create an action to launch a viewer to display the image. You could also use actions to launch web-based reports for an attribute field or combination of fields, specifying them in the same way we did in our Google search example.

We can also make more complex examples, for instance, using **Python** actions.

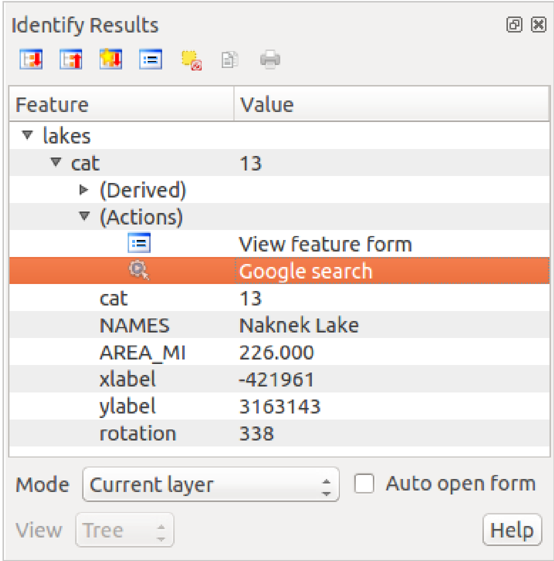

Figure 12.35: Select feature and choose action

Usually, when we create an action to open a file with an external application, we can use absolute paths, or eventually relative paths. In the second case, the path is relative to the location of the external program executable file. But what about if we need to use relative paths, relative to the selected layer (a file-based one, like a shapefile or SpatiaLite)? The following code will do the trick:

```
command = "firefox";
imagerelpath = "images_test/test_image.jpg";
layer = qgis.utils.iface.activeLayer();
import os.path;
layerpath = layer.source() if layer.providerType() == 'ogr'
  else (qgis.core.QgsDataSourceURI(layer.source()).database()
  if layer.providerType() == 'spatialite' else None);
path = os.path.dirname(str(layerpath));
image = os.path.join(path,imagerelpath);
import subprocess;
subprocess.Popen( [command, image ] );
```

We just have to remember that the action is one of type *Python* and the *command* and *imagerelpath* variables must be changed to fit our needs.

But what about if the relative path needs to be relative to the (saved) project file? The code of the Python action would be:

```
command="firefox";
imagerelpath="images/test_image.jpg";
projectpath=qgis.core.QgsProject.instance().fileName();
import os.path; path=os.path.dirname(str(projectpath)) if projectpath != '' else None;
image=os.path.join(path, imagerelpath);
import subprocess;
subprocess.Popen( [command, image ] );
```

Another Python action example is the one that allows us to add new layers to the project. For instance, the following examples will add to the project respectively a vector and a raster. The names of the files to be added to the project and the names to be given to the layers are data driven (*filename* and *layername* are column names of the table of attributes of the vector where the action was created):

```
qgis.utils.iface.addVectorLayer('/yourpath/[% "filename" %].shp','[% "layername" %]',
  'ogr')
```

To add a raster (a TIF image in this example), it becomes:

```
qgis.utils.iface.addRasterLayer('/yourpath/[% "filename" %].tif','[% "layername" %]
')
```

12.3.8 Meniul Îmbinărilor

The *Joins* menu allows you to join a loaded attribute table to a loaded vector layer. After clicking , the *Add vector join* dialog appears. As key columns, you have to define a join layer you want to connect with the target vector layer. Then, you have to specify the join field that is common to both the join layer and the target layer. Now you can also specify a subset of fields from the joined layer based on the checkbox *Choose which fields are joined*. As a result of the join, all information from the join layer and the target layer are displayed in the attribute table of the target layer as joined information. If you specified a subset of fields only these fields are displayed in the attribute table of the target layer.

QGIS currently has support for joining non-spatial table formats supported by OGR (e.g., CSV, DBF and Excel), delimited text and the PostgreSQL provider (see figure_joins_1).

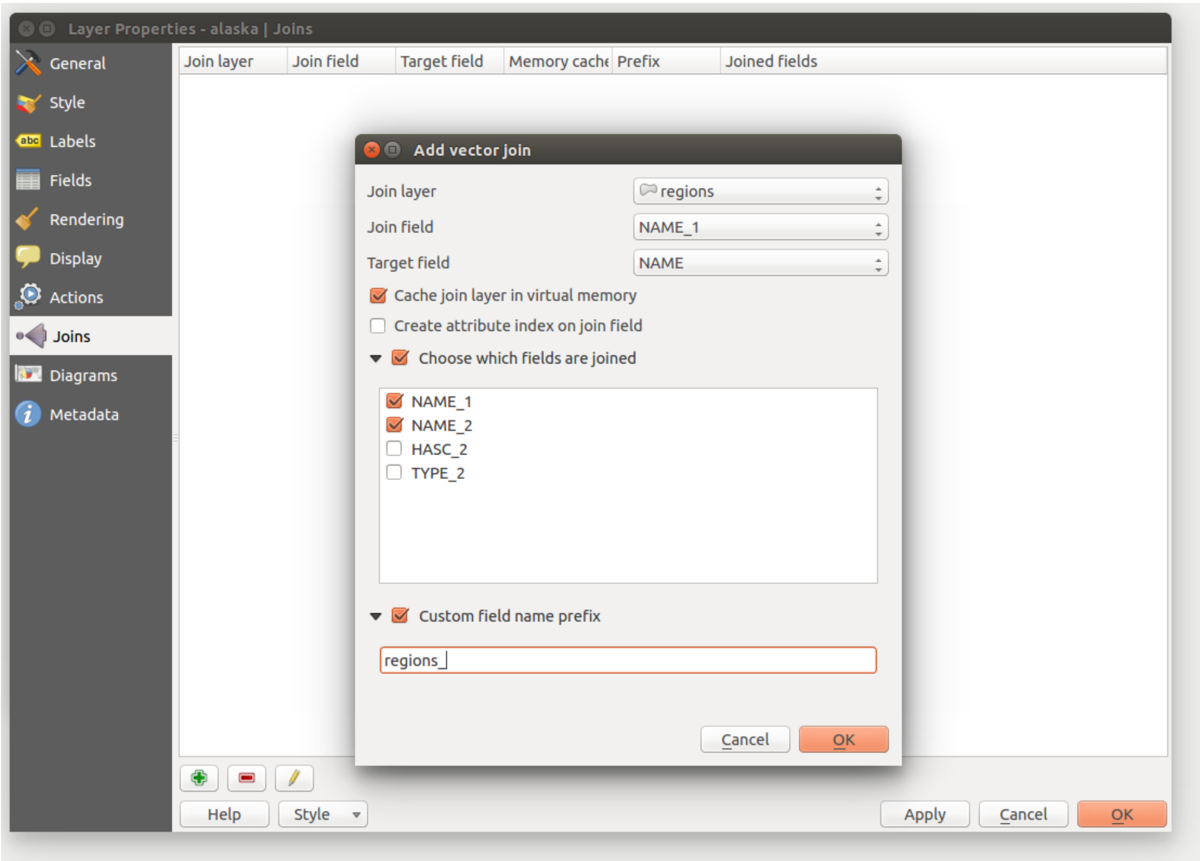

Figure 12.36: Join an attribute table to an existing vector layer

În plus, adăugarea dialogului de îmbinare vectorială vă permite să:

- *Cache join layer in virtual memory*
- *Create attribute index on the join field*
- *Alegei câmpurile care vor fi îmbinate*
- Create a *Custom field name prefix*

12.3.9 Meniul Diagramelor

The *Diagrams* menu allows you to add a graphic overlay to a vector layer (see figure_diagrams_1).

The current core implementation of diagrams provides support for pie charts, text diagrams and histograms.

The menu is divided into four tabs: *Appearance*, *Size*, *Postion* and *Options*.

In the cases of the text diagram and pie chart, text values of different data columns are displayed one below the other with a circle or a box and dividers. In the *Size* tab, diagram size is based on a fixed size or on linear scaling according to a classification attribute. The placement of the diagrams, which is done in the *Position* tab, interacts with the new labeling, so position conflicts between diagrams and labels are detected and solved. In addition, chart positions can be fixed manually.

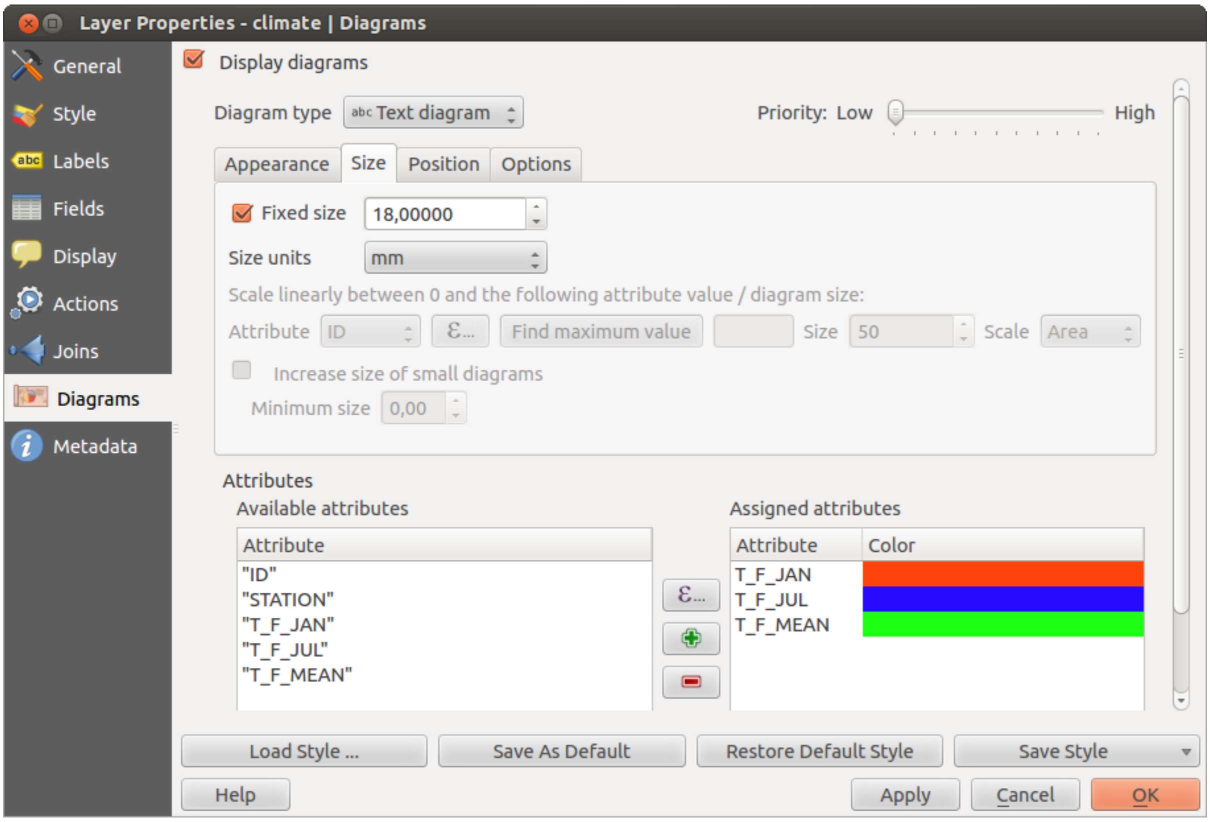

Figure 12.37: Vector properties dialog with diagram menu

We will demonstrate an example and overlay on the Alaska boundary layer a text diagram showing temperature data from a climate vector layer. Both vector layers are part of the QGIS sample dataset (see section *Date eantion*).

1. First, click on the Load Vector icon, browse to the QGIS sample dataset folder, and load the two vector shape layers `alaska.shp` and `climate.shp`.
2. Dublu clic pe stratul `climate` din legenda hărții, pentru a deschide fereastra de dialog a *Proprietăților Stratului*.
3. Click on the *Diagrams* menu, activate *Display diagrams*, and from the *Diagram type* combo box, select 'Text diagram'.
4. In the *Appearance* tab, we choose a light blue as background color, and in the *Size* tab, we set a fixed size to 18 mm.
5. In the *Position* tab, placement could be set to 'Around Point'.

6. In the diagram, we want to display the values of the three columns `T_F_JAN`, `T_F_JUL` and `T_F_MEAN`. First select `T_F_JAN` as *Attributes* and click the button, then `T_F_JUL`, and finally `T_F_MEAN`.
7. Now click **[Apply]** to display the diagram in the QGIS main window.
8. You can adapt the chart size in the *Size* tab. Deactivate the *Fixed size* and set the size of the diagrams on the basis of an attribute with the **[Find maximum value]** button and the *Size* menu. If the diagrams appear too small on the screen, you can activate the *Increase size of small diagrams* checkbox and define the minimum size of the diagrams.
9. Change the attribute colors by double clicking on the color values in the *Assigned attributes* field. Figure_diagrams_2 gives an idea of the result.
10. În cele din urmă, facei clic pe **[Ok]**.

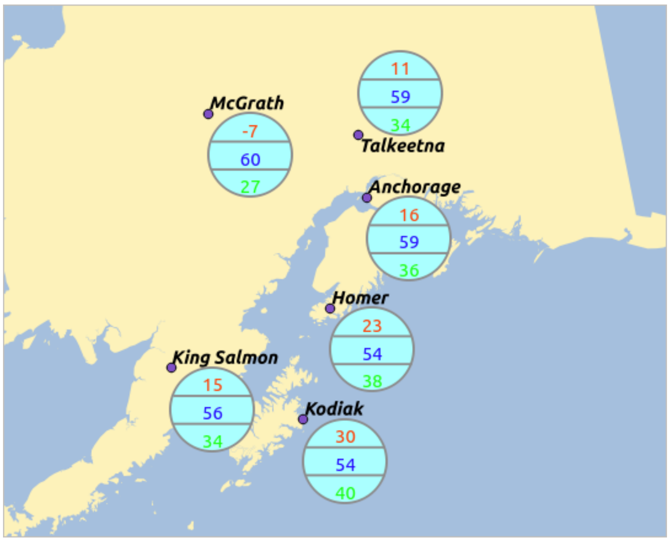

Figure 12.38: Diagram from temperature data overlayed on a map

Remember that in the *Position* tab, a *Data defined position* of the diagrams is possible. Here, you can use attributes to define the position of the diagram. You can also set a scale-dependent visibility in the *Appearance* tab.

The size and the attributes can also be an expression. Use the button to add an expression. See *Expresii* chapter for more information and example.

12.3.10 Meniu Metadate

The *Metadata* menu consists of *Description*, *Attribution*, *MetadataURL* and *Properties* sections.

In the *Properties* section, you get general information about the layer, including specifics about the type and location, number of features, feature type, and editing capabilities. The *Extents* table provides you with layer extent information and the *Layer Spatial Reference System*, which is information about the CRS of the layer. This is a quick way to get information about the layer.

Additionally, you can add or edit a title and abstract for the layer in the *Description* section. It's also possible to define a *Keyword list* here. These keyword lists can be used in a metadata catalogue. If you want to use a title from an XML metadata file, you have to fill in a link in the *DataUrl* field. Use *Attribution* to get attribute data from an XML metadata catalogue. In *MetadataUrl*, you can define the general path to the XML metadata catalogue. This information will be saved in the QGIS project file for subsequent sessions and will be used for QGIS server.

.

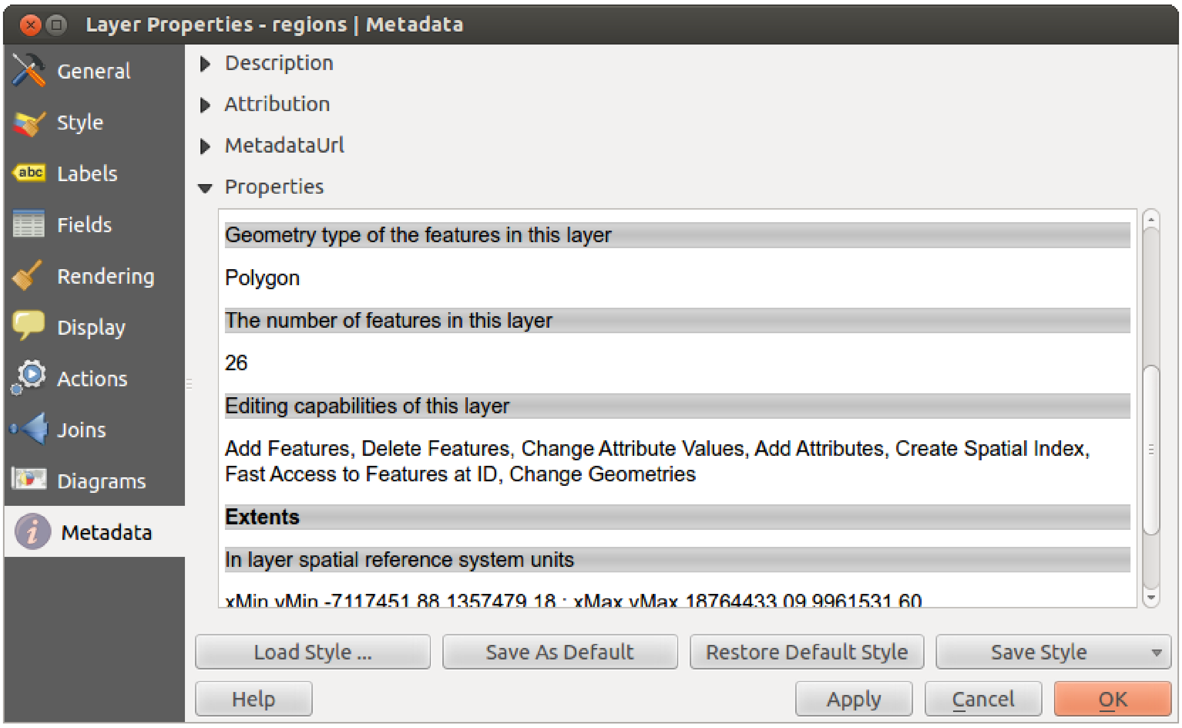

Figure 12.39: Metadata menu in vector layers properties dialog

12.4 Expresii

The **Expressions** feature are available through the field calculator or the add a new column button in the attribut table or the Field tab in the Layer properties ; through the graduaded, categorized and rule-based rendering in the Style tab of the Layer properties ; through the expression-based labeling in the Labeling core application ; through the feature selection and through the diagram tab of the Layer properties as well as the *Main properties* of the label item and the *Atlas generation* tab in the Print Composer.

They are a powerful way to manipulate attribute value in order to dynamically change the final value in order to change the geometry style, the content of the label, the value for diagram, select some feature or create virtual column.

12.4.1 Lista Funcţiilor

The **Function List** contains functions as well as fields and values. View the help function in the **Selected Function Help**. In **Expression** you see the calculation expressions you create with the **Function List**. For the most commonly used operators, see **Operators**.

In the **Function List**, click on *Fields and Values* to view all attributes of the attribute table to be searched. To add an attribute to the Field calculator **Expression** field, double click its name in the *Fields and Values* list. Generally, you can use the various fields, values and functions to construct the calculation expression, or you can just type it into the box. To display the values of a field, you just right click on the appropriate field. You can choose between *Load top 10 unique values* and *Load all unique values*. On the right side, the **Field Values** list opens with the unique values. To add a value to the Field calculator **Expression** box, double click its name in the **Field Values** list.

The *Operators*, *Math*, *Conversions*, *String*, *Geometry* and *Record* groups provide several functions. In *Operators*, you find mathematical operators. Look in *Math* for mathematical functions. The *Conversions* group contains functions that convert one data type to another. The *String* group provides functions for data strings. In the *Geometry* group, you find functions for geometry objects. With *Record* group functions, you can add a numeration to your data set. To add a function to the Field calculator **Expression** box, click on the > and then double click the function.

Operatori

This group contains operators (e.g., +, -, *).

```
a + b      a plus b
a - b      a minus b
a * b      a multiplied by b
a / b      a divided by b
a % b      a modulo b (for example, 7 % 2 = 1, or 2 fits into 7 three
           times with remainder 1)
a ^ b      a power b (for example, 2^2=4 or 2^3=8)
a = b      a and b are equal
a > b      a is larger than b
a < b      a is smaller than b
a <> b     a and b are not equal
a != b     a and b are not equal
a <= b     a is less than or equal to b
a >= b     a is larger than or equal to b
a ~ b      a matches the regular expression b
+ a        positive sign
- a        negative value of a
||         joins two values together into a string 'Hello' || ' world'
LIKE       returns 1 if the string matches the supplied pattern
ILIKE      returns 1 if the string matches case-insensitive the supplied
           pattern (ILIKE can be used instead of LIKE to make the match
           case-insensitive)
IS         returns 1 if a is the same as b
OR         returns 1 when condition a or b is true
AND        returns 1 when condition a and b are true
NOT        returns 1 if a is not the same as b
column name "column name"     value of the field column name, take
                              care to not be confused with simple
                              quote, see below
'string'                      a string value, take care to not be
                              confused with double quote, see above
NULL                          null value
a IS NULL                     a has no value
a IS NOT NULL                 a has a value
a IN (value[,value])          a is below the values listed
a NOT IN (value[,value])      a is not below the values listed
```

Câteva exemple:

- Îmbină un ir cu o valoare din numele unei coloane:

  ```
  'My feature's id is: ' || "gid"
  ```

- Testai dacă atributul câmpului “description” începe cu irul ‘Hello’ (notai poziia caracterului %):

  ```
  "description" LIKE 'Hello%'
  ```

Condiionări

Acest grup conine funcii care gestionează verificările condiionale din expresii.

```
CASE                          evaluates multiple expressions and returns a
                              result
CASE ELSE                     evaluates multiple expressions and returns a
                              result
coalesce                      returns the first non-NULL value from the
```

```
                                 expression list
regexp_match                     returns true if any part of a string matches
                                 the supplied regular expression
```

Câteva exemple:

- Trimite înapoi o valoare în cazul în care prima condiie este adevărată, altfel, transmite o altă valoare:

  ```
  CASE WHEN "software" LIKE '%QGIS%' THEN 'QGIS' ELSE 'Other'
  ```

Funciile Matematice

Acest grup conine funcii matematice (ex.: rădăcina pătrată, sin i cos).

```
sqrt(a)                          square root of a
abs                              returns the absolute value of a number
sin(a)                           sine of a
cos(a)                           cosine of a
tan(a)                           tangent of a
asin(a)                          arcsin of a
acos(a)                          arccos of a
atan(a)                          arctan of a
atan2(y,x)                       arctan of y/x using the signs of the two
                                 arguments to determine the quadrant of the
                                 result
exp                              exponential of a value
ln                               value of the natural logarithm of the passed
                                 expression
log10                            value of the base 10 logarithm of the passed
                                 expression
log                              value of the logarithm of the passed value
                                 and base
round                            round to number of decimal places
rand                             random integer within the range specified by
                                 the minimum
                                 and maximum argument (inclusive)
randf                            random float within the range specified by
                                 the minimum
                                 and maximum argument (inclusive)
max                              largest value in a set of values
min                              smallest value in a set of values
clamp                            restricts an input value to a specified
                                 range
scale_linear                     transforms a given value from an input
                                 domain to an output
                                 range using linear interpolation
scale_exp                        transforms a given value from an input
                                 domain to an output
                                 range using an exponential curve
floor                            rounds a number downwards
ceil                             rounds a number upwards
$pi                              pi as value for calculations
```

Conversii

Acest grup conine funcii pentru transformarea dintr-un tip de dată în altul (ex.: din ir în întreg, din întreg în ir).

```
toint                          converts a string to integer number
toreal                         converts a string to real number
tostring                       converts number to string
todatetime                     converts a string into Qt data time type
```

todate	converts a string into Qt data type
totime	converts a string into Qt time type
tointerval	converts a string to an interval type (can be used to take days, hours, months, etc. off a date)

Funcii pentru Dată i Oră

Acest grup conine funcii care gestionează datele calendaristice i ora.

$now	current date and time
age	difference between two dates
year	extract the year part from a date, or the number of years from an interval
month	extract the month part from a date, or the number of months from an interval
week	extract the week number from a date, or the number of weeks from an interval
day	extract the day from a date, or the number of days from an interval
hour	extract the hour from a datetime or time, or the number of hours from an interval
minute	extract the minute from a datetime or time, or the number of minutes from an interval
second	extract the second from a datetime or time, or the number of minutes from an interval

Câteva exemple:

- Obine luna i anul curente, în formatul "10/2014"

  ```
  month($now) || '/' || year($now)
  ```

Funcii pentru iruri

Acest grup conine funcii care operează asupra irurilor, (de ex: înlocuirea, conversia în majuscule).

lower	convert string a to lower case
upper	convert string a to upper case
title	converts all words of a string to title case (all words lower case with leading capital letter)
trim	removes all leading and trailing white space (spaces, tabs, etc.) from a string
wordwrap	returns a string wrapped to a maximum/ minimum number of characters
length	length of string a
replace	returns a string with the supplied string replaced
regexp_replace(a,this,that)	returns a string with the supplied regular expression replaced
regexp_substr	returns the portion of a string which matches a supplied regular expression
substr(*a*,from,len)	returns a part of a string
concat	concatenates several strings to one
strpos	returns the index of a regular expression in a string
left	returns a substring that contains the n leftmost characters of the string
right	returns a substring that contains the n rightmost characters of the string

rpad	returns a string with supplied width padded using the fill character
lpad	returns a string with supplied width padded using the fill character
format	formats a string using supplied arguments
format_number	returns a number formatted with the locale separator for thousands (also truncates the number to the number of supplied places)
format_date	formats a date type or string into a custom string format

Funciile Culorilor

Acest grup conine funcii pentru manipularea culorilor.

color_rgb	returns a string representation of a color based on its red, green, and blue components
color_rgba	returns a string representation of a color based on its red, green, blue, and alpha (transparency) components
ramp_color	returns a string representing a color from a color ramp
color_hsl	returns a string representation of a color based on its hue, saturation, and lightness attributes
color_hsla	returns a string representation of a color based on its hue, saturation, lightness and alpha (transparency) attributes
color_hsv	returns a string representation of a color based on its hue, saturation, and value attributes
color_hsva	returns a string representation of a color based on its hue, saturation, value and alpha (transparency) attributes
color_cmyk	returns a string representation of a color based on its cyan, magenta, yellow and black components
color_cmyka	returns a string representation of a color based on its cyan, magenta, yellow, black and alpha (transparency) components

Funcii Geometrice

Acest grup conine funcii care operează asupra geometriei obiectelor (de ex.: lungimea, suprafaa).

$geometry	returns the geometry of the current feature (can be used for processing with other functions)
$area	returns the area size of the current feature
$length	returns the length size of the current feature
$perimeter	returns the perimeter length of the current feature
$x	returns the x coordinate of the current feature
$y	returns the y coordinate of the current feature
xat	retrieves the nth x coordinate of the current feature. n given as a parameter of the function
yat	retrieves the nth y coordinate of the current feature. n given as a parameter of the function
xmin	returns the minimum x coordinate of a geometry. Calculations are in the Spatial Reference System of this Geometry
xmax	returns the maximum x coordinate of a geometry. Calculations are in the Spatial Reference System of this Geometry
ymin	returns the minimum y coordinate of a geometry. Calculations are in the Spatial Reference System of this Geometry
ymax	returns the maximum y coordinate of a geometry.

```
                 Calculations are in the Spatial Reference System of this
                 Geometry
geomFromWKT      returns a geometry created from a well-known text (WKT)
                 representation
geomFromGML      returns a geometry from a GML representation of geometry
bbox
disjoint         returns 1 if the geometries do not share any space
                 together
intersects       returns 1 if the geometries spatially intersect
                 (share any portion of space) and 0 if they don't
touches          returns 1 if the geometries have at least one point in
                 common, but their interiors do not intersect
crosses          returns 1 if the supplied geometries have some, but not
                 all, interior points in common
contains         returns true if and only if no points of b lie in the
                 exterior of a, and at least one point of the interior
                 of b lies in the interior of a
overlaps         returns 1 if the geometries share space, are of the
                 same dimension, but are not completely contained by
                 each other
within           returns 1 if geometry a is completely inside geometry b
buffer           returns a geometry that represents all points whose
                 distance from this geometry is less than or equal to
                 distance
centroid         returns the geometric center of a geometry
bounds           returns a geometry which represents the bounding box of
                 an input geometry. Calculations are in the Spatial
                 Reference System of this Geometry.
bounds_width     returns the width of the bounding box of a geometry.
                 Calculations are in the Spatial Reference System of
                 this Geometry.
bounds_height    returns the height of the bounding box of a geometry.
                 Calculations are in the Spatial Reference System of
                 this Geometry.
convexHull       returns the convex hull of a geometry (this represents
                 the minimum convex geometry that encloses all geometries
                 within the set)
difference       returns a geometry that represents that part of geometry
                 a that does not intersect with geometry b
distance         returns the minimum distance (based on spatial ref)
                 between two geometries in projected units
intersection     returns a geometry that represents the shared portion
                 of geometry a and geometry b
symDifference    returns a geometry that represents the portions of a and
                 b that do not intersect
combine          returns the combination of geometry a and geometry b
union            returns a geometry that represents the point set union of
                 the geometries
geomToWKT        returns the well-known text (WKT) representation of the
                 geometry without SRID metadata
geometry         returns the feature's geometry
transform        returns the geometry transformed from the source CRS to
                 the dest CRS
```

Funciile Înregistrărilor

Acest grup conine funcii care operează asupra identificatorilor de înregistrare.

```
$rownum                 returns the number of the current row
$id                     returns the feature id of the current row
$currentfeature         returns the current feature being evaluated.
                        This can be used with the 'attribute' function
```

```
                          to evaluate attribute values from the current
                          feature.
$scale                    returns the current scale of the map canvas
$uuid                     generates a Universally Unique Identifier (UUID)
                          for each row. Each UUID is 38 characters long.
getFeature                returns the first feature of a layer matching a
                          given attribute value.
attribute                 returns the value of a specified attribute from
                          a feature.
$map                      returns the id of the current map item if the map
                          is being drawn in a composition, or "canvas" if
                          the map is being drawn within the main QGIS
                          window.
```

Fields and Values

Contains a list of fields from the layer. Sample values can also be accessed via right-click.

Select the field name from the list, then right-click to access a context menu with options to load sample values from the selected field.

Fields name should be double-quoted. Values or string should be simple-quoted.

.

12.5 Editarea

QGIS supports various capabilities for editing OGR, SpatiaLite, PostGIS, MSSQL Spatial and Oracle Spatial vector layers and tables.

Note: Procedura pentru editarea straturilor GRASS este diferită - a se vedea seciunea *Digitizarea i editarea unui strat vectorial GRASS* pentru detalii.

Tip: Editări Concurente

This version of QGIS does not track if somebody else is editing a feature at the same time as you are. The last person to save their edits wins.

12.5.1 Setarea Toleranei Acroării i Căutarea Razei

Before we can edit vertices, we must set the snapping tolerance and search radius to a value that allows us an optimal editing of the vector layer geometries.

Toleranţa de acroare

Snapping tolerance is the distance QGIS uses to `search` for the closest vertex and/or segment you are trying to connect to when you set a new vertex or move an existing vertex. If you aren't within the snapping tolerance, QGIS will leave the vertex where you release the mouse button, instead of snapping it to an existing vertex and/or segment. The snapping tolerance setting affects all tools that work with tolerance.

1. A general, project-wide snapping tolerance can be defined by choosing *Settings* → *Options*. On Mac, go to *QGIS* → *Preferences...*. On Linux: *Edit* → *Options*. In the *Digitizing* tab, you can select between 'to vertex', 'to segment' or 'to vertex and segment' as default snap mode. You can also define a default snapping tolerance and a search radius for vertex edits. The tolerance can be set either in map units or in pixels. The advantage of choosing pixels is that the snapping tolerance doesn't have to be changed after zoom operations. In our small digitizing project (working with the Alaska dataset), we define the snapping

units in feet. Your results may vary, but something on the order of 300 ft at a scale of 1:10000 should be a reasonable setting.

2. A layer-based snapping tolerance can be defined by choosing *Settings* → (or *File* →) *Snapping options...* to enable and adjust snapping mode and tolerance on a layer basis (see figure_edit_1).

Note that this layer-based snapping overrides the global snapping option set in the Digitizing tab. So, if you need to edit one layer and snap its vertices to another layer, then enable snapping only on the `snap to` layer, then decrease the global snapping tolerance to a smaller value. Furthermore, snapping will never occur to a layer that is not checked in the snapping options dialog, regardless of the global snapping tolerance. So be sure to mark the checkbox for those layers that you need to snap to.

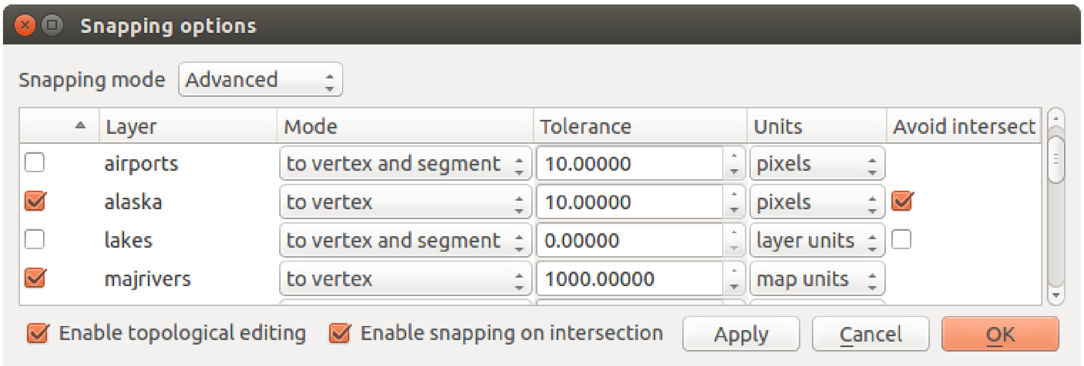

Figure 12.40: Edit snapping options on a layer basis (Advanced mode)

The *Snapping options* enables you to make a quick and simple general setting for all layers in the project so that the pointer snaps to all existing vertices and/or segments when using the 'All layers' snapping mode. In most cases it is sufficient to use this snapping mode.

It is important to consider that the per-layer tolerance in 'map units' was actually in layer units. So if working with a layer in WGS84 reprojected to UTM, setting tolerance to 1 map unit (i.e. 1 meter) wouldn't work correctly because the units would be actually degrees. So now the 'map units' has been relabeled to 'layer units' and the new entry 'map units' operates with units of the map view. While working with 'on-the-fly' CRS transformation it is now possible to use a snapping tolerance that refers to either the units of the reprojected layer (setting 'layer units') or the units of the map view (setting 'map units').

Raza de căutare

Search radius is the distance QGIS uses to `search` for the closest vertex you are trying to move when you click on the map. If you aren't within the search radius, QGIS won't find and select any vertex for editing, and it will pop up an annoying warning to that effect. Snap tolerance and search radius are set in map units or pixels, so you may find you need to experiment to get them set right. If you specify too big of a tolerance, QGIS may snap to the wrong vertex, especially if you are dealing with a large number of vertices in close proximity. Set search radius too small, and it won't find anything to move.

The search radius for vertex edits in layer units can be defined in the *Digitizing* tab under *Settings* → *Options*. This is the same place where you define the general, project- wide snapping tolerance.

12.5.2 Zooming and Panning

Before editing a layer, you should zoom in to your area of interest. This avoids waiting while all the vertex markers are rendered across the entire layer.

Apart from using the pan and zoom-in / zoom-out icons on the toolbar with the mouse, navigating can also be done with the mouse wheel, spacebar and the arrow keys.

Zooming and panning with the mouse wheel

While digitizing, you can press the mouse wheel to pan inside of the main window, and you can roll the mouse wheel to zoom in and out on the map. For zooming, place the mouse cursor inside the map area and roll it forward (away from you) to zoom in and backwards (towards you) to zoom out. The mouse cursor position will be the center of the zoomed area of interest. You can customize the behavior of the mouse wheel zoom using the *Map tools* tab under the *Settings* → *Options* menu.

Panning with the arrow keys

Panning the map during digitizing is possible with the arrow keys. Place the mouse cursor inside the map area, and click on the right arrow key to pan east, left arrow key to pan west, up arrow key to pan north, and down arrow key to pan south.

You can also use the space bar to temporarily cause mouse movements to pan the map. The `PgUp` and `PgDown` keys on your keyboard will cause the map display to zoom in or out without interrupting your digitizing session.

12.5.3 Editarea topologică

Besides layer-based snapping options, you can also define topological functionalities in the *Snapping options...* dialog in the *Settings* (or *File*) menu. Here, you can define *Enable topological editing*, and/or for polygon layers, you can activate the column *Avoid Int.*, which avoids intersection of new polygons.

Editarea editării topologice

The option *Enable topological editing* is for editing and maintaining common boundaries in polygon mosaics. QGIS 'detects' a shared boundary in a polygon mosaic, so you only have to move the vertex once, and QGIS will take care of updating the other boundary.

Evitarea intersecţiilor pentru poligoanele noi

The second topological option in the *Avoid Int.* column, called *Avoid intersections of new polygons*, avoids overlaps in polygon mosaics. It is for quicker digitizing of adjacent polygons. If you already have one polygon, it is possible with this option to digitize the second one such that both intersect, and QGIS then cuts the second polygon to the common boundary. The advantage is that you don't have to digitize all vertices of the common boundary.

Activarea acroării la intersecii

Another option is to use *Enable snapping on intersection*. It allows you to snap on an intersection of background layers, even if there's no vertex on the intersection.

12.5.4 Digitizarea unui strat vectorial existent

By default, QGIS loads layers read-only. This is a safeguard to avoid accidentally editing a layer if there is a slip of the mouse. However, you can choose to edit any layer as long as the data provider supports it, and the underlying data source is writable (i.e., its files are not read-only).

In general, tools for editing vector layers are divided into a digitizing and an advanced digitizing toolbar, described in section *Digitizare avansată*. You can select and unselect both under *View*

→ *Toolbars* →. Using the basic digitizing tools, you can perform the following functions:

Pictogramă	Scop	Pictogramă	Scop
	Editări curente		Activarea/dezactivarea editării
	Adding Features: Capture Point		Adding Features: Capture Line
	Adding Features: Capture Polygon		Deplasarea Entitãii
	Instrumentul Nod		tergere Selecie
	Decupare Entităi		Copiere Entităi
	Lipire Entităi		Salvează modificările stratului

Editarea Tabelei: Bara instrumentelor de editare de bază, pentru straturile vectoriale

All editing sessions start by choosing the Toggle editing option. This can be found in the context menu after right clicking on the legend entry for a given layer.

Alternatively, you can use the Toggle Editing Toggle editing button from the digitizing toolbar to start or stop the editing mode. Once the layer is in edit mode, markers will appear at the vertices, and additional tool buttons on the editing toolbar will become available.

Tip: Salvai cu Regularitate

Remember to Save Layer Edits regularly. This will also check that your data source can accept all the changes.

Adăugare Entităi

You can use the Add Feature, Add Feature or Add Feature icons on the toolbar to put the QGIS cursor into digitizing mode.

For each feature, you first digitize the geometry, then enter its attributes. To digitize the geometry, left-click on the map area to create the first point of your new feature.

For lines and polygons, keep on left-clicking for each additional point you wish to capture. When you have finished adding points, right-click anywhere on the map area to confirm you have finished entering the geometry of that feature.

The attribute window will appear, allowing you to enter the information for the new feature. Figure_edit_2 shows setting attributes for a fictitious new river in Alaska. In the *Digitizing* menu under the *Settings* → *Options* menu, you can also activate *Suppress attributes pop-up windows after each created feature* and *Reuse last entered attribute values*.

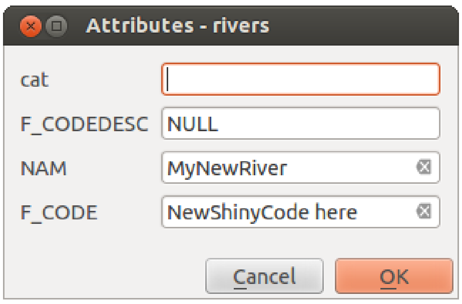

Figure 12.41: Enter Attribute Values Dialog after digitizing a new vector feature

With the Move Feature(s) icon on the toolbar, you can move existing features.

Tip: Attribute Value Types

For editing, the attribute types are validated during entry. Because of this, it is not possible to enter a number into a text column in the dialog *Enter Attribute Values* or vice versa. If you need to do so, you should edit the attributes in a second step within the *Attribute table* dialog.

Current Edits

This feature allows the digitization of multiple layers. Choose *Save for Selected Layers* to save all changes you made in multiple layers. You also have the opportunity to *Rollback for Selected Layers*, so that the digitization may be withdrawn for all selected layers. If you want to stop editing the selected layers, *Cancel for Selected Layer(s)* is an easy way.

Aceleai funcii sunt disponibile pentru editarea tuturor straturilor proiectului.

Instrumentul Nod

For shapefile-based layers as well as SpatialLite, PostgreSQL/PostGIS, MSSQL Spatial, and Oracle Spatial tables, the Node Tool provides manipulation capabilities of feature vertices similar to CAD programs. It is possible to simply select multiple vertices at once and to move, add or delete them altogether. The node tool also works with 'on the fly' projection turned on, and it supports the topological editing feature. This tool is, unlike other tools in QGIS, persistent, so when some operation is done, selection stays active for this feature and tool. If the node tool is unable to find any features, a warning will be displayed.

It is important to set the property *Settings* → *Options* → *Digitizing* → *Search Radius:* 1,00 to a number greater than zero (i.e., 10). Otherwise, QGIS will not be able to tell which vertex is being edited.

Tip: Simbolurile Vertexului

The current version of QGIS supports three kinds of vertex markers: 'Semi-transparent circle', 'Cross' and 'None'. To change the marker style, choose *Options* from the *Settings* menu, click on the *Digitizing* tab and select the appropriate entry.

Operaţiuni de bază

Start by activating the Node Tool and selecting a feature by clicking on it. Red boxes will appear at each vertex of this feature.

- **Selecting vertices**: You can select vertices by clicking on them one at a time, by clicking on an edge to select the vertices at both ends, or by clicking and dragging a rectangle around some vertices. When a vertex is selected, its color changes to blue. To add more vertices to the current selection, hold down the `Ctrl` key while clicking. Hold down `Ctrl` or `Shift` when clicking to toggle the selection state of vertices (vertices that are currently unselected will be selected as usual, but also vertices that are already selected will become unselected).
- **Adding vertices**: To add a vertex, simply double click near an edge and a new vertex will appear on the edge near to the cursor. Note that the vertex will appear on the edge, not at the cursor position; therefore, it should be moved if necessary.
- **Deleting vertices**: After selecting vertices for deletion, click the `Delete` key. Note that you cannot use the Node Tool to delete a complete feature; QGIS will ensure it retains the minimum number of vertices for the feature type you are working on. To delete a complete feature use the Delete Selected tool.

- **Moving vertices**: Select all the vertices you want to move. Click on a selected vertex or edge and drag in the direction you wish to move. All the selected vertices will move together. If snapping is enabled, the whole selection can jump to the nearest vertex or line.

Each change made with the node tool is stored as a separate entry in the Undo dialog. Remember that all operations support topological editing when this is turned on. On-the-fly projection is also supported, and the node tool provides tooltips to identify a vertex by hovering the pointer over it.

Tăiere, Copiere i Lipire Entităi

Selected features can be cut, copied and pasted between layers in the same QGIS project, as long as destination layers are set to Toggle editing beforehand.

Features can also be pasted to external applications as text. That is, the features are represented in CSV format, with the geometry data appearing in the OGC Well-Known Text (WKT) format.

However, in this version of QGIS, text features from outside QGIS cannot be pasted to a layer within QGIS. When would the copy and paste function come in handy? Well, it turns out that you can edit more than one layer at a time and copy/paste features between layers. Why would we want to do this? Say we need to do some work on a new layer but only need one or two lakes, not the 5,000 on our `big_lakes` layer. We can create a new layer and use copy/paste to plop the needed lakes into it.

Ca un exemplu, vom copia unele lacuri într-un nou strat:

1. Încărcai stratul din care dorii să copiai (stratul sursă)
2. Încărcai sau creai stratul în care dorii să copiai (stratul intă)
3. Începei editarea stratului intă
4. Activai stratul sursă, făcând clic pe el în legendă
5. Use the Select Single Feature tool to select the feature(s) on the source layer
6. Click on the Copy Features tool
7. Activai stratul destinaie, făcând clic pe el în legendă
8. Click on the Paste Features tool
9. Dezactivai editarea i salvai modificările.

What happens if the source and target layers have different schemas (field names and types are not the same)? QGIS populates what matches and ignores the rest. If you don't care about the attributes being copied to the target layer, it doesn't matter how you design the fields and data types. If you want to make sure everything - the feature and its attributes - gets copied, make sure the schemas match.

Tip: Congruena Entităilor Inserate

If your source and destination layers use the same projection, then the pasted features will have geometry identical to the source layer. However, if the destination layer is a different projection, then QGIS cannot guarantee the geometry is identical. This is simply because there are small rounding-off errors involved when converting between projections.

Tip: Copie un atribut de tip ir în altul**

If you have created a new column in your attribute table with type 'string' and want to paste values from another attribute column that has a greater length the length of the column size will be extended to the same amount. This is because the GDAL Shapefile driver starting with GDAL/OGR 1.10 knows to auto-extend string and integer fields to dynamically accomodate for the length of the data to be inserted.

tergerea Entităilor Selectate

If we want to delete an entire polygon, we can do that by first selecting the polygon using the regular Select Single Feature tool. You can select multiple features for deletion. Once you have the selection set, use the Delete Selected tool to delete the features.

The Cut Features tool on the digitizing toolbar can also be used to delete features. This effectively deletes the feature but also places it on a "spatial clipboard". So, we cut the feature to delete. We could then use the Paste Features tool to put it back, giving us a one-level undo capability. Cut, copy, and paste work on the currently selected features, meaning we can operate on more than one at a time.

Salvarea Straturilor Modificate

When a layer is in editing mode, any changes remain in the memory of QGIS. Therefore, they are not committed/saved immediately to the data source or disk. If you want to save edits to the current layer but want to continue editing without leaving the editing mode, you can click the Save Layer Edits button. When you turn editing mode off with Toggle editing (or quit QGIS for that matter), you are also asked if you want to save your changes or discard them.

If the changes cannot be saved (e.g., disk full, or the attributes have values that are out of range), the QGIS in-memory state is preserved. This allows you to adjust your edits and try again.

Tip: Integritatea Datelor

It is always a good idea to back up your data source before you start editing. While the authors of QGIS have made every effort to preserve the integrity of your data, we offer no warranty in this regard.

12.5.5 Digitizare avansată

Pictogramă	Scop	Pictogramă	Scop
	Anulare		Refacere
	Rotire Enti(tăi)		Simplificare Entitate
	Adăugare Inel		Adăugare Parte
	Umplere inel		Ştergere Inel
	Ştergere Parte		Remodelare Entităi
	Curba de Compensare		Divizare Entităi
	Divizare Pări		Unificare Entităi Selectate
	Unificare Atribute pentru Entităile Selectate		Rotii Simbolurile Punctelor

Editarea Avansată a Tabelei: Bara instrumentelor avansate de editare a straturilor vectoriale

Anulare/Restabilire

The Undo and Redo tools allows you to undo or redo vector editing operations. There is also a dockable widget, which shows all operations in the undo/redo history (see Figure_edit_3). This widget is not displayed by default; it can be displayed by right clicking on the toolbar and activating the Undo/Redo checkbox. Undo/Redo is however active, even if the widget is not displayed.

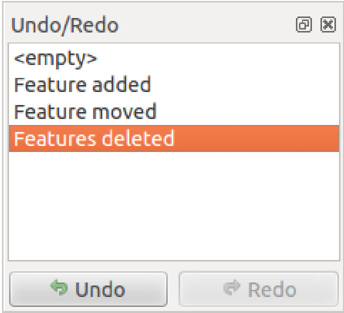

Figure 12.42: Redo and Undo digitizing steps

When Undo is hit, the state of all features and attributes are reverted to the state before the reverted operation happened. Changes other than normal vector editing operations (for example, changes done by a plugin), may or may not be reverted, depending on how the changes were performed.

To use the undo/redo history widget, simply click to select an operation in the history list. All features will be reverted to the state they were in after the selected operation.

Rotire Enti(tăi)

Use Rotate Feature(s) to rotate one or multiple features in the map canvas. Press the Rotate Feature(s) icon and then click on the feature to rotate. Either click on the map to place the rotated feature or enter an angle in the user input widget. If you want to rotate several features, they shall be selected first.

If you enable the map tool with feature(s) selected, its (their) centroid appears and will be the rotation anchor point. If you want to move the anchor point, hold the `Ctrl` button and click on the map to place it.

If you hold `Shift` before clicking on the map, the rotation will be done in 45 degree steps, which can be modified afterwards in the user input widget.

Simplificare Entitate

The Simplify Feature tool allows you to reduce the number of vertices of a feature, as long as the geometry doesn't change. With the tool you can also simplify multi-part features. First, drag a rectangle over the feature. The vertices will be highlighted in red while the color of the feature will change and a dialog where you can define a tolerance in map units or pixels will appear. QGIS calculates the amount of vertices that can be deleted while maintaining the geometry using the given tolerance. The higher the tolerance is the more vertices can be deleted. After gaining the statistics about the simplification just klick the *OK* button. The tolerance you used will be saved when leaving a project or when leaving an edit session. So you can go back to the same tolerance the next time when simplifying a feature.

Adăugare Inel

You can create ring polygons using the Add Ring icon in the toolbar. This means that inside an existing area, it is possible to digitize further polygons that will occur as a 'hole', so only the area between the boundaries of the outer and inner polygons remains as a ring polygon.

Adăugare Parte

You can add part polygons to a selected multipolygon. The new part polygon must be digitized outside the selected multi-polygon.

Umplere inel

You can use the Fill Ring function to add a ring to a polygon and add a new feature to the layer at the same time. Thus you need not first use the Add Ring icon and then the Add feature function anymore.

Ştergere Inel

The Delete Ring tool allows you to delete ring polygons inside an existing area. This tool only works with polygon layers. It doesn't change anything when it is used on the outer ring of the polygon. This tool can be used on polygon and multi-polygon features. Before you select the vertices of a ring, adjust the vertex edit tolerance.

Ştergere Parte

The Delete Part tool allows you to delete parts from multifeatures (e.g., to delete polygons from a multi-polygon feature). It won't delete the last part of the feature; this last part will stay untouched. This tool works with all multi-part geometries: point, line and polygon. Before you select the vertices of a part, adjust the vertex edit tolerance.

Remodelare Entităi

You can reshape line and polygon features using the Reshape Features icon on the toolbar. It replaces the line or polygon part from the first to the last intersection with the original line. With polygons, this can sometimes lead to unintended results. It is mainly useful to replace smaller parts of a polygon, not for major overhauls, and the reshape line is not allowed to cross several polygon rings, as this would generate an invalid polygon.

For example, you can edit the boundary of a polygon with this tool. First, click in the inner area of the polygon next to the point where you want to add a new vertex. Then, cross the boundary and add the vertices outside the polygon. To finish, right-click in the inner area of the polygon. The tool will automatically add a node where the new line crosses the border. It is also possible to remove part of the area from the polygon, starting the new line outside the polygon, adding vertices inside, and ending the line outside the polygon with a right click.

Note: The reshape tool may alter the starting position of a polygon ring or a closed line. So, the point that is represented 'twice' will not be the same any more. This may not be a problem for most applications, but it is something to consider.

Curbe de Compensare

The Offset Curve tool creates parallel shifts of line layers. The tool can be applied to the edited layer (the geometries are modified) or also to background layers (in which case it creates copies of the lines / rings and adds them to the the edited layer). It is thus ideally suited for the creation of distance line layers. The displacement is shown at the bottom left of the taskbar.

To create a shift of a line layer, you must first go into editing mode and activate the Offset Curve tool. Then click on a feature to shift it. Move the mouse and click where wanted or enter the desired distance in the user input widget. Your changes may then be saved with the|mActionSaveEdits|:sup:*Save Layer Edits* tool.

QGIS options dialog (Digitizing tab then **Curve offset tools** section) allows you to configure some parameters like **Join style**, **Quadrant segments**, **Miter limit**.

Divizare Entităi

You can split features using the Split Features icon on the toolbar. Just draw a line across the feature you want to split.

Divizare päri

In QGIS 2.0 it is now possible to split the parts of a multi part feature so that the number of parts is increased. Just draw a line across the part you want to split using the Split Parts icon.

Unificai entităile selectate

The Merge Selected Features tool allows you to merge features. A new dialog will allow you to choose which value to choose between each selected features or select a function (Minimum, Maximum, Median, Sum, Skip Attribute) to use for each column. If features don't have a common boundaries, a multipolygon will be created.

Unificai atributele pentru entităile selectate

The Merge Attributes of Selected Features tool allows you to merge attributes of features with common boundaries and attributes without merging their boundaries. First, select several features at once. Then press the Merge Attributes of Selected Features button. Now QGIS asks you which attributes are to be applied to all selected objects. As a result, all selected objects have the same attribute entries.

Rotii Simbolurile Punctelor

Rotate Point Symbols allows you to change the rotation of point symbols in the map canvas. You must first define a rotation column from the attribute table of the point layer in the *Advanced* menu of the *Style* menu of the *Layer Properties*. Also, you will need to go into the 'SVG marker' and choose *Data defined properties ...*. Activate *Angle* and choose 'rotation' as field. Without these settings, the tool is inactive.

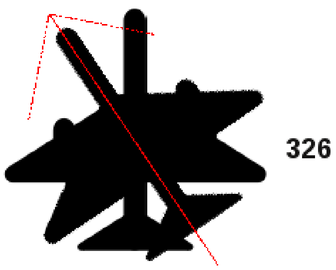

Figure 12.43: Rotate Point Symbols

To change the rotation, select a point feature in the map canvas and rotate it, holding the left mouse button pressed. A red arrow with the rotation value will be visualized (see Figure_edit_4). When you release the left mouse button again, the value will be updated in the attribute table.

Note: Dacă inei apăsată tasta `Ctrl`, rotirea se va face în pai de 15 grade.

12.5.6 Panoul de Digitizare Avansată

When capturing new geometries or geometry parts you also have the possibility to use the Advanced Digitizing panel. You can digitize lines exactly parallel or at a specific angle or lock lines to specific angles. Furthermore you can enter coordinates directly so that you can make a precise definition for your new geomtry.

_figure_advanced_edit 1:

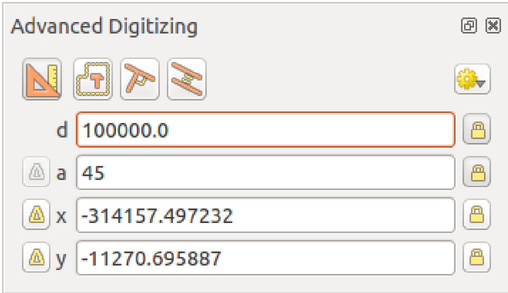

Figure 12.44: The Advanced Digitizing panel

Instrumentele nu sunt activate dacă vizualizarea hării este în coordonate geografice.

12.5.7 Crearea noillor straturi Vectoriale

QGIS allows you to create new shapefile layers, new SpatiaLite layers, new GPX layers and New Temporary Scratch Layers. Creation of a new GRASS layer is supported within the GRASS plugin. Please refer to section *Crearea unui nou strat vectorial GRASS* for more information on creating GRASS vector layers.

Crearea unui nou strat de tip fiier shape

To create a new shape layer for editing, choose *New* → *New Shapefile Layer...* from the *Layer* menu. The *New Vector Layer* dialog will be displayed as shown in Figure_edit_5. Choose the type of layer (point, line or polygon) and the CRS (coordinate reference system).

Note that QGIS does not yet support creation of 2.5D features (i.e., features with X,Y,Z coordinates).

To complete the creation of the new shapefile layer, add the desired attributes by clicking on the **[Add to attributes list]** button and specifying a name and type for the attribute. A first 'id' column is added as default but can be removed, if not wanted. Only *Type: real* , *Type: integer* , *Type: string* and *Type:date* attributes are supported. Additionally and according to the attribute type, you can also define the width and precision of the new attribute column. Once you are happy with the attributes, click **[OK]** and provide a name for the shapefile. QGIS will automatically add a `.shp` extension to the name you specify. Once the layer has been created, it will be added to the map, and you can edit it in the same way as described in section *Digitizarea unui strat vectorial existent* above.

Crearea unui nou strat SpatiaLite

To create a new SpatiaLite layer for editing, choose *New* → *New SpatiaLite Layer...* from the *Layer* menu. The *New SpatiaLite Layer* dialog will be displayed as shown in Figure_edit_6.

The first step is to select an existing SpatiaLite database or to create a new SpatiaLite database. This can be done with the browse button ... to the right of the database field. Then, add a name for the new layer, define the layer type, and specify the coordinate reference system with **[Specify CRS]**. If desired, you can select *Create an autoincrementing primary key*.

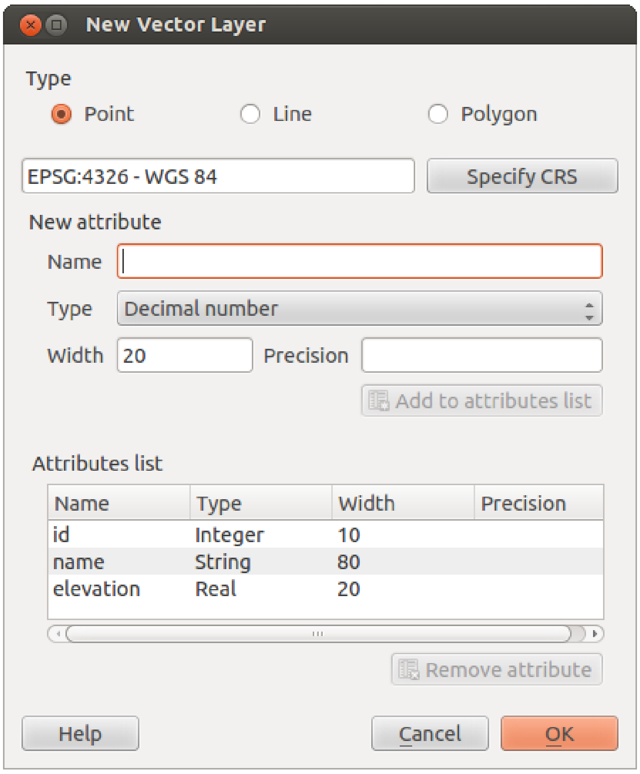

Figure 12.45: Creating a new Shapefile layer Dialog

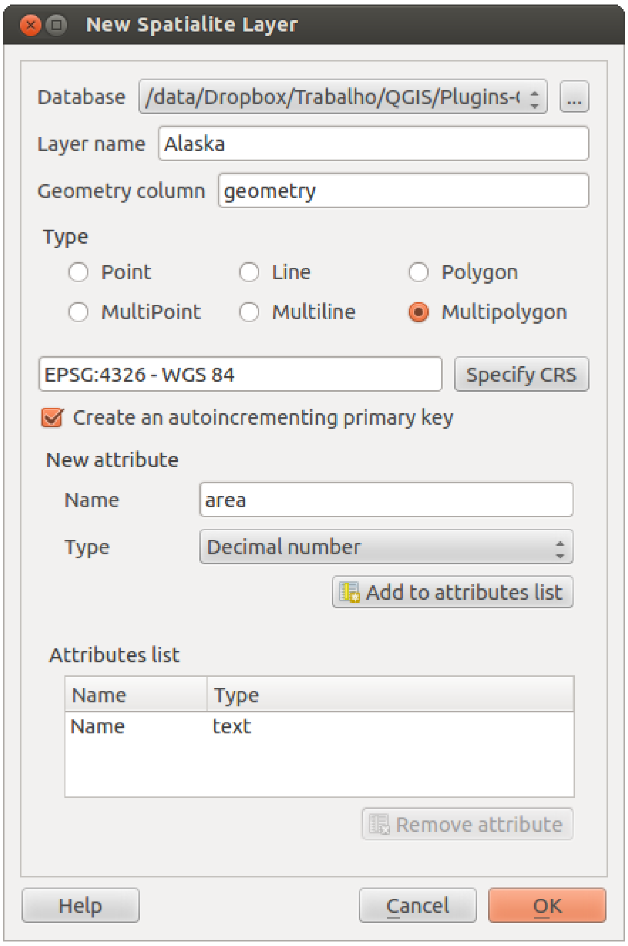

Figure 12.46: Creating a New SpatiaLite layer Dialog

To define an attribute table for the new SpatiaLite layer, add the names of the attribute columns you want to create with the corresponding column type, and click on the **[Add to attribute list]** button. Once you are happy with the attributes, click **[OK]**. QGIS will automatically add the new layer to the legend, and you can edit it in the same way as described in section *Digitizarea unui strat vectorial existent* above.

Managementul, în continuare, al straturilor SpatiaLite se poate face cu DB Manager. Vedei *Plugin-ul DB Manager*.

Crearea unui nou strat GPX

To create a new GPX file, you need to load the GPS plugin first. *Plugins* → *Plugin Manager...* opens the Plugin Manager Dialog. Activate the *GPS Tools* checkbox.

When this plugin is loaded, choose *New* → *Create new GPX Layer...* from the *Layer* menu. In the *Save new GPX file as* dialog, you can choose where to save the new GPX layer.

Crearea unui Strat Nou Temporar, Stocat în Memorie

Empty, editable memory layers can be defined using *Layer* → *Create Layer* → *New Temporary Scratch Layer*. Here you can even create *Multipoint*, *Multiline* and *Multipolygon* Layers beneath *Point*, *Line* and *Polygon* Layers. Temporary Scratch Layers are not saved and will be discarded when QGIS is closed. See also paste_into_layer .

12.5.8 Working with the Attribute Table

The attribute table displays features of a selected layer. Each row in the table represents one map feature, and each column contains a particular piece of information about the feature. Features in the table can be searched, selected, moved or even edited.

To open the attribute table for a vector layer, make the layer active by clicking on it in the map legend area. Then, from the main *Layer* menu, choose *Open Attribute Table*. It is also possible to right click on the layer and choose *Open Attribute Table* from the drop-down menu, and to click on the *Open Attribute Table* button in the Attributes toolbar.

This will open a new window that displays the feature attributes for the layer (figure_attributes_1). The number of features and the number of selected features are shown in the attribute table title.

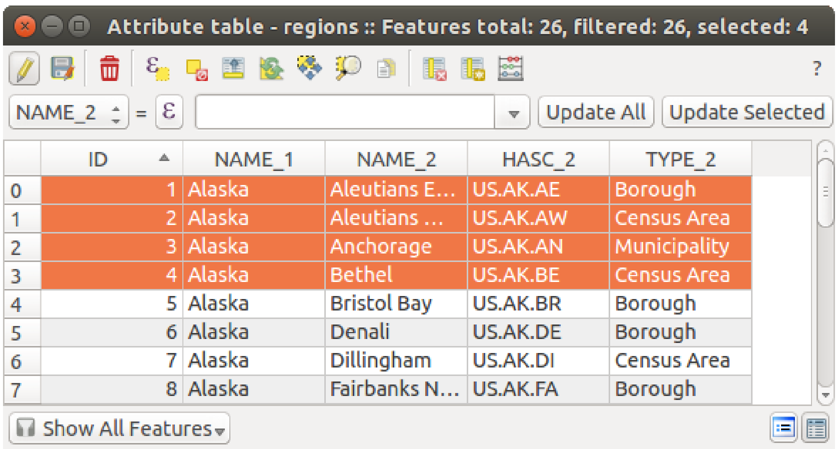

Figure 12.47: Attribute Table for regions layer

Selecting features in an attribute table

Each selected row in the attribute table displays the attributes of a selected feature in the layer. If the set of features selected in the main window is changed, the selection is also updated in the attribute table. Likewise, if the set of rows selected in the attribute table is changed, the set of features selected in the main window will be updated.

Rows can be selected by clicking on the row number on the left side of the row. **Multiple rows** can be marked by holding the `Ctrl` key. A **continuous selection** can be made by holding the `Shift` key and clicking on several row headers on the left side of the rows. All rows between the current cursor position and the clicked row are selected. Moving the cursor position in the attribute table, by clicking a cell in the table, does not change the row selection. Changing the selection in the main canvas does not move the cursor position in the attribute table.

The table can be sorted by any column, by clicking on the column header. A small arrow indicates the sort order (downward pointing means descending values from the top row down, upward pointing means ascending values from the top row down).

For a **simple search by attributes** on only one column, choose the *Column filter* → from the menu in the bottom left corner. Select the field (column) on which the search should be performed from the drop-down menu, and hit the **[Apply]** button. Then, only the matching features are shown in the attribute table.

To make a selection, you have to use the Select features using an Expression icon on top of the attribute table. Select features using an Expression allows you to define a subset of a table using a *Function List* like in the Field Calculator (see *Calculatorul Câmpurilor*). The query result can then be saved as a new vector layer. For example, if you want to find regions that are boroughs from `regions.shp` of the QGIS sample data, you have to open the *Fields and Values* menu and choose the field that you want to query. Double-click the field 'TYPE_2' and also **[Load all unique values]** . From the list, choose and double-click 'Borough'. In the *Expression* field, the following query appears:

```
"TYPE_2" = 'Borough'
```

Here you can also use the *Function list* → *Recent (Selection)* to make a selection that you used before. The expression builder remembers the last 20 used expressions.

The matching rows will be selected, and the total number of matching rows will appear in the title bar of the attribute table, as well as in the status bar of the main window. For searches that display only selected features on the map, use the Query Builder described in section *Constructorul de Interogări*.

To show selected records only, use *Show Selected Features* from the menu at the bottom left.

The field calculator bar allows you to make calculations on the selected rows only. For example, you can alter the number of the ID field of the file:*regions.shp* with the expression

```
ID+5
```

as shown in figure_attributes_1 .

The other buttons at the top of the attribute table window provide the following functionality:

- Toggle editing mode to edit single values and to enable functionalities described below (also with `Ctrl+E`)
- Save Edits (also with `Ctrl+S`)
- Unselect all (also with `Ctrl+U`)
- Move selected to top (also with `Ctrl+T`)
- Invert selection (also with `Ctrl+R`)
- Copy selected rows to clipboard (also with `Ctrl+C`)
- Zoom map to the selected rows (also with `Ctrl+J`)

- Pan map to the selected rows (also with `Ctrl+P`)
- Delete selected features (also with `Ctrl+D`)
- New Column for PostGIS layers and for OGR layers with GDAL version >= 1.6 (also with `Ctrl+W`)
- Delete Column for PostGIS layers and for OGR layers with GDAL version >= 1.9 (also with `Ctrl+L`)
- Open field calculator (also with `Ctrl+I`)

Below these buttons is the Field Calculator bar, which allows calculations to be quickly applied attributes visible in the table. This bar uses the same expressions as the Field Calculator (see *Calculatorul Câmpurilor*).

Tip: Skip WKT geometry

If you want to use attribute data in external programs (such as Excel), use the Copy selected rows to clipboard button. You can copy the information without vector geometries if you deactivate *Settings* → *Options* → Data sources menu *Copy geometry in WKT representation from attribute table*.

Save selected features as new layer

The selected features can be saved as any OGR-supported vector format and also transformed into another coordinate reference system (CRS). Just open the right mouse menu of the layer and click on *Save as* to define the name of the output file, its format and CRS (see section *Map Legend*). To save the selection ensure that the *Save only selected features* is selected. It is also possible to specify OGR creation options within the dialog.

Paste into new layer

Features that are on the clipboard may be pasted into a new layer. To do this, first make a layer editable. Select some features, copy them to the clipboard, and then paste them into a new layer using *Edit* → *Paste Features as* and choosing *New vector layer* or *New memory layer*.

This applies to features selected and copied within QGIS and also to features from another source defined using well-known text (WKT).

Working with non spatial attribute tables

QGIS allows you also to load non-spatial tables. This currently includes tables supported by OGR and delimited text, as well as the PostgreSQL, MSSQL and Oracle provider. The tables can be used for field lookups or just generally browsed and edited using the table view. When you load the table, you will see it in the legend field. It can be opened with the Open Attribute Table tool and is then editable like any other layer attribute table.

As an example, you can use columns of the non-spatial table to define attribute values, or a range of values that are allowed, to be added to a specific vector layer during digitizing. Have a closer look at the edit widget in section *Meniul Câmpurilor* to find out more.

12.5.9 Creating one to many relations

Relations are a technique often used in databases. The concept is, that features (rows) of different layers (tables) can belong to each other.

As an example you have a layer with all regions of alaska (polygon) which provides some attributes about its name and region type and a unique id (which acts as primary key).

Foreign keys

Then you get another point layer or table with information about airports that are located in the regions and you also want to keep track of these. If you want to add them to the region layer, you need to create a one to many relation using foreign keys, because there are several airports in most regions.

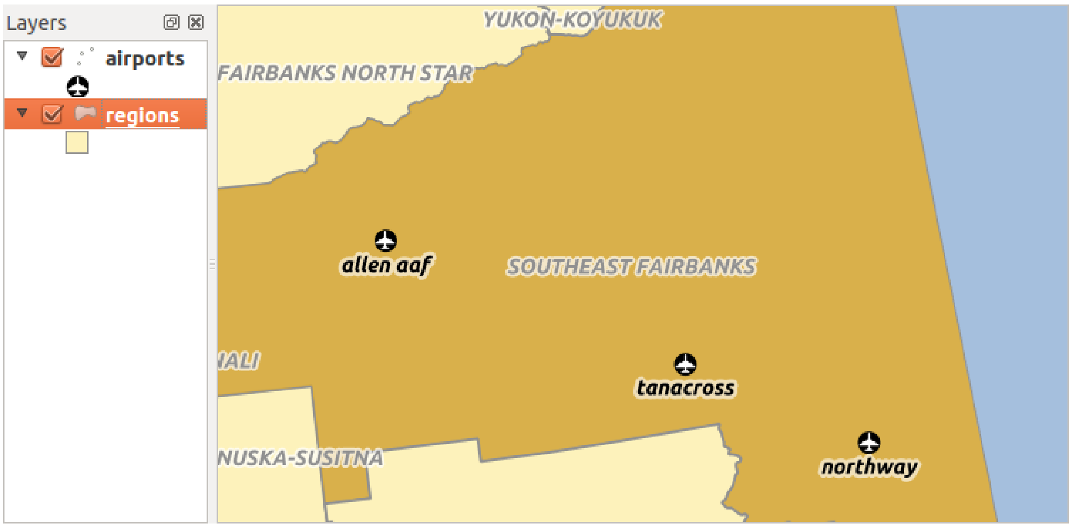

Figure 12.48: Alaska region with airports

In addition to the already existing attributes in the airports attribute table another field fk_region which acts as a foreign key (if you have a database, you will probably want to define a constraint on it).

This field fk_region will always contain an id of a region. It can be seen like a pointer to the region it belongs to. And you can design a custom edit form for the editing and QGIS takes care about the setup. It works with different providers (so you can also use it with shape and csv files) and all you have to do is to tell QGIS the relations between your tables.

Layers

QGIS makes no difference between a table and a vector layer. Basically, a vector layer is a table with a geometry. So can add your table as a vector layer. To demostrate you can load the 'region' shapefile (with geometries) and the 'airport' csv table (without geometries) and a foreign key (fk_region) to the layer region. This means, that each airport belongs to exactly one region while each region can have any number of airports (a typical one to many relation).

Definition (Relation Manager)

The first thing we are going to do is to let QGIS know about the relations between the layer. This is done in *Settings → Project Properties*. Open the *Relations* menu and click on *Add*.

- **name** is going to be used as a title. It should be a human readable string, describing, what the relation is used for. We will just call say "Airports" in this case.
- **referencing layer** is the one with the foreign key field on it. In our case this is the airports layer
- **referencing field** will say, which field points to the other layer so this is fk_region in this case
- **referenced layer** is the one with the primary key, pointed to, so here it is the regions layer
- **referenced field** is the primary key of the referenced layer so it is ID
- **id** will be used for internal purposes and has to be unique. You may need it to build custom forms once this is supported. If you leave it empty, one will be generated for you but you can assign one yourself to get one that is easier to handle.

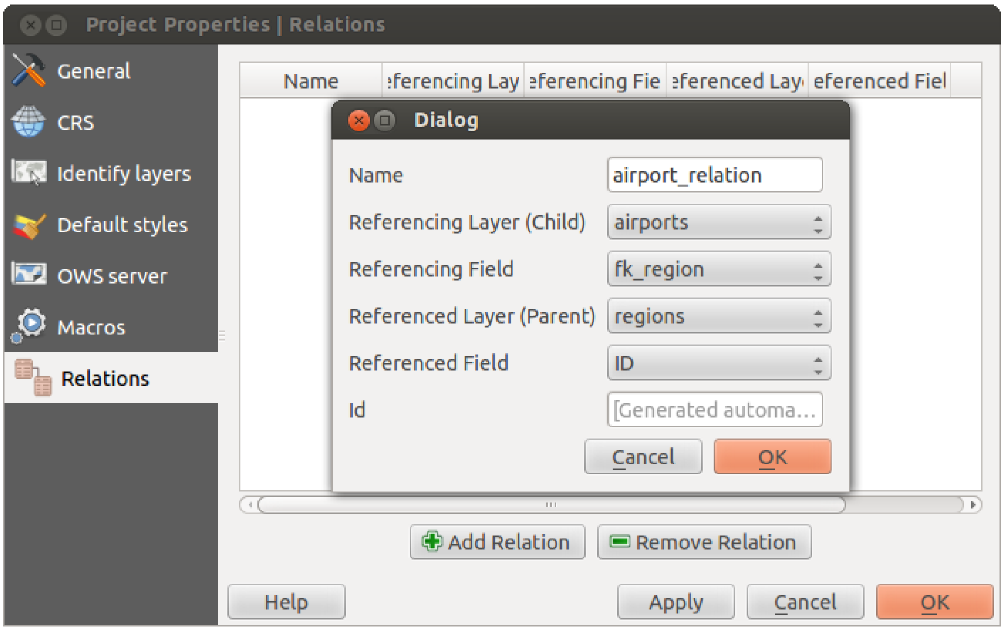

Figure 12.49: Relation Manager

Forms

Now that QGIS knows about the relation, it will be used to improve the forms it generates. As we did not change the default form method (autogenerated) it will just add a new widget in our form. So let's select the layer region in the legend and use the identify tool. Depending on your settings, the form might open directly or you will have to choose to open it in the identification dialog under actions.

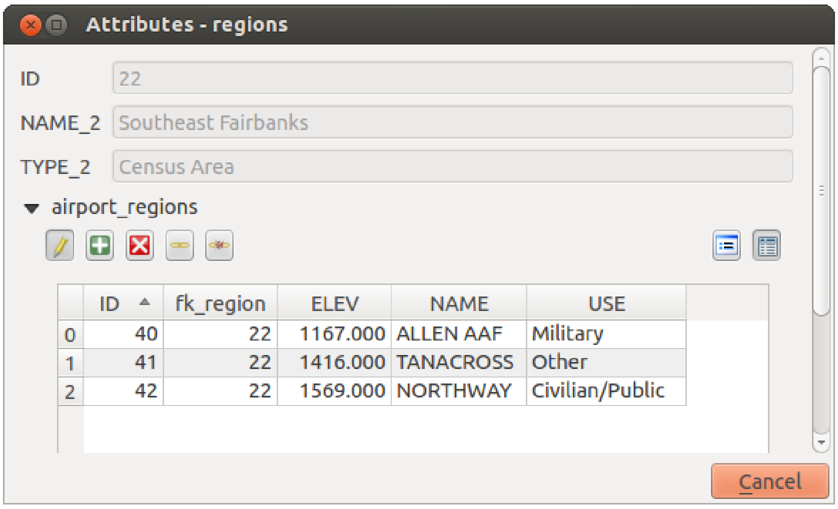

Figure 12.50: Identification dialog regions with relation to airports

As you can see, the airports assigned to this particular region are all shown in a table. And there are also some buttons available. Let's review them shortly

- The  button is for toggling the edit mode. Be aware that it toggles the edit mode of the airport layer, although we are in the feature form of a feature from the region layer. But the table is representing features of the airport layer.
- The  button will add a new feature to the airport layer. And it will assign the new airport to the current region by default.

- The button will delete the selected airport permanently.
- The symbol will open a new dialog where you can select any existing airport which will then be assigned to the current region. This may be handy if you created the airport on the wrong region by accident.
- The symbol will unlink the selected airport from the current region, leaving them unassigned (the foreign key is set to NULL) effectively.
- The two buttons to the right switch between table view and form view where the later let's you view all the airports in their respective form.

If you work on the airport table, a new widget type is available which lets you embed the feature form of the referenced region on the feature form of the airports. It can be used when you open the layer properties of the airports table, switch to the *Fields* menu and change the widget type of the foreign key field 'fk_region' to Relation Reference.

If you look at the feature dialog now, you will see, that the form of the region is embedded inside the airports form and will even have a combobox, which allows you to assign the current airport to another region.

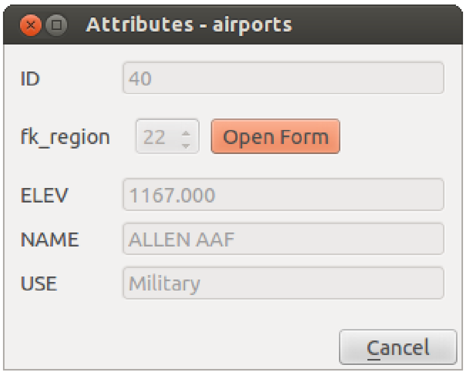

Figure 12.51: Identification dialog airport with relation to regions

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12.6 Constructorul de Interogări

The Query Builder allows you to define a subset of a table using a SQL-like WHERE clause and to display the result in the main window. The query result can then be saved as a new vector layer.

12.6.1 Interogare

Open the **Query Builder** by opening the Layer Properties and going to the *General* menu. Under *Feature subset*, click on the **[Query Builder]** button to open the *Query builder*. For example, if you have a `regions` layer with a `TYPE_2` field, you could select only regions that are `borough` in the *Provider specific filter expression* box of the Query Builder. Figure_attributes_2 shows an example of the Query Builder populated with the `regions.shp` layer from the QGIS sample data. The Fields, Values and Operators sections help you to construct the SQL-like query.

The **Fields list** contains all attribute columns of the attribute table to be searched. To add an attribute column to the SQL WHERE clause field, double click its name in the Fields list. Generally, you can use the various fields, values and operators to construct the query, or you can just type it into the SQL box.

The **Values list** lists the values of an attribute table. To list all possible values of an attribute, select the attribute in the Fields list and click the **[all]** button. To list the first 25 unique values of an attribute column, select the attribute column in the Fields list and click the **[Sample]** button. To add a value to the SQL WHERE clause field, double click its name in the Values list.

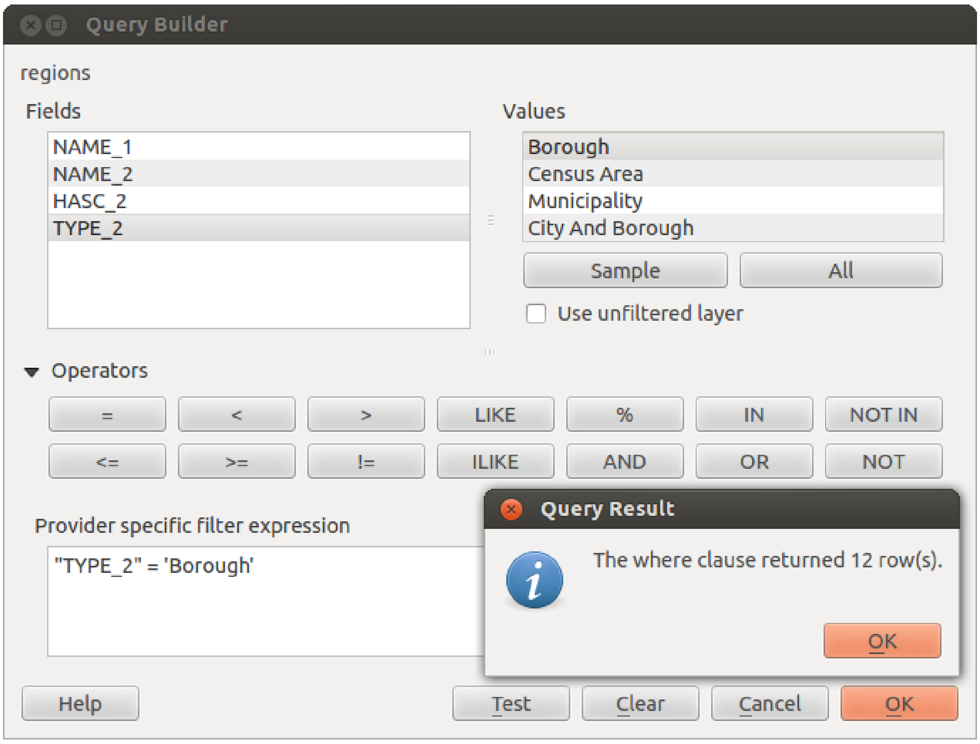

Figure 12.52: Constructorul de Interogări

The **Operators section** contains all usable operators. To add an operator to the SQL WHERE clause field, click the appropriate button. Relational operators (= , > , ...), string comparison operator (`LIKE`), and logical operators (`AND`, `OR`, ...) are available.

The **[Test]** button shows a message box with the number of features satisfying the current query, which is useful in the process of query construction. The **[Clear]** button clears the text in the SQL WHERE clause text field. The **[OK]** button closes the window and selects the features satisfying the query. The **[Cancel]** button closes the window without changing the current selection.

QGIS treats the resulting subset acts as if it where the entire layer. For example if you applied the filter above for 'Borough', you can not display, query, save or edit Anchorage, because that is a 'Municipality' and therefore not part of the subset.

The only exception is that unless your layer is part of a database, using a subset will prevent you from editing the layer.

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12.7 Calculatorul Câmpurilor

The Field Calculator button in the attribute table allows you to perform calculations on the basis of existing attribute values or defined functions, for instance, to calculate length or area of geometry features. The results can be written to a new attribute field, a virtual field, or they can be used to update values in an existing field.

Tip: Virtual Fields

- Virtual fields are not permanent and are not saved.
- To make a field virtual it must be done when the field is made.

The field calculator is now available on any layer that supports edit. When you click on the field calculator icon the dialog opens (see figure_attributes_3). If the layer is not in edit mode, a warning is displayed and using the field calculator will cause the layer to be put in edit mode before the calculation is made.

The quick field calculation bar on top of the attribute table is only visible if the layer is editable.

In quick field calculation bar, you first select the existing field name then open the expression dialog to create your expression or write it directly in the field then click on **Update All** button.

12.7.1 Expression tab

In the field calculator dialog, you first must select whether you want to only update selected features, create a new attribute field where the results of the calculation will be added or update an existing field.

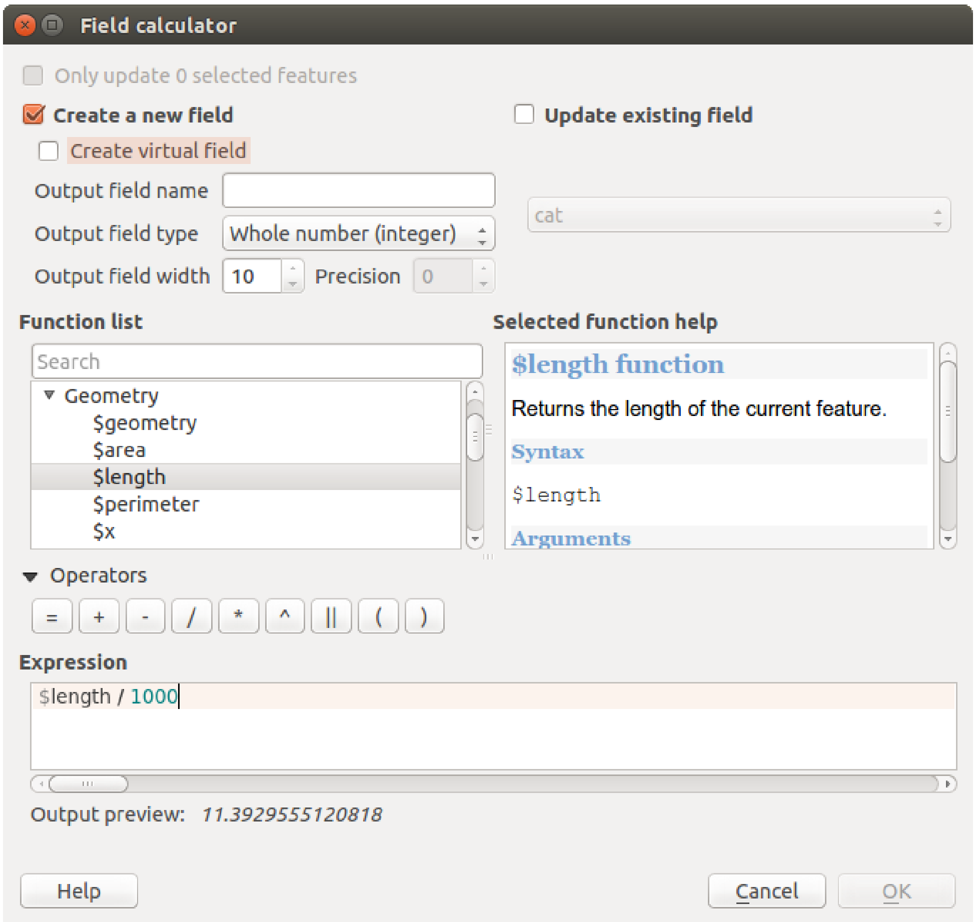

Figure 12.53: Calculatorul Câmpurilor

If you choose to add a new field, you need to enter a field name, a field type (integer, real or string), the total field width, and the field precision (see figure_attributes_3). For example, if you choose a field width of 10 and a field precision of 3, it means you have 6 digits before the dot, then the dot and another 3 digits for the precision.

A short example illustrates how field calculator works when using the *Expression* tab. We want to calculate the length in km of the `railroads` layer from the QGIS sample dataset:

1. Load the shapefile `railroads.shp` in QGIS and press Open Attribute Table.
2. Clic pe Toggle editing mode, apoi deschidei dialogul Field Calculator.
3. Select the *Create a new field* checkbox to save the calculations into a new field.
4. Add `length` as Output field name and `real` as Output field type, and define Output field width to be 10 and Precision, 3.

5. Now double click on function `$length` in the *Geometry* group to add it into the Field calculator expression box.
6. Completai expresia introducând ''/ 1000" în caseta de expresii a Calculatorului de Câmpuri, i făcând clic pe **[Ok]**.
7. You can now find a new field `length` in the attribute table.

The available functions are listed in *Expresii* chapter.

12.7.2 Function Editor tab

With the Function Editor you are able to define your own Python custom functions in a comfortable way. The function editor will create new Python files in `qgis2pythonexpressions` and will auto load all functions defined when starting QGIS. Be aware that new functions are only saved in the `expressions` folder and not in the project file. If you have a project that uses one of your custom functions you will need to also share the .py file in the expressions folder.

Here's a short example on how to create your own functions:

```
@qgsfunction(args="auto", group='Custom')
def myfunc(value1, value2 feature, parent):
    pass
```

The short example creates a function 'myfunc' that will give you a function with two values. When using the args='auto' function argument the number of function arguments required will be calculated by the number of arguments the function has been defined with in Python (minus 2 - feature, and parent).

This function then can be used with the following expression:

```
myfunc('test1', 'test2')
```

Your function will be implemented in the 'Custom' *Functions* of the *Expression* tab after using the *Run Script* button.

Further information about creating Python code can be found on http://www.qgis.org/html/en/docs/pyqgis_developer_cookbook/inde

The function editor is not only limited to working with the field calculator, it can be found whenever you work with expressions. See also *Expresii*.

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CHAPTER 13

Lucrul cu Datele Raster

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13.1 Lucrul cu Datele Raster

This section describes how to visualize and set raster layer properties. QGIS uses the GDAL library to read and write raster data formats, including ArcInfo Binary Grid, ArcInfo ASCII Grid, GeoTIFF, ERDAS IMAGINE, and many more. GRASS raster support is supplied by a native QGIS data provider plugin. The raster data can also be loaded in read mode from zip and gzip archives into QGIS.

As of the date of this document, more than 100 raster formats are supported by the GDAL library (see GDAL-SOFTWARE-SUITE in *Literatură i Referine Web*). A complete list is available at http://www.gdal.org/formats_list.html.

Note: Not all of the listed formats may work in QGIS for various reasons. For example, some require external commercial libraries, or the GDAL installation of your OS may not have been built to support the format you want to use. Only those formats that have been well tested will appear in the list of file types when loading a raster into QGIS. Other untested formats can be loaded by selecting the `[GDAL] All files (*)` filter.

Lucrul cu datele raster GRASS este descris în seciunea *Integrarea GRASS GIS*.

13.1.1 Ce reprezintă datele raster?

Raster data in GIS are matrices of discrete cells that represent features on, above or below the earth's surface. Each cell in the raster grid is the same size, and cells are usually rectangular (in QGIS they will always be rectangular). Typical raster datasets include remote sensing data, such as aerial photography, or satellite imagery and modelled data, such as an elevation matrix.

Unlike vector data, raster data typically do not have an associated database record for each cell. They are geocoded by pixel resolution and the x/y coordinate of a corner pixel of the raster layer. This allows QGIS to position the data correctly in the map canvas.

QGIS makes use of georeference information inside the raster layer (e.g., GeoTiff) or in an appropriate world file to properly display the data.

13.1.2 Loading raster data in QGIS

Raster layers are loaded either by clicking on the Add Raster Layer icon or by selecting the *Layer* → *Add Raster Layer* menu option. More than one layer can be loaded at the same time by holding down the `Ctrl` or `Shift` key and clicking on multiple items in the *Open a GDAL Supported Raster Data Source* dialog.

Once a raster layer is loaded in the map legend, you can click on the layer name with the right mouse button to select and activate layer-specific features or to open a dialog to set raster properties for the layer.

Meniul straturilor raster, deschis cu butonul din dreapta al mouse-ului

- *Apropiere Până la Extinderea Stratului*
- *Transfocare la Cea Mai Bună Scară (100%)*
- *Întinde, Folosind Extinderea Curentă*
- *Arată în Vizualizare*
- *Elimină*
- *Duplicare*
- *Setează CRS-ul Stratului*
- *Obine CRS-ul Proiectului din Strat*
- *Salvează ca ...*
- *Proprietăi*
- *Redenumire*
- *Copiere Stiluri*
- *Adăugare Grup Nou*
- *Extinde tot*
- *Restrânge tot*
- *Actualizează Ordinea de Desenare*

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13.2 Dialogul Proprietăilor Rasterului

Pentru a vizualiza i seta proprietăile pentru un strat raster, facei dublu clic pe numele stratului din harta legendei, sau facei clic dreapta pe numele stratului i alegei *Properties* din meniul contextual. Acest lucru va deschide dialogul *Raster Layer Properties* (v. figure_raster_1).

Există câteva meniuri în dialog:

- *General*
- *Stil*
- *Transparenă*
- *Piramide*
- *Histogramă*
- *Metadate*

13.2.1 Meniu General

Informaii despre strat

Meniul *General* afiează informaii de bază despre rasterul selectat, incluzând calea stratului sursă, numele afiat în legendă (care poate fi modificat), numărul de coloane, de rânduri i valorile fără-date ale rasterului.

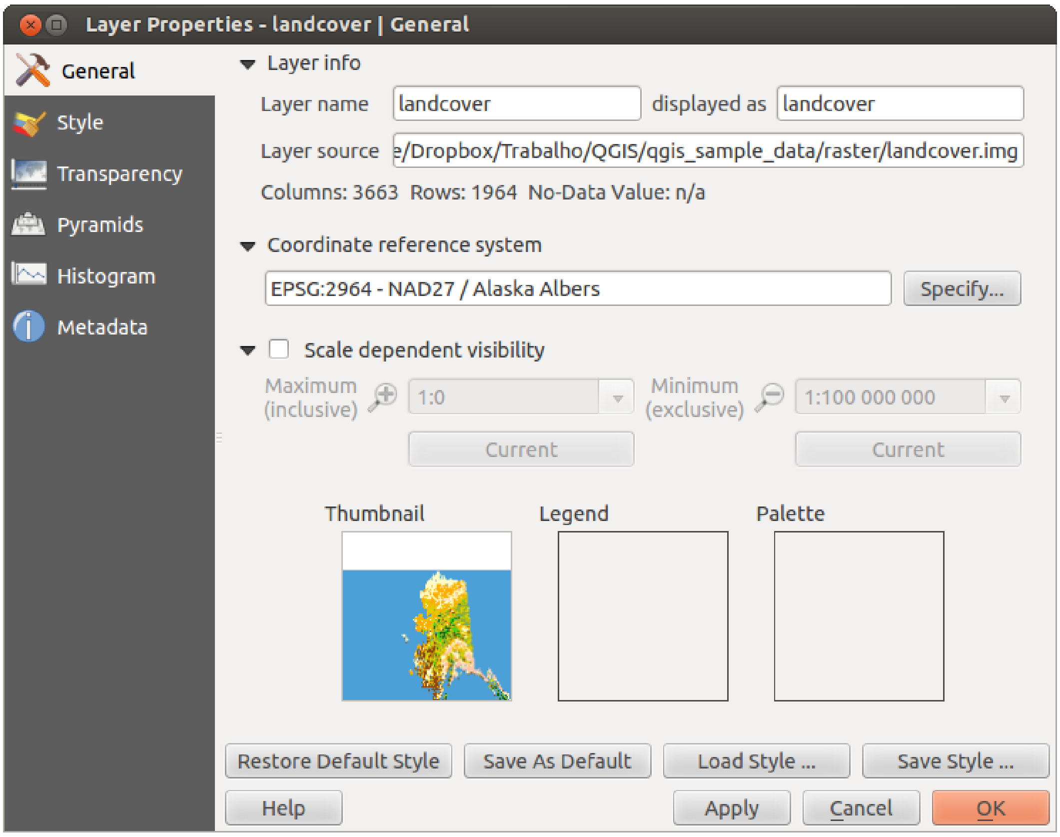

Figure 13.1: Raster Layers Properties Dialog

Sistemul de coordonate de referinţă

Aici, vei găsi informaiile sistemului de coordonate de referină (CRS), afiate sub formă de ir PROJ.4. Dacă această setare nu este corectă, ea poate fi modificată făcând clic pe butonul **[Specify]**.

Vizibilitate în Funcţie de Scară

În plus, în această filă poate fi stabilită vizibilitatea dependentă de scară. Va trebui să bifai caseta i să stabilii o scară corespunzătoare pentru afiarea datelor dvs. în canevasul hării.

În partea de jos, putei vedea o miniatură a stratului, simbolul legendei sale, i paleta.

13.2.2 Meniul Stilului

Randare bandă

QGIS offers four different *Render types*. The renderer chosen is dependent on the data type.

1. Culoare multibandă - Dacă fiierul vine ca o multibandă compusă din diferite benzi (de exemplu, utilizând o imagine prin satelit cu mai multe benzi)
2. Paletă de culori - în cazul în care un singur fiier bandă vine cu o paletă indexată (de exemplu, utilizată cu o hartă topografică digitală)
3. Singleband gray - (one band of) the image will be rendered as gray; QGIS will choose this renderer if the file has neither multibands nor an indexed palette nor a continous palette (e.g., used with a shaded relief map)

4. Pseudoculoare simpla bandă - acest render este posibil pentru fiierele cu o paleta continuă, sau o harta de culoare (ex: folosită cu o hartă de elevaii)

Culoare multibandă

Cu renderul de culoare multibandă, trei benzi selectate din imagine vor fi randate, fiecare bandă reprezentând componenta de culoare roie, verde sau albastră, care vor fi folosite pentru a crea o imagine color. Putei alege mai multe metode de *Îmbunătăire a Contrastului*: 'Fără Îmbunătăire', 'Întindere la MinMax', 'Întindere i decupare la MinMax' i 'Decupare la min max'.

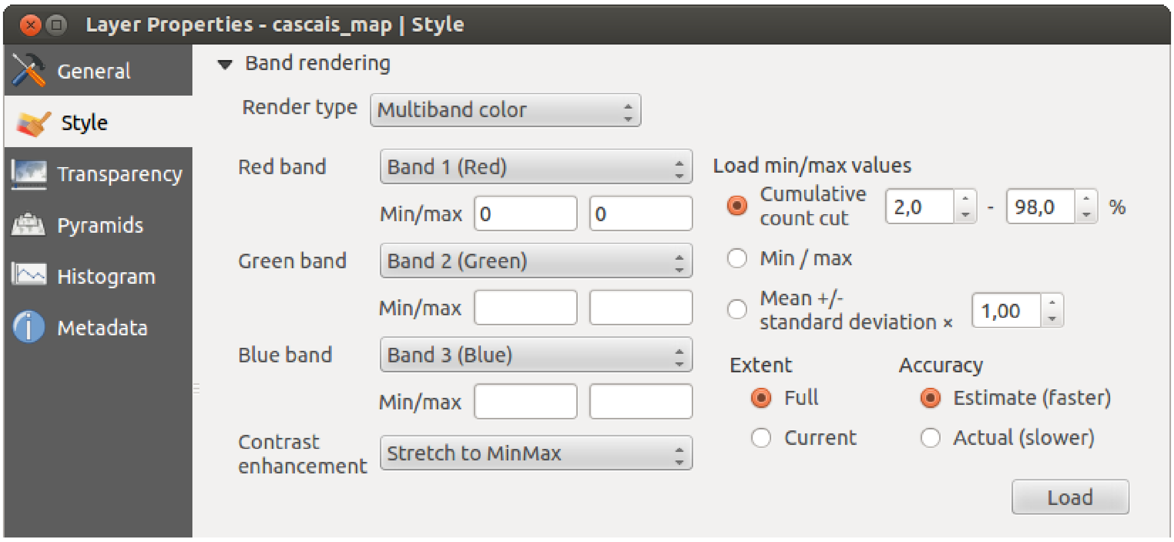

Figure 13.2: Raster Renderer - Multiband color

This selection offers you a wide range of options to modify the appearance of your raster layer. First of all, you have to get the data range from your image. This can be done by choosing the *Extent* and pressing **[Load]**. QGIS can *Estimate (faster)* the *Min* and *Max* values of the bands or use the *Actual (slower) Accuracy*.

Now you can scale the colors with the help of the *Load min/max values* section. A lot of images have a few very low and high data. These outliers can be eliminated using the *Cumulative count cut* setting. The standard data range is set from 2% to 98% of the data values and can be adapted manually. With this setting, the gray character of the image can disappear. With the scaling option *Min/max*, QGIS creates a color table with all of the data included in the original image (e.g., QGIS creates a color table with 256 values, given the fact that you have 8 bit bands). You can also calculate your color table using the *Mean +/- standard deviation x* 1,00. Then, only the values within the standard deviation or within multiple standard deviations are considered for the color table. This is useful when you have one or two cells with abnormally high values in a raster grid that are having a negative impact on the rendering of the raster.

All calculations can also be made for the *Current* extent.

Tip: Vizualizarea unei singure benzi dintr-un Raster Multibandă

Dacă dorii să vizualizai o singură bandă a unei imagini multibandă (de exemplu, Roie), ai putea crede că ai setat benzile Verde i Albastră pe "nespecificat". Dar acest lucru nu este modul corect. Pentru a afia banda Roie, setai tipul de imagine la 'Singleband gri', apoi selectai Rou ca bandă de utilizat pentru Gri.

Paletă

This is the standard render option for singleband files that already include a color table, where each pixel value is assigned to a certain color. In that case, the palette is rendered automatically. If you want to change colors assigned to certain values, just double-click on the color and the *Select color* dialog appears. Also, in QGIS 2.2. it's now possible to assign a label to the color values. The label appears in the legend of the raster layer then.

Îmbunătăţirea contrastului

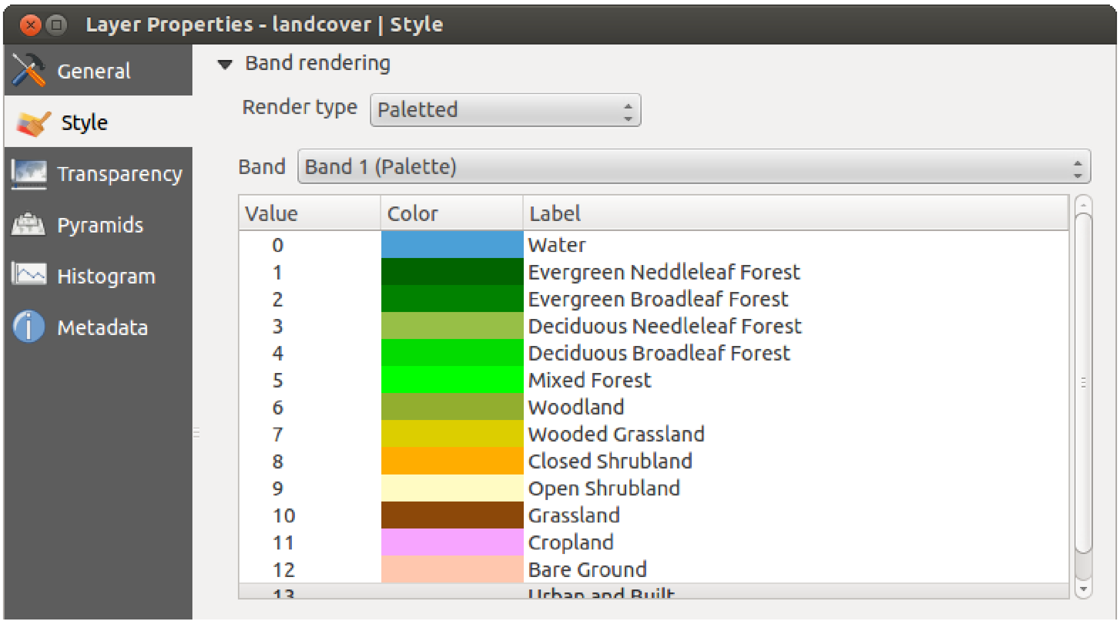

Figure 13.3: Raster Renderer - Paletted

Note: When adding GRASS rasters, the option *Contrast enhancement* will always be set automatically to *stretch to min max*, regardless of if this is set to another value in the QGIS general options.

O singură bandă gri

This renderer allows you to render a single band layer with a *Color gradient*: 'Black to white' or 'White to black'. You can define a *Min* and a *Max* value by choosing the *Extent* first and then pressing **[Load]**. QGIS can *Estimate (faster)* the *Min* and *Max* values of the bands or use the *Actual (slower) Accuracy*.

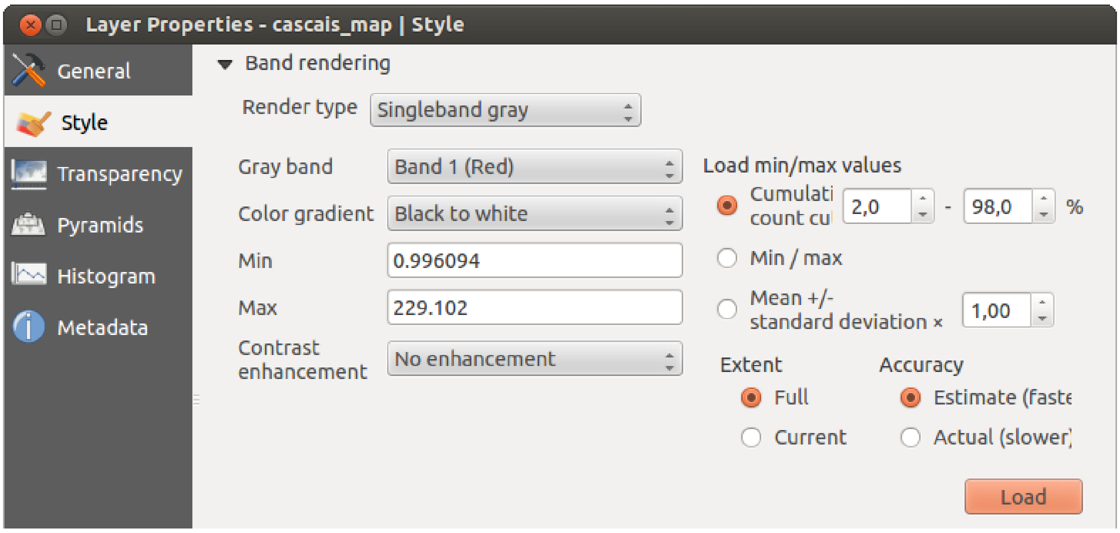

Figure 13.4: Raster Renderer - Singleband gray

With the *Load min/max values* section, scaling of the color table is possible. Outliers can be eliminated using the *Cumulative count cut* setting. The standard data range is set from 2% to 98% of the data values and can be adapted manually. With this setting, the gray character of the image can disappear. Further settings can be made with *Min/max* and *Mean +/- standard deviation x* 1,00. While the first one creates a color table with all of the data included in the original image, the second creates a color table that only considers values within the standard deviation or within multiple standard deviations. This is useful when you have one or two cells with abnormally high values in a raster grid that are having a negative impact on the rendering of the raster.

Pseudoculoare cu bandă unică

This is a render option for single-band files, including a continous palette. You can also create individual color maps for the single bands here. Sunt disponibile trei tipuri de interpolare de culoare:

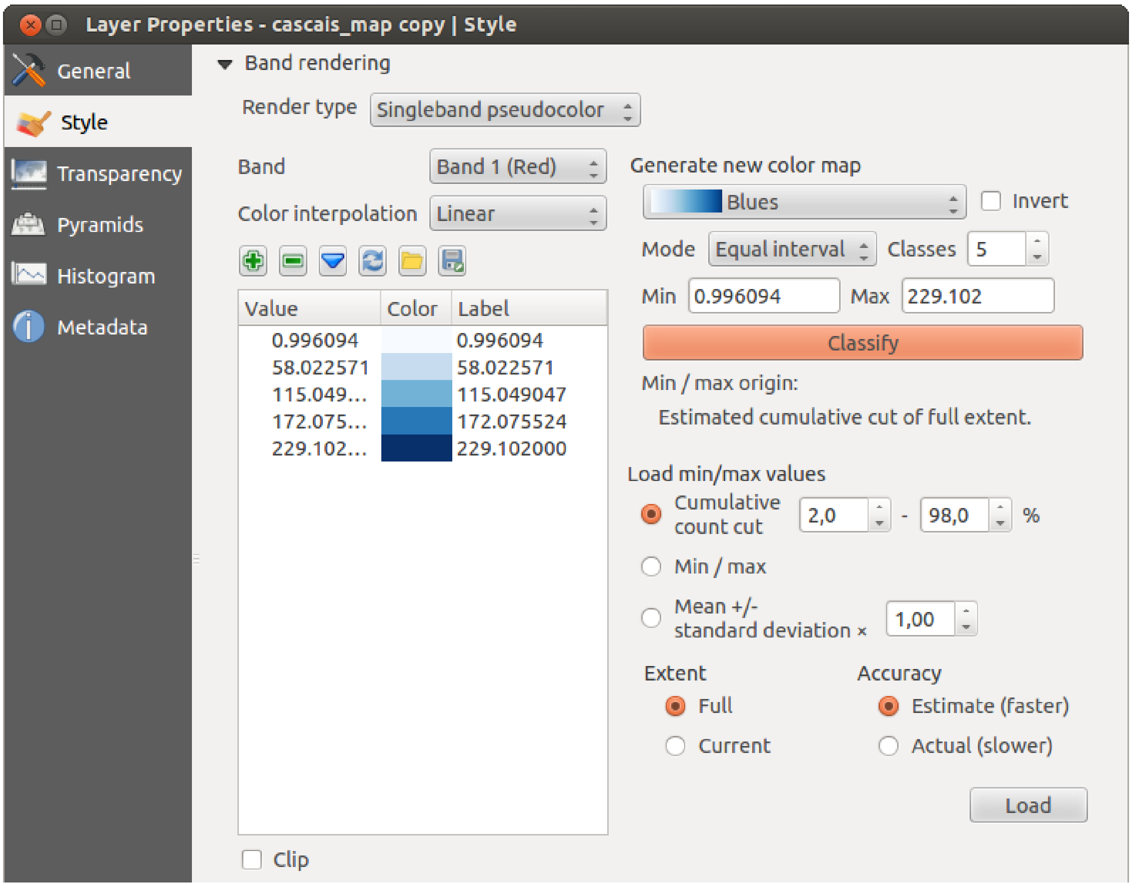

Figure 13.5: Raster Renderer - Singleband pseudocolor

1. Discret
2. Liniar
3. Exact

In the left block, the button Add values manually adds a value to the individual color table. The button Remove selected row deletes a value from the individual color table, and the Sort colormap items button sorts the color table according to the pixel values in the value column. Double clicking on the value column lets you insert a specific value. Double clicking on the color column opens the dialog *Change color*, where you can select a color to apply on that value. Further, you can also add labels for each color, but this value won't be displayed when you use the identify feature tool. You can also click on the button Load color map from band, which tries to load the table from the band (if it has any). And you can use the buttons Load color map from file or Export color map to file to load an existing color table or to save the defined color table for other sessions.

In the right block, *Generate new color map* allows you to create newly categorized color maps. For the *Classification mode* 'Equal interval', you only need to select the *number of classes* and press the button *Classify*. You can invert the colors of the color map by clicking the *Invert* checkbox. In the case of the *Mode* 'Continous', QGIS creates classes automatically depending on the *Min* and *Max*. Defining *Min/Max* values can be done with the help of the *Load min/max values* section. A lot of images have a few very low and high data.

These outliers can be eliminated using the *Cumulative count cut* setting. The standard data range is set from 2% to 98% of the data values and can be adapted manually. With this setting, the gray character of the image can disappear. With the scaling option *Min/max*, QGIS creates a color table with all of the data included in the original image (e.g., QGIS creates a color table with 256 values, given the fact that you have 8 bit bands). You can also calculate your color table using the *Mean +/- standard deviation x* 1,00. Then, only the values within the standard deviation or within multiple standard deviations are considered for the color table.

Randarea culorii

Pentru fiecare *Randare de bandă*, este posibilă o *Randare de culoare*.

Putei obine, de asemenea, efecte speciale de rendare pentru fiier(ele) raster, folosind unul din modurile de amestecare (v. *Dialogul Proprietăților Vectoriale*).

Further settings can be made in modifiying the *Brightness*, the *Saturation* and the *Contrast*. You can also use a *Grayscale* option, where you can choose between 'By lightness', 'By luminosity' and 'By average'. For one hue in the color table, you can modify the 'Strength'.

Reeşantionare

Opiunea *Reeantionare* îi face apariia atunci când mării i micorai o imagine. Modurile de reeantionare pot optimiza aspectul hării. Eie calculează o nouă matrice cu valori de gri, printr-o transformare geometrică.

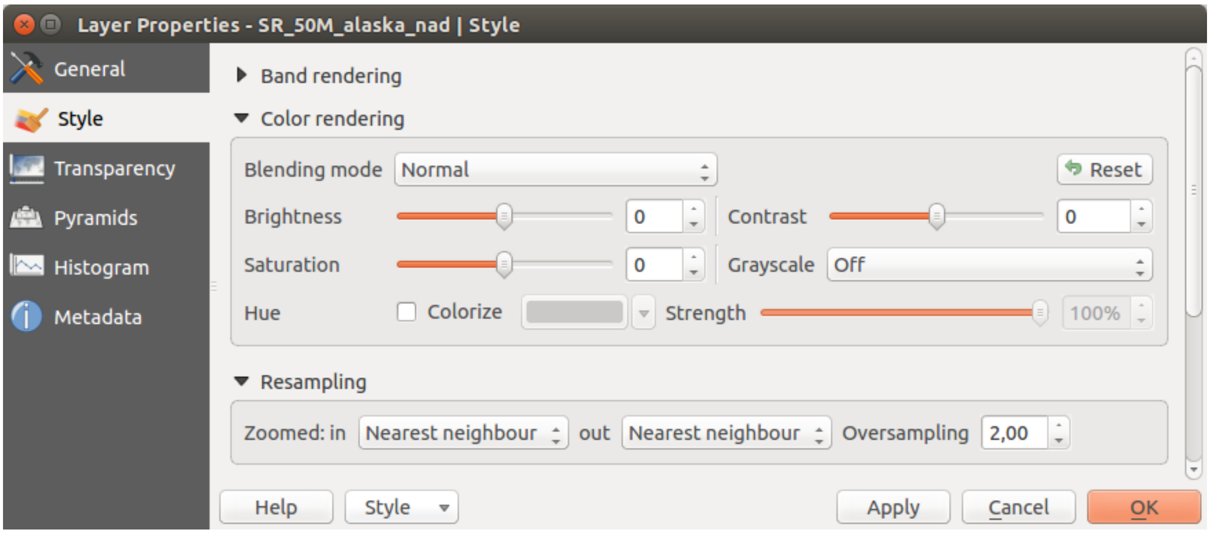

Figure 13.6: Raster Rendering - Resampling

Atunci când se aplică metoda 'Celui mai apropiat vecin ', harta poate avea o structură pixelată, la efectuarea unei transfocări. Aceasta aspect poate fi îmbunătăit prin utilizarea metodei 'Biliniară' sau 'Cubică', care poate determina ca entitäile ascuite să fie neclare. Efectul constă într-o imagine mai fină. Această metodă poate fi aplicată, de exemplu, pentru hări raster, topografice, digitale.

13.2.3 Meniul de Transparenţă

QGIS has the ability to display each raster layer at a different transparency level. Use the transparency slider to indicate to what extent the underlying layers (if any) should be visible though the current raster layer. This is very useful if you like to overlay more than one raster layer (e.g., a shaded relief map overlayed by a classified raster map). This will make the look of the map more three dimensional.

În plus, putei introduce o valoare raster care ar trebui să fie tratată ca *FĂRĂDATE* în meniul *Additional no data value*.

Un mod chiar mai flexibil de a personaliza transparena este disponibil în seciunea *Custom transparency options*. Transparena fiecărui pixel poate fi setată aici.

As an example, we want to set the water of our example raster file `landcover.tif` to a transparency of 20%. The following steps are neccessary:

1. Încărcai fiierul raster `landcover.tif`.
2. Deschidei dialogul *Proprietăilor* printr-un dublu-clic pe numele rasterului din legendă, sau printr-un clic-dreapta urmat de selectarea *Proprietăilor* din meniul care se deschide.
3. Selectai meniul *Transparenă*.
4. Pentru *Banda de transparenă* alegei 'None'.
5. Click the Add values manually button. A new row will appear in the pixel list.
6. Introducei valoarea raster în coloanele 'From' i 'To' (vom folosi 0 aici), i vom ajusta transparena la 20.
7. Clic pe butonul **[Apply]**, apoi aruncai o privire hării.

Putei repeta paii 5 i 6 pentru a stabili mai multe valori cu transparenă personalizate.

As you can see, it is quite easy to set custom transparency, but it can be quite a lot of work. Therefore, you can use the button Export to file to save your transparency list to a file. The button Import from file loads your transparency settings and applies them to the current raster layer.

13.2.4 Meniul Piramidelor

Large resolution raster layers can slow navigation in QGIS. By creating lower resolution copies of the data (pyramids), performance can be considerably improved, as QGIS selects the most suitable resolution to use depending on the level of zoom.

Trebuie să avei acces de scriere în directorul în care sunt stocate datele originale, pentru a construi piramide.

Mai multe metode de reproiectare pot dfi folosite pentru a calcula piramidele:

- cel mai apropiat vecin
- Medie
- Gauss
- Cubic
- Mod
- Niciuna

If you choose 'Internal (if possible)' from the *Overview format* menu, QGIS tries to build pyramids internally. You can also choose 'External' and 'External (Erdas Imagine)'.

Reinei că realizarea piramidelor interne poate modifica fiierul de date original, iar o dată create ele nu mai pot fi eliminate! Dacă dorii să păstrai o versiune 'fără-piramide' a rasterului dvs., facei o copie de rezervă înainte de construirea piramidelor.

13.2.5 Meniul Histogramei

The *Histogram* menu allows you to view the distribution of the bands or colors in your raster. The histogram is generated automatically when you open the *Histogram* menu. All existing bands will be displayed together. You can save the histogram as an image with the button. With the *Visibility* option in the *Prefs/Actions* menu, you can display histograms of the individual bands. You will need to select the option *Show selected band*. The *Min/max options* allow you to 'Always show min/max markers', to 'Zoom to min/max' and to 'Update style to min/max'. With the *Actions* option, you can 'Reset' and 'Recompute histogram' after you have chosen the *Min/max options*.

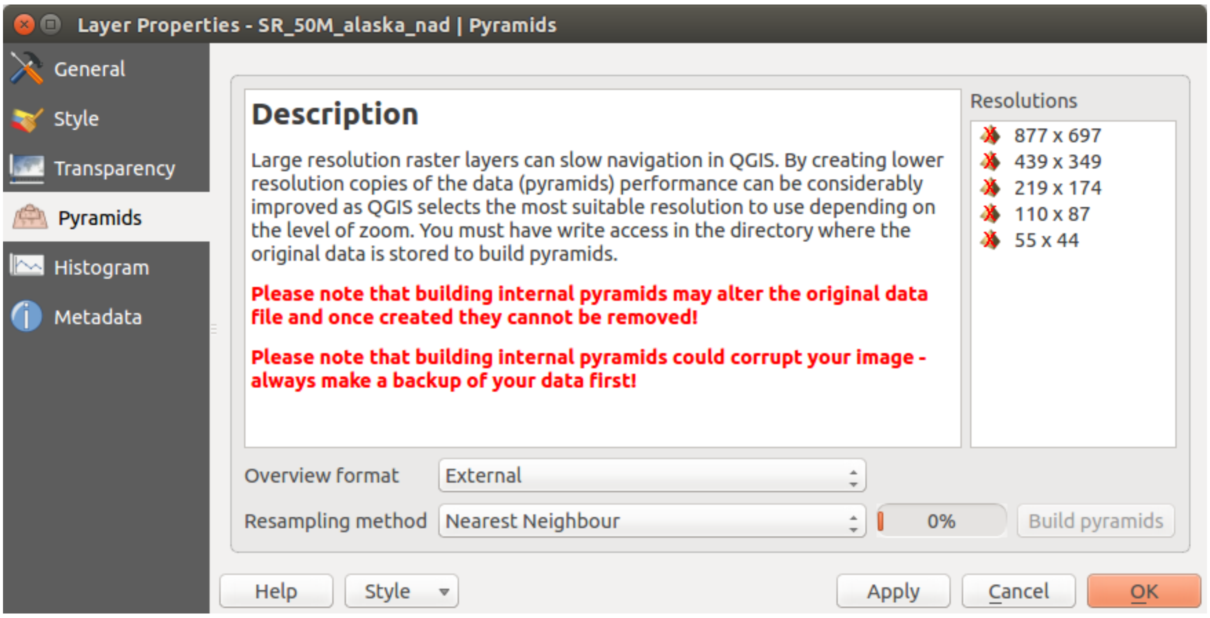

Figure 13.7: The Pyramids Menu

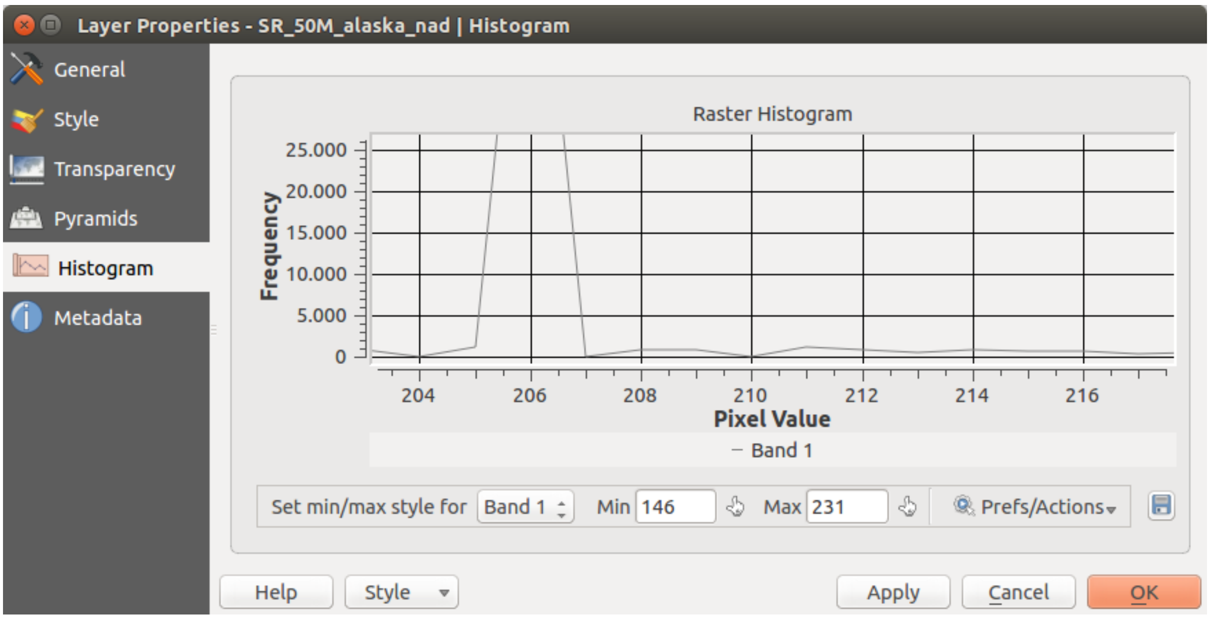

Figure 13.8: Raster Histogram

13.2.6 Meniu Metadate

Meniul *Metadate* afişează o multitudine de informaţii despre stratul raster, inclusiv statistici despre fiecare bandă din stratul raster curent. Prin intermediul acestui meniu, se pot accesa *Descriere*, *Atribuire*, guilabel: 'MetadataUrl' şi *Proprietăţi*. În *Proprietăţi*, statisticile sunt colectate pe tipicul 'bine de tiut', astfel încât este posibil ca pentru un anumit strat statisticile să nu fie colectate încă.

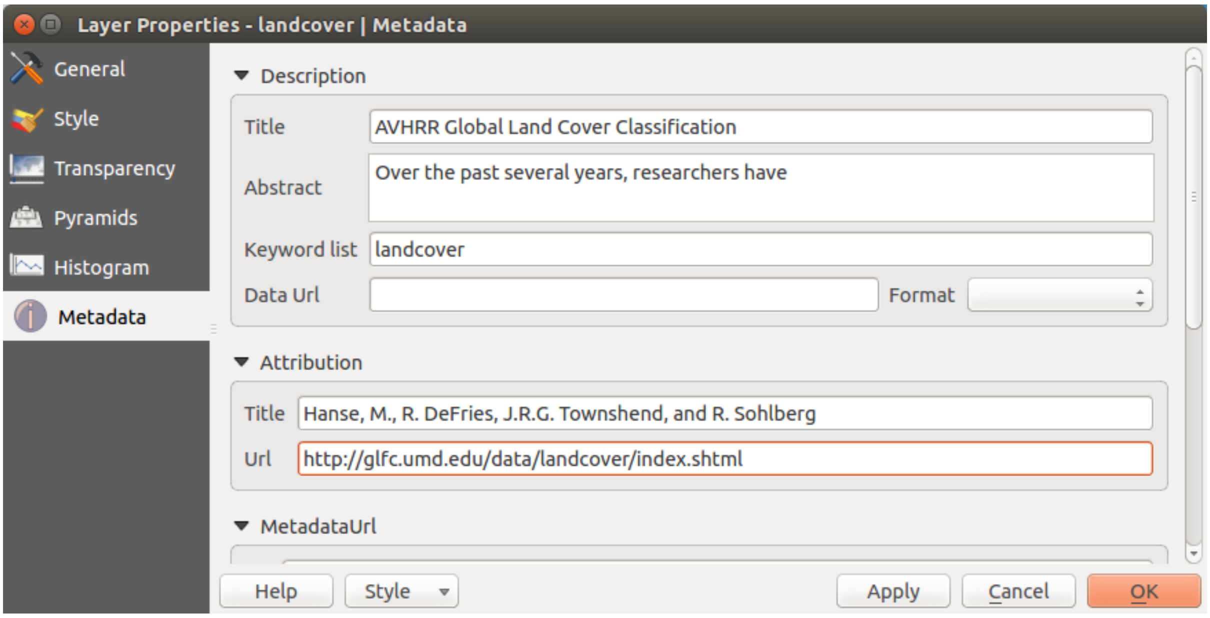

Figure 13.9: Raster Metadata

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13.3 Calculatorul Raster

The *Raster Calculator* in the *Raster* menu allows you to perform calculations on the basis of existing raster pixel values (see figure_raster_10). The results are written to a new raster layer with a GDAL-supported format.

The **Raster bands** list contains all loaded raster layers that can be used. To add a raster to the raster calculator expression field, double click its name in the Fields list. You can then use the operators to construct calculation expressions, or you can just type them into the box.

In the **Result layer** section, you will need to define an output layer. You can then define the extent of the calculation area based on an input raster layer, or based on X,Y coordinates and on columns and rows, to set the resolution of the output layer. If the input layer has a different resolution, the values will be resampled with the nearest neighbor algorithm.

The **Operators** section contains all available operators. To add an operator to the raster calculator expression box, click the appropriate button. Mathematical calculations (`+`, `-`, `*`, ...) and trigonometric functions (`sin`, `cos`, `tan`, ...) are available. Stay tuned for more operators to come!

With the *Add result to project* checkbox, the result layer will automatically be added to the legend area and can be visualized.

13.3.1 Exemple

Convert elevation values from meters to feet

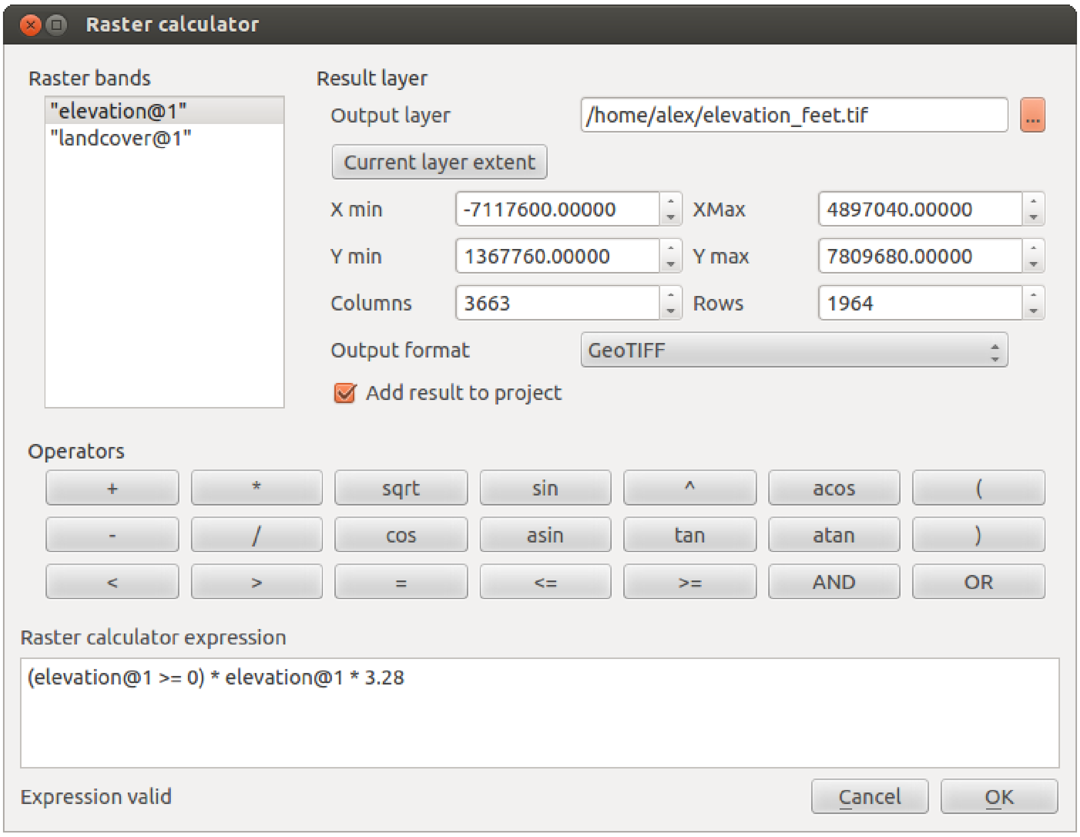

Figure 13.10: Calculatorul Raster

Creating an elevation raster in feet from a raster in meters, you need to use the conversion factor for meters to feet: 3.28. The expression is:

```
"elevation@1" * 3.28
```

Folosirea unei măti

If you want to mask out parts of a raster – say, for instance, because you are only interested in elevations above 0 meters – you can use the following expression to create a mask and apply the result to a raster in one step.

```
("elevation@1" >= 0) * "elevation@1"
```

In other words, for every cell greater than or equal to 0, set its value to 1. Otherwise set it to 0. This creates the mask on the fly.

If you want to classify a raster – say, for instance into two elevation classes, you can use the following expression to create a raster with two values 1 and 2 in one step.

```
("elevation@1" < 50) * 1 + ("elevation@1" >= 50) * 2
```

In other words, for every cell less than 50 set its value to 1. For every cell greater than or equal 50 set its value to 2.

.

CHAPTER 14

Lucrul cu date OGC

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14.1 QGIS as OGC Data Client

Open Geospatial Consortium (OGC) este o organizatie internaională, având ca membri mai mult de 300 de organizaii comerciale, guvernamentale, non-profit i de cercetare din întreaga lume. Membrii săi dezvoltă i implementează standarde i servicii pentru coninut geospaial, de prelucrare i de schimb a datelor GIS.

Descriind un model de date de bază pentru entităile geografice, un număr tot mai mare de specificaii sunt dezvoltate de OGC, pentru a servi nevoilor specifice pentru tehnologii geospaiale i de localizare interoperabile, inclusiv GIS. Informaii suplimentare pot fi găsite la http://www.opengeospatial.org/.

Important OGC specifications supported by QGIS are:

- **WMS** — Web Map Service (*Client WMS/WMTS*)
- **WMTS** — Web Map Tile Service (*Client WMS/WMTS*)
- **WFS** — Web Feature Service (*Client WFS i WFS-T*)
- **WFS-T** — Web Feature Service - Transactional (*Client WFS i WFS-T*)
- **WCS** — Web Coverage Service (*Client WCS*)
- **SFS** — Simple Features for SQL (*Straturi PostGIS*)
- **GML** — Limbaj cu Marcaje Geografice

OGC services are increasingly being used to exchange geospatial data between different GIS implementations and data stores. QGIS can deal with the above specifications as a client, being **SFS** (through support of the PostgreSQL / PostGIS data provider, see section *Straturi PostGIS*).

14.1.1 Client WMS/WMTS

Privire de ansamblu asupra suportului WMS

QGIS currently can act as a WMS client that understands WMS 1.1, 1.1.1 and 1.3 servers. In particular, it has been tested against publicly accessible servers such as DEMIS.

A WMS server acts upon requests by the client (e.g., QGIS) for a raster map with a given extent, set of layers, symbolization style, and transparency. The WMS server then consults its local data sources, rasterizes the map, and sends it back to the client in a raster format. For QGIS, this format would typically be JPEG or PNG.

WMS is generically a REST (Representational State Transfer) service rather than a full-blown Web service. As such, you can actually take the URLs generated by QGIS and use them in a web browser to retrieve the same images that QGIS uses internally. This can be useful for troubleshooting, as there are several brands of WMS server on the market and they all have their own interpretation of the WMS standard.

Straturile WMS pot fi adăugate pur i simplu, atât timp cât: tii URL-ul de acces la serverul WMS, ai stabilit o conexiune validă la acel server, iar serverul înelege ptotocolul HTTP, ca mecanism de transport al datelor.

Privire de ansamblu asupra suportului WMTS

QGIS can also act as a WMTS client. WMTS is an OGC standard for distributing tile sets of geospatial data. This is a faster and more efficient way of distributing data than WMS because with WMTS, the tile sets are pre-generated, and the client only requests the transmission of the tiles, not their production. A WMS request typically involves both the generation and transmission of the data. A well-known example of a non-OGC standard for viewing tiled geospatial data is Google Maps.

Pentru a afia datele la o varietate de scări, apropiate de ceea ce i-ar putea dori utilizatorul, seturile de plăcue WMTS sunt produse la mai multe niveluri de scări diferite, i sunt puse la dispoziia clientului GIS pentru a le apela.

Această diagramă ilustrează conceptul seturilor de plăcue:

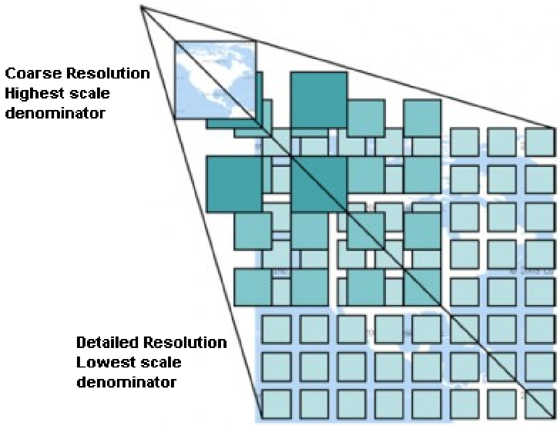

Figure 14.1: Conceptul seturilor de plăcue WMTS:

The two types of WMTS interfaces that QGIS supports are via Key-Value-Pairs (KVP) and RESTful. These two interfaces are different, and you need to specify them to QGIS differently.

1) In order to access a **WMTS KVP** service, a QGIS user must open the WMS/WMTS interface and add the following string to the URL of the WMTS tile service:

```
"?SERVICE=WMTS&REQUEST=GetCapabilities"
```

Un exemplu al acestui tip de adresă este

```
http://opencache.statkart.no/gatekeeper/gk/gk.open_wmts?\
  service=WMTS&request=GetCapabilities
```

Pentru testare, stratul topo2 din acest WMTS funcionează bine. Adăugarea acestui ir indică faptul că se va utiliza un serviciu web WMTS în locul unui serviciu WMS.

2. Serviciul **RESTful WMTS** are o formă diferită de adresă URL, simplă. Formatul recomandat de OGC este:

```
{WMTSBaseURL}/1.0.0/WMTSCapabilities.xml
```

This format helps you to recognize that it is a RESTful address. A RESTful WMTS is accessed in QGIS by simply adding its address in the WMS setup in the URL field of the form. An example of this type of address for the case of an Austrian basemap is http://maps.wien.gv.at/basemap/1.0.0/WMTSCapabilities.xml.

Note: You can still find some old services called WMS-C. These services are quite similar to WMTS (i.e., same purpose but working a little bit differently). You can manage them the same as you do WMTS services. Just add ?tiled=true at the end of the url. See http://wiki.osgeo.org/wiki/Tile_Map_Service_Specification for more information about this specification.

Când citii WMTS, vă putei gândi adesea i la WMS-C.

Selectarea serverelor WMS/WMTS

The first time you use the WMS feature in QGIS, there are no servers defined.

Begin by clicking the Add WMS layer button on the toolbar, or selecting *Layer → Add WMS Layer...*.

Va apărea dialogul de *Adăugare Strat(uri) de la un Server. Putei adăuga demonstrativ unele servere, făcând clic pe butonul **[Adaugă servere implicite]**. În acest fel, adăugai două servere WMS demo pentru a le utiliza: serverele WMS ale DM Solutions Group i LizardTech. Pentru a defini un nou server WMS, în fila :guilabel:'Straturilor* selectai butonul **[Nou]**. Apoi introducei parametrii de conectare la serverul WMS dorit, aa cum se arată în table_OGC_1:

Nume	Un nume pentru această conexiune. Acest nume va fi folosit în lista Conexiunilor la Server, astfel încât să o putei distinge de alte servere WMS.
URL	URL-ul serverului care furnizează datele. Acesta trebuie să fie un nume de gazdă solubil - acelai format pe care l-ai folosi pentru a deschide o conexiune telnet, sau pentru a efectua ping către un calculator.
Nume utilizator	Numele de utilizator pentru a accesa un server WMS securizat. Acest parametru este opional.
Parolă	Parola pentru autentificarea de bază la un server WMS. Acest parametru este opional.
Ignorare GetMap URI	*Ignoră GetMap URI raportat în capabilităi*. Folosete URI-ul dat din câmpul URL de mai sus.
Ignorare GetFeatureInfo URI	*Ignoră GetFeatureInfo URI raportat în capabilităi*. Folosete URI-ul dat din câmpul URL de mai sus.

Tabelul OGC 1: Parametri de conectare WMS

If you need to set up a proxy server to be able to receive WMS services from the internet, you can add your proxy server in the options. Choose *Settings → Options* and click on the *Network & Proxy* tab. There, you can add your proxy settings and enable them by setting *Use proxy for web access*. Make sure that you select the correct proxy type from the *Proxy type* drop-down menu.

Once the new WMS server connection has been created, it will be preserved for future QGIS sessions.

Tip: Despre URL-urile Server-ului WMS

Be sure, when entering the WMS server URL, that you have the base URL only. For example, you shouldn't have fragments such as `request=GetCapabilities` or `version=1.0.0` in your URL.

Încărcarea Straturilor WMS/WMTS

Once you have successfully filled in your parameters, you can use the **[Connect]** button to retrieve the capabilities of the selected server. This includes the image encoding, layers, layer styles and projections. Since this is a network operation, the speed of the response depends on the quality of your network connection to the WMS server. While downloading data from the WMS server, the download progress is visualized in the lower left of the WMS dialog.

Ecranul dvs. ar trebui să arate un pic ca în figure_OGR_1, care arată răspunsul oferit de serverul WMS al Portalului Solurilor Europene.

Codificare Imagine

The *Image encoding* section lists the formats that are supported by both the client and server. Choose one depending on your image accuracy requirements.

Tip: Codificare Imagine

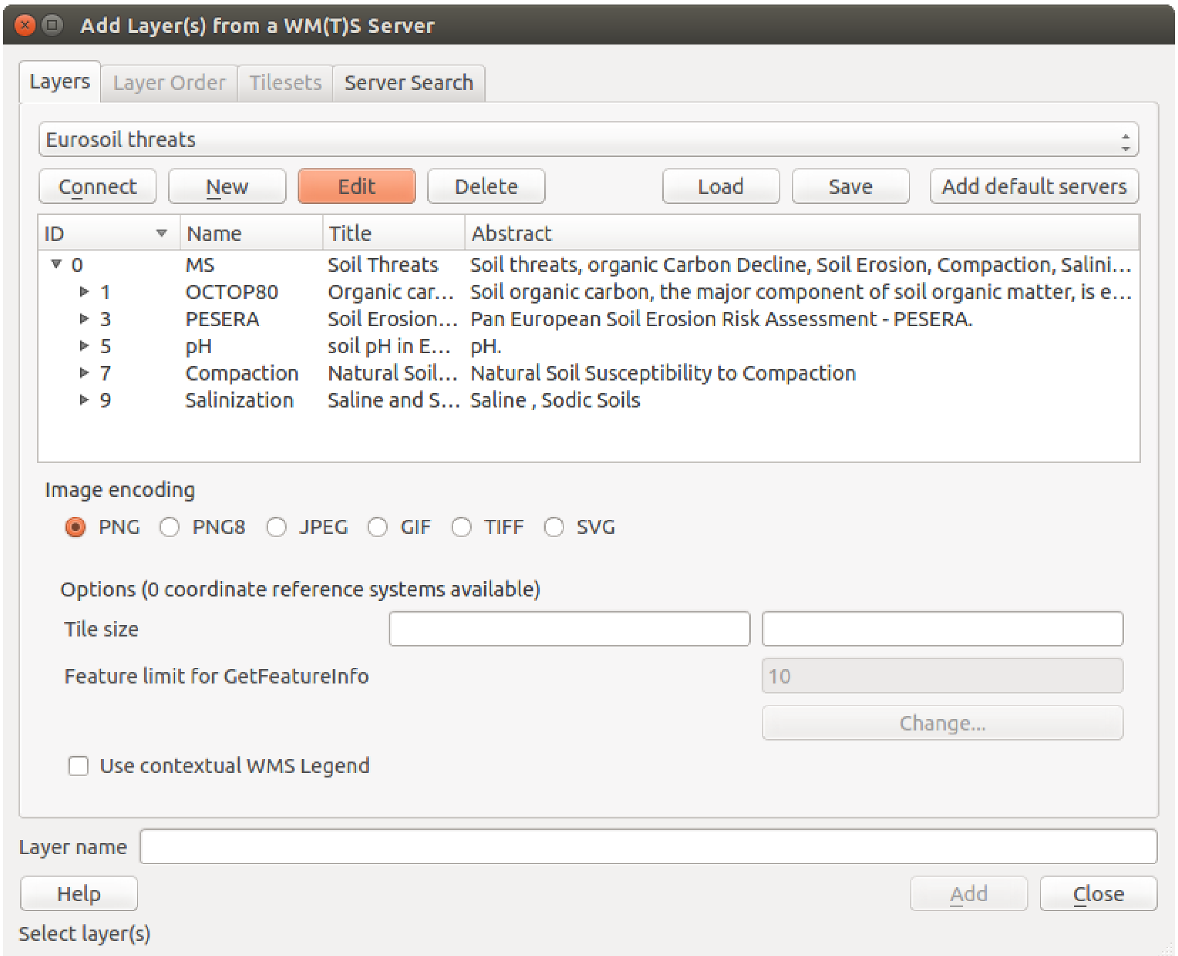

Figure 14.2: Dialog for adding a WMS server, showing its available layers

Vei descoperi că, de obicei, un server WMS vă oferă posibilitatea de a alege codificarea imaginii sub formă de JPEG sau PNG. JPEG este un format de compresie cu pierderi, în timp ce PNG reproduce fidel datele raster originale.

Use JPEG if you expect the WMS data to be photographic in nature and/or you don't mind some loss in picture quality. This trade-off typically reduces by five times the data transfer requirement compared with PNG.

Utilizai PNG dacă dorii reprezentări precise ale datelor originale, i nu vă deranjează cerinele crescute de transfer de date.

Opiuni

The Options area of the dialog provides a text field where you can add a *Layer name* for the WMS layer. This name will appear in the legend after loading the layer.

Below the layer name, you can define *Tile size* if you want to set tile sizes (e.g., 256x256) to split up the WMS request into multiple requests.

Limitarea entităilor pentru GetFeatureInfo definete ce entităi de pe server vor fi interogate.

If you select a WMS from the list, a field with the default projection provided by the mapserver appears. If the **[Change...]** button is active, you can click on it and change the default projection of the WMS to another CRS provided by the WMS server.

Finally you can activate *Use contextual WMS-Legend* if the WMS Server supports this feature. Then only the relevant legend for your current map view extent will be shown and thus will not include legend items for things you can't see in the current map.

Ordinea straturilor

The *Layer Order* tab lists the selected layers available from the current connected WMS server. You may notice that some layers are expandable; this means that the layer can be displayed in a choice of image styles.

You can select several layers at once, but only one image style per layer. When several layers are selected, they will be combined at the WMS server and transmitted to QGIS in one go.

Tip: Ordinea straturilor WMS

WMS layers rendered by a server are overlaid in the order listed in the Layers section, from top to bottom of the list. If you want to change the overlay order, you can use the *Layer Order* tab.

Transparenţă

In this version of QGIS, the *Global transparency* setting from the *Layer Properties* is hard coded to be always on, where available.

Tip: Transparenţa stratului WMS

Disponibilitatea transparenei pentru imaginile WMS depinde de codificarea folosită pentru imagini: formatele PNG i GIF acceptă transparena, în timp ce pentru JPEG acest lucru nu este posibil.

Sistemul de Coordonate de Referină

A coordinate reference system (CRS) is the OGC terminology for a QGIS projection.

Fiecare strat WMS poate fi prezentat în mai multe CRS-uri, în funcie de capacitatea serverului WMS.

To choose a CRS, select **[Change...]** and a dialog similar to Figure Projection 3 in *Lucrul cu Proiecii* will appear. The main difference with the WMS version of the dialog is that only those CRSs supported by the WMS server will be shown.

Căutare server

Within QGIS, you can search for WMS servers. Figure_OGC_2 shows the *Server Search* tab with the *Add Layer(s) from a Server* dialog.

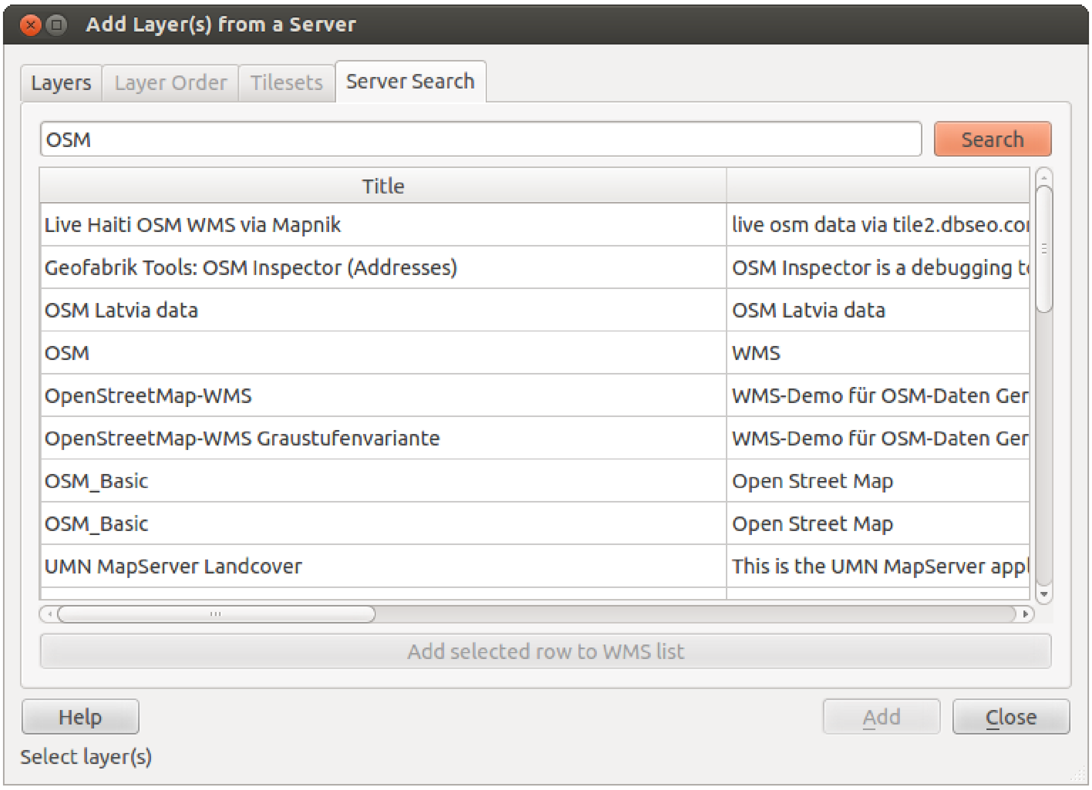

Figure 14.3: Dialog for searching WMS servers after some keywords

As you can see, it is possible to enter a search string in the text field and hit the **[Search]** button. After a short while, the search result will be populated into the list below the text field. Browse the result list and inspect your search results within the table. To visualize the results, select a table entry, press the **[Add selected row to WMS list]** button and change back to the *Layers* tab. QGIS has automatically updated your server list, and the selected search result is already enabled in the list of saved WMS servers in the *Layers* tab. You only need to request the list of layers by clicking the **[Connect]** button. This option is quite handy when you want to search maps by specific keywords.

Practic, această opiune este un front-end pentru API-ul de la http://geopole.org.

Seturi de plăcue

Atunci când se utilizează servicii WMTS (Cached WMS), cum ar fi

```
http://opencache.statkart.no/gatekeeper/gk/gk.open_wmts?\
  service=WMTS&request=GetCapabilities
```

you are able to browse through the *Tilesets* tab given by the server. Additional information like tile size, formats and supported CRS are listed in this table. In combination with this feature, you can use the tile scale slider by selecting *Settings* → *Panels* (KDE and Windows) or *View* → *Panels* (Gnome and MacOSX), then choosing *Tile scale*. This gives you the available scales from the tile server with a nice slider docked in.

Folosirea instrumentului de identificare

Once you have added a WMS server, and if any layer from a WMS server is queryable, you can then use the Identify tool to select a pixel on the map canvas. A query is made to the WMS server for each selection made. The results of the query are returned in plain text. The formatting of this text is dependent on the particular WMS server used. **Selecia Formatului**

If multiple output formats are supported by the server, a combo box with supported formats is automatically added to the identify results dialog and the selected format may be stored in the project for the layer. **Suport pentru formatul GML**

The Identify tool supports WMS server response (GetFeatureInfo) in GML format (it is called Feature in the QGIS GUI in this context). If "Feature" format is supported by the server and selected, results of the Identify tool are vector features, as from a regular vector layer. When a single feature is selected in the tree, it is highlighted in the map and it can be copied to the clipboard and pasted to another vector layer. See the example setup of the UMN Mapserver below to support GetFeatureInfo in GML format.

```
# in layer METADATA add which fields should be included and define geometry (example):

"gml_include_items"   "all"
"ows_geometries"      "mygeom"
"ows_mygeom_type"     "polygon"

# Then there are two possibilities/formats available, see a) and b):

# a) basic (output is generated by Mapserver and does not contain XSD)
# in WEB METADATA define formats (example):
"wms_getfeatureinfo_formatlist" "application/vnd.ogc.gml,text/html"

# b) using OGR (output is generated by OGR, it is send as multipart and contains XSD)
# in MAP define OUTPUTFORMAT (example):
OUTPUTFORMAT
    NAME "OGRGML"
    MIMETYPE "ogr/gml"
    DRIVER "OGR/GML"
    FORMATOPTION "FORM=multipart"
END

# in WEB METADATA define formats (example):
"wms_getfeatureinfo_formatlist" "OGRGML,text/html"
```

Vizualizarea Proprietăţilor

După ce ai adăugat un server WMS, îi putei vizualiza proprietăile printr-un clic-dreapta pe el, în legendă, i prin selectarea *Proprietăilor*. **Fila Metadatelor**

The tab *Metadata* displays a wealth of information about the WMS server, generally collected from the capabilities statement returned from that server. Many definitions can be gleaned by reading the WMS standards (see OPEN-GEOSPATIAL-CONSORTIUM in *Literatură i Referine Web*), but here are a few handy definitions:

- **Proprietăţile serverului**
  - **Versiunea WMS** — Versiunea WMS acceptată de server.
  - **Image Formats** — The list of MIME-types the server can respond with when drawing the map. QGIS supports whatever formats the underlying Qt libraries were built with, which is typically at least `image/png` and `image/jpeg`.
  - **Identity Formats** — The list of MIME-types the server can respond with when you use the Identify tool. Currently, QGIS supports the `text-plain` type.
- **Proprietăţile stratului**
  - **Selectat** — Indiferent dacă acest strat a fost sau nu selectat, atunci când serverul său a fost adăugat în acest proiect.
  - **Visible** — Whether or not this layer is selected as visible in the legend (not yet used in this version of QGIS).
  - **Poate Identifica** — Dacă acest strat va returna un rezultat, sau nu, atunci când este folosit instrumentul Identificare asupra lui.

– **Can be Transparent** — Whether or not this layer can be rendered with transparency. This version of QGIS will always use transparency if this is `Yes` and the image encoding supports transparency.

– **Can Zoom In** — Whether or not this layer can be zoomed in by the server. This version of QGIS assumes all WMS layers have this set to `Yes`. Deficient layers may be rendered strangely.

– **Numărare în Cascadă** — Serverele WMS pot aciona ca un proxy pentru alte servere WMS, pentru a obine datele raster ale unui strat. Această intrare arată de câte ori este transmisă cererea pentru acest strat către alte servere WMS, pentru obinerea unui rezultat.

– **Fixed Width, Fixed Height** — Whether or not this layer has fixed source pixel dimensions. This version of QGIS assumes all WMS layers have this set to nothing. Deficient layers may be rendered strangely.

– **WGS 84 Bounding Box** — The bounding box of the layer, in WGS 84 coordinates. Some WMS servers do not set this correctly (e.g., UTM coordinates are used instead). If this is the case, then the initial view of this layer may be rendered with a very 'zoomed-out' appearance by QGIS. The WMS webmaster should be informed of this error, which they may know as the WMS XML elements `LatLonBoundingBox`, `EX_GeographicBoundingBox` or the CRS:84 `BoundingBox`.

– **Disponibil în CRS** — Proieciile în care poate fi randat acest strat de către serverul WMS. Acestea sunt prezentate în format nativ WMS.

– **Disponibil în stil** — Stilurile de imagine în care poate fi randat acest strat de către serverul WMS.

Arată legenda grafică WMS în cuprins i în compozitor

The QGIS WMS data provider is able to display a legend graphic in the table of contents' layer list and in the map composer. The WMS legend will be shown only if the WMS server has GetLegendGraphic capability and the layer has getCapability url specified, so you additionally have to select a styling for the layer.

If a legendGraphic is available, it is shown below the layer. It is little and you have to click on it to open it in real dimension (due to QgsLegendInterface architectural limitation). Clicking on the layer's legend will open a frame with the legend at full resolution.

In the print composer, the legend will be integrated at it's original (dowloaded) dimension. Resolution of the legend graphic can be set in the item properties under Legend -> WMS LegendGraphic to match your printing requirements

The legend will display contextual information based on your current scale. The WMS legend will be shown only if the WMS server has GetLegendGraphic capability and the layer has getCapability url specified, so you have to select a styling.

Limitările clientului WMS

Not all possible WMS client functionality had been included in this version of QGIS. Some of the more noteworthy exceptions follow.

Editarea Setărilor Stratului WMS

Once you've completed the Add WMS layer procedure, there is no way to change the settings. A work-around is to delete the layer completely and start again.

Cerinele de autentificare ale Serverelor WMS

Currently, publicly accessible and secured WMS services are supported. The secured WMS servers can be accessed by public authentication. You can add the (optional) credentials when you add a WMS server. See section *Selectarea serverelor WMS/WMTS* for details.

Tip: Accesarea straturilor OGC securizate

If you need to access secured layers with secured methods other than basic authentication, you can use InteProxy as a transparent proxy, which does support several authentication methods. More information can be found in the InteProxy manual at http://inteproxy.wald.intevation.org.

Tip: QGIS WMS Mapserver

Since Version 1.7.0, QGIS has its own implementation of a WMS 1.3.0 Mapserver. Read more about this in chapter *QGIS as OGC Data Server*.

14.1.2 Client WCS

Un Serviciu de Acoperire Web (WCS) oferă acces la datele raster, în forme care sunt utile pentru randarea pe partea clientului, ca date de intrare în modelele tiinifice, precum i pentru ali clieni. WCS poate fi comparat cu WFS i WMS. La fel ca i instanele serviciilor WMS i WFS, un WCS permite clienilor să aleagă poriuni din informaiile serverelor, bazate pe constrângeri spaiale i pe alte criterii de interogare.

QGIS has a native WCS provider and supports both version 1.0 and 1.1 (which are significantly different), but currently it prefers 1.0, because 1.1 has many issues (i.e., each server implements it in a different way with various particularities).

The native WCS provider handles all network requests and uses all standard QGIS network settings (especially proxy). It is also possible to select cache mode ('always cache', 'prefer cache', 'prefer network', 'always network'), and the provider also supports selection of time position, if temporal domain is offered by the server.

14.1.3 Client WFS i WFS-T

In QGIS, a WFS layer behaves pretty much like any other vector layer. You can identify and select features, and view the attribute table. Since QGIS 1.6, editing WFS-T is also supported.

În general, adăugarea unui strat WFS este foarte similară cu procedura utilizată pentru WMS. Diferena este că nu există servere standard definite, aa că trebuie să-l adăugăm pe al nostru.

Încărcarea unui strat WFS

Ca exemplu, vom folosi serverul WFS de la DM Solutions pentru a afia un strat. URL-ul este: http://www2.dmsolutions.ca/cgi-bin/mswfs_gmap

1. Clic pe instrumentul Add WFS Layer din bara de instrumente a Straturilor. Va apărea dialogul *Add WFS Layer from a Server*.
2. Clic pe **[Nou]**.
3. Introducei 'DM Solutions' ca nume.
4. Introducei URL-ul (a se vedea mai sus).
5. Clic pe **[OK]**.
6. Choose 'DM Solutions' from the *Server Connections* drop-down list.
7. Clic pe **[Conectare]**.
8. Ateptai ca lista de straturi să fie populată.
9. Selectai stratul *Parks* din listă.
10. Clic pe **[Apply]** pentru a adăuga stratul la hartă.

Reinei că orice setări proxy stabilite în preferine sunt, de asemenea, recunoscute.

You'll notice the download progress is visualized in the lower left of the QGIS main window. Once the layer is loaded, you can identify and select a province or two and view the attribute table.

Numai WFS 1.0.0 este acceptat. În acest moment, nu au existat multe teste asupra versiunilor WFS implementate în alte servere. Dacă întâmpinai probleme cu oricare alt server WFS, vă rugam să nu ezitai să contactai echipa de dezvoltare. Vă rugăm să consultai seciunea *Asistentă i Ajutor* pentru mai multe informaii despre listele de discuii.

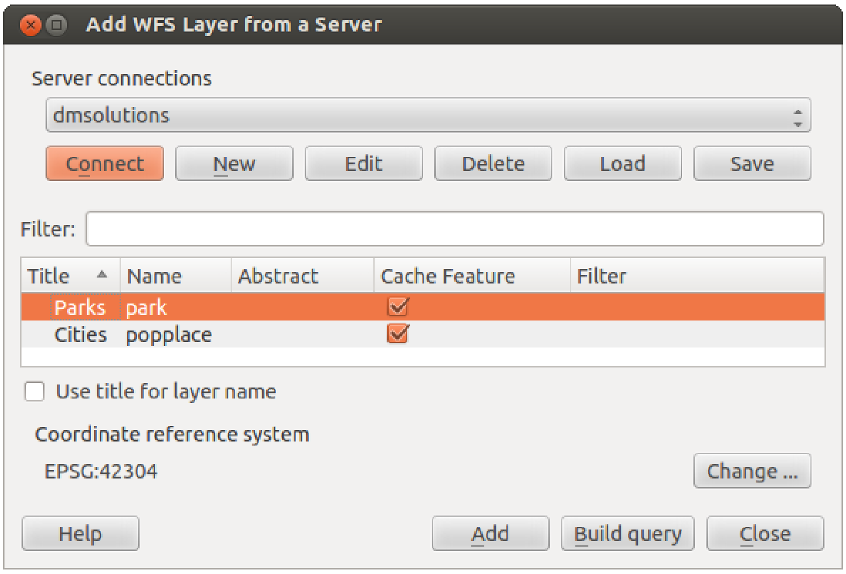

Figure 14.4: Adding a WFS layer

Tip: Găsirea Serverelor WFS

You can find additional WFS servers by using Google or your favorite search engine. There are a number of lists with public URLs, some of them maintained and some not.

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14.2 QGIS as OGC Data Server

QGIS Server is an open source WMS 1.3, WFS 1.0.0 and WCS 1 1.1.1 implementation that, in addition, implements advanced cartographic features for thematic mapping. The QGIS Server is a FastCGI/CGI (Common Gateway Interface) application written in C++ that works together with a web server (e.g., Apache, Lighttpd). It has Python plugin support allowing for fast and efficient development and deployment of new features. It is funded by the EU projects Orchestra, Sany and the city of Uster in Switzerland.

QGIS Server uses QGIS as back end for the GIS logic and for map rendering. Furthermore, the Qt library is used for graphics and for platform-independent C++ programming. In contrast to other WMS software, the QGIS Server uses cartographic rules as a configuration language, both for the server configuration and for the user-defined cartographic rules.

As QGIS desktop and QGIS Server use the same visualization libraries, the maps that are published on the web look the same as in desktop GIS.

In one of the following manuals, we will provide a sample configuration to set up a QGIS Server. For now, we recommend to read one of the following URLs to get more information:

- http://karlinapp.ethz.ch/qgis_wms/
- http://hub.qgis.org/projects/quantum-gis/wiki/QGIS_Server_Tutorial
- http://linfiniti.com/2010/08/qgis-mapserver-a-wms-server-for-the-masses/

14.2.1 Sample installation on Debian Squeeze

At this point, we will give a short and simple sample installation how-to for a minimal working configuration using Apache2 on Debian Squeeze. Many other OSs provide packages for QGIS Server, too. If you have to build it all from source, please refer to the URLs above.

Firstly, add the following debian GIS repository by adding the following repository:

```
$ cat /etc/apt/sources.list.d/debian-gis.list
deb http://qgis.org/debian trusty main
deb-src http://qgis.org/debian trusty main

$ # Add keys
$ sudo gpg --recv-key DD45F6C3
$ sudo gpg --export --armor DD45F6C3 | sudo apt-key add -

$ # Update package list
$ sudo apt-get update && sudo apt-get upgrade
```

Now, install QGIS-Server:

```
$ sudo apt-get install qgis-server python-qgis
```

Installation of a HelloWorld example plugin for testing the servers. You create a directory to hold server plugins. This will be specified in the virtual host configuration and passed on to the server through an environment variable:

```
$ sudo mkdir -p /opt/qgis-server/plugins
$ cd /opt/qgis-server/plugins
$ sudo wget https://github.com/elpaso/qgis-helloserver/archive/master.zip
$ # In case unzip was not installed before:
$ sudo apt-get install unzip
$ sudo unzip master.zip
$ sudo mv qgis-helloserver-master HelloServer
```

Instalai serverul Apache într-o gazdă virtuală separată, care monitorizează portul 80. Activai modulul de rescriere pentru a permite autentificarea antetelor HTTP BASIC:

```
$ sudo a2enmod rewrite
$ cat /etc/apache2/conf-available/qgis-server-port.conf
Listen 80
$ sudo a2enconf qgis-server-port
```

Aceasta este configuraia gazdei virtuale, stocate în `/etc/apache2/sites-available/001-qgis-server.conf` :

```
<VirtualHost *:80>
  ServerAdmin webmaster@localhost
  DocumentRoot /var/www/html

  ErrorLog ${APACHE_LOG_DIR}/qgis-server-error.log
  CustomLog ${APACHE_LOG_DIR}/qgis-server-access.log combined

  # Longer timeout for WPS... default = 40
  FcgidIOTimeout 120
  FcgidInitialEnv LC_ALL "en_US.UTF-8"
  FcgidInitialEnv PYTHONIOENCODING UTF-8
  FcgidInitialEnv LANG "en_US.UTF-8"
  FcgidInitialEnv QGIS_DEBUG 1
  FcgidInitialEnv QGIS_SERVER_LOG_FILE /tmp/qgis-000.log
  FcgidInitialEnv QGIS_SERVER_LOG_LEVEL 0
  FcgidInitialEnv QGIS_PLUGINPATH "/opt/qgis-server/plugins"

  # ABP: needed for QGIS HelloServer plugin HTTP BASIC auth
  <IfModule mod_fcgid.c>
      RewriteEngine on
      RewriteCond %{HTTP:Authorization} .
      RewriteRule .* - [E=HTTP_AUTHORIZATION:%{HTTP:Authorization}]
  </IfModule>

  ScriptAlias /cgi-bin/ /usr/lib/cgi-bin/
```

```
  <Directory "/usr/lib/cgi-bin">
      AllowOverride All
      Options +ExecCGI -MultiViews +FollowSymLinks
      # for apache2 > 2.4
      Require all granted
      #Allow from all
  </Directory>
 </VirtualHost>
```

Acum activai gazda virtuală i repornii Apache:

```
$ sudo a2ensite 001-qgis-server
$ sudo service apache2 restart
```

Testai serverul cu plugin-ul HelloWorld:

```
$ wget -q -O - "http://localhost/cgi-bin/qgis_mapserv.fcgi?SERVICE=HELLO"
HelloServer!
```

You can have a look at the default GetCpabilities of the QGIS server at: `http://localhost/cgi-bin/qgis_mapserv.fcgi?SERVICE=WMS&VERSION=1.3.0&REQUEST=GetCapabili`

Tip: If you work with a feature that has many nodes then modyfying and adding a new feature will fail. In this case it is possible to insert the following code into the `001-qgis-server.conf` file:

```
<IfModule mod_fcgid.c>
FcgidMaxRequestLen 26214400
FcgidConnectTimeout 60
</IfModule>
```

14.2.2 Creating a WMS/WFS/WCS from a QGIS project

To provide a new QGIS Server WMS, WFS or WCS, we have to create a QGIS project file with some data. Here, we use the 'Alaska' shapefile from the QGIS sample dataset. Define the colors and styles of the layers in QGIS and the project CRS, if not already defined.

Then, go to the *OWS Server* menu of the *Project* → *Project Properties* dialog and provide some information about the OWS in the fields under *Service Capabilities*. This will appear in the GetCapabilities response of the WMS, WFS or WCS. If you don't check *Service capabilities*, QGIS Server will use the information given in the `wms_metadata.xml` file located in the `cgi-bin` folder.

WMS capabilities

In the *WMS capabilities* section, you can define the extent advertised in the WMS GetCapabilities response by entering the minimum and maximum X and Y values in the fields under *Advertised extent*. Clicking *Use Current Canvas Extent* sets these values to the extent currently displayed in the QGIS map canvas. By checking *CRS restrictions*, you can restrict in which coordinate reference systems (CRS) QGIS Server will offer to render maps. Use the button below to select those CRS from the Coordinate Reference System Selector, or click *Used* to add the CRS used in the QGIS project to the list.

If you have print composers defined in your project, they will be listed in the GetCapabilities response, and they can be used by the GetPrint request to create prints, using one of the print composer layouts as a template. This is a QGIS-specific extension to the WMS 1.3.0 specification. If you want to exclude any print composer from being published by the WMS, check *Exclude composers* and click the button below. Then, select a print composer from the *Select print composer* dialog in order to add it to the excluded composers list.

If you want to exclude any layer or layer group from being published by the WMS, check *Exclude Layers* and click the button below. This opens the *Select restricted layers and groups* dialog, which allows you to choose

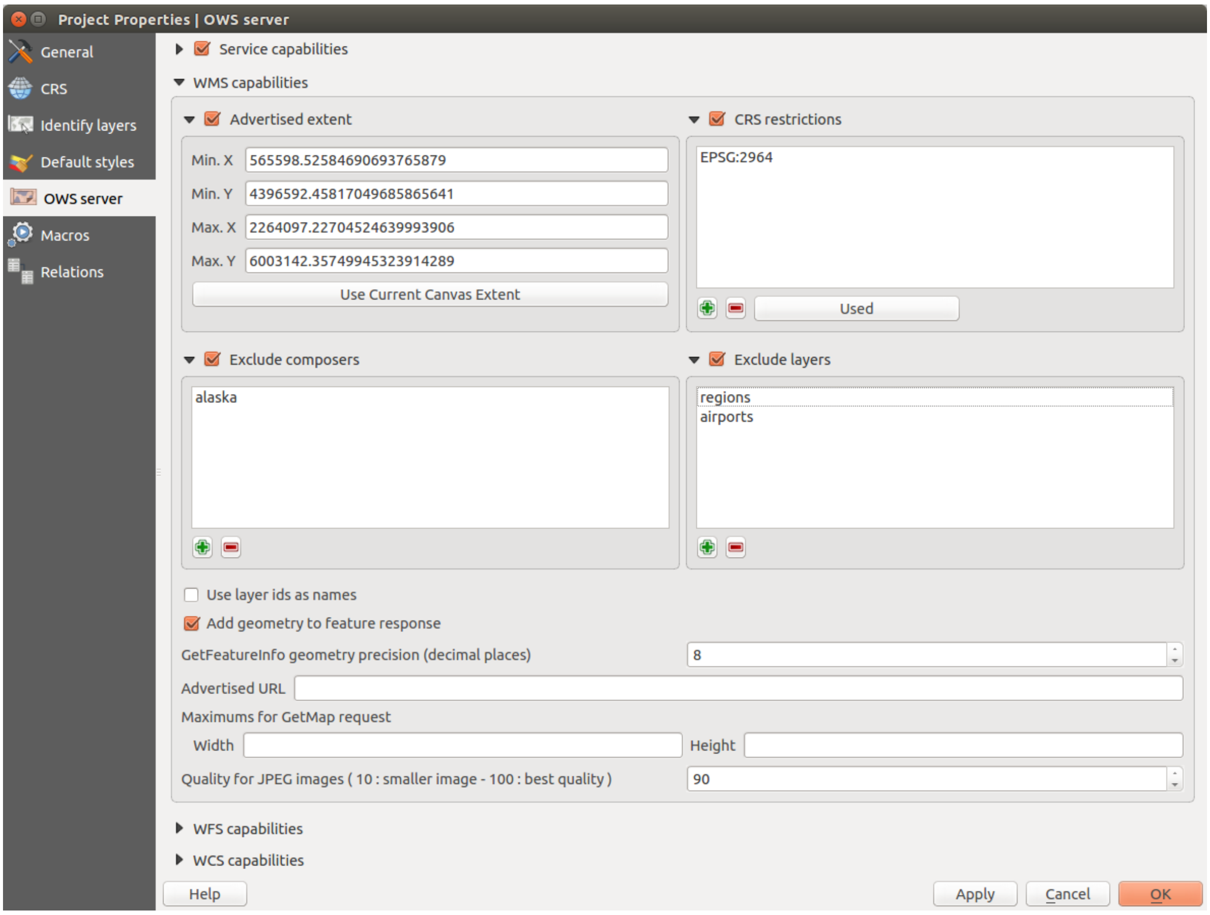

Figure 14.5: Definitions for a QGIS Server WMS/WFS/WCS project (KDE)

the layers and groups that you don't want to be published. Use the `Shift` or `Ctrl` key if you want to select multiple entries at once.

You can receive requested GetFeatureInfo as plain text, XML and GML. Default is XML, text or GML format depends the output format choosen for the GetFeatureInfo request.

If you wish, you can check *Add geometry to feature response*. This will include in the GetFeatureInfo response the geometries of the features in a text format. If you want QGIS Server to advertise specific request URLs in the WMS GetCapabilities response, enter the corresponding URL in the *Advertised URL* field. Furthermore, you can restrict the maximum size of the maps returned by the GetMap request by entering the maximum width and height into the respective fields under *Maximums for GetMap request*.

If one of your layers uses the Map Tip display (i.e. to show text using expressions) this will be listed inside the GetFeatureInfo output. If the layer uses a Value Map for one of his attributes, also this information will be shown in the GetFeatureInfo output.

QGIS support the following request for WMS service:

- GetCapabilities
- GetMap
- GetFeatureInfo
- GetLegendGraphic (profilul SLD)
- DescribeLayer (profilul SLD)
- GetStyles (profilul QGIS personalizat)

WFS capabilities

In the *WFS capabilities* area, you can select the layers that you want to publish as WFS, and specify if they will allow the update, insert and delete operations. If you enter a URL in the *Advertised URL* field of the *WFS capabilities* section, QGIS Server will advertise this specific URL in the WFS GetCapabilities response.

QGIS support the following request for WFS service:

- GetCapabilities
- DescribeFeatureType
- GetFeature
- Transaction

WCS capabilities

In the *WCS capabilities* area, you can select the layers that you want to publish as WCS. If you enter a URL in the *Advertised URL* field of the *WCS capabilities* section, QGIS Server will advertise this specific URL in the WCS GetCapabilities response.

Now, save the session in a project file `alaska.qgs`. To provide the project as a WMS/WFS, we create a new folder `/usr/lib/cgi-bin/project` with admin privileges and add the project file `alaska.qgs` and a copy of the `qgis_mapserv.fcgi` file - that's all.

Now we test our project WMS, WFS and WCS. Add the WMS, WFS and WCS as described in *Încărcarea Straturilor WMS/WMTS*, *Client WFS i WFS-T* and *Client WCS* to QGIS and load the data. The URL is:

```
http://localhost/cgi-bin/project/qgis_mapserv.fcgi
```

QGIS support the following request for WCS service:

- GetCapabilities
- DescribeCoverage
- GetCoverage

Reglarea fină a OWS-ului dvs.

For vector layers, the *Fields* menu of the *Layer* → *Properties* dialog allows you to define for each attribute if it will be published or not. By default, all the attributes are published by your WMS and WFS. If you want a specific attribute not to be published, uncheck the corresponding checkbox in the *WMS* or *WFS* column.

You can overlay watermarks over the maps produced by your WMS by adding text annotations or SVG annotations to the project file. See section Annotation Tools in *Instrumente generale* for instructions on creating annotations. For annotations to be displayed as watermarks on the WMS output, the *Fixed map position* check box in the *Annotation text* dialog must be unchecked. This can be accessed by double clicking the annotation while one of the annotation tools is active. For SVG annotations, you will need either to set the project to save absolute paths (in the *General* menu of the *Project* → *Project Properties* dialog) or to manually modify the path to the SVG image in a way that it represents a valid relative path.

Parametri suplimentari acceptai de cererea WMS GetMap

In the WMS GetMap request, QGIS Server accepts a couple of extra parameters in addition to the standard parameters according to the OCG WMS 1.3.0 specification:

- **MAP** parameter: Similar to MapServer, the `MAP` parameter can be used to specify the path to the QGIS project file. You can specify an absolute path or a path relative to the location of the server executable (`qgis_mapserv.fcgi`). If not specified, QGIS Server searches for .qgs files in the directory where the server executable is located.

  Exemplu:

  ```
  http://localhost/cgi-bin/qgis_mapserv.fcgi?\
    REQUEST=GetMap&MAP=/home/qgis/mymap.qgs&...
  ```

- Parametrul **DPI**: parametrul `DPI` poate fi folosit pentru a specifica rezoluia de ieire solicitată.

  Exemplu:

  ```
  http://localhost/cgi-bin/qgis_mapserv.fcgi?REQUEST=GetMap&DPI=300&...
  ```

- **OPACITIES** parameter: Opacity can be set on layer or group level. Allowed values range from 0 (fully transparent) to 255 (fully opaque).

  Exemplu:

  ```
  http://localhost/cgi-bin/qgis_mapserv.fcgi?\
    REQUEST=GetMap&LAYERS=mylayer1,mylayer2&OPACITIES=125,200&...
  ```

QGIS Server logging

To log requests send to server, set the following environment variables:

- **QGIS_SERVER_LOG_FILE**: Specificai calea i numele fiierului. Asigurai-vă că serverul are permisiuni adecvate pentru a scrie în fiier. Fiierul ar trebui să fie creat automat, doar trimitei nite cereri la server. Dacă nu se află acolo, atunci verificai permisiunile.
- **QGIS_SERVER_LOG_LEVEL**: Precizai nivelul de jurnalizare dorit. Valorile disponibile sunt:
  - 0 INFO (se jurnalizează toate cererile),
  - 1 AVERTISMENT,
  - 2 CRITIC (se jurnalizează doar erorile critice, adecvat în scop de producie).

  Exemplu:

  ```
  SetEnv QGIS_SERVER_LOG_FILE /var/tmp/qgislog.txt
  SetEnv QGIS_SERVER_LOG_LEVEL 0
  ```

Note

- Când utilizai modulul Fcgid, folosii FcgidInitialEnv în loc de SetEnv!
- Server logging is enabled also if executable is compiled in release mode.

Variabile de mediu

- **QGIS_OPTIONS_PATH**: The variable specifies path to directory with settings. It works the same ways as QGIS application –optionspath option. It is looking for settings file in <QGIS_OPTIONS_PATH>/QGIS/QGIS2.ini. For exaple, to set QGIS server on Apache to use /path/to/config/QGIS/QGIS2.ini settings file, add to Apache config:

```
SetEnv QGIS_OPTIONS_PATH "/path/to/config/"
```

.

Lucrul cu datele GPS

.

15.1 Plugin-ul GPS

15.1.1 Ce este GPS?

GPS, the Global Positioning System, is a satellite-based system that allows anyone with a GPS receiver to find their exact position anywhere in the world. GPS is used as an aid in navigation, for example in airplanes, in boats and by hikers. The GPS receiver uses the signals from the satellites to calculate its latitude, longitude and (sometimes) elevation. Most receivers also have the capability to store locations (known as **waypoints**), sequences of locations that make up a planned **route** and a tracklog or **track** of the receiver's movement over time. Waypoints, routes and tracks are the three basic feature types in GPS data. QGIS displays waypoints in point layers, while routes and tracks are displayed in linestring layers.

15.1.2 Încărcarea datelor GPS dintr-un fiier

There are dozens of different file formats for storing GPS data. The format that QGIS uses is called GPX (GPS eXchange format), which is a standard interchange format that can contain any number of waypoints, routes and tracks in the same file.

To load a GPX file, you first need to load the plugin. *Plugins* → *Plugin Manager...* opens the Plugin Manager Dialog. Activate the *GPS Tools* checkbox. When this plugin is loaded, a button with a small handheld GPS device will show up in the toolbar and in *Layer* → *Create Layer* → :

- GPS Tools
- *Create new GPX Layer*

For working with GPS data, we provide an example GPX file available in the QGIS sample dataset: `qgis_sample_data/gps/national_monuments.gpx`. See section *Date eantion* for more information about the sample data.

1. Select *Vector* → *GPS* → *GPS Tools* or click the GPS Tools icon in the toolbar and open the *Load GPX file* tab (see figure_GPS_1).
2. Răsfoii folderul `qgis_sample_data/gps/`, selectând fiierul GPX `national_monuments.gpx` i făcând clic pe **[Deschidere]**.

Use the **[Browse...]** button to select the GPX file, then use the checkboxes to select the feature types you want to load from that GPX file. Each feature type will be loaded in a separate layer when you click **[OK]**. The file `national_monuments.gpx` only includes waypoints.

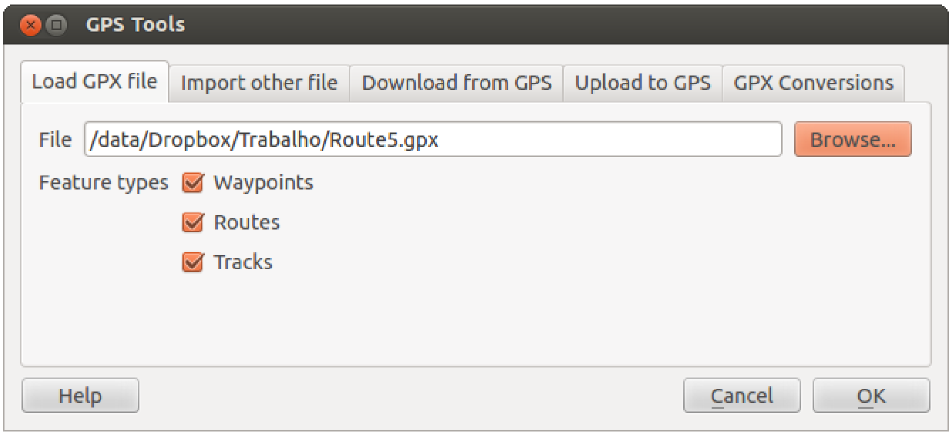

Figure 15.1: The *GPS Tools* dialog window

Note: GPS units allow you to store data in different coordinate systems. When downloading a GPX file (from your GPS unit or a web site) and then loading it in QGIS, be sure that the data stored in the GPX file uses WGS 84 (latitude/longitude). QGIS expects this, and it is the official GPX specification. See http://www.topografix.com/GPX/1/1/.

15.1.3 GPSBabel

Since QGIS uses GPX files, you need a way to convert other GPS file formats to GPX. This can be done for many formats using the free program GPSBabel, which is available at http://www.gpsbabel.org. This program can also transfer GPS data between your computer and a GPS device. QGIS uses GPSBabel to do these things, so it is recommended that you install it. However, if you just want to load GPS data from GPX files you will not need it. Version 1.2.3 of GPSBabel is known to work with QGIS, but you should be able to use later versions without any problems.

15.1.4 Importarea datelor GPS

To import GPS data from a file that is not a GPX file, you use the tool *Import other file* in the GPS Tools dialog. Here, you select the file that you want to import (and the file type), which feature type you want to import from it, where you want to store the converted GPX file and what the name of the new layer should be. Note that not all GPS data formats will support all three feature types, so for many formats you will only be able to choose between one or two types.

15.1.5 Descărcarea datelor GPS de pe un dispozitiv

QGIS can use GPSBabel to download data from a GPS device directly as new vector layers. For this we use the *Download from GPS* tab of the GPS Tools dialog (see Figure_GPS_2). Here, we select the type of GPS device, the port that it is connected to (or USB if your GPS supports this), the feature type that you want to download, the GPX file where the data should be stored, and the name of the new layer.

The device type you select in the GPS device menu determines how GPSBabel tries to communicate with your GPS device. If none of the available types work with your GPS device, you can create a new type (see section *Definirea noilor tipuri de dispozitive*).

The port may be a file name or some other name that your operating system uses as a reference to the physical port in your computer that the GPS device is connected to. It may also be simply USB, for USB-enabled GPS units.

- Pe Linux, este ceva de genul `/dev/ttyS0` sau `/dev/ttyS1`.
- Pe Windows, este `COM1` sau `COM2`.

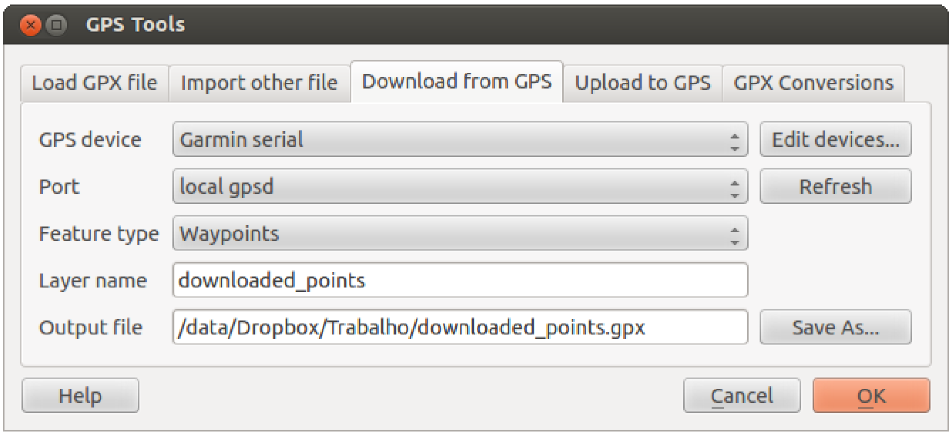

Figure 15.2: Instrumentul de descărcare

When you click **[OK]**, the data will be downloaded from the device and appear as a layer in QGIS.

15.1.6 Încărcarea datelor GPS pe un dispozitiv

You can also upload data directly from a vector layer in QGIS to a GPS device using the *Upload to GPS* tab of the GPS Tools dialog. To do this, you simply select the layer that you want to upload (which must be a GPX layer), your GPS device type, and the port (or USB) that it is connected to. Just as with the download tool, you can specify new device types if your device isn't in the list.

This tool is very useful in combination with the vector-editing capabilities of QGIS. It allows you to load a map, create waypoints and routes, and then upload them and use them on your GPS device.

15.1.7 Definirea noilor tipuri de dispozitive

There are lots of different types of GPS devices. The QGIS developers can't test all of them, so if you have one that does not work with any of the device types listed in the *Download from GPS* and *Upload to GPS* tools, you can define your own device type for it. You do this by using the GPS device editor, which you start by clicking the **[Edit devices]** button in the download or the upload tab.

To define a new device, you simply click the **[New device]** button, enter a name, enter download and upload commands for your device, and click the **[Update device]** button. The name will be listed in the device menus in the upload and download windows – it can be any string. The download command is the command that is used to download data from the device to a GPX file. This will probably be a GPSBabel command, but you can use any other command line program that can create a GPX file. QGIS will replace the keywords `%type`, `%in`, and `%out` when it runs the command.

`%type` will be replaced by `-w` if you are downloading waypoints, `-r` if you are downloading routes and `-t` if you are downloading tracks. These are command-line options that tell GPSBabel which feature type to download.

`%in` will be replaced by the port name that you choose in the download window and `%out` will be replaced by the name you choose for the GPX file that the downloaded data should be stored in. So, if you create a device type with the download command `gpsbabel %type -i garmin -o gpx %in %out` (this is actually the download command for the predefined device type 'Garmin serial') and then use it to download waypoints from port `/dev/ttyS0` to the file `output.gpx`, QGIS will replace the keywords and run the command `gpsbabel -w -i garmin -o gpx /dev/ttyS0 output.gpx`.

The upload command is the command that is used to upload data to the device. The same keywords are used, but `%in` is now replaced by the name of the GPX file for the layer that is being uploaded, and `%out` is replaced by the port name.

Putei afla mai multe despre GPSBabel i despre opiunile disponibile pentru linia de comandă la http://www.gpsbabel.org.

După ce ai creat un nou tip de dispozitiv, acesta va apărea în listele dispozitivelor, pentru instrumentele de download i de upload.

15.1.8 Descărcai punctele/traseele de pe unităile GPS

As described in previous sections QGIS uses GPSBabel to download points/tracks directly in the project. QGIS comes out of the box with a pre-defined profile to download from Garmin devices. Unfortunately there is a bug #6318 that does not allow create other profiles, so downloading directly in QGIS using the GPS Tools is at the moment limited to Garmin USB units.

Garmin GPSMAP 60cs

MS Windows

Instalai driver-ele USB Garmin de la http://www8.garmin.com/support/download_details.jsp?id=591

Connect the unit. Open GPS Tools and use `type=garmin serial` and `port=usb`: Fill the fields *Layer name* and *Output file*. Sometimes it seems to have problems saving in a certain folder, using something like `c:\temp` usually works.

Ubuntu/Mint GNU/Linux

It is first needed an issue about the permissions of the device, as described at https://wiki.openstreetmap.org/wiki/USB_Garmin_on_GNU/Linux. You can try to create a file `/etc/udev/rules.d/51-garmin.rules` containing this rule

```
ATTRS{idVendor}=="091e", ATTRS{idProduct}=="0003", MODE="666"
```

După aceea este necesar să vă asigurai că modulul de kernel `garmin_gps` nu este încărcat

```
rmmod garmin_gps
```

and then you can use the GPS Tools. Unfortunately there seems to be a bug #7182 and usually QGIS freezes several times before the operation work fine.

BTGP-38KM datalogger (doar Bluetooth)

MS Windows

The already referred bug does not allow to download the data from within QGIS, so it is needed to use GPSBabel from the command line or using its interface. The working command is

```
gpsbabel -t -i skytraq,baud=9600,initbaud=9600 -f COM9 -o gpx -F C:/GPX/aaa.gpx
```

Ubuntu/Mint GNU/Linux

Use same command (or settings if you use GPSBabel GUI) as in Windows. On Linux it maybe somehow common to get a message like

```
skytraq: Too many read errors on serial port
```

este doar o chestiune de oprire i repornire a înregistratorului de date, apoi încercai din nou.

BlueMax GPS-4044 datalogger (atât BT cât i USB)

MS Windows

Note: Este nevoie de instalarea driver-elor sale înainte de utilizarea pe Windows 7. Vizitai site-ul producătorului pentru descărcarea corectă.

La descărcarea cu GPSBabel, atât cel cu USB cât i cel cu BT returnează întotdeauna o eroare de genul

```
gpsbabel -t -i mtk -f COM12 -o gpx -F C:/temp/test.gpx
mtk_logger: Can't create temporary file data.bin
Error running gpsbabel: Process exited unsucessfully with code 1
```

Ubuntu/Mint GNU/Linux

Cu USB

After having connected the cable use the `dmesg` command to understand what port is being used, for example `/dev/ttyACM3`. Then as usual use GPSBabel from the CLI or GUI

```
gpsbabel -t -i mtk -f /dev/ttyACM3 -o gpx -F /home/user/bluemax.gpx
```

Cu Bluetooth

Use Blueman Device Manager to pair the device and make it available through a system port, then run GPSBabel

```
gpsbabel -t -i mtk -f /dev/rfcomm0 -o gpx -F /home/user/bluemax_bt.gpx
```

.

15.2 Urmărirea live a GPS-ului

To activate live GPS tracking in QGIS, you need to select *Settings* → *Panels* *GPS information*. You will get a new docked window on the left side of the canvas.

Există patru ecrane posibile în această fereastră de urmărire GPS:

- GPS position coordinates and an interface for manually entering vertices and features
- GPS signal strength of satellite connections
- GPS polar screen showing number and polar position of satellites
- GPS options screen (see figure_gps_options)

With a plugged-in GPS receiver (has to be supported by your operating system), a simple click on **[Connect]** connects the GPS to QGIS. A second click (now on **[Disconnect]**) disconnects the GPS receiver from your computer. For GNU/Linux, gpsd support is integrated to support connection to most GPS receivers. Therefore, you first have to configure gpsd properly to connect QGIS to it.

> **Warning:** If you want to record your position to the canvas, you have to create a new vector layer first and switch it to editable status to be able to record your track.

15.2.1 Poziia i atributele suplimentare

If the GPS is receiving signals from satellites, you will see your position in latitude, longitude and altitude together with additional attributes.

15.2.2 Puterea semnalului GPS

Here, you can see the signal strength of the satellites you are receiving signals from.

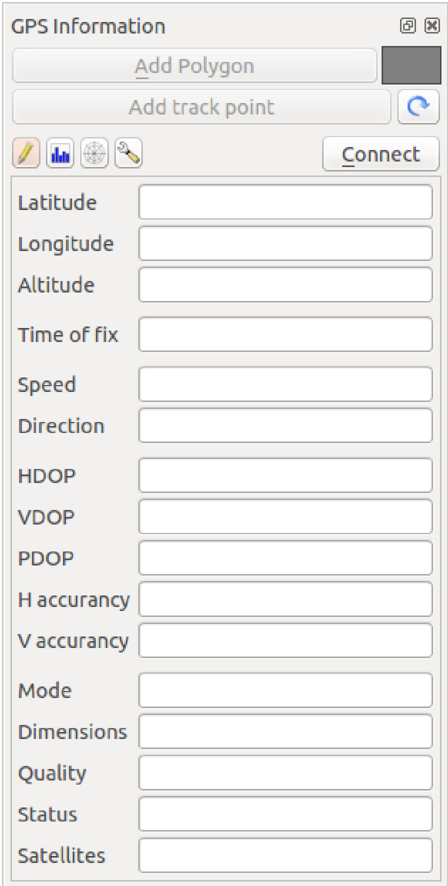

Figure 15.3: GPS tracking position and additional attributes

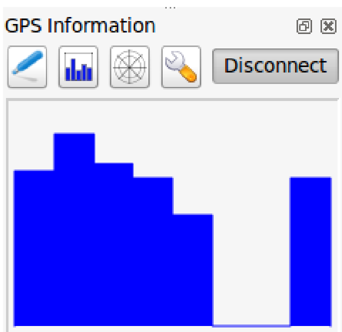

Figure 15.4: GPS tracking signal strength

15.2.3 Fereastra polară GPS

If you want to know where in the sky all the connected satellites are, you have to switch to the polar screen. You can also see the ID numbers of the satellites you are receiving signals from.

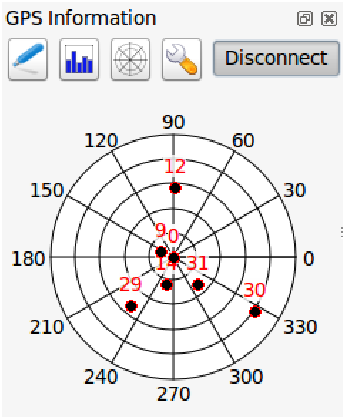

Figure 15.5: GPS tracking polar window

15.2.4 Opiunile GPS

In case of connection problems, you can switch between:

- *Autodetect*
- *Internal*
- *Serial device*
- *gpsd* (selecting the Host, Port and Device your GPS is connected to)

Un nou clic pe **[Connect]** iniiază conectarea la receptorul GPS.

You can activate *Automatically save added features* when you are in editing mode. Or you can activate *Automatically add points* to the map canvas with a certain width and color.

Activating *Cursor*, you can use a slider to shrink and grow the position cursor on the canvas.

Activating *Map centering* allows you to decide in which way the canvas will be updated. This includes 'always', 'when leaving', if your recorded coordinates start to move out of the canvas, or 'never', to keep map extent.

Finally, you can activate *Log file* and define a path and a file where log messages about the GPS tracking are logged.

If you want to set a feature manually, you have to go back to Position and click on **[Add Point]** or **[Add track point]**.

15.2.5 Conectaare la un GPS Bluetooth pentru urmărirea în direct a poziiei

With QGIS you can connect a Bluetooth GPS for field data collection. To perform this task you need a GPS Bluetooth device and a Bluetooth receiver on your computer.

At first you must let your GPS device be recognized and paired to the computer. Turn on the GPS, go to the Bluetooth icon on your notification area and search for a New Device.

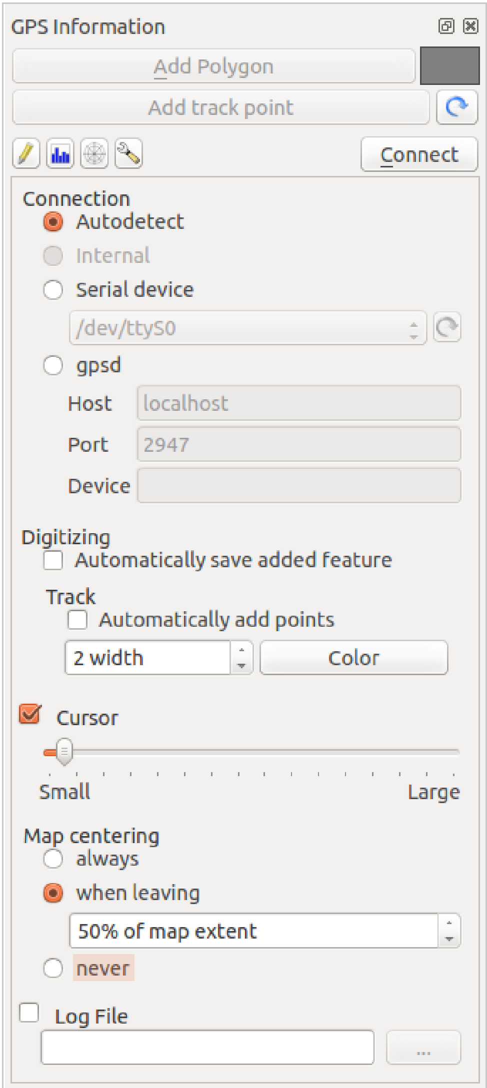

Figure 15.6: GPS tracking options window

On the right side of the Device selection mask make sure that all devices are selected so your GPS unit will probably appear among those available. In the next step a serial connection service should be available, select it and click on **[Configure]** button.

Reinei numărul portului COM atribuit conexiunii GPS, după cum rezultă din proprietăile Bluetooth.

After the GPS has been recognized, make the pairing for the connection. Usually the autorization code is `0000`.

Now open *GPS information* panel and switch to GPS options screen. Select the COM port assigned to the GPS connection and click the **[Connect]**. After a while a cursor indicating your position should appear.

If QGIS can't receive GPS data, then you should restart your GPS device, wait 5-10 seconds then try to connect again. Usually this solution work. If you receive again a connection error make sure you don't have another Bluetooth receiver near you, paired with the same GPS unit.

15.2.6 Folosirea GPSMAP 60cs

MS Windows

Cel mai simplu mod de lucru constă în utilizarea unui middleware (gratuit, dar fără sursă deschisă), denumit GpsGate.

Launch the program, make it scan for GPS devices (works for both USB and BT ones) and then in QGIS just click **[Connect]** in the Live tracking panel using the *Autodetect* mode.

Ubuntu/Mint GNU/Linux

As for Windows the easiest way is to use a server in the middle, in this case GPSD, so

```
sudo apt-get install gpsd
```

Apoi, încărcai nucleul `garmin_gps`

```
sudo modprobe garmin_gps
```

And then connect the unit. Then check with `dmesg` the actual device being used bu the unit, for example `/dev/ttyUSB0`. Now you can launch gpsd

```
gpsd /dev/ttyUSB0
```

i, la final, conectai-va la instrumentul de urmărire în direct din QGIS.

15.2.7 Folosirea datalogger-ului BTGP-38KM (doar Bluetooth)

Folosirea GPSD (în Linux) sau GPSGate (în Windows) se face fără efort.

15.2.8 Folosirea datalogger-ului BlueMax GPS-4044 (atât BT cât i USB)

MS Windows

The live tracking works for both USB and BT modes, by using GPSGate or even without it, just use the *Autodetect* mode, or point the tool the right port.

Ubuntu/Mint GNU/Linux

Pentru USB

The live tracking works both with GPSD

```
gpsd /dev/ttyACM3
```

or without it, by connecting the QGIS live tracking tool directly to the device (for example `/dev/ttyACM3`).

Pentru Bluetooth

The live tracking works both with GPSD

```
gpsd /dev/rfcomm0
```

or without it, by connecting the QGIS live tracking tool directly to the device (for example `/dev/rfcomm0`).

.

Integrarea GRASS GIS

The GRASS plugin provides access to GRASS GIS databases and functionalities (see GRASS-PROJECT in *Literatură i Referine Web*). This includes visualizing GRASS raster and vector layers, digitizing vector layers, editing vector attributes, creating new vector layers and analysing GRASS 2-D and 3-D data with more than 400 GRASS modules.

In this section, we'll introduce the plugin functionalities and give some examples of managing and working with GRASS data. The following main features are provided with the toolbar menu when you start the GRASS plugin, as described in section sec_starting_grass:

- Open mapset
- New mapset
- Close mapset
- Add GRASS vector layer
- Add GRASS raster layer
- Create new GRASS vector
- Edit GRASS vector layer
- Open GRASS tools
- Display current GRASS region
- Edit current GRASS region

16.1 Startarea plugin-ului GRASS

To use GRASS functionalities and/or visualize GRASS vector and raster layers in QGIS, you must select and load the GRASS plugin with the Plugin Manager. Therefore, go to the menu *Plugins* → *Manage Plugins*, select *GRASS* and click **[OK]**.

You can now start loading raster and vector layers from an existing GRASS `LOCATION` (see section sec_load_grassdata). Or, you can create a new GRASS `LOCATION` with QGIS (see section *Crearea unei noi LOCAII GRASS*) and import some raster and vector data (see section *Importai datele într-o LOCAIE GRASS*) for further analysis with the GRASS Toolbox (see section *Bara de instrumente GRASS*).

16.2 Încărcarea straturilor raster i vectoriale GRASS

With the GRASS plugin, you can load vector or raster layers using the appropriate button on the toolbar menu. As an example, we will use the QGIS Alaska dataset (see section *Date eantion*). It includes a small sample GRASS `LOCATION` with three vector layers and one raster elevation map.

1. Create a new folder called `grassdata`, download the QGIS 'Alaska' dataset `qgis_sample_data.zip` from http://download.osgeo.org/qgis/data/ and unzip the file into `grassdata`.
2. Start QGIS.
3. If not already done in a previous QGIS session, load the GRASS plugin clicking on *Plugins* → *Manage Plugins* and activate *GRASS*. The GRASS toolbar appears in the QGIS main window.
4. In the GRASS toolbar, click the Open mapset icon to bring up the *MAPSET* wizard.
5. For `Gisdbase`, browse and select or enter the path to the newly created folder `grassdata`.
6. You should now be able to select the *LOCATION* `alaska` and the *MAPSET* `demo`.
7. Click **[OK]**. Notice that some previously disabled tools in the GRASS toolbar are now enabled.
8. Click on Add GRASS raster layer, choose the map name `gtopo30` and click **[OK]**. The elevation layer will be visualized.
9. Click on Add GRASS vector layer, choose the map name `alaska` and click **[OK]**. The Alaska boundary vector layer will be overlayed on top of the `gtopo30` map. You can now adapt the layer properties as described in chapter *Dialogul Proprietăilor Vectoriale* (e.g., change opacity, fill and outline color).
10. Also load the other two vector layers, `rivers` and `airports`, and adapt their properties.

As you see, it is very simple to load GRASS raster and vector layers in QGIS. See the following sections for editing GRASS data and creating a new `LOCATION`. More sample GRASS `LOCATIONs` are available at the GRASS website at http://grass.osgeo.org/download/sample-data/.

Tip: Încărcarea Datelor GRASS

If you have problems loading data or QGIS terminates abnormally, check to make sure you have loaded the GRASS plugin properly as described in section *Startarea plugin-ului GRASS*.

16.3 GRASS LOCATION i MAPSET

GRASS data are stored in a directory referred to as GISDBASE. This directory, often called `grassdata`, must be created before you start working with the GRASS plugin in QGIS. Within this directory, the GRASS GIS data are organized by projects stored in subdirectories called `LOCATIONs`. Each `LOCATION` is defined by its coordinate system, map projection and geographical boundaries. Each `LOCATION` can have several `MAPSETs` (subdirectories of the `LOCATION`) that are used to subdivide the project into different topics or subregions, or as workspaces for individual team members (see Neteler & Mitasova 2008 in *Literatură i Referine Web*). In order to analyze vector and raster layers with GRASS modules, you must import them into a GRASS `LOCATION`. (This is not strictly true – with the GRASS modules `r.external` and `v.external` you can create read-only links to external GDAL/OGR-supported datasets without importing them. But because this is not the usual way for beginners to work with GRASS, this functionality will not be described here.)

16.3.1 Crearea unei noi LOCAII GRASS

As an example, here is how the sample GRASS `LOCATION alaska`, which is projected in Albers Equal Area projection with unit feet was created for the QGIS sample dataset. This sample GRASS `LOCATION alaska`

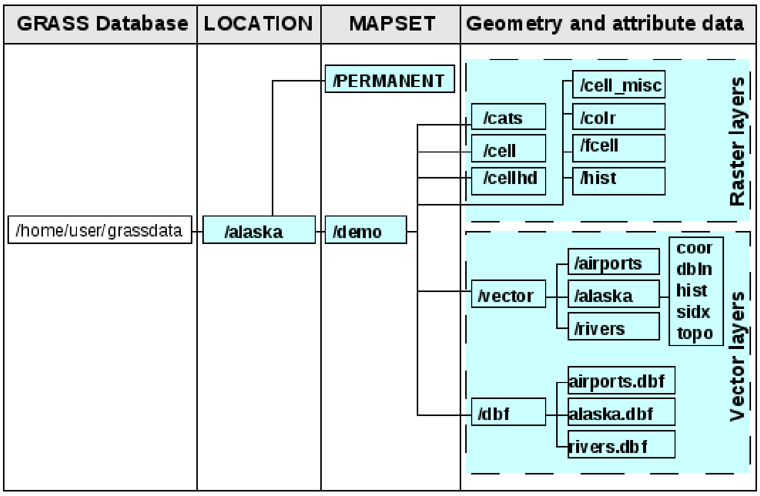

Figure 16.1: Datele GRASS din LOCAIA alaska

will be used for all examples and exercises in the following GRASS-related sections. It is useful to download and install the dataset on your computer (see *Date eantion*).

1. Start QGIS and make sure the GRASS plugin is loaded.
2. Visualize the `alaska.shp` shapefile (see section *Loading a Shapefile*) from the QGIS Alaska dataset (see *Date eantion*).
3. In the GRASS toolbar, click on the New mapset icon to bring up the *MAPSET* wizard.
4. Selectai dosarul `grassdata`, unei baze de date existente GRASS (GISDBASE) sau creai unul pentru noua `LOCAIE` folosind un manager de fiiere de pe computerul dvs. Apoi facei clic pe **[Next]**.
5. We can use this wizard to create a new `MAPSET` within an existing `LOCATION` (see section *Adăugarea unui nou MAPSET*) or to create a new `LOCATION` altogether. Select *Create new location* (see figure_grass_location_2).
6. Introducei un nume pentru `LOCATION` – vom folosi 'alaska' – apoi facei clic pe **[Next]**.
7. Define the projection by clicking on the radio button *Projection* to enable the projection list.
8. We are using Albers Equal Area Alaska (feet) projection. Since we happen to know that it is represented by the EPSG ID 2964, we enter it in the search box. (Note: If you want to repeat this process for another `LOCATION` and projection and haven't memorized the EPSG ID, click on the CRS Status icon in the lower right-hand corner of the status bar (see section *Lucrul cu Proiecii*)).
9. În *Filtrul*, inserai 2964 pentru a selecta proiecia.
10. Clic pe **[Next]**.
11. To define the default region, we have to enter the `LOCATION` bounds in the north, south, east, and west directions. Here, we simply click on the button **[Set current |qg| extent]**, to apply the extent of the loaded layer `alaska.shp` as the GRASS default region extent.
12. Clic pe **[Next]**.
13. We also need to define a `MAPSET` within our new `LOCATION` (this is necessary when creating a new `LOCATION`). You can name it whatever you like - we used 'demo'. GRASS automatically creates a special `MAPSET` called `PERMANENT`, designed to store the core data for the project, its default spatial extent and coordinate system definitions (see Neteler & Mitasova 2008 in *Literatură i Referine Web*).
14. Verificai rezumatul pentru a vă asigura că este corect, apoi facei clic pe **[Finish]**.
15. Sunt create noua `LOCAIE`, 'alaska', i două `SETURI DE HĂRI`, 'demo' i 'PERMANENT'. Setul deschis în mod curent este 'demo', aa cum a l-ai definit.

16. Observai că unele instrumente din bara de instrumente GRASS, dezactivate anterior, sunt acum activate.

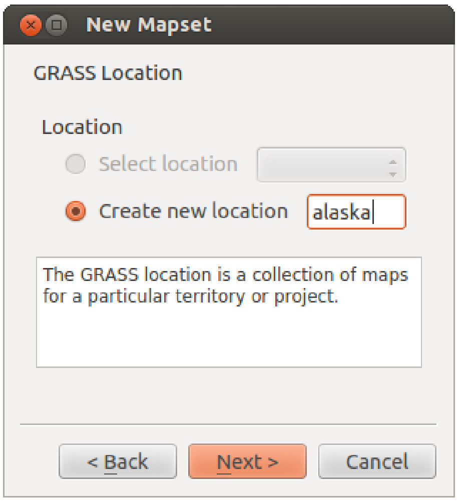

Figure 16.2: Creating a new GRASS LOCATION or a new MAPSET in QGIS

If that seemed like a lot of steps, it's really not all that bad and a very quick way to create a `LOCATION`. The `LOCATION` 'alaska' is now ready for data import (see section *Importai datele într-o LOCAIE GRASS*). You can also use the already-existing vector and raster data in the sample GRASS `LOCATION` 'alaska', included in the QGIS 'Alaska' dataset *Date eantion*, and move on to section *Modelul de date vectoriale GRASS*.

16.3.2 Adăugarea unui nou MAPSET

A user has write access only to a GRASS `MAPSET` he or she created. This means that besides access to your own `MAPSET`, you can read maps in other users' `MAPSETs` (and they can read yours), but you can modify or remove only the maps in your own `MAPSET`.

All `MAPSETs` include a `WIND` file that stores the current boundary coordinate values and the currently selected raster resolution (see Neteler & Mitasova 2008 in *Literatură i Referine Web*, and section *Regiunea instrumentelor GRASS*).

1. Start QGIS and make sure the GRASS plugin is loaded.
2. In the GRASS toolbar, click on the New mapset icon to bring up the *MAPSET* wizard.
3. Selectai folderul `grassdata` al bazei de date GRASS (GISDBASE) cu locaia `LOCATION` 'alaska', în care dorim să adăugăm un nou set de hări denumit 'test'.
4. Clic pe **[Next]**.
5. We can use this wizard to create a new `MAPSET` within an existing `LOCATION` or to create a new `LOCATION` altogether. Click on the radio button *Select location* (see figure_grass_location_2) and click **[Next]**.
6. Introducei denumirea `text` pentru noul `Set de Hări`. În jos ferestrei se poate vedea lista `Seturilor de Hări` existente, precum i proprietarii afereni.
7. Clic pe **[Next]**, verificai rezumatul, pentru a vă asigura că este corect, apoi facei clic pe **[Finish]**.

16.4 Importai datele într-o LOCAIE GRASS

This section gives an example of how to import raster and vector data into the 'alaska' GRASS `LOCATION` provided by the QGIS 'Alaska' dataset. Therefore, we use the landcover raster map `landcover.img` and the vector GML file `lakes.gml` from the QGIS 'Alaska' dataset (see *Date eantion*).

1. Start QGIS and make sure the GRASS plugin is loaded.
2. In the GRASS toolbar, click the Open MAPSET icon to bring up the *MAPSET* wizard.
3. Select as GRASS database the folder `grassdata` in the QGIS Alaska dataset, as `LOCATION` 'alaska', as `MAPSET` 'demo' and click **[OK]**.
4. Now click the Open GRASS tools icon. The GRASS Toolbox (see section *Bara de instrumente GRASS*) dialog appears.
5. To import the raster map `landcover.img`, click the module `r.in.gdal` in the *Modules Tree* tab. This GRASS module allows you to import GDAL-supported raster files into a GRASS `LOCATION`. The module dialog for `r.in.gdal` appears.
6. Browse to the folder `raster` in the QGIS 'Alaska' dataset and select the file `landcover.img`.
7. As raster output name, define `landcover_grass` and click **[Run]**. In the *Output* tab, you see the currently running GRASS command `r.in.gdal -o input=/path/to/landcover.img output=landcover_grass`.
8. When it says **Succesfully finished**, click **[View output]**. The `landcover_grass` raster layer is now imported into GRASS and will be visualized in the QGIS canvas.
9. To import the vector GML file `lakes.gml`, click the module `v.in.ogr` in the *Modules Tree* tab. This GRASS module allows you to import OGR-supported vector files into a GRASS `LOCATION`. The module dialog for `v.in.ogr` appears.
10. Browse to the folder `gml` in the QGIS 'Alaska' dataset and select the file `lakes.gml` as OGR file.
11. As vector output name, define `lakes_grass` and click **[Run]**. You don't have to care about the other options in this example. In the *Output* tab you see the currently running GRASS command `v.in.ogr -o dsn=/path/to/lakes.gml output=lakes\_grass`.
12. When it says **Succesfully finished**, click **[View output]**. The `lakes_grass` vector layer is now imported into GRASS and will be visualized in the QGIS canvas.

16.5 Modelul de date vectoriale GRASS

It is important to understand the GRASS vector data model prior to digitizing.

In general, GRASS uses a topological vector model.

This means that areas are not represented as closed polygons, but by one or more boundaries. A boundary between two adjacent areas is digitized only once, and it is shared by both areas. Boundaries must be connected and closed without gaps. An area is identified (and labeled) by the **centroid** of the area.

Besides boundaries and centroids, a vector map can also contain points and lines. All these geometry elements can be mixed in one vector and will be represented in different so-called 'layers' inside one GRASS vector map. So in GRASS, a layer is not a vector or raster map but a level inside a vector layer. This is important to distinguish carefully. (Although it is possible to mix geometry elements, it is unusual and, even in GRASS, only used in special cases such as vector network analysis. Normally, you should prefer to store different geometry elements in different layers.)

It is possible to store several 'layers' in one vector dataset. For example, fields, forests and lakes can be stored in one vector. An adjacent forest and lake can share the same boundary, but they have separate attribute tables. It is also possible to attach attributes to boundaries. An example might be the case where the boundary between a lake and a forest is a road, so it can have a different attribute table.

The 'layer' of the feature is defined by the 'layer' inside GRASS. 'Layer' is the number which defines if there is more than one layer inside the dataset (e.g., if the geometry is forest or lake). For now, it can be only a number. In the future, GRASS will also support names as fields in the user interface.

Attributes can be stored inside the GRASS `LOCATION` as dBase or SQLite3 or in external database tables, for example, PostgreSQL, MySQL, Oracle, etc.

Atributele din tabelele bazei de date sunt legate de elementele geometrice printr-o valoare de ‘categorie’.

‘Categoria’ (key, ID) este un număr întreg ataat primitivelor geometrice, fiind folosită ca legătură către o coloană cheie, din tabelul bazei de date.

Tip: Înelegerea modelului de date vectoriale GRASS

Cel mai bun mod de a învăa despre modelul vectorial GRASS i despre capabilităile sale, este de a descărca unul dintre multe tutoriale GRASS în care modelul vectorial este descris în profunzime. Vizitai http://grass.osgeo.org/documentation/manuals/ pentru informaii suplimentare, cări i tutoriale în diverse limbi.

16.6 Crearea unui nou strat vectorial GRASS

To create a new GRASS vector layer with the GRASS plugin, click the Create new GRASS vector toolbar icon. Enter a name in the text box, and you can start digitizing point, line or polygon geometries following the procedure described in section *Digitizarea i editarea unui strat vectorial GRASS*.

In GRASS, it is possible to organize all sorts of geometry types (point, line and area) in one layer, because GRASS uses a topological vector model, so you don’t need to select the geometry type when creating a new GRASS vector. This is different from shapefile creation with QGIS, because shapefiles use the Simple Feature vector model (see section *Crearea noillor straturi Vectoriale*).

Tip: Creating an attribute table for a new GRASS vector layer

If you want to assign attributes to your digitized geometry features, make sure to create an attribute table with columns before you start digitizing (see figure_grass_digitizing_5).

16.7 Digitizarea i editarea unui strat vectorial GRASS

The digitizing tools for GRASS vector layers are accessed using the Edit GRASS vector layer icon on the toolbar. Make sure you have loaded a GRASS vector and it is the selected layer in the legend before clicking on the edit tool. Figure figure_grass_digitizing_2 shows the GRASS edit dialog that is displayed when you click on the edit tool. The tools and settings are discussed in the following sections.

Tip: Digitizarea poligoanelor în GRASS

If you want to create a polygon in GRASS, you first digitize the boundary of the polygon, setting the mode to ‘No category’. Then you add a centroid (label point) into the closed boundary, setting the mode to ‘Next not used’. The reason for this is that a topological vector model links the attribute information of a polygon always to the centroid and not to the boundary.

Bara de Instrumente

In figure_grass_digitizing_1, you see the GRASS digitizing toolbar icons provided by the GRASS plugin. Table table_grass_digitizing_1 explains the available functionalities.

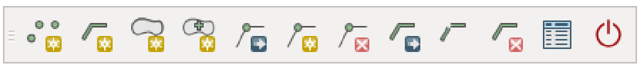

Figure 16.3: GRASS Digitizing Toolbar

Pic-togramă	Instrument	Scop
	Punct Nou	Digitizare punct nou
	Linie nouă	Digitizare linie nouă
	Limită Nouă	Digitize new boundary (finish by selecting new tool)
	Centroid Nou	Digitizarea unui nou centroid (etichetarea zonei existente)
	Move vertex	Move one vertex of existing line or boundary and identify new position
	Add vertex	Add a new vertex to existing line
	Delete vertex	Delete vertex from existing line (confirm selected vertex by another click)
	Move element	Move selected boundary, line, point or centroid and click on new position
	Split line	Split an existing line into two parts
	Delete element	Delete existing boundary, line, point or centroid (confirm selected element by another click)
	Edit attributes	Edit attributes of selected element (note that one element can represent more features, see above)
	Close	Close session and save current status (rebuilds topology afterwards)

Tabela 1 de Digitizare GRASS: Insrtrumente de Digitizare GRASS

Category Tab

The *Category* tab allows you to define the way in which the category values will be assigned to a new geometry element.

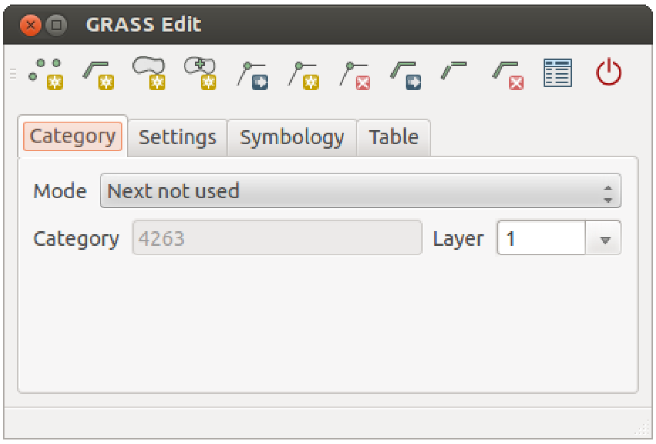

Figure 16.4: GRASS Digitizing Category Tab

- **Mode**: The category value that will be applied to new geometry elements.
  - Next not used - Apply next not yet used category value to geometry element.
  - Manual entry - Manually define the category value for the geometry element in the 'Category' entry field.
  - No category - Do not apply a category value to the geometry element. This is used, for instance, for area boundaries, because the category values are connected via the centroid.

- **Category** - The number (ID) that is attached to each digitized geometry element. It is used to connect each geometry element with its attributes.
- **Field (layer)** - Each geometry element can be connected with several attribute tables using different GRASS geometry layers. The default layer number is 1.

Tip: Creating an additional GRASS 'layer' with |qg|

If you would like to add more layers to your dataset, just add a new number in the 'Field (layer)' entry box and press return. In the Table tab, you can create your new table connected to your new layer.

Settings Tab

The *Settings* tab allows you to set the snapping in screen pixels. The threshold defines at what distance new points or line ends are snapped to existing nodes. This helps to prevent gaps or dangles between boundaries. The default is set to 10 pixels.

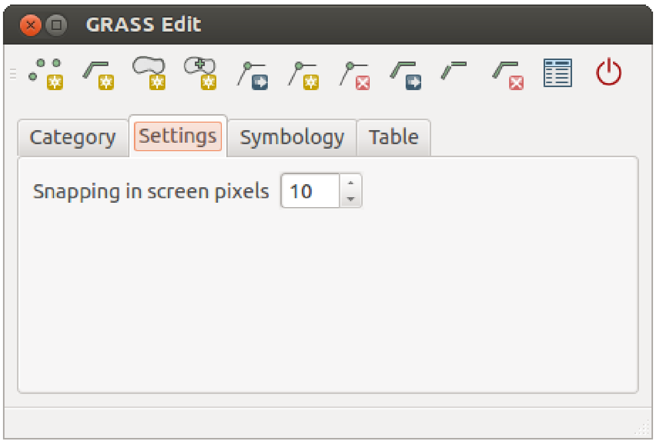

Figure 16.5: GRASS Digitizing Settings Tab

Symbology Tab

The *Symbology* tab allows you to view and set symbology and color settings for various geometry types and their topological status (e.g., closed / opened boundary).

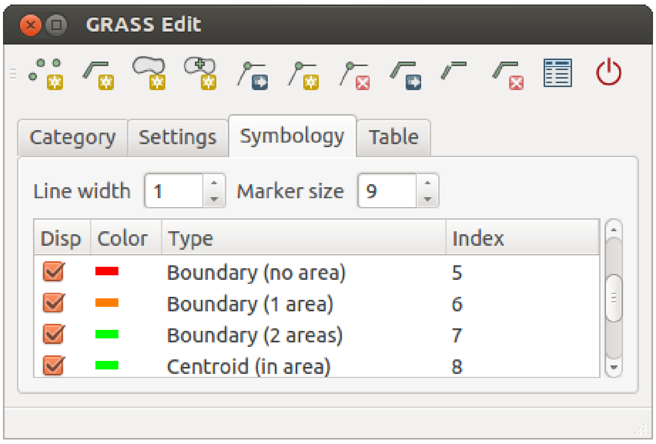

Figure 16.6: GRASS Digitizing Symbology Tab

Table Tab

The *Table* tab provides information about the database table for a given 'layer'. Here, you can add new columns to an existing attribute table, or create a new database table for a new GRASS vector layer (see section *Crearea unui nou strat vectorial GRASS*).

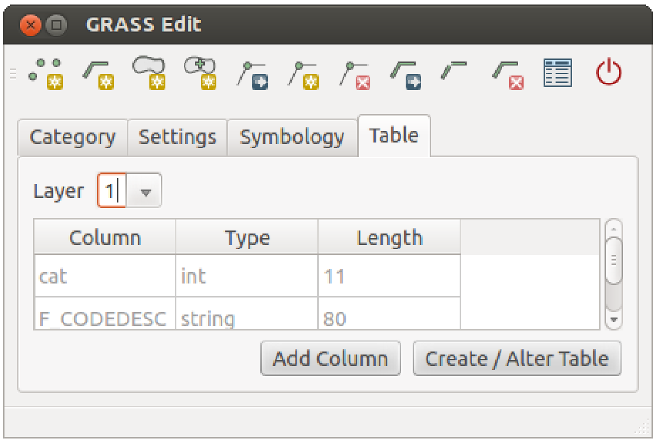

Figure 16.7: GRASS Digitizing Table Tab

Tip: Permisiuni de Editare GRASS

Trebuie să fii proprietarul `SETULUI DE HĂRI` GRASS, pentru a-l putea edita. Este imposibilă editarea datelor din straturile `SETULUI DE HĂRI` care nu vă aparine, chiar dacă avei permisiunea de scriere.

16.8 Regiunea instrumentelor GRASS

The region definition (setting a spatial working window) in GRASS is important for working with raster layers. Vector analysis is by default not limited to any defined region definitions. But all newly created rasters will have the spatial extension and resolution of the currently defined GRASS region, regardless of their original extension and resolution. The current GRASS region is stored in the `$LOCATION/$MAPSET/WIND` file, and it defines north, south, east and west bounds, number of columns and rows, horizontal and vertical spatial resolution.

It is possible to switch on and off the visualization of the GRASS region in the QGIS canvas using the Display current GRASS region button.

With the Edit current GRASS region icon, you can open a dialog to change the current region and the symbology of the GRASS region rectangle in the QGIS canvas. Type in the new region bounds and resolution, and click **[OK]**. The dialog also allows you to select a new region interactively with your mouse on the QGIS canvas. Therefore, click with the left mouse button in the QGIS canvas, open a rectangle, close it using the left mouse button again and click **[OK]**.

The GRASS module `g.region` provides a lot more parameters to define an appropriate region extent and resolution for your raster analysis. You can use these parameters with the GRASS Toolbox, described in section *Bara de instrumente GRASS*.

16.9 Bara de instrumente GRASS

The Open GRASS Tools box provides GRASS module functionalities to work with data inside a selected GRASS `LOCATION` and `MAPSET`. To use the GRASS Toolbox you need to open a `LOCATION` and `MAPSET` that you have write permission for (usually granted, if you created the `MAPSET`). This is necessary, because new raster or vector layers created during analysis need to be written to the currently selected `LOCATION` and `MAPSET`.

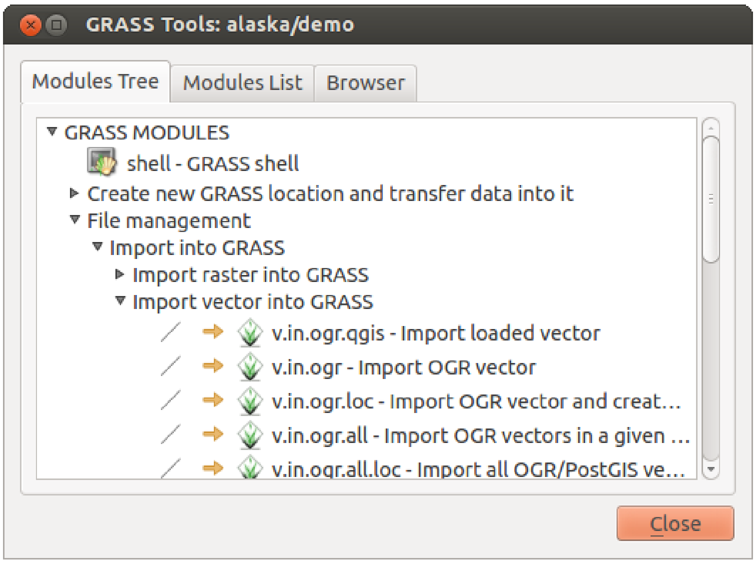

Figure 16.8: Bara de Instrumente i Arborele Modulelor GRASS

16.9.1 Lucrul cu modulele GRASS

The GRASS shell inside the GRASS Toolbox provides access to almost all (more than 300) GRASS modules in a command line interface. To offer a more user-friendly working environment, about 200 of the available GRASS modules and functionalities are also provided by graphical dialogs within the GRASS plugin Toolbox.

A complete list of GRASS modules available in the graphical Toolbox in QGIS version 2.8 is available in the GRASS wiki at http://grass.osgeo.org/wiki/GRASS-QGIS_relevant_module_list.

De asemenea, este posibilă personalizarea coninutul Instrumentarului GRASS. Această procedură este descrisă în seciunea *Personalizarea Barei de Instrumente GRASS*.

As shown in figure_grass_toolbox_1, you can look for the appropriate GRASS module using the thematically grouped *Modules Tree* or the searchable *Modules List* tab.

By clicking on a graphical module icon, a new tab will be added to the Toolbox dialog, providing three new sub-tabs: *Options*, *Output* and *Manual*.

Opiuni

The *Options* tab provides a simplified module dialog where you can usually select a raster or vector layer visualized in the QGIS canvas and enter further module-specific parameters to run the module.

The provided module parameters are often not complete to keep the dialog clear. If you want to use further module parameters and flags, you need to start the GRASS shell and run the module in the command line.

A new feature since QGIS 1.8 is the support for a *Show Advanced Options* button below the simplified module dialog in the *Options* tab. At the moment, it is only added to the module `v.in.ascii` as an example of use, but it will probably be part of more or all modules in the GRASS Toolbox in future versions of QGIS. This allows you to use the complete GRASS module options without the need to switch to the GRASS shell.

Rezultat

Fila *Rezultatelor* oferă informaii despre starea de ieire a modulului. Când facei clic pe butonul **[Run]**, modulul comută la fila *Rezultatelor* tab, apoi vei vedea informaii despre procesul de analiză. Dacă totul funcionează bine, vei vedea în cele din urmă un mesaj de `Definitivare cu succes`.

Manual

The *Manual* tab shows the HTML help page of the GRASS module. You can use it to check further module parameters and flags or to get a deeper knowledge about the purpose of the module. At the end of each module manual page, you see further links to the `Main Help index`, the `Thematic index` and the `Full index`. These links provide the same information as the module `g.manual`.

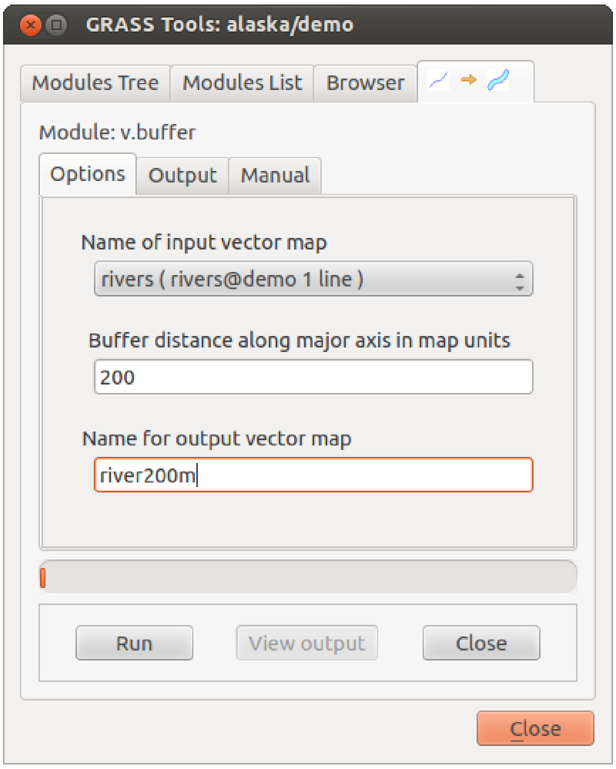

Figure 16.9: Opiunile Bării de Instrumente i a Arborelui Modulelor GRASS

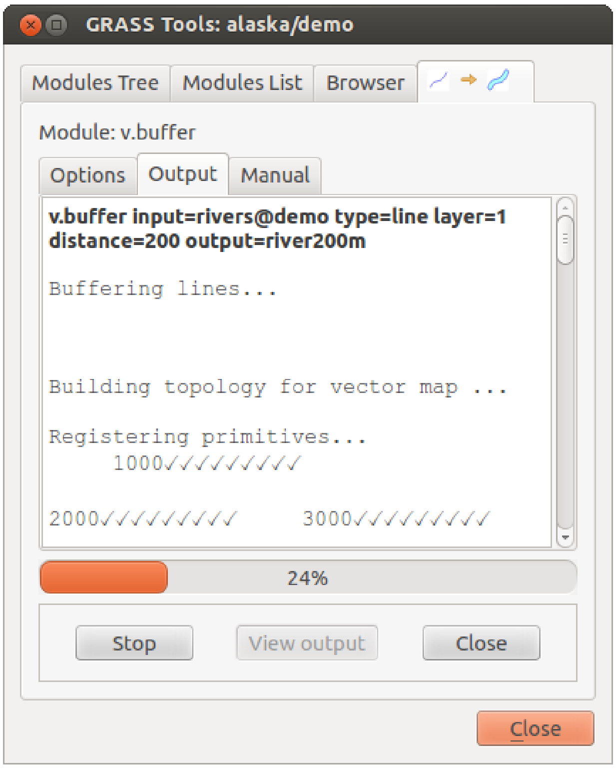

Figure 16.10: Rezultatul Bării de Instrumente i a Arborelui Modulelor GRASS

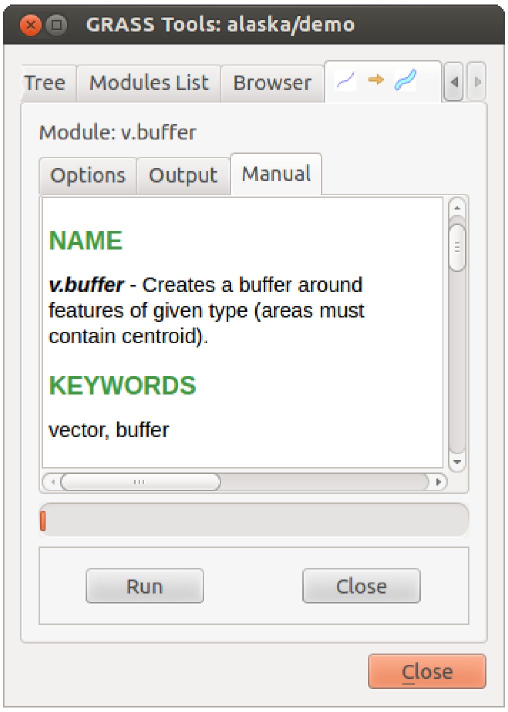

Figure 16.11: Manualul Bării de Instrumente i a Arborelui Modulelor GRASS

Tip: Afiează imediat rezultatele

Dacă dorii să afiai imediat rezultatele calculelor dvs în canevasul hării, putei folosi butonul 'Vizualizare Output', din partea de jos a filei modulului.

16.9.2 Exemple de module GRASS

Următoarele exemple vor demonstra puterea unora dintre modulele GRASS.

Crearea curbelor de nivel

The first example creates a vector contour map from an elevation raster (DEM). Here, it is assumed that you have the Alaska `LOCATION` set up as explained in section *Importai datele într-o LOCAIE GRASS*.

- First, open the location by clicking the Open mapset button and choosing the Alaska location.
- Now load the `gtopo30` elevation raster by clicking Add GRASS raster layer and selecting the `gtopo30` raster from the demo location.
- Now open the Toolbox with the Open GRASS tools button.
- În lista de de unelte pentru categorii, facei dublu-clic pe *Raster* → *Surface Management* → *Generate vector contour lines*.
- Now a single click on the tool **r.contour** will open the tool dialog as explained above (see *Lucrul cu modulele GRASS*). The `gtopo30` raster should appear as the *Name of input raster*.
- Type into the *Increment between Contour levels* 1,00 the value 100. (This will create contour lines at intervals of 100 meters.)
- Introducei în *Name for output vector map 'numele ''ctour_100'*.

- Facei clic pe **[Run]** pentru a începe procesul. Ateptai câteva momente până când mesajul `Finalizare cu succes` apare în fereastra de ieire. Apoi facei clic pe **[View Output]** i **[Close]**.

Deoarece aceasta este o regiune de mare, va dura ceva timp până la afiare. Dupa ce se termină randarea, putei deschide fereastra de proprietăi ale stratului pentru a schimba culoarea liniei, astfel încât conturul să apară clar pe rasterul de elvaie, la fel ca în *Dialogul Proprietăilor Vectoriale*.

Next, zoom in to a small, mountainous area in the center of Alaska. Zooming in close, you will notice that the contours have sharp corners. GRASS offers the **v.generalize** tool to slightly alter vector maps while keeping their overall shape. The tool uses several different algorithms with different purposes. Some of the algorithms (i.e., Douglas Peuker and Vertex Reduction) simplify the line by removing some of the vertices. The resulting vector will load faster. This process is useful when you have a highly detailed vector, but you are creating a very small-scale map, so the detail is unnecessary.

Tip: Instrumentul de simplificare

Note that the QGIS fTools plugin has a *Simplify geometries* → tool that works just like the GRASS **v.generalize** Douglas-Peuker algorithm.

However, the purpose of this example is different. The contour lines created by `r.contour` have sharp angles that should be smoothed. Among the **v.generalize** algorithms, there is Chaiken's, which does just that (also Hermite splines). Be aware that these algorithms can **add** additional vertices to the vector, causing it to load even more slowly.

- Open the GRASS Toolbox and double-click the categories *Vector* → *Develop map* → *Generalization*, then click on the **v.generalize** module to open its options window.
- Verificai dacă 'ctour_100' apare ca *Nume pentru vectorul de intrare*.
- From the list of algorithms, choose Chaiken's. Leave all other options at their default, and scroll down to the last row to enter in the field *Name for output vector map* 'ctour_100_smooth', and click **[Run]**.
- The process takes several moments. Once `Successfully finished` appears in the output windows, click **[View output]** and then **[Close]**.
- Putei schimba culoarea vectorului pentru a-l afia în mod clar pe fundalul raster, i pentru a contrasta faă de curbele de nivel originale. Vei observa că noile curbe de nivel au coluri mai fine decât originalul, în timp ce urmează fidel forma originală.

Tip: Alte utilizări pentru r.contour

The procedure described above can be used in other equivalent situations. If you have a raster map of precipitation data, for example, then the same method will be used to create a vector map of isohyetal (constant rainfall) lines.

Crearea unui efect 3-D de umbrire

Several methods are used to display elevation layers and give a 3-D effect to maps. The use of contour lines, as shown above, is one popular method often chosen to produce topographic maps. Another way to display a 3-D effect is by hillshading. The hillshade effect is created from a DEM (elevation) raster by first calculating the slope and aspect of each cell, then simulating the sun's position in the sky and giving a reflectance value to each cell. Thus, you get sun-facing slopes lighted; the slopes facing away from the sun (in shadow) are darkened.

- Begin this example by loading the `gtopo30` elevation raster. Start the GRASS Toolbox, and under the Raster category, double-click to open *Spatial analysis* → *Terrain analysis*.
- Apoi facei clic pe **r.shaded.relief** pentru a deschide modulul.
- Change the *azimuth angle* 1,00 270 to 315.
- Introducei `gtopo30_shade` pentru noul raster reliefat, apoi facei clic pe **[Run]**.
- Când procesul se încheie, adăugai hării rasterul reliefat. Ar trebui să-l vedei afiat în tonuri de gri.

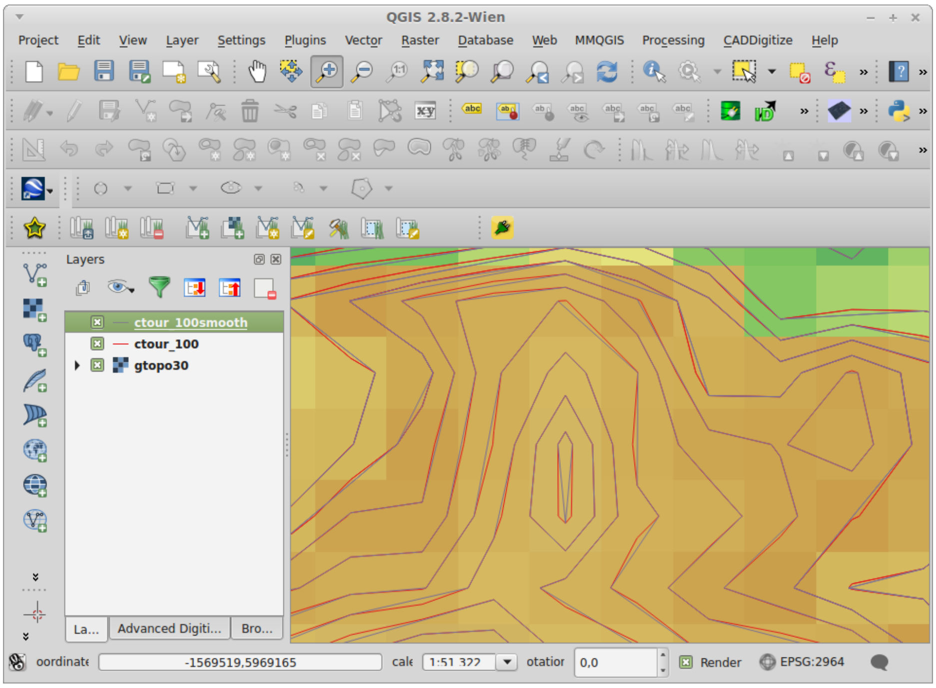

Figure 16.12: Modulul GRASS v.generalize pentru a radina o hartă vectorială

- To view both the hillshading and the colors of the `gtopo30` together, move the hillshade map below the `gtopo30` map in the table of contents, then open the *Properties* window of `gtopo30`, switch to the *Transparency* tab and set its transparency level to about 25%.

Ar trebui să avei acum elevaia `gtopo30` cu harta de cuori i transparena setate **deasupra** hării reliefului, în tonuri de gri. Pentru a observa mai bine efectele vizuale ale reliefării, desetai vizualizarea hării `gtopo30_shade`, apoi resetai-o.

Folosirea consolei GRASS

The GRASS plugin in QGIS is designed for users who are new to GRASS and not familiar with all the modules and options. As such, some modules in the Toolbox do not show all the options available, and some modules do not appear at all. The GRASS shell (or console) gives the user access to those additional GRASS modules that do not appear in the Toolbox tree, and also to some additional options to the modules that are in the Toolbox with the simplest default parameters. This example demonstrates the use of an additional option in the **r.shaded.relief** module that was shown above.

The module **r.shaded.relief** can take a parameter `zmult`, which multiplies the elevation values relative to the X-Y coordinate units so that the hillshade effect is even more pronounced.

- Load the `gtopo30` elevation raster as above, then start the GRASS Toolbox and click on the GRASS shell. In the shell window, type the command `r.shaded.relief map=gtopo30 shade=gtopo30_shade2 azimuth=315 zmult=3` and press **[Enter]**.
- After the process finishes, shift to the *Browse* tab and double-click on the new `gtopo30_shade2` raster to display it in QGIS.
- As explained above, move the shaded relief raster below the `gtopo30` raster in the table of contents, then check the transparency of the colored `gtopo30` layer. You should see that the 3-D effect stands out more strongly compared with the first shaded relief map.

Statistici raster pentru o hartă vectorială

Următorul exemplu arată modul în care un modul din GRASS poate agrega datele rastere, apoi să adauge coloanele de statistici pentru fiecare poligon din harta vectorială.

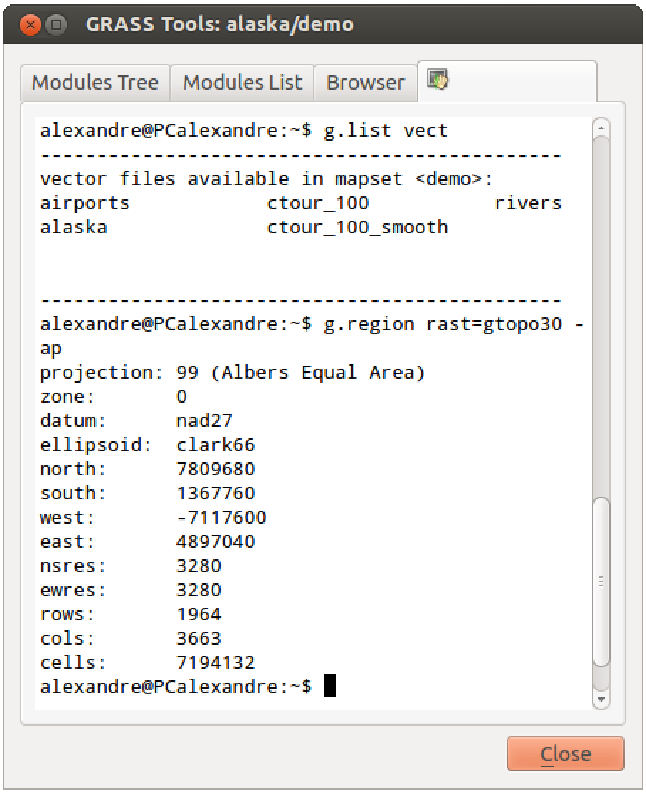

Figure 16.13: Consola GRASS, modulul r.shaded.relief

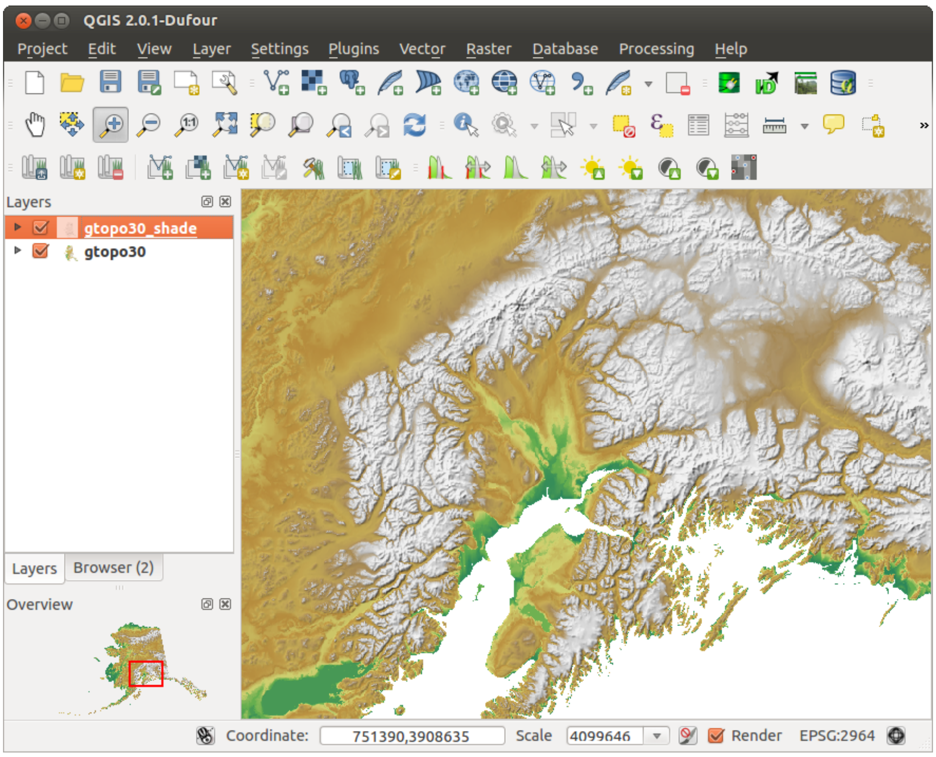

Figure 16.14: Afiează relieful umbrit, creat cu modulul GRASS r.shaded.relief

- Din nou, folosind datele pentru Alaska, referii-vă la *Importai datele într-o LOCAIE GRASS* pentru a importa arborii fiierelor shape din directorul `shapefiles` din GRASS.
- Now an intermediate step is required: centroids must be added to the imported trees map to make it a complete GRASS area vector (including both boundaries and centroids).
- Din Bara de instrumente alegei *Vector* → *Manage features*, apoi deschidei modulul **v.centroids**.
- Introducei 'forest_areas' pentru *output vector map*, apoi rulai modulul.
- Now load the `forest_areas` vector and display the types of forests - deciduous, evergreen, mixed - in different colors: In the layer *Properties* window, *Symbology* tab, choose from *Legend type* 'Unique value' and set the *Classification field* to 'VEGDESC'. (Refer to the explanation of the symbology tab in *Meniul Stilului* of the vector section.)
- Mai departe, redeschidei Bara de instrumente GRASS, apoi deschidei *Vector* → *Vector update* din alte hări.
- Clic pe modulul **v.rast.stats**. Introducei `gtopo30` i `forest_areas`.
- Only one additional parameter is needed: Enter *column prefix* `elev`, and click **[Run]**. This is a computationally heavy operation, which will run for a long time (probably up to two hours).
- Finally, open the `forest_areas` attribute table, and verify that several new columns have been added, including `elev_min`, `elev_max`, `elev_mean`, etc., for each forest polygon.

16.9.3 Working with the GRASS LOCATION browser

Another useful feature inside the GRASS Toolbox is the GRASS `LOCATION` browser. In figure_grass_module_7, you can see the current working `LOCATION` with its `MAPSETs`.

In the left browser windows, you can browse through all `MAPSETs` inside the current `LOCATION`. The right browser window shows some meta-information for selected raster or vector layers (e.g., resolution, bounding box, data source, connected attribute table for vector data, and a command history).

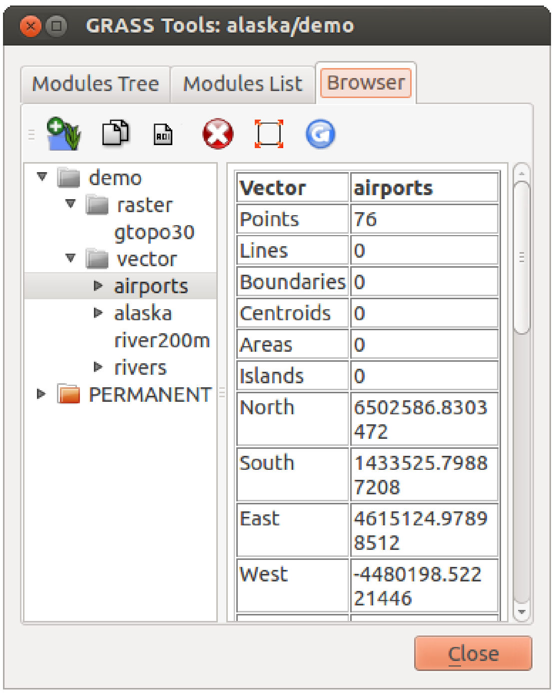

Figure 16.15: GRASS LOCATION browser

The toolbar inside the *Browser* tab offers the following tools to manage the selected `LOCATION`:

- *Add selected map to canvas*

- *Copy selected map*
- *Rename selected map*
- *Delete selected map*
- *Set current region to selected map*
- *Refresh browser window*

The *Rename selected map* and *Delete selected map* only work with maps inside your currently selected `MAPSET`. All other tools also work with raster and vector layers in another `MAPSET`.

16.9.4 Personalizarea Barei de Instrumente GRASS

Nearly all GRASS modules can be added to the GRASS Toolbox. An XML interface is provided to parse the pretty simple XML files that configure the modules' appearance and parameters inside the Toolbox.

Un fiier XML eantion, pentru generarea modulului `v.buffer` (v.buffer.qgm) arată în felul următor:

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE qgisgrassmodule SYSTEM "http://mrcc.com/qgisgrassmodule.dtd">

<qgisgrassmodule label="Vector buffer" module="v.buffer">
        <option key="input" typeoption="type" layeroption="layer" />
        <option key="buffer"/>
        <option key="output" />
</qgisgrassmodule>
```

The parser reads this definition and creates a new tab inside the Toolbox when you select the module. A more detailed description for adding new modules, changing a module's group, etc., can be found on the QGIS wiki at http://hub.qgis.org/projects/quantum-gis/wiki/Adding_New_Tools_to_the_GRASS_Toolbox.

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QGIS processing framework

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17.1 Introducere

This chapter introduces the QGIS processing framework, a geoprocessing environment that can be used to call native and third-party algorithms from QGIS, making your spatial analysis tasks more productive and easy to accomplish.

În următoarele seciuni, vom examina modul de a folosi elementele grafice ale acestui cadru i de a obine mai mult de la fiecare.

There are four basic elements in the framework GUI, which are used to run algorithms for different purposes. Choosing one tool or another will depend on the kind of analysis that is to be performed and the particular characteristics of each user and project. All of them (except for the batch processing interface, which is called from the toolbox, as we will see) can be accessed from the *Processing* menu item. (You will see more than four entries. The remaining ones are not used to execute algorithms and will be explained later in this chapter.)

- Setul de instrumente. Elementul principal al GUI, acesta este utilizat pentru a executa un singur algoritm sau o serie de procese bazate pe acel algoritm.

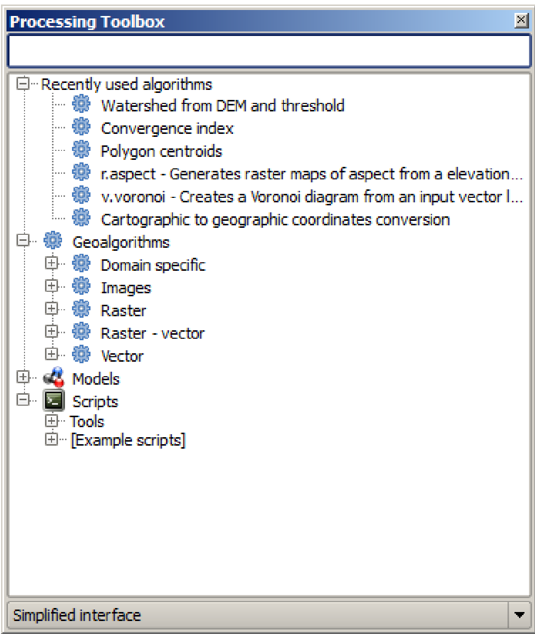

Figure 17.1: Processing Toolbox

- Modelatorul grafic. Mai muli algoritmi pot fi combinai grafic folosind modelatorul, pentru a defini un flux de lucru, i pentru a crea un singur proces care implică mai multe subprocese.

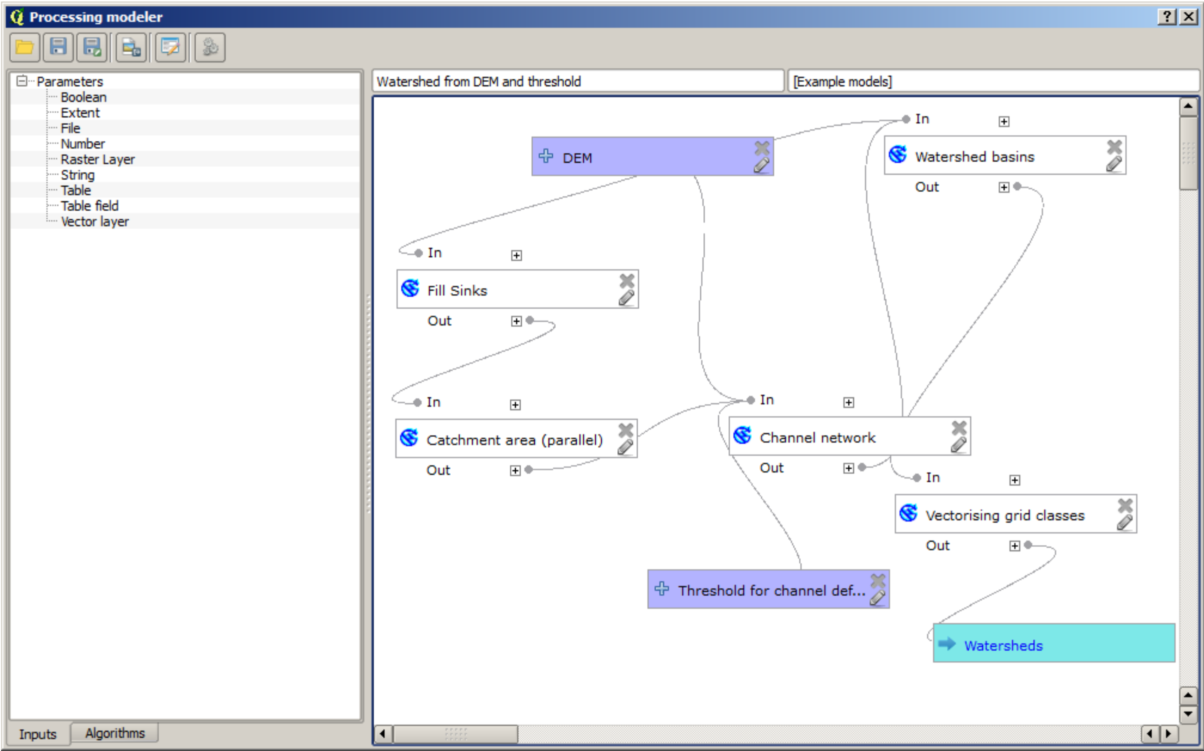

Figure 17.2: Processing Modeler

- Gestionarul istoricului. Toate aciunile realizate, folosind oricare dintre elementele menionate anterior, sunt stocate într-un fiier care poate fi, mai târziu, reprodus cu uurină, cu ajutorul managerului de istoric.
- Interfaa de procesare în serie. Această interfaă vă permite să executai procese în serie i să automatizai execuia unui singur algoritm pe seturi de date multiple.

În următoarele seciuni, vom examina în detaliu fiecare dintre aceste elemente.

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17.2 Instrumentarul

Bara de instrumente este elementul principal al GUI-ului de prelucrare, fiind cel cu care avei cele mai multe anse de a vă întâlni în munca de zi cu zi. Acesta prezintă lista, grupată în diferite blocuri, a tuturor algoritmilor disponibilii, fiind punctul de acces pentru rularea lor, fie ca proces individual, fie ca proces aparinând unei serii, care implică mai multe execuii ale aceluiai algoritm utilizând diferite seturi de intrare.

The toolbox contains all the available algorithms, divided into predefined groups. All these groups are found under a single tree entry named *Geoalgorithms*.

Additionally, two more entries are found, namely *Models* and *Scripts*. These include user-created algorithms, and they allow you to define your own workflows and processing tasks. We will devote a full section to them a bit later.

În partea de sus a setului de instrumente, vei găsi o casetă de text. Pentru a reduce numărul de algoritmi prezentai în caseta de instrumente i pentru a găsi mai uor unul de care avei nevoie, putei introduce orice cuvânt sau o expresie în caseta de text. Observai că, pe măsură ce tastai, numărul de algoritmi din setul de instrumente se reduce doar la acei algoritmi care conin în numele lor textul pe care l-ai introdus.

In the lower part, you will find a box that allows you to switch between the simplified algorithm list (the one explained above) and the advanced list. If you change to the advanced mode, the toolbox will look like this:

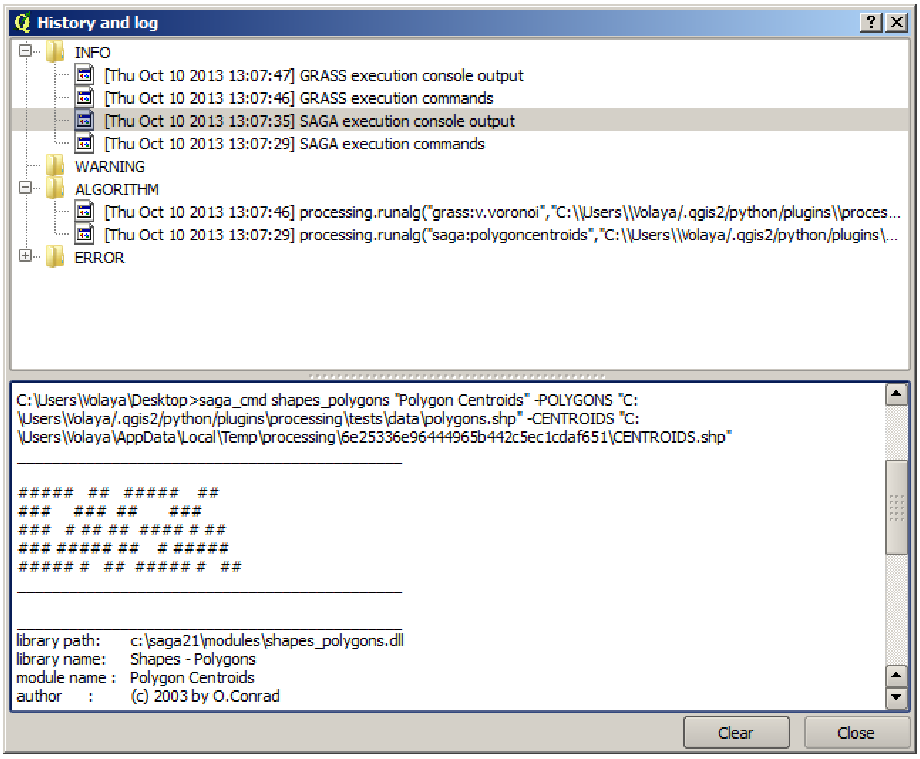

Figure 17.3: Processing History

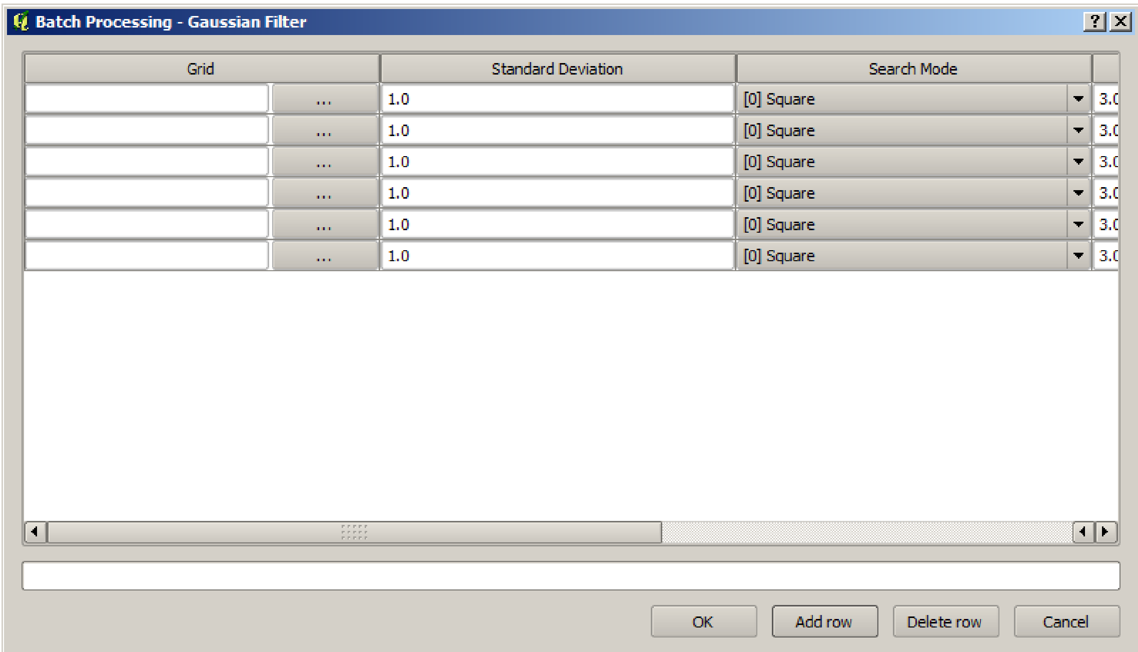

Figure 17.4: Batch Processing interface

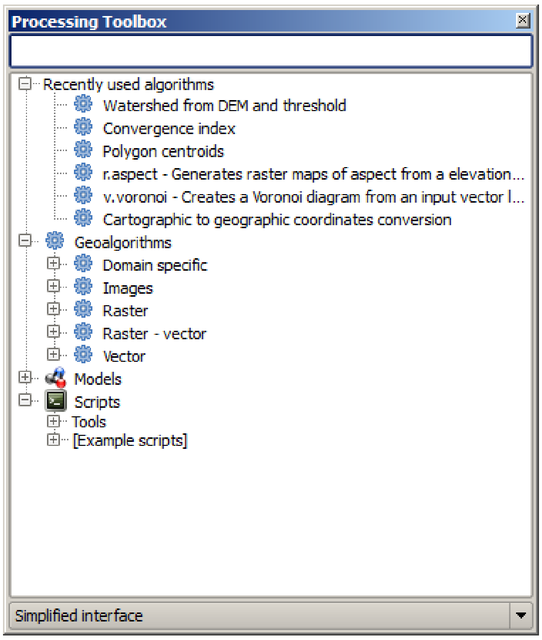

Figure 17.5: Processing Toolbox

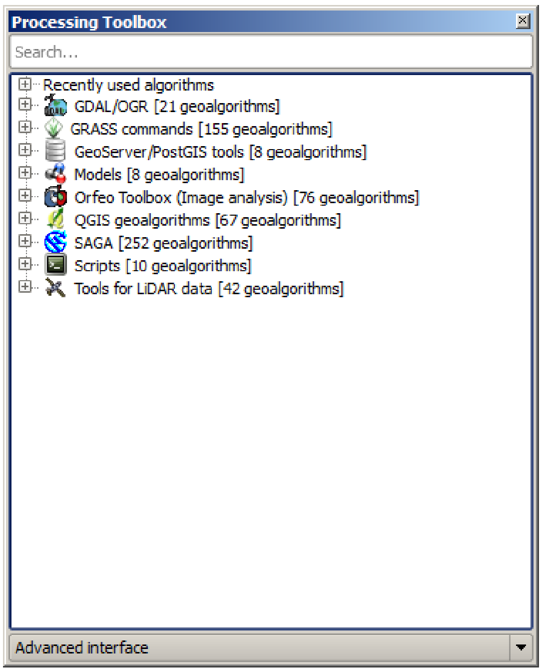

Figure 17.6: Processing Toolbox (advanced mode)

In the advanced view, each group represents a so-called 'algorithm provider', which is a set of algorithms coming from the same source, for instance, from a third-party application with geoprocessing capabilities. Some of these groups represent algorithms from third-party applications like SAGA, GRASS or R, while others contain algorithms directly coded as part of the processing plugin, not relying on any additional software.

This view is recommended to those users who have a certain knowledge of the applications that are backing the algorithms, since they will be shown with their original names and groups.

Also, some additional algorithms are available only in the advanced view, such as LiDAR tools and scripts based on the R statistical computing software, among others. Independent QGIS plugins that add new algorithms to the toolbox will only be shown in the advanced view.

In particular, the simplified view contains algorithms from the following providers:

- GRASS
- SAGA
- OTB
- Native QGIS algorithms

In the case of running QGIS under Windows, these algorithms are fully-functional in a fresh installation of QGIS, and they can be run without requiring any additional installation. Also, running them requires no prior knowledge of the external applications they use, making them more accesible for first-time users.

If you want to use an algorithm not provided by any of the above providers, switch to the advanced mode by selecting the corresponding option at the bottom of the toolbox.

Pentru a executa un algoritm, este suficient să facei dublu-clic pe numele său, în bara de instrumente.

17.2.1 Dialogul algoritmului

Once you double-click on the name of the algorithm that you want to execute, a dialog similar to that in the figure below is shown (in this case, the dialog corresponds to the SAGA 'Convergence index' algorithm).

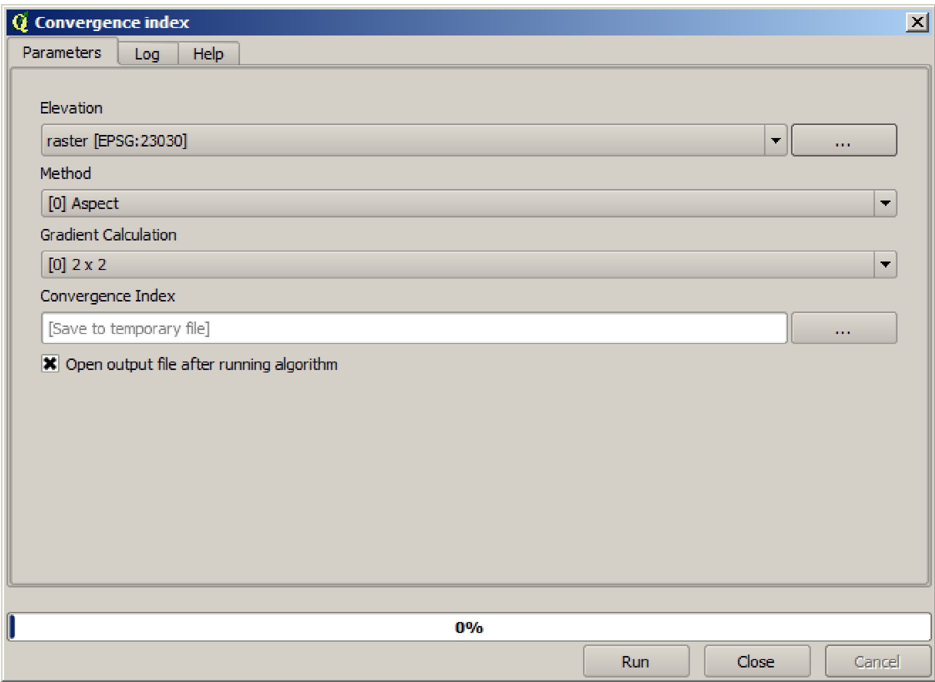

Figure 17.7: Parameters Dialog

This dialog is used to set the input values that the algorithm needs to be executed. It shows a table where input values and configuration parameters are to be set. It of course has a different content, depending on the requirements of the algorithm to be executed, and is created automatically based on those requirements. On the left side, the name of the parameter is shown. On the right side, the value of the parameter can be set.

Dei numărul i tipul de parametri depind de caracteristicile algoritmului, structura este similară pentru toate. Parametrii din tabel pot avea unul din tipurile de mai jos.

- A raster layer, to select from a list of all such layers available (currently opened) in QGIS. The selector contains as well a button on its right-hand side, to let you select filenames that represent layers currently not loaded in QGIS.
- A vector layer, to select from a list of all vector layers available in QGIS. Layers not loaded in QGIS can be selected as well, as in the case of raster layers, but only if the algorithm does not require a table field selected from the attributes table of the layer. In that case, only opened layers can be selected, since they need to be open so as to retrieve the list of field names available.

  Vei vedea un buton pentru fiecare selector de strat vectorial, aa cum se arată în figura de mai jos.

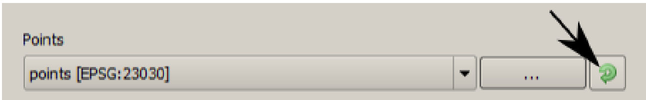

Figure 17.8: Vector iterator button

În cazul în care algoritmul conine mai muli, se va putea alege doar unul. Dacă este apăsat butonul corespunzător unei intrări vectoriale, algoritmul va fi executat iterativ pentru fiecare dintre entităile sale, în loc de o singură dată pentru întregul strat, generându-se un număr de rezultate identic cu numărul de execuii ale algoritmului. Acest lucru permite automatizarea procesului, atunci când toate entităile dintr-un strat trebuie să fie procesate separat.

- A table, to select from a list of all available in QGIS. Non-spatial tables are loaded into QGIS like vector layers, and in fact they are treated as such by the program. Currently, the list of available tables that you will see when executing an algorithm that needs one of them is restricted to tables coming from files in dBase (`.dbf`) or Comma-Separated Values (`.csv`) formats.
- Opiunea de a alege dintr-o listă de selecie a variantelor posibile.
- A numerical value, to be introduced in a text box. You will find a button by its side. Clicking on it, you will see a dialog that allows you to enter a mathematical expression, so you can use it as a handy calculator. Some useful variables related to data loaded into QGIS can be added to your expression, so you can select a value derived from any of these variables, such as the cell size of a layer or the northernmost coordinate of another one.

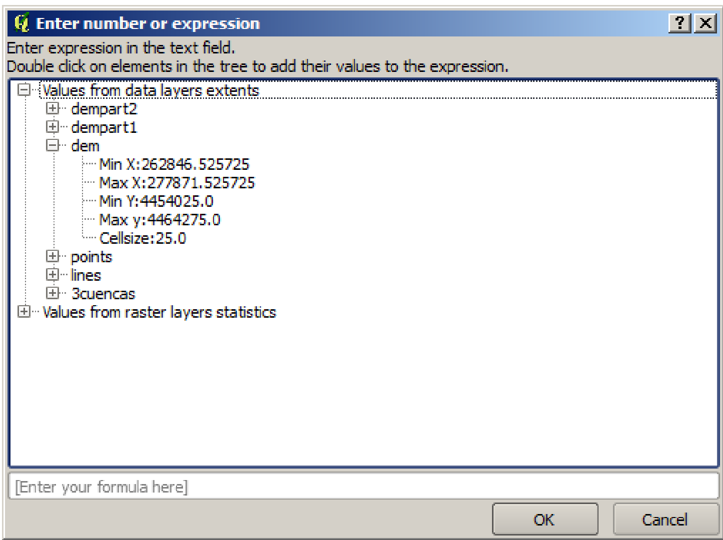

Figure 17.9: Number Selector

- Un interval, cu valori min i max care vor fi introduse în două casete de text.

- Un ir, care urmează să fie introdus într-o casetă de text.
- Un câmp, de ales din tabelul atribute al unui strat vectorial, sau un singur tabel selectat dintr-un alt parametru.
- Un sistem de coordonate de referină. Avei posibilitatea să tastai codul EPSG direct în caseta de text, sau să-l selectai din dialogul de selecie a CRS-ului, care apare atunci când facei clic pe butonul din partea dreaptă.
- An extent, to be entered by four numbers representing its `xmin`, `xmax`, `ymin`, `ymax` limits. Clicking on the button on the right-hand side of the value selector, a pop-up menu will appear, giving you two options: to select the value from a layer or the current canvas extent, or to define it by dragging directly onto the map canvas.

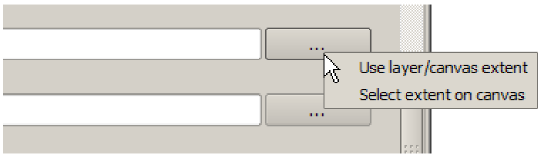

Figure 17.10: Extent selector

Dacă selectai prima opiune, vei vedea o fereastră similară cu cea următoare.

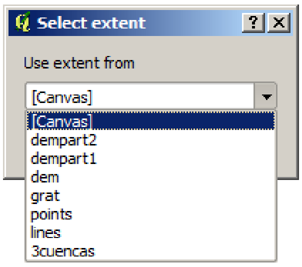

Figure 17.11: Extent List

Dacă o selectai pe a doua, fereastra parametrilor se va ascunde, astfel încât să putei facei clic pe ea i să o tragei pe pânză. După ce ai definit dreptunghiul selectat, dialogul va reapărea, având valorile în caseta de text a extinderii.

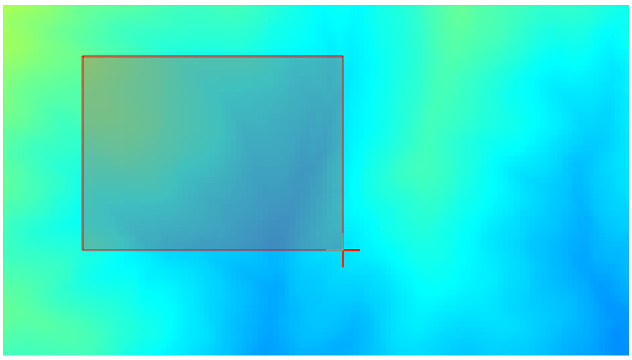

Figure 17.12: Extent Drag

- A list of elements (whether raster layers, vector layers or tables), to select from the list of such layers available in QGIS. To make the selection, click on the small button on the left side of the corresponding row to see a dialog like the following one.
- Un mic tabel care va fi editat de către utilizator. Acesta este folosit pentru a defini parametri, cum ar fi tabele de căutare sau nucleele de convoluie, printre altele.

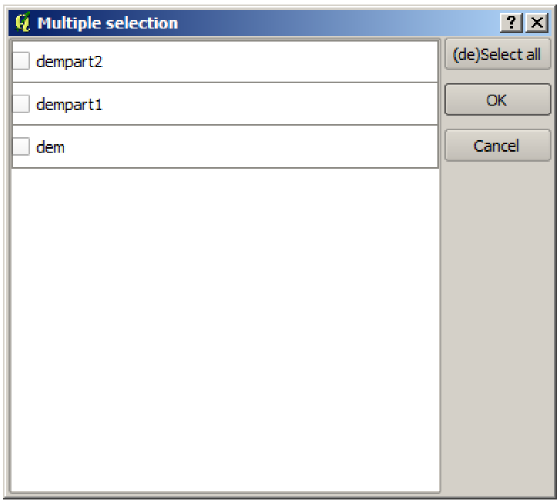

Figure 17.13: Multiple Selection

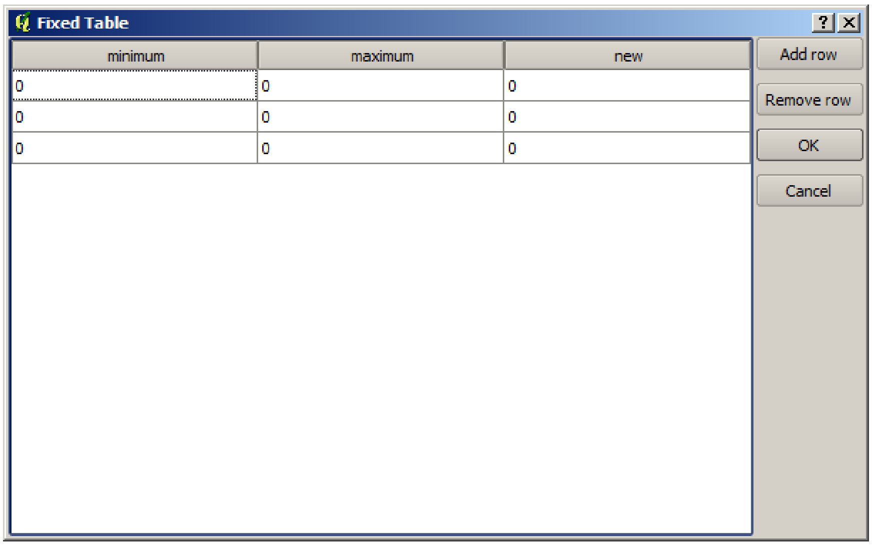

Figure 17.14: Fixed Table

Facei clic pe butonul din partea dreapta pentru a vedea tabelul i pentru a-i edita valorile.

În funcie de algoritm, numărul de rânduri poate fi modificat sau nu, cu ajutorul butoanelor din pe partea dreaptă a ferestrei.

You will find a **[Help]** tab in the the parameters dialog. If a help file is available, it will be shown, giving you more information about the algorithm and detailed descriptions of what each parameter does. Unfortunately, most algorithms lack good documentation, but if you feel like contributing to the project, this would be a good place to start.

O notă privind proieciile

Algorithms run from the processing framework — this is also true of most of the external applications whose algorithms are exposed through it. Do not perform any reprojection on input layers and assume that all of them are already in a common coordinate system and ready to be analized. Whenever you use more than one layer as input to an algorithm, whether vector or raster, it is up to you to make sure that they are all in the same coordinate system.

Note that, due to QGIS's on-the-fly reprojecting capabilities, although two layers might seem to overlap and match, that might not be true if their original coordinates are used without reprojecting them onto a common coordinate system. That reprojection should be done manually, and then the resulting files should be used as input to the algorithm. Also, note that the reprojection process can be performed with the algorithms that are available in the processing framework itself.

By default, the parameters dialog will show a description of the CRS of each layer along with its name, making it easy to select layers that share the same CRS to be used as input layers. If you do not want to see this additional information, you can disable this functionality in the processing configuration dialog, unchecking the *Show CRS* option.

Dacă încercai să executai un algoritm folosind ca intrare două sau mai multe straturi, cu CRS-uri nepotrivite, va fi afiat un dialog de avertizare.

Putei încă să executai algoritmul, dar fii contieni de faptul că, în cele mai multe cazuri se vor produce rezultate greite, cum ar fi straturile goale datorate straturilor de intrare care nu se suprapun.

17.2.2 Obiecte de date generate de algoritmi

Obiectele de date generate de un algoritm pot fi oricare din următoarele tipuri:

- Un strat raster
- Un strat vectorial
- O tabelă
- Un fiier HTML (folosit pentru ieiri de text i grafice)

These are all saved to disk, and the parameters table will contain a text box corresponding to each one of these outputs, where you can type the output channel to use for saving it. An output channel contains the information needed to save the resulting object somewhere. In the most usual case, you will save it to a file, but the architecture allows for any other way of storing it. For instance, a vector layer can be stored in a database or even uploaded to a remote server using a WFS-T service. Although solutions like these are not yet implemented, the processing framework is prepared to handle them, and we expect to add new kinds of output channels in a near feature.

To select an output channel, just click on the button on the right side of the text box. That will open a save file dialog, where you can select the desired file path. Supported file extensions are shown in the file format selector of the dialog, depending on the kind of output and the algorithm.

The format of the output is defined by the filename extension. The supported formats depend on what is supported by the algorithm itself. To select a format, just select the corresponding file extension (or add it, if you are directly typing the file path instead). If the extension of the file path you entered does not match any of the supported formats, a default extension (usually `.dbf`' for tables, `.tif` for raster layers and `.shp` for vector layers) will be appended to the file path, and the file format corresponding to that extension will be used to save the layer or table.

If you do not enter any filename, the result will be saved as a temporary file in the corresponding default file format, and it will be deleted once you exit QGIS (take care with that, in case you save your project and it contains temporary layers).

You can set a default folder for output data objects. Go to the configuration dialog (you can open it from the *Processing* menu), and in the *General* group, you will find a parameter named *Output folder*. This output folder is used as the default path in case you type just a filename with no path (i.e., `myfile.shp`) when executing an algorithm.

When running an algorithm that uses a vector layer in iterative mode, the entered file path is used as the base path for all generated files, which are named using the base name and appending a number representing the index of the iteration. The file extension (and format) is used for all such generated files.

Apart from raster layers and tables, algorithms also generate graphics and text as HTML files. These results are shown at the end of the algorithm execution in a new dialog. This dialog will keep the results produced by any algorithm during the current session, and can be shown at any time by selecting *Processing* → *Results viewer* from the QGIS main menu.

Some external applications might have files (with no particular extension restrictions) as output, but they do not belong to any of the categories above. Those output files will not be processed by QGIS (opened or included into the current QGIS project), since most of the time they correspond to file formats or elements not supported by QGIS. This is, for instance, the case with LAS files used for LiDAR data. The files get created, but you won't see anything new in your QGIS working session.

Pentru toate celelalte tipuri de rezultate, vei găsi o casetă de selectare, pe care o putei folosi pentru a indica algoritmului dacă să încarce fiierul după ce este generat de către algoritm, sau nu. În mod implicit, toate fiierele vor fi deschise.

Optional outputs are not supported. That is, all outputs are created. However, you can uncheck the corresponding checkbox if you are not interested in a given output, which essentially makes it behave like an optional output (in other words, the layer is created anyway, but if you leave the text box empty, it will be saved to a temporary file and deleted once you exit QGIS).

17.2.3 Configurarea cadrului de procesare

După cum s-a menionat, meniul de configurare oferă acces la un nou dialog în care putei configura modul în care funcionează algoritmii. Parametrii de configurare sunt structurai în blocuri separate pe care le putei selecta în partea stângă a dialogului.

Along with the aforementioned *Output folder* entry, the *General* block contains parameters for setting the default rendering style for output layers (that is, layers generated by using algorithms from any of the framework GUI components). Just create the style you want using QGIS, save it to a file, and then enter the path to that file in the settings so the algorithms can use it. Whenever a layer is loaded by SEXTANTE and added to the QGIS canvas, it will be rendered with that style.

Stilurile de randare pot fi configurate în mod individual pentru fiecare algoritm i pentru fiecare dintre rezultatele sale. Doar facei clic dreapta pe numele algoritmului din caseta de instrumente i selectai *Edit rendering styles*. Vei vedea un dialog similar cu cel care urmează.

Selectai fiierul de stil (`.qml`) pe care îl bdorii pentru fiecare ieire, apoi apăsai **[OK]**.

Ali parametri de configurare din grupul *General* sunt listai mai jos:

- *Use filename as layer name*. The name of each resulting layer created by an algorithm is defined by the algorithm itself. In some cases, a fixed name might be used, meaning that the same output name will be used, no matter which input layer is used. In other cases, the name might depend on the name of the input layer or some of the parameters used to run the algorithm. If this checkbox is checked, the name will be taken from the output filename instead. Notice that, if the output is saved to a temporary file, the filename of this temporary file is usually a long and meaningless one intended to avoid collision with other already existing filenames.

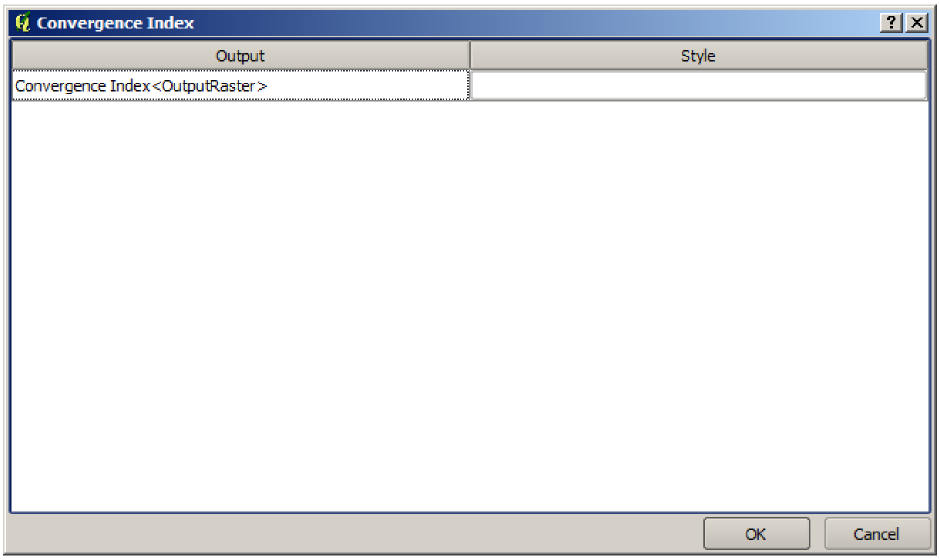

Figure 17.15: Rendering Styles

- *Use only selected features*. If this option is selected, whenever a vector layer is used as input for an algorithm, only its selected features will be used. If the layer has no selected features, all features will be used.
- *Pre-execution script file* and *Post-execution script file*. These parameters refer to scripts written using the processing scripting functionality, and are explained in the section covering scripting and the console.

Apart from the *General* block in the settings dialog, you will also find a block for algorithm providers. Each entry in this block contains an *Activate* item that you can use to make algorithms appear or not in the toolbox. Also, some algorithm providers have their own configuration items, which we will explain later when covering particular algorithm providers.

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17.3 Modelatorul grafic

The *graphical modeler* allows you to create complex models using a simple and easy-to-use interface. When working with a GIS, most analysis operations are not isolated, but rather part of a chain of operations instead. Using the graphical modeler, that chain of processes can be wrapped into a single process, so it is as easy and convenient to execute as a single process later on a different set of inputs. No matter how many steps and different algorithms it involves, a model is executed as a single algorithm, thus saving time and effort, especially for larger models.

Modelatorul poate fi deschis din meniul de prelucrare.

The modeler has a working canvas where the structure of the model and the workflow it represents are shown. On the left part of the window, a panel with two tabs can be used to add new elements to the model.

Crearea unui model de implică două etape:

1. *Definition of necessary inputs*. These inputs will be added to the parameters window, so the user can set their values when executing the model. The model itself is an algorithm, so the parameters window is generated automatically as it happens with all the algorithms available in the processing framework.
2. *Definition of the workflow*. Using the input data of the model, the workflow is defined by adding algorithms and selecting how they use those inputs or the outputs generated by other algorithms already in the model.

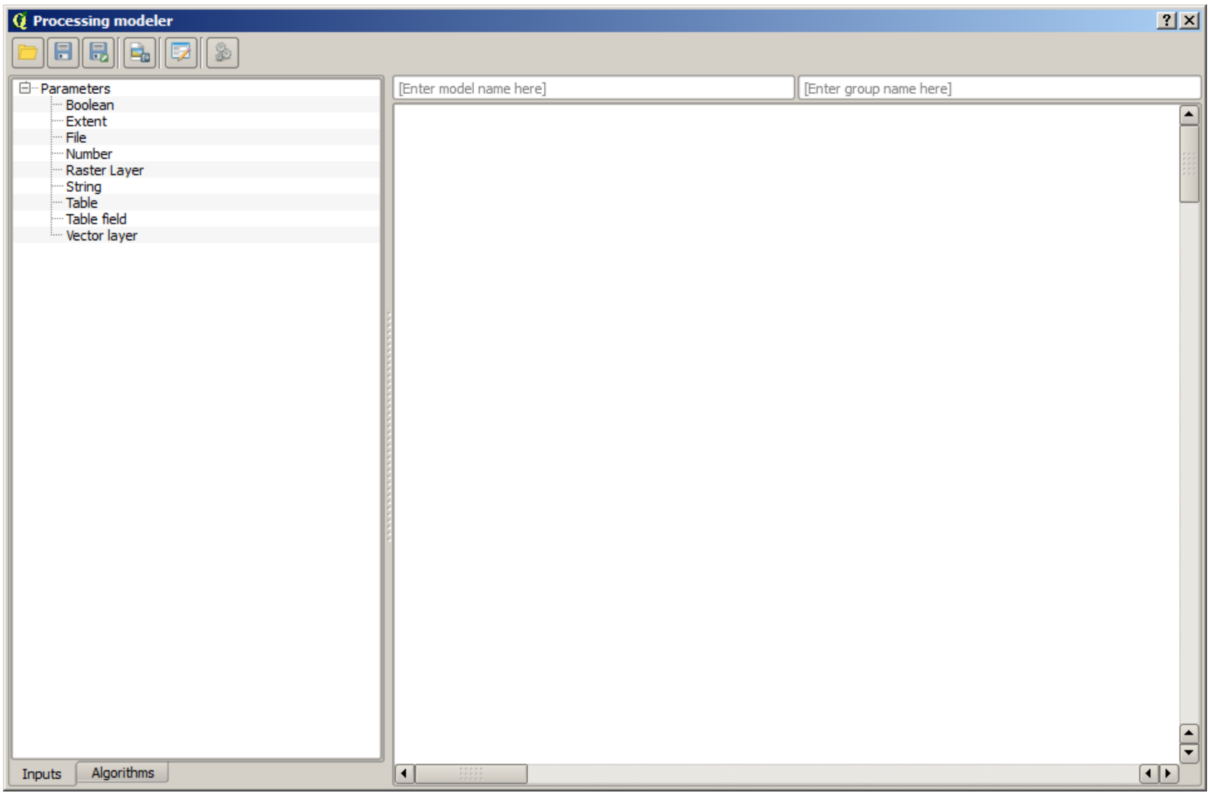

Figure 17.16: Modeler

17.3.1 Definiia intrărilor

The first step to create a model is to define the inputs it needs. The following elements are found in the *Inputs* tab on the left side of the modeler window:

- Stratul raster
- Stratul vectorial
- irul
- Câmpul tabelei
- Tabela
- Extinderea
- Numărul
- Boolean
- Fiierul

Double-clicking on any of these elements, a dialog is shown to define its characteristics. Depending on the parameter itself, the dialog may contain just one basic element (the description, which is what the user will see when executing the model) or more of them. For instance, when adding a numerical value, as can be seen in the next figure, apart from the description of the parameter, you have to set a default value and a range of valid values.

Pentru fiecare intrare adăugată, un element nou este adăugat pe canevasul modelatorului.

Putei adăuga intrări, de asemenea, prin glisarea tipului de intrare din listă, i fixarea lui în canevasul modelatorului, în poziia în care dorii să-l plasai.

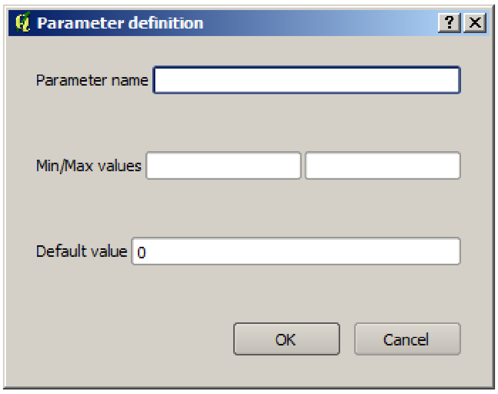

Figure 17.17: Model Parameters

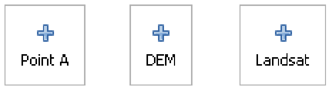

Figure 17.18: Model Parameters

17.3.2 Definiia fluxului de lucru

Once the inputs have been defined, it is time to define the algorithms to apply on them. Algorithms can be found in the *Algorithms* tab, grouped much in the same way as they are in the toolbox.

The appearance of the toolbox has two modes here as well: simplified and advanced. However, there is no element to switch between views in the modeler, so you have to do it in the toolbox. The mode that is selected in the toolbox is the one that will be used for the list of algorithms in the modeler.

To add an algorithm to a model, double-click on its name or drag and drop it, just like it was done when adding inputs. An execution dialog will appear, with a content similar to the one found in the execution panel that is shown when executing the algorithm from the toolbox. The one shown next corresponds to the SAGA 'Convergence index' algorithm, the same example we saw in the section dedicated to the toolbox.

As you can see, some differences exist. Instead of the file output box that was used to set the file path for output layers and tables, a simple text box is used here. If the layer generated by the algorithm is just a temporary result that will be used as the input of another algorithm and should not be kept as a final result, just do not edit that text box. Typing anything in it means that the result is final and the text that you supply will be the description for the output, which will be the output the user will see when executing the model.

Selecting the value of each parameter is also a bit different, since there are important differences between the context of the modeler and that of the toolbox. Let's see how to introduce the values for each type of parameter.

- Layers (raster and vector) and tables. These are selected from a list, but in this case, the possible values are not the layers or tables currently loaded in QGIS, but the list of model inputs of the corresponding type, or other layers or tables generated by algorithms already added to the model.
- Numerical values. Literal values can be introduced directly in the text box. But this text box is also a list that can be used to select any of the numerical value inputs of the model. In this case, the parameter will take the value introduced by the user when executing the model.
- Şir. Ca i în cazul valorilor numerice, irurile de caractere literale pot fi tastate, sau se poate selecta un ir de intrare.
- Table field. The fields of the parent table or layer cannot be known at design time, since they depend on the selection of the user each time the model is executed. To set the value for this parameter, type the name of a field directly in the text box, or use the list to select a table field input already added to the model. The validity of the selected field will be checked at run time.

In all cases, you will find an additional parameter named *Parent algorithms* that is not available when calling the algorithm from the toolbox. This parameter allows you to define the order in which algorithms are executed

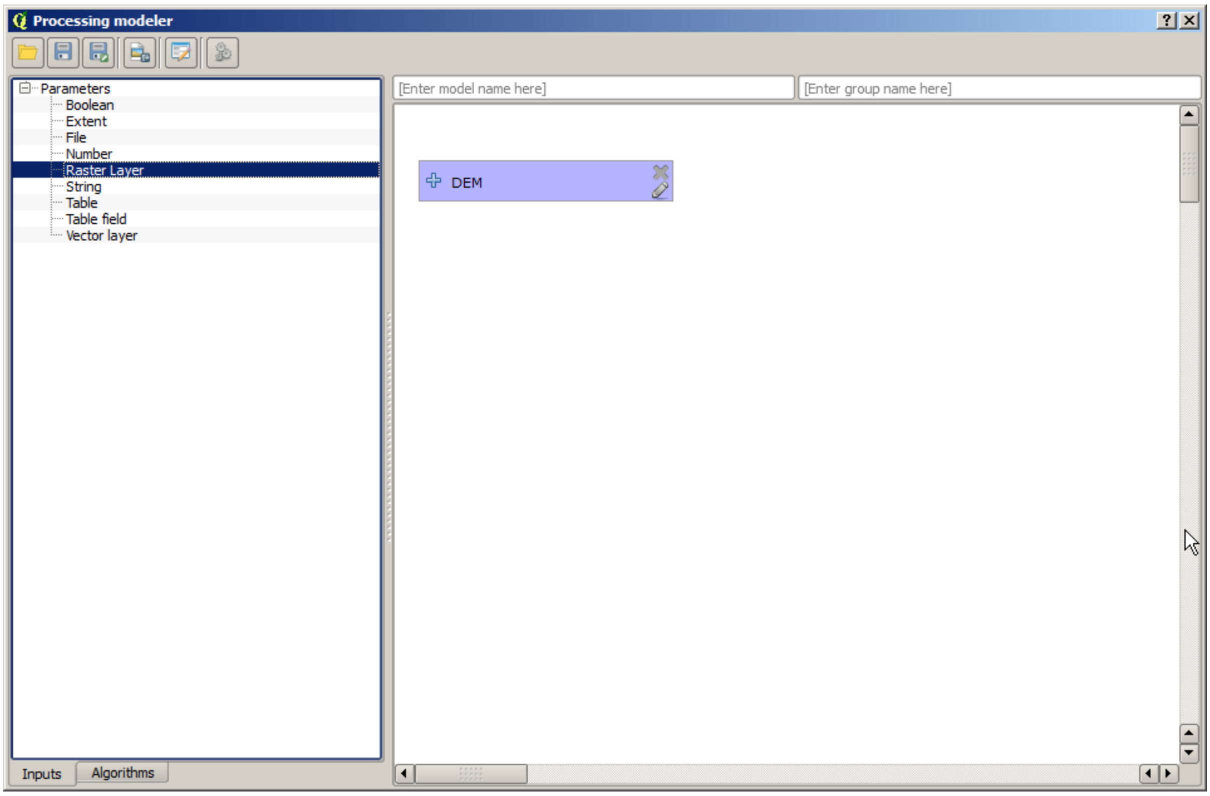

Figure 17.19: Model Parameters

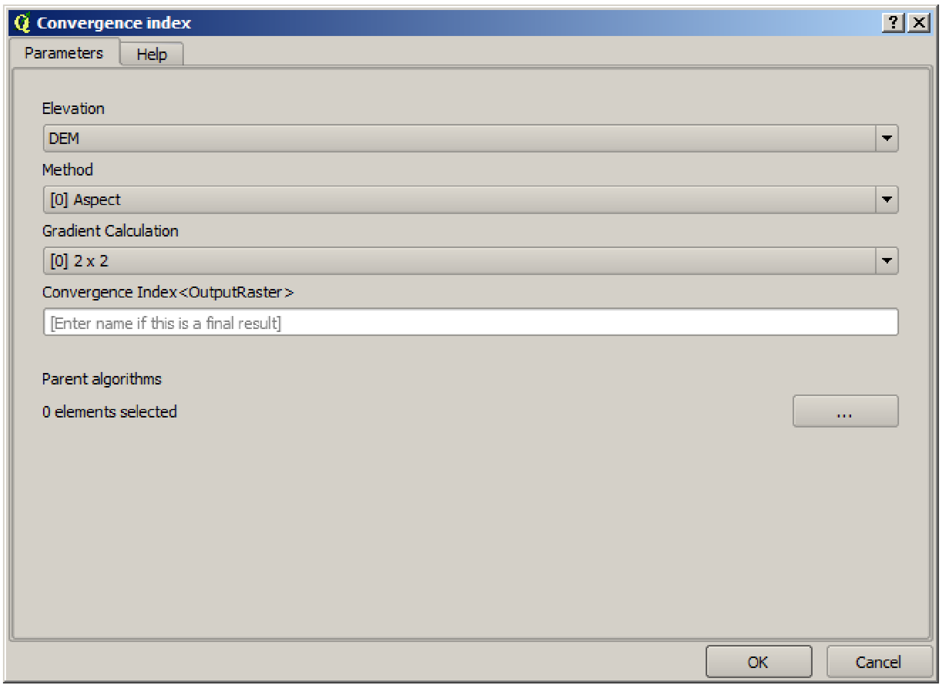

Figure 17.20: Model Parameters

by explicitly defining one algorithm as a parent of the current one, which will force the parent algorithm to be executed before the current one.

When you use the output of a previous algorithm as the input of your algorithm, that implicitly sets the previous algorithm as parent of the current one (and places the corresponding arrow in the modeler canvas). However, in some cases an algorithm might depend on another one even if it does not use any output object from it (for instance, an algorithm that executes an SQL sentence on a PostGIS database and another one that imports a layer into that same database). In that case, just select the previous algorithm in the *Parent algorithms* parameter and the two steps will be executed in the correct order.

Once all the parameters have been assigned valid values, click on **[OK]** and the algorithm will be added to the canvas. It will be linked to all the other elements in the canvas, whether algorithms or inputs, that provide objects that are used as inputs for that algorithm.

Elements can be dragged to a different position within the canvas, to change the way the module structure is displayed and make it more clear and intuitive. Links between elements are updated automatically. You can zoom in and out by using the mouse wheel.

You can run your algorithm anytime by clicking on the **[Run]** button. However, in order to use the algorithm from the toolbox, it has to be saved and the modeler dialog closed, to allow the toolbox to refresh its contents.

17.3.3 Salvarea i încărcarea modelelor

Use the **[Save]** button to save the current model and the **[Open]** button to open any model previously saved. Models are saved with the `.model` extension. If the model has been previously saved from the modeler window, you will not be prompted for a filename. Since there is already a file associated with that model, the same file will be used for any subsequent saves.

Înainte de a salva un model, trebuie să introducei un nume i un grup pentru el, folosind casetele de text din partea de sus a ferestrei.

Models saved on the `models` folder (the default folder when you are prompted for a filename to save the model) will appear in the toolbox in the corresponding branch. When the toolbox is invoked, it searches the `models` folder for files with the `.model` extension and loads the models they contain. Since a model is itself an algorithm, it can be added to the toolbox just like any other algorithm.

The models folder can be set from the processing configuration dialog, under the *Modeler* group.

Models loaded from the `models` folder appear not only in the toolbox, but also in the algorithms tree in the *Algorithms* tab of the modeler window. That means that you can incorporate a model as a part of a bigger model, just as you add any other algorithm.

In some cases, a model might not be loaded because not all the algorithms included in its workflow are available. If you have used a given algorithm as part of your model, it should be available (that is, it should appear in the toolbox) in order to load that model. Deactivating an algorithm provider in the processing configuration window renders all the algorithms in that provider unusable by the modeler, which might cause problems when loading models. Keep that in mind when you have trouble loading or executing models.

17.3.4 Editarea unui model

Putei edita modelul pe care îl creai în mod curent, să redefinii fluxul de lucru i relaiile dintre algoritmi i intrările care definesc modelul în sine.

Dacă facei clic-dreapta pe un algoritm din canevas reprezentând modelul, vei vedea un meniu contextual ca cel prezentat în continuare:

Selecting the *Remove* option will cause the selected algorithm to be removed. An algorithm can be removed only if there are no other algorithms depending on it. That is, if no output from the algorithm is used in a different one as input. If you try to remove an algorithm that has others depending on it, a warning message like the one you can see below will be shown:

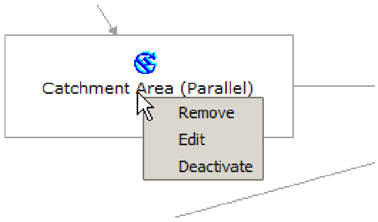

Figure 17.21: Modeler Right Click

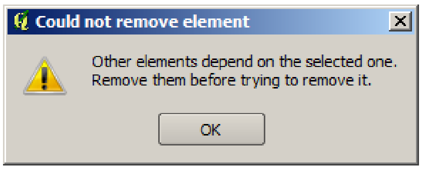

Figure 17.22: Cannot Delete Algorithm

Selecting the *Edit* option or simply double-clicking on the algorithm icon will show the parameters dialog of the algorithm, so you can change the inputs and parameter values. Not all input elements available in the model will appear in this case as available inputs. Layers or values generated at a more advanced step in the workflow defined by the model will not be available if they cause circular dependencies.

Select the new values and then click on the **[OK]** button as usual. The connections between the model elements will change accordingly in the modeler canvas.

17.3.5 Editarea fiierelor de ajutor i a meta-informaiilor modelului

You can document your models from the modeler itself. Just click on the **[Edit model help]** button and a dialog like the one shown next will appear.

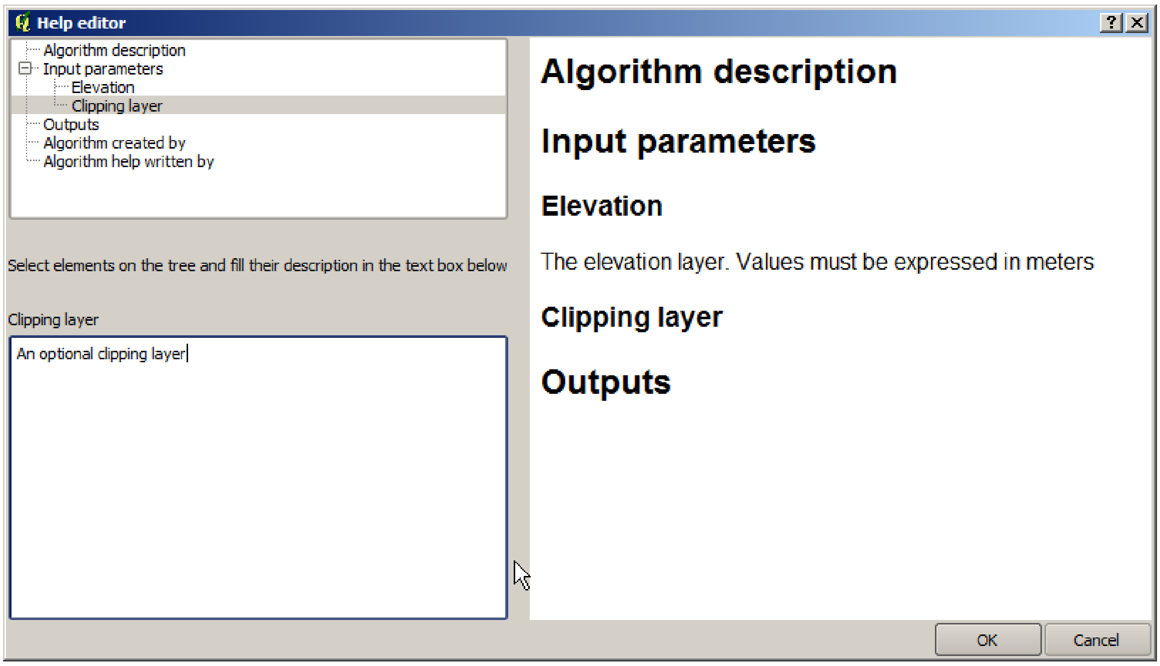

Figure 17.23: Help Edition

On the right-hand side, you will see a simple HTML page, created using the description of the input parameters and outputs of the algorithm, along with some additional items like a general description of the model or its author.

The first time you open the help editor, all these descriptions are empty, but you can edit them using the elements on the left-hand side of the dialog. Select an element on the upper part and then write its description in the text box below.

Model help is saved in a file in the same folder as the model itself. You do not have to worry about saving it, since it is done automatically.

17.3.6 Despre algoritmii disponibili

You might notice that some algorithms that can be be executed from the toolbox do not appear in the list of available algorithms when you are designing a model. To be included in a model, an algorithm must have a correct semantic, so as to be properly linked to others in the workflow. If an algorithm does not have such a well-defined semantic (for instance, if the number of output layers cannot be known in advance), then it is not possible to use it within a model, and thus, it does not appear in the list of algorithms that you can find in the modeler dialog.

Additionally, you will see some algorithms in the modeler that are not found in the toolbox. These algorithms are meant to be used exclusively as part of a model, and they are of no interest in a different context. The 'Calculator' algorithm is an example of that. It is just a simple arithmetic calculator that you can use to modify numerical values (entered by the user or generated by some other algorithm). This tool is really useful within a model, but outside of that context, it doesn't make too much sense.

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17.4 Interfaa de prelucrare în serie

17.4.1 Introducere

Toi algoritmii (inclusiv modelele) se pot executa ca un proces în serie. Astfel, acetia pot fi executai folosindu-se nu doar un singur set de intrări, ci mai multe, care rulează algoritmii la nevoie. Acest lucru este util când se procesează cantităi mari de date, nefiind necesară lansarea repetată a unui algoritm din caseta de instrumente.

Pentru a executa un algoritm sub formă de procedeu în serie, facei clic-dreapta pe numele său din caseta de instrumente, apoi selectai opiunea *Execute as batch process* din meniul pop-up care va apărea.

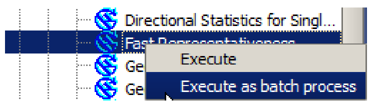


Figure 17.24: Batch Processing Right Click

17.4.2 Tabela parametrilor

Executarea unui proces în serie este similară execuiei unui singur algoritm. Dei valorile parametrilor trebuie să fie definite, în acest caz nu este de ajuns o singură valoare pentru fiecare parametru, ci un set, câte unul pentru fiecare execuie a algoritmului. Valorile sunt introduse cu ajutorul unui tabel asemănător cu cel prezentat în continuare.

Fiecare linie a tabelului reprezintă o singură execuie a algoritmului, iar fiecare celulă conine valoarea unuia dintre parametri. Acesta este similar cu dialogul parametrilor pe care îl vedei la execuia unui algoritm din caseta de instrumente, însă cu un alt aranjament.

În mod implicit, tabelul conine doar două rânduri. Putei adăuga sau elimina rânduri folosind butoanele din partea de jos a ferestrei.

O dată ce dimensiunea tabelei a fost stabilită, acesta trebuie să fie umplută cu valorile dorite.

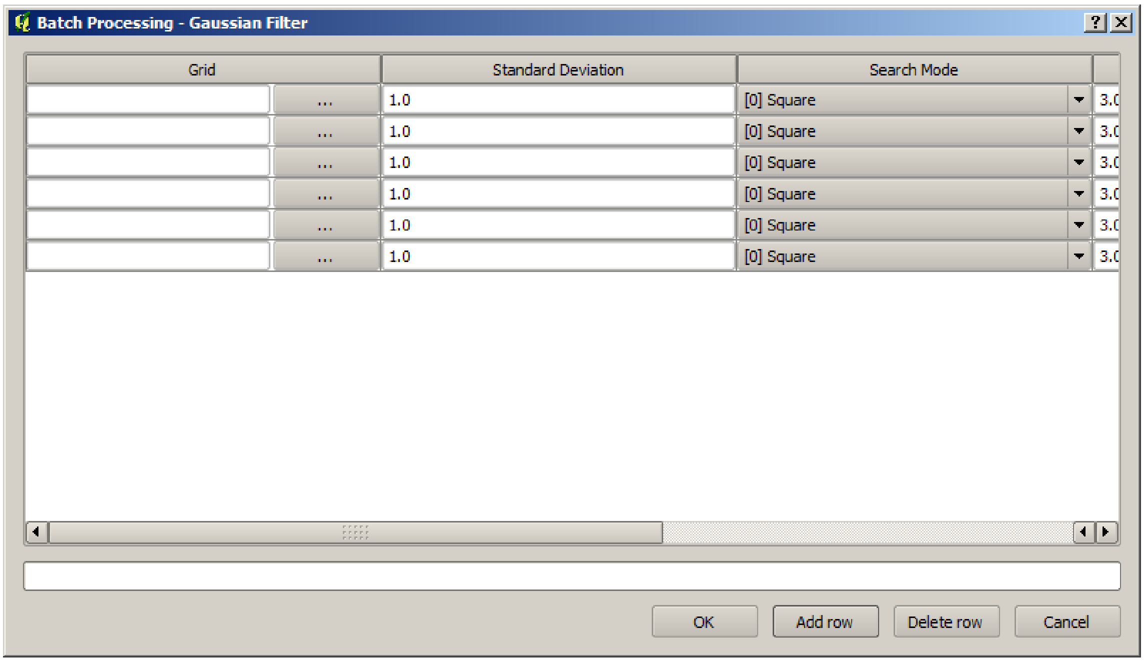


Figure 17.25: Batch Processing

17.4.3 Completarea tabelei cu parametri

Pentru majoritatea parametrilor, setarea valorii este trivială. Trebuie doar să tastai valoarea sau să o selectai din lista de opiuni disponibile, în funcie de tipul parametrului.

The main differences are found for parameters representing layers or tables, and for output file paths. Regarding input layers and tables, when an algorithm is executed as part of a batch process, those input data objects are taken directly from files, and not from the set of them already opened in QGIS. For this reason, any algorithm can be executed as a batch process, even if no data objects at all are opened and the algorithm cannot be run from the toolbox.

Filenames for input data objects are introduced directly typing or, more conveniently, clicking on the ... button on the right hand of the cell, which shows a typical file chooser dialog. Multiple files can be selected at once. If the input parameter represents a single data object and several files are selected, each one of them will be put in a separate row, adding new ones if needed. If the parameter represents a multiple input, all the selected files will be added to a single cell, separated by semicolons (`;`).

Output data objects are always saved to a file and, unlike when executing an algorithm from the toolbox, saving to a temporary file is not permitted. You can type the name directly or use the file chooser dialog that appears when clicking on the accompanying button.

După ce ai selectat fiierul, este prezentat un nou dialog, care permite autocompletarea altor celule din aceeai coloană (acelai parametru).

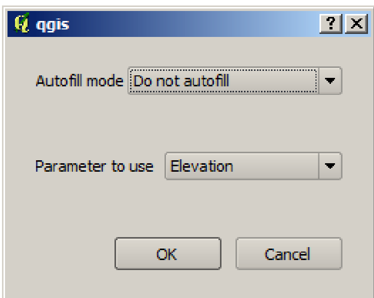


Figure 17.26: Salvarea Procesării în Serie

În cazul în care este selectată valoarea implicită ('Autocompletarea nu are loc'), numele fiierului selectat va fi introdus în celula selectată din tabelul de parametri. Dacă oricare dintre celelalte opiuni este selectată, atunci toate celulele aflate sub cea selectată vor fi automat completate, pe baza unor criterii definite. În acest fel, este mult mai uoară completarea tabelei, procesul în serie putându-se defini cu efort redus.

Completarea automată se poate face prin simpla adăugare de numere corelative la calea fiierului selectat, sau prin adăugarea valorii unui alt câmp în acelai rând. Acest lucru este deosebit de util pentru a denumi obiectele datelor de ieire în funcie de cele de intrare.

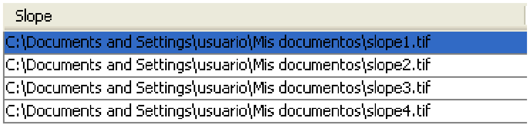


Figure 17.27: Batch Processing File Path

17.4.4 Executare ca proces în serie

Pentru a executa procesul în serie după ce ai introdus toate valorile necesare, facei clic pe **[OK]**. Progresul activitâii de procesare globală va fi afiat în bara de progres din partea de jos a dialogului.

.

17.5 Utilizarea algoritmilor de procesare din consolă

The console allows advanced users to increase their productivity and perform complex operations that cannot be performed using any of the other GUI elements of the processing framework. Models involving several algorithms can be defined using the command-line interface, and additional operations such as loops and conditional sentences can be added to create more flexible and powerful workflows.

There is not a proccesing console in QGIS, but all processing commands are available instead from the QGIS built-in Python console. That means that you can incorporate those commands into your console work and connect processing algorithms to all the other features (including methods from the QGIS API) available from there.

The code that you can execute from the Python console, even if it does not call any specific processing method, can be converted into a new algorithm that you can later call from the toolbox, the graphical modeler or any other component, just like you do with any other algorithm. In fact, some algorithms that you can find in the toolbox are simple scripts.

In this section, we will see how to use processing algorithms from the QGIS Python console, and also how to write algorithms using Python.

17.5.1 Apelarea algoritmilor din consola Python

Primul lucru pe care trebuie să-l facei, este de a importa funciile de prelucrare cu ajutorul următoarei linii:

```
>>> import processing
```

Now, there is basically just one (interesting) thing you can do with that from the console: execute an algorithm. That is done using the `runalg()` method, which takes the name of the algorithm to execute as its first parameter, and then a variable number of additional parameters depending on the requirements of the algorithm. So the first thing you need to know is the name of the algorithm to execute. That is not the name you see in the toolbox, but rather a unique command–line name. To find the right name for your algorithm, you can use the `algslist()` method. Type the following line in your console:

```
>>> processing.alglist()
```

Vei vedea ceva de genul asta.

```
Accumulated Cost (Anisotropic)---------------->saga:accumulatedcost(anisotropic)
Accumulated Cost (Isotropic)------------------>saga:accumulatedcost(isotropic)
Add Coordinates to points--------------------->saga:addcoordinatestopoints
Add Grid Values to Points--------------------->saga:addgridvaluestopoints
Add Grid Values to Shapes--------------------->saga:addgridvaluestoshapes
Add Polygon Attributes to Points-------------->saga:addpolygonattributestopoints
Aggregate------------------------------------->saga:aggregate
Aggregate Point Observations------------------>saga:aggregatepointobservations
Aggregation Index----------------------------->saga:aggregationindex
Analytical Hierarchy Process------------------>saga:analyticalhierarchyprocess
Analytical Hillshading------------------------>saga:analyticalhillshading
Average With Mask 1--------------------------->saga:averagewithmask1
Average With Mask 2--------------------------->saga:averagewithmask2
Average With Thereshold 1--------------------->saga:averagewiththereshold1
Average With Thereshold 2--------------------->saga:averagewiththereshold2
Average With Thereshold 3--------------------->saga:averagewiththereshold3
B-Spline Approximation------------------------>saga:b-splineapproximation
...
```

That's a list of all the available algorithms, alphabetically ordered, along with their corresponding command-line names.

You can use a string as a parameter for this method. Instead of returning the full list of algorithms, it will only display those that include that string. If, for instance, you are looking for an algorithm to calculate slope from a DEM, type `alglist("slope")` to get the following result:

```
DTM Filter (slope-based)---------------------->saga:dtmfilter(slope-based)
Downslope Distance Gradient------------------->saga:downslopedistancegradient
Relative Heights and Slope Positions---------->saga:relativeheightsandslopepositions
Slope Length---------------------------------->saga:slopelength
Slope, Aspect, Curvature---------------------->saga:slopeaspectcurvature
Upslope Area---------------------------------->saga:upslopearea
Vegetation Index[slope based]----------------->saga:vegetationindex[slopebased]
```

Acest rezultat s-ar putea schimba în funcie de algoritmii pe care îi avei la dispoziie.

It is easier now to find the algorithm you are looking for and its command-line name, in this case `saga:slopeaspectcurvature`.

Once you know the command-line name of the algorithm, the next thing to do is to determine the right syntax to execute it. That means knowing which parameters are needed and the order in which they have to be passed when calling the `runalg()` method. There is a method to describe an algorithm in detail, which can be used to get a list of the parameters that an algorithm requires and the outputs that it will generate. To get this information, you can use the `alghelp(name_of_the_algorithm)` method. Use the command-line name of the algorithm, not the full descriptive name.

Calling the method with `saga:slopeaspectcurvature` as parameter, you get the following description:

```
>>> processing.alghelp("saga:slopeaspectcurvature")
ALGORITHM: Slope, Aspect, Curvature
   ELEVATION <ParameterRaster>
   METHOD <ParameterSelection>
   SLOPE <OutputRaster>
   ASPECT <OutputRaster>
   CURV <OutputRaster>
   HCURV <OutputRaster>
   VCURV <OutputRaster>
```

Now you have everything you need to run any algorithm. As we have already mentioned, there is only one single command to execute algorithms: `runalg()`. Its syntax is as follows:

```
>>> processing.runalg(name_of_the_algorithm, param1, param2, ..., paramN,
         Output1, Output2, ..., OutputN)
```

The list of parameters and outputs to add depends on the algorithm you want to run, and is exactly the list that the `alghelp()` method gives you, in the same order as shown.

Depending on the type of parameter, values are introduced differently. The next list gives a quick review of how to introduce values for each type of input parameter:

- Raster Layer, Vector Layer or Table. Simply use a string with the name that identifies the data object to use (the name it has in the QGIS Table of Contents) or a filename (if the corresponding layer is not opened, it will be opened but not added to the map canvas). If you have an instance of a QGIS object representing the layer, you can also pass it as parameter. If the input is optional and you do not want to use any data object, use `None`.
- Selection. If an algorithm has a selection parameter, the value of that parameter should be entered using an integer value. To know the available options, you can use the `algoptions()` command, as shown in the following example:

```
>>> processing.algoptions("saga:slopeaspectcurvature")
METHOD(Method)
    0 - [0] Maximum Slope (Travis et al. 1975)
    1 - [1] Maximum Triangle Slope (Tarboton 1997)
    2 - [2] Least Squares Fitted Plane (Horn 1981, Costa-Cabral & Burgess 1996)
    3 - [3] Fit 2.Degree Polynom (Bauer, Rohdenburg, Bork 1985)
    4 - [4] Fit 2.Degree Polynom (Heerdegen & Beran 1982)
    5 - [5] Fit 2.Degree Polynom (Zevenbergen & Thorne 1987)
    6 - [6] Fit 3.Degree Polynom (Haralick 1983)
```

  In this case, the algorithm has one such parameter, with seven options. Notice that ordering is zero-based.

- Multiple input. The value is a string with input descriptors separated by semicolons (`;`). As in the case of single layers or tables, each input descriptor can be the data object name, or its file path.
- Table Field from XXX. Use a string with the name of the field to use. This parameter is case-sensitive.
- Fixed Table. Type the list of all table values separated by commas (`,`) and enclosed between quotes (`"`). Values start on the upper row and go from left to right. You can also use a 2-D array of values representing the table.
- CRS. Introducei numărul de cod EPSG pentr CRS-ul dorit.
- Extindere. Trebuie să utilizai un ir cu valorile `xmin`, `xmax`, `ymin` i `ymax` separate prin virgule (`,`).

Parametrii boolean, fiier, ir i numeric nu au nevoie de explicaii suplimentare.

Input parameters such as strings, booleans, or numerical values have default values. To use them, specify `None` in the corresponding parameter entry.

For output data objects, type the file path to be used to save it, just as it is done from the toolbox. If you want to save the result to a temporary file, use `None`. The extension of the file determines the file format. If you enter a file extension not supported by the algorithm, the default file format for that output type will be used, and its corresponding extension appended to the given file path.

Unlike when an algorithm is executed from the toolbox, outputs are not added to the map canvas if you execute that same algorithm from the Python console. If you want to add an output to the map canvas, you have to do it yourself after running the algorithm. To do so, you can use QGIS API commands, or, even easier, use one of the handy methods provided for such tasks.

The `runalg` method returns a dictionary with the output names (the ones shown in the algorithm description) as keys and the file paths of those outputs as values. You can load those layers by passing the corresponding file paths to the `load()` method.

17.5.2 Funcii suplimentare pentru prelucrarea datelor

Apart from the functions used to call algorithms, importing the `processing` package will also import some additional functions that make it easier to work with data, particularly vector data. They are just convenience functions that wrap some functionality from the QGIS API, usually with a less complex syntax. These functions should be used when developing new algorithms, as they make it easier to operate with input data.

Below is a list of some of these commands. More information can be found in the classes under the `processing/tools` package, and also in the example scripts provided with QGIS.

- `getObject(obj)`: Returns a QGIS object (a layer or table) from the passed object, which can be a filename or the name of the object in the QGIS Table of Contents.
- `values(layer, fields)`: Returns the values in the attributes table of a vector layer, for the passed fields. Fields can be passed as field names or as zero-based field indices. Returns a dict of lists, with the passed field identifiers as keys. It considers the existing selection.
- `features(layer)`: Returns an iterator over the features of a vector layer, considering the existing selection.
- `uniqueValues(layer, field)`: Returns a list of unique values for a given attribute. Attributes can be passed as a field name or a zero-based field index. It considers the existing selection.

17.5.3 Crearea script-urilor i execuia lor din caseta de instrumente

You can create your own algorithms by writing the corresponding Python code and adding a few extra lines to supply additional information needed to define the semantics of the algorithm. You can find a *Create new script* menu under the *Tools* group in the *Script* algorithms block of the toolbox. Double-click on it to open the script editing dialog. That's where you should type your code. Saving the script from there in the `scripts` folder (the default folder when you open the save file dialog) with `.py` extension will automatically create the corresponding algorithm.

Numele algoritmului (cel pe care îl vei vedea în caseta de instrumente) este generat din numele fiierului, eliminându-i extensia i înlocuind cratimele cu spaii albe.

Let's have a look at the following code, which calculates the Topographic Wetness Index (TWI) directly from a DEM.

```
##dem=raster
##twi=output
ret_slope = processing.runalg("saga:slopeaspectcurvature", dem, 0, None,
                None, None, None, None)
ret_area = processing.runalg("saga:catchmentarea(mass-fluxmethod)", dem,
                0, False, False, False, False, None, None, None, None, None)
processing.runalg("saga:topographicwetnessindex(twi), ret_slope['SLOPE'],
                ret_area['AREA'], None, 1, 0, twi)
```

As you can see, the calculation involves three algorithms, all of them coming from SAGA. The last one calculates the TWI, but it needs a slope layer and a flow accumulation layer. We do not have these layers, but since we have the DEM, we can calculate them by calling the corresponding SAGA algorithms.

The part of the code where this processing takes place is not difficult to understand if you have read the previous sections in this chapter. The first lines, however, need some additional explanation. They provide the information that is needed to turn your code into an algorithm that can be run from any of the GUI components, like the toolbox or the graphical modeler.

These lines start with a double Python comment symbol (`##`) and have the following structure:

```
[parameter_name]=[parameter_type] [optional_values]
```

Here is a list of all the parameter types that are supported in processing scripts, their syntax and some examples.

- `raster`. Un strat raster.
- `vector`. Un strat vectorial.
- `table`. O tabelă.
- `number`. O valoare numerică. Trebuie să existe o valoare implicită. De exemplu, `depth=number 2.4`.

- `string`. Un ir de text. Ca i în cazul valorilor numerice, trebuie să fie adăugată o valoare implicită. De exemplu, `name=string Victor`.
- `boolean`. O valoare booleană. Se adaugă `True` sau `False` pentru a seta valoarea implicită. De exemplu, `verbose=boolean True`.
- `multiple raster`. Un set de straturi raster, de intrare.
- `multiple vector`. Un set de straturi vectoriale de intrare.
- `field`. A field in the attributes table of a vector layer. The name of the layer has to be added after the `field` tag. For instance, if you have declared a vector input with `mylayer=vector`, you could use `myfield=field mylayer` to add a field from that layer as parameter.
- `folder`. Un folder.
- `file`. Un nume de fiier.

The parameter name is the name that will be shown to the user when executing the algorithm, and also the variable name to use in the script code. The value entered by the user for that parameter will be assigned to a variable with that name.

When showing the name of the parameter to the user, the name will be edited to improve its appearance, replacing low hyphens with spaces. So, for instance, if you want the user to see a parameter named `A numerical value`, you can use the variable name `A_numerical_value`.

Layers and table values are strings containing the file path of the corresponding object. To turn them into a QGIS object, you can use the `processing.getObjectFromUri()` function. Multiple inputs also have a string value, which contains the file paths to all selected object, separated by semicolons (`;`).

Ieirile sunt definite într-un mod similar, folosind următoarele etichete:

- `output raster`
- `output vector`
- `output table`
- `output html`
- `output file`
- `output number`
- `output string`

The value assigned to the output variables is always a string with a file path. It will correspond to a temporary file path in case the user has not entered any output filename.

When you declare an output, the algorithm will try to add it to QGIS once it is finished. That is why, although the `runalg()` method does not load the layers it produces, the final TWI layer will be loaded (using the case of our previous example), since it is saved to the file entered by the user, which is the value of the corresponding output.

Do not use the `load()` method in your script algorithms, just when working with the console line. If a layer is created as output of an algorithm, it should be declared as such. Otherwise, you will not be able to properly use the algorithm in the modeler, since its syntax (as defined by the tags explained above) will not match what the algorithm really creates.

Hidden outputs (numbers and strings) do not have a value. Instead, you have to assign a value to them. To do so, just set the value of a variable with the name you used to declare that output. For instance, if you have used this declaration,

```
##average=output number
```

următoarea linie va seta valoarea de ieire la 5:

```
average = 5
```

In addition to the tags for parameters and outputs, you can also define the group under which the algorithm will be shown, using the `group` tag.

If your algorithm takes a long time to process, it is a good idea to inform the user. You have a global named `progress` available, with two possible methods: `setText(text)` and `setPercentage(percent)` to modify the progress text and the progress bar.

Several examples are provided. Please check them to see real examples of how to create algorithms using the processing framework classes. You can right-click on any script algorithm and select *Edit script* to edit its code or just to see it.

17.5.4 Documentarea script-urilor

As in the case of models, you can create additional documentation for your scripts, to explain what they do and how to use them. In the script editing dialog, you will find an **[Edit script help]** button. Click on it and it will take you to the help editing dialog. Check the section about the graphical modeler to know more about this dialog and how to use it.

Help files are saved in the same folder as the script itself, adding the `.help` extension to the filename. Notice that you can edit your script's help before saving the script for the first time. If you later close the script editing dialog without saving the script (i.e., you discard it), the help content you wrote will be lost. If your script was already saved and is associated to a filename, saving the help content is done automatically.

17.5.5 Script de interceptare a pre- i post-execuiei

Scripts can also be used to set pre- and post-execution hooks that are run before and after an algorithm is run. This can be used to automate tasks that should be performed whenever an algorithm is executed.

The syntax is identical to the syntax explained above, but an additional global variable named `alg` is available, representing the algorithm that has just been (or is about to be) executed.

In the *General* group of the processing configuration dialog, you will find two entries named *Pre-execution script file* and *Post-execution script file* where the filename of the scripts to be run in each case can be entered.

.

17.6 Managerul istoricului

17.6.1 Procesarea istoricului

De fiecare dată când executai un algoritm, informaiile despre proces sunt stocate în managerul istoricului. Împreună cu parametrii utilizai, sunt salvate, de asemenea, data i ora executării.

This way, it is easy to track and control all the work that has been developed using the processing framework, and easily reproduce it.

Managerul de istoric reprezintă un set de intrări de registru, grupate în funcie de data de executare, ceea ce uurează informaiile despre un algoritm executat în orice moment anume.

Informaiile procesului sunt păstrate ca o expresie pentru linia de comandă, chiar dacă algoritmul a fost lansat din caseta de instrumente. Acest lucru îl face, de asemenea, util pentru cei care învaă cum să utilizeze interfaa liniei de comandă, deoarece acetia pot apela un algoritm folosind bara de instrumente i apoi să verifice managerul istoricului, pentru a vedea cum ar putea acelai algoritm să fie apelat din linia de comandă.

În afară de navigarea intrărilor în registru, putei, de asemenea re-executa procesele, printr-un simplu dublu-clic pe intrarea corespunzătoare.

Along with recording algorithm executions, the processing framework communicates with the user by means of the other groups of the registry, namely *Errors*, *Warnings* and *Information*. In case something is not working properly, having a look at the *Errors* might help you to see what is happening. If you get in contact with a

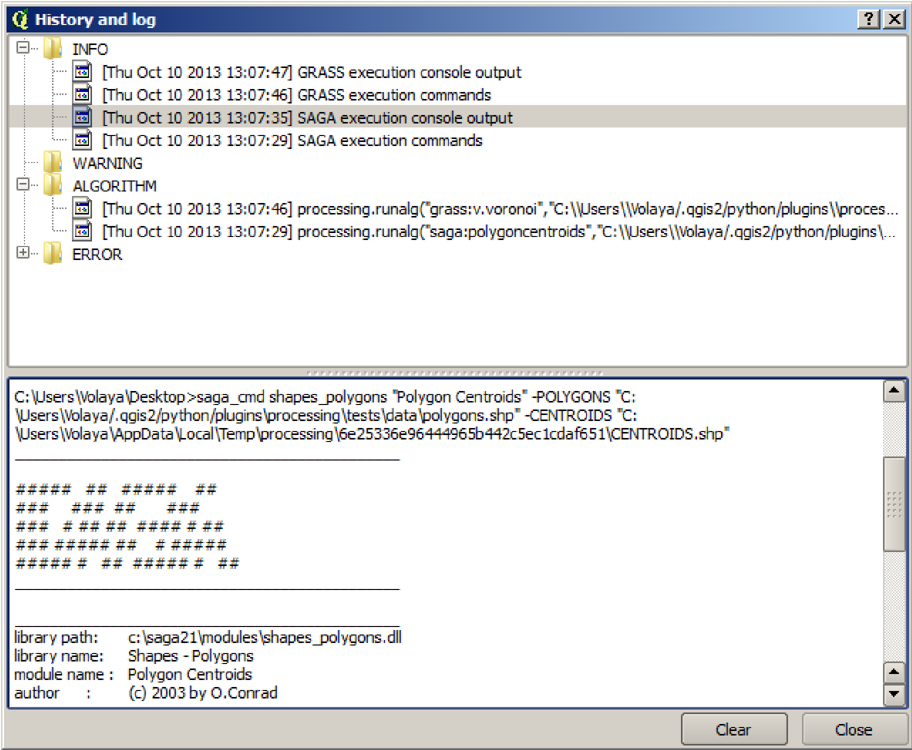


Figure 17.28: Istoricul

developer to report a bug or error, the information in that group will be very useful for her or him to find out what is going wrong.

Third-party algorithms are usually executed by calling their command-line interfaces, which communicate with the user via the console. Although that console is not shown, a full dump of it is stored in the *Information* group each time you run one of those algorithms. If, for instance, you are having problems executing a SAGA algorithm, look for an entry named 'SAGA execution console output' to check all the messages generated by SAGA and try to find out where the problem is.

Some algorithms, even if they can produce a result with the given input data, might add comments or additional information to the *Warning* block if they detect potential problems with the data, in order to warn you. Make sure you check those messages if you are having unexpected results.

17.7 Scrierea noilor Algoritmi de Procesare sub formă de script-uri Python

Putei crea proprii algoritmi, prin scrierea codului Python corespunzător i prin adăugarea câtorva linii suplimentare, pentru a furniza informaiile suplimentare, necesare pentru a defini semantica algoritmului. Putei găsi meniul *Create new script* în grupul *Tools* din blocul algoritmilor, al barei de instrumente. Facei dublu-clic pe el, pentru a deschide dialogul de editare a script-ului. Acolo ar trebui să tastai codul. Salvând script-ul de acolo în folderul `scripts` (implicit, atunci când deschidei dialogul de salvare a fiierului), cu extensia `.py`, se va crea automat algoritmul corespunzător.

The name of the algorithm (the one you will see in the toolbox) is created from the filename, removing its extension and replacing low hyphens with blank spaces.

Haidei să folosim următorul cod, care calculează Indicele de Umiditate Topografic (TWI) direct dintr-un DEM

```
##dem=raster
##twi=output raster
ret_slope = processing.runalg("saga:slopeaspectcurvature", dem, 0, None,
```

```
                None, None, None, None)
ret_area = processing.runalg("saga:catchmentarea", dem,
                0, False, False, False, False, None, None, None, None, None)
processing.runalg("saga:topographicwetnessindextwi, ret_slope['SLOPE'],
                ret_area['AREA'], None, 1, 0, twi)
```

As you can see, it involves 3 algorithms, all of them coming from SAGA. The last one of them calculates the TWI, but it needs a slope layer and a flow accumulation layer. We do not have these ones, but since we have the DEM, we can calculate them calling the corresponding SAGA algorithms.

The part of the code where this processing takes place is not difficult to understand if you have read the previous chapter. The first lines, however, need some additional explanation. They provide the information that is needed to turn your code into an algorithm that can be run from any of the GUI components, like the toolbox or the graphical modeler.

Aceste linii încep cu un dublu simbol de comentariu Python (`##`) i are următoarea structură

```
[parameter_name]=[parameter_type] [optional_values]
```

Here is a list of all the parameter types that are supported in processign scripts, their syntax and some examples.

- `raster`. Un strat raster
- `vector`. Un strat vectorial
- `table`. O tabelă
- `number`. O valoare numerică. Trebuie să fie specificată o valoare implicită. De exemplu, `depth=number 2.4`
- `string`. Un ir care cuprinde text. Ca i în cazul valorilor numerice, trebuie să existe o valoare implicită. De exemplu, `name=string Victor`
- `longstring`. Este similar irului de caractere, dar se va afia o casetă de text mai mare, mai potrivită pentru irurile lungi, cum ar fi un script care ateaptă un mic fragment de cod.
- `boolean`. O valoare booleană. Se adaugă `True` sau `False` pentru a seta valoarea implicită. De exemplu, `verbose=boolean True`.
- `multiple raster`. Un set de straturi raster de intrare.
- `multiple vector`. Un set de straturi vectoriale de intrare.
- `field`. A field in the attributes table of a vector layer. The name of the layer has to be added after the `field` tag. For instance, if you have declared a vector input with `mylayer=vector`, you could use `myfield=field mylayer` to add a field from that layer as parameter.
- `folder`. Un folder
- `file`. Un nume de fiier
- `crs`. Un Sistem de Coordonate de Referină

The parameter name is the name that will be shown to the user when executing the algorithm, and also the variable name to use in the script code. The value entered by the user for that parameter will be assigned to a variable with that name.

When showing the name of the parameter to the user, the name will be edited it to improve its appearance, replacing low hyphens with spaces. So, for instance, if you want the user to see a parameter named `A numerical value`, you can use the variable name `A_numerical_value`.

Layers and tables values are strings containing the filepath of the corresponding object. To turn them into a QGIS object, you can use the `processing.getObjectFromUri()` function. Multiple inputs also have a string value, which contains the filepaths to all selected objects, separated by semicolons (`;`).

Ieirile sunt definite într-un mod similar, folosind următoarele etichete:

- `output raster`

- `output vector`
- `output table`
- `output html`
- `output file`
- `output number`
- `output string`
- `output extent`

The value assigned to the output variables is always a string with a filepath. It will correspond to a temporary filepath in case the user has not entered any output filename.

In addition to the tags for parameters and outputs, you can also define the group under which the algorithm will be shown, using the `group` tag.

The last tag that you can use in your script header is `##nomodeler`. Use that when you do not want your algorithm to be shown in the modeler window. This should be used for algorithms that do not have a clear syntax (for instance, if the number of layers to be created is not known in advance, at design time), which make them unsuitable for the graphical modeler

17.8 Manipularea datelor produse de algoritm

When you declare an output representing a layer (raster, vector or table), the algorithm will try to add it to QGIS once it is finished. That is the reason why, although the `runalg()` method does not load the layers it produces, the final *TWI* layer will be loaded, since it is saved to the file entered by the user, which is the value of the corresponding output.

Do not use the `load()` method in your script algorithms, but just when working with the console line. If a layer is created as output of an algorithm, it should be declared as such. Otherwise, you will not be able to properly use the algorithm in the modeler, since its syntax (as defined by the tags explained above) will not match what the algorithm really creates.

Hidden outputs (numbers and strings) do not have a value. Instead, it is you who has to assign a value to them. To do so, just set the value of a variable with the name you used to declare that output. For instance, if you have used this declaration,

```
##average=output number
```

următoarea linie va seta valoarea de ieire la 5:

```
average = 5
```

17.9 Comunicarea cu utilizatorul

If your algorithm takes a long time to process, it is a good idea to inform the user. You have a global named `progress` available, with two available methods: `setText(text)` and `setPercentage(percent)` to modify the progress text and the progress bar.

If you have to provide some information to the user, not related to the progress of the algorithm, you can use the `setInfo(text)` method, also from the `progress` object.

If your script has some problem, the correct way of propagating it is to raise an exception of type `GeoAlgorithmExecutionException()`. You can pass a message as argument to the constructor of the exception. Processing will take care of handling it and communicating with the user, depending on where the algorithm is being executed from (toolbox, modeler, Python console...)

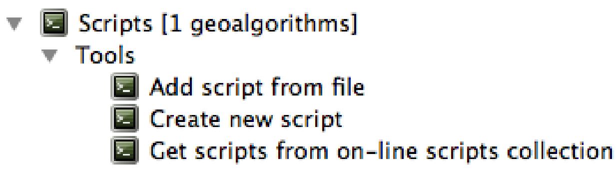
17.10 Documentarea script-urilor

As in the case of models, you can create additional documentation for your script, to explain what they do and how to use them. In the script editing dialog you will find a **[Edit script help]** button. Click on it and it will take you to the help editing dialog. Check the chapter about the graphical modeler to know more about this dialog and how to use it.

Help files are saved in the same folder as the script itself, adding the `.help` extension to the filename. Notice that you can edit your script's help before saving it for the first time. If you later close the script editing dialog without saving the script (i.e. you discard it), the help content you wrote will be lost. If your script was already saved and is associated to a filename, saving is done automatically.

17.11 Exemple de script-uri

Several examples are available in the on-line collection of scripts, which you can access by selecting the *Get script from on-line script collection* tool under the *Scripts/tools* entry in the toolbox.



Please, check them to see real examples of how to create algorithms using the processing framework classes. You can right-click on any script algorithm and select *Edit script* to edit its code or just to see it.

17.12 Cele mai bune practici pentru scrierea algoritmilor pentru script

Here's a quick summary of ideas to consider when creating your script algorithms and, especially, if you want to share with other QGIS users. Following these simple rules will ensure consistency across the different Processing elements such as the toolbox, the modeler or the batch processing interface.

- Do not load resulting layers. Let Processing handle your results and load your layers if needed.
- Always declare the outputs your algorithm creates. Avoid things such as declaring one output and then using the destination filename set for that output to create a collection of them. That will break the correct semantics of the algorithm and make it impossible to use it safely in the modeler. If you have to write an algorithm like that, make sure you add the `##nomodeler` tag.
- Do not show message boxes or use any GUI element from the script. If you want to communicate with the user, use the `setInfo()` method or throw an `GeoAlgorithmExecutionException`
- As a rule of thumb, do not forget that your algorithm might be executed in a context other than the Processing toolbox.

17.13 Script de interceptare a pre- i post-execuiei

Scripts can also be used to set pre- and post-execution hooks that are run before and after an algorithm is run. This can be used to automate tasks that should be performed whenever an algorithm is executed.

The syntax is identical to the syntax explained above, but an additional global variable named `alg` is available, representing the algorithm that has just been (or is about to be) executed.

In the *General* group of the processing config dialog you will find two entries named *Pre-execution script file* and *Post-execution script file* where the filename of the scripts to be run in each case can be entered.

.

17.14 Configurarea Aplicaiilor Externe

The processing framework can be extended using additional applications. Currently, SAGA, GRASS, OTB (Orfeo Toolbox) and R are supported, along with some other command-line applications that provide spatial data analysis functionalities. Algorithms relying on an external application are managed by their own algorithm provider.

This section will show you how to configure the processing framework to include these additional applications, and it will explain some particular features of the algorithms based on them. Once you have correctly configured the system, you will be able to execute external algorithms from any component like the toolbox or the graphical modeler, just like you do with any other geoalgorithm.

By default, all algorithms that rely on an external appplication not shipped with QGIS are not enabled. You can enable them in the configuration dialog. Make sure that the corresponding application is already installed in your system. Enabling an algorithm provider without installing the application it needs will cause the algorithms to appear in the toolbox, but an error will be thrown when you try to execute them.

This is because the algorithm descriptions (needed to create the parameters dialog and provide the information needed about the algorithm) are not included with each application, but with QGIS instead. That is, they are part of QGIS, so you have them in your installation even if you have not installed any other software. Running the algorithm, however, needs the application binaries to be installed in your system.

17.14.1 O notă pentru utilizatorii de Windows

If you are not an advanced user and you are running QGIS on Windows, you might not be interested in reading the rest of this chapter. Make sure you install QGIS in your system using the standalone installer. That will automatically install SAGA, GRASS and OTB in your system and configure them so they can be run from QGIS. All the algorithms in the simplified view of the toolbox will be ready to be run without needing any further configuration. If installing through OSGeo4W application, make sure you select for insttallation SAGA and OTB as well.

If you want to know more about how these providers work, or if you want to use some algorithms not included in the simplified toolbox (such as R scripts), keep on reading.

17.14.2 O notă privind formatele de fiiere

When using an external software, opening a file in QGIS does not mean that it can be opened and processed as well in that other software. In most cases, other software can read what you have opened in QGIS, but in some cases, that might not be true. When using databases or uncommon file formats, whether for raster or vector layers, problems might arise. If that happens, try to use well-known file formats that you are sure are understood by both programs, and check the console output (in the history and log dialog) to know more about what is going wrong.

Using GRASS raster layers is, for instance, one case in which you might have trouble and not be able to complete your work if you call an external algorithm using such a layer as input. For this reason, these layers will not appear as available to algorithms.

You should, however, find no problems at all with vector layers, since QGIS automatically converts from the original file format to one accepted by the external application before passing the layer to it. This adds extra processing time, which might be significant if the layer has a large size, so do not be surprised if it takes more time to process a layer from a DB connection than it does to process one of a similar size stored in a shapefile.

Providers not using external applications can process any layer that you can open in QGIS, since they open it for analysis through QGIS.

Regarding output formats, all formats supported by QGIS as output can be used, both for raster and vector layers. Some providers do not support certain formats, but all can export to common raster layer formats that can later be transformed by QGIS automatically. As in the case of input layers, if this conversion is needed, that might increase the processing time.

If the extension of the filename specified when calling an algorithm does not match the extension of any of the formats supported by QGIS, then a suffix will be added to set a default format. In the case of raster layers, the `.tif` extension is used, while `.shp` is used for vector layers.

17.14.3 O notă privind seleciile stratului vectorial

External applications may also be made aware of the selections that exist in vector layers within QGIS. However, that requires rewriting all input vector layers, just as if they were originally in a format not supported by the external application. Only when no selection exists, or the *Use only selected features* option is not enabled in the processing general configuration, can a layer be directly passed to an external application.

În alte cazuri, este necesară exportarea doar a entităilor selectate, care provoacă timpi de execuie mai lungi.

SAGA

SAGA algorithms can be run from QGIS if you have SAGA installed in your system and you configure the processing framework properly so it can find SAGA executables. In particular, the SAGA command-line executable is needed to run SAGA algorithms.

If you are running Windows, both the stand-alone installer and the OSGeo4W installer include SAGA along with QGIS, and the path is automatically configured, so there is no need to do anything else.

If you have installed SAGA yourself (remember, you need version 2.1), the path to the SAGA executable must be configured. To do this, open the configuration dialog. In the *SAGA* block, you will find a setting named *SAGA Folder*. Enter the path to the folder where SAGA is installed. Close the configuration dialog, and now you are ready to run SAGA algorithms from QGIS.

If you are running Linux, SAGA binaries are not included with SEXTANTE, so you have to download and install the software yourself. Please check the SAGA website for more information. SAGA 2.1 is needed.

In this case, there is no need to configure the path to the SAGA executable, and you will not see those folders. Instead, you must make sure that SAGA is properly installed and its folder is added to the PATH environment variable. Just open a console and type `saga_cmd` to check that the system can find where the SAGA binaries are located.

17.14.4 Despre limitările sistemului grilă SAGA

Most SAGA algorithms that require several input raster layers require them to have the same grid system. That is, they must cover the same geographic area and have the same cell size, so their corresponding grids match. When calling SAGA algorithms from QGIS, you can use any layer, regardless of its cell size and extent. When multiple raster layers are used as input for a SAGA algorithm, QGIS resamples them to a common grid system and then passes them to SAGA (unless the SAGA algorithm can operate with layers from different grid systems).

Definirea acestui sistem grilă comun este controlată de către utilizator, acest lucru putând făcut din zona grupului SAGA al ferestrei de setare. Există două modalităi de stabilire a sistemului grilă intă:

- Setare manuală. Putei defini extinderea, prin stabilirea valorilor următorilor parametri:
  - *Reeantionare min X*
  - *Reeantionare max X*
  - *Reeantionare min Y*
  - *Reeantionare max Y*
  - *Reeantionare dimensiune celulă*

Notice that QGIS will resample input layers to that extent, even if they do not overlap with it.

- Setare automată din straturile de intrare. Pentru a selecta această opiune, doar să verificai opiunea *Use min covering grid system for resampling*. Toate celelalte setări vor fi ignorate, iar extinderea minimă care acoperă toate straturile de intrare va fi utilizată. Dimensiunea celulei din stratul intă reprezintă maximul dimensiunilor tuturor celulelor din straturile de intrare.

For algorithms that do not use multiple raster layers, or for those that do not need a unique input grid system, no resampling is performed before calling SAGA, and those parameters are not used.

17.14.5 Limitări pentru straturile multi-bandă

Unlike QGIS, SAGA has no support for multi-band layers. If you want to use a multiband layer (such as an RGB or multispectral image), you first have to split it into single-banded images. To do so, you can use the 'SAGA/Grid - Tools/Split RGB image' algorithm (which creates three images from an RGB image) or the 'SAGA/Grid - Tools/Extract band' algorithm (to extract a single band).

17.14.6 Limitări de mărime a celulelor

SAGA assumes that raster layers have the same cell size in the X and Y axis. If you are working with a layer with different values for horizontal and vertical cell size, you might get unexpected results. In this case, a warning will be added to the processing log, indicating that an input layer might not be suitable to be processed by SAGA.

17.14.7 Jurnalizare

When QGIS calls SAGA, it does so using its command-line interface, thus passing a set of commands to perform all the required operations. SAGA shows its progress by writing information to the console, which includes the percentage of processing already done, along with additional content. This output is filtered and used to update the progress bar while the algorithm is running.

Both the commands sent by QGIS and the additional information printed by SAGA can be logged along with other processing log messages, and you might find them useful to track in detail what is going on when QGIS runs a SAGA algorithm. You will find two settings, namely *Log console output* and *Log execution commands*, to activate that logging mechanism.

Most other providers that use an external application and call it through the command-line have similar options, so you will find them as well in other places in the processing settings list.

R. Creating R scripts

R integration in QGIS is different from that of SAGA in that there is not a predefined set of algorithms you can run (except for a few examples). Instead, you should write your scripts and call R commands, much like you would do from R, and in a very similar manner to what we saw in the section dedicated to processing scripts. This section shows you the syntax to use to call those R commands from QGIS and how to use QGIS objects (layers, tables) in them.

The first thing you have to do, as we saw in the case of SAGA, is to tell QGIS where your R binaries are located. You can do this using the *R folder* entry in the processing configuration dialog. Once you have set that parameter, you can start creating and executing your own R scripts.

Once again, this is different in Linux, and you just have to make sure that the R folder is included in the PATH environment variable. If you can start R just typing `R` in a console, then you are ready to go.

To add a new algorithm that calls an R function (or a more complex R script that you have developed and you would like to have available from QGIS), you have to create a script file that tells the processing framework how to perform that operation and the corresponding R commands to do so.

R script files have the extension .rsx, and creating them is pretty easy if you just have a basic knowledge of R syntax and R scripting. They should be stored in the R scripts folder. You can set this folder in the *R* settings group (available from the processing settings dialog), just like you do with the folder for regular processing scripts.

Let's have a look at a very simple script file, which calls the R method spsample to create a random grid within the boundary of the polygons in a given polygon layer. This method belongs to the maptools package. Since almost all the algorithms that you might like to incorporate into QGIS will use or generate spatial data, knowledge of spatial packages like maptools and, especially, sp, is mandatory.

```
##polyg=vector
##numpoints=number 10
##output=output vector
##sp=group
pts=spsample(polyg,numpoints,type="random")
output=SpatialPointsDataFrame(pts, as.data.frame(pts))
```

The first lines, which start with a double Python comment sign (##), tell QGIS the inputs of the algorithm described in the file and the outputs that it will generate. They work with exactly the same syntax as the SEXTANTE scripts that we have already seen, so they will not be described here again.

When you declare an input parameter, QGIS uses that information for two things: creating the user interface to ask the user for the value of that parameter and creating a corresponding R variable that can later be used as input for R commands.

In the above example, we are declaring an input of type vector named polyg. When executing the algorithm, QGIS will open in R the layer selected by the user and store it in a variable also named polyg. So, the name of a parameter is also the name of the variable that we can use in R for accesing the value of that parameter (thus, you should avoid using reserved R words as parameter names).

Spatial elements such as vector and raster layers are read using the readOGR() and brick() commands (you do not have to worry about adding those commands to your description file – QGIS will do it), and they are stored as Spatial*DataFrame objects. Table fields are stored as strings containing the name of the selected field.

Tabelele sunt deschise folosind comanda read.csv(). În cazul în care un tabel introdus de către utilizator nu este în format CSV, acesta va fi convertit înainte de importul în R.

În plus, fiierele raster pot fi citite prin utilizarea comenzii readGDAL() în loc de brick()``atuni când se folosete ``##usereadgdal.

If you are an advanced user and do not want QGIS to create the object representing the layer, you can use the ##passfilename tag to indicate that you prefer a string with the filename instead. In this case, it is up to you to open the file before performing any operation on the data it contains.

Cu ajutorul informaiilor de mai sus, putem înelege acum prima linie de primul nostru exemplu de script (prima linie care nu începe cu un comentariu Python).

```
pts=spsample(polyg,numpoints,type="random")
```

The variable polygon already contains a SpatialPolygonsDataFrame object, so it can be used to call the spsample method, just like the numpoints one, which indicates the number of points to add to the created sample grid.

Since we have declared an output of type vector named out, we have to create a variable named out and store a Spatial*DataFrame object in it (in this case, a SpatialPointsDataFrame). You can use any name for your intermediate variables. Just make sure that the variable storing your final result has the same name that you used to declare it, and that it contains a suitable value.

In this case, the result obtained from the spsample method has to be converted explicitly into a SpatialPointsDataFrame object, since it is itself an object of class ppp, which is not a suitable class to be returned to QGIS.

If your algorithm generates raster layers, the way they are saved will depend on whether or not you have used the #dontuserasterpackage option. In you have used it, layers are saved using the writeGDAL() method. If not, the writeRaster() method from the raster package will be used.

If you have used the `#passfilename` option, outputs are generated using the `raster` package (with `writeRaster()`), even though it is not used for the inputs.

If your algorithm does not generate any layer, but rather a text result in the console instead, you have to indicate that you want the console to be shown once the execution is finished. To do so, just start the command lines that produce the results you want to print with the > ('greater') sign. The output of all other lines will not be shown. For instance, here is the description file of an algorithm that performs a normality test on a given field (column) of the attributes of a vector layer:

```
##layer=vector
##field=field layer
##nortest=group
library(nortest)
>lillie.test(layer[[field]])
```

The output of the last line is printed, but the output of the first is not (and neither are the outputs from other command lines added automatically by QGIS).

Dacă algoritmul dvs. creează orice gen de grafic (folosind metoda `plot()`), adăugai următoarea linie:

```
##showplots
```

This will cause QGIS to redirect all R graphical outputs to a temporary file, which will be opened once R execution has finished.

Ambele rezultate grafice cât i cele din consolă vor fi afiate în managerul rezultatelor procesării.

For more information, please check the script files provided with SEXTANTE. Most of them are rather simple and will greatly help you understand how to create your own scripts.

Note: `rgdal` and `maptools` libraries are loaded by default, so you do not have to add the corresponding `library()` commands (you just have to make sure that those two packages are installed in your R distribution). However, other additional libraries that you might need have to be explicitly loaded. Just add the necessary commands at the beginning of your script. You also have to make sure that the corresponding packages are installed in the R distribution used by QGIS. The processing framework will not take care of any package installation. If you run a script that requires a package that is not installed, the execution will fail, and Processing will try to detect which packages are missing. You must install those missing libraries manually before you can run the algorithm.

GRASS

Configuring GRASS is not much different from configuring SAGA. First, the path to the GRASS folder has to be defined, but only if you are running Windows. Additionaly, a shell interpreter (usually `msys.exe`, which can be found in most GRASS for Windows distributions) has to be defined and its path set up as well.

By default, the processing framework tries to configure its GRASS connector to use the GRASS distribution that ships along with QGIS. This should work without problems in most systems, but if you experience problems, you might have to configure the GRASS connector manually. Also, if you want to use a different GRASS installation, you can change that setting and point to the folder where the other version is installed. GRASS 6.4 is needed for algorithms to work correctly.

Dacă lucrai pe Linux, trebuie doar să vă asigurai că GRASS este instalat corect i că poate fi rulat fără probleme de la o consolă.

GRASS algorithms use a region for calculations. This region can be defined manually using values similar to the ones found in the SAGA configuration, or automatically, taking the minimum extent that covers all the input layers used to execute the algorithm each time. If the latter approach is the behaviour you prefer, just check the *Use min covering region* option in the GRASS configuration parameters.

The last parameter that has to be configured is related to the mapset. A mapset is needed to run GRASS, and the processing framework creates a temporary one for each execution. You have to specify if the data you are working with uses geographical (lat/lon) coordinates or projected ones.

GDAL

No additional configuration is needed to run GDAL algorithms. Since they are already incorporated into QGIS, the algorithms can infer their configuration from it.

Orfeo Toolbox

Orfeo Toolbox (OTB) algorithms can be run from QGIS if you have OTB installed in your system and you have configured QGIS properly, so it can find all necessary files (command-line tools and libraries).

As in the case of SAGA, OTB binaries are included in the stand-alone installer for Windows, but they are not included if you are runing Linux, so you have to download and install the software yourself. Please check the OTB website for more information.

Once OTB is installed, start QGIS, open the processing configuration dialog and configure the OTB algorithm provider. In the *Orfeo Toolbox (image analysis)* block, you will find all settings related to OTB. First, ensure that algorithms are enabled.

Then, configure the path to the folder where OTB command-line tools and libraries are installed:

- Usually *OTB applications folder* points to `/usr/lib/otb/applications` and *OTB command line tools folder* is `/usr/bin`.
- If you use the OSGeo4W installer, then install `otb-bin` package and enter `C:\OSGeo4W\apps\orfeotoolbox\applications` as *OTB applications folder* and `C:\OSGeo4W\bin` as *OTB command line tools folder*. These values should be configured by default, but if you have a different OTB installation, configure them to the corresponding values in your system.

TauDEM

To use this provider, you need to install TauDEM command line tools.

17.14.8 Windows

Please visit the TauDEM homepage for installation instructions and precompiled binaries for 32-bit and 64-bit systems. **IMPORTANT**: You need TauDEM 5.0.6 executables. Version 5.2 is currently not supported.

17.14.9 Linux

There are no packages for most Linux distributions, so you should compile TauDEM by yourself. As TauDEM uses MPICH2, first install it using your favorite package manager. Alternatively, TauDEM works fine with Open MPI, so you can use it instead of MPICH2.

Download TauDEM 5.0.6 source code and extract the files in some folder.

Deschidei fiierul `linearpart.h`, apoi după linia

```
#include "mpi.h"
```

adăugai o nouă linie cu

```
#include <stdint.h>
```

astfel, vei obine

```
#include "mpi.h"
#include <stdint.h>
```

Salvai modificările i închidei fiierul. Acum deschidei `tiffIO.h`, găsii linia `#include "stdint.h"` i înlocuii ghilimelele (`" "`) cu `<>`, apoi vei obine

```
#include <stdint.h>
```

Save the changes and close the file. Create a build directory and cd into it

```
mkdir build
cd build
```

Configure your build with the command

```
CXX=mpicxx cmake -DCMAKE_INSTALL_PREFIX=/usr/local ..
```

and then compile

```
make
```

Finally, to install TauDEM into `/usr/local/bin`, run

```
sudo make install
```

.

17.15 QGIS Commander

Processing includes a practical tool that allows you to run algorithms without having to use the toolbox, but just by typing the name of the algorithm you want to run.

Instrumentul este cunoscut ca i *QGIS commander*, i constă doar într-o simplă casetă de text cu autocompletare, unde vei tasta comanda pe care dorii să o rulai.

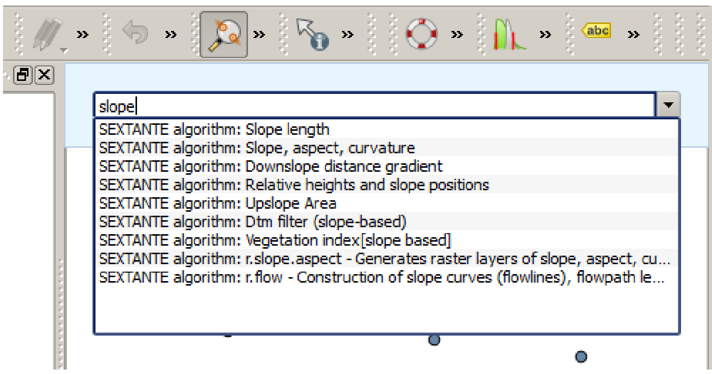


Figure 17.29: The QGIS Commander

The Commander is started from the *Analysis* menu or, more practically, by pressing `Shift + Ctrl + M` (you can change that default keyboard shortcut in the QGIS configuration if you prefer a different one). Apart from executing Processing algorithms, the Commander gives you access to most of the functionality in QGIS, which means that it gives you a practical and efficient way of running QGIS tasks and allows you to control QGIS with reduced usage of buttons and menus.

Moreover, the Commander is configurable, so you can add your custom commands and have them just a few keystrokes away, making it a powerful tool to help you become more productive in your daily work with QGIS.

17.15.1 Comenzi disponibile

Comenzile disponibile în Commander se încadrează în următoarele categorii:

- Algoritmi de procesare. Acetia sunt afiai ca `Algoritmi de procesare: <name of the algorithm>`.
- Menu items. These are shown as `Menu item: <menu entry text>`. All menus items available from the QGIS interface are available, even if they are included in a submenu.
- Funcii Python. Putei crea funcii scurte Python care vor fi incluse în lista de comenzi disponibile. Acestea sunt afiate ca `Funcia: <function name>`.

Pentru a rula oricare dintre categorii, este suficient să începei să tastai, apoi să selectai elementul corespunzător din lista de comenzi disponibile, care apare după filtrarea întregii liste de comenzi, generată de textul introdus.

In the case of calling a Python function, you can select the entry in the list, which is prefixed by `Function:` (for instance, `Function: removeall), or just directly type the function name (``removeall` in the previous example). There is no need to add brackets after the function name.

17.15.2 Crearea funciilor personalizate

Custom functions are added by entering the corresponding Python code in the `commands.py` file that is found in the `.qgis/sextante/commander directory` in your user folder. It is just a simple Python file where you can add the functions that you need.

The file is created with a few example functions the first time you open the Commander. If you haven't launched the Commander yet, you can create the file yourself. To edit the commands file, use your favorite text editor. You can also use a built-in editor by calling the `edit` command from the Commander. It will open the editor with the commands file, and you can edit it directly and then save your changes.

For instance, you can add the following function, which removes all layers:

```
from qgis.gui import *

def removeall():
    mapreg = QgsMapLayerRegistry.instance()
    mapreg.removeAllMapLayers()
```

După ce ai adăugat funcia, ea va fi disponibilă în Commander, putând-o invoca prin tastarea `removeall`. Nu este nevoie să facei nimic în afară de scrierea funciei în sine.

Functions can receive parameters. Add `*args` to your function definition to receive arguments. When calling the function from the Commander, parameters have to be passed separated by spaces.

Here is an example of a function that loads a layer and takes a parameter with the filename of the layer to load.

```
import processing

def load(*args):
  processing.load(args[0])
```

If you want to load the layer in `/home/myuser/points.shp`, type `load /home/myuser/points.shp` in the Commander text box.

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CHAPTER 18

Compozitorul de Hări

With the Print Composer you can create nice maps and atlasses that can be printed or saved as PDF-file, an image or an SVG-file. This is a powerfull way to share geographical information produced with QGIS that can be included in reports or published.

The Print Composer provides growing layout and printing capabilities. It allows you to add elements such as the QGIS map canvas, text labels, images, legends, scale bars, basic shapes, arrows, attribute tables and HTML frames. You can size, group, align, position and rotate each element and adjust the properties to create your layout. The layout can be printed or exported to image formats, PostScript, PDF or to SVG (export to SVG is not working properly with some recent Qt4 versions; you should try and check individually on your system). You can save the layout as a template and load it again in another session. Finally, generating several maps based on a template can be done through the atlas generator. See a list of tools in table_composer_1:

Pictogramă	Scop	Pictogramă	Scop
	Salvarea Proiectului		Compozitor Nou
	Duplicare Compozitor		Managerul Compoziiilor
	Încărcare din ablon		Salvare ca ablon
	Print or export as PostScript		Exportare într-un format de imagine
	Exportă compoziia în format SVG		Exportare ca PDF
	Revenire la ultima modificare		Restaurare conform ultimei modificări
	Transfocare pe ansamblu		Zoom to 100%
	Apropiere		Îndepărtare
	Refresh View		
	Pan		Zoom to specific region
	Selectează/Mută elementul în compoziie		Mută coninutul în interiorul unui element
	Adaugă noua hartă din canevasul hării QGIS		Adaugă imaginea în compoziie
	Adaugă eticheta în compoziie		Adaugă noua legendă în compoziie
	Add scale bar to print composition		Adaugă formele de bază în compoziie
	Adaugă săgeata în compoziie		Adaugă tabela de atribute în compoziie
	Add an HTML frame		
	Grupează elementele în compoziie		Degrupează elementele din compoziie
	Lock Selected Items		Unlock All items
	Ridică elementele selectate		Coboară elementele selectate
	Mută în capătul de sus elementele selectate		Mută în capătul de jos elementele selectate
	Aliniere la stânga a elementelor selectate		Aliniază la dreapta elementele selectate
	Aliniere în centru a elementelor selectate		Aliniere în centru, pe vericală, a elementelor selectate
	Aliniere în sus a elementelor selectate		Aliniere în jos a elementelor selectate
	Preview Atlas		First Feature
	Previous Feature		Next Feature
	Last feature		Print Atlas
	Export Atlas as Image		Atlas Settings

Tabelul Compoziiilor 1: Instrumentele Compozitorului de Hări

Toate instrumentele din Compozitorul de Hări sunt disponibile atât în meniuri, cât i ca pictograme în bara de instrumente. Bara de instrumente poate fi activată i dezactivată, prin apăsarea butonului din dreapta al mouse-ului deasupra barei de instrumente.

18.1 Primii pai

18.1.1 Deschide un nou ablon al Compozitorului de Hări

Before you start to work with the Print Composer, you need to load some raster and vector layers in the QGIS map canvas and adapt their properties to suit your own convenience. After everything is rendered and symbolized to your liking, click the New Print Composer icon in the toolbar or choose *File* → *New Print Composer*. You will be prompted to choose a title for the new Composer.

18.1.2 Overview of the Print Composer

Opening the Print Composer provides you with a blank canvas that represents the paper surface when using the print option. Initially you find buttons on the left beside the canvas to add map composer items; the current QGIS map canvas, text labels, images, legends, scale bars, basic shapes, arrows, attribute tables and HTML frames. In this toolbar you also find toolbar buttons to navigate, zoom in on an area and pan the view on the composer and toolbar buttons to select a map composer item and to move the contents of the map item.

Figure_composer_overview shows the initial view of the Print Composer before any elements are added.

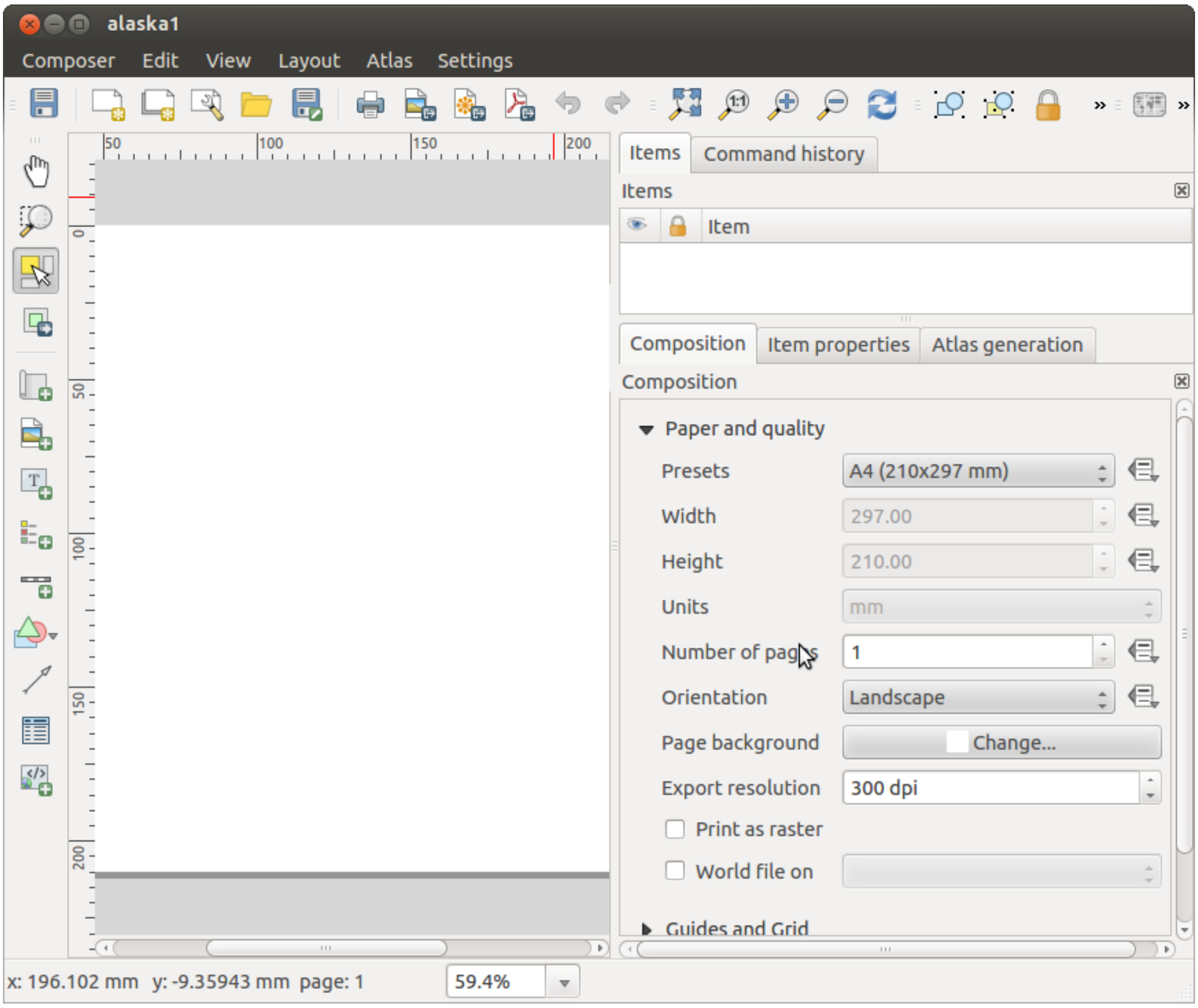

Figure 18.1: Compozitorul de Hări

On the right beside the canvas you find two panels. The upper panel holds the tabs *Items* and *Command History* and the lower panel holds the tabs *Composition*, *Item properties* and *Atlas generation*.

- The *Items* tab provides a list of all map composer items added to the canvas.
- The *Command history* tab displays a history of all changes applied to the Print Composer layout. With a mouse click, it is possible to undo and redo layout steps back and forth to a certain status.
- The *Composition* tab allows you to set paper size, orientation, the page background, number of pages and print quality for the output file in dpi. Furthermore, you can also activate the *Print as raster* checkbox. This means all items will be converted to raster before printing or saving as PostScript or PDF. In this tab, you can also customize settings for grid and smart guides.
- The *Item Properties* tab displays the properties for the selected item. Click the Select/Move item icon to select an item (e.g., legend, scale bar or label) on the canvas. Then click the *Item Properties* tab and customize the settings for the selected item.
- The *Atlas generation* tab allows you to enable the generation of an atlas for the current Composer and gives access to its parameters.
- Finally, you can save your print composition with the Save Project button.

In the bottom part of the Print Composer window, you can find a status bar with mouse position, current page number and a combo box to set the zoom level.

You can add multiple elements to the Composer. It is also possible to have more than one map view or legend or scale bar in the Print Composer canvas, on one or several pages. Each element has its own properties and, in the case of the map, its own extent. If you want to remove any elements from the Composer canvas you can do that with the `Delete` or the `Backspace` key.

Instrumentele de navigare

To navigate in the canvas layout, the Print Composer provides some general tools:

- Mărire
- Micorare
- Zoom full
- Zoom to 100%
- Refresh view (if you find the view in an inconsistent state)
- Pan composer
- Zoom (zoom to a specific region of the Composer)

You can change the zoom level also using the mouse wheel or the combo box in the status bar. If you need to switch to pan mode while working in the Composer area, you can hold the `Spacebar` or the the mouse wheel. With `Ctrl+Spacebar`, you can temporarily switch to zoom mode, and with `Ctrl+Shift+Spacebar`, to zoom out mode.

18.1.3 Sample Session

To demonstrate how to create a map please follow the next instructions.

1. On the left site, select the Add new map toolbar button and draw a rectangle on the canvas holding down the left mouse button. Inside the drawn rectangle the QGIS map view to the canvas.
2. Select the Add new scalebar toolbar button and place the map item with the left mouse button on the Print Composer canvas. A scalebar will be added to the canvas.

3. Select the Add new legend toolbar button and draw a rectangle on the canvas holding down the left mouse button. Inside the drawn rectangle the legend will be drawn.
4. Select the Select/Move item icon to select the map on the canvas and move it a bit.
5. While the map item is still selected you can also change the size of the map item. Click while holding down the left mouse button, in a white little rectangle in one of the corners of the map item and drag it to a new location to change it's size.
6. Click the *Item Properties* tab on the left lower panel and find the setting for the orientation. Change the value of the setting *Map orientation* to '15.00° '. You should see the orientation of the map item change.
7. Finally, you can save your print composition with the Save Project button.

18.1.4 Print Composer Options

From *Settings → Composer Options* you can set some options that will be used as default during your work.

- *Compositions defaults* let you specify the default font to use.
- With *Grid appearance*, you can set the grid style and its color. There are three types of grid: **Dots**, **Solid** lines and **Crosses**.
- *Grid and guide defaults* defines spacing, offset and tolerance of the grid.

18.1.5 Fila compoziiei — Configurarea compoziiei generale

În fila *Compoziiilor*, putei defini setările globale ale compoziiei dvs.

- You can choose one of the *Presets* for your paper sheet, or enter your custom *width* and *height*.
- Composition can now be divided into several pages. For instance, a first page can show a map canvas, and a second page can show the attribute table associated with a layer, while a third one shows an HTML frame linking to your organization website. Set the *Number of pages* to the desired value. You can choose the page *Orientation* and its *Exported resolution*. When checked, *print as raster* means all elements will be rasterized before printing or saving as PostScript or PDF.
- *Grid and guides* lets you customize grid settings like *spacings*, *offsets* and *tolerance* to your need. The tolerance is the maximum distance below which an item is snapped to smart guides.

Snap to grid and/or to smart guides can be enabled from the *View* menu. In this menu, you can also hide or show the grid and smart guides.

18.1.6 Composer items common options

Composer items have a set of common properties you will find on the bottom of the *Item Properties* tab: Position and size, Rotation, Frame, Background, Item ID and Rendering (See figure_composer_common_1).

- Dialogul *Position and size* vă permite definirea dimensiunii i a poziiei cadrului care conine elementul. Putei alege, de asemenea, care *Punct de Referină* va fi setat la coordonatele **X** i **Y** definite anterior.
- The *Rotation* sets the rotation of the element (in degrees).
- The *Frame* shows or hides the frame around the label. Use the *Frame color* and *Thickness* menus to adjust those properties.
- Use the *Background color* menu for setting a background color. With the dialog you can pick a color (see *Color Picker*).

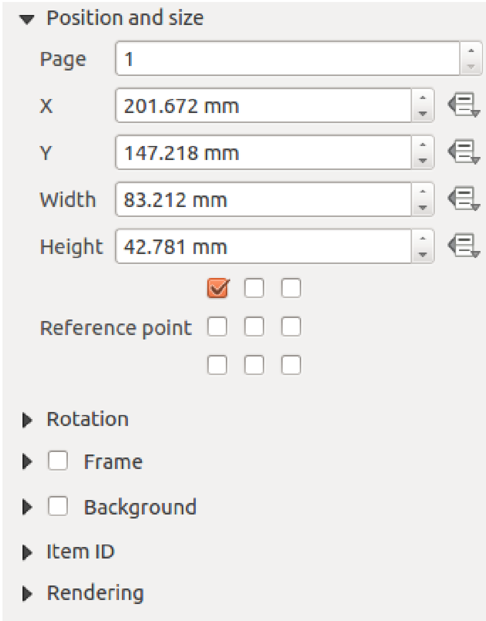

Figure 18.2: Dialogul proprietăilor elementelor comune

- Use the *Item ID* to create a relationship to other Print Composer items. This is used with QGIS server and any potential web client. You can set an ID on an item (e.g., a map and a label), and then the web client can send data to set a property (e.g., label text) for that specific item. The GetProjectSettings command will list what items and which IDs are available in a layout.
- *Rendering* mode can be selected in the option field. See Rendering_Mode.

Note:

- If you checked *Use live-updating color chooser dialogs* in the QGIS general options, the color button will update as soon as you choose a new color from **Color Dialog** windows. If not, you need to close the **Color Dialog**.
- The Data defined override icon next to a field means that you can associate the field with data in the map item or use expressions. These are particularly helpful with atlas generation (See atlas_data_defined_overrides).

18.2 Mod de randare

QGIS now allows advanced rendering for Composer items just like vector and raster layers.

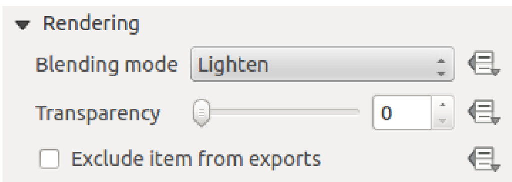

Figure 18.3: Mod de randare

- *Transparency* : You can make the underlying item in the Composer visible with this tool. Use the slider to adapt the visibility of your item to your needs. You can also make a precise definition of the percentage of visibility in the menu beside the slider.

- *Exclude item from exports*: You can decide to make an item not visible in all exports. After activating this checkbox, the item will not be included in PDF's, prints etc..
- *Blending mode*: You can achieve special rendering effects with these tools that you previously only may know from graphics programs. The pixels of your overlaying and underlaying items are mixed through the settings described below.
  - Normal: This is the standard blend mode, which uses the alpha channel of the top pixel to blend with the pixel beneath it; the colors aren't mixed.
  - Lighten: This selects the maximum of each component from the foreground and background pixels. Be aware that the results tend to be jagged and harsh.
  - Screen: Light pixels from the source are painted over the destination, while dark pixels are not. This mode is most useful for mixing the texture of one layer with another layer (e.g., you can use a hillshade to texture another layer).
  - Dodge: Dodge will brighten and saturate underlying pixels based on the lightness of the top pixel. So, brighter top pixels cause the saturation and brightness of the underlying pixels to increase. This works best if the top pixels aren't too bright; otherwise the effect is too extreme.
  - Addition: This blend mode simply adds pixel values of one layer with pixel values of the other. In case of values above 1 (as in the case of RGB), white is displayed. This mode is suitable for highlighting features.
  - Darken: This creates a resultant pixel that retains the smallest components of the foreground and background pixels. Like lighten, the results tend to be jagged and harsh.
  - Multiply: Here, the numbers for each pixel of the top layer are multiplied with the numbers for the corresponding pixel of the bottom layer. The results are darker pictures.
  - Burn: Darker colors in the top layer cause the underlying layers to darken. Burn can be used to tweak and colorise underlying layers.
  - Overlay: This mode combines the multiply and screen blending modes. In the resulting picture, light parts become lighter and dark parts become darker.
  - Soft light: This is very similar to overlay, but instead of using multiply/screen it uses color burn/dodge. This mode is supposed to emulate shining a soft light onto an image.
  - Lumina puternică: lumina puternică este similară cu modul de suprapunere. Este gândită să imite proiectarea unei lumini foarte intense pe o imagine.
  - Difference: Difference subtracts the top pixel from the bottom pixel, or the other way around, to always get a positive value. Blending with black produces no change, as the difference with all colors is zero.
  - Subtract: This blend mode simply subtracts pixel values of one layer with pixel values of the other. In case of negative values, black is displayed.

18.3 Elementele Compozitorului

18.3.1 The Map item

Click on the Add new map toolbar button in the Print Composer toolbar to add the QGIS map canvas. Now, drag a rectangle onto the Composer canvas with the left mouse button to add the map. To display the current map, you can choose between three different modes in the map *Item Properties* tab:

- **Rectangle** este setarea implicită. Se afiează doar o casetă goală cu mesajul 'Harta va fi imprimată aici'.
- **Cache** renders the map in the current screen resolution. If you zoom the Composer window in or out, the map is not rendered again but the image will be scaled.

- **Render** means that if you zoom the Composer window in or out, the map will be rendered again, but for space reasons, only up to a maximum resolution.

Cache is the default preview mode for newly added Print Composer maps.

You can resize the map element by clicking on the Select/Move item button, selecting the element, and dragging one of the blue handles in the corner of the map. With the map selected, you can now adapt more properties in the map *Item Properties* tab.

To move layers within the map element, select the map element, click the Move item content icon and move the layers within the map item frame with the left mouse button. After you have found the right place for an item, you can lock the item position within the Print Composer canvas. Select the map item and use the toolbar Lock Selected Items or the *Items* tab to Lock the item. A locked item can only be selected using the *Items* tab. Once selected you can use the *Items* tab to unlock individual items. The Unlock All Items icon will unlock all locked composer items.

Proprietăi principale

The *Main properties* dialog of the map *Item Properties* tab provides the following functionalities (see figure_composer_map_1):

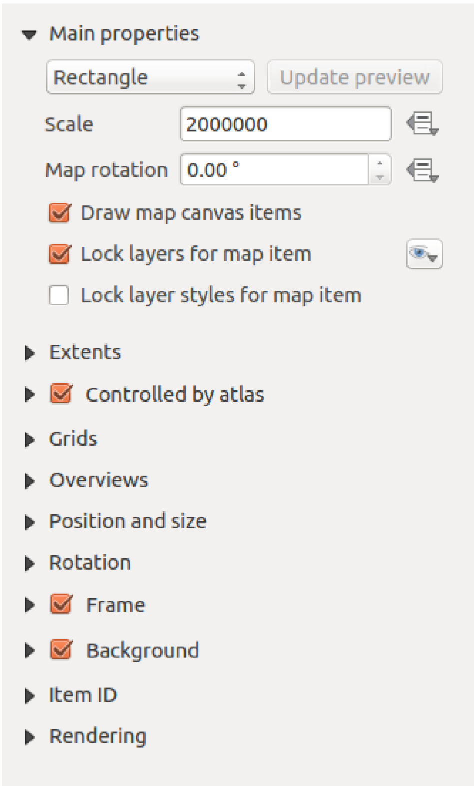

Figure 18.4: Fila Proprietăilor Elementului Hartă

- The **Preview** area allows you to define the preview modes 'Rectangle', 'Cache' and 'Render', as described above. If you change the view on the QGIS map canvas by changing vector or raster properties, you can update the Print Composer view by selecting the map element in the Print Composer and clicking the **[Update preview]** button.
- Câmpul *Scale* 1,00 setează o scară manuală.

- The field *Map rotation* 1,00 allows you to rotate the map element content clockwise in degrees. The rotation of the map view can be imitated here. Note that a correct coordinate frame can only be added with the default value 0 and that once you defined a *Map rotation* it currently cannot be changed.
- *Draw map canvas items* lets you show annotations that may be placed on the map canvas in the main QGIS window.
- You can choose to lock the layers shown on a map item. Check *Lock layers for map item*. After this is checked, any layer that would be displayed or hidden in the main QGIS window will not appear or be hidden in the map item of the Composer. But style and labels of a locked layer are still refreshed according to the main QGIS interface. You can prevent this by using *Lock layer styles for map item*.
- The button allows you to add quickly all the presets views you have prepared in QGIS. Clicking on the button you will see the list of all the preset views: just select the preset you want to display. The map canvas will automatically lock the preset layers by enabling the *Lock layers for map item*: if you want to unselect the preset, just uncheck the and press on the button. See *Map Legend* to find out how to create presets views.

Extinderi

The *Extents* dialog of the map item tab provides the following functionalities (see figure_composer_map_2):

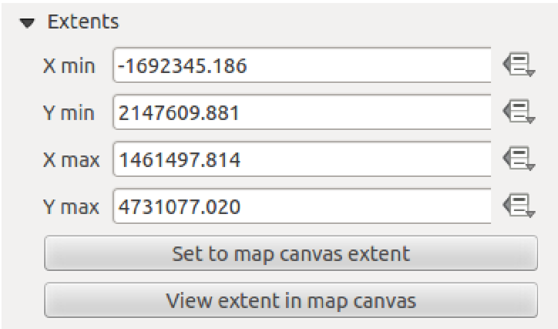

Figure 18.5: Dialogul Extinderilor Hării

- The **Map extents** area allows you to specify the map extent using X and Y min/max values and by clicking the **[Set to map canvas extent]** button. This button sets the map extent of the composer map item to the extent of the current map view in the main QGIS application. The button **[View extent in map canvas]** does exactly the opposite, it updates the extent of the map view in the QGIS application to the extent of the composer map item.

If you change the view on the QGIS map canvas by changing vector or raster properties, you can update the Print Composer view by selecting the map element in the Print Composer and clicking the **[Update preview]** button in the map *Item Properties* tab (see figure_composer_map_1).

Grids

The *Grids* dialog of the map *Item Properties* tab provides the possibility to add several grids to a map item.

- With the plus and minus button you can add or remove a selected grid.
- With the up and down button you can move a grid in the list and set the drawing priority.

When you double click on the added grid you can give it another name.

After you have added a grid, you can activate the checkbox *Show grid* to overlay a grid onto the map element. Expand this option to provide a lot of configuration options, see Figure_composer_map_4.

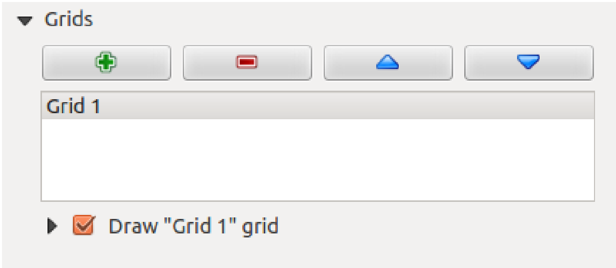

Figure 18.6: Map Grids Dialog

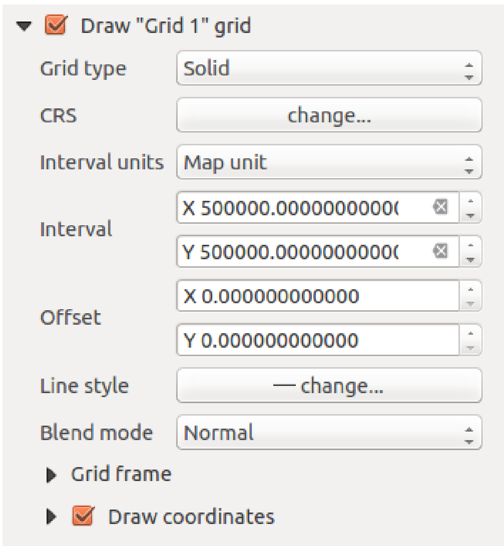

Figure 18.7: Draw Grid Dialog

As grid type, you can specify to use a 'Solid', 'Cross', 'Markers' or 'Frame and annotations only'. 'Frame and annotations only' is especially useful when working with rotated maps or reprojected grids. In the devisions section of the Grid Frame Dialog mentioned below you then have a corresponding setting. Symbology of the grid can be chosen. See section Rendering_Mode. Furthermore, you can define an interval in the X and Y directions, an X and Y offset, and the width used for the cross or line grid type.

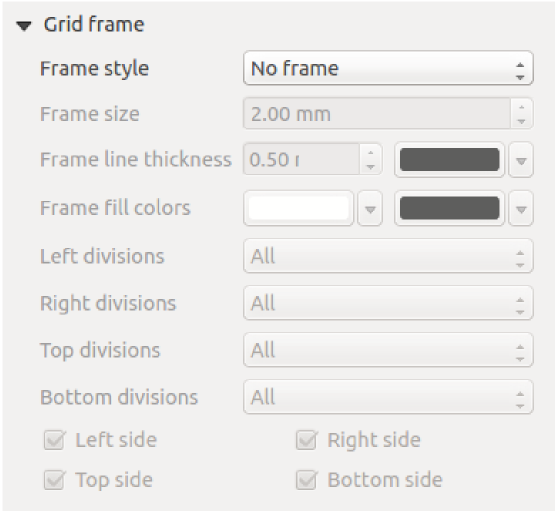

Figure 18.8: Grid Frame Dialog

- There are different options to style the frame that holds the map. Following options are available: No Frame, Zebra, Interior ticks, Exterior ticks, Interior and Exterior ticks and Lineborder.
- With 'LatitudeY/ only' and 'Longitude/X only' setting in the devisions section you have the possibility to prevent a mix of latitude/y and longitude/x coordinates showing on a side when working with rotated maps or reprojected grids.
- Advanced rendering mode is also available for grids (see section Rendering_mode).
- The *Draw coordinates* checkbox allows you to add coordinates to the map frame. You can choose the annotation numeric format, the options range from decimal to degrees, minute and seconds, with or without suffix, and aligned or not. You can choose which annotation to show. The options are: show all, latitude only, longitude only, or disable(none). This is useful when the map is rotated. The annotation can be drawn inside or outside the map frame. The annotation direction can be defined as horizontal, vertical ascending or vertical descending. In case of map rotation you can Finally, you can define the annotation font, the annotation font color, the annotation distance from the map frame and the precision of the drawn coordinates.

Overviews

The *Overviews* dialog of the map *Item Properties* tab provides the following functionalities:

You can choose to create an overview map, which shows the extents of the other map(s) that are available in the composer. First you need to create the map(s) you want to include in the overview map. Next you create the map you want to use as the overview map, just like a normal map.

- With the plus and minus button you can add or remove an overview.
- With the up and down button you can move an overview in the list and set the drawing priority.

Open *Overviews* and press the green plus icon-button to add an overview. Initially this overview is named 'Overview 1' (see Figure_composer_map_7). You can change the name when you double-click on the overview item in the list named 'Overview 1' and change it to another name.

When you select the overview item in the list you can customize it.

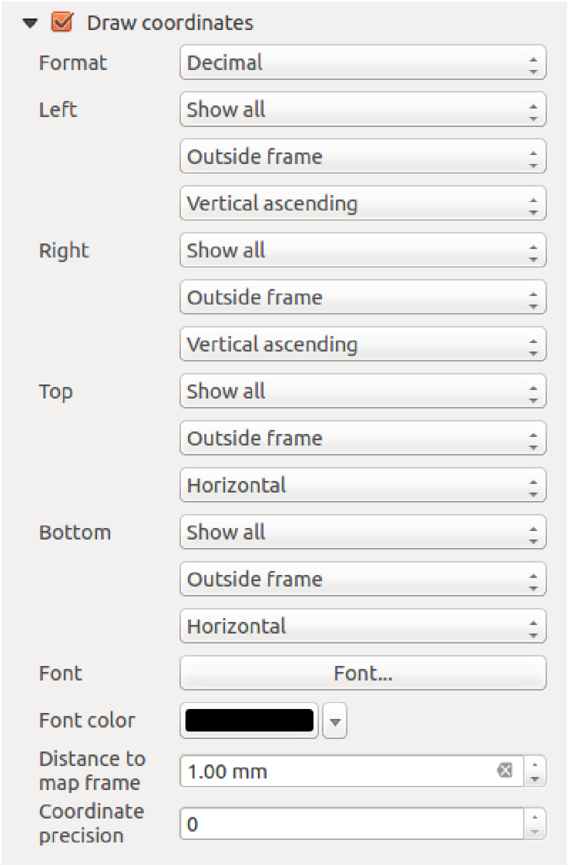

Figure 18.9: Grid Draw Coordinates dialog

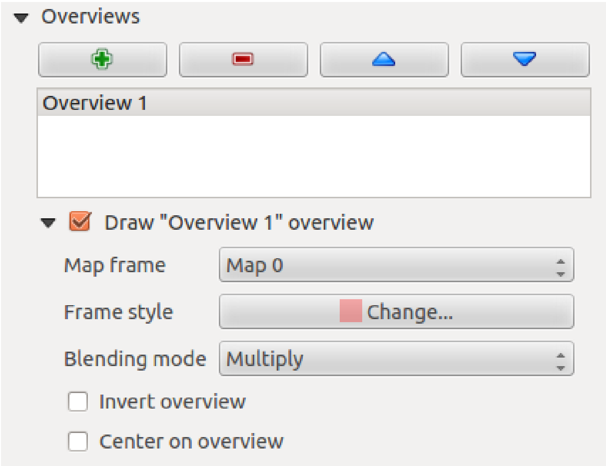

Figure 18.10: Map Overviews Dialog

- The *Draw “<name_overview>” overview* needs to be activated to draw the extent of selected map frame.
- The *Map frame* combo list can be used to select the map item whose extents will be drawn on the present map item.
- The *Frame Style* allows you to change the style of the overview frame.
- The *Blending mode* allows you to set different transparency blend modes. See Rendering_Mode.
- The *Invert overview* creates a mask around the extents when activated: the referenced map extents are shown clearly, whereas everything else is blended with the frame color.
- The *Center on overview* puts the extent of the overview frame in the center of the overview map. You can only activate one overview item to center, when you have added several overviews.

18.3.2 The Label item

To add a label, click the Add label icon, place the element with the left mouse button on the Print Composer canvas and position and customize its appearance in the label *Item Properties* tab.

The *Item Properties* tab of a label item provides the following functionality for the label item (see Figure_composer_label):

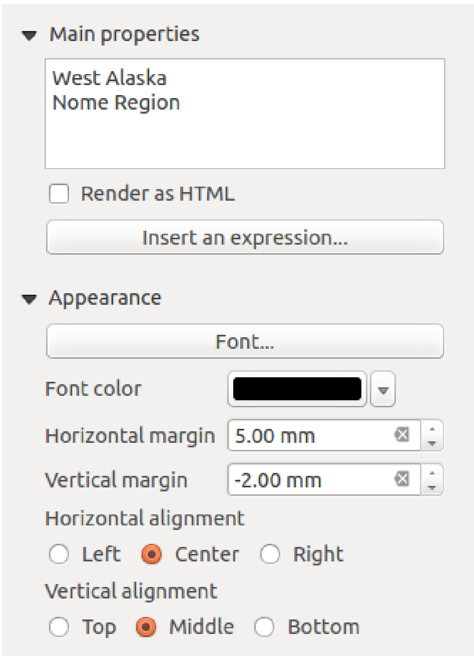

Figure 18.11: Fila Proprietăilor Elementului Etichetă

Proprietăi principale

- The main properties dialog is where the text (HTML or not) or the expression needed to fill the label is added to the Composer canvas.
- Labels can be interpreted as HTML code: check *Render as HTML*. You can now insert a URL, a clickable image that links to a web page or something more complex.
- You can also insert an expression. Click on **[Insert an expression]** to open a new dialog. Build an expression by clicking the functions available in the left side of the panel. Two special categories can be

useful, particularly associated with the atlas functionality: geometry functions and records functions. At the bottom, a preview of the expression is shown.

Appearance

- Define *Font* by clicking on the **[Font...]** button or a *Font color* selecting a color using the color selection tool.
- You can specify different horizontal and vertical margins in mm. This is the margin from the edge of the composer item. The label can be positioned outside the bounds of the label e.g. to align label items with other items. In this case you have to use negative values for the margin.
- Using the *Alignment* is another way to position your label. Note that when e.g. using the *Horizontal alignment* in *Center* Position the *Horizontal margin* feature is disabled.

18.3.3 The Image item

To add an image, click the Add image icon, place the element with the left mouse button on the Print Composer canvas and position and customize its appearance in the image *Item Properties* tab.

The picture *Item Properties* tab provides the following functionalities (see figure_composer_image_1):

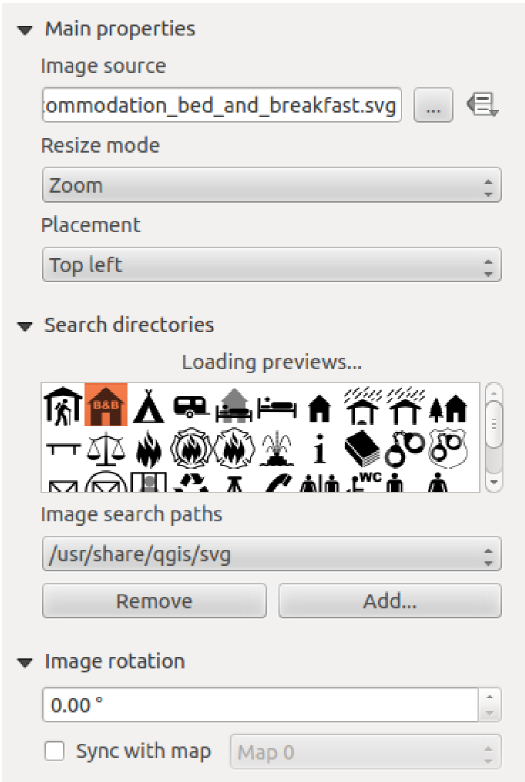

Figure 18.12: Fila Proprietăilor Elementului Imagine

You first have to select the image you want to display. There are several ways to set the *image source* in the **Main properties** area.

1. Use the browse button ... of *image source* to select a file on your computer using the browse dialog. The browser will start in the SVG-libraries provided with QGIS. Besides `SVG`, you can also select other image formats like `.png` or `.jpg`.

2. You can enter the source directly in the *image source* text field. You can even provide a remote URL-address to an image.
3. From the **Search directories** area you can also select an image from *loading previews ...* to set the image source.
4. Use the data defined button to set the image source from a record or using a regular expression.

With the *Resize mode* option, you can set how the image is displayed when the frame is changed, or choose to resize the frame of the image item so it matches the original size of the image.

You can select one of the following modes:

- Zoom: Enlarges the image to the frame while maintaining aspect ratio of picture.
- Stretch: Stretches image to fit inside the frame, ignores aspect ratio.
- Clip: Use this mode for raster images only, it sets the size of the image to original image size without scaling and the frame is used to clip the image, so only the part of the image inside the frame is visible.
- Zoom and resize frame: Enlarges image to fit frame, then resizes frame to fit resultant image.
- Resize frame to image size: Sets size of frame to match original size of image without scaling.

Selected resize mode can disable the item options 'Placement' and 'Image rotation'. The *Image rotation* is active for the resize mode 'Zoom' and 'Clip'.

With *Placement* you can select the position of the image inside it's frame. The **Search directories** area allows you to add and remove directories with images in SVG format to the picture database. A preview of the pictures found in the selected directories is shown in a pane and can be used to select and set the image source.

Images can be rotated with the *Image rotation* field. Activating the *Sync with map* checkbox synchronizes the rotation of a picture in the QGIS map canvas (i.e., a rotated north arrow) with the appropriate Print Composer image.

It is also possible to select a north arrow directly. If you first select a north arrow image from **Search directories** and then use the browse button ... of the field *Image source*, you can now select one of the north arrow from the list as displayed in figure_composer_image_2.

Note: Many of the north arrows do not have an 'N' added in the north arrow, this is done on purpose for languages that do not use an 'N' for North, so they can use another letter.

18.3.4 The Legend item

To add a map legend, click the Add new legend icon, place the element with the left mouse button on the Print Composer canvas and position and customize the appearance in the legend *Item Properties* tab.

The *Item properties* of a legend item tab provides the following functionalities (see figure_composer_legend_1):

Proprietăi principale

The *Main properties* dialog of the legend *Item Properties* tab provides the following functionalities (see figure_composer_legend_2):

In Main properties you can:

- Change the title of the legend.
- Set the title alignment to Left, Center or Right.
- You can choose which *Map* item the current legend will refer to in the select list.
- You can wrap the text of the legend title on a given character.

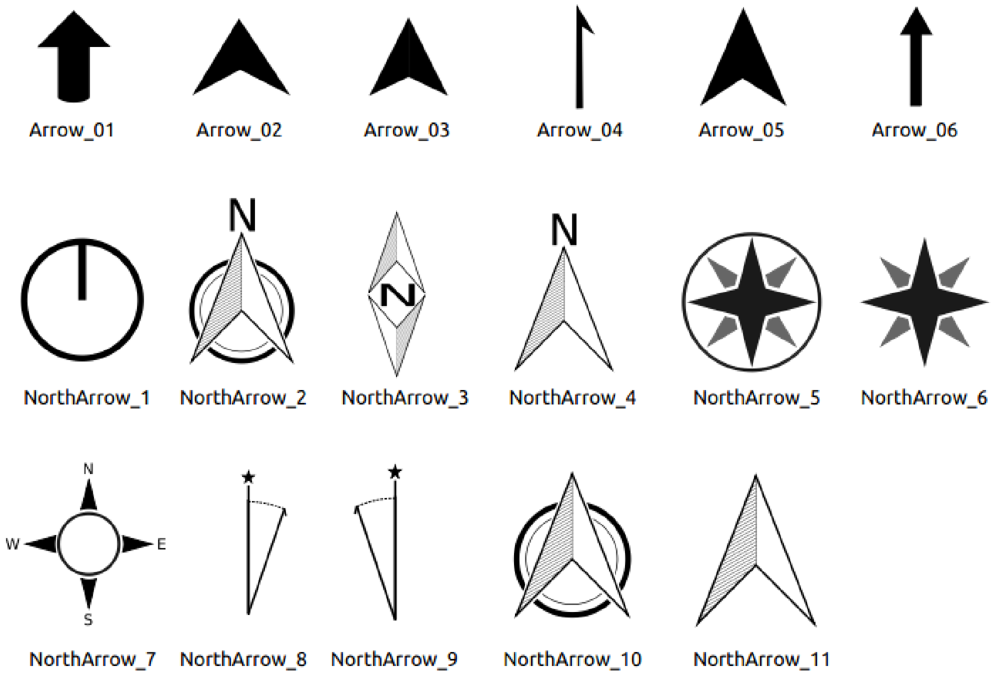

Figure 18.13: North arrows available for selection in provided SVG library

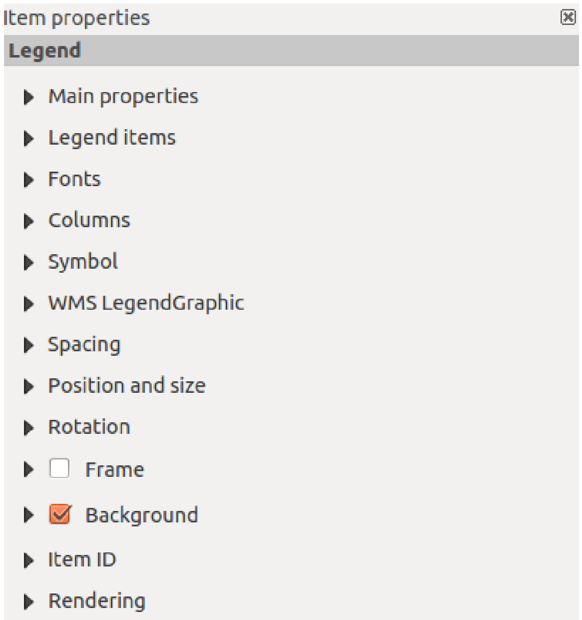

Figure 18.14: Fila Proprietăilor Elementului Legendă

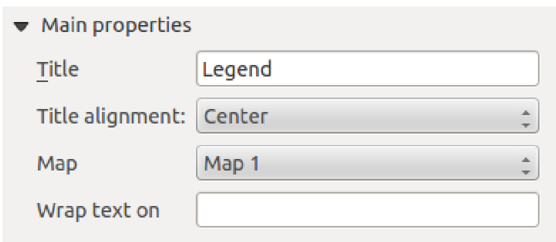

Figure 18.15: Dialogul Proprietăilor Principale ale Legendei

Elementele legendei

The *Legend items* dialog of the legend *Item Properties* tab provides the following functionalities (see figure_composer_legend_3):

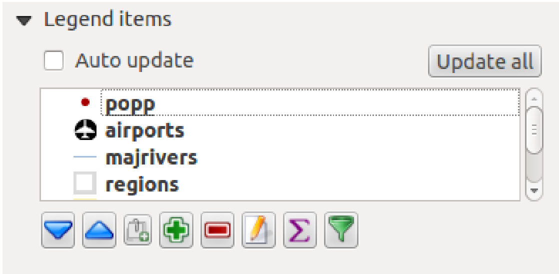

Figure 18.16: Dialogul Elementelor Legendei

- The legend will be updated automatically if *Auto-update* is checked. When *Auto-update* is unchecked this will give you more control over the legend items. The icons below the legend items list will be activated.
- The legend items window lists all legend items and allows you to change item order, group layers, remove and restore items in the list, edit layer names and add a filter.
  - The item order can be changed using the **[Up]** and **[Down]** buttons or with 'drag-and-drop' functionality. The order can not be changed for WMS legend graphics.
  - Use the **[Add group]** button to add a legend group.
  - Use the **[plus]** and **[minus]** button to add or remove layers.
  - The **[Edit]** button is used to edit the layer-, groupname or title, first you need to select the legend item.
  - The **[Sigma]** button adds a feature count for each vector layer.
  - Use the **[filter]** button to filter the legend by map content, only the legend items visible in the map will be listed in the legend.

  After changing the symbology in the QGIS main window, you can click on **[Update All]** to adapt the changes in the legend element of the Print Composer.

Fonts, Columns, Symbol

The *Fonts*, *Columns* and *Symbol* dialogs of the legend *Item Properties* tab provide the following functionalities (see figure_composer_legend_4):

- Putei schimba fontul pentru titlul legendei, pentru grup, subgrup i element (stratul) din elementul legendă. Facei clic pe un buton de categorie pentru a deschide dialogul **Select font**.
- You provide the labels with a **Color** using the advanced color picker, however the selected color will be given to all font items in the legend..
- Legend items can be arranged over several columns. Set the number of columns in the *Count* 1,00 field.
  - *Equal column widths* sets how legend columns should be adjusted.
  - The *Split layers* option allows a categorized or a graduated layer legend to be divided between columns.
- You can change the width and height of the legend symbol in this dialog.

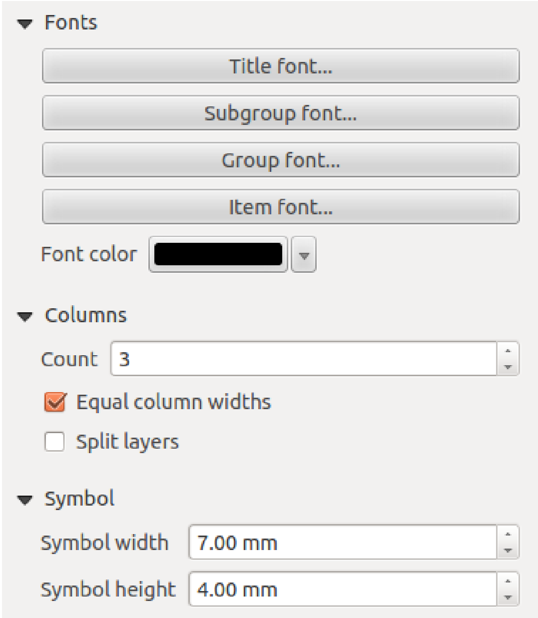

Figure 18.17: Dialogul Fontului, Coloanelor, Simbolului i Spaierii Legendei

WMS LegendGraphic and Spacing

The *WMS LegendGraphic* and *Spacing* dialogs of the legend *Item Properties* tab provide the following functionalities (see figure_composer_legend_5):

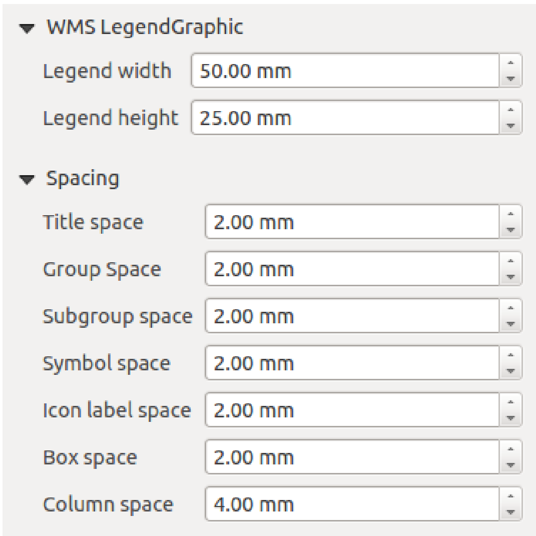

Figure 18.18: WMS LegendGraphic Dialogs

When you have added a WMS layer and you insert a legend composer item, a request will be send to the WMS server to provide a WMS legend. This Legend will only be shown if the WMS server provides the GetLegendGraphic capability. The WMS legend content will be provided as a raster image.

WMS LegendGraphic is used to be able to adjust the *Legend width* and the *Legend height* of the WMS legend raster image.

Spacing around title, group, subgroup, symbol, icon label, box space or column space can be customized through this dialog.

18.3.5 The Scale Bar item

To add a scale bar, click the Add new scalebar icon, place the element with the left mouse button on the Print Composer canvas and position and customize the appearance in the scale bar *Item Properties* tab.

The *Item properties* of a scale bar item tab provides the following functionalities (see figure_composer_scalebar_1):

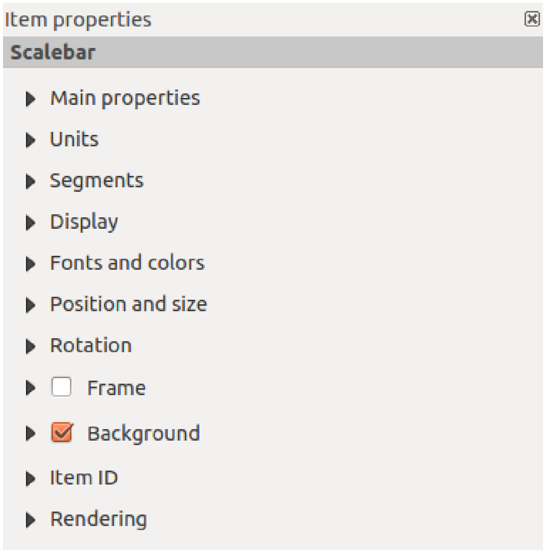

Figure 18.19: Scale Bar Item properties Tab

Proprietăi principale

The *Main properties* dialog of the scale bar *Item Properties* tab provides the following functionalities (see figure_composer_scalebar_2):

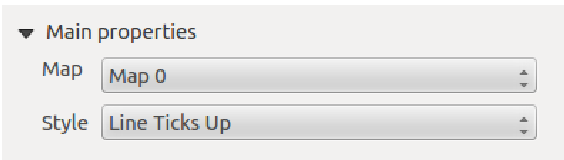

Figure 18.20: Scale Bar Main properties Dialog

- First, choose the map the scale bar will be attached to.
- Then, choose the style of the scale bar. Six styles are available:
  - **Single box** and **Double box** styles, which contain one or two lines of boxes alternating colors.
  - **Middle**, **Up** or **Down** line ticks.
  - **Numeric**, where the scale ratio is printed (i.e., 1:50000).

Unităi i Segmente

The *Units* and *Segments* dialogs of the scale bar *Item Properties* tab provide the following functionalities (see figure_composer_scalebar_3):

In these two dialogs, you can set how the scale bar will be represented.

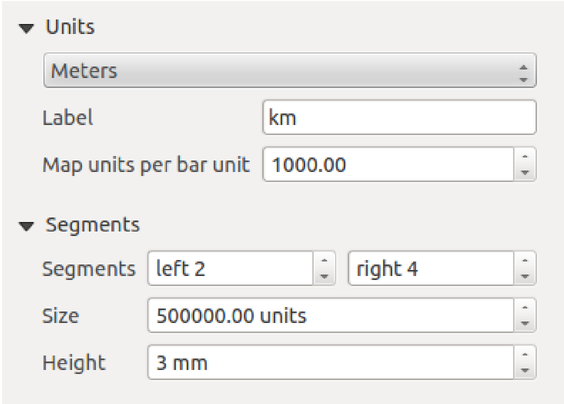

Figure 18.21: Scale Bar Units and Segments Dialogs

- Select the map units used. There are four possible choices: **Map Units** is the automated unit selection; **Meters**, **Feet** or **Nautical Miles** force unit conversions.
- The *Label* field defines the text used to describe the units of the scale bar.
- The *Map units per bar unit* allows you to fix the ratio between a map unit and its representation in the scale bar.
- You can define how many *Segments* will be drawn on the left and on the right side of the scale bar, and how long each segment will be (*Size* field). *Height* can also be defined.

Display

The *Display* dialog of the scale bar *Item Properties* tab provide the following functionalities (see figure_composer_scalebar_4):

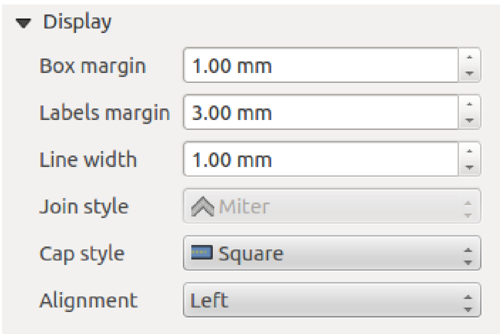

Figure 18.22: Scale Bar Display

You can define how the scale bar will be displayed in its frame.

- *Box margin* : space between text and frame borders
- *Labels margin* : space between text and scale bar drawing
- *Line width* : line widht of the scale bar drawing
- *Join style* : Corners at the end of scalebar in style Bevel, Rounded or Square (only available for Scale bar style Single Box & Double Box)
- *Cap style* : End of all lines in style Square, Round or Flat (only available for Scale bar style Line Ticks Up, Down and Middle)
- *Alignment* : Puts text on the left, middle or right side of the frame (works only for Scale bar style Numeric)

Fonts and colors

The *Fonts and colors* dialog of the scale bar *Item Properties* tab provide the following functionalities (see figure_composer_scalebar_5):

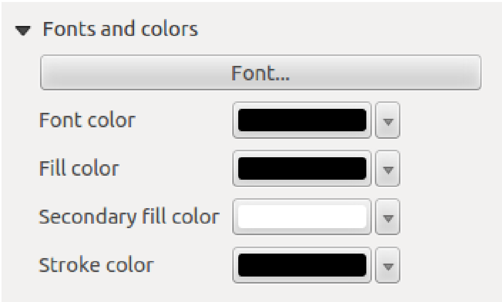

Figure 18.23: Scale Bar Fonts and colors Dialogs

You can define the fonts and colors used for the scale bar.

- Use the **[Font]** button to set the font
- *Font color*: set the font color
- *Fill color*: set the first fill color
- *Secondary fill color*: set the second fill color
- *Stroke color*: set the color of the lines of the Scale Bar

Fill colors are only used for scale box styles Single Box and Double Box. To select a color you can use the list option using the dropdown arrow to open a simple color selection option or the more advanced color selection option, that is started when you click in the colored box in the dialog.

18.3.6 The Basic Shape Items

To add a basic shape (ellipse, rectangle, triangle), click the Add basic shape icon or the Add Arrow icon, place the element holding down the left mouse. Customize the appearance in the *Item Properties* tab.

When you also hold down the `Shift` key while placing the basic shape you can create a perfect square, circle or triangle.

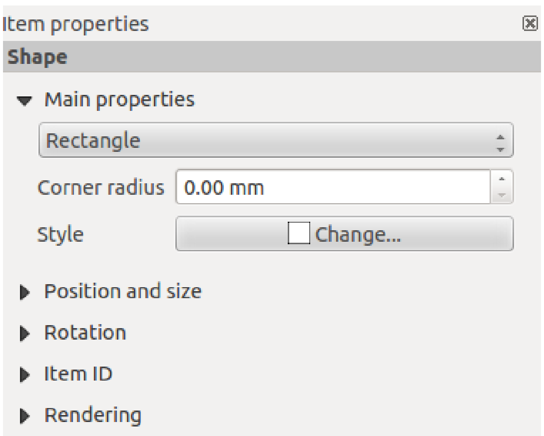

Figure 18.24: Fila Proprietăilor Elementului Shape

The *Shape* item properties tab allows you to select if you want to draw an ellipse, rectangle or triangle inside the given frame.

You can set the style of the shape using the advanced symbol style dialog with which you can define its outline and fill color, fill pattern, use markers etcetera.

For the rectangle shape, you can set the value of the corner radius to round of the corners.

Note: Unlike other items, you can not style the frame or the background color of the frame.

18.3.7 The Arrow item

To add an arrow, click the Add Arrow icon, place the element holding down the left mouse button and drag a line to draw the arrow on the Print Composer canvas and position and customize the appearance in the scale bar *Item Properties* tab.

When you also hold down the `Shift` key while placing the arrow, it is placed in an angle of exactly 45° .

The arrow item can be used to add a line or a simple arrow that can be used, for example, to show the relation between other print composer items. To create a north arrow, the image item should be considered first. QGIS has a set of North arrows in SVG format. Furthermore you can connect an image item with a map so it can rotate automatically with the map (see the_image_item).

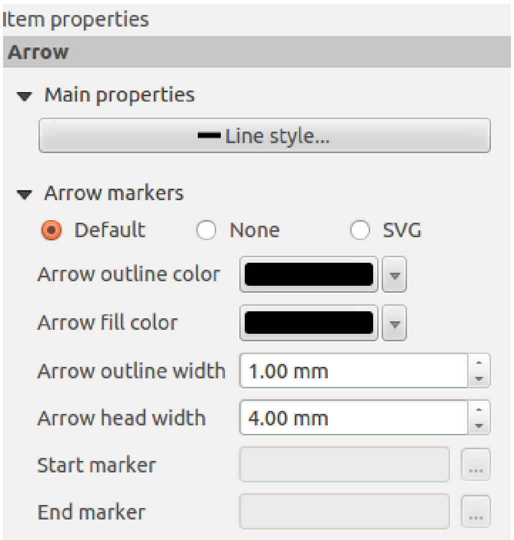

Figure 18.25: Fila Proprietăilor Elementului Săgeată

Item Properties

The *Arrow* item properties tab allows you to configure an arrow item.

The **[Line style ...]** button can be used to set the line style using the line style symbol editor.

In *Arrows markers* you can select one of three radio buttons.

- *Default* : To draw a regular arrow, gives you options to style the arrow head
- *None* : To draw a line without arrow head
- *SVG Marker* : To draw a line with an SVG *Start marker* and/or *End marker*

For *Default* Arrow marker you can use following options to style the arrow head.

- *Arrow outline color* : Set the outline color of the arrow head
- *Arrow fill color* : Set the fill color of the arrow head

- *Arrow outline width* : Set the outline width of the arrow head
- *Arrow head width*: Set the size of the arrow head

For *SVG Marker* you can use following options.

- *Start marker* : Choose an SVG image to draw at the beginning of the line
- *End marker* : Choose an SVG image to draw at the end of the line
- *Arrow head width*: Sets the size of Start and/or End marker

SVG images are automatically rotated with the line. The color of the SVG image can not be changed.

18.3.8 The Attribute Table item

It is possible to add parts of a vector attribute table to the Print Composer canvas: Click the Add attribute table icon, place the element with the left mouse button on the Print Composer canvas, and position and customize the appearance in the *Item Properties* tab.

The *Item properties* of an attribute table item tab provides the following functionalities (see figure_composer_table_1):

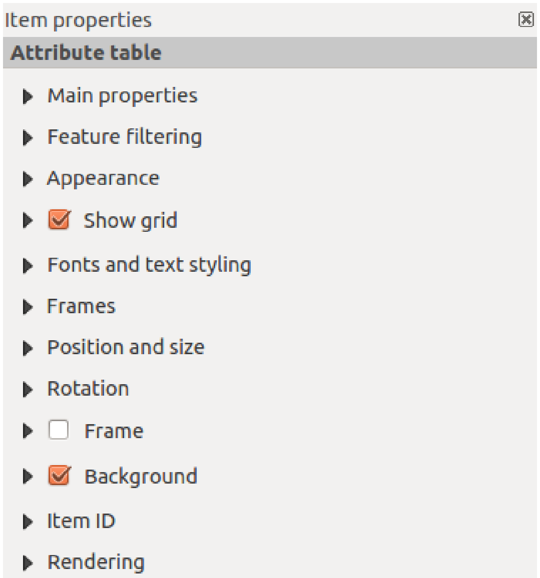

Figure 18.26: Attribute table Item properties Tab

Proprietăi principale

The *Main properties* dialogs of the attribute table *Item Properties* tab provide the following functionalities (see figure_composer_table_2):

- For *Source* you can normally select only 'Layer features'.
- With *Layer* you can choose from the vector layers loaded in the project.
- The button **[Refresh table data]** can be used to refresh the table when the actual contents of the table has changed.
- In case you activated the *Generate an atlas* option in the *Atlas generation* tab, there are two additional *Source* possible: 'Current atlas feature' (see figure_composer_table_2b) and 'Relation children' (see figure_composer_table_2c). Choosing the 'Current atlas feature' you won't see any option to choose the layer, and the table item will only show a row with the attributes from the current feature of the atlas coverage

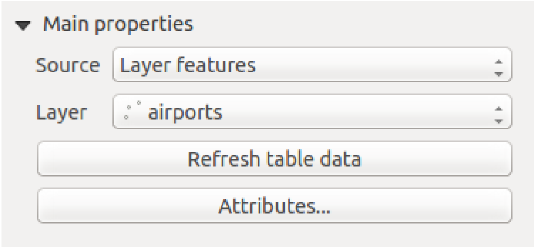

Figure 18.27: Attribute table Main properties Dialog

layer. Choosing 'Relation children', an option with the relation name will show up. The 'Relation children' option can only be used if you have defined a relation using your atlas coverage layer as parent, and it will show the children rows of the atlas coverage layer's current feature (for further information about the atlas generation see atlasgeneration).

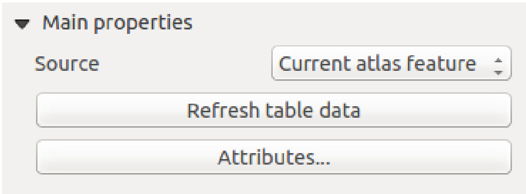

Figure 18.28: Attribute table Main properties for 'Current atlas feature'

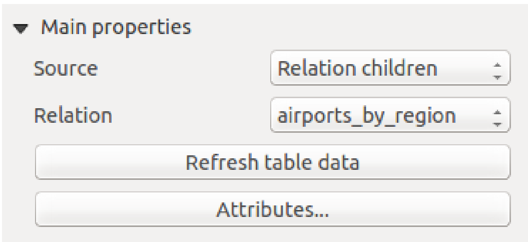

Figure 18.29: Attribute table Main properties for 'Relation children'

- The button **[Attributes...]** starts the *Select attributes* menu, see figure_composer_table_3, that can be used to change the visible contents of the table. After making changes use the **[OK]** button to apply changes to the table.

  In the *Columns* section you can:

  – Remove an attribute, just select an attribute row by clicking anywhere in a row and press the minus button to remove the selected attribute.

  – Add a new attribute use the plus button. At the end a new empty row appears and you can select empty cell of the column *Attribute*. You can select a field attribute from the list or you can select to build a new attribute using a regular expression (button). Of course you can modify every already existing attribute by means of a regular expression.

  – Use the up and down arrows to change the order of the attributes in the table.

  – Select a cel in the Headings column to change the Heading, just type in a new name.

  – Select a cel in the Alignment column and you can choose between Left, Center or Right alignment.

  – Select a cel in the Width column and you can change it from Automatic to a width in mm, just type a number. When you want to change it back to Automatic, use the cross.

  – The **[Reset]** button can always be used to restore it to the original attribute settings.

  In the *Sorting* section you can:

- Add an attribute to sort the table with. Select an attribute and set the sorting order to 'Ascending' or 'Descending' and press the plus button. A new line is added to the sort order list.
- select a row in the list and use the up and down button to change the sort priority on attribute level.
- use the minus button to remove an attribute from the sort order list.

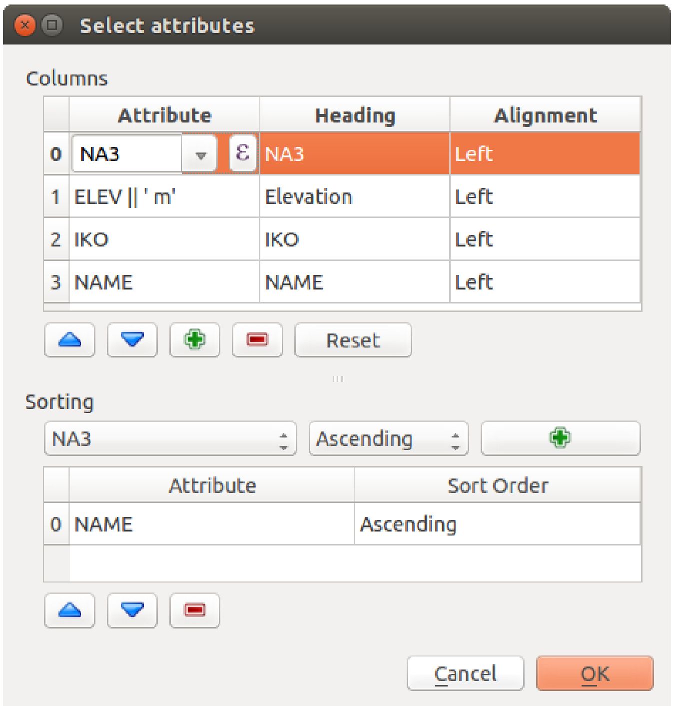

Figure 18.30: Dialogul de Selectare a atributelor din Tabela de atribute

Feature filtering

The *Feature filtering* dialogs of the attribute table *Item Properties* tab provide the following functionalities (see figure_composer_table_4):

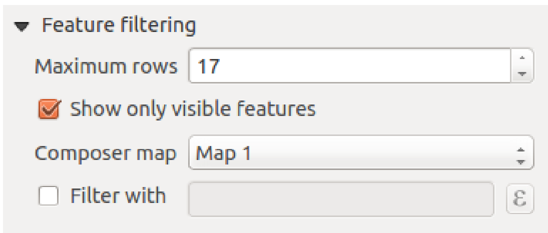

Figure 18.31: Attribute table Feature filtering Dialog

You can:

- Define the *Maximum rows* to be displayed.
- Activate *Remove duplicate rows from table* to show unique records only.
- Activate *Show only visible features within a map* and select the corresponding *Composer map* to display the attributes of features only visible on selected map.
- Activate *Show only features intersecting Atlas feature* is only available when *Generate an atlas* is activated. When activated it will show a table with only the features shown on the map of that particular page of the atlas.

- Activate *Filter with* and provide a filter by typing in the input line or insert a regular expression using the given expression button. A few examples of filtering statements you can use when you have loaded the airports layer from the Sample dataset:
  - `ELEV > 500`
  - `NAME = 'ANIAK'`
  - `NAME NOT LIKE 'AN%`
  - `regexp_match( attribute( $currentfeature, 'USE' ) , '[i]')`

  The last regular expression will include only the arpoirts that have a letter 'i' in the attribute field 'USE'.

Appearance

The *Appearance* dialogs of the attribute table *Item Properties* tab provide the following functionalities (see figure_composer_table_5):

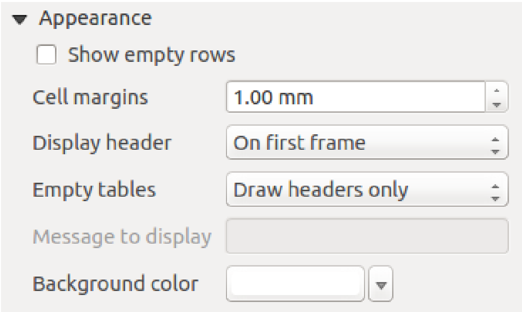

Figure 18.32: Attribute table appearance Dialog

- Click *Show empty rows* to make empty entries in the attribute table visible.
- With *Cell margins* you can define the margin around text in each cell of the table.
- With *Display header* you can select from a list one of 'On first frame', 'On all frames' default option, or 'No header'.
- The option *Empty table* controls what will be displayed when the result selection is empty.
  - **Draw headers only**, will only draw the header except if you have choosen 'No header' for *Display header*.
  - **Hide entire table**, will only draw the background of the table. You can activate *Don't draw background if frame is empty* in *Frames* to completely hide the table.
  - **Draw empty cells**, will fill the attribute table with empty cells, this option can also be used to provide additional empty cells when you have a result to show!
  - **Show set message**, will draw the header and adds a cell spanning all columns and display a message like 'No result' that can be provided in the option *Message to display*
- The option *Message to display* is only activated when you have selected **Show set message** for *Empty table*. The message provided will be shown in the table in the first row, when the result is an empty table.
- With *Background color* you can set the background color of the table.

Show grid

The *Show grid* dialog of the attribute table *Item Properties* tab provide the following functionalities (see figure_composer_table_6):

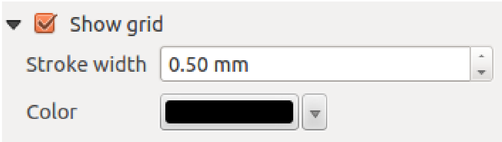

Figure 18.33: Attribute table Show grid Dialog

- Activate *Show grid* when you want to display the grid, the outlines of the table cells.
- With *Stroke width* you can set the thickness of the lines used in the grid.
- The *Color* of the grid can be set using the color selection dialog.

Fonts and text styling

The *Fonts and text styling* dialog of the attribute table *Item Properties* tab provide the following functionalities (see figure_composer_table_7):

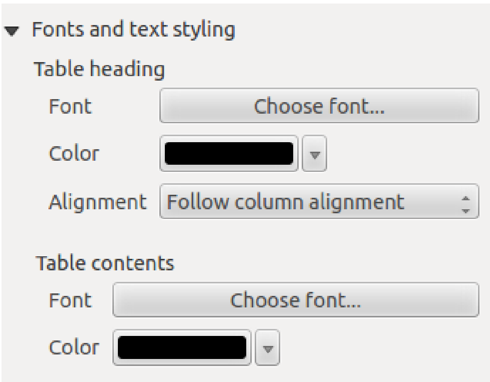

Figure 18.34: Attribute table Fonts and text styling Dialog

- You can define *Font* and *Color* for *Table heading* and *Table contents*.
- For *Table heading* you can additionally set the *Alignment* and choose from *Follow column alignment*, *Left*, *Center* or *Right*. The column alignment is set using the *Select Attributes* dialog (see Figure_composer_table_3).

Frames

The *Frames* dialog of the attribute table *Item Properties* tab provide the following functionalities (see figure_composer_table_8):

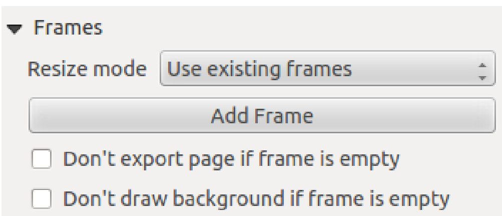

Figure 18.35: Attribute table Frames Dialog

- With *Resize mode* you can select how to render the attribute table contents:
  - *Use existing frames* displays the result in the first frame and added frames only.
  - *Extent to next page* will create as many frames (and corresponding pages) as necessary to display the full selection of attribute table. Each frame can be moved around on the layout. If you resize a frame, the resulting table will be divided up between the other frames. The last frame will be trimmed to fit the table.
  - *Repeat until finished* will also create as many frames as the *Extend to next page* option, except all frames will have the same size.
- Use the **[Add Frame]** button to add another frame with the same size as selected frame. The result of the table that will not fit in the first frame will continue in the next frame when you use the Resize mode *Use existing frames*.
- Activate *Don't export page if frame is empty* prevents the page to be exported when the table frame has no contents. This means all other composer items, maps, scalebars, legends etc. will not be visible in the result.
- Activate *Don't draw background if frame is empty* prevents the background to be drawn when the table frame has no contents.

18.3.9 The HTML frame item

It is possible to add a frame that displays the contents of a website or even create and style your own HTML page and display it!

Click the Add HTML frame icon, place the element by dragging a rectangle holding down the left mouse button on the Print Composer canvas and position and customize the appearance in the *Item Properties* tab (see figure_composer_html_1).

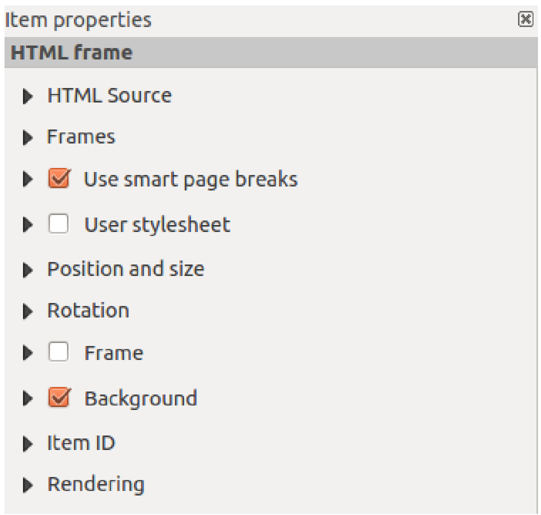

Figure 18.36: HTML frame, the item properties Tab

HTML Source

As an HTML source, you can either set a URL and activate the URL radiobutton or enter the HTML source directly in the textbox provided and activate the Source radiobutton.

The *HTML Source* dialog of the HTML frame *Item Properties* tab provides the following functionalities (see figure_composer_html_2):

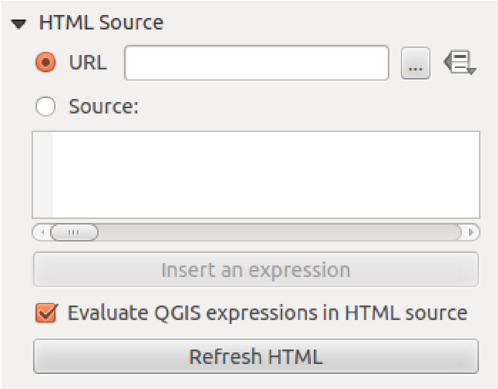

Figure 18.37: HTML frame, the HTML Source properties

- In *URL* you can enter the URL of a webpage you copied from your internet browser or select an HTML file using the browse button . There is also the option to use the Data defined override button, to provide an URL from the contents of an attribute field of a table or using a regular expression.
- In *Source* you can enter text in the textbox with some HTML tags or provide a full HTML page.
- The **[insert an expression]** button can be used to insert an expression like `[%Year($now)%]` in the Source textbox to display the current year. This button is only activated when radiobutton *Source* is selected. After inserting the expression click somewhere in the textbox before refreshing the HTML frame, otherwise you will lose the expression.
- Activate *Evaluate QGIS expressions in HTML code* to see the result of the expression you have included, otherwise you will see the expression instead.
- Use the **[Refresh HTML]** button to refresh the HTML frame(s) to see the result of changes.

Frames

The *Frames* dialog of the HTML frame *Item Properties* tab provides the following functionalities (see figure_composer_html_3):

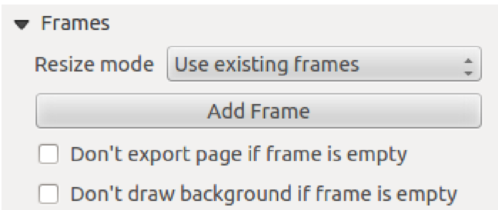

Figure 18.38: HTML frame, the Frames properties

- With *Resize mode* you can select how to render the HTML contents:
  - *Use existing frames* displays the result in the first frame and added frames only.
  - *Extent to next page* will create as many frames (and corresponding pages) as necessary to render the height of the web page. Each frame can be moved around on the layout. If you resize a frame, the webpage will be divided up between the other frames. The last frame will be trimmed to fit the web page.
  - *Repeat on every page* will repeat the upper left of the web page on every page in frames of the same size.
  - *Repeat until finished* will also create as many frames as the *Extend to next page* option, except all frames will have the same size.

- Use the **[Add Frame]** button to add another frame with the same size as selected frame. If the HTML page that will not fit in the first frame it will continue in the next frame when you use *Resize mode* or *Use existing frames*.
- Activate *Don't export page if frame is empty* prevents the map layout from being exported when the frame has no HTML contents. This means all other composer items, maps, scalebars, legends etc. will not be visible in the result.
- Activate *Don't draw background if frame is empty* prevents the HTML frame being drawn if the frame is empty.

Use smart page breaks and User style sheet

The *Use smart page breaks* dialog and *Use style sheet* dialog of the HTML frame *Item Properties* tab provides the following functionalities (see figure_composer_html_4):

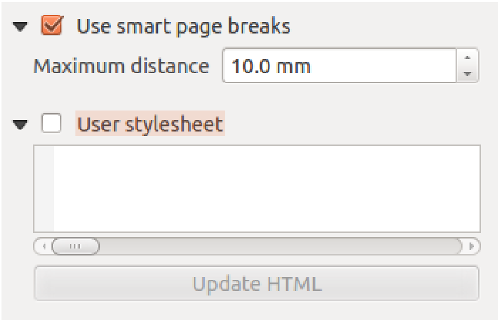

Figure 18.39: HTML frame, Use smart page breaks and User stylesheet properties

- Activate *Use smart page breaks* to prevent the html frame contents from breaking mid-way a line of text so it continues nice and smooth in the next frame.
- Set the *Maximum distance* allowed when calculating where to place page breaks in the html. This distance is the maximum amount of empty space allowed at the bottom of a frame after calculating the optimum break location. Setting a larger value will result in better choice of page break location, but more wasted space at the bottom of frames. This is only used when *Use smart page breaks* is activated.
- Activate *User stylesheet* to apply HTML styles that often is provided in cascading style sheets. An example of style code is provide below to set the color of `<h1>` header tag to green and set the font and fontsize of text included in paragraph tags `<p>`.

```
h1 {color: #00ff00;
}
p {font-family: "Times New Roman", Times, serif;
   font-size: 20px;
}
```

- Use the **[Update HTML]** button to see the result of the stylesheet settings.

18.4 Manage items

18.4.1 Size and position

Each item inside the Composer can be moved/resized to create a perfect layout. For both operations the first step is to activate the Select/Move item tool and to click on the item; you can then move it using the mouse while holding the left button. If you need to constrain the movements to the horizontal or the vertical axis, just hold the `Shift` while moving the mouse. If you need a better precision, you can move a selected item using the `Arrow keys` on the keyboard; if the movement is too slow, you can speed up it by holding `Shift`.

A selected item will show squares on its boundaries; moving one of them with the mouse, will resize the item in the corresponding direction. While resizing, holding `Shift` will maintain the aspect ratio. Holding `Alt` will resize from the item center.

The correct position for an item can be obtained using snapping to grid or smart guides. Guides are set by clicking and dragging in the rulers. Guides are moved by clicking in the ruler, level with the guide and dragging to a new place. To delete a guide move it off the canvas. If you need to disable the snap on the fly just hold `Ctrl` while moving the mouse.

You can choose multiple items with the Select/Move item button. Just hold the `Shift` button and click on all the items you need. You can then resize/move this group just like a single item.

Once you have found the correct position for an item, you can lock it by using the items on the toolbar or ticking the box next to the item in the *Items* tab. Locked items are **not** selectable on the canvas.

Locked items can be unlocked by selecting the item in the *Items* tab and unchecking the tickbox or you can use the icons on the toolbar.

To unselect an item, just click on it holding the `Shift` button.

Inside the *Edit* menu, you can find actions to select all the items, to clear all selections or to invert the current selection.

18.4.2 Alignment

Raising or lowering functionalities for elements are inside the Raise selected items pull-down menu. Choose an element on the Print Composer canvas and select the matching functionality to raise or lower the selected element compared to the other elements (see table_composer_1). This order is shown in the *Items* tab. You can also raise or lower objects in the *Items* tab by clicking and dragging an object's label in this list.

There are several alignment functionalities available within the Align selected items pull-down menu (see table_composer_1). To use an alignment functionality, you first select some elements and then click on the matching alignment icon. All selected elements will then be aligned within to their common bounding box. When moving items on the Composer canvas, alignment helper lines appear when borders, centers or corners are aligned.

18.4.3 Copy/Cut and Paste items

The print composer includes actions to use the common Copy/Cut/Paste functionality for the items in the layout. As usual first you need to select the items using one of the options seen above; at this point the actions can be found in the *Edit* menu. When using the Paste action, the elements will be pasted according to the current mouse position.

Note: HTML items can not be copied in this way. As a workaround, use the **[Add Frame]** button in the *Item Properties* tab.

18.5 Instrumentele de Revenire i Restaurare

During the layout process, it is possible to revert and restore changes. This can be done with the revert and restore tools:

- Revert last change
- Restore last change

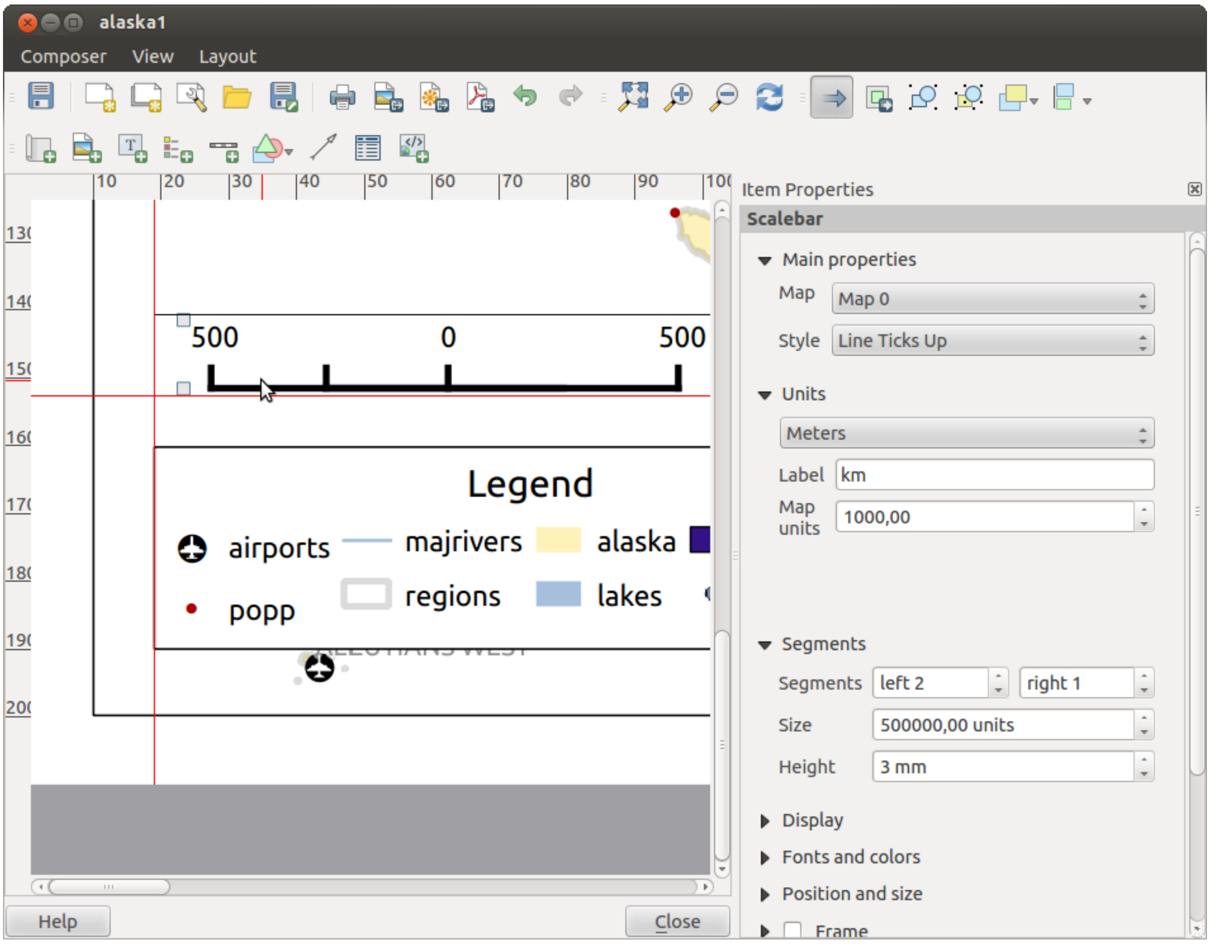

Figure 18.40: Liniile de ghidare din Compozitorul de Hări

This can also be done by mouse click within the *Command history* tab (see figure_composer_29).

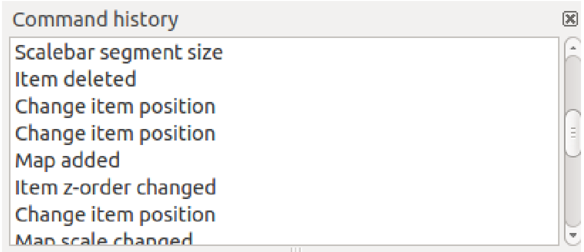

Figure 18.41: Istoricul Comenzilor din Compozitorul de Hări

18.6 Generarea Atlasului

The Print Composer includes generation functions that allow you to create map books in an automated way. The concept is to use a coverage layer, which contains geometries and fields. For each geometry in the coverage layer, a new output will be generated where the content of some canvas maps will be moved to highlight the current geometry. Fields associated with this geometry can be used within text labels.

Every page will be generated with each feature. To enable the generation of an atlas and access generation parameters, refer to the *Atlas generation* tab. This tab contains the following widgets (see Figure_composer_atlas):

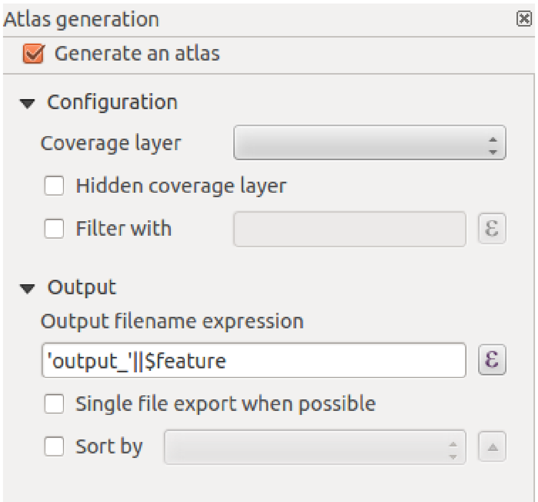

Figure 18.42: Fila de generare a Atlasului

- *Generate an atlas*, which enables or disables the atlas generation.
- A *Coverage layer* combo box that allows you to choose the (vector) layer containing the geometries on which to iterate over.
- An optional *Hidden coverage layer* that, if checked, will hide the coverage layer (but not the other ones) during the generation.
- An optional *Filter with* text area that allows you to specify an expression for filtering features from the coverage layer. If the expression is not empty, only features that evaluate to `True` will be selected. The button on the right allows you to display the expression builder.
- An *Output filename expression* textbox that is used to generate a filename for each geometry if needed. It is based on expressions. This field is meaningful only for rendering to multiple files.

- A *Single file export when possible* that allows you to force the generation of a single file if this is possible with the chosen output format (PDF, for instance). If this field is checked, the value of the *Output filename expression* field is meaningless.
- An optional *Sort by* that, if checked, allows you to sort features of the coverage layer. The associated combo box allows you to choose which column will be used as the sorting key. Sort order (either ascending or descending) is set by a two-state button that displays an up or a down arrow.

You can use multiple map items with the atlas generation; each map will be rendered according to the coverage features. To enable atlas generation for a specific map item, you need to check *Controlled by Atlas* under the item properties of the map item. Once checked, you can set:

- A radiobutton *Margin around feature* that allows you to select the amount of space added around each geometry within the allocated map. Its value is meaningful only when using the auto-scaling mode.
- A *Predefined scale* (best fit). It will use the best fitting option from the list of predefined scales in your project properties settings (see *Project –> Project Properties –> General –> Project Scales* to configure these predefined scales).
- A *Fixed scale* that allows you to toggle between auto-scale and fixed-scale mode. In fixed-scale mode, the map will only be translated for each geometry to be centered. In auto-scale mode, the map's extents are computed in such a way that each geometry will appear in its entirety.

18.6.1 Labels

In order to adapt labels to the feature the atlas plugin iterates over, you can include expressions. For example, for a city layer with fields CITY_NAME and ZIPCODE, you could insert this:

```
The area of [% upper(CITY_NAME) || ',' || ZIPCODE || ' is ' format_number($area/1000000,2) %] km2
```

The information *[% upper(CITY_NAME) || ',' || ZIPCODE || ' is ' format_number($area/1000000,2) %]* is an expression used inside the label. That would result in the generated atlas as:

The area of PARIS,75001 is 1.94 km2

18.6.2 Data Defined Override Buttons

There are several places where you can use a Data Defined Override button to override the selected setting. These options are particularly usefull with Atlas Generation.

For the following examples the *Regions* layer of the QGIS sample dataset is used and selected for Atlas Generation. We also assume the paper format *A4 (210X297)* is selected in the *Composition* tab for field *Presets*.

With a *Data Defined Override* button you can dynamically set the paper orientation. When the height (north-south) of the extents of a region is greater than it's width (east-west), you rather want to use *portrait* instead of *landscape* orientation to optimize the use of paper.

In the *Composition* you can set the field *Orientation* and select *Landscape* or *Portrait*. We want to set the orientation dynamically using an expression depending on the region geometry. press the button of field *Orientation*, select *Edit ...* so the *Expression string builder* dialog opens. Give following expression:

```
CASE WHEN bounds_width($atlasgeometry) > bounds_height($atlasgeometry) THEN 'Landscape' ELSE 'Por
```

Now the paper orients itself automatically for each Region you need to reposition the location of the composer item as well. For the map item you can use the button of field *Width* to set it dynamically using following expression:

```
(CASE WHEN bounds_width($atlasgeometry) > bounds_height($atlasgeometry) THEN 297 ELSE 210 END) -
```

Use the button of field *Heigth* to provide following expression:

```
(CASE WHEN bounds_width($atlasgeometry) > bounds_height($atlasgeometry) THEN 210 ELSE 297 END) - 
```

When you want to give a title above map in the center of the page, insert a label item above the map. First use the item properties of the label item to set the horizontal alignment to *Center*. Next activate from *Reference point* the upper middle checkbox. You can provide following expression for field *X* :

```
(CASE WHEN bounds_width($atlasgeometry) > bounds_height($atlasgeometry) THEN 297 ELSE 210 END) / 
```

For all other composer items you can set the position in a similar way so they are correctly positioned when page is automatically rotated in portrait or landscape.

Information provided is derived from the excellent blog (in english and portugese) on the Data Defined Override options Multiple_format_map_series_using_QGIS_2.6 .

This is just one example of how you can use Data Defined Overrides.

18.6.3 Preview

Once the atlas settings have been configured and map items selected, you can create a preview of all the pages by clicking on *Atlas* → *Preview Atlas* and using the arrows, in the same menu, to navigate through all the features.

18.6.4 Generarea

The atlas generation can be done in different ways. For example, with *Atlas* → *Print Atlas*, you can directly print it. You can also create a PDF using *Atlas* → *Export Atlas as PDF*: The user will be asked for a directory for saving all the generated PDF files (except if the *Single file export when possible* has been selected). If you need to print just a page of the atlas, simply start the preview function, select the page you need and click on *Composer* → *Print* (or create a PDF).

18.7 Hide and show panels

To maximise the space available to interact with a composition you can use *View* –> *Hide panels* or press `F10`.

:: note:

```
It's also possible to switch to a full screen mode to have more space to interact by pressing
:kbd:`F11` or using :guilabel:`View --> |checkbox| :guilabel:`Toggle full screen`.
```

18.8 Generarea Rezultatului

Figure_composer_output shows the Print Composer with an example print layout, including each type of map item described in the sections above.

Before printing a layout you have the possibility to view your composition without bounding boxes. This can be enabled by deactivating *View* –> *Show bounding boxes* or pressing the shortcut `Ctrl+Shift+B`.

The Print Composer allows you to create several output formats, and it is possible to define the resolution (print quality) and paper size:

- The Print icon allows you to print the layout to a connected printer or a PostScript file, depending on installed printer drivers.

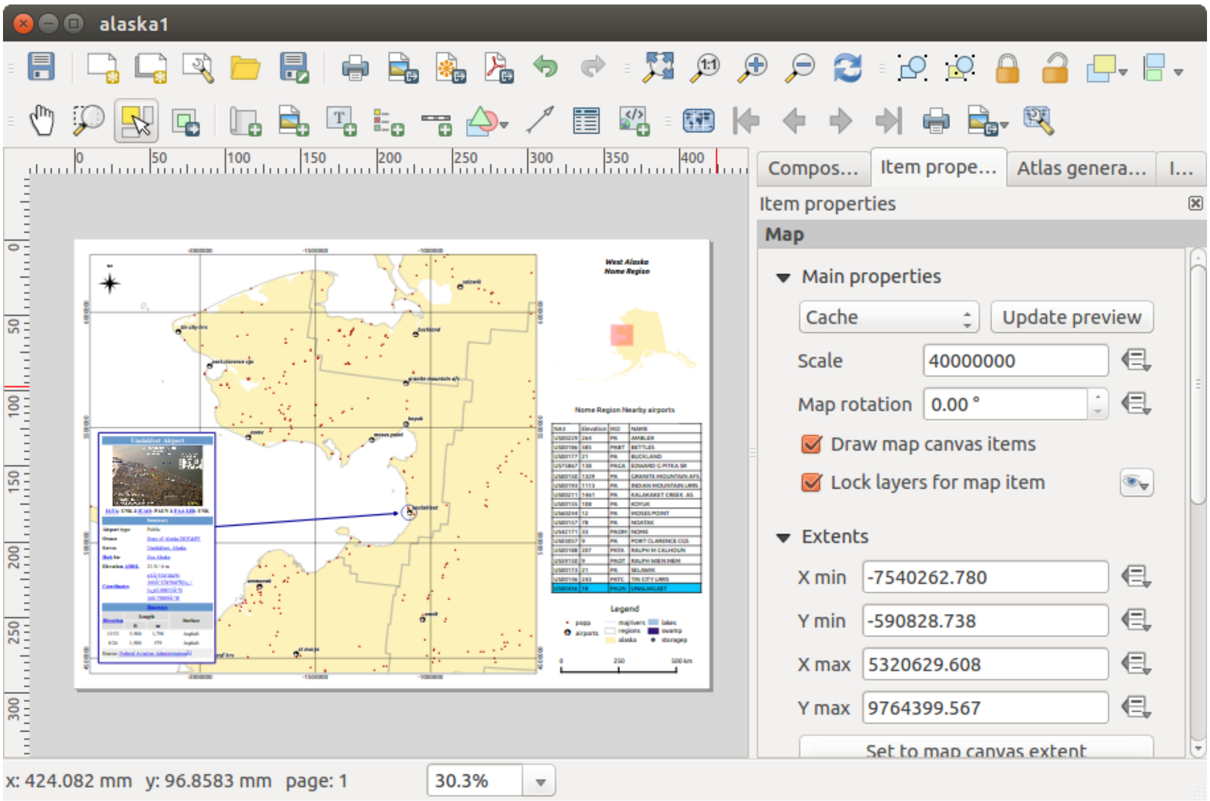

Figure 18.43: Print Composer with map view, legend, image, scale bar, coordinates, text and HTML frame added

- The Export as image icon exports the Composer canvas in several image formats, such as PNG, BPM, TIF, JPG,...
- Export as PDF saves the defined Print Composer canvas directly as a PDF.
- The Export as SVG icon saves the Print Composer canvas as an SVG (Scalable Vector Graphic).

If you need to export your layout as a **georeferenced image** (i.e., to load back inside QGIS), you need to enable this feature under the Composition tab. Check *World file on* and choose the map item to use. With this option, the 'Export as image' action will also create a world file.

Note:

- Currently, the SVG output is very basic. This is not a QGIS problem, but a problem with the underlying Qt library. This will hopefully be sorted out in future versions.
- Exporting big rasters can sometimes fail, even if there seems to be enough memory. This is also a problem with the underlying Qt management of rasters.

18.9 Gestiunea Compozitorului

With the Save as template and Add items from template icons, you can save the current state of a Print Composer session as a `.qpt` template and load the template again in another session.

The Composer Manager button in the QGIS toolbar and in *Composer* → *Composer Manager* allows you to add a new Composer template, create a new composition based on a previously saved template or to manage already existing templates.

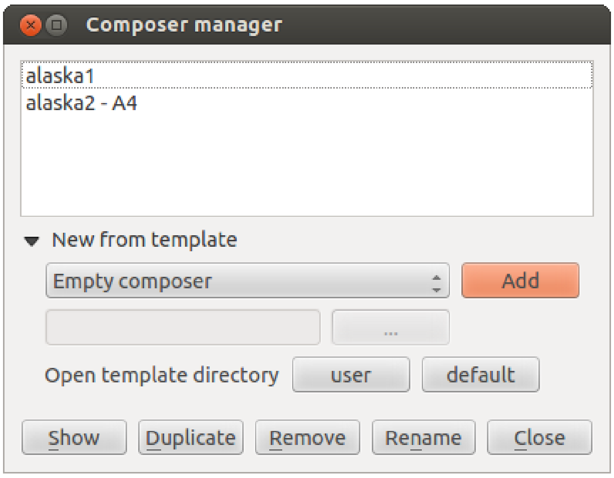

Figure 18.44: Managerul Compozitorului de Hări

By default, the Composer manager searches for user templates in ~/.qgis2/composer_template.

The New Composer and Duplicate Composer buttons in the QGIS toolbar and in *Composer* → *New Composer* and *Composer* → *Duplicate Composer* allow you to open a new Composer dialog, or to duplicate an existing composition from a previously created one.

Finally, you can save your print composition with the Save Project button. This is the same feature as in the QGIS main window. All changes will be saved in a QGIS project file.

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Plugin-uri

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19.1 QGIS Plugins

QGIS has been designed with a plugin architecture. This allows many new features and functions to be easily added to the application. Many of the features in QGIS are actually implemented as plugins.

Putei gestiona plugin-urile dumneavoastră în fereastra de dialog, care poate fi deschisă cu *Plugins* > *Manage and install plugins ...*.

When a plugin needs to be updated, and if plugins settings have been set up accordingly, QGIS main interface could display a blue link in the status bar to tell you that there are some updates for plugins waiting to be applied.

19.1.1 Dialogul Plugin-urilor

The menus in the Plugins dialog allow the user to install, uninstall and upgrade plugins in different ways. Each plugin have some metadatas displayed in the right panel:

- information if the plugin is experimental
- descriere
- rating vote(s) (you can vote for your prefered plugin!)
- etichete
- some useful links as the home page, tracker and code repository
- autor(i)
- versiunea disponibilă

Se poate utiliza filtrul pentru a găsi un anumit plugin.

All

Here, all the available plugins are listed, including both core and external plugins. Use **[Upgrade all]** to look for new versions of the plugins. Furthermore, you can use **[Install plugin]**, if a plugin is listed but not installed, and **[Uninstall plugin]** as well as **[Reinstall plugin]**, if a plugin is installed. If a plugin is installed, it can be de/activated using the checkbox.

Installed

În acest meniu, putei găsi doar plugin-urile instalate. Plugin-urile externe pot fi dezinstalate i reinstalate folosind butoanele **[Dezinstalare plugin]** i **[Reinstalare plugin]**. Putei **[Actualiza tot]**, la fel de bine.

Neinstalat

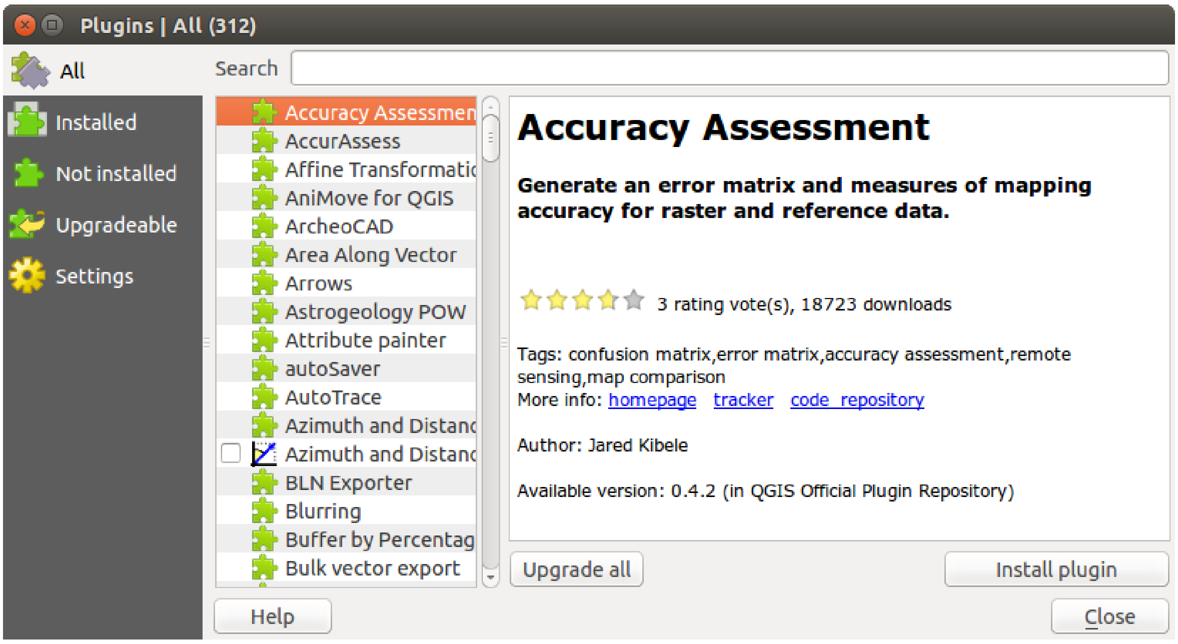

Figure 19.1: The *All* menu

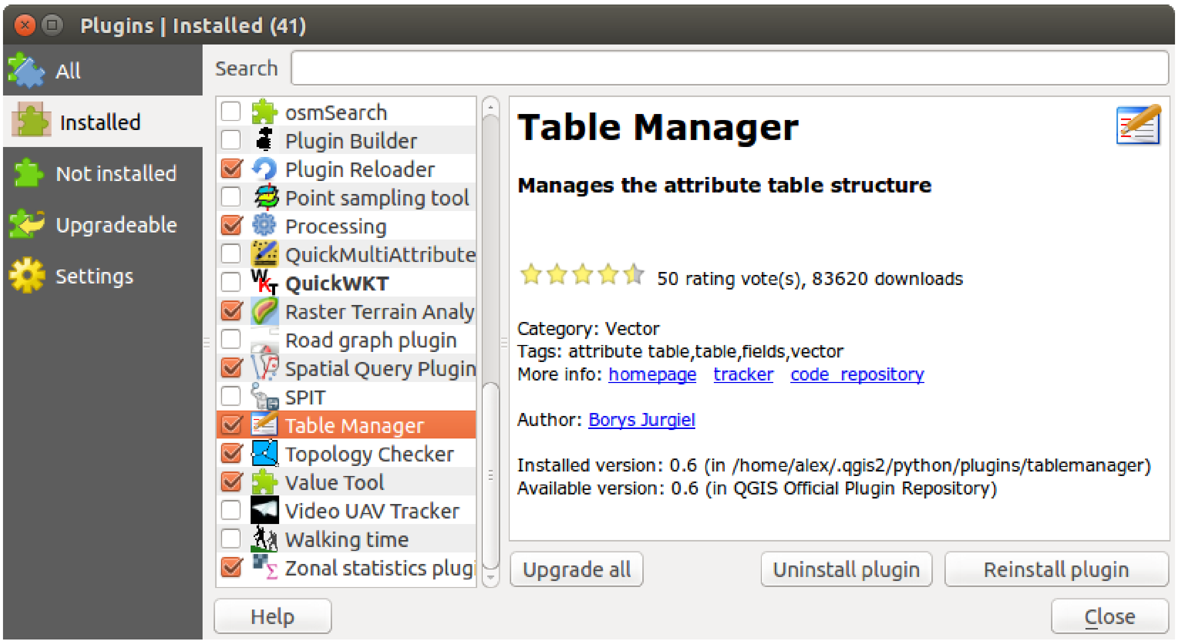

Figure 19.2: The *Installed* menu

This menu lists all plugins available that are not installed. You can use the **[Install plugin]** button to implement a plugin into QGIS.

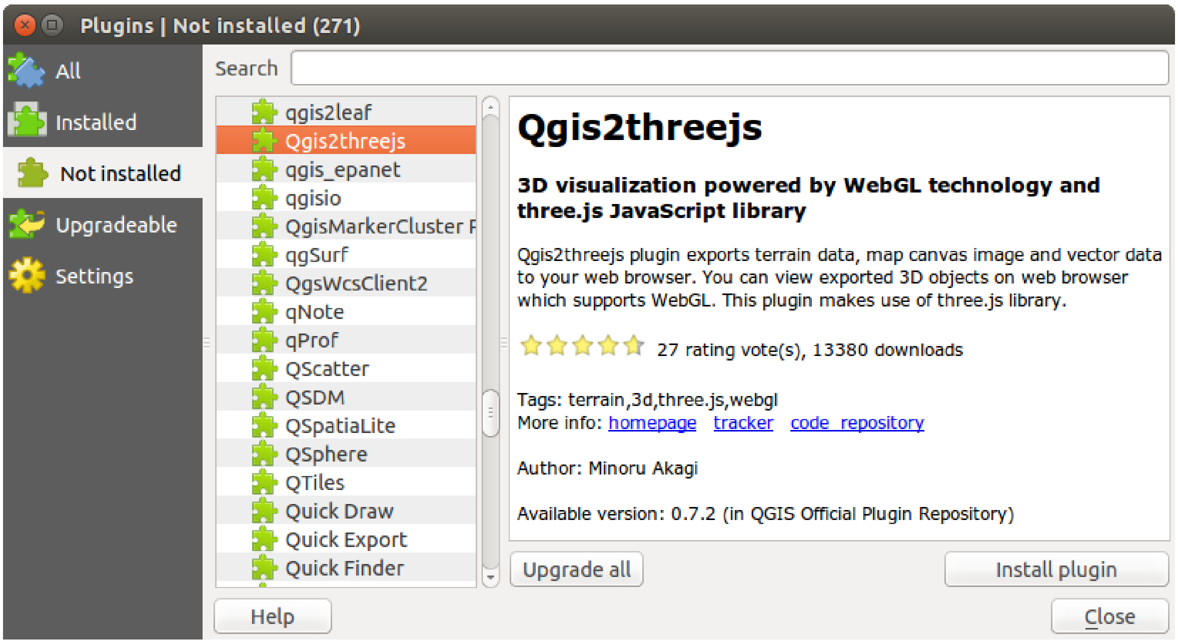

Figure 19.3: The *Not installed* menu

Upgradeable

If you activated *Show also experimental plugins* in the *Settings* menu, you can use this menu to look for more recent plugin versions. This can be done with the **[Upgrade plugin]** or **[Upgrade all]** buttons.

Settings

În acest meniu, vei vedea următoarele opiuni:

- *Check for updates on startup*. Whenever a new plugin or a plugin update is available, QGIS will inform you 'every time QGIS starts', 'once a day', 'every 3 days', 'every week', 'every 2 weeks' or 'every month'.
- *Show also experimental plugins*. QGIS will show you plugins in early stages of development, which are generally unsuitable for production use.
- *Arată, de asemenea, plugin-uri depreciate*. Aceste plugin-uri sunt depreciate i, în general, sunt improprii pentru utilizarea în producie.

Pentru a adăuga depozitele autorilor externi, facei clic pe **[Add...]** din seciunea *Plugin repositories*. Dacă nu dorii adăugarea unia sau a mai multora dinte depozitele adăugate, le putei dezactiva prin intermediul butonului **[Edit...]**, sau eliminai-le complet cu butonul **[Delete]**.

The *Search* function is available in nearly every menu (except *Settings*). Here, you can look for specific plugins.

Tip: Core and external plugins

QGIS plugins are implemented either as **Core Plugins** or **External Plugins**. **Core Plugins** are maintained by the QGIS Development Team and are automatically part of every QGIS distribution. They are written in one of two languages: C++ or Python. **External Plugins** are currently all written in Python. They are stored in external repositories and are maintained by the individual authors.

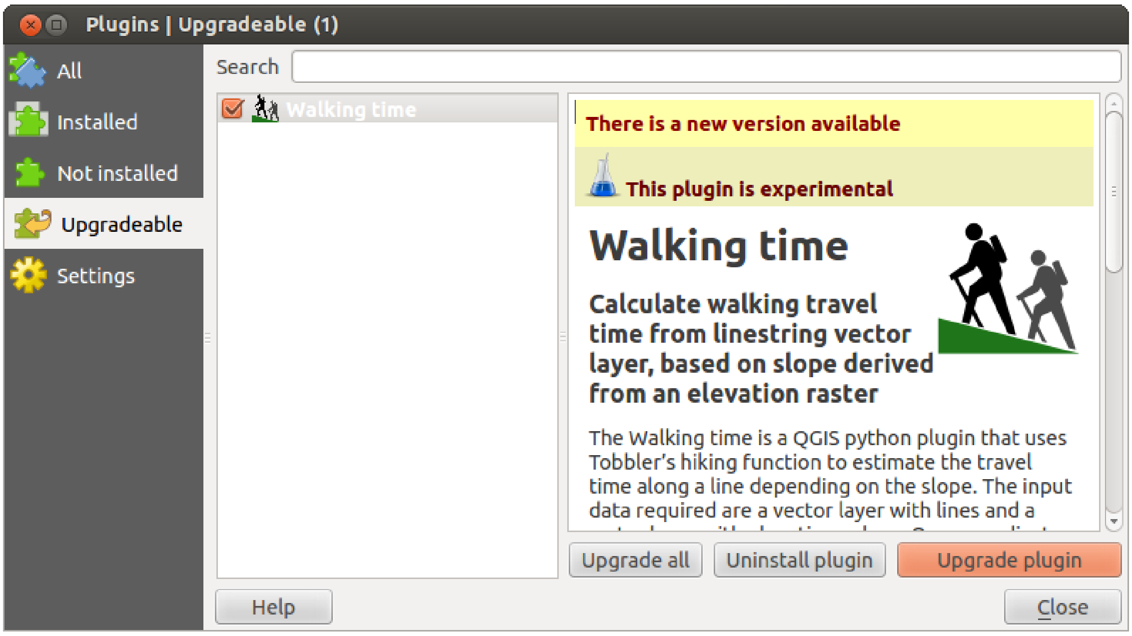

Figure 19.4: The *Upgradeable* menu

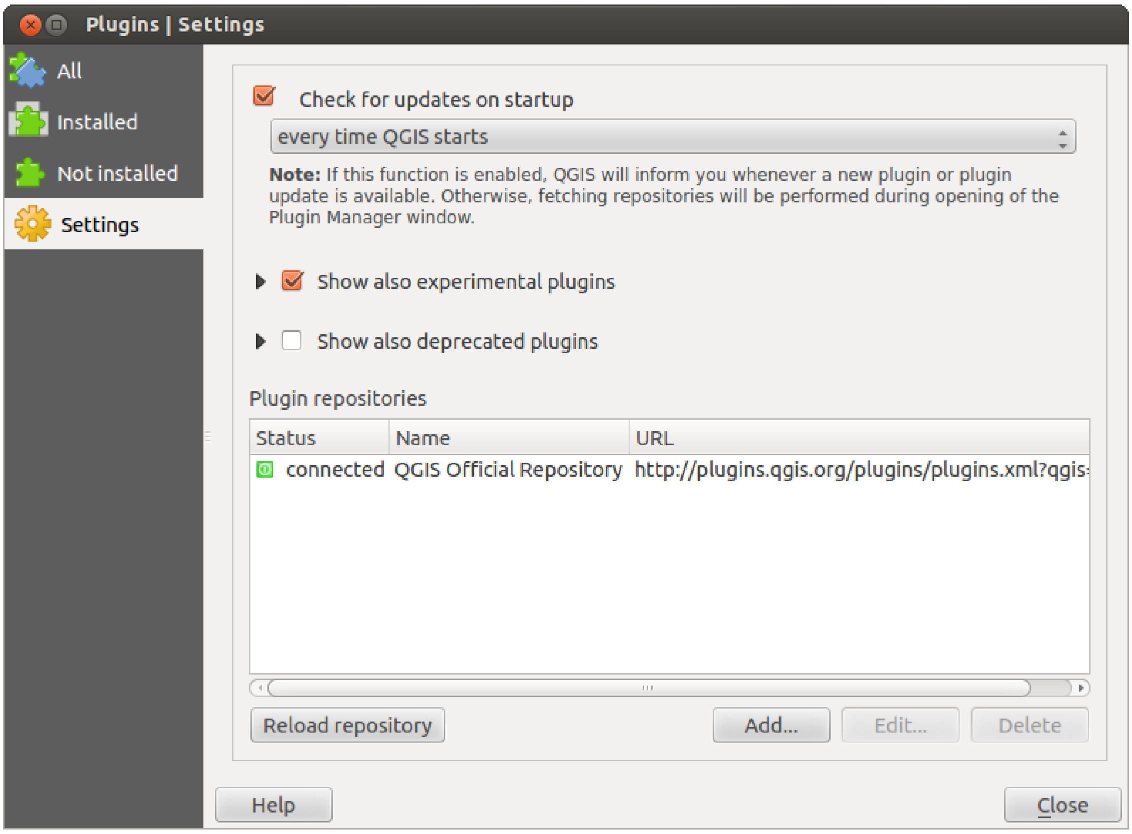

Figure 19.5: The *Settings* menu

Detailed documentation about the usage, minimum QGIS version, home page, authors, and other important information are provided for the 'Official' QGIS Repository at http://plugins.qgis.org/plugins/. For other external repositories, documentation might be available with the external plugins themselves. In general, it is not included in this manual.

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19.2 Using QGIS Core Plugins

Pictogramă	Plugin	Descriere	Manual de Referină
	Accuracy Assessment	Generate an error matrix	*accuracy*
	CadTools	Perform CAD-like functions in QGIS	*cadtools*
	Captură coordonate	Capturează coordonatele mouse-ului într-un CRS diferit	*Plugin-ul de Captură a Coordonatelor*
	DB Manager	Manage your databases within QGIS	*Plugin-ul DB Manager*
	Convertor DXF2Shape	Converteşte fişierul din format DXF în format SHP	*Plugin-ul Convertor Dxf2Shp*
	eVis	Instrumentul de Vizualizare a Evenimentelor	*Plugin-ul eVis*
	fTools	O suită de instrumente vectoriale	*Plugin-ul fTools*
	Instrumente GPS	Instrumente pentru încărcarea i importul datelor GPS	*Plugin-ul GPS*
	GRASS	Funcionalitatea GRASS	*Integrarea GRASS GIS*
	Instrumente GDAL	Funcionalitatea rasterelor GDAL	*Plugin-ul Instrumentelor GDAL*
	Georeferenţiator GDAL	Georeferenţiere rastere folosind GDAL	*Plugin-ul de georefereniere*
	Hartă calorică	Creează hări calorice raster din vectorii de intrare de tip punct.	*Plugin-ul Heatmap*
	Plugin-ul de interpolare	Interpolarea bazată pe vertecii unui strat vectorial	*Plugin-ul de Interpolare*
	Editarea Offline	Editarea offline şi sincronizarea cu baza de date	*Plugin-ul de Editare Offline*
	Oracle Spatial GeoRaster	Accesare Oracle Spatial GeoRasters	*Plugin-ul GeoRaster Oracle Spatial*
	Managerul de Plugin-uri	Gestionează plugin-uri de bază i externe	*Dialogul Plugin-urilor*
	Analiza Terenurilor Raster	Calculează entităile geomorfologice din DEM-uri	*Plugin-ul de Analiză a Terenurilor Raster*
	Plugin pentru Grafuri Rutiere	Analiza celei mai scurte căi	*Plugin pentru Grafuri Rutiere*
	SQL Anywhere plugin	Access SQL anywhere DB	*sqlanywhere*
	Interogare spaţială	Interogări spaiale asupra vectorilor	*Pluginul de Interogare spaţială*
	SPIT	Shapefile to PostgreSQL/PostGIS Import Tool	*Plugin-ul SPIT*
	Statistici Zonale	Calculează statistici raster pentru vectorii poligonali	*Plugin-ul de statistici zonale*
	MetaSearch	Interacionează cu serviciile catalogului de metadate (CSW)	*MetaSearch Catalogue Client*

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19.3 Plugin-ul de Captură a Coordonatelor

Plugin-ul de captură a coordonatelor este uor de utilizat i oferă capacitatea de afiare a coordonatelor pe canevasul hării, pentru cele două sisteme de coordonate de referină selectate (CRS-uri).

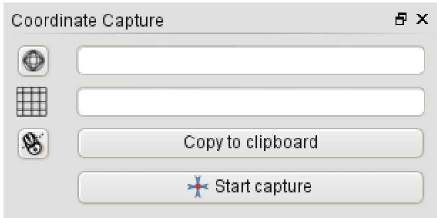

Figure 19.6: Coordinate Capture Plugin

1. Start QGIS, select *Project Properties* from the *Settings* (KDE, Windows) or *File* (Gnome, OSX) menu and click on the *Projection* tab. As an alternative, you can also click on the CRS status icon in the lower right-hand corner of the status bar.
2. Clic pe caseta de bifare *Activare proiecie din zbor* i selectai sistemul de proiecie a coordonatelor dorit (v. *Lucrul cu Proiecii*).
3. Activai plugin-ul de captură a coordonatelor din Managerul de Plugin-uri (v. *Dialogul Plugin-urilor*) i asigurai-vă ca dialogul este vizibil, mergând la *View* → *Panels* i bifând *Coordinate Capture*. Dialogul de captură a coordonatelor va aparea, aa cum se vede în Imaginea figure_coordinate_capture_1. Ca alternativă, putei merge la *Vector* → *Coordinate Capture* i să vedei dacă este bifată caseta *Coordinate Capture*.
4. Clic pe pictograma Click to the select the CRS to use for coordinate display i selectai un CRS diferit de cel selectat mai sus.
5. Pentru a începe înregistrarea coordonatelor, facei clic pe **[Start capture]**. Acum avei posibilitatea să facei clic oriunde pe canevas, iar plugin-ul va afia coordonatele pentru ambele CRS-uri selectate.
6. Pentru a activa urmărirea coordonatelor mouse-ului, efectuai clic pe pictograma mouse tracking.
7. De asemenea, se pot copia în clipboard coordonatele selectate.

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19.4 Plugin-ul DB Manager

The DB Manager Plugin is officially part of the QGIS core and is intended to replace the SPIT Plugin and, additionally, to integrate all other database formats supported by QGIS in one user interface. The DB Manager Plugin provides several features. You can drag layers from the QGIS Browser into the DB Manager, and it will import your layer into your spatial database. You can drag and drop tables between spatial databases and they will get imported. .. _figure_db_manager:

Meniul *Bazei de Date* vă permite să vă conectai la o bază de date existentă, pentru a lansa fereastra SQL i pentru a iei din Plugin-ul DB Manager. O dată ce vă conectai la o bază de date existentă, apar meniurile adiionale *Schemă* i *Tabelă*.

Meniul *Schema* include instrumente pentru a crea i a terge scheme (vide) i, în cazul în care topologia este disponibilă, (de exemplu, PostGIS 2), pentru a începe o *TopoVizualizare*.

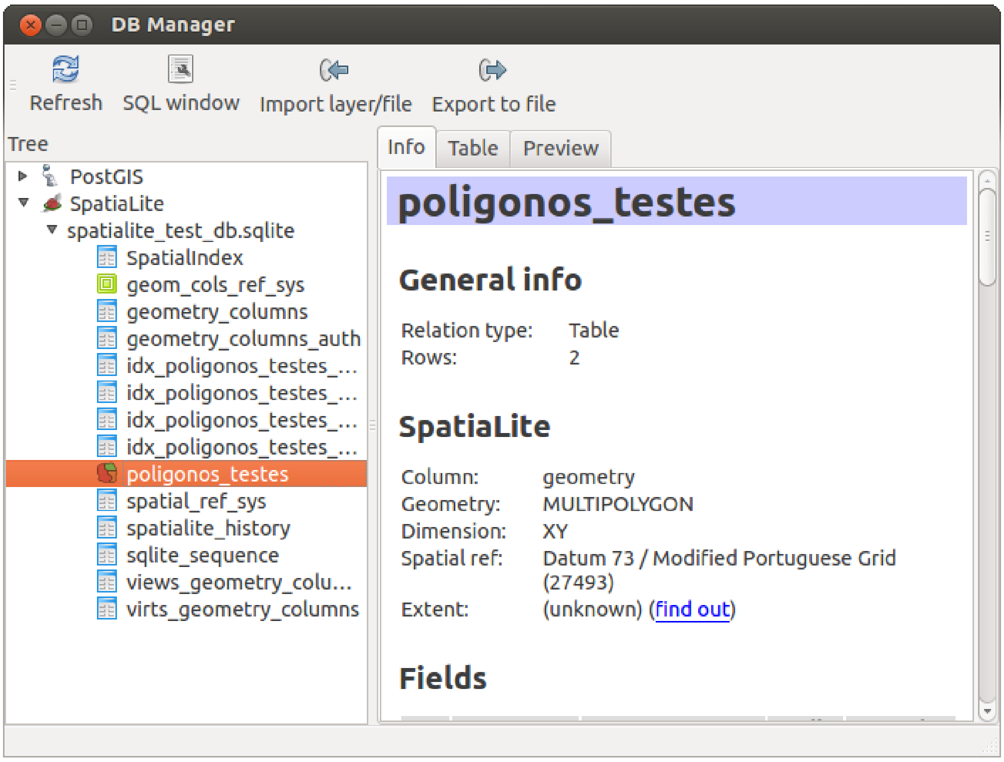


Figure 19.7: DB Manager dialog

The *Table* menu allows you to create and edit tables and to delete tables and views. It is also possible to empty tables and to move tables from one schema to another. As further functionality, you can perform a VACUUM and then an ANALYZE for each selected table. Plain VACUUM simply reclaims space and makes it available for reuse. ANALYZE updates statistics to determine the most efficient way to execute a query. Finally, you can import layers/files, if they are loaded in QGIS or exist in the file system. And you can export database tables to shape with the Export File feature.

The *Tree* window lists all existing databases supported by QGIS. With a double-click, you can connect to the database. With the right mouse button, you can rename and delete existing schemas and tables. Tables can also be added to the QGIS canvas with the context menu.

If connected to a database, the **main** window of the DB Manager offers three tabs. The *Info* tab provides information about the table and its geometry, as well as about existing fields, constraints and indexes. It also allows you to run Vacuum Analyze and to create a spatial index on a selected table, if not already done. The *Table* tab shows all attributes, and the *Preview* tab renders the geometries as preview.

19.4.1 Lucrul cu fereastra SQL

You can also use the DB Manager to execute SQL queries against your spatial database and then view the spatial output for queries by adding the results to QGIS as a query layer. It is possible to highlight a portion of the SQL and only that portion will be executed when you press `F5` or click the *Execute (F5)* button.

.

19.5 Plugin-ul Convertor Dxf2Shp

Plugin-ul convertor dxf2shape poate fi folosit pentru a converti date vectoriale dintr-un DXF în format shapefile. Este nevoie de următorii parametri care trebuie să fie specificai înainte de rulare:

- **Fiierul de intrare DXF**: Introducei calea către fiierul DXF care trebuie convertit.

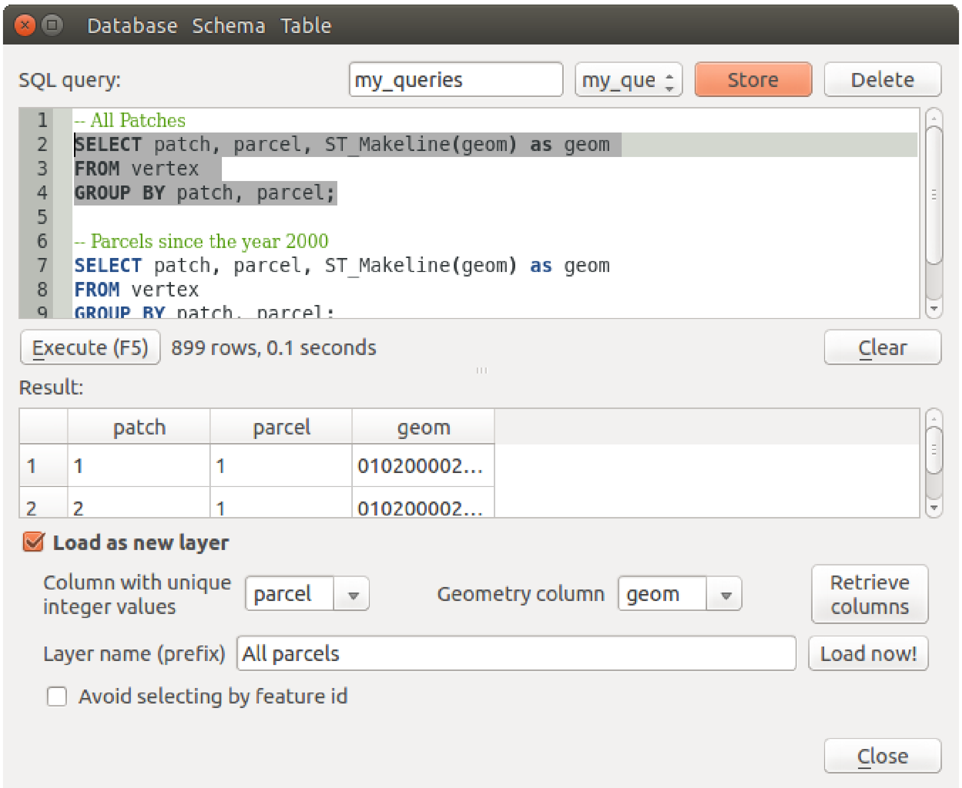


Figure 19.8: Executing SQL queries in the DB Manager SQL window

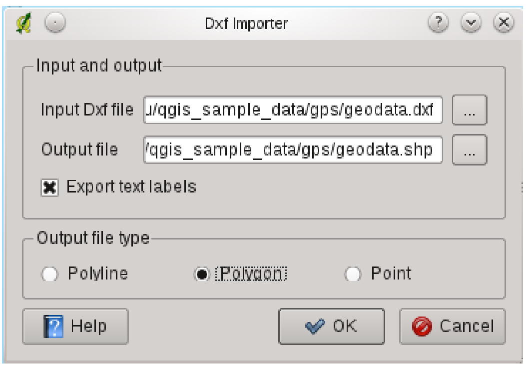


Figure 19.9: Plugin-ul Convertor Dxf2Shape

- **Fiierul de ieire Shp**: Introducei numele dorit pentru fiierul shape care trebuie creat.
- **Tipul fiierului de ieire**: Specificai tipul de geometrie dorit pentru fiierul shape de ieire. Tipuri de acceptate în prezent sunt polilinie, poligon, i punct.
- **Exportare etichete cu text**: Când opiunea este selectată, un strat suplimentar de tip shapefile va fi creat, iar tabela DBF asociată va conine informaii despre câmpul 'text' din fiierul DXF, i irurile de caractere în sine.

19.5.1 Utilizarea plugin-ului

1. Start QGIS, load the Dxf2Shape plugin in the Plugin Manager (see *Dialogul Plugin-urilor*) and click on the Dxf2Shape Converter icon, which appears in the QGIS toolbar menu. The Dxf2Shape plugin dialog appears, as shown in Figure_dxf2shape_1.
2. Introducei fiierul DXF de intrare, numele i tipul pentru fiierul shape de ieire.
3. Activai caseta de bifare *Exportă etichetele cu text* dacă dorii să creai un strat suplimentar, de tip punct, cu etichete.
4. Clic pe **[OK]**.

.

19.6 Plugin-ul eVis

(This section is derived from Horning, N., K. Koy, P. Ersts. 2009. eVis (v1.1.0) User's Guide. American Museum of Natural History, Center for Biodiversity and Conservation. Available from http://biodiversityinformatics.amnh.org/, and released under the GNU FDL.)

The Biodiversity Informatics Facility at the American Museum of Natural History's (AMNH) Center for Biodiversity and Conservation (CBC) has developed the Event Visualization Tool (eVis), another software tool to add to the suite of conservation monitoring and decision support tools for guiding protected area and landscape planning. This plugin enables users to easily link geocoded (i.e., referenced with latitude and longitude or X and Y coordinates) photographs, and other supporting documents, to vector data in QGIS.

eVis is now automatically installed and enabled in new versions of QGIS, and as with all plugins, it can be disabled and enabled using the Plugin Manager (see *Dialogul Plugin-urilor*).

Plugin-ul eVis este compus din trei module: 'Database Connection tool', 'Event ID tool', i 'Event Browser'. Acestea lucrează împreună pentru a permite vizualizarea fotografiilor geocodate i a altor documente care sunt legate de entităi stocate în fiiere vectoriale, baze de date sau foi de calcul.

19.6.1 Browser-ul de Evenimente

The Event Browser module provides the functionality to display geocoded photographs that are linked to vector features displayed in the QGIS map window. Point data, for example, can be from a vector file that can be input using QGIS or it can be from the result of a database query. The vector feature must have attribute information associated with it to describe the location and name of the file containing the photograph and, optionally, the compass direction the camera was pointed when the image was acquired. Your vector layer must be loaded into QGIS before running the Event Browser.

Lansarea modulului Event Browser

To launch the Event Browser module, click on *Database* → *eVis* → *eVis Event Browser*. This will open the *Generic Event Browser* window.

The *Event Browser* window has three tabs displayed at the top of the window. The *Display* tab is used to view the photograph and its associated attribute data. The *Options* tab provides a number of settings that can be adjusted to control the behavior of the eVis plugin. Lastly, the *Configure External Applications* tab is used to maintain a table of file extensions and their associated application to allow eVis to display documents other than images.

Înelegerea ferestrei de Afiare

To see the *Display* window, click on the *Display* tab in the *Event Browser* window. The *Display* window is used to view geocoded photographs and their associated attribute data.

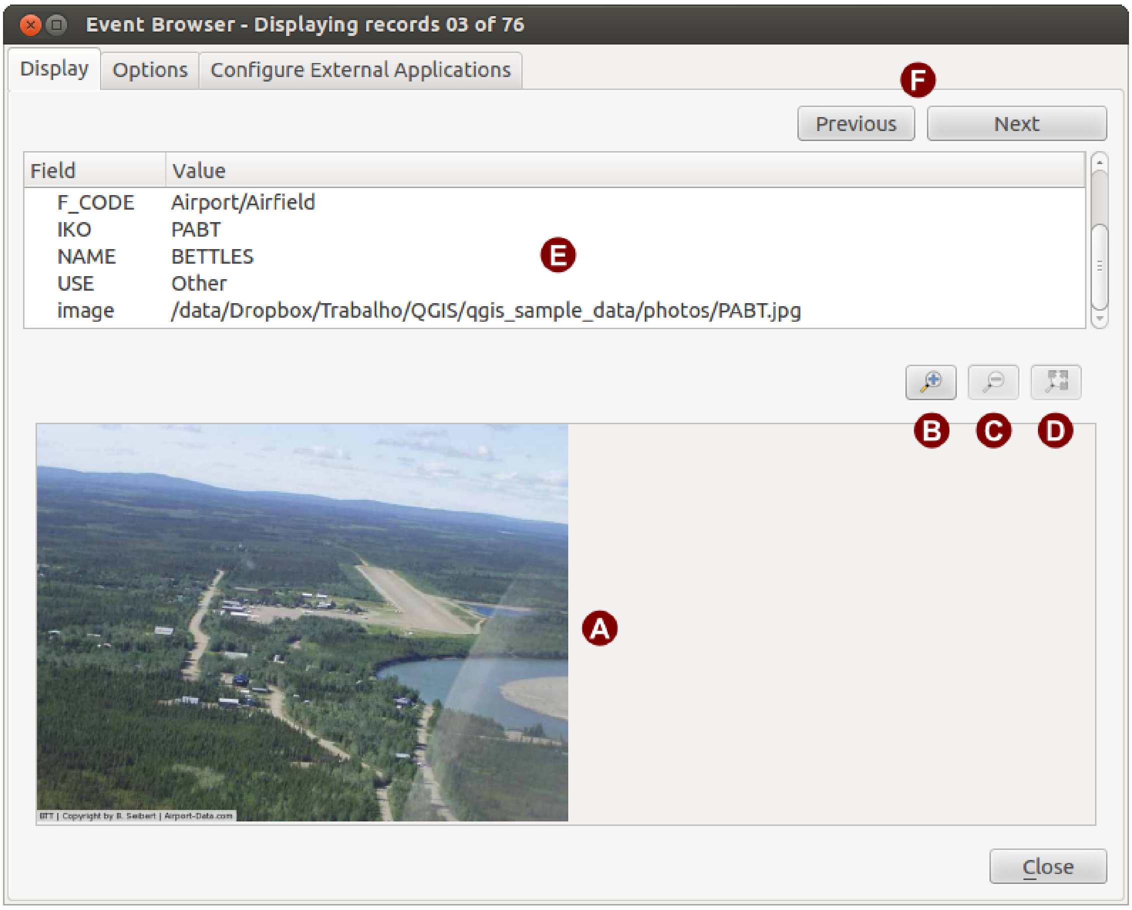


Figure 19.10: Fereastra de afiare *eVis*

1. **Fereastra de afiare**: O fereastră în care va apărea fotografia.
2. **Zoom in button**: Apropiai pentru a vedea mai multe detalii. Dacă nu se poate afia întreaga imagine vor apărea bare de derulare în stânga i în josul ferestrei pentru a putea permite derularea imaginii.
3. **Zoom out button**: Depărtai pentru a vedea o zonă mai mare.
4. Butonul **Zoom to full extent**: Afiează întreaga fotografie.
5. **Attribute information window**: All of the attribute information for the point associated with the photograph being viewed is displayed here. If the file type being referenced in the displayed record is not an image but is of a file type defined in the *Configure External Applications* tab, then when you double-click on the value of the field containing the path to the file, the application to open the file will be launched to view or hear the contents of the file. If the file extension is recognized, the attribute data will be displayed in green.
6. **Navigation buttons**: Folosii butoanele Anterior i Următor pentru a încărca entitatea precedentă sau următoare atunci când este selectată mai mult de o entitate.

Înelegerea ferestrei Opiuni

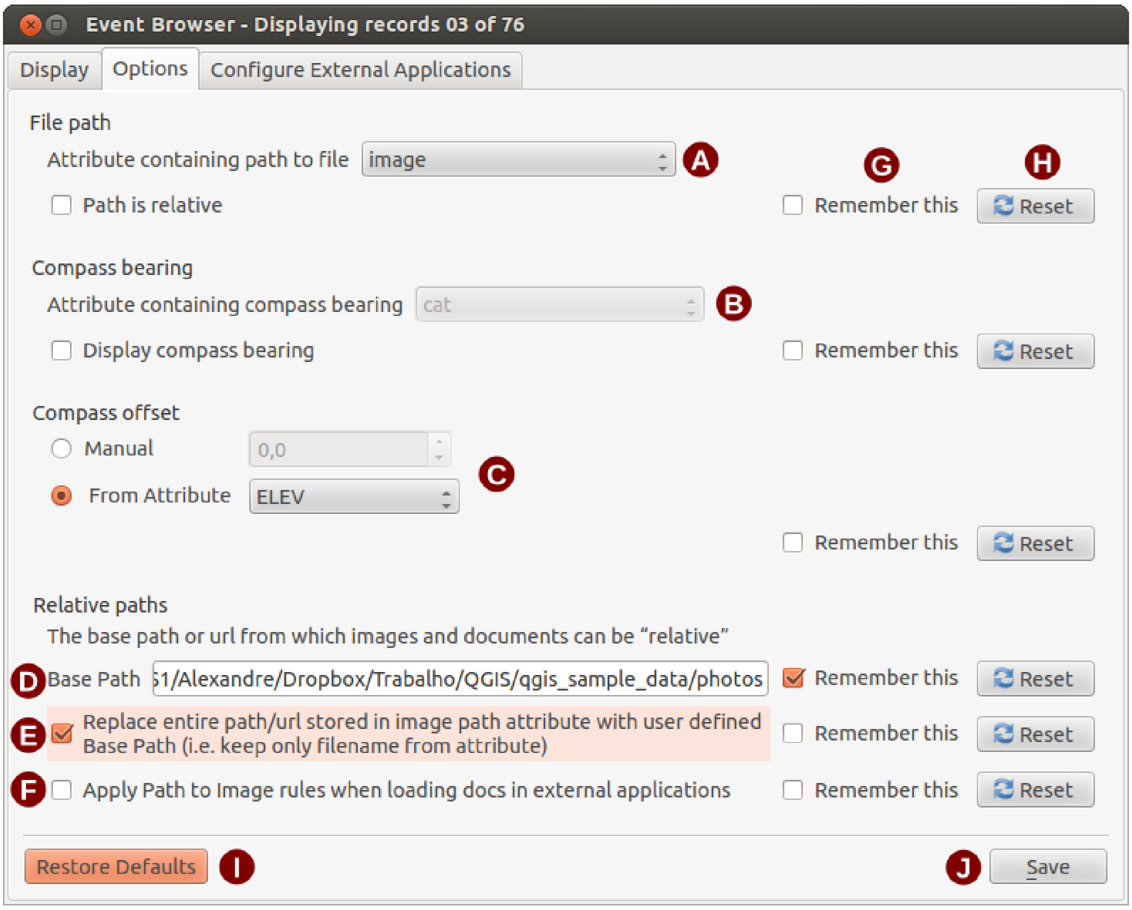


Figure 19.11: Fereastra de opiuni *eVis*

1. **File path**: A drop-down list to specify the attribute field that contains the directory path or URL for the photographs or other documents being displayed. If the location is a relative path, then the checkbox must be clicked. The base path for a relative path can be entered in the *Base Path* text box below. Information about the different options for specifying the file location are noted in the section *Specificai locaia i numele unei fotografii* below.
2. **Compass bearing**: A drop-down list to specify the attribute field that contains the compass bearing associated with the photograph being displayed. If compass bearing information is available, it is necessary to click the checkbox below the drop-down menu title.
3. **Compass offset**: Compass offsets can be used to compensate for declination (to adjust bearings collected using magnetic bearings to true north bearings). Click the *Manual* radio button to enter the offset in the text box or click the *From Attribute* radio button to select the attribute field containing the offsets. For both of these options, east declinations should be entered using positive values, and west declinations should use negative values.
4. **Directory base path**: Calea la care se va adăuga calea relativă definită în Figure_eVis_2 (A).
5. **Replace path**: If this checkbox is checked, only the file name from A will be appended to the base path.
6. **Apply rule to all documents**: If checked, the same path rules that are defined for photographs will be used for non-image documents such as movies, text documents, and sound files. If not checked, the path rules will only apply to photographs, and other documents will ignore the base path parameter.
7. **Remember settings**: If the checkbox is checked, the values for the associated parameters will be saved for the next session when the window is closed or when the **[Save]** button below is pressed.
8. **Resetare valori**: Resetează valorile de pe această linie la setarea implicită.

9. **Restore defaults**: This will reset all of the fields to their default settings. It has the same effect as clicking all of the **[Reset]** buttons.
10. **Salvare**: Acest lucru va salva setările fără a închide panoul *Opiunilor*.

Înelegera ferestrei de Configurare a Aplicaiilor Externe

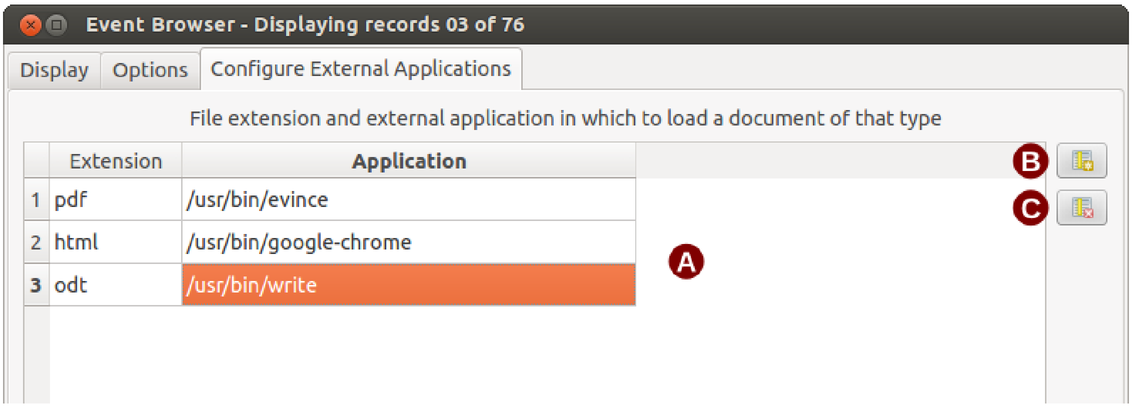


Figure 19.12: Fereastra Aplicaiilor Externe *eVis*

1. **File reference table**: Un tabel care conine tipurile de fiiere care pot fi deschise cu eVis. Fiecare tip de fiier are nevoie de o extensie i de o cale către o aplicaie care poate deschide acel tip de fiier. Aceasta permite deschiderea unui număr mare de asemenea fiiere cum ar fi filme, înregistrări sonore i documente text în plus faă de imagini.
2. **Add new file type**: Adaugă un nou tip de fiier cu o extensie unică i calea către aplicaia care poate deschide acel fiier.
3. **Delete current row**: terge tipul de fiier evideniat în tabel i definit de o extensie de fiier i o cale către o aplicaie asociată.

19.6.2 Specificai locaia i numele unei fotografii

The location and name of the photograph can be stored using an absolute or relative path, or a URL if the photograph is available on a web server. Examples of the different approaches are listed in Table evis_examples.

```
X         Y         FILE                                                  BEARING
780596    1784017   C:\Workshop\eVis_Data\groundphotos\DSC_0168.JPG       275
780596    1784017   /groundphotos/DSC_0169.JPG                            80
780819    1784015   http://biodiversityinformatics.amnh.org/\
                    evis_testdata/DSC_0170.JPG                            10
780596    1784017   pdf:http://www.testsite.com/attachments.php?\
                    attachment_id-12                                      76
```

19.6.3 Specificai locaia i numele altor documente justificative

Supporting documents such as text documents, videos, and sound clips can also be displayed or played by eVis. To do this, it is necessary to add an entry in the file reference table that can be accessed from the *Configure External Applications* window in the *Generic Event Browser* that matches the file extension to an application that can be used to open the file. It is also necessary to have the path or URL to the file in the attribute table for the vector layer. One additional rule that can be used for URLs that don't contain a file extension for the document you want to open is to specify the file extension before the URL. The format is — `file extension:URL`. The URL is preceded by the file extension and a colon; this is particularly useful for accessing documents from wikis and other web sites that use a database to manage the web pages (see Table evis_examples).

19.6.4 Lansarea modulului de Răsfoire a Evenimentelor

When the *Event Browser* window opens, a photograph will appear in the display window if the document referenced in the vector file attribute table is an image and if the file location information in the *Options* window is properly set. If a photograph is expected and it does not appear, it will be necessary to adjust the parameters in the *Options* window.

If a supporting document (or an image that does not have a file extension recognized by eVis) is referenced in the attribute table, the field containing the file path will be highlighted in green in the attribute information window if that file extension is defined in the file reference table located in the *Configure External Applications* window. To open the document, double-click on the green-highlighted line in the attribute information window. If a supporting document is referenced in the attribute information window and the file path is not highlighted in green, then it will be necessary to add an entry for the file's filename extension in the *Configure External Applications* window. If the file path is highlighted in green but does not open when double-clicked, it will be necessary to adjust the parameters in the *Options* window so the file can be located by eVis.

If no compass bearing is provided in the *Options* window, a red asterisk will be displayed on top of the vector feature that is associated with the photograph being displayed. If a compass bearing is provided, then an arrow will appear pointing in the direction indicated by the value in the compass bearing display field in the *Event Browser* window. The arrow will be centered over the point that is associated with the photograph or other document.

To close the *Event Browser* window, click on the **[Close]** button from the *Display* window.

19.6.5 Instrumentul Event ID

The 'Event ID' module allows you to display a photograph by clicking on a feature displayed in the QGIS map window. The vector feature must have attribute information associated with it to describe the location and name of the file containing the photograph and, optionally, the compass direction the camera was pointed when the image was acquired. This layer must be loaded into QGIS before running the 'Event ID' tool.

Lansarea modulului Event ID

To launch the 'Event ID' module, either click on the Event ID icon or click on *Database* → *eVis* → *Event ID Tool*. This will cause the cursor to change to an arrow with an 'i' on top of it signifying that the ID tool is active.

To view the photographs linked to vector features in the active vector layer displayed in the QGIS map window, move the Event ID cursor over the feature and then click the mouse. After clicking on the feature, the *Event Browser* window is opened and the photographs on or near the clicked locality are available for display in the browser. If more than one photograph is available, you can cycle through the different features using the **[Previous]** and **[Next]** buttons. The other controls are described in the ref:*evis_browser* section of this guide.

19.6.6 Conexiune la Baza de Date

Modulul 'Database Connection' pune la dispoziie unelte pentru conectarea i interogarea unei baze de date sau a unei alte resurse ODBC, cum ar fi o foaie de calcul.

eVis can directly connect to the following types of databases: PostgreSQL, MySQL, and SQLite; it can also read from ODBC connections (e.g., MS Access). When reading from an ODBC database (such as an Excel spreadsheet), it is necessary to configure your ODBC driver for the operating system you are using.

Lansarea modulului de Conectare la Baza de Date

To launch the 'Database Connection' module, either click on the appropriate icon eVis Database Connection or click on *Database* → *eVis* → *Database Connection*. This will launch the *Database Connection* window. The window has three tabs: *Predefined Queries*, *Database Connection*, and *SQL Query*. The *Output Console* window at the bottom of the window displays the status of actions initiated by the different sections of this module.

Conectarea la baza de date

Click on the *Database Connection* tab to open the database connection interface. Next, use the *Database Type* combo box to select the type of database that you want to connect to. If a password or username is required, that information can be entered in the *Username* and *Password* textboxes.

Enter the database host in the *Database Host* textbox. This option is not available if you selected ‘MS Access’ as the database type. If the database resides on your desktop, you should enter “localhost”.

Introducei numele bazei de date în câmpul text *Database Name*. Dacă selectai ‘ODBC’ ca tip de bază de date, va trebui să introducei numele sursei de date.

When all of the parameters are filled in, click on the **[Connect]** button. If the connection is successful, a message will be written in the *Output Console* window stating that the connection was established. If a connection was not established, you will need to check that the correct parameters were entered above.

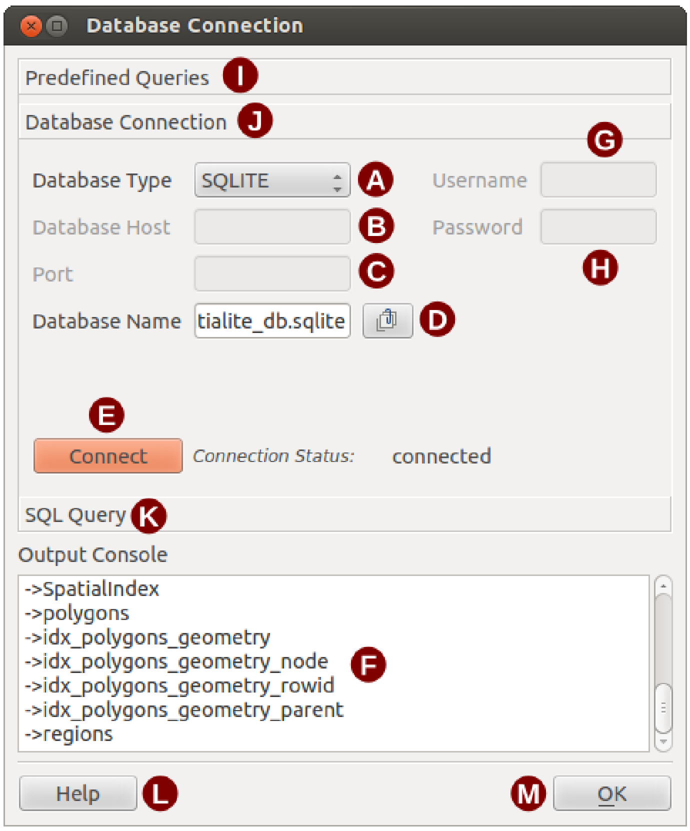


Figure 19.13: Fereastra de conectare la Baza de Date *eVis*

1. **Database Type**: A drop-down list to specify the type of database that will be used.
2. **Database Host**: Numele gazdei pentru baza de date.
3. **Port**: The port number if a MySQL or PostgreSQL database type is selected.
4. **Database Name**: The name of the database.
5. **Connect**: A button to connect to the database using the parameters defined above.
6. **Output Console**: The console window where messages related to processing are displayed.
7. **Username**: Nume utilizator care va fi utilizat atunci când o bază de date este protejată prin parolă.
8. **Password**: Parola care va fi utilizată atunci când o bază de date este protejată prin parolă.
9. **Predefined Queries**: Fila care va deschide fereastra “Interogărilor Predefinite”
10. **Conectare la Baza de Date**: Închide fereastra principală a *Conexiunii la Baza de Date*.

11. **SQL Query**: Fila care va deschide fereastra “SQL Query”.
12. **Help**: Displays the online help.
13. **OK**: Închide fereastra principală a “Conexiunii la Baza de Date”.

Rularea interogărilor SQL

SQL queries are used to extract information from a database or ODBC resource. In eVis, the output from these queries is a vector layer added to the QGIS map window. Click on the *SQL Query* tab to display the SQL query interface. SQL commands can be entered in this text window. A helpful tutorial on SQL commands is available at http://www.w3schools.com/sql. For example, to extract all of the data from a worksheet in an Excel file, `select * from [sheet1$]` where `sheet1` is the name of the worksheet.

Click on the **[Run Query]** button to execute the command. If the query is successful, a *Database File Selection* window will be displayed. If the query is not successful, an error message will appear in the *Output Console* window.

In the *Database File Selection* window, enter the name of the layer that will be created from the results of the query in the *Name of New Layer* textbox.

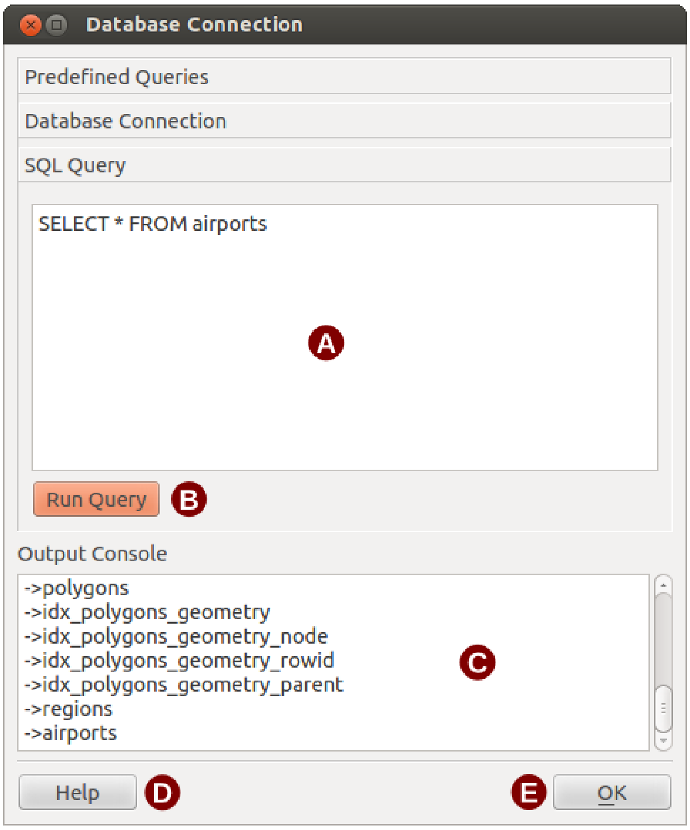


Figure 19.14: Fila de interogare eVis SQL

1. **Fereastra Textului SQL de Interogare**: O fereastră de introducere a interogărilor SQL.
2. **Execuie Interogare**: Butonul care va executa interogarea introdusă în *Fereastra de Interogare SQL*.
3. **Fereastra Consolei**: Fereastra consolei în care sunt afiate mesajele referitoare la procesare.
4. **Help**: Displays the online help.
5. **OK**: Închide fereastra principală a *Conexiunii la Baza de Date*.

Use the *X Coordinate* and *Y Coordinate* combo boxes to select the fields from the database that stores the `X` (or longitude) and `Y` (or latitude) coordinates. Clicking on the **[OK]** button causes the vector layer created from the SQL query to be displayed in the QGIS map window.

To save this vector file for future use, you can use the QGIS 'Save as...' command that is accessed by right-clicking on the layer name in the QGIS map legend and then selecting 'Save as...'

Tip: Crearea unui strat vectorial dintr-o foaie de calcul Excel

When creating a vector layer from a Microsoft Excel Worksheet, you might see that unwanted zeros ("0") have been inserted in the attribute table rows beneath valid data. This can be caused by deleting the values for these cells in Excel using the `Backspace` key. To correct this problem, you need to open the Excel file (you'll need to close QGIS if you are connected to the file, to allow you to edit the file) and then use *Edit* → *Delete* to remove the blank rows from the file. To avoid this problem, you can simply delete several rows in the Excel Worksheet using *Edit* → *Delete* before saving the file.

Rularea interogărilor predefinite

With predefined queries, you can select previously written queries stored in XML format in a file. This is particularly helpful if you are not familiar with SQL commands. Click on the *Predefined Queries* tab to display the predefined query interface.

To load a set of predefined queries, click on the Open File icon. This opens the *Open File* window, which is used to locate the file containing the SQL queries. When the queries are loaded, their titles as defined in the XML file will appear in the drop-down menu located just below the Open File icon. The full description of the query is displayed in the text window under the drop-down menu.

Select the query you want to run from the drop-down menu and then click on the *SQL Query* tab to see that the query has been loaded into the query window. If it is the first time you are running a predefined query or are switching databases, you need to be sure to connect to the database.

Click on the **[Run Query]** button in the *SQL Query* tab to execute the command. If the query is successful, a *Database File Selection* window will be displayed. If the query is not successful, an error message will appear in the *Output Console* window.

1. **Deschidere Fiier**: Lansează navigatorul de fiiere "Deschidere Fiier", pentru a căuta fiierul XML care conine interogări predefinite.
2. **Predefined Queries**: A drop-down list with all of the queries defined by the predefined queries XML file.
3. **Descrierea interogării**: O scurtă descriere a interogării. Această descriere face parte din fiierul XML de interogări predefinite.
4. **Fereastra Consolei**: Fereastra consolei în care sunt afiate mesajele referitoare la procesare.
5. **Help**: Displays the online help.
6. **OK**: Închide fereastra principală a "Conexiunii la Baza de Date".

Formatul XML pentru interogări predefinite eVis

Etichetele XML citite de eVis

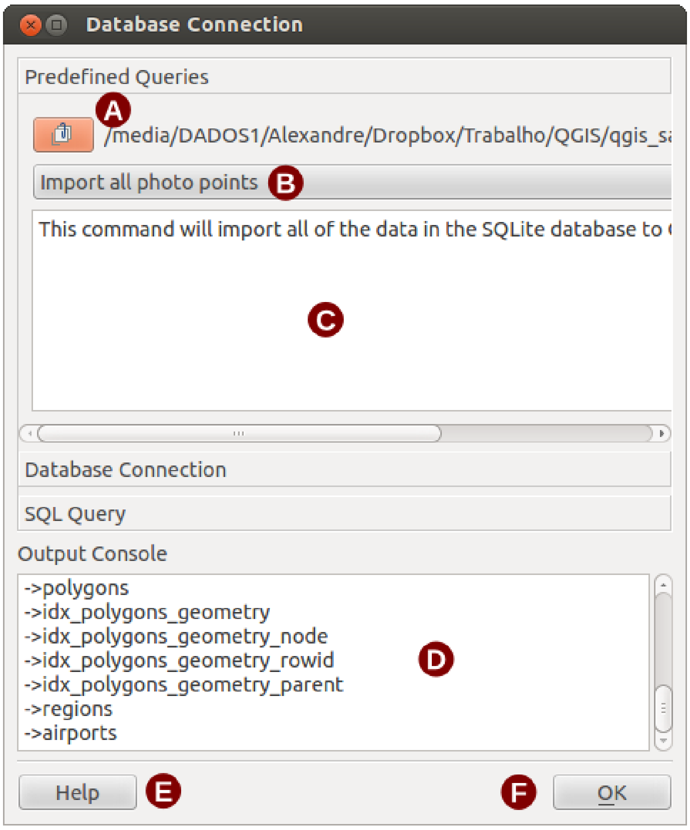


Figure 19.15: The *eVis* Predefined Queries tab

Etichetă	Descriere
interogare	Definete începutul i sfâritul unei expresii de interogare.
scurtă descriere	A short description of the query that appears in the eVis drop-down menu.
descriere	O descriere mai detaliată a interogării afiată în Fereastra Textului de Interogare Predefinită .
database-type	The database type, defined in the Database Type drop-down menu in the Database Connection tab.
database-port	The port as defined in the Port text box in the Database Connection tab.
database-name	The database name as defined in the Database Name text box in the Database Connection tab.
databaseuser-name	The database username as defined in the Username text box in the Database Connection tab.
databasep-assword	The database password as defined in the Password text box in the Database Connection tab.
sqlstate-ment	Comanda SQL.
autocon-nect	A flag (“true”” or “false”) to specify if the above tags should be used to automatically connect to the database without running the database connection routine in the Database Connection tab.

Modelul complet de fiier XML, cu trei interogări, este afiat mai jos:

```
<?xml version="1.0"?>
<doc>
 <query>
   <shortdescription>Import all photograph points</shortdescription>
   <description>This command will import all of the data in the SQLite database to QGIS
      </description>
   <databasetype>SQLITE</databasetype>
   <databasehost />
```

```
    <databaseport />
    <databasename>C:\textbackslash Workshop/textbackslash
eVis\_Data\textbackslash PhotoPoints.db</databasename>
    <databaseusername />
    <databasepassword />
    <sqlstatement>SELECT Attributes.*, Points.x, Points.y FROM Attributes LEFT JOIN
       Points ON Points.rec_id=Attributes.point_ID</sqlstatement>
    <autoconnect>false</autoconnect>
 </query>
  <query>
    <shortdescription>Import photograph points "looking across Valley"</shortdescription>
    <description>This command will import only points that have photographs "looking across
       a valley" to QGIS</description>
    <databasetype>SQLITE</databasetype>
    <databasehost />
    <databaseport />
    <databasename>C:\Workshop\eVis_Data\PhotoPoints.db</databasename>
    <databaseusername />
    <databasepassword />
    <sqlstatement>SELECT Attributes.*, Points.x, Points.y FROM Attributes LEFT JOIN
       Points ON Points.rec_id=Attributes.point_ID where COMMENTS='Looking across
       valley'</sqlstatement>
    <autoconnect>false</autoconnect>
 </query>
 <query>
    <shortdescription>Import photograph points that mention "limestone"</shortdescription>
    <description>This command will import only points that have photographs that mention
       "limestone" to QGIS</description>
    <databasetype>SQLITE</databasetype>
    <databasehost />
    <databaseport />
    <databasename>C:\Workshop\eVis_Data\PhotoPoints.db</databasename>
    <databaseusername />
    <databasepassword />
    <sqlstatement>SELECT Attributes.*, Points.x, Points.y FROM Attributes LEFT JOIN
       Points ON Points.rec_id=Attributes.point_ID where COMMENTS like '%limestone%'
       </sqlstatement>
    <autoconnect>false</autoconnect>
 </query>
</doc>
```

.

19.7 Plugin-ul fTools

Scopul plugin-ului conceput în Python, fTools, este acela de a oferi o resursă pentru mai multe operaiuni cu vectori GIS, fără a mai fi nevoie de software adiional, biblioteci, sau alte improvizaii complexe. Oferă o suită, în cretere, de funcii pentru managementul si analiza datelor spatiale, ale căror însuiri predominante sunt funcionalitatea i rapiditatea în execuie.

fTools is now automatically installed and enabled in new versions of QGIS, and as with all plugins, it can be disabled and enabled using the Plugin Manager (see *Dialogul Plugin-urilor*). When enabled, the fTools plugin adds a *Vector* menu to QGIS, providing functions ranging from Analysis and Research Tools to Geometry and Geoprocessing Tools, as well as several useful Data Management Tools.

19.7.1 Unelte de analiza

Iconita	Unealta	Scop
	Matricea distantelor	Masoara distantele dintre doua straturi de puncte si ofera rezultatul sub forma de: a) Matrice patratica a distantelor, b) Matrice liniara a distantelor sau c) Rezumat al distantelor. Calculul poate fi limitat la cele mai apropiate mii puncte.
	Suma lungimilor liniilor	Calculeaza suma totala a lungimilor liniilor aflate in interiorul fiecarui poligon de pe un strat vectorial de poligoane.
	Puncte in poligon	Numara punctele aflate in interiorul fiecarui poligon al unui strat vectorial de poligoane.
	Lista valorilor unice	Afiează lista cu valorile unice dintr-un câmp al unui strat vectorial de intrare.
	Statistici esentiale	Calculeaza statistici esentiale (media, deviatia statistica standard, suma, coeficientul de variatie CV) pentru un camp dat.
	Analiza celui mai apropiat vecin	Afiează rezultatele analizei celui mai apropiat vecin pentru a evalua nivelul de grupare într-un strat vectorial de tip punct .
	Coordonatele medii	Calculeaza coordonatele fie ale centrului normal, fie ale centrului de greutate, pentru obiecte vectoriale - individual sau grupate dupa anumite campuri ale bazei de date.
	Intersectii de linii	Indentifica intersectiile dintre linii si genereaza un fisier shape cu punctele corespunzatoare. Util pentru localizarea intersectiilor de drumuri, ape curgatoare. Ignora intersectiile cu lungime mai mare de 0.

Tabela Ftools 1: fTools Unelte de Analiza

19.7.2 Unelte de cercetare

Iconita	Unealta	Scop
	Selecie aleatorie	Selectai aleatoriu un număr sau un procentaj de n entităi.
	Selecie aleatorie în cadrul subseturilor	Selecteaza aleatoriu elemente din subseturi create pe baza unor identificatori unici.
	Puncte aleatorii	Genereaza puncte pseudo-aleatoare intre limitele unui strat indicat.
	Puncte regulate	Genereaza o retea regulata de puncte intre limitele unui strat indicat si exporta respectivele puncte ca fisier shape.
	Grilă vectorială	Generează grilă de tip linie sau poligon, în funcie de spaierea specificată de utilizator.
	Selectie in functie de localizare	Selecteaza elemente pe baza pozitiei relative fata de un alt strat. Rezultatul poate fi o selectie noua, un subset dintr-o selectie curenta, sau o completare a selectiei curente cu noi elemente.
	Poligon din extinderea stratului	Creaza un poligon dreptunghiular care incadreaza limitele unui strat vectorial sau raster.

Tabela Ftools 2: fTools Unelte de Cercetare

19.7.3 Unelte de geoprocesare

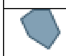
Iconita	Unealta	Scop
	Structuri convexe	Creaza o structura convexa minima (Convex hull) pentru un strat indicat, sau pe baza unor identificatori din baza de date.
	Zona(-e) tampon	Creaza zone tampon in jurul elementelor la o distanta specificata sau preluata dintr-un camp al bazei de date.
	Intersectare	Rezultatul va contine elementele din stratul initial care se suprapun (se intersecteaza) peste elementele din stratul indicat drept de intersectie.
	Uniune	Rezultatul va combina elementele din cele 2 straturi indicate, fie ca se interesteaza fie ca nu.
	Diferenta simetrica	Rezultatul va contine elementele din straturile indicate mai putin elementele care se suprapun (se intersecteaza).
	Taiere	Rezultatul va contine elementele din stratul initial care se suprapun cu elementele stratului indicat drept de taiere. Elementele initiale vor fi taiate la intersectia cu elementele din stratul de taiere.
	Diferenta	Rezultatul va contine elementele din stratul initial care nu se suprapun cu elementele stratului indicat drept de taiere. Elementele initiale vor fi taiate la intersectia cu elementele din stratul de taiere.
	Dizolvare	Imbina elementele pe baza unui identificator indicat. Toate elementele cu valori identice se vor combina astfel incat sa formeze un singur element.
	Eliminarea poligoanelor tip sliver	Merges selected features with the neighbouring polygon with the largest area or largest common boundary.

Tabela Ftools 3: fTools Unelte de geoprocesare

19.7.4 Unelte de geometrie

Iconita	Unealta	Scop
	Verificare validitate geometrie	Check polygons for intersections, closed holes, and fix node ordering. You can choose the engine used by the in the options dialog, digitizing tab Change the Validate geometries value. There is two engines: QGIS and GEOS which have pretty different behaviour. Another tools exists which shows different result as well: Topology Checker plugin and 'must not have invalid geometries' rule.
	Exporta/Adauga coloane cu informatie geometrica.	Adauga informatie geometrica la straturi de puncte (XCOORD, YCOORD), de linii (LUNGIMEA) sau respectiv de poligoane (ARIA, PERIMETRUL).
	Centroizii poligoanelor	Calculeaza centroidul fiecarui poligon pentru un strat indicat de poligoane.
	Triangulatia Delaunay	Calculează i de salvează (ca poligoane) triangularea Delaunay a stratului vectorial de tip punct.
	Poligoane Voronoi	Calculează poligoanele Voronoi ale stratului vectorial de tip punct.
	Simplifica geometria	Generalizeaza liniile sau poligoanele pe baza unui algoritm Douglas-Peucker modificat.
	Densificare geometria	Densifică liniile sau poligoanele prin adăugarea de noduri.
	Degrupare elemente	Converteste grupurile de elemente in elemente simple. Creaza poligoane si linii.
	Grupare elemente	Grupeaza elemente intr-un singur element pe baza unui identificator unic.
	Din poligoane in linii	Converteste poligoanele in linii, grupurile de poligoane in grupuri de linii.
	Din linii in poligoane	Converteste liniile in poligoane, grupurile de linii in grupuri de poligoane.
	Extrage noduri	Extrage nodurile din straturile indicate de linii sau poligoane si creaza un strat de puncte.

Tabela Ftools 4: fTools Unelte de geometrie

Note: Instrumentul *Simplificare geometrie* poate fi folosit pentru a elimina nodurile duplicate, din geometriile de tip linie i poligon. E suficient să setai parametrul *Simplificare toleranță* la 0 iar acest lucru va rezolva problema.

19.7.5 Instrumente de management de date

Iconita	Unealta	Scop
	Definire proiectie actuala	Specifica CRS pentru fisiere shape care nu au definit sistemul de coordonate.
	Imbinare atribute in functie de localizare	Adauga atribute aditionale la un strat vectorial pe baza unei relatii spatiale. Atributele unui strat sunt adaugate la tabela de atribute a celuilalt strat - rezultatul salvandu-se in format shape.
	Separa stratul vectorial	Separa stratul vectorial indicat in straturi multiple pe baza atributelor.
	Imbinare fisiere shape intr-unul singur	Imbina informatia din multiple fisiere shape intr-un unic fisier pe baza tipului de strat vectorial (punct, linie, poligon).
	Creare index spatial	Creaza un index spatial pentru formatele OGR- suportate.

Tabela Ftools 5: fTools Unelte de managementul datelor

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19.8 Plugin-ul Instrumentelor GDAL

19.8.1 Ce reprezintă Instrumentele GDAL?

The GDAL Tools plugin offers a GUI to the collection of tools in the Geospatial Data Abstraction Library, http://gdal.osgeo.org . These are raster management tools to query, re-project, warp and merge a wide variety of raster formats. Also included are tools to create a contour (vector) layer, or a shaded relief from a raster DEM, and to make a VRT (Virtual Raster Tile in XML format) from a collection of one or more raster files. These tools are available when the plugin is installed and activated.

Biblioteca GDAL

The GDAL library consists of a set of command line programs, each with a large list of options. Users comfortable with running commands from a terminal may prefer the command line, with access to the full set of options. The GDALTools plugin offers an easy interface to the tools, exposing only the most popular options.

19.8.2 Lista Instrumentelor GDAL

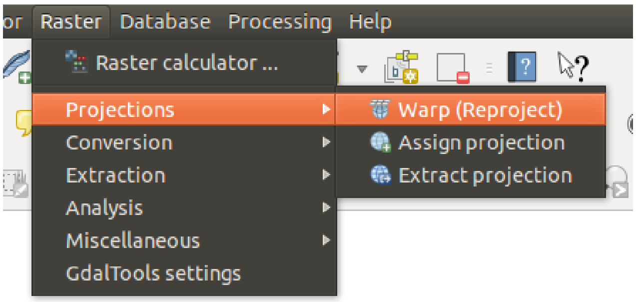

Figure 19.16: Meniul *Instrumentelor GDAL*

Proiecii

Warp (Reproject)	This utility is an image mosaicing, reprojection and warping utility. The program can reproject to any supported projection, and can also apply GCPs stored with the image if the image is "raw" with control information. For more information, you can read on the GDAL website http://www.gdal.org/gdalwarp.html.
Assign projection	This tool allows you to assign projection to rasters that are already georeferenced but miss projection information. Also with its help, it is possible to alter existing projection definitions. Both single file and batch mode are supported. For more information, please visit the utility page at the GDAL site, http://www.gdal.org/gdalwarp.html.
Extract projection	This utility helps you to extract projection information from an input file. If you want to extract projection information from a whole directory, you can use the batch mode. It creates both `.prj` and `.wld` files.

Conversion

Rasterize	This program burns vector geometries (points, lines and polygons) into the raster band(s) of a raster image. Vectors are read from OGR-supported vector formats. Note that the vector data must in the same coordinate system as the raster data; on the fly reprojection is not provided. For more information see http://www.gdal.org/gdal_rasterize.html.
Polygonize	This utility creates vector polygons for all connected regions of pixels in the raster sharing a common pixel value. Each polygon is created with an attribute indicating the pixel value of that polygon. The utility will create the output vector datasource if it does not already exist, defaulting to ESRI shapefile format. See also http://www.gdal.org/gdal_polygonize.html.
Translate	This utility can be used to convert raster data between different formats, potentially performing some operations like subsetting, resampling, and rescaling pixels in the process. For more information you can read on http://www.gdal.org/gdal_translate.html.
RGB to PCT	This utility will compute an optimal pseudocolor table for a given RGB image using a median cut algorithm on a downsampled RGB histogram. Then it converts the image into a pseudocolored image using the color table. This conversion utilizes Floyd-Steinberg dithering (error diffusion) to maximize output image visual quality. The utility is also described at http://www.gdal.org/rgb2pct.html.
PCT to RGB	This utility will convert a pseudocolor band on the input file into an output RGB file of the desired format. For more information, see http://www.gdal.org/pct2rgb.html.

Extragere

Contour	This program generates a vector contour file from the input raster elevation model (DEM). On http://www.gdal.org/gdal_contour.html, you can find more information.
Clipper	This utility allows you to clip (extract subset) rasters using selected extent or based on mask layer bounds. More information can be found at http://www.gdal.org/gdal_translate.html.

Analiză

Sieve	This utility removes raster polygons smaller than a provided threshold size (in pixels) and replaces them with the pixel value of the largest neighbor polygon. The result can be written back to the existing raster band, or copied into a new file. For more information, see http://www.gdal.org/gdal_sieve.html.
Near Black	This utility will scan an image and try to set all pixels that are nearly black (or nearly white) around the edge to exactly black (or white). This is often used to “fix up” lossy compressed aerial photos so that color pixels can be treated as transparent when mosaicing. See also http://www.gdal.org/nearblack.html.
Fill nodata	This utility fills selected raster regions (usually nodata areas) by interpolation from valid pixels around the edges of the areas. On http://www.gdal.org/gdal_fillnodata.html, you can find more information.
Proximity	This utility generates a raster proximity map indicating the distance from the center of each pixel to the center of the nearest pixel identified as a target pixel. Target pixels are those in the source raster for which the raster pixel value is in the set of target pixel values. For more information see http://www.gdal.org/gdal_proximity.html.
Grid (Interpolation)	This utility creates a regular grid (raster) from the scattered data read from the OGR datasource. Input data will be interpolated to fill grid nodes with values, and you can choose from various interpolation methods. The utility is also described on the GDAL website, http://www.gdal.org/gdal_grid.html.
DEM (Terrain models)	Tools to analyze and visualize DEMs. It can create a shaded relief, a slope, an aspect, a color relief, a Terrain Ruggedness Index, a Topographic Position Index and a roughness map from any GDAL-supported elevation raster. For more information, see http://www.gdal.org/gdaldem.html.

Diverse

Build Virtual Raster (Catalog)	This program builds a VRT (Virtual Dataset) that is a mosaic of the list of input GDAL datasets. See also http://www.gdal.org/gdalbuildvrt.html.
Merge	This utility will automatically mosaic a set of images. All the images must be in the same coordinate system and have a matching number of bands, but they may be overlapping, and at different resolutions. In areas of overlap, the last image will be copied over earlier ones. The utility is also described at http://www.gdal.org/gdal_merge.html.
Information	This utility lists various information about a GDAL-supported raster dataset. On http://www.gdal.org/gdalinfo.html, you can find more information.
Build Overviews	The gdaladdo utility can be used to build or rebuild overview images for most supported file formats with one of several downsampling algorithms. For more information, see http://www.gdal.org/gdaladdo.html.
Tile Index	This utility builds a shapefile with a record for each input raster file, an attribute containing the filename, and a polygon geometry outlining the raster. See also http://www.gdal.org/gdaltindex.html.

Setările Instrumentelor GDAL

Utilizai acest dialog pentru a încorpora variabilele GDAL.

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19.9 Plugin-ul de georefereniere

Plugin-ul de Georefereniere este un instrument pentru generarea de fiiere world pentru raster. Acesta vă permite să referiniai rastere în sisteme geografice sau proiectate de coordonate, prin crearea unui nou GeoTiff sau prin adăugarea unui fiier world imaginii existente. Abordarea de bază pentru georefereniera unui raster, este de a localiza punctele de pe raster pentru care putei determina cu exactitate coordonatele.

Funcionalităi

Pictogramă	Scop	Pictogramă	Scop
	Deschidere raster		Start georefereniere
	Generare script GDAL		Încărcare puncte GCP
	Salvare puncte GCP ca		Setări de transformare
	Adăugare punct		tergere punct
	Mutare punct GCP		Panoramare
	Mărire		Micorare
	Mărire la nivelul stratului		Nivelul de mărire anterior
	Următorul nivel de mărire		Link Georeferencer to QGIS
	Link QGIS to Georeferencer		Întinderea completă a histogramei
	Întinderea locală a histogramei		

Tabela Georefereniator 1: Instrumente Georefereniator

19.9.1 Procedura uzuală

Pentru introducerea coordonatelor X i Y (DMS (dd mm ss.ss), DD (dd.dd) sau a coordonatelor proiectate (mmmm.mm)), ce corespund cu punctul selectat din imagine, pot fi folosite două proceduri alternative:

- Uneori, rasterul are pe margine cruciulie cu coordonatele "scrise" pe imagine. În acest caz, putei introduce manual coordonatele.
- Using already georeferenced layers. This can be either vector or raster data that contain the same objects/features that you have on the image that you want to georeference and with the projection that you want for your image. In this case, you can enter the coordinates by clicking on the reference dataset loaded in the QGIS map canvas.

Procedura standard de georefereniere a unei imagini implică selectarea mai multor puncte de pe raster, specificându-le coordonatele i alegând o modalitate relevantă de transformare a tipului lor. Bazându-se pe parametrii i datele introduse, plugin-ul va calcula parametrii fiierului harii lumii. Cu cât oferii mai multe coordonate, cu atât va fi mai bun rezultatul.

The first step is to start QGIS, load the Georeferencer Plugin (see *Dialogul Plugin-urilor*) and click on *Raster* → *Georeferencer* , which appears in the QGIS menu bar. The Georeferencer Plugin dialog appears as shown in figure_georeferencer_1.

Pentru acest exemplu, utilizăm o plană topografică a Dakotei de Sud din SDGS. Va putea fi vizualizată mai târziu împreună cu datele din locaia fierului GRASS `spearfish60`. Putei descărca plana topografică de aici: http://grass.osgeo.org/sampledata/spearfish_toposheet.tar.gz.

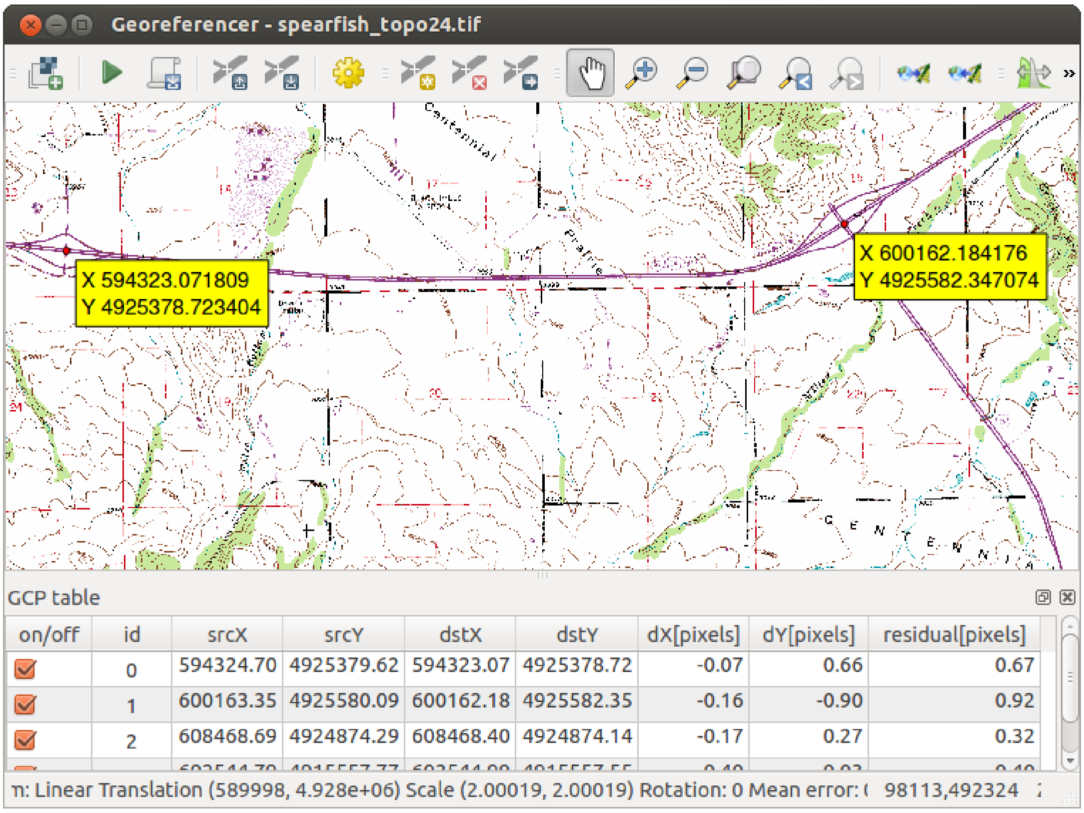

Figure 19.17: Fereastra a plugin-ului de georefereniere

Introducei punctele de control din teren (GCPs)

1. To start georeferencing an unreferenced raster, we must load it using the button. The raster will show up in the main working area of the dialog. Once the raster is loaded, we can start to enter reference points.
2. Using the Add Point button, add points to the main working area and enter their coordinates (see Figure figure_georeferencer_2). For this procedure you have three options:
   - Facei clic pe un punct din imaginea raster i introducei coordonatele X i Y manual.
   - Click on a point in the raster image and choose the From map canvas button to add the X and Y coordinates with the help of a georeferenced map already loaded in the QGIS map canvas.
   - With the button, you can move the GCPs in both windows, if they are at the wrong place.
3. Continuai să introducei puncte. Ar trebui să aibă cel puin patru puncte, iar cu cât mai mult coordonate introducei, cu atât mai bun va fi rezultatul. Există instrumente adiionale în dialogul pluginului, pentru transfocarea i deplasarea zonei de lucru, în scopul localizării unui set relevant de puncte GCP.

The points that are added to the map will be stored in a separate text file (`[filename].points`) usually together with the raster image. This allows us to reopen the Georeferencer plugin at a later date and add new points or delete existing ones to optimize the result. The points file contains values of the form: `mapX, mapY, pixelX, pixelY`. You can use the Load GCP points and Save GCP points as buttons to manage the files.

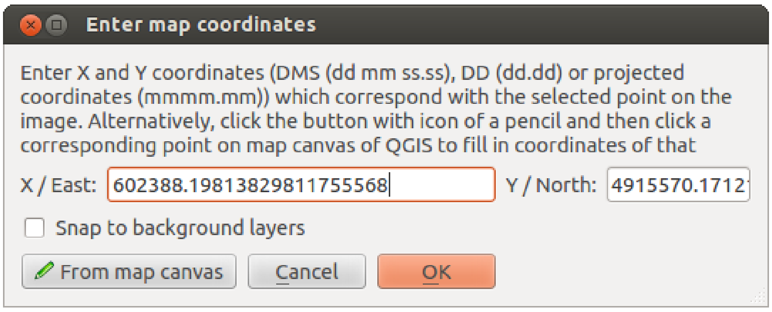

Figure 19.18: Adăugare puncte la imaginea raster

Definirea setărilor de transformare

După ce ai adăugat GCP / Ground Control Point = Puncte de Control pe Teren, la imaginea raster, va trebui să definii parametrii transformării pentru procesul de georefereniere.

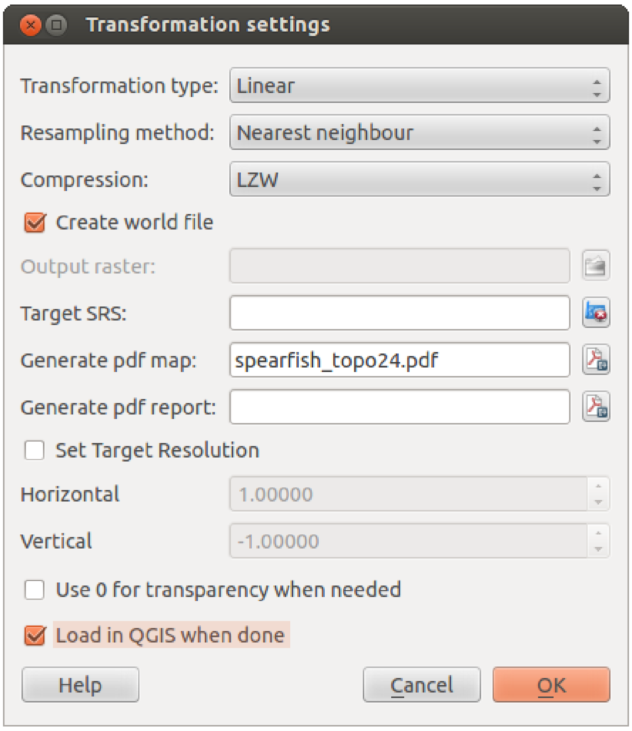

Figure 19.19: Definirea setărilor de transformare ale georefereniatorului

Algoritmi de transformare disponibili

În funcie de cât de multe puncte de control ai capturat din teren, poate că dorii să utilizai diveri algoritmi de transformare. Alegerea algoritmului de transformare depinde, de asemenea, de tipul i calitatea datelor de intrare, i de valoarea distorsiunilor geometrice pe care dorii să le introducei în rezultatul final.

În mod curent, sunt disponibile următoarele *tipuri de transformări*:

- Algoritmul **Liniar** este utilizat la crearea unui fiier world, fiind diferit de ali algoritmi prin faptul că nu transformă, de fapt, rasterul. Acest algoritm probabil că nu va fi suficient, atunci când vă confruntai cu un material scanat.
- The **Helmert** transformation performs simple scaling and rotation transformations.

- The **Polynomial** algorithms 1-3 are among the most widely used algorithms introduced to match source and destination ground control points. The most widely used polynomial algorithm is the second-order polynomial transformation, which allows some curvature. First-order polynomial transformation (affine) preserves colliniarity and allows scaling, translation and rotation only.
- Algoritmul **Thin Plate Spline** (TPS) este o metodă de georefereniere mai modernă, care este capabil de a introduce deformări locale în date. Acest algoritm este util atunci când sunt georefereniate originale de calitate foarte mică.
- Transformarea **Projective** efectuează translaia i rotaia liniară a coordonatelor.

Definire metodă de reeşantionare

Tipul de reeantionarea pe care o alegei va depinde în funcie de datele de intrare i de obiectivul final al exerciiului . Dacă nu dorii să modificai statistica imaginii , este posibil să dorii să alegei ” Cel mai apropiat vecin ” , în timp ce un ” reeantionare Cubică ” va oferi probabil un rezultat mai finisat .

Dacă este posibil, se va alege între cinci metode diferite de reeantionare:

1. Cel mai apropiat vecin
2. Liniar
3. Cubic
4. Curbă Cubică
5. Lanczos

Definii setările de transformare

Există mai multe opiuni care trebuie definite pentru grila de ieire georeferentiată.

- Caseta de text *Create world file* este disponibilă numai dacă vă decidei să utilizai tipul de transformare liniar, pentru că acest lucru înseamnă că imaginea raster nu va fi transformată, în realitate. În acest caz, câmpul *Output raster* nu este activat, deoarece se va crea numai un nou fiier world.
- Pentru toate celelalte tipuri de transformare, trebuie să definii o *Ieire raster*. Implicit, un nou fiier ([file-name]_modified) va fi creat în acelai dosar, împreună cu imaginea raster originală.
- Ca un pas următor, trebuie să definii *Target SRS* (Sistemul de Referină Spaială) pentru rasterul georefereniat (v. *Lucrul cu Proiecii*).
- Dacă dorii, putei **genera o hartă PDF** i, de asemenea, **un raport pdf **. Raportul include informaii cu privire la parametrii utilizai de transformare, o imagine a reziduurilor i o listă cu toate GCP-urile i erorile lor RMS.
- În plus, putei bifa caseta *Setare Rezoluie intă*, pentru a defini rezoluia pixelilor din rasterul de ieire. Rezoluiile orizontală i verticală implicite sunt 1.
- Opiunea *Use 0 for transparency when needed* poate fi activată, dacă pixelii cu valoarea 0 ar trebui să fie transpareni. În exemplul nostru toposheet, toate zonele albe ar trebui să fie transparente.
- Finally, *Load in QGIS when done* loads the output raster automatically into the QGIS map canvas when the transformation is done.

Afiarea i adaptarea proprietăilor rasterului

Executând click pe eticheta ”Proprietăi raster” din meniul ”Setări” se deschide meniul proprietăi raster al stratului pe care dorii să îl georefereniai.

Configurarea georefereniatorului

- You can define whether you want to show GCP coordiniates and/or IDs.
- Ca unităi reziduale, se pot alege pixelii i unităile de hartă.
- Pentru raportul PDF, pot fi definite o margine stângă i una dreaptă i, de asemenea, dimensiunea hârtiei pentru harta PDF.
- În final, putei bifa caseta *Arată fereastra Georefereniatorului andocată*.

Execuie transformare

After all GCPs have been collected and all transformation settings are defined, just press the Start georeferencing button to create the new georeferenced raster.

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19.10 Plugin-ul Heatmap

The *Heatmap* plugin uses Kernel Density Estimation to create a density (heatmap) raster of an input point vector layer. The density is calculated based on the number of points in a location, with larger numbers of clustered points resulting in larger values. Heatmaps allow easy identification of "hotspots" and clustering of points.

19.10.1 Activarea plugin-ului Heatmap

First this core plugin needs to be activated using the Plugin Manager (see *Dialogul Plugin-urilor*). After activation, the heatmap icon can be found in the Raster Toolbar, and under the *Raster* → *Heatmap* menu.

Selectai meniul *View* → *Toolbars* → *Raster* pentru a arăta Bara de Instrumente, dacă aceasta nu este vizibilă.

19.10.2 Folosirea plugin-ului Heatmap

Clicking the *Heatmap* tool button opens the Heatmap plugin dialog (see figure_heatmap_2).

Dialogul are următoarele opiuni:

- **Input point layer**: Lists all the vector point layers in the current project and is used to select the layer to be analysed.
- **Output raster**: Allows you to use the ... button to select the folder and filename for the output raster the Heatmap plugin generates. A file extension is not required.
- **Output format**: Selects the output format. Although all formats supported by GDAL can be choosen, in most cases GeoTIFF is the best format to choose.
- **Radius**: Is used to specify the heatmap search radius (or kernel bandwidth) in meters or map units. The radius specifies the distance around a point at which the influence of the point will be felt. Larger values result in greater smoothing, but smaller values may show finer details and variation in point density.

Atunci când este bifată caseta *Advanced*, vor fi disponibile opiuni adiionale:

- **Rows** and **Columns**: Used to change the dimensions of the output raster. These values are also linked to the **Cell size X** and **Cell size Y** values. Increasing the number of rows or columns will decrease the cell size and increase the file size of the output file. The values in Rows and Columns are also linked, so doubling the number of rows will automatically double the number of columns and the cell sizes will also be halved. The geographical area of the output raster will remain the same!

- **Cell size X** and **Cell size Y**: Control the geographic size of each pixel in the output raster. Changing these values will also change the number of Rows and Columns in the output raster.
- **Kernel shape**: The kernel shape controls the rate at which the influence of a point decreases as the distance from the point increases. Different kernels decay at different rates, so a triweight kernel gives features greater weight for distances closer to the point then the Epanechnikov kernel does. Consequently, triweight results in "sharper" hotspots, and Epanechnikov results in "smoother" hotspots. A number of standard kernel functions are available in QGIS, which are described and illustrated on Wikipedia.
- **Decay ratio**: Can be used with Triangular kernels to further control how heat from a feature decreases with distance from the feature.
  - O valoare de 0 (=minimum) indică o căldură concentrată în centrul razei date, i complet stinsă la margine.
  - O valoare de 0.5 indică faptul că pixelii de la marginea razei vor primi jumătate din "căldura" pe care o primesc pixelii aflai în centrul razei de căutare.
  - O valoare de 1 semnifică distribuirea uniformă a căldurii pe întreaga rază a cercului de căutare. (Acest lucru este echivalent cu kernel-ul 'Uniform'.)
  - O valoare mai mare decât 1 indică o căldură mai mare înspre marginea razei de căutare, decât în centru.

Stratul punctelor de intrare poate avea, de asemenea, câmpuri atribut, care pot afecta modul de influenare a hării calorice:

- **Use radius from field**: Sets the search radius for each feature from an attribute field in the input layer.
- **Use weight from field**: Allows input features to be weighted by an attribute field. This can be used to increase the influence certain features have on the resultant heatmap.

Când este specificat ca ieire un nume de fiier raster, butonul **[OK]** poate fi utilizat pentru a crea harta calorică.

19.10.3 Tutorial: Crearea unei Hări Calorice

For the following example, we will use the `airports` vector point layer from the QGIS sample dataset (see *Date eantion*). Another exellent QGIS tutorial on making heatmaps can be found at http://qgis.spatialthoughts.com.

În Figure_Heatmap_1, sunt afiate aeroporturile din Alaska.

1. Select the *Heatmap* tool button to open the Heatmap dialog (see Figure_Heatmap_2).
2. In the *Input point layer* field, select `airports` from the list of point layers loaded in the current project.
3. Specify an output filename by clicking the ... button next to the *Output raster* field. Enter the filename `heatmap_airports` (no file extension is necessary).
4. Lăsai `GeoTIFF` ca *Format de ieire* implicit.
5. Schimbai valoarea *Razei* la `1000000` metri.
6. Clic pe **[OK]** pentru a crea i încărca harta calorică Aeroporturi (a se vedea Figure_Heatmap_3).

QGIS will generate the heatmap and add the results to your map window. By default, the heatmap is shaded in greyscale, with lighter areas showing higher concentrations of airports. The heatmap can now be styled in QGIS to improve its appearance.

1. Open the properties dialog of the `heatmap_airports` layer (select the layer `heatmap_airports`, open the context menu with the right mouse button and select *Properties*).
2. Selectai fila *Stil*.
3. Change the *Render type* to 'Singleband pseudocolor'.
4. Select a suitable *Color map* , for instance `YlOrRed`.

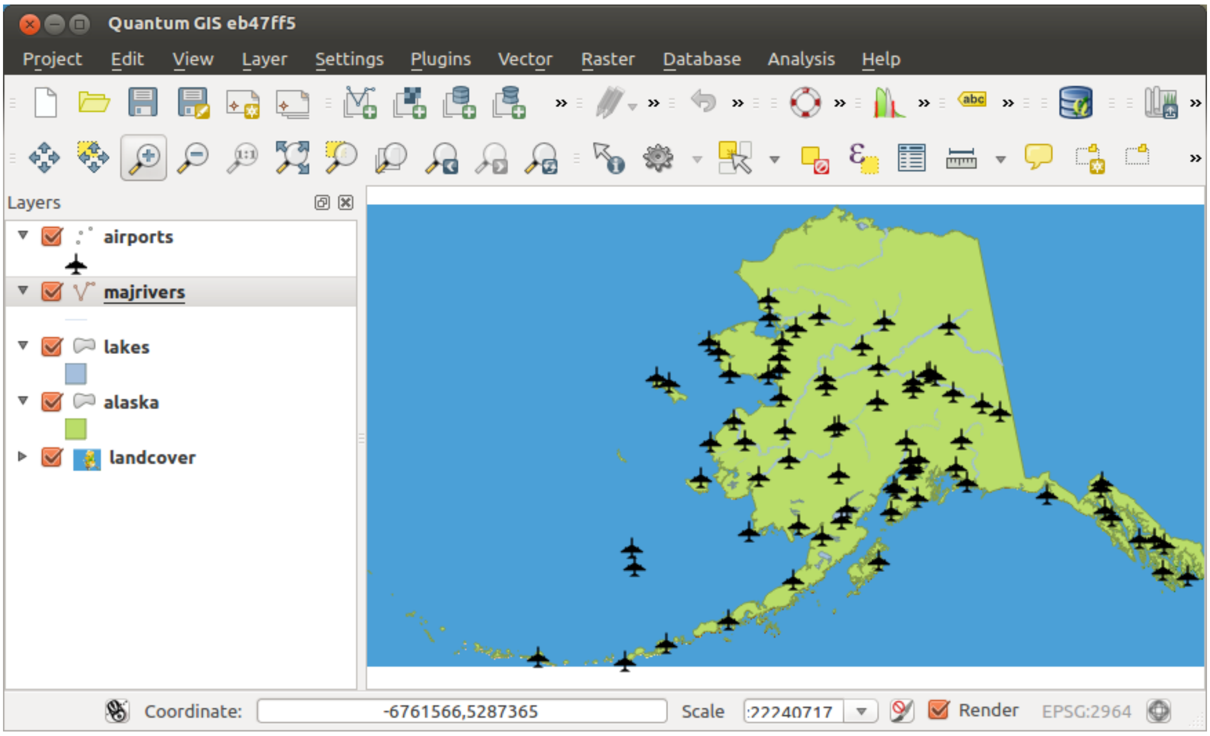


Figure 19.20: Airports of Alaska

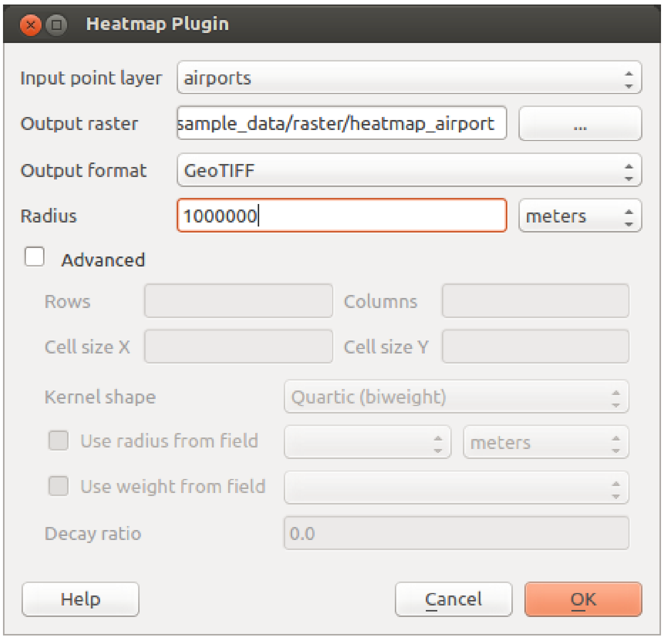


Figure 19.21: The Heatmap Dialog

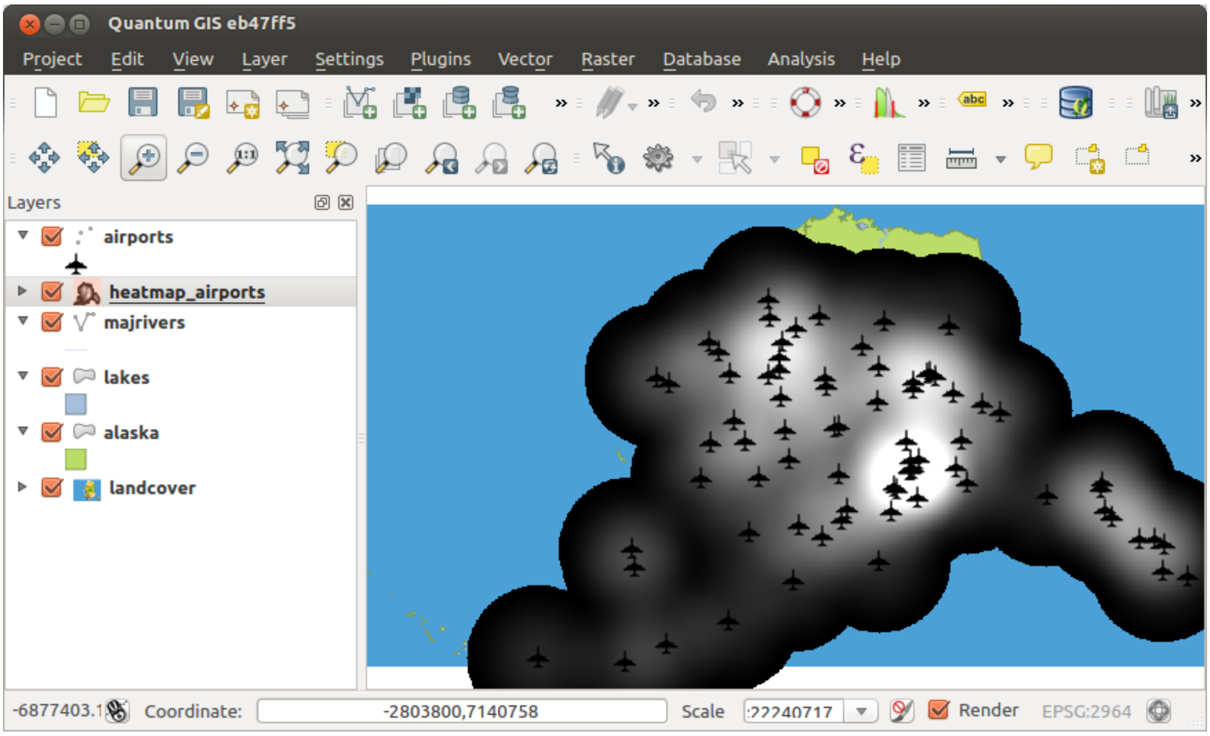


Figure 19.22: The heatmap after loading looks like a grey surface

5. Clic p butonul **[Load]** pentru a obine valorile minime i maxime din raster, apoi facei clic pe butonul **[Classify]**.
6. Apăsai **[OK]** pentru a actualiza stratul.

Rezultatul final este prezentat în Figure_Heatmap_4.

.

19.11 Plugin-ul de Interpolare

The Interplation plugin can be used to generate a TIN or IDW interpolation of a point vector layer. It is very simple to handle and provides an intuitive graphical user interface for creating interpolated raster layers (see Figure_interpolation_1). The plugin requires the following parameters to be specified before running:

- Input **Vector layers**: Specify the input point vector layer(s) from a list of loaded point layers. If several layers are specified, then data from all layers is used for interpolation. Note: It is possible to insert lines or polygons as constraints for the triangulation, by specifying either "points", "structure lines" or "break lines" in the *Type* combo box.
- **Atributul de interpolare**: Selectai coloana atributului care va fi utilizat pentru interpolare, sau activai caseta *Use Z-Coordinate* pentru a utiliza valorile Z stocate, ale stratului.
- **Interpolation Method**: Select the interpolation method. This can be either 'Triangulated Irregular Network (TIN)' or 'Inverse Distance Weighted (IDW)'. With the TIN method you can create a surface formed by triangles of nearest neighbour points. To do this, circumcircles around selected sample points are created and their intersections are connected to a network of non overlapping and as compact as possible triangles. The resulting surfaces are not smooth. When using the IDW method the sample points are weighted during interpolation such that the influence of one point relative to another declines with distance from the unknown point you want to create. The IDW interpolation method also has some disadvantages: the quality of the interpolation result can decrease, if the distribution of sample data points is uneven. Furthermore, maximum

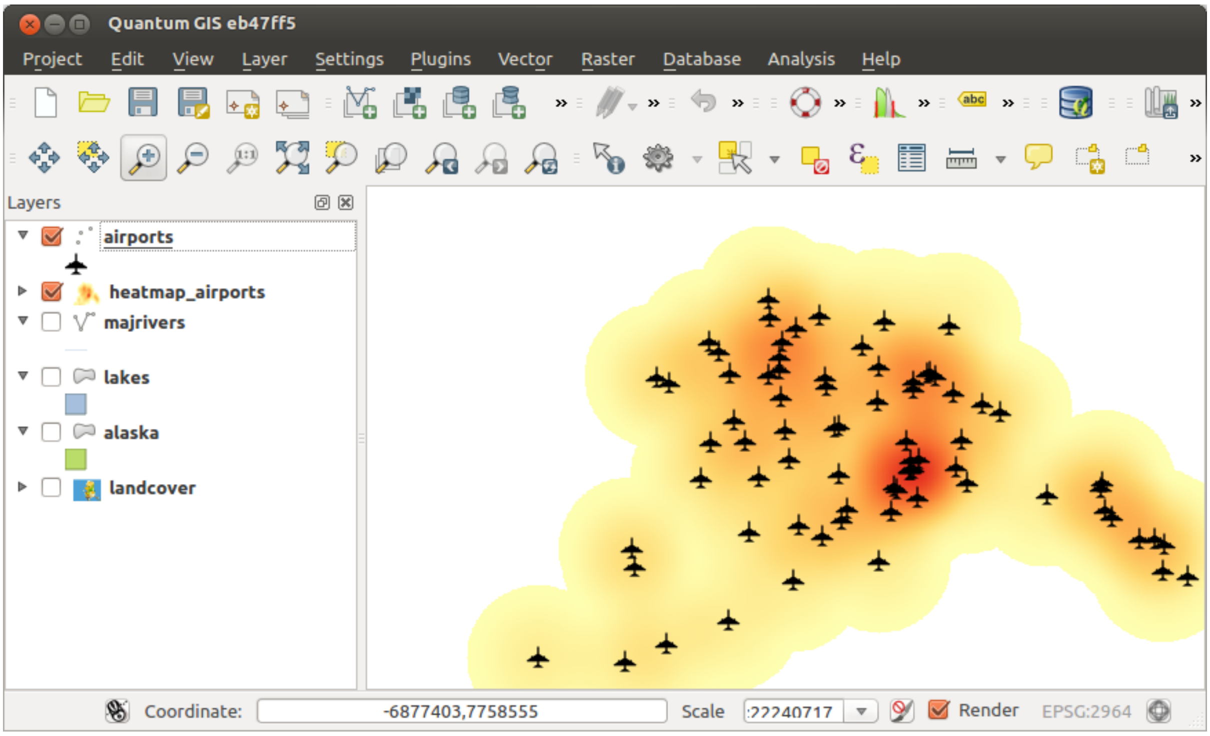


Figure 19.23: Styled heatmap of airports of Alaska

and minimum values in the interpolated surface can only occur at sample data points. This often results in small peaks and pits around the sample data points.

- **Numărul de coloane/rânduri**: Specificai numărul de rânduri i coloane pentru fiierul de ieire raster.
- **Fiierul de ieire**: Specificai un nume pentru fiierul de ieire raster.
- *Add result to project* pentru a încărca rezultatul în canevasul hării.

Note that using lines as constraints for the interpolation the triangulation (TIN method) you can either use 'structure lines' or 'break lines'. When using 'break lines' you produce sharp breaks in the surface while using 'structure lines' you produce continous breaks. The triangulation is modified by both methods such that no edge crosses a breakline or structure line.

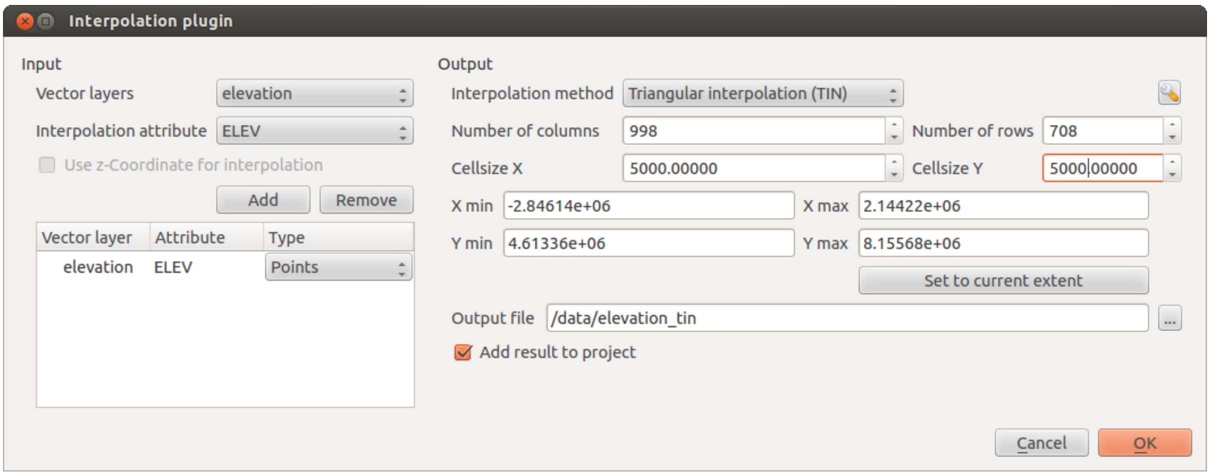


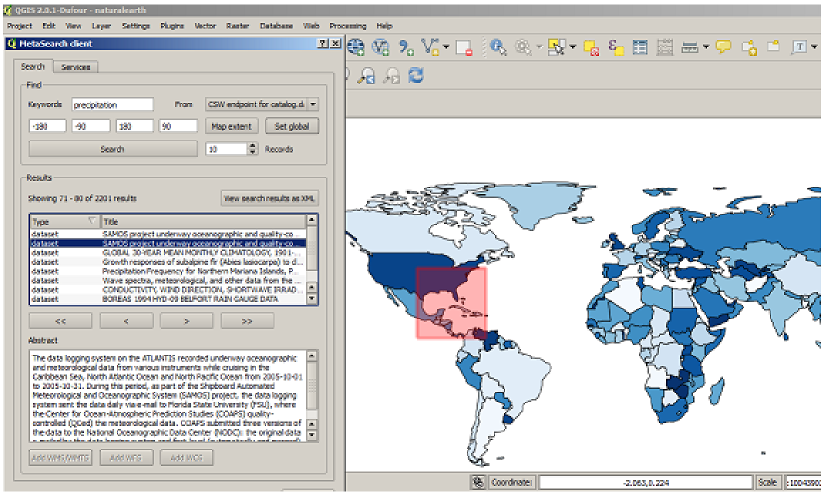
Figure 19.24: Interpolation Plugin

19.11.1 Utilizarea plugin-ului

1. Start QGIS and load a point vector layer (e.g., `elevp.csv`).
2. Load the Interpolation plugin in the Plugin Manager (see *Dialogul Plugin-urilor*) and click on the *Raster* → *Interpolation* → *Interpolation* , which appears in the QGIS menu bar. The Interpolation plugin dialog appears as shown in Figure_interpolation_1.
3. Select an input layer (e.g., *elevp*) and column (e.g., `ELEV`) for interpolation.
4. Selectai o metodă de interpolare (de exemplu, 'Reea Neregulată Triangulată (TIN)'), i specificai o dimensiune a ochiurilor de 5000, precum i numele fiierului de ieire raster (de exemplu, `elevation_tin`).
5. Clic pe **[OK]**.

.

19.12 MetaSearch Catalogue Client



19.12.1 Introducere

MetaSearch is a QGIS plugin to interact with metadata catalogue services, supporting the OGC Catalogue Service for the Web (CSW) standard.

MetaCăutarea oferă o abordare simplă, intuitivă, i o interfaă prietenoasă, pentru căutarea în cataloagele cu metadate din QGIS.

19.12.2 Instalare

MetaSearch is included by default with QGIS 2.0 and higher. All dependencies are included within MetaSearch.

Instalai Metacăutarea din managerul de pluginuri QGIS, sau manual de la http://plugins.qgis.org/plugins/MetaSearch.

19.12.3 Lucrul cu Catalogul Metadatelor în QGIS

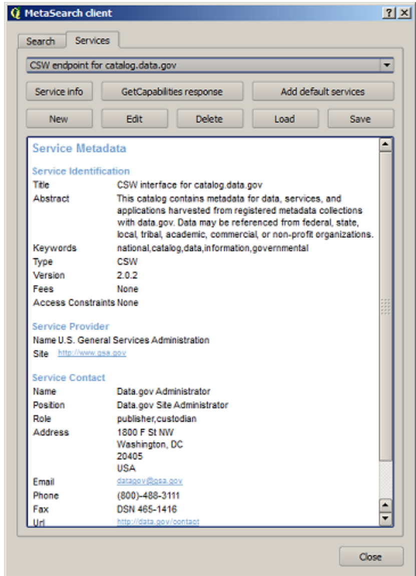
CSW (Serviciu Catalog pentru Web)

CSW (Catalogue Service for the Web) is an OGC (Open Geospatial Consortium) specification, that defines common interfaces to discover, browse, and query metadata about data, services, and other potential resources.

Inițializare

To start MetaSearch, click the MetaSearch icon or select Web / MetaSearch / MetaSearch via the QGIS main menu. The MetaSearch dialog will appear. The main GUI consists of two tabs: 'Services' and 'Search'.

Gestiunea Serviciului Catalog



The 'Services' tab allows the user to manage all available catalogue services. MetaSearch provides a default list of Catalogue Services, which can be added by pressing 'Add default services' button.

Pentru toate intrările Catalogului de Servicii listate, facei clic pe caseta de selectare.

To add a Catalogue Service entry, click the 'New' button, and enter a Name for the service, as well as the URL/endpoint. Note that only the base URL is required (not a full GetCapabilities URL). Clicking ok will add the service to the list of entries.

To edit an existing Catalogue Service entry, select the entry you would like to edit and click the 'Edit' button, and modify the Name or URL values, then click ok.

To delete a Catalogue Service entry, select the entry you would like to delete and click the 'Delete' button. You will be asked to confirm deleting the entry.

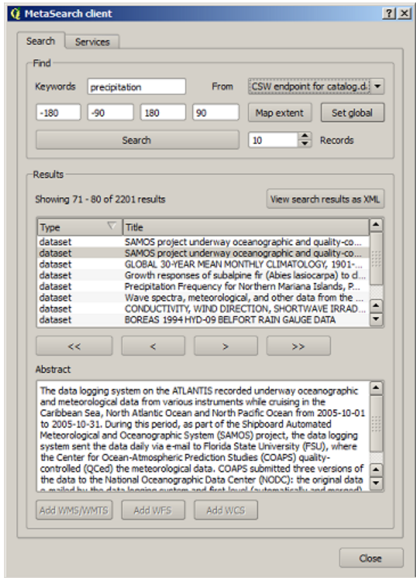
MetaSearch allows for loading and saving connections to an XML file. This is useful when you need to share settings between applications. Below is an example of the XML file format.

```
<?xml version="1.0" encoding="UTF-8"?>
<qgsCSWConnections version="1.0">
    <csw name="Data.gov CSW" url="http://catalog.data.gov/csw-all"/>
    <csw name="Geonorge - National CSW service for Norway" url="http://www.geonorge.no/geonetwork
    <csw name="Geoportale Nazionale - Servizio di ricerca Italiano" url="http://www.pcn.minambient
    <csw name="LINZ Data Service" url="http://data.linz.govt.nz/feeds/csw"/>
    <csw name="Nationaal Georegister (Nederland)" url="http://www.nationaalgeoregister.nl/geonetw
    <csw name="RNDT - Repertorio Nazionale dei Dati Territoriali - Servizio di ricerca" url="http
    <csw name="UK Location Catalogue Publishing Service" url="http://csw.data.gov.uk/geonetwork/s
    <csw name="UNEP/GRID-Geneva Metadata Catalog" url="http://metadata.grid.unep.ch:8080/geonetwo
</qgsCSWConnections>
```

To load a list of entries, click the 'Load' button. A new window will appear; click the 'Browse' button and navigate to the XML file of entries you wish to load and click 'Open'. The list of entries will be displayed. Select the entries you wish to add from the list and click 'Load'.

The 'Service info' button displays information about the selected Catalogue Service such as service identification, service provider and contact information. If you would like to view the raw XML response, click the 'GetCapabilities response' button. A separate window will open displaying Capabilities XML.

Serviciul de Căutare în Catalog



The 'Search' tab allows the user to query Catalogue Services for data and services, set various search parameters and view results.

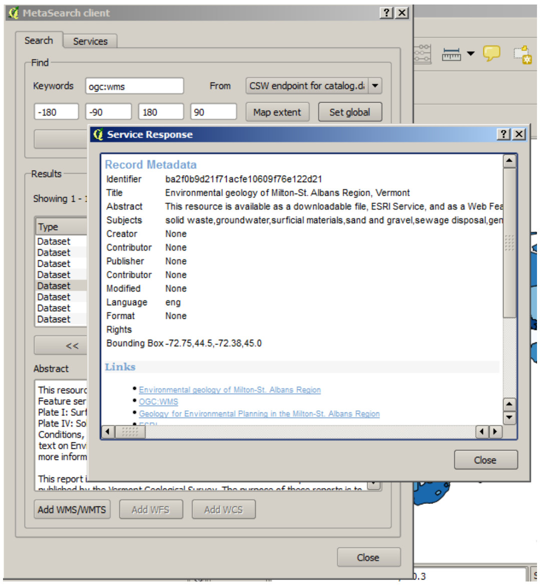
Următorii parametri de căutare sunt disponibili:

- **Keywords**: free text search keywords
- **From**: the Catalogue Service to perform the query against
- **Bounding box**: the spatial area of interest to filter on. The default bounding box is the map view / canvas. Click 'Set global' to do a global search, or enter custom values as desired
- **Records**: the number of records to return when searching. Default is 10 records

Clicking the 'Search' button will search the selected Metadata Catalogue. Search results are displayed in a list and are sortable by clicking on the column title. You can navigate through search results with the directional buttons below the search results. Clicking the 'View search results as XML' button opens a window with the service response in raw XML format.

Clicking a result will show the record's abstract in the 'Abstract' window and provides the following options:

- if the metadata record has an associated bounding box, a footprint of the bounding box will be displayed on the map
- double-clicking the record displays the record metadata with any associated access links. Clicking the links opens the link in the user's web browser
- if the record is an OGC web service (WMS/WMTS, WFS, WCS), the appropriate 'Add to WMS/WMTS|WFS|WCS' buttons will be enabled for the user to add to QGIS. When clicking this button, MetaSearch will verify if this is a valid OWS. The OWS will then be added to the appropriate QGIS connection list, and the appropriate WMS/WMTS|WFS|WCS connection dialogue will then appear



Setări

You can fine tune MetaSearch with the following settings:

- **Connection naming**: when adding an OWS connection (WMS/WMTS|WFS|WCS), the connection is stored with the various QGIS layer provider. Use this setting to set whether to use the name provided from MetaSearch, whether to overwrite or to use a temporary name
- **Results paging**: when searching metadata catalogues, the number of results to show per page
- **Timeout**: when searching metadata catalogues, the number of seconds for blocking connection attempt. Default value is 10

.

19.13 Plugin-ul de Editare Offline

Pentru colectarea datelor, lucrul în teren cu un laptop sau un telefon mobil, neconectate la reea, reprezintă o situaie comună. La revenirea reelei, modificările trebuie să fie sincronizate cu sursa de date de master (cum ar fi o bază de date PostGIS). Dacă mai multe persoane lucrează simultan la aceleai seturi de date, este dificilă fuzionarea editărilor individuale, chiar dacă nimeni nu modifică aceleai entităi.

The Offline Editing Plugin automates the synchronisation by copying the content of a datasource (usually PostGIS or WFS-T) to a SpatiaLite database and storing the offline edits to dedicated tables. After being connected to the network again, it is possible to apply the offline edits to the master dataset.

19.13.1 Utilizarea plugin-ului

- Deschidei unele straturi vectoriale (cum ar fi din PostGIS sau dintr-o sursă de date WFS-T).
- Salvai-l ca proiect.
- Go to *Database* → *Offline Editing* → *Convert to offline project* and select the layers to save. The content of the layers is saved to SpatiaLite tables.
- Editarea offline a straturilor.
- After being connected again, upload the changes using *Database* → *Offline Editing* → *Synchronize*.

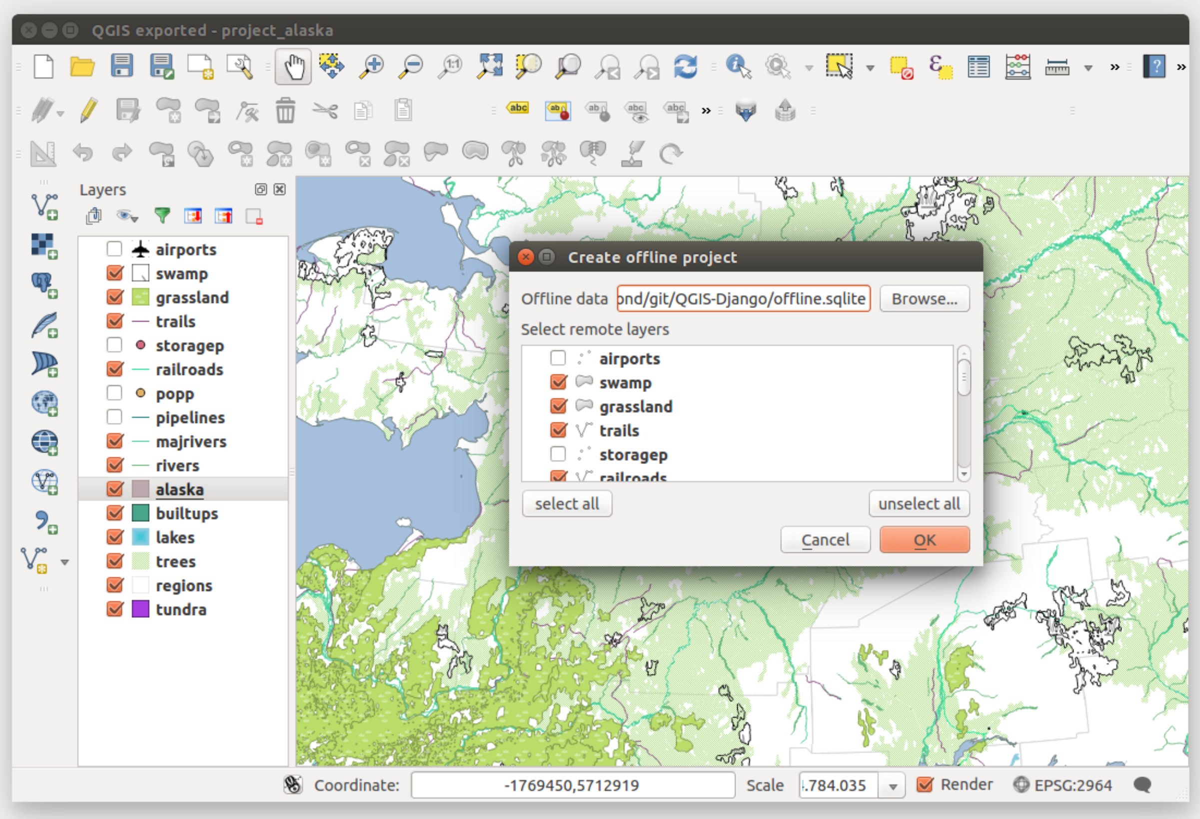


Figure 19.25: Creare proiect offline din PostGIS sau din straturile WFS.

.

19.14 Plugin-ul GeoRaster Oracle Spatial

In Oracle databases, raster data can be stored in SDO_GEORASTER objects available with the Oracle Spatial extension. In QGIS, the Oracle Spatial GeoRaster plugin is supported by GDAL and depends on Oracle's database product being installed and working on your machine. While Oracle is proprietary software, they provide their software free for development and testing purposes. Here is one simple example of how to load raster images to GeoRaster:

```
$ gdal_translate -of georaster input_file.tif geor:scott/tiger@orcl
```

Acesta va încărca rasterul în tabela GDAL_IMPORT, sub forma unei coloane denumite `RASTER`.

19.14.1 Gestionare conexiuni

Firstly, the Oracle GeoRaster Plugin must be enabled using the Plugin Manager (see *Dialogul Plugin-urilor*). The first time you load a GeoRaster in QGIS, you must create a connection to the Oracle database that contains the data. To do this, begin by clicking on the Add Oracle GeoRaster Layer toolbar button – this will open the *Select Oracle Spatial GeoRaster* dialog window. Click on **[New]** to open the dialog window, and specify the connection parameters (See Figure_oracle_raster_1):

- **Nume**: Introducei un nume pentru conexiunea la baza de date.
- **Instana bazei de date**: Introducei numele bazei de date la care vă vei conecta.
- **Numele de utilizator**: Numele utilizatorului care va fi utilizat pentru accesarea bazei de date.

- **Parola**: Parola asociată numelui de utilizator care este cerut la accesarea bazei de date.

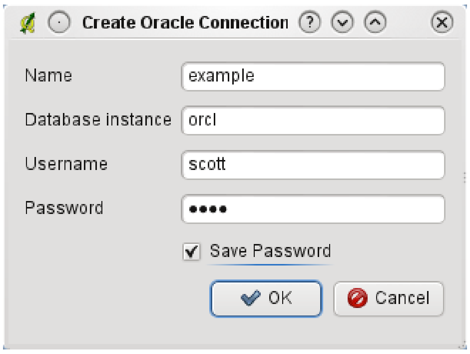


Figure 19.26: Dialogul de Creare a conexiunilor Oracle

Now, back on the main *Oracle Spatial GeoRaster* dialog window (see Figure_oracle_raster_2), use the drop-down list to choose one connection, and use the **[Connect]** button to establish a connection. You may also **[Edit]** the connection by opening the previous dialog and making changes to the connection information, or use the **[Delete]** button to remove the connection from the drop-down list.

19.14.2 Selectarea unui GeoRaster

O dată ce o conexiune a fost stabilită, fereastra subseturilor de date va arata numele tuturor tabelelor care conin coloanele GeoRaster din această bază de date, în formatul unui nume de subset de date GDAL.

Click on one of the listed subdatasets and then click on **[Select]** to choose the table name. Now another list of subdatasets will show with the names of GeoRaster columns on that table. This is usually a short list, since most users will not have more than one or two GeoRaster columns on the same table.

Click on one of the listed subdatasets and then click on **[Select]** to choose one of the table/column combinations. The dialog will now show all the rows that contain GeoRaster objects. Note that the subdataset list will now show the Raster Data Table and Raster Id pairs.

În orice moment, intrarea seleciei poate fi editată pentru a merge direct la un GeoRaster cunoscut, sau pentru a reveni la început i pentru a selecta un alt nume de tabelă.

The selection data entry can also be used to enter a `WHERE` clause at the end of the identification string (e.g., `geor:scott/tiger@orcl,gdal_import,raster,geoid=`). See http://www.gdal.org/frmt_georaster.html for more information.

19.14.3 Afiarea GeoRaster-ului

Finally, by selecting a GeoRaster from the list of Raster Data Tables and Raster Ids, the raster image will be loaded into QGIS.

The *Select Oracle Spatial GeoRaster* dialog can be closed now and the next time it opens, it will keep the same connection and will show the same previous list of subdatasets, making it very easy to open up another image from the same context.

Note: GeoRasters that contain pyramids will display much faster, but the pyramids need to be generated outside of QGIS using Oracle PL/SQL or gdaladdo.

Următorul exemplu folosete `gdaladdo`:

```
gdaladdo georaster:scott/tiger@orcl,georaster\_table,georaster,georid=6 -r
nearest 2 4 6 8 16 32
```

Acesta este un exemplu care folosete PL/SQL:

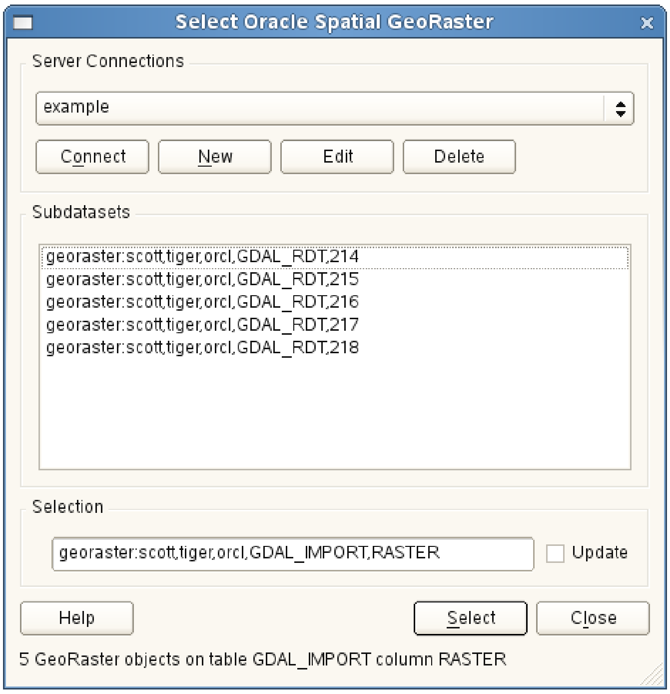


Figure 19.27: Selectarea Dalogului Oracle GeoRaster

```
$ sqlplus scott/tiger
SQL> DECLARE
 gr sdo_georaster;
BEGIN
    SELECT image INTO gr FROM cities WHERE id = 1 FOR UPDATE;
    sdo_geor.generatePyramid(gr, 'rLevel=5, resampling=NN');
    UPDATE cities SET image = gr WHERE id = 1;
    COMMIT;
END;
```

.

19.15 Plugin-ul de Analiză a Terenurilor Raster

The Raster Terrain Analysis Plugin can be used to calculate the slope, aspect, hillshade, ruggedness index and relief for digital elevation models (DEM). It is very simple to handle and provides an intuitive graphical user interface for creating new raster layers (see Figure_raster_terrain_1).

Descrierea analizei:

- **Pante**: Calculează unghiul de înclinare, în grade, pentru fiecare celulă (pe baza primei comenzi de estimare derivativă).
- **Aspectul**: Expoziia (începe cu 0 pentru direcia nordului, în grade, în sens invers acelor de ceasornic).
- **Umbrirea reliefului**: Creează o hartă umbrită folosind lumina i umbra, pentru a oferi un aspect pronunat tridimensional unei hări cu relief umbrit. Harta de ieire are o singură bandă, care reflectă valoarea de gri a pixelilor.
- **Indicele de Robustee**: O măsurare cantitativă a eterogenităii terenului, aa cum este descris de către Riley i colab. (1999). Se calculează pentru fiecare locaie, prin rezumarea schimbărilor de altitudine, în grila 3x3 pixeli.

- **Relieful**: Creează o hartă a reliefului umbrit, din datele digitale ale elevaiei. Este implementată o metodă de alegere a culorilor de elevaie, prin analizarea distribuiei de frecvenă. Harta de ieire este de tip multibandă, cu trei benzi care reflectă valorile RGB ale reliefului umbrit.

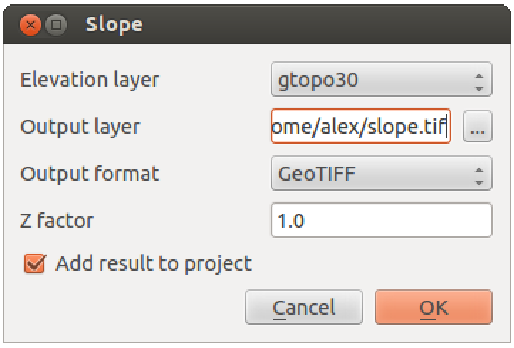


Figure 19.28: Plugin-ul de Modelare a Terenurilor Raster (calculul pantei)

19.15.1 Utilizarea plugin-ului

1. Start QGIS and load the `gtopo30` raster layer from the GRASS sample location.
2. Încarcă plugin-ul de Analiză a Terenului Raster din Managerul de Plugin-uri (v. *Dialogul Plugin-urilor*).
3. Selectai o metodă de analiză din meniu (cum ar fi, *Raster* → *Analiza Terenului* → *Pantă*). Dialogul *Pantei* apare aa cum se prezintă în Figure_raster_terrain_1.
4. Specificai o cale i un tip pentru fiierul de ieire.
5. Clic pe **[OK]**.

.

19.16 Plugin pentru Grafuri Rutiere

The Road Graph Plugin is a C++ plugin for QGIS that calculates the shortest path between two points on any polyline layer and plots this path over the road network.

Caracteristici principale:

- Calculează calea, precum i lungimea i durata călătoriei.
- Optimizarea se face în funcie de lungimea sau de timpul călătoriei.
- Exportă calea într-un strat vectorial.
- Evideniază direciile drumurilor (aceasta e desfăoară lent, utilizându-se, în principal, pentru scopuri de depanare i pentru testarea setărilor).

As a roads layer, you can use any polyline vector layer in any QGIS-supported format. Two lines with a common point are considered connected. Please note, it is required to use layer CRS as project CRS while editing a roads layer. This is due to the fact that recalculation of the coordinates between different CRSs introduces some errors that can result in discontinuities, even when 'snapping' is used.

În tabela de atribute a stratului, pot fi folosite următoarele câmpuri:

- Viteza din seciunea drumurilor (câmp numeric).
- Direcia (orice tip care pot fi exprimat înr-un ir). Direciile înainte i înapoi corespund unui drum cu sens unic, ambele direcii indicând un drum cu două sensuri.

Dacă unele câmpuri nu au nici o valoare sau nu există, se folosesc valorile implicite. Putei modifica valorile implicite i unele setări de plugin, din caseta de dialog a setărilor.

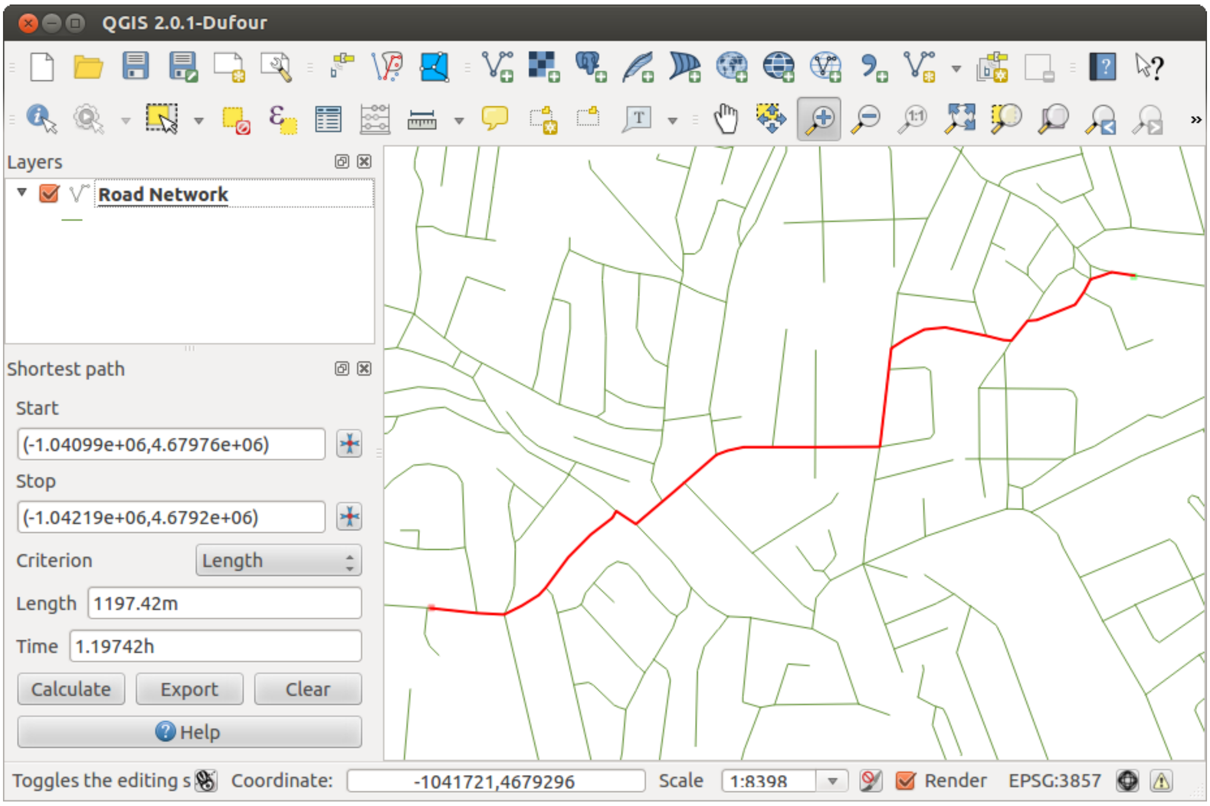


Figure 19.29: Road Graph Plugin

19.16.1 Utilizarea plugin-ului

After plugin activation, you will see an additional panel on the left side of the main QGIS window. Now, enter some parameters into the *Road graph plugin settings* dialog in the *Vector* → *Road Graph* menu (see figure_road_graph_2).

După setarea *Unităilor de timp*, a *Unităilor de distanță* i a *Toleranei topologiei*, putei alege stratul vectorial din fila *Stratului de transport*. Aici putei alege, de asemenea, *Câmpul direciei* i *Câmpul vitezei*. În fila *Setărilor implicite*, putei seta *Direcia* pentru calcule.

În cele din urmă, în panoul *Shortest Path*, selectai un punct de Start i unul de Stop în stratul reelei de drumuri, apoi facei clic pe **[Calculate]**.

.

19.17 Pluginul de Interogare spaţială

The Spatial Query Plugin allows you to make a spatial query (i.e., select features) in a target layer with reference to another layer. The functionality is based on the GEOS library and depends on the selected source feature layer.

Posibilii operatori sunt:

- Conine
- Este egal
- Se suprapune
- Se încrucieează
- Se intersectează

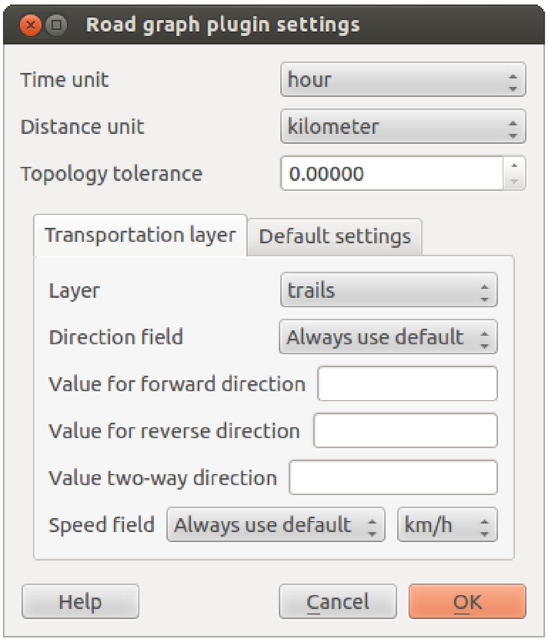


Figure 19.30: Road graph plugin settings

- Este separat
- Atinge
- Este în interior

19.17.1 Utilizarea plugin-ului

Ca exemplu, ne dorim să găsim regiunile care conin aeroporturi, din setul de date Alaska.Sunt necesari următorii pai:

1. Start QGIS and load the vector layers `regions.shp` and `airports.shp`.
2. Load the Spatial Query plugin in the Plugin Manager (see *Dialogul Plugin-urilor*) and click on the Spatial Query icon, which appears in the QGIS toolbar menu. The plugin dialog appears.
3. Selectează stratul `regiuni` ca sursă, i stratul `airporturi` ca referină pentru entităi.
4. Selectai 'Conine' ca oprator, apoi facei clic pe operatorul **[Apply]**.

Din interogare, vei obine o listă de ID-uri ale entităilor, cu mai multe opiuni, aa cum se arată în figure_spatial_query_1.

- Click on Create layer with list of items.
- Select an ID from the list and click on Create layer with selected.
- Select 'Remove from current selection' in the field *And use the result to* .
- Putei bifa *Transfocare pe item* sau guilabel:*Jurnalizează mesajele*.
- Additionally in *Result Feature ID's* with the options 'Invalid source' and 'Invalid reference' you can have a look at features with geometries errors. These features aren't used for the query.

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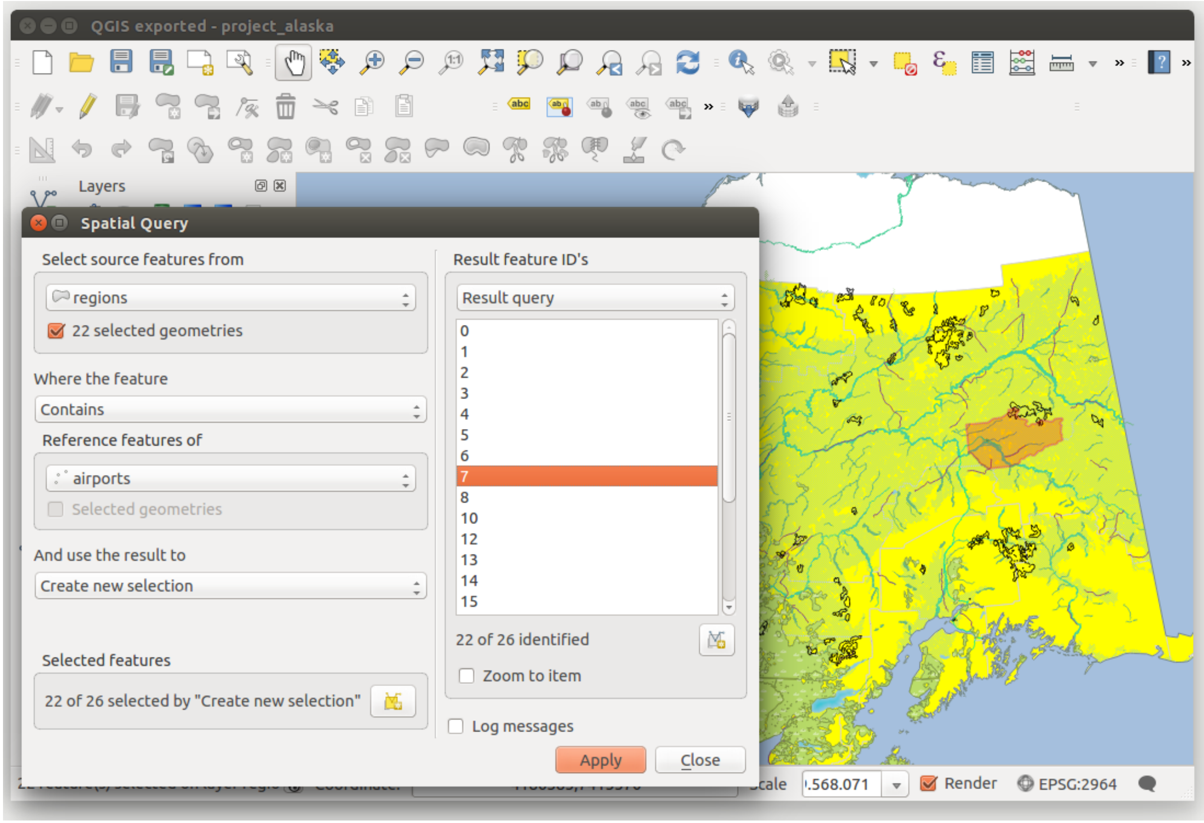

Figure 19.31: Spatial Query analysis - regions contain airports

19.18 Plugin-ul SPIT

QGIS comes with a plugin named SPIT (Shapefile to PostGIS Import Tool). SPIT can be used to load multiple shapefiles at one time and includes support for schemas. To use SPIT, open the Plugin Manager from the *Plugins* menu, in the *Installed* menu check the box next to the *SPIT* and click **[OK]**.

To import a shapefile, use *Database* → *Spit* → *Import Shapefiles to PostgreSQL* from the menu bar to open the *SPIT - Shapefile to PostGIS Import Tool* dialog. Select the PostGIS database you want to connect to and click on **[Connect]**. If you want, you can define or change some import options. Now you can add one or more files to the queue by clicking on the **[Add]** button. To process the files, click on the **[OK]** button. The progress of the import as well as any errors/warnings will be displayed as each shapefile is processed. .

19.19 Plugin-ul de Verificare a Topologiei

Topologia descrie relaiile dintre puncte, linii i poligoane, care reprezintă entităile unei regiuni geografice. Cu ajutorul plugin-ului Topology Checker, putei trece prinntre fierele vectoriale i le putei verifica topologia, în funcie de diverse reguli. Aceste reguli determină dacă între entităile dvs. se află relaii spaiale de tipurile 'Equal', 'Contain', 'Cover', 'CoveredBy', 'Cross', 'Disjoint', 'Intersect', 'Overlap', 'Touch' sau 'Within'. Depinde de întrebările dvs. individuale care dintre regulile topologice se vor aplica datelor vectoriale (de exemplu, în mod normal, nu vei accepta depăiri în straturile de tip linie, dar în cazul unor străzi înfundate, nu dorii ca acestea să fie eliminate din stratul vectorial).

QGIS has a built-in topological editing feature, which is great for creating new features without errors. But existing data errors and user-induced errors are hard to find. This plugin helps you find such errors through a list of rules.

Este foarte simplă crearea regulilor de topologie cu plugin-ul Topology Checker.

În **straturile de tip punct** sunt disponibile următoarele reguli:

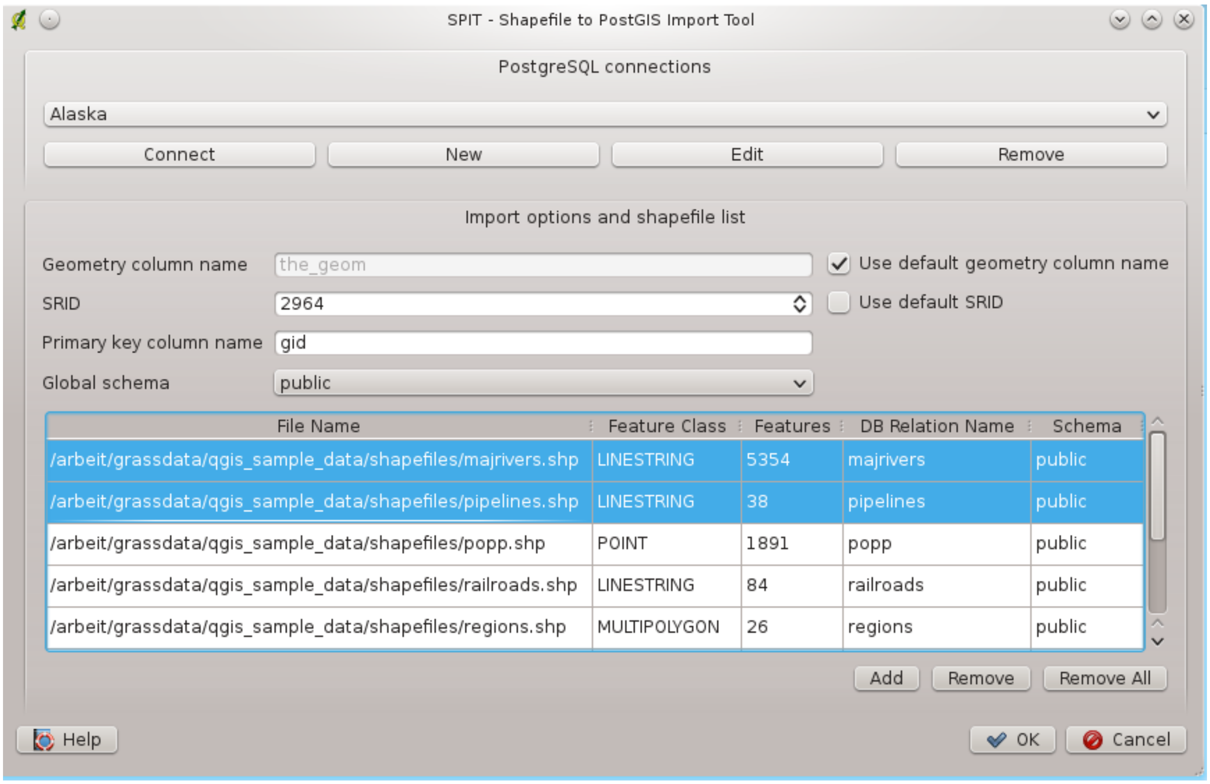

Figure 19.32: Utilizarea plugin-ului SPIT pentru a importa fiiere shape în PostGIS

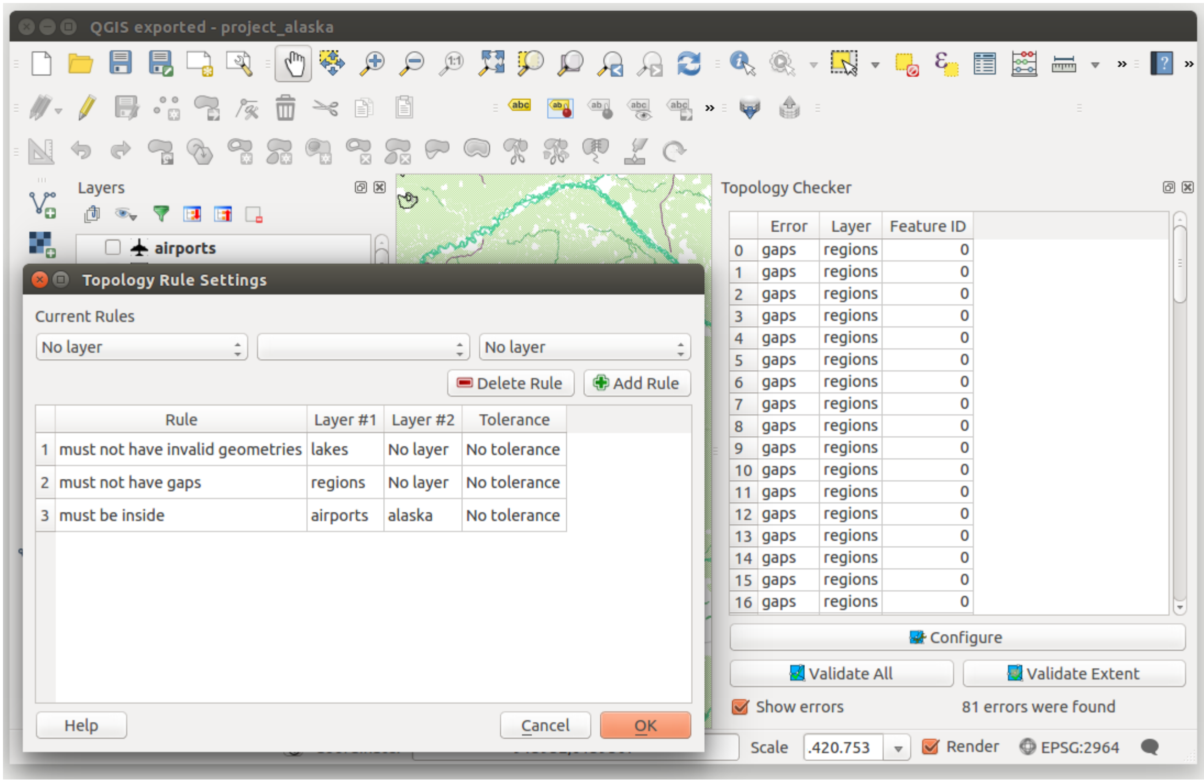

Figure 19.33: Plugin-ul de Verificare a Topologiei

- **Trebuie să fie acoperit de**: Aici putei alege un strat vectorial din proiectul dvs. Punctele care nu sunt acoperite de stratul vectorial dat, apar în câmpul 'Eroare'.
- **Trebuie să fie acoperit de punctele finale din**: Aici putei alege un strat de tip linie din proiectul dvs.
- **Must be inside**: Here you can choose a polygon layer from your project. The points must be inside a polygon. Otherwise, QGIS writes an 'Error' for the point.
- **Nu trebuie să aibă duplicate**: Ori de câte ori un punct este reprezentat de două sau de mai multe ori, el va apărea în câmpul 'Eroare'.
- **Nu trebuie să aibă geometrii nevalide**: Verifică dacă geometriile sunt valabile.
- **Nu trebuie să aibă geometrii-multi-parte**: Toate punctele multi-parte sunt înscrise în câmpul 'Eroare'.

În **straturile de tip linie**, sunt disponibile următoarele reguli:

- **Punctele de capăt trebuie să fie acoperite de**: Aici putei selecta un strat de tip punct din proiectul dvs.
- **Nu trebuie să aibă răsuciri**: Aceasta va arăta depăirile din stratul de tip linie.
- **Nu trebuie să aibă duplicate**: Ori de câte ori o linie este reprezentată de două sau de mai multe ori, ea va apărea în câmpul 'Eroare'.
- **Nu trebuie să aibă geometrii nevalide**: Verifică dacă geometriile sunt valabile.
- **Nu trebuie să aibă geometrii multi-parte**: Uneori, o geometrie poate fi de fapt o colecie de simple geometrii (simple-păr i). O astfel de geometrie poartă denumirea de geometrie multi-parte. În cazul în care conine doar un singur tip de geometrie simplă, o denumim multi-punct, multi-linie sau multi-poligon. Toate liniile multi-parte sunt scrise în câmpul 'Error'.
- **Must not have pseudos**: A line geometry's endpoint should be connected to the endpoints of two other geometries. If the endpoint is connected to only one other geometry's endpoint, the endpoint is called a psuedo node.

În **straturile de tip poligon**, sunt disponibile următoarele reguli:

- **Trebuie să conină**: Strat poligonal trebuie să conină cel puin geometria unui punct din al doilea strat.
- **Ar trebui să nu aibă duplicate**: Poligoanele din acelai strat nu trebuie să aibă geometrii identice. Ori de câte ori un poligon este reprezentat de două sau de mai multe ori, el va apărea în câmpul 'Eroare'.
- **Nu trebuie să aibă lacune**: Poligoane adiacente nu trebuie să formeze goluri între ele. Graniele administrative ar putea fi menionate ca un exemplu (poligoanele statelor din SUA nu au nici un fel de spaii între ele...).
- **Nu trebuie să aibă geometrii nevalide**: Verifică dacă geometriile sunt valabile. Unele dintre regulile care definesc o geometrie validă sunt:
  - Inelele poligonale trebuie să fie închise.
  - Inelele care definesc găurile ar trebui să fie situate în interiorul inelelor care definesc limitele exterioare.
  - Inelele pot să nu de auto-intersecteze (pot să nu se atingă sau să nu se suprapună).
  - Inelele pot să nu se atingă cu alte inele, cu excepia unui punct.
- **Nu trebuie să aibă geometrii multi-parte**: Uneori, o geometrie poate fi de fapt o colecie de simple geometrii (simple-păr i). O astfel de geometrie poartă denumirea de geometrie multi-parte. În cazul în care conine doar un singur tip de geometrie simplă, o denumim multi-punct, multi-linie sau multi-poligon. De exemplu, o ară formată din mai multe insule poate fi reprezentată ca un multi-poligon.
- **Nu trebuie să se suprapună**: Poligoanele adiacente nu ar trebui să partajeze nici un spaiu comun.
- **Nu trebuie să se suprapună cu**: Poligoanele adiacente dintr-un strat nu ar trebui să partajeze nici un spaiu comun cu alt strat.

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19.20 Plugin-ul de statistici zonale

With the *Zonal statistics* plugin, you can analyze the results of a thematic classification. It allows you to calculate several values of the pixels of a raster layer with the help of a polygonal vector layer (see figure_zonal_statistics). You can calculate the sum, the mean value and the total count of the pixels that are within a polygon. The plugin generates output columns in the vector layer with a user-defined prefix.

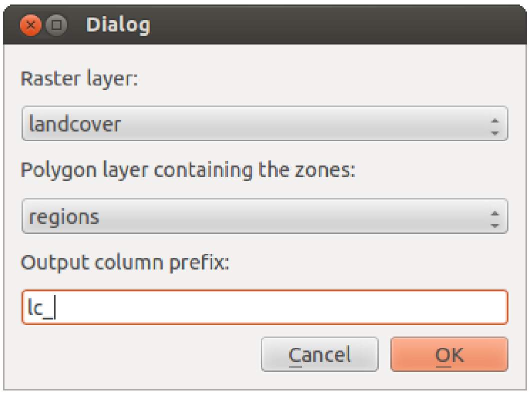

Figure 19.34: Zonal statistics dialog (KDE)

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CHAPTER 20

Asistenă i Ajutor

20.1 Liste de discuii

QGIS is under active development and as such it won't always work like you expect it to. The preferred way to get help is by joining the qgis-users mailing list. Your questions will reach a broader audience and answers will benefit others.

20.1.1 qgis-users

This mailing list is used for discussion of QGIS in general, as well as specific questions regarding its installation and use. You can subscribe to the qgis-users mailing list by visiting the following URL: http://lists.osgeo.org/mailman/listinfo/qgis-user

20.1.2 fossgis-talk-liste

For the German-speaking audience, the German FOSSGIS e.V. provides the fossgis-talk-liste mailing list. This mailing list is used for discussion of open-source GIS in general, including QGIS. You can subscribe to the fossgis-talk-liste mailing list by visiting the following URL: https://lists.fossgis.de/mailman/listinfo/fossgis-talk-liste

20.1.3 qgis-developer

Dacă suntei un dezvoltator care se confruntă cu probleme de natură tehnică, putei adera la lista de discuii QGIS-developer: http://lists.osgeo.org/mailman/listinfo/qgis-developer

20.1.4 qgis-commit

Each time a commit is made to the QGIS code repository, an email is posted to this list. If you want to be up-to-date with every change to the current code base, you can subscribe to this list at: http://lists.osgeo.org/mailman/listinfo/qgis-commit

20.1.5 qgis-trac

Această listă oferă notificări prin e-mail referitoare la managementul de proiect, inclusiv rapoarte de erori, sarcini, i cereri de funcionalităi. Vă putei abona la această listă, accesând: http://lists.osgeo.org/mailman/listinfo/qgis-trac

20.1.6 qgis-community-team

This list deals with topics like documentation, context help, user guide, web sites, blog, mailing lists, forums, and translation efforts. If you would like to work on the user guide as well, this list is a good starting point to ask your questions. You can subscribe to this list at: http://lists.osgeo.org/mailman/listinfo/qgis-community-team

20.1.7 qgis-release-team

This list deals with topics like the release process, packaging binaries for various OSs and announcing new releases to the world at large. You can subscribe to this list at: http://lists.osgeo.org/mailman/listinfo/qgis-release-team

20.1.8 qgis-tr

This list deals with the translation efforts. If you like to work on the translation of the manuals or the graphical user interface (GUI), this list is a good starting point to ask your questions. You can subscribe to this list at: http://lists.osgeo.org/mailman/listinfo/qgis-tr

20.1.9 qgis-edu

This list deals with QGIS education efforts. If you would like to work on QGIS education materials, this list is a good starting point to ask your questions. You can subscribe to this list at: http://lists.osgeo.org/mailman/listinfo/qgis-edu

20.1.10 qgis-psc

This list is used to discuss Steering Committee issues related to overall management and direction of QGIS. You can subscribe to this list at: http://lists.osgeo.org/mailman/listinfo/qgis-psc

You are welcome to subscribe to any of the lists. Please remember to contribute to the list by answering questions and sharing your experiences. Note that the qgis-commit and qgis-trac lists are designed for notification only and are not meant for user postings.

20.2 IRC

We also maintain a presence on IRC - visit us by joining the #qgis channel on irc.freenode.net. Please wait for a response to your question, as many folks on the channel are doing other things and it may take a while for them to notice your question. If you missed a discussion on IRC, not a problem! We log all discussion, so you can easily catch up. Just go to http://qgis.org/irclogs and read the IRC-logs.

Commercial support for QGIS is also available. Check the website http://qgis.org/en/commercial-support.html for more information.

20.3 BugTracker

While the qgis-users mailing list is useful for general 'How do I do XYZ in QGIS?'-type questions, you may wish to notify us about bugs in QGIS. You can submit bug reports using the QGIS bug tracker at http://hub.qgis.org/projects/quantum-gis/issues. When creating a new ticket for a bug, please provide an email address where we can contact you for additional information.

Please bear in mind that your bug may not always enjoy the priority you might hope for (depending on its severity). Some bugs may require significant developer effort to remedy, and the manpower is not always available for this.

Cererile de funcionalităi pot fi depuse, de asemenea, folosind acelai sistem de tichete ca i pentru erori. Asigurai-vă că ai selectat tipul `Feature`.

If you have found a bug and fixed it yourself, you can submit this patch also. Again, the lovely redmine ticketsystem at http://hub.qgis.org/wiki/quantum-gis/issues has this type as well. Check the `Patch supplied` checkbox and attach your patch before submitting your bug. One of the developers will review it and apply it to QGIS. Please don't be alarmed if your patch is not applied straight away – developers may be tied up with other commitments.

20.4 Blog

The QGIS community also runs a weblog at http://planet.qgis.org/planet/, which has some interesting articles for users and developers as well provided by other blogs in the community. You are invited to contribute your own QGIS blog!

20.5 Plugin-uri

The website http://plugins.qgis.org provides the official QGIS plugins web portal. Here, you find a list of all stable and experimental QGIS plugins available via the 'Official QGIS Plugin Repository'.

20.6 Wiki

Lastly, we maintain a WIKI web site at http://hub.qgis.org/projects/quantum-gis/wiki where you can find a variety of useful information relating to QGIS development, release plans, links to download sites, message-translation hints and more. Check it out, there are some goodies inside!

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Anexă

21.1 Licena Publică Generală GNU

Versiunea 2, Iunie 1991

Preambul

Licenele majorităii programelor sunt concepute pentru a vă priva de libertatea de a le partaja i de a le modifica. Prin contrast, intenia Licenei Publice Generale GNU este de a vă garanta libertatea de a distribui i modifica programele gratuite - pentru a se asigura că programele sunt gratuite pentru toi utilizatorii. Această Licenă Publică Generală se aplică majorităii programelor aparinând Free Software Foundation precum i tuturor celorlalte programe ai căror autori decid să o folosească. (În schimb, alte programe aparinând Free Software Foundation se află sub Licena Publică Generală GNU pentru Biblioteci.) De asemenea, ea poate fi aplicată i programelor dumneavoastră.

Când vorbim de software gratuit, ne referim la libertate, i nu la pre. Licenele noastre sunt concepute să vă garanteze libertatea de a distribui copii ale programelor gratuite (i de a oferi acest serviciu contra cost, dacă dorii), de a primi sau de a obine codul sursă, dacă dorii, de a schimba programul sau a folosi poriuni din el în noi programe libere, i de a ti că putei face toate aceste lucruri.

Pentru a vă proteja drepturile, trebuie să impunem restricii împotriva oricui ar încerca să vă conteste aceste drepturi sau să vă ceară să renunai la ele. Aceste restricii implică anumite responsabilităi pentru dumneavoastră dacă distribuii copii ale programelor, sau dacă le modificai.

De exemplu, dacă distribuii copii ale unui astfel de program, indiferent dacă o facei gratuit sau contra unei sume de bani, trebuie să cedai beneficiarilor toate drepturile pe care le avei dumneavoastră. Trebuie să vă asigurai că ei primesc, sau pot primi, codul sursă. În plus, trebuie să le arătai care sunt termenii în care primesc programul, pentru a ti care le sunt drepturile.

Vă protejăm drepturile în două rânduri: (1) prin stabilirea drepturilor de autor pentru program, i (2) prin această Licenă care vă conferă dreptul legal de a copia, distribui i/sau modifica programul.

De asemenea, pentru propria noastră protecie cât i pentru cea a autorilor, vrem să ne asigurăm că toată lumea înelege că nu există niciun fel de garanie pentru acest program gratuit. Dacă programul este modificat de altcineva i distribuit mai departe, vrem ca beneficiarii programului să tie că ceea ce au nu este originalul, în aa fel încât nicio problemă introdusă de altcineva nu va avea un efect negativ asupra reputaiei autorilor iniiali.

În final, orice program liber este în mod constant ameninat de patentele software. Vrem să evităm pericolul ca cei ce redistribuie programele libere să obină patente, practic transformând programul într-unul proprietar. Pentru a preveni aceasta, facem clară poziia noastră conform căreia orice patent trebuie acordat fie în aa fel, încât să poată fi liceniat i fără restricii pentru uzul gratuit al oricui, fie să nu necesite licenă.

Termenii i condiiile exacte de copiere, distribuire i modificare sunt specificate în următoarele paragrafe. TERMENI I CONDIII PENTRU COPIERE, DISTRIBUIRE I MODIFICARE

0. Această Licenă se aplică oricărui program sau proiect ce conine o meniune a deinătorului drepturilor de autor spunând că poate fi distribuit în termenii acestei Licene Publice Generale. Prin "Program", în continuare, vom înelege orice asemenea program sau proiect, iar prin "lucru bazat pe Program" vom înelege fie programul fie orice alt proiect derivat din Program, conform cu legea drepturilor de autor: adică, un proiect ce conine Programul sau poriuni din el, fie în forma originală fie modificată i/sau tradusă în altă limbă. (În restul acestui document traducerile vor fi incluse fără restricii în termenul "modificare".) Fiecare persoană autorizată de această Licenă va fi desemnată prin termenul "dumneavoastră".

   Activităile care nu sunt de copiere, distribuire i modificare nu sunt acoperite de această Licenă; ele sunt în afara scopului ei. Activitatea de executare a Programului nu este restricionată, iar rezultatul Programului este acoperit de licenă doar în cazul în care coninutul său constituie un proiect bazat pe Program (independent de faptul că a fost obinut prin rularea Programului). Măsura în care acest lucru este adevărat depinde de natura Programului.

1. Puteţi copia şi distribui copii nemodificate ale codului sursă al Programului în forma în care îl primii, prin orice mediu, cu condiia să specificaţi vizibil pe fiecare copie autorul şi lipsa oricărei garanii, să păstrai intacte toate notele referitoare la această Licenţă şi la absenţa oricărei garanii şi să distribuiţi o copie a acestei Licenţe cu fiecare copie a Programului.

   Puteţi pretinde o retribuie financiară pentru actul fizic de transfer al unei copii, şi putei oferi garanie contra cost.

2. Putei efectua modificări asupra copiilor Programului, sau asupra oricăror poriuni ale sale, creând astfel un proiect bazat pe Program, iar copierea i distribuirea unor asemenea modificări sau proiecte se pot face conform termenilor Seciunii 1 de mai sus, doar dacă toate condiiile următoarele sunt îndeplinite:

   (a) Trebuie ca fiierele modificate să conină notie proeminent vizibile, care să menioneze faptul că dumneavoastră le-ai modificat, precum i data fiecărei modificări.

   (b) Trebuie ca orice proiect pe care îl distribuii sau publicai, care în întregime sau în parte conine sau este derivat din Program, sau din oricare parte a acestuia, să poată fi liceniat gratuit i în întregime tuturor părilor tere, în termenii acestei Licene.

   (c) Dacă programul modificat citete comenzi în mod interactiv, trebuie să îl modificai în aa fel încât, atunci când este pornit în mod interactiv, să afieze un mesaj referitor la drepturile de autor, precum i o notă în care se menionează lipsa oricărei garanii (sau faptul că dumneavoastră oferii o garanie). De asemenea, trebuie specificat faptul că utilizatorii pot redistribui programul în aceste condiii, precum i o explicaie a modalităii în care poate fi obinut textul acestei Licene. (Excepie: dacă Programul este interactiv, dar nu afiează în mod normal un asemenea mesaj, nu este necesar ca proiectul bazat pe Program să afieze un mesaj.)

   Aceste cerine se aplică Programului modificat în întregime. Dacă pot fi identificate seciuni ale proiectului care nu sunt derivate din Program, i pot fi considerate de sine stătătoare, atunci această Licenă i termenii săi nu se aplică acelor seciuni când sunt distribuite ca proiecte separate. Când distribuii aceleai seciuni ca parte a unui întreg care este un proiect bazat pe Program, distribuirea întregului proiect trebuie să fie făcută în acord cu termenii acestei Licene, ale cărei permisiuni pentru alte licene se extind asupra întregului, i deci asupra fiecărei seciuni în parte, indiferent de autor.

   Astfel, nu este în intenia acestei seciuni să pretindă drepturi sau să conteste drepturile dumneavoastră asupra unui proiect efectuat în întregime de dumneavoastră. Intenia este de a exercita dreptul de a controla distribuia proiectelor derivate sau colective bazate pe Program.

   În plus, pura agregare pe un mediu de stocare sau distribuie cu Programul (sau cu un proiect bazat pe Program) a unui alt proiect, care nu este bazat pe Program, nu aduce acel proiect sub incidena acestei Licene.

3. Putei copia i distribui Programul (sau un proiect bazat pe el, conform Seciunii 2) în format obiect sau executabil conform termenilor Seciunilor 1 i 2 de mai sus, cu condiia să îndeplinii una dintre condiiile de mai jos:

   (a) Să îl oferii însoit de codul sursă corespunzător, în format citibil de către maină, care trebuie să fie distribuit în termenii Seciunilor 1 i 2 de mai sus, pe un mediu de distribuie uzual transportului de software; sau

(b) Să îl oferii însoit de o ofertă scrisă, validă pentru cel puin trei ani, pentru o taxă care să nu depăească costul fizic al efectuării distribuiei sursei, de a oferi o copie completă, în format citibil de către maină, a codului sursă, distribuit în termenii Seciunilor 1 i 2 de mai sus, pe un mediu de distribuie uzual transportului de software; sau

(c) Să îl oferii însoit de informaia pe care ai primit-o referitoare la oferta de a distribui codul sursa corespunzător. (Această alternativă este permisă numai pentru distribuiri necomerciale i doar dacă ai primit programul în format obiect sau executabil împreună cu această ofertă, în conformitate cu Subseciunea b de mai sus.)

Codul sursă al unui proiect este forma preferată în care se fac modificări asupra proiectului. Pentru un proiect executabil, codul sursă complet înseamnă codul sursă al tuturor modulelor pe care le conine, împreună cu toate fiierele asociate coninând definiii ale interfeelor i scripturile folosite pentru a controla compilarea i instalarea executabilului. Cu toate acestea, ca o excepie, nu este obligatorie distribuirea împreună cu codul sursă a acelor componente care sunt în mod normal distribuite (în format sursă sau binar) cu componentele majore (compilator, nucleu, etc.) ale sistemului de operare sub care rulează executabilul, exceptând situaia în care acea componentă acompaniază executabilul.

Dacă distribuia executabilului sau codului obiect este făcută prin oferirea permisiunii de copiere dintr-un loc dedicat, atunci oferirea permisiunii de copiere a codului sursă din acelai loc este considerată distribuire a codului sursă, chiar dacă beneficiarul nu este obligat să copieze codul sursă împreuna cu codul obiect.

4. Nu putei copia, modifica, sub-autoriza sau distribui Programul decât aa cum este prevăzut în această Licenă. Orice încercare de a copia, modifica, sub-autoriza sau distribui Programul în ali termeni va duce la anularea drepturilor ce vă revin conform acestei Licene. Cu toate acestea, nu vor fi anulate drepturile celor ce au primit copii sau drepturi de la dumneavoastră conform cu această Licenă, atâta timp cât rămân în conformitate cu ea.

5. Nu suntei obligai să acceptai această Licenă, deoarece nu ai semnat-o. Cu toate acestea, numai această Licenă vă permite să modificai Programul sau proiectele derivate din el. Aceste aciuni sunt interzise prin lege dacă nu acceptai această Licenă. În consecină, prin modificarea sau distribuirea Programului (sau a oricărui proiect bazat pe Program), indicai în mod implicit acceptarea acestei Licene i a tuturor termenilor i condiiilor de copiere, distribuire sau modificare a Programului sau proiectelor bazate pe el.

6. De fiecare dată când redistribuii Programul (sau orice proiect bazat pe Program), beneficiarul primete o licenă de la liceniatorul original care îi permite să copieze, distribuie sau modifice Programul în aceiai termeni i condiii. Nu putei impune nici o restricie adiională asupra exercitării drepturilor pe care destinatarul le primete prin această Licenă. Nu suntei responsabil cu impunerea respectării acestei Licene de către o teră parte.

7. În cazul în care, ca o consecină a unei decizii judecătoreti, sau pretinsă încălcare a unui patent, sau pentru orice altă cauză (nu neapărat limitată la chestiuni legate de patente), vi se impun condiii (prin hotărâre judecătorească, înelegere sau alte mijloace) care contravin condiiilor acestei Licene, acest lucru nu vă permite nerespectarea condiiilor acestei Licene. Dacă nu putei face în aa fel încât să satisfacei simultan obligaiile din această Licenă i alte obligaii pertinente, atunci, ca o consecină, vă este interzisă distribuirea Programului. De exemplu, dacă o autorizaie de folosire a unui patent nu vă permite redistribuirea gratuită a Programului de către oricine îl primete de la dumneavoastră, direct sau indirect, atunci singurul mod în care putei satisface simultan aceste condiii i Licena de faă este să nu distribuii Programul în niciun fel.

   Dacă vreo poriune a acestei seciuni este invalidată sau de neaplicat în anumite circumstane, restul seciunii continuă să se aplice, iar seciunea în întregime se aplică în toate celelalte circumstane.

   Nu este în intenia acestei seciuni să vă determine să încălcai vreun patent sau alte pretenii de drepturi de proprietate, sau să contestai valabilitatea oricăror asemenea pretenii; această seciune are ca scop unic protejarea integritäii sistemului de distribuire de programe libere, care este implementat prin licene publice. Multe persoane au contribuit generos la spectrul larg de programe distribuite prin acest sistem, bazându-se pe aplicarea sa consistentă; este la latitudinea autorului/donatorului să decidă dacă este dispus să distribuie programe prin orice alt sistem, i o persoană autorizată să folosească acele programe nu poate impune acea decizie.

   Această seciune este dedicată clarificării a ceea ce este considerat a fi o consecină a restului acestei Licene.

8. Dacă distribuia i/sau folosirea Programului este restricionată în anumite ări, din cauza patentelor, sau din cauza unor interfee aflate sub incidena unor drepturi de autor restrictive, deinătorul drepturilor de autor ce

plasează Programul sub această Licenă poate adăuga o limitare geografica a distribuirii ce exclude acele ări, în aa fel încât distribuirea să fie permisă doar în, sau între, ările care nu sunt excluse. Într-un asemenea caz, Licena încorporează această limitare ca i cum ar fi scrisă în corpul acestei Licene.

9. Free Software Foundation poate publica din când în când noi versiuni i/sau versiuni revăzute, ale Licenei Publice Generale. Asemenea versiuni noi vor fi similare în spirit versiunii prezente, dar pot diferi în anumite detalii, pentru a adresa noi probleme sau situaii.

   Fiecărei versiuni îi este asociat un număr unic. Dacă programul specifică faptul că i se aplică o versiune a acestei Licene i "orice altă versiune ulterioară", avei opiunea de a urma termenii i condiiile acelei versiuni, sau ai oricărei versiuni ulterioare publicate de Free Software Foundation. Dacă Programul nu specifică un număr de versiune, putei alege orice versiune publicată vreodată de Free Software Foundation.

10. Dacă dorii să incorporai pări ale Programului în alte programe libere ale căror condiii de distribuie sunt diferite, cerei permisiunea autorului. Pentru programe ale căror drepturi de autor aparin Free Software Foundation, cerei permisiunea de la Free Software Foundation; uneori facem excepii pentru aceasta. Decizia noastră va fi ghidată de cele două scopuri de a prezerva statutul liber al tuturor proiectelor derivate din programele noastre libere i de a promova distribuirea i refolosirea programelor în general.

NICIO GARANIE

11. DEOARECE PROGRAMUL ESTE OFERIT SUB O LICENĂ CE NU IMPLICĂ NICI UN COST, NU EXISTĂ NICIO GARANIE PENTRU PROGRAM, ÎN MĂSURA PERMISĂ DE LEGILE CE SE APLICĂ. EXCEPTÂND SITUAIILE UNDE ESTE SPECIFICAT ALTFEL ÎN SCRIS, DEINĂTORII DREPTURILOR DE AUTOR I/SAU ALTE PĂRI IMPLICATE OFERĂ PROGRAMUL "ÎN FORMA EXISTENTĂ" FĂRĂ NICIO GARANIE DE NICIUN FEL, EXPLICITĂ SAU IMPLICITĂ, INCLUZÂND, DAR FĂRĂ A FI LIMITATĂ LA, GARANII IMPLICITE DE VANDABILITATE I CONFORMITATE UNUI ANUMIT SCOP. VĂ ASUMAI ÎN ÎNTREGIME RISCUL ÎN CEEA CE PRIVETE CALITATEA I PERFORMANA ACESTUI PROGRAM. ÎN CAZUL ÎN CARE PROGRAMUL SE DOVEDETE A FI DEFECT, VĂ ASUMAI ÎN ÎNTREGIME COSTUL TUTUROR SERVICIILOR, REPARAIILOR I CORECIILOR NECESARE.

12. ÎN NICIO SITUAIE, EXCEPTÂND CAZURILE ÎN CARE ESTE CERUT DE LEGEA APLICABILĂ SAU CA REZULTAT AL UNEI ÎNELEGERI SCRISE, UN DEINĂTOR AL DREPTURILOR DE AUTOR, SAU ORICE ALTĂ PARTE CARE POATE MODIFICA I/SAU REDISTRIBUI PROGRAMUL CONFORM PERMISIUNILOR DE MAI SUS NU VA FI FĂCUT RĂSPUNZĂTOR PENTRU PAGUBELE DUMNEAVOASTRĂ, INCLUSIV CELE GENERALE, SPECIALE, ÎNTÂMPLĂTOARE SAU REZULTANTE, APĂRUTE DIN FOLOSIREA SAU INABILITATEA DE A FOLOSI PROGRAMUL (INCLUZÂND, DAR FĂRĂ A FI LIMITAT LA PIERDEREA SAU DETERIORAREA DATELOR, SAU PIERDERILE SUFERITE DE DUMNEAVOASTRĂ SAU TERE PERSOANE, SAU O INCAPACITATE A PROGRAMULUI DE A INTEROPERA CU ALTE PROGRAME), CHIAR DACĂ DEINĂTORUL SAU TERA PARTE A FOST PREVENITĂ ASUPRA POSIBILITĂII UNOR ASEMENEA PAGUBE.

Excepia QGIS Qt de la GPL

În plus, ca o excepie specială, echipa de dezvoltare QGIS oferă permisiunea de a lega codul acestui program cu biblioteca Qt, inclusiv, dar fără a se limita la următoarele versiuni (atât gratuite i comerciale): Qt/Non-commerical Windows, Qt/Windows, Qt/X11, Qt/Mac, i Qt/Embedded (sau cu versiuni modificate ale Qt care folosesc aceeai licenă ca i Qt), i de a distribui combinaii ale celor două legate. Trebuie să vă supunei Licenei Generale Publice GNU în toate privinele pentru toate codul utilizat, altul decât Qt. Dacă modificai acest fiier, putei prelungi această excepie de la versiunea de fiier, dar nu avei obligaia să facei acest lucru. Dacă nu dorii acest lucru, tergei această declaraie de excepie din versiunea dumneavoastră.

21.2 Licena GNU pentru Documentaia liberă

Versiunea 1.3, 3 November 2008

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<http://fsf.org/>

Oricui îi este permisă copierea şi distribuirea de copii identice ale acestui document, dar fără modificarea lui.

Preambul

Scopul acestei Licenţe este de a conferi "gratuitate" unui manual, colecii de texte, sau altui document funcional i folositor, în sensul libertăii: de a asigura tuturor permisiunea de copiere şi redistribuire, cu sau fără modificări, în scopuri comerciale şi necomerciale. Ca scop secundar, această Licenţă rezervă autorului şi editorului dreptul de a fi creditaţi pentru munca lor, atât timp cât nu sunt responsabili pentru modificările efectuate de către alţii.

Acestă Licenă conferă un fel de "obligaii", ceea ce înseamnă că lucrările derivate dintr-un document trebuie să fie i ele libere, la rândul lor. Această Licenă este inspirată de Licena Publică Generală GNU, care este o licenă similară, concepută pentru a acoperi softul liber.

Am creat această Licenţă pentru a fi de folos manualelor pentru softul liber, deoarece un soft liber necesită o documentaţie liberă: un program trebuie însoţit de manuale care oferă aceeaşi libertate de folosire ca şi softul. Acestă Licenţă nu este limitată, însă, la manualele pentru soft; ea poate fi folosită pentru textul oricărei lucrări, indiferent de subiect sau de modul de publicare. Această Licenţă este recomandată în principal pentru lucrări care servesc drept referinţă sau au fost scrise în scop de instruire.

1. APLICABILITATE ŞI DEFINIŢII

Această Licenţă se aplică oricărei lucrări sau manual, în orice mediu, care conţine o notă, inclusă de către deţinătorul dreptului de autor, care permite distribuţia în termenii acestei Licenţe. Această notă conferă dreptul universal, fără indemnizaţie şi nelimitat ca durată de a folosi lucrarea în condiţiile de faă. Termenul **Document**, de mai jos, se referă la un astfel de manual sau lucrare. Orice membru din public este un beneficiar al acestei Licenţe şi va fi desemnat prin termenul **Dvs.**. Se consideră, în mod automat, că aţi acceptat termenii acestei Licenţe, în urma copierii, modificării sau distribuirii unei lucrări într-un mod care necesită permisiunea autorului, în condiiile legii drepturilor de autor.

O "**Versiune Modificată**" a Documentului este orice lucrare conţinând Documentul sau o porţiune de-a lui, copiată identic sau cu modificări şi/sau tradusă într-o altă limbă.

O "**Secţiune Secundară**" este o anexă cu titlu, sau o secţiune menţionată în cuprins care are ca scop exclusiv descrierea relaţiei editorilor sau a autorilor Documentului cu subiectul Documentului (sau cu aspecte conexe) şi care nu conţine referiri directe la subiectul Documentului. (Astfel, dacă Documentul este în parte manual de matematică, o Secţiune Secundară nu poate conţine deloc explicaţii matematice.) Poate exista doar o conexiune istorică cu subiectul i cu problemele înrudite cu subiectul, ori pot fi prezentate puncte de vedere legale, comerciale, filozofice, etice sau politice legate de acesta.

"**Secţiunile Neschimbabile**" sunt anumite Secţiuni Secundare ale căror titluri sunt specificate ca fiind acele titluri de Secţiuni Neschimbabile din nota ce permite distribuţia Documentului sub acoperirea acestei Licenţe. Dacă o secţiune nu este conformă cu definiţia de mai sus a unei Secţiuni Secundare atunci ea nu poate fi desemnată ca fiind Neschimbabilă. Documentul poate să nu conţină Secţiuni Neschimbabile. Dacă Documentul nu specifică vreo Secţiune Neschimbabilă atunci se consideră că nu există nici una.

"**Textele De Copertă**" sunt anumite pasaje scurte de text care sunt listate ca Texte Pentru Coperta I sau ca Texte Pentru Coperta IV în nota care specifică distribuirea Documentului sub acoperirea acestei Licenţe. Un Text Pentru Coperta I poate avea cel mult 5 cuvinte, iar un Text Pentru Coperta IV poate avea cel mult 25 de cuvinte.

O copie "**Transparentă**" a Documentului este o copie în format electronic, reprezentată într-un format ale cărui specificaţii sunt disponibile publicului, fiind uşor de modificat cu ajutorul unui editor de text generic sau (pentru imagini compuse din pixeli) cu un editor grafic generic ori (pentru desene) cu un editor larg răspândit de grafică vectorială, şi care poate fi folosit ca intrare în procesoarele de text sau de transformare automată în diverse formate adecvate ca intrare pentru procesoarele de text. O copie făcută într-un format de fişier Transparent dar care, prin prezenţa sau absenţa anumitor elemente specifice formatului, descurajează sau împiedică modificările ulterioare, nu reprezintă o copie Transparentă. Un format de imagine nu este Transparent dacă este folosit pentru a reprezenta o cantitate substanţială de text. O copie care nu este "Transparentă" se numete "Opacă"

Exemple de formate compatibile cu copiile Transparente: textul ASCII fără marcaje, formatul de intrare Texinfo, formatele de intrare LaTeX, SGML şi XML folosind un DTD public, HTML simplu şi standard, fişierele PostScript şi PDF modificabile. Exemple de formate Transparente pentru imagine: PNG, XCF şi JPG. Formatele Opace includ formate de text ce pot fi citite şi editate doar de procesoare de text proprietare, SGML şi XML pentru care DTD-ul şi/sau uneltele de procesare nu sunt disponibile, HTML generat automat, documentele PostScript şi PDF produse de diverse procesoare de text doar în scopul printării/afişării.

“**Pagina de Titlu**” înseamnă, pentru o carte tipărită, pagina cu titlul şi paginile următoare, necesare pentru a prezenta, lizibil, materialul care trebuie tipărit, conform acestei Licenţe, pe Pagina de Titlu. Pentru lucrări care nu au o pagină cu titlu propriu-zisă, “Pagina de Titlu” este textul aflat lângă principala apariţie a titlului lucrării, precedând începutul corpului Documentului.

“**Editorul**” reprezintă orice persoană sau entitate care distribuie copii ale documentului pentru public.

O secţiune “Numită XYZ” este o subunitate a Documentului, al cărei titlu este, fie XYZ, fie conţine XYZ în paranteze, după textul care traduce XYZ în altă limbă. (Aici XYZ înlocuieşte nume specifice ce vor fi menţionate mai jos, ca de exemplu “Mulţumiri”, “Dedicaţii”, “Giruri” sau “Istorie”.) Pentru a “Păstra Titlul” unei astfel de secţiuni atunci când modificaţi Documentul înseamnă că va rămânea o seciune “Numită XYZ”, conform acestei definiţii.

Documentul poate include Limitări de Responsabilitate ataşate notificării care afirmă că această Licenţă se aplică Documentului. Aceste se consideră a fi incluse prin referinţă în această Licenţă, dar numai cu privire la limitările de responsabilitate: orice alte implicaţii pe care aceste Limitări de Responsabilitate le-ar putea avea sunt nule şi nu au nici un efect asupra înţelesului acestei Licenţe.

2. COPII IDENTICE

Puteţi copia şi distribui Documentul pe orice mediu, fie comercial sau necomercial, atâta timp cât această Licenţă, notificările de drepturi de autor şi notificarea de licenţă care spune că această Licenţă se aplică acestui Document, sunt reproduse în toate copiile, şi atâta timp cât nu adăugaţi nici un fel de altă condiţie în afară de cele prezente în această Licenţă. Nu aveţi dreptul să luaţi măsuri tehnice de a obstrucţiona sau controla citirea sau recopierea copiilor pe care le faceţi sau le distribuiţi. Aveţi totuşi dreptul să acceptaţi compensaţii în schimbul copiilor. Dacă distribuiţi un număr suficient de mare de copii, atunci trebuie să respectaţi şi condiţiile din secţiunea 3.

Avei, de asemenea, dreptul să împrumutai copii în aceleai condiii ca cele de mai sus, i avei dreptul să afiai copii.

3. COPIEREA ÎN CANTITĂI MARI

Dacă publicai copii tipărite (sau copii în medii care folosesc de obicei coperi tipărite) ale Documentului, în număr mai mare de 100 i dacă notificarea de licenă a Documentului cere Texte de Copertă, trebuie să includei copiile pe coperi care să conină, clar i lizibil, toate aceste Texte de Copertă: Textele Pentru Coperta I pe coperta I i Texte Pentru Coperta IV pe coperta IV. Ambele coperi trebuie de asemenea să vă identifice în mod clar i lizibil ca editor al respectivelor copii. Coperta I trebuie să prezinte titlul în întregime, cu toate cuvintele din titlu la fel de vizibile i proeminente. Putei adăuga alte materiale pe copertă în plus. Copierea cu modificările limitate la coperi, atâta timp cât satisfac aceste condiii, pot fi tratate în toate celelalte aspecte ca i copii identice.

Dacă textele necesare pentru oricare dintre coperi sunt prea voluminoase pentru a încăpea în mod lizibil, trebuie să punei primele rânduri (atâtea cât încap în mod rezonabil) pe coperta efectivă i să continuai cu restul pe pagini adiacente.

Dacă publicai sau distribuii copii Opace ale Documentului în număr mai mare de 100, trebuie ori să includei câte o copie Transparentă în format electronic împreună cu fiecare copie Opacă, ori să specificai în sau împreună cu fiecare copie Opacă o locaie din reeaua electronică la care publicul general care folosete reeaua să aibă acces pentru a descărca, folosind un protocol standard public, copii complete, Transparente ale documentului, fără adăugarea oricărui material adiional. Dacă folosii a doua opiune trebuie să facei demersuri rezonabil de prudente ca atunci când începei distribuirea copiilor Opace să vă asigurai că această copie Transparentă va rămâne accesibilă, în acest fel, la locaia respectivă timp de cel puin un an după distribuia ultimei copii Opace (în mod direct sau prin ageni ori distribuitori) a respectivei ediii pentru public.

Se cere, dar nu în mod necesar, să contactai autorii Documentului cu o perioadă bună înainte de a distribui orice cantitate mare de copii, pentru a le da ocazia să vă pună la dispoziie o versiune actualizată a Documentului.

4. MODIFICĂRI

Putei copia i distribui o Versiune Modificată a Documentului în condiiile seciunilor 2 i 3 de mai sus, cu condiia de a acoperi Versiunea Modificată sub exact această Licenă, cu Versiunea Modificată inând locul Documentului, astfel liceniind distribuirea i modificările Versiunii Modificate oricui intră în posesia unei copii ale acesteia. În plus, trebuie să facei următoarele lucruri în Versiunea Modificată:

1. Folosii în Pagina de Titlu (i pe coperi, dacă există) un titlu diferit de cel al Documentului, i de versiunile sale anterioare (care trebuie, dacă există, să fie listate în seciunea de Istorie a Documentului). Putei folosi acelai titlu ca o versiune anterioară dacă editorul original al acelei copii vă dă permisiunea.

2. Listai pe Pagina de Titlu, ca autori, una sau mai multe dintre persoanele sau entităile responsabile în calitate de autori pentru modificările Versiunii Modificate, împreună cu cel puin cinci dintre autorii principali ai Documentului (toi autorii principali, dacă are mai puin de cinci), în afară de cazul că acetia vă eliberează de această obligaie.
3. Includei pe Pagina de Titlu numele editorului Versiunii Modificate în calitate de editor.
4. Păstrai toate notificările de drepturi de autor ale Documentului.
5. Adăugai o notificare de drepturi de autori relevantă pentru modificările Dvs. adiacent celorlalte notificări de drepturi de autor.
6. Includei, imediat după notificările de drepturi de autor, o notificare de licenă dând permisiune publică de a folosi Versiunea Modificată în condiiile acestei Licene, sub forma prezentată în Apendicele de mai jos.
7. Păstrai în acea notificare de licenă lista integrală a Seciunilor Neschimbabile i Textele de Copertă necesare, date în notificarea de licenă a Documentului.
8. Includei o copie nealterată a acestei Licene.
9. Păstrai seciunea Numită "Istorie", Păstrai-i Titlul i adăugai-i un element care să indice măcar titlul, anul, noii autori i editorul Versiunii Modificate aa cum este dat pe Pagina de Titlu. Dacă nu există o seciune Numită "Istorie" în Document, creai una în care indicai titlul, anul, autorii i editorul Documentului aa cum este dat pe Pagina de Titlu al acestuia i apoi adăugai un element care să descrie Versiunea Modificată aa cum a fost cerut în fraza precedentă.
10. Păstrai locaia de reea, dacă există, dată în Document pentru acces public la o copie Transparentă a Documentului, cât i locaiile de reea date în Document pentru versiunile mai vechi pe care s-a bazat acesta. Acestea pot fi incluse în seciunea Numită "Istorie". Putei omite locaia de reea a unei lucrări care a fost publicată cu cel puin patru ani înainte de Documentul în sine, sau dacă editorul original al versiunii la care se referă vă dă permisiunea.
11. Pentru orice seciune Numită "Mulumiri" sau "Dedicaii" Păstrai Titlul seciunii i păstrai în seciunile respective toată substana i tonul mulumirilor i/sau dedicaiilor fiecărui contribuitor.
12. Păstrai toate Seciunile Neschimbabile ale Documentului, nealterate ca text i ca titluri. Numerotarea seciunilor sau echivalentul numerotării nu sunt considerate ca făcând parte din titlurile seciunilor.
13. tergei orice seciune Numită "Giruri". O astfel de seciune nu poate fi inclusă în Versiunea Modificată.
14. Nu modificai titlul nici unei seciuni existente pentru a fi Numită "Giruri" sau pentru a intra în conflict cu vreo Seciune Neschimbabilă.
15. Păstrai toate Limitările de Responsabilitate.

Dacă Versiunea Modificată include seciuni noi incluse în titlu sau anexe care se califică drept Seciuni Secundare i nu conin material copiat din Document, avei dreptul la alegerea Dvs. să numii unele sau toate acestea ca fiind Neschimbabile. Pentru a face aceasta, adăugai-le titlurile la lista de Seciuni Neschimbabile în notificarea de licenă a Versiunii Modificate. Aceste titluri trebuie să fie distincte faă de toate celelalte titlurile de seciune.

Putei adăuga o seciune Numită "Giruri" doar dacă aceasta conine numai girurile a diverse entităi asupra Versiunii Modificate—de exemplu recenzii sau faptul că textul a fost aprobat de o organizaie ca fiind o definiie autoritară a unui standard.

Putei adăuga un pasaj de cel mult cinci cuvinte ca Text Pentru Coperta I i un pasaj de cel mult 25 de cuvinte ca Text Pentru Coperta IV la sfâritul Textelor De Copertă în Versiunea Modificată. Numai un singur pasaj poate fi adăugat la Textul Pentru Coperta I i unul la Textul Pentru Coperta IV de către (sau prin aranjament cu) orice entitate. Dacă Documentul conine deja texte de copertă pentru coperta respectivă, adăugat în prealabil de Dvs. sau prin aranjament cu aceeai entitate în numele căreia acionai, atunci nu putei adăuga un altul, însă putei să-l înlocuii pe cel vechi numai cu permisiunea explicită a editorului anterior care l-a adăugat pe cel vechi.

Autorul (autorii) i editorul (editorii) Documentului nu vă dau prin această Licenă permisiunea de a le folosi numele pentru publicitate sau pentru a pretinde sau implica vreo girare a oricărei Versiuni Modificate.

5. COMBINAREA DOCUMENTELOR

Putei combina Documentul cu alte documente acoperite de această Licenă sub termenii definii în seciunea 4 de mai sus pentru versiuni modificate, cu condiia să includei în versiunea combinată toate Seciunile Neschimbabile ale tuturor documentelor originale, nemodificate, i să le listai pe toate ca Seciuni Neschimbabile ale versiunii combinate în notificarea de licenă, cât i să păstrai toate Limitările de Responsabilitate.

Versiunea modificată nu trebuie să conină decât o singură copie a acestei Licene, iar duplicatele identice ale Seciunilor Neschimbabile pot fi înlocuite cu o singură copie. Dacă există Seciuni Neschimbabile cu nume identice i coninut diferit, schimbai-le numele adăugând la sfâritul titlului, în paranteză, ori numele autorului sau al editorului original al acelei seciuni dacă acesta este cunoscut, ori un număr unic. Facei aceleai modificări respective titlurilor seciunilor în lista de Seciuni Neschimbabile din notificarea de licenă a versiunii combinate.

În versiunea combinată trebuie să combinai i toate seciunile Numite "Istorie" din diversele documente originale, creând o seciune unică Numită "Istorie"; la fel trebuie să combinai i toate seciunile Numite "Mulumiri" cât i cele Numite "Dedicaii". Trebuie să tergei toate seciunile Numite "Giruri".

6. COLECII DE DOCUMENTE

Putei crea o colecie formată din Document i alte documente acoperite de această Licenă i să înlocuii copiile individuale ale acestei Licene din diversele documente cu o singură copie care să fie inclusă în colecie cu condiia să urmai regulile acestei Licene pentru copii identice pentru fiecare document în toate celelalte privine.

Putei să extragei un document dintr-o astfel de colecie i să-l distribuii individual sub această Licenă cu condiia de a include o copie a acestei Licene în documentul extras i să urmai condiiile acestei Licene în toate celelalte privine în legătură cu copiile identice ale acelui document.

7. AGREGAREA CU LUCRĂRI INDEPENDENTE

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Traducerea este considerată o formă de modificare, drept care putei distribui traduceri ale Documentului sub cerinele seciunii 4. Înlocuirea Seciunilor Neschimbabile cu traduceri ale acestora necesită permisiune specială din partea celor care dein drepturile de autor, însă putei include traduceri ale unora dintre sau tuturor Seciunilor Neschimbabile împreună cu variantele originale ale acestora. Putei include o traducere a acestei Licene cât i toate notificările de licenă din Document, cât i Limitările de Responsabilitate atâta timp cât includei i versiunea originală în engleză a acestei Licene, plus versiunile originale ale respectivelor notificări de licenă i limitări de responsabilitate. În cazul apariiei oricăror discrepane între versiunea tradusă i versiunea originală a acestei Licene, a vreunei notificări de licenă sau a vreunei limitări de responsabilitate, versiunea originală are prioritate.

Dacă vreo seciune din Document este Numită "Mulumiri", "Dedicaii" sau "Istorie" cerina (din seciunea 4) de a-i Păstra Titlul (seciunea 1) va necesita în mod normal schimbarea titlului în sine.

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"Site-ul de Colaborare Masivă a Multiautorilor" (sau „MMC Site") înseamnă orice server www care publică lucrări posibil de a fi supuse drepturilor de autor şi, de asemenea, oferă facilităţi proeminente pentru oricine editează aceste lucrări. Un server pubic wiki este un exemplu în care oricine poate edita lucrări scrise. Un "Site de Colaborare Masivă a Multiautorilor" (sau „MMC Site") în conţinutul său înseamnă o mulţime de lucrări susceptibile de a fi supuse licenţelor supsue site-ului MMC.

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Operatorul unui site MMC poate republica un MMC coninut în site sub CC-BY-SA în acelai loc, în orice moment înainte de 1 august 2009, cu condiia ca MMC să fie eligibil pentru reautorizare.

ADDENDUM: Cum să utilizaţi această licenţă pentru documentele dvs.

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Dacă avei Seciuni Neschimbabile, Texte pentru Coperta I i Texte pentru Coperta IV, înlocuii linia "cu ... Texte." cu:

> with the Invariant Sections being LIST THEIR TITLES, with the Front-Cover Texts being LIST, and with the Back-Cover Texts being LIST.

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Dacă documentul conine exemple netriviale de cod de programare, vă recomandăm publicarea acestor exemple, în paralel, sub o licenă pentru softul liber, cum ar fi Licena Publică Generală GNU, pentru a permite utilizarea lor în software-ul liber.

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CHAPTER 22

Literatură i Referine Web

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