

QGIS

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&

IIIT-HYDERABAD

Introduction to QGIS

- Quantum GIS (QGIS) is a GIS tool for managing geographical data, 3-D analysis, statistical analysis.
- QGIS is **Free and Open Source** software.
- It is an official project of OSGEO (Open Source Geospatial Foundation) 
- Available under **GNU General Public License**; having support for vector, raster, and database formats.
- QGIS is translated into **70** languages (Hindi, Tamil, Malayalam, Telugu)
- Plug-ins available to expand compatibility and functionality.
- Extensive help and documentation is available.

Who uses open source?

90% of supercomputers

80% of internet servers

70% of smart phones *

Who uses open source GIS?

ESRI

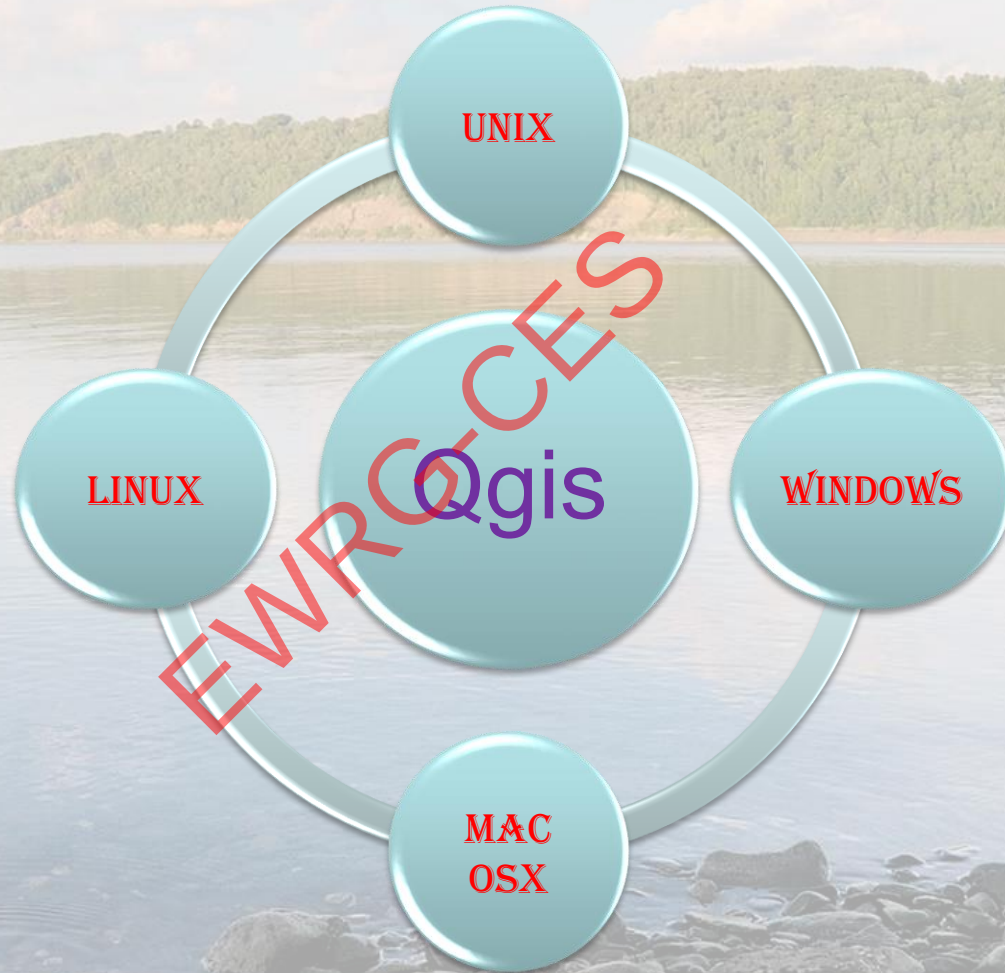
IDRISI

ERDAS

Google

many others . . .

- QGIS is multiplatform GIS that runs on



ANDROID version of Qgis is also available for mobile phones

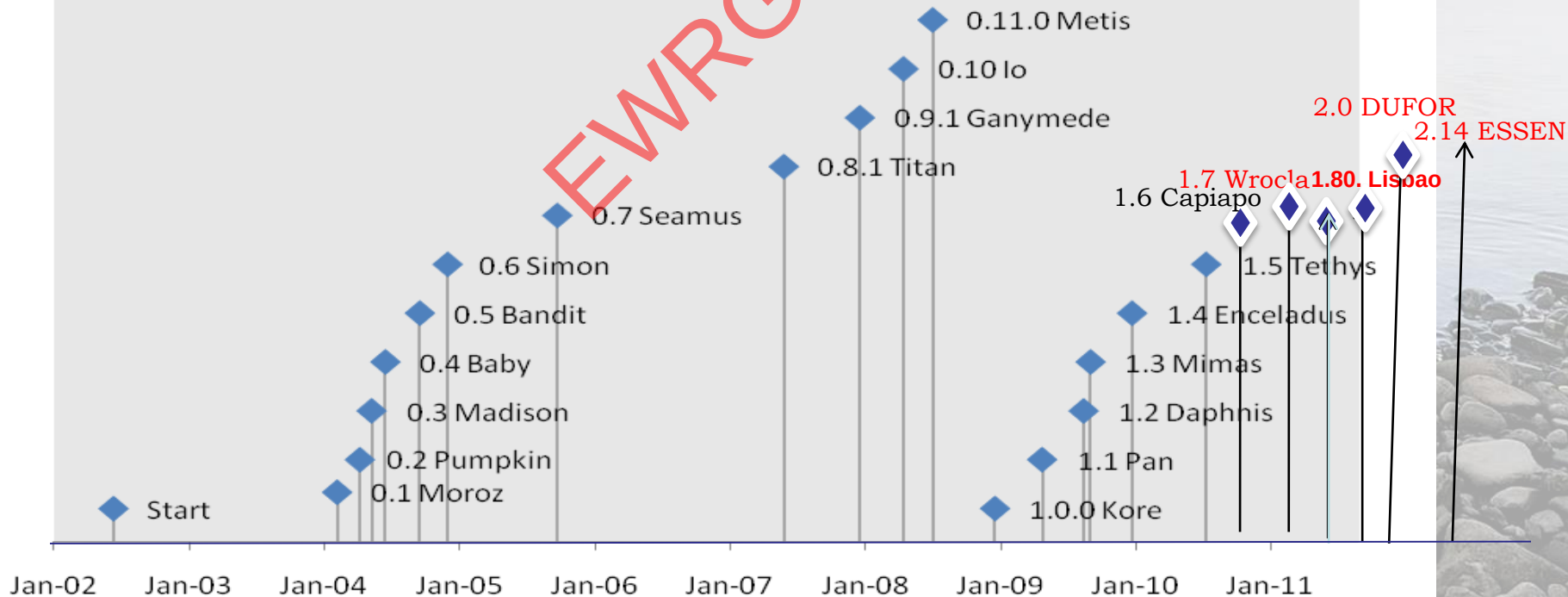
History

Gary Sherman in February 2002 started to develop a gis. Quantum GIS can also be used as graphical user interface to GRASS from version 1.2.

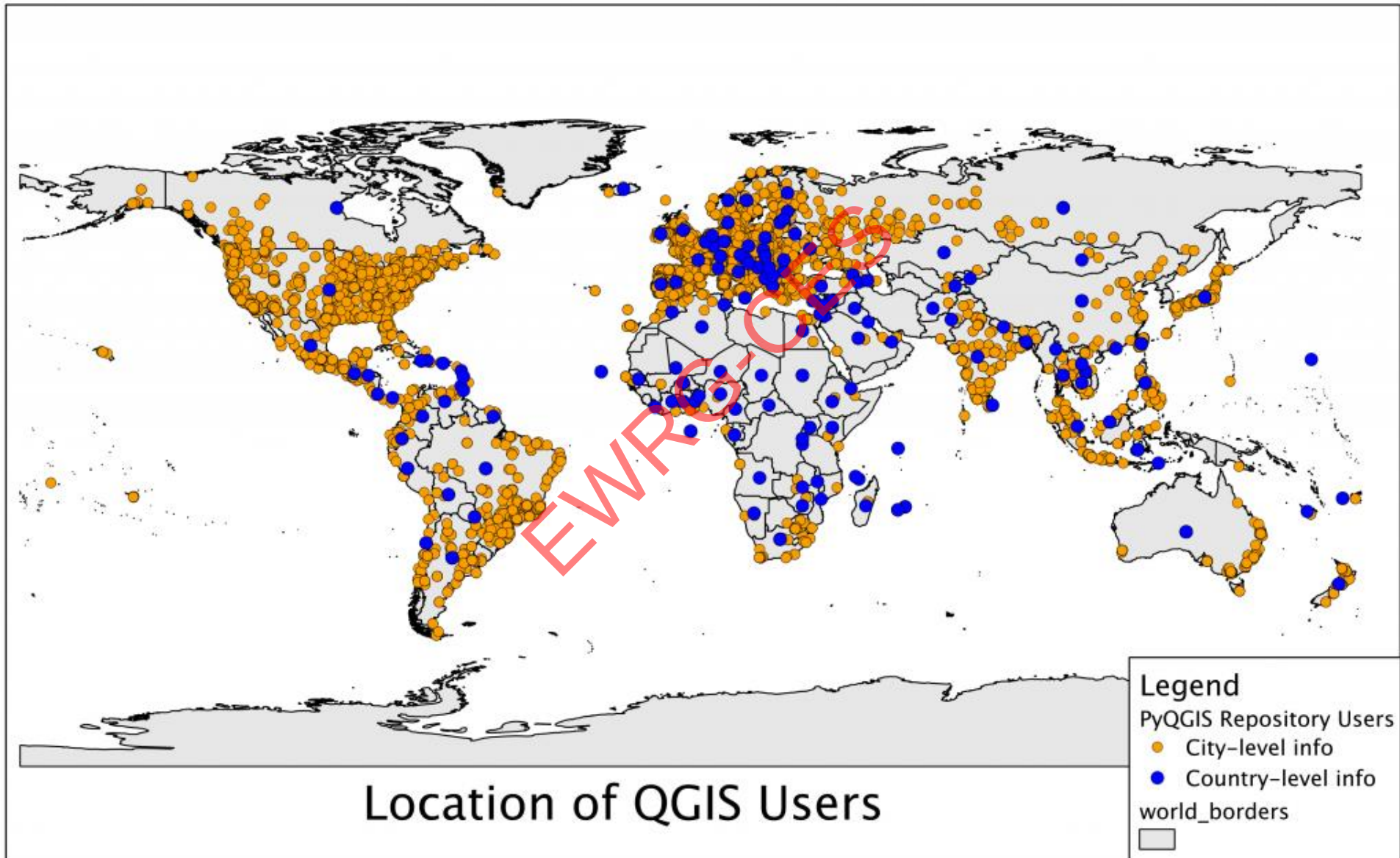
The first release → **July 19, 2002.**

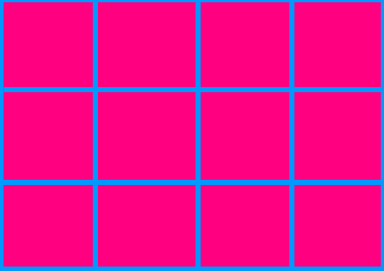
The current version → Qgis 2.14 Essen

QGIS Timeline

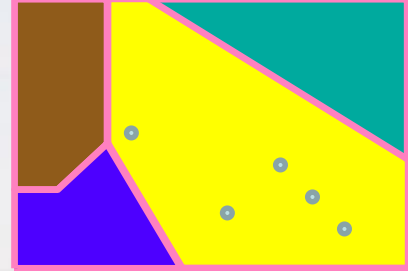


Quantum GIS Users around the World





GIS Data Formats



Raster

- Data are divided into cell, pixels, or elements
- Cells are organized in arrays
- Each cell has a single value
- Perhaps the most common example of raster data is a **digital image**

Vector

Data are associated with **points, lines, polygons or boundaries** enclosing areas

Points are located by coordinates

Lines are described by a series of connecting vectors (line segments described by the coordinates of the start of the vector, its direction, and magnitude or length)

Areas or polygons are described by a series of vectors enclosing the area

QGIS_DATA TYPES

MAP DATA

- Contains the **location and shape** of geographic features.
- Maps use three basic shapes to present real-world features:
points, lines, and areas (called polygons)

ATTRIBUTE DATA

- Tabular data is the **descriptive data** that GIS links to map features.
- Ex specific areas information like states, census tracts, cities, and so on and often comes packaged with map data.

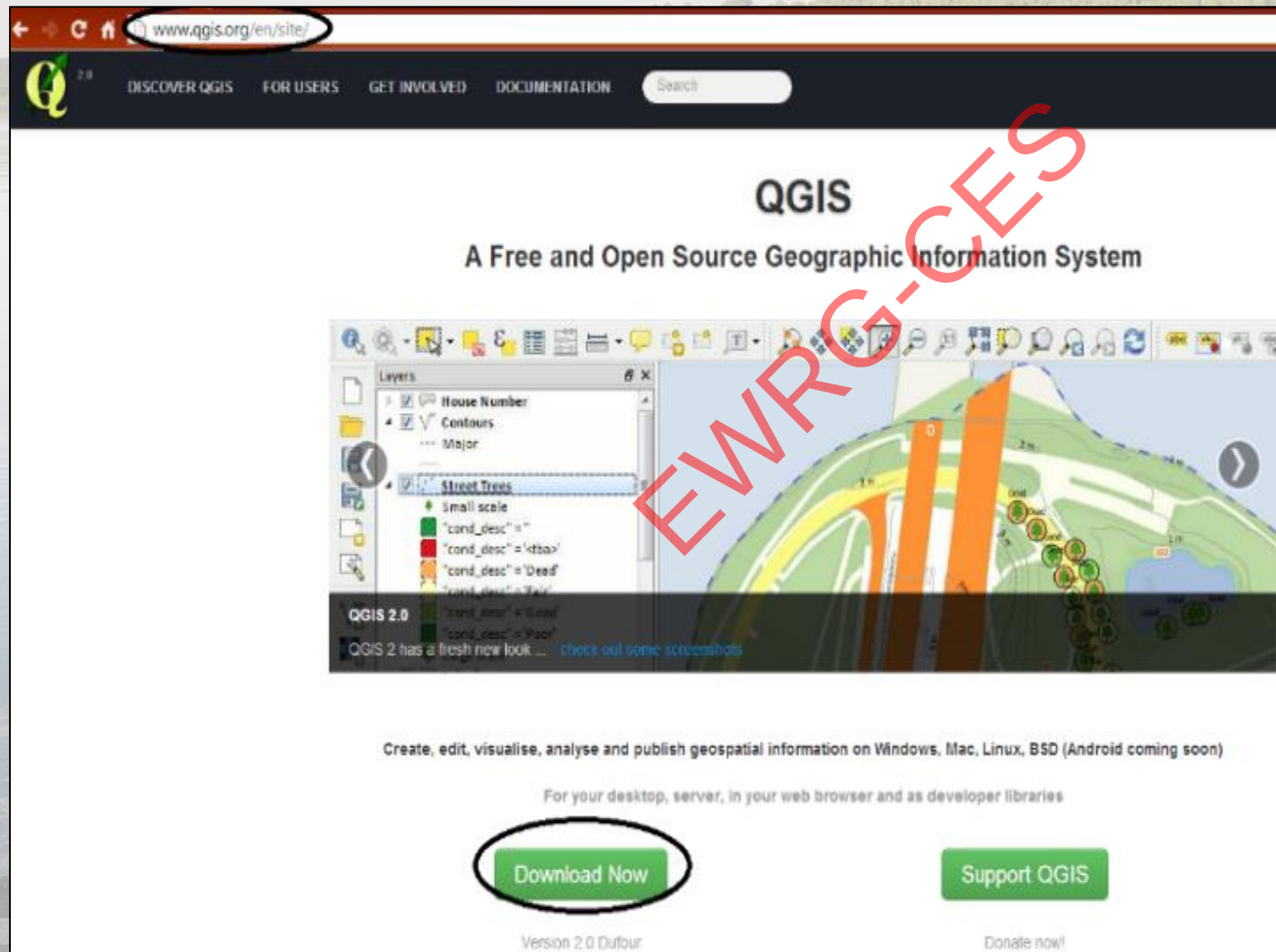
IMAGE DATA

- Features are represented as **a matrix of cells**
- Image data ranges from satellite images and aerial photographs to scanned maps

Getting Started

Installation:

Get the latest information of binary packages at the QGIS website at <http://www.qgis.org/en/site/>



The screenshot shows the QGIS website homepage. The browser address bar displays www.qgis.org/en/site/. The website header includes the QGIS logo, navigation links (DISCOVER QGIS, FOR USERS, GET INVOLVED, DOCUMENTATION), and a search bar. The main content area features the QGIS logo and the text "A Free and Open Source Geographic Information System". Below this is a large image of the QGIS 2.0 desktop interface, showing a map with various layers (House Number, Contours, Major, Street Trees) and a toolbar. A red "EWING-ES" watermark is overlaid on the image. At the bottom of the page, there is a green "Download Now" button, which is circled in black, and a green "Support QGIS" button. The footer includes the text "Version 2.0 Dufour" and "Donate now!".



1

Menu Bar

2

Tool Bar

3

Map Legend

4

Map View/ Canvas area

EWRG-CES

Status Bar



Coordinate:

2.091,-1.195

5

Scale

1:1451611



Render

EPSG:4326

❑ The **menu bar** provides access to numerous QGIS features.

Project Edit View Layer Settings Plugins Vector Raster Database Help

❑ The **toolbars** offers additional tools for interacting with the map. Hold the mouse over the particular icon, a short description of the tool's purpose will be displayed.

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

❑ The **map legend area** sets the visibility

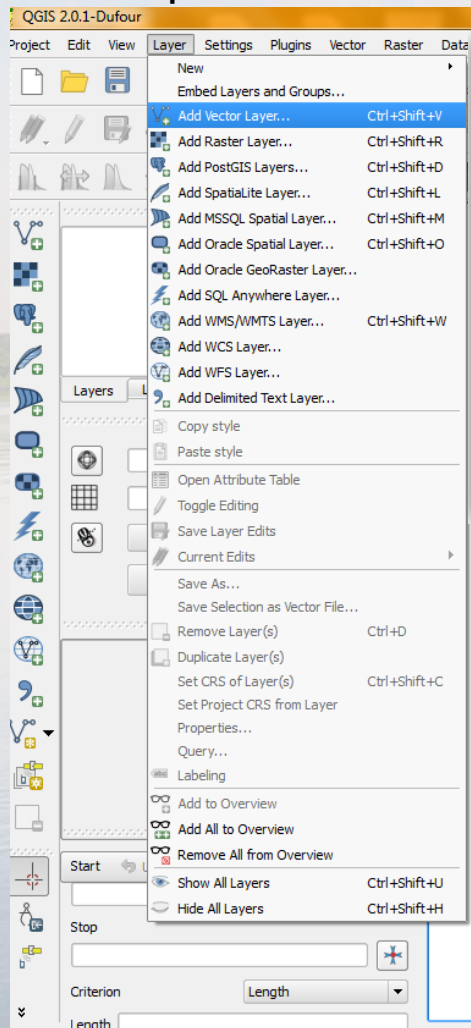
❑ QGIS - maps are displayed in map **canvas area**

❑ The map overview panel provides a full extent view of layers added

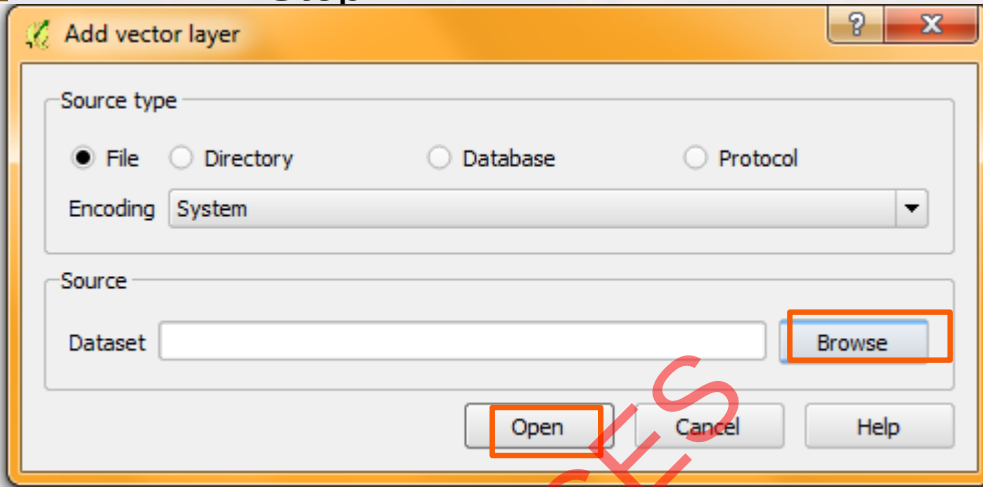
❑ The **status bar** shows the current position in map coordinates

Working with vector data

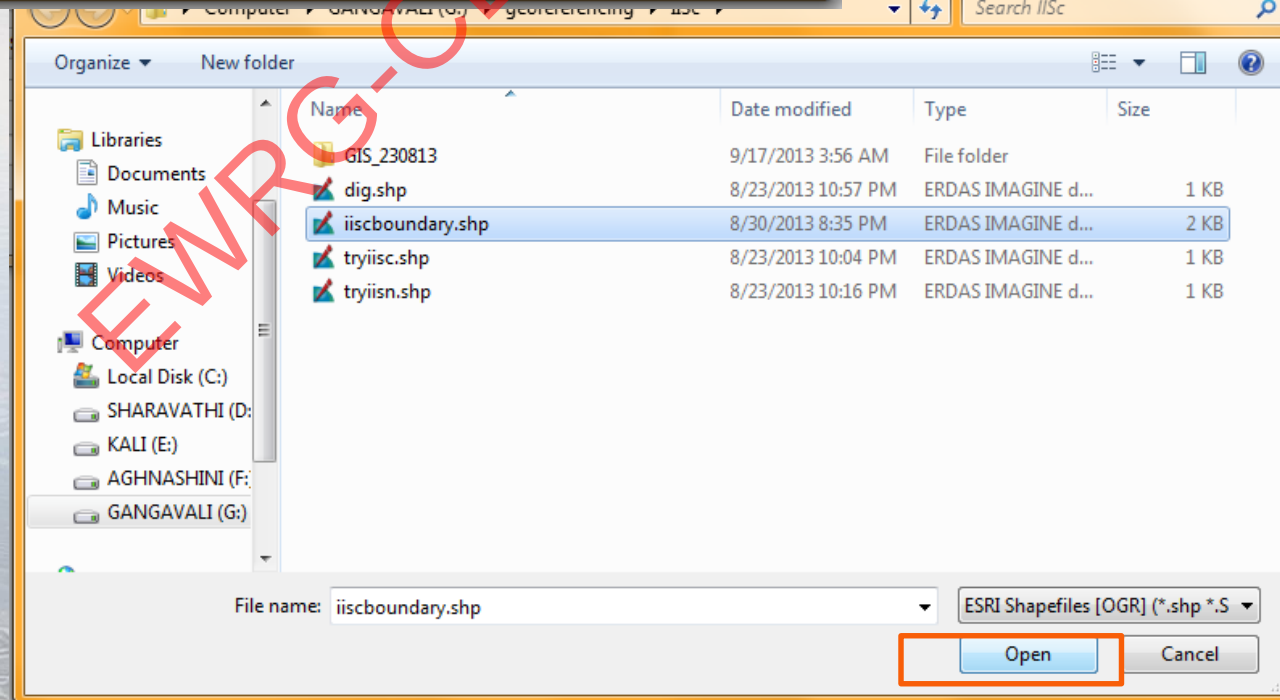
Step 1

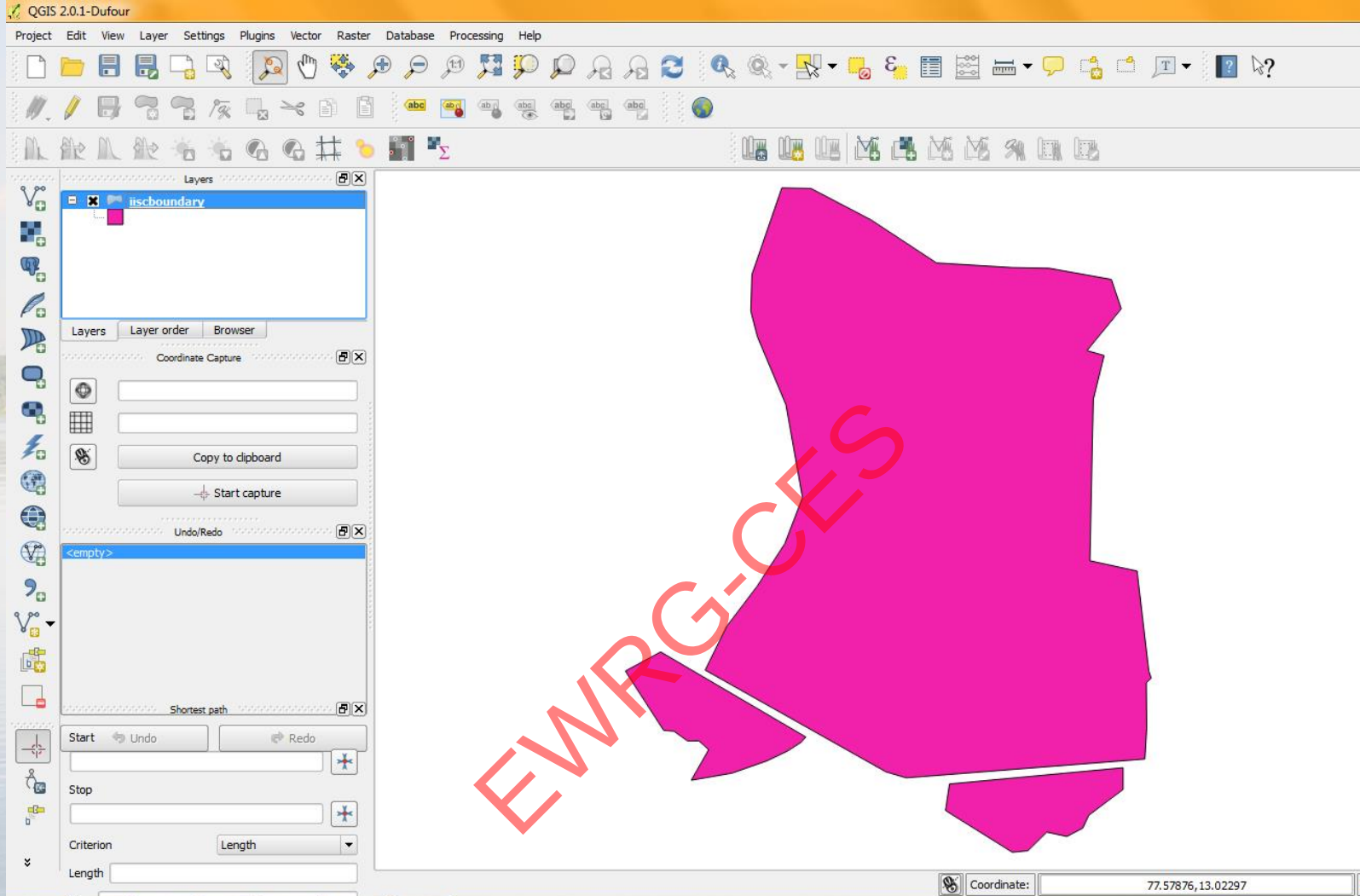


Step 2



Step 3





Improving the performance

Select **properties** by right click on the layer name; the properties dialogue box will be opened with multiple options i.e. **General, Styles, Lables, Attributes, Metadata, Actions, Diagram overlay.**

Improving performance

QGIS 2.0.1-Dufour

Project Edit View Layer Settings Plugins Vector Raster Database Processing Help

Layers

- Zoom to Layer Extent
- Show in Overview
- Remove
- Duplicate
- Set Layer CRS
- Set Project CRS from Layer
- Open Attribute Table
- Toggle Editing
- Save As...
- Save Selection As...
- Filter...
- Show Feature Count
- Properties
- Rename
- Copy Style
- Add New Group
- Expand All
- Collapse All
- Update Drawing Order

Layer Properties - iiscboundary

General

Style

Labels

Fields

Display

Actions

Joins

Diagrams

Metadata

Attribute editor layout:

Python Init function:

Id	Name	Type	Type name	Length	Precision	Comment	Edit widget	Alias
0	Name	QString	String	80	0		Line edit	
1	descriptio	QString	String	80	0		Line edit	
2	timestamp	QString	String	80	0		Line edit	
3	begin	QString	String	80	0		Line edit	
4	end	QString	String	80	0		Line edit	
5	altitudeMo	QString	String	80	0		Line edit	
6	tessellate	int	Integer	10	0		Line edit	
7	extrude	int	Integer	10	0		Line edit	
8	visibility	int	Integer	10	0		Line edit	

Restore Default Style

Save As Default

Load Style ...

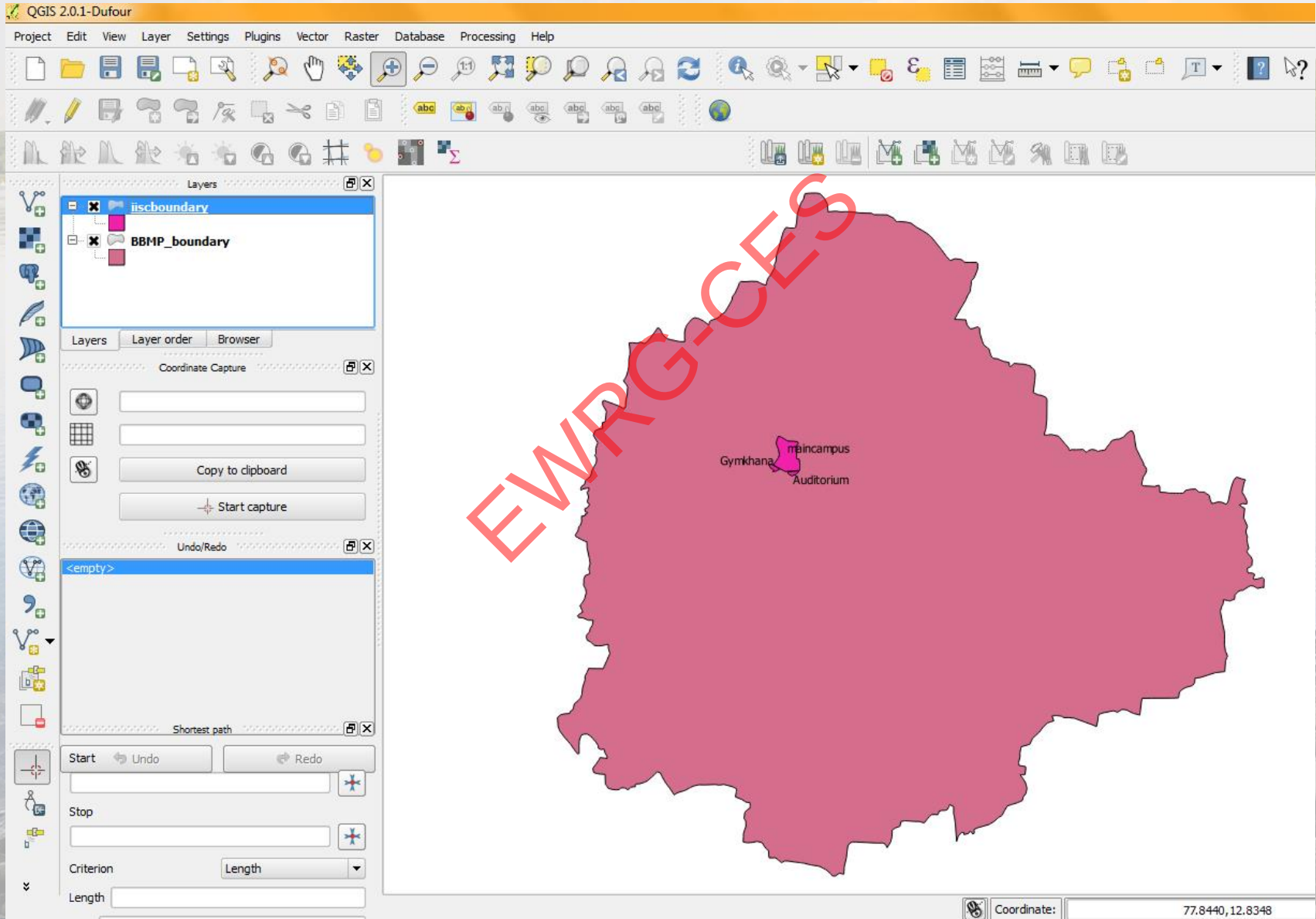
Save Style

OK Cancel Apply Help

Coordinate: 77.55314, 13.01678

OVERLAYING

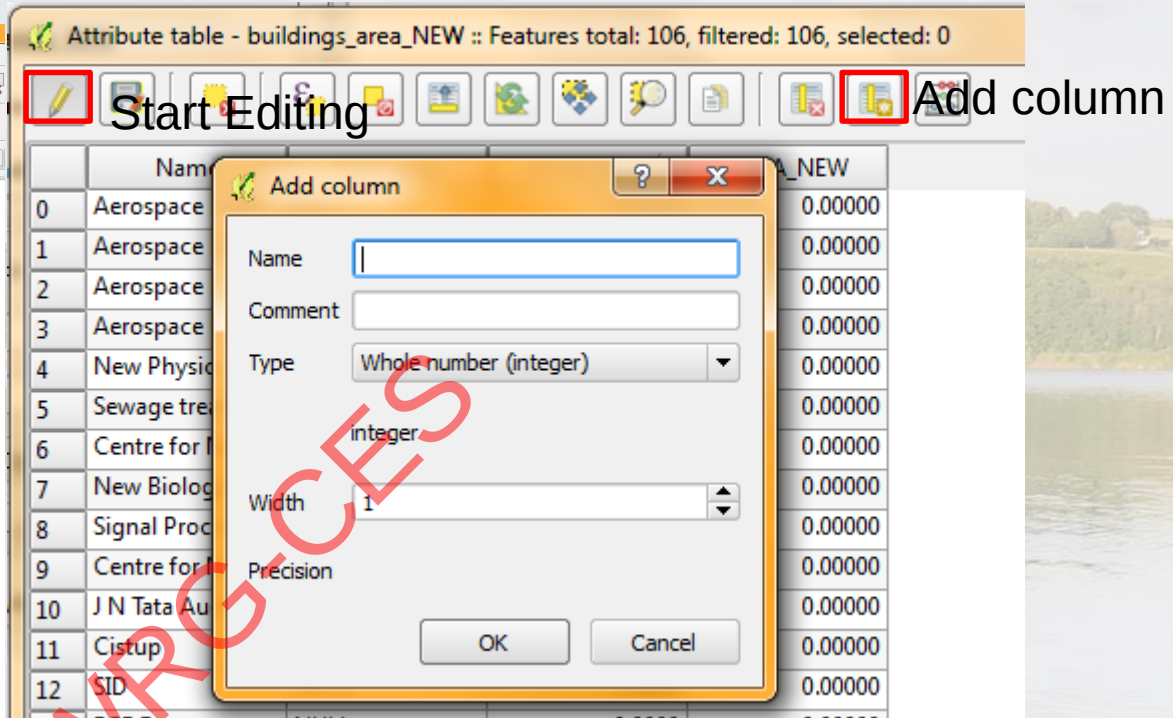
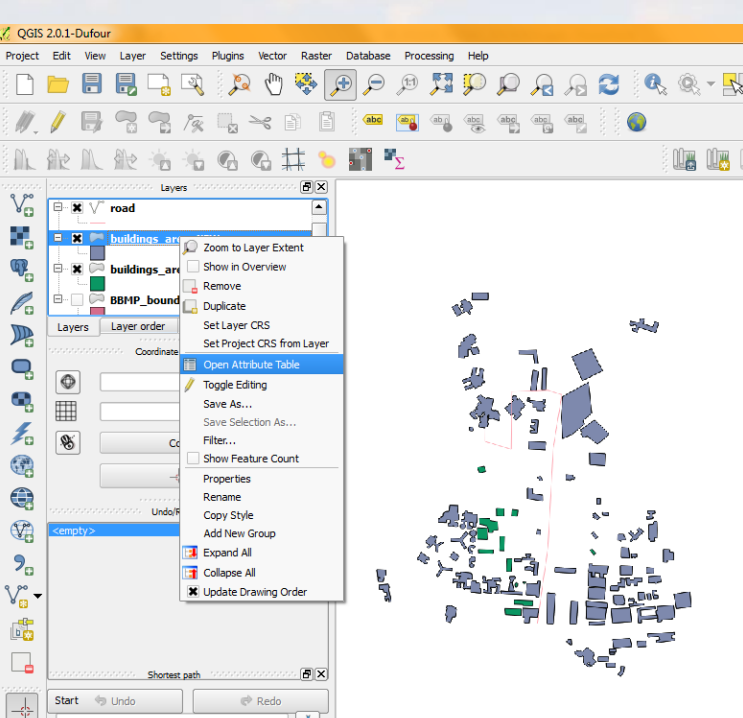
We can overlay one vector on another by adding a vector layer.



Database ingest-querying

- Data ingestion is the process of obtaining, importing, and processing data.
- Process: involves altering individual files by editing their content and fit into a larger document.

Editing Attribute Information

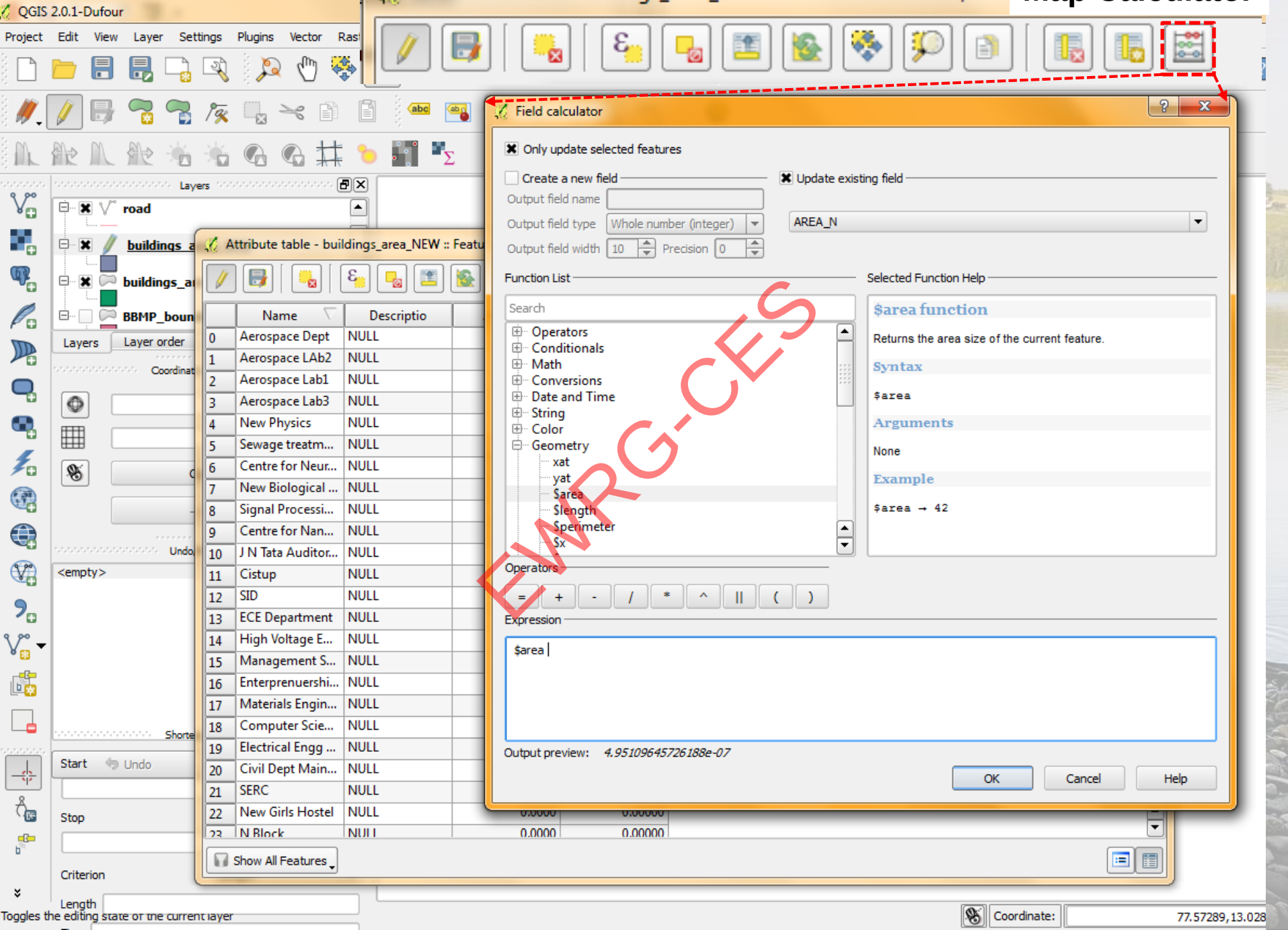


Attribute table - buildings_area_NEW :: Features total: 106, filtered: 106, selected: 0

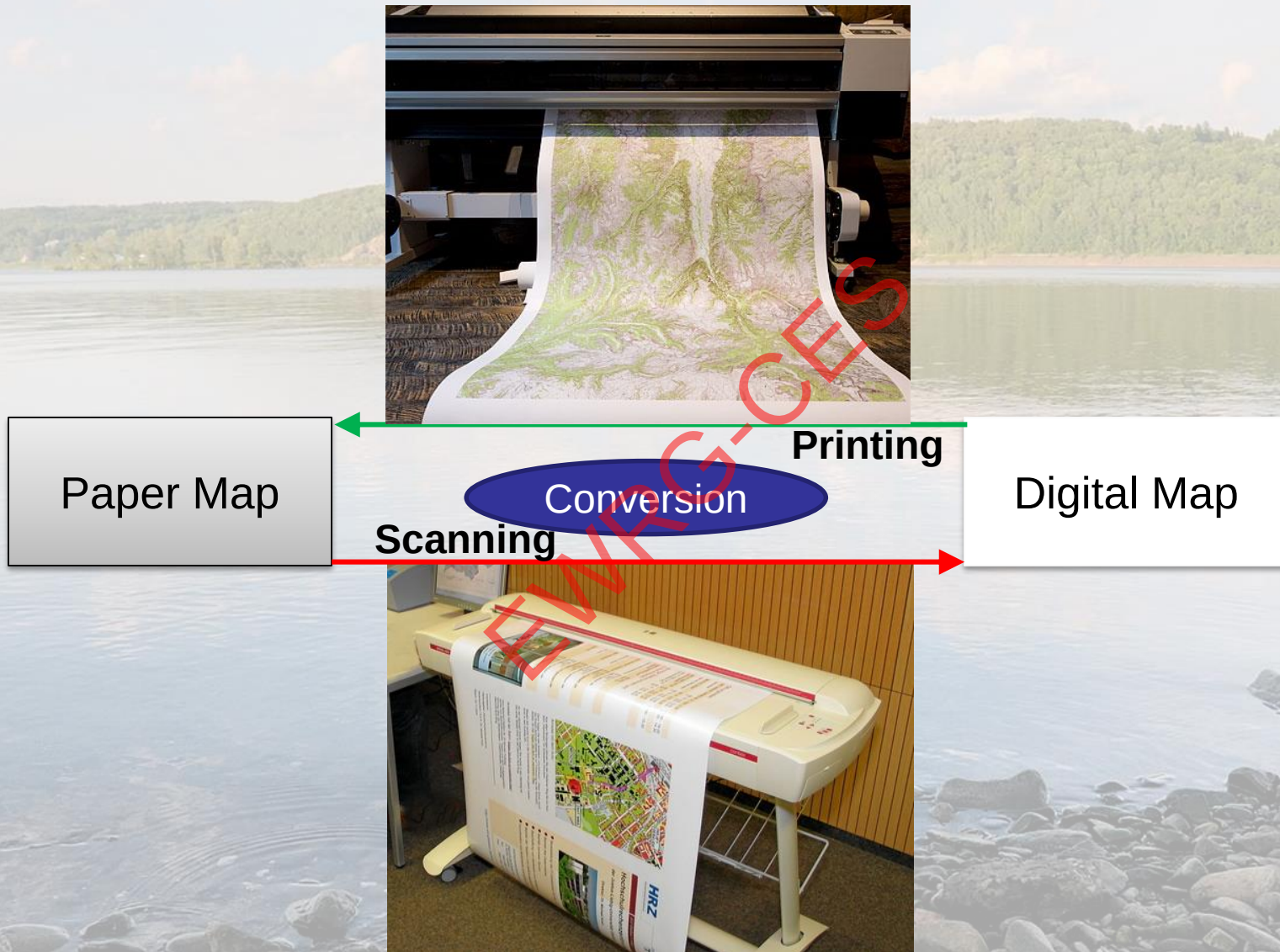
Save edits and stop toggle edit

Add Attribute Information

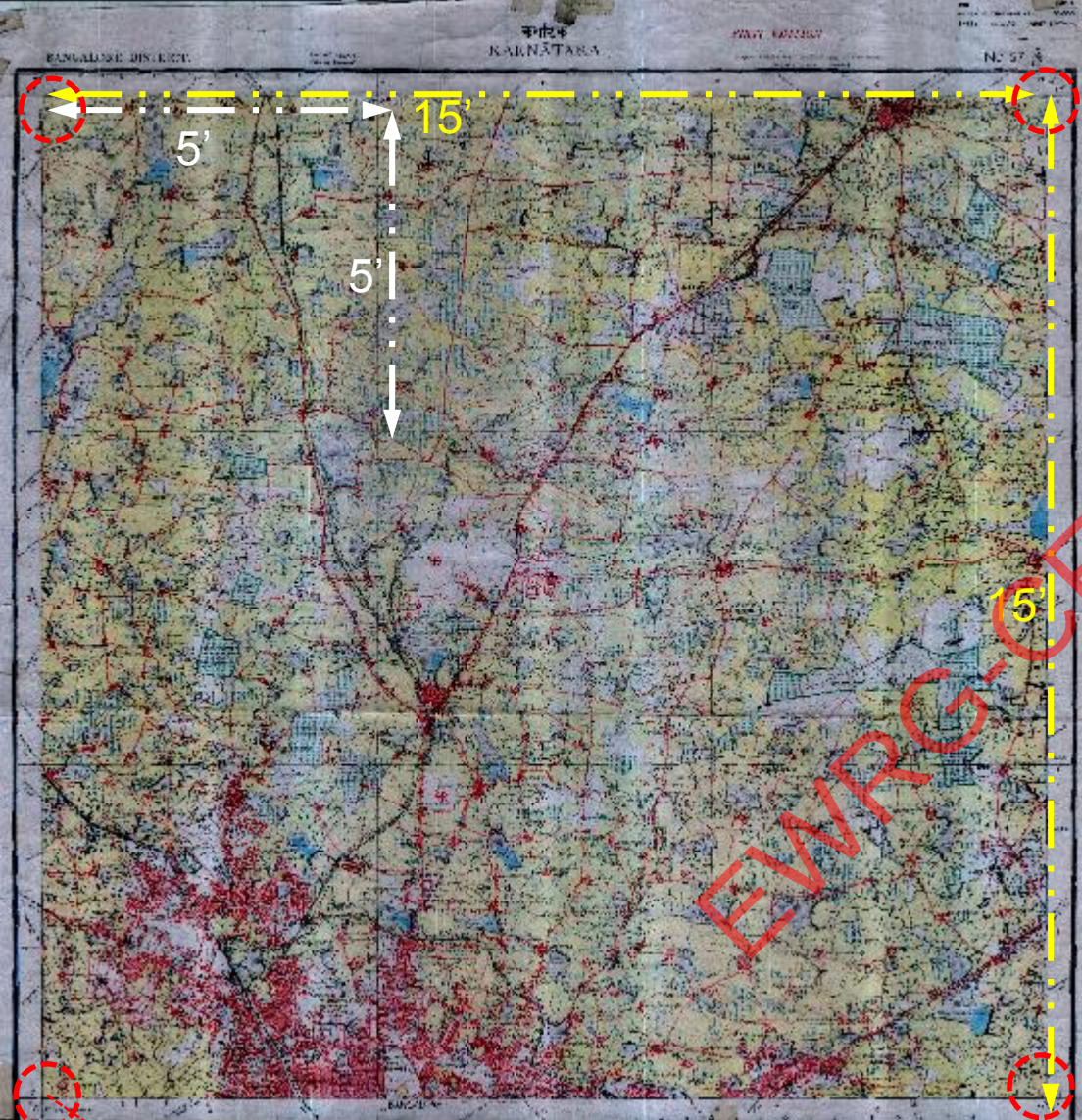
	Name	Description	AREA_N	AREA_NEW	name
0	Aerospace Dept	NULL	0.0000	0.00000	NULL
1	Aerospace Lab2	NULL	0.0000	0.00000	NULL
2	Aerospace Lab1	NULL	0.0000	0.00000	NULL
3	Aerospace Lab3	NULL	0.0000	0.00000	NULL
4	New Physics	NULL	0.0000	0.00000	NULL
5	Sewage treatm...	NULL	0.0000	0.00000	NULL



Paper Map to Digital Map



Reading Coordinates in toposheet



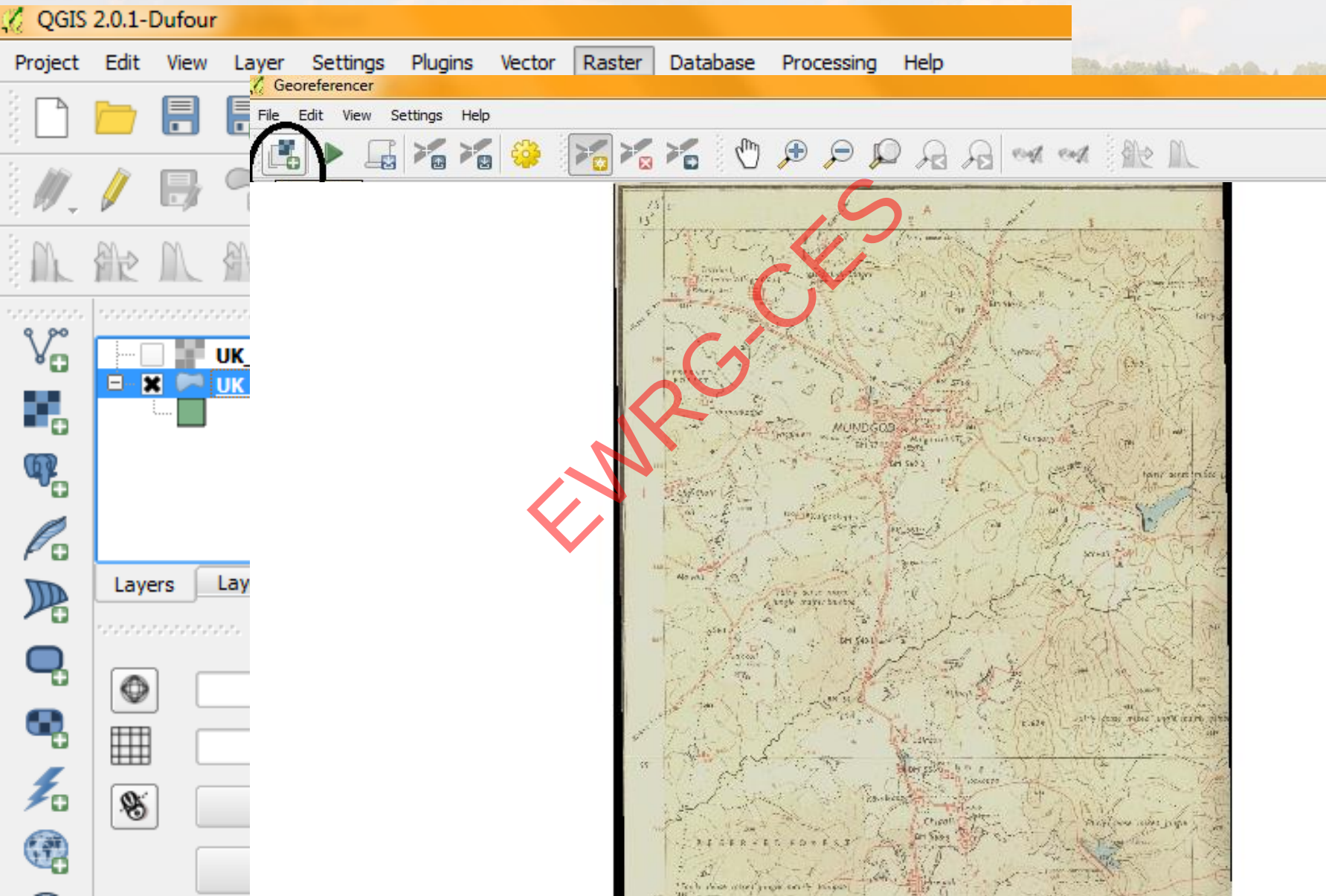
- 1: 50000

- Scanned toposheets have no geographical reference i.e., they are in the rectangular coordinate system



Geo referencing:

Geo referencing usually refers to the method by which locations in the raster and vector GIS files are related to real earth-surface positions.



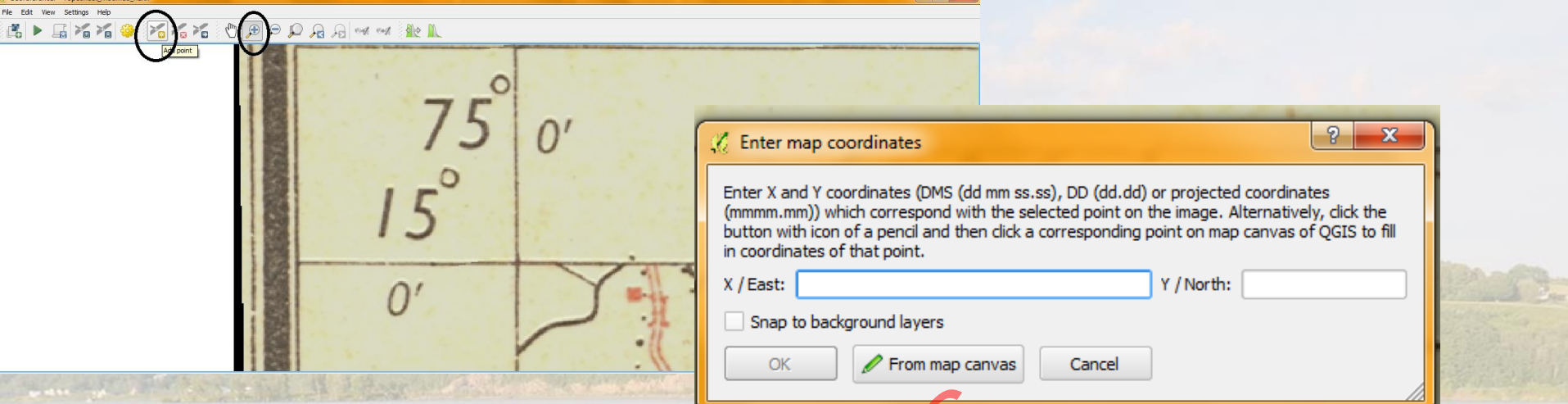
To start geo referencing an unreferenced raster, we must load it using the button. The raster will show up in the main working area of the dialog. Once the raster is loaded, we can start to enter reference points.

Using the Add Point button, add points to the main working area and enter their coordinates

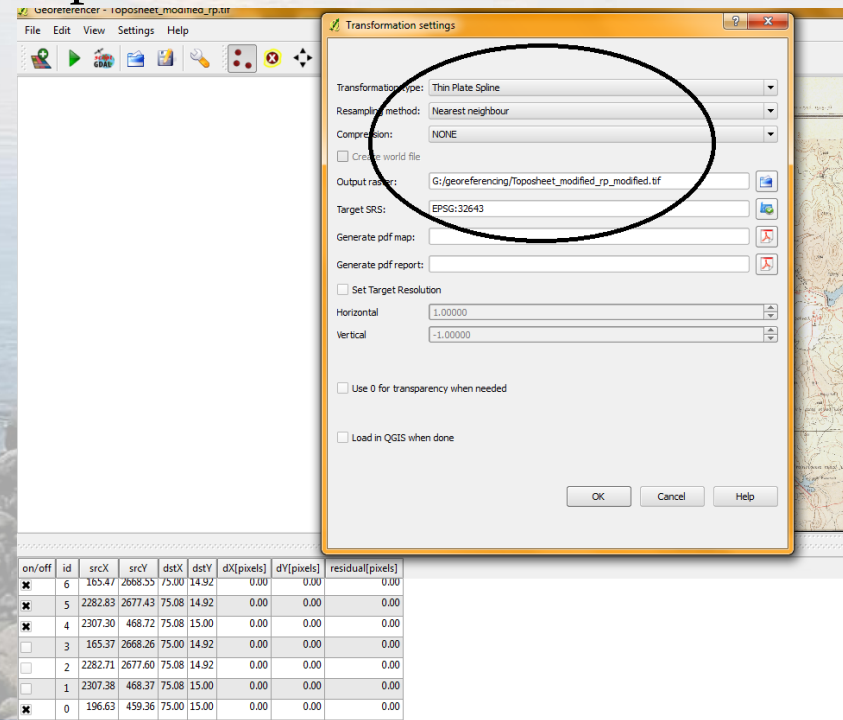
For this procedure you have two options:

- a) Click on a point in the raster image and enter the X and Y coordinates manually
- b) Click on a point in the raster image and choose the button from map canvas to add the X and Y coordinates with the help of a georeferenced map already loaded in the QGIS map canvas.
- c) With the button, you can move the GCPs in both windows, if they are at the wrong place.

Continue entering points. You should have at least 4 points, and the more coordinates you can provide, the better the result will be. There are additional tools on the plugin dialog to zoom and pan the working area in order to locate a relevant set of GCP points.



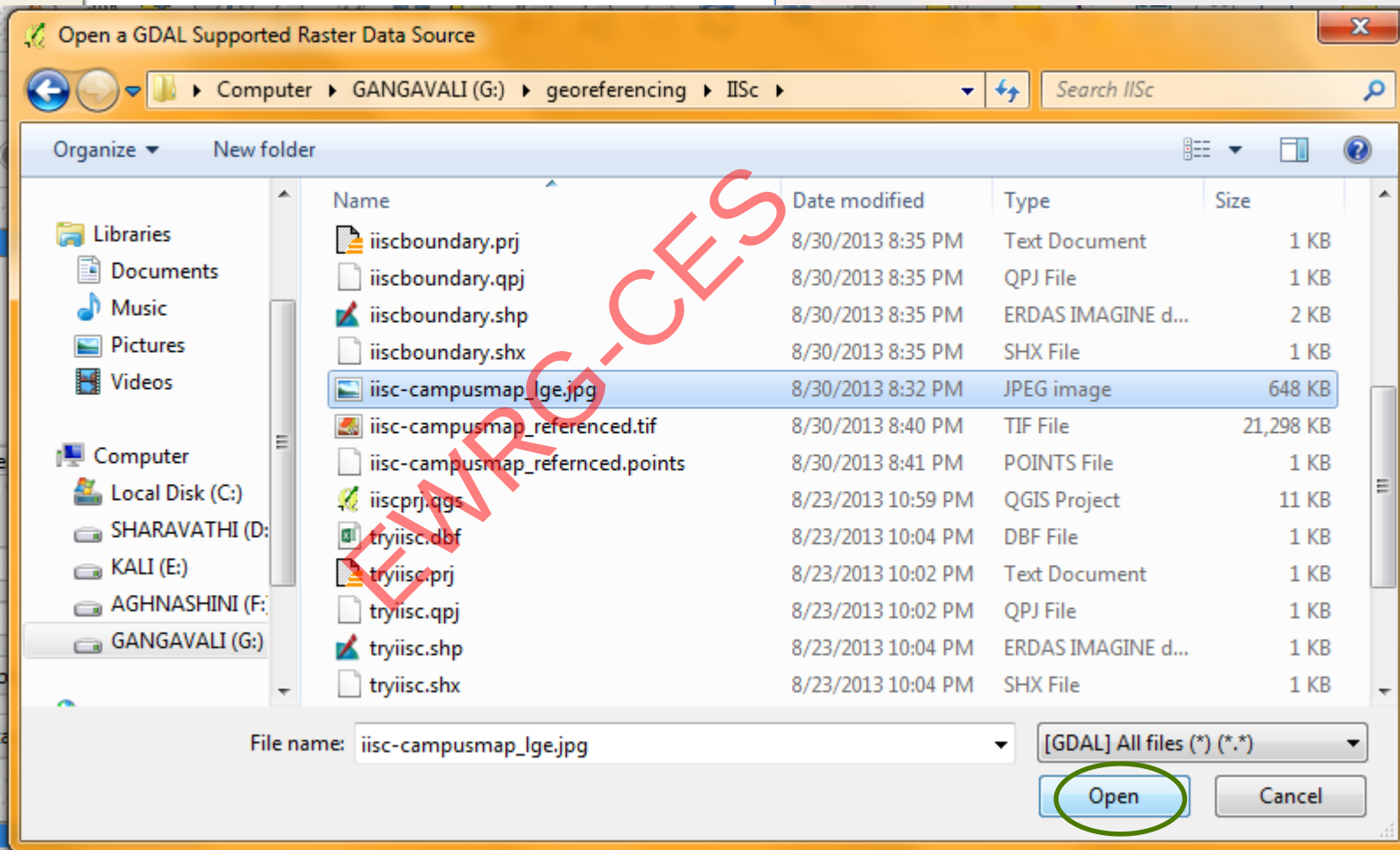
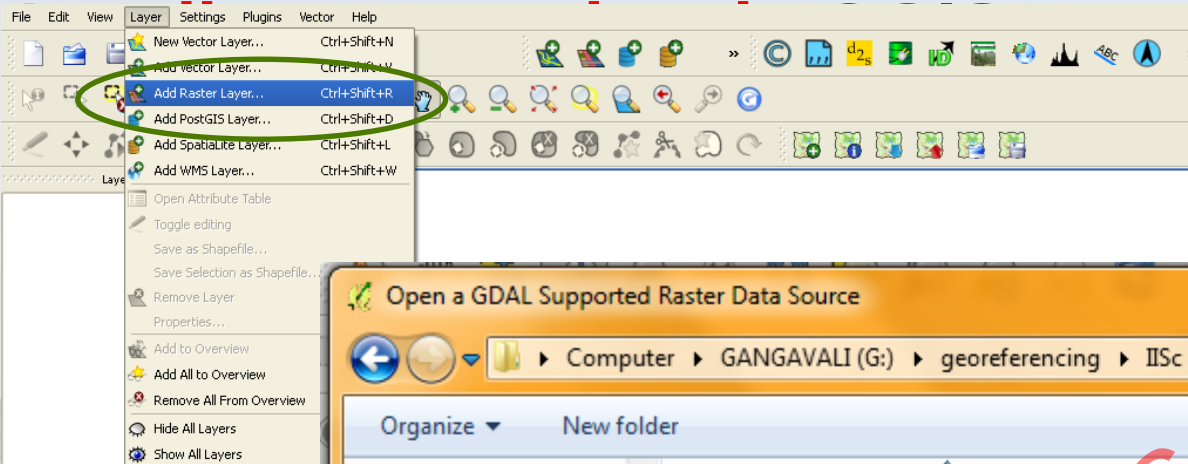
- After entering GCP's click on **Settings** option in Georeferencing menu bar select Transformation Settings option.
- A drop box will be displayed and select options as shown in the below image.
- Specify output file name and transformation parameters and projection system then click OK.

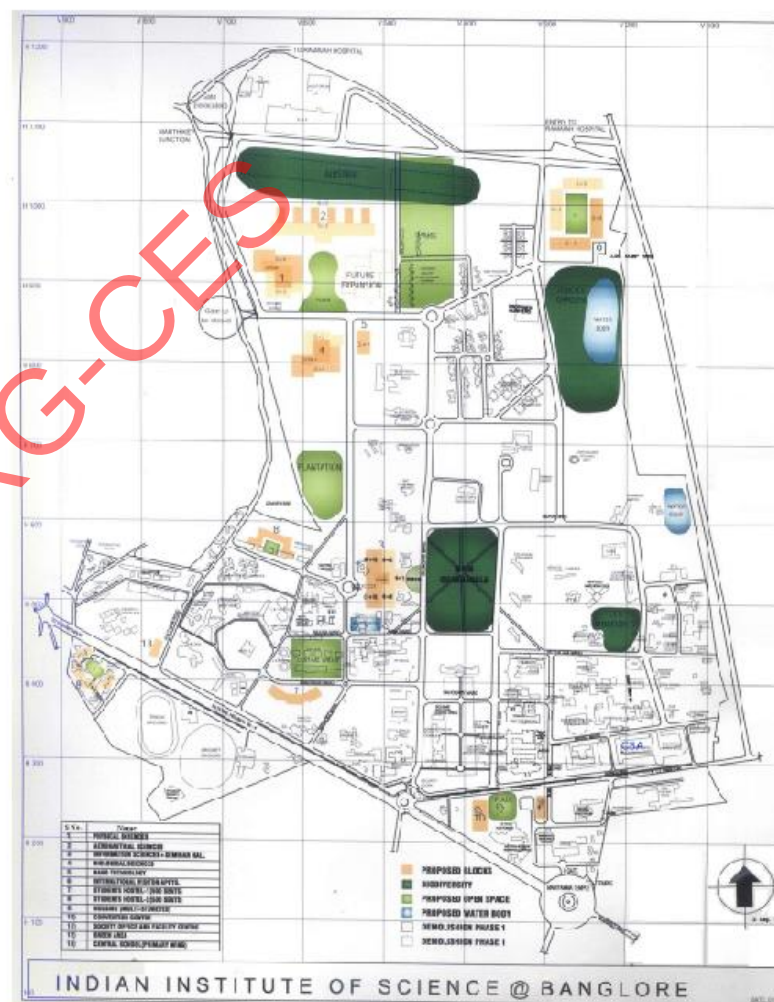


Working with raster data:

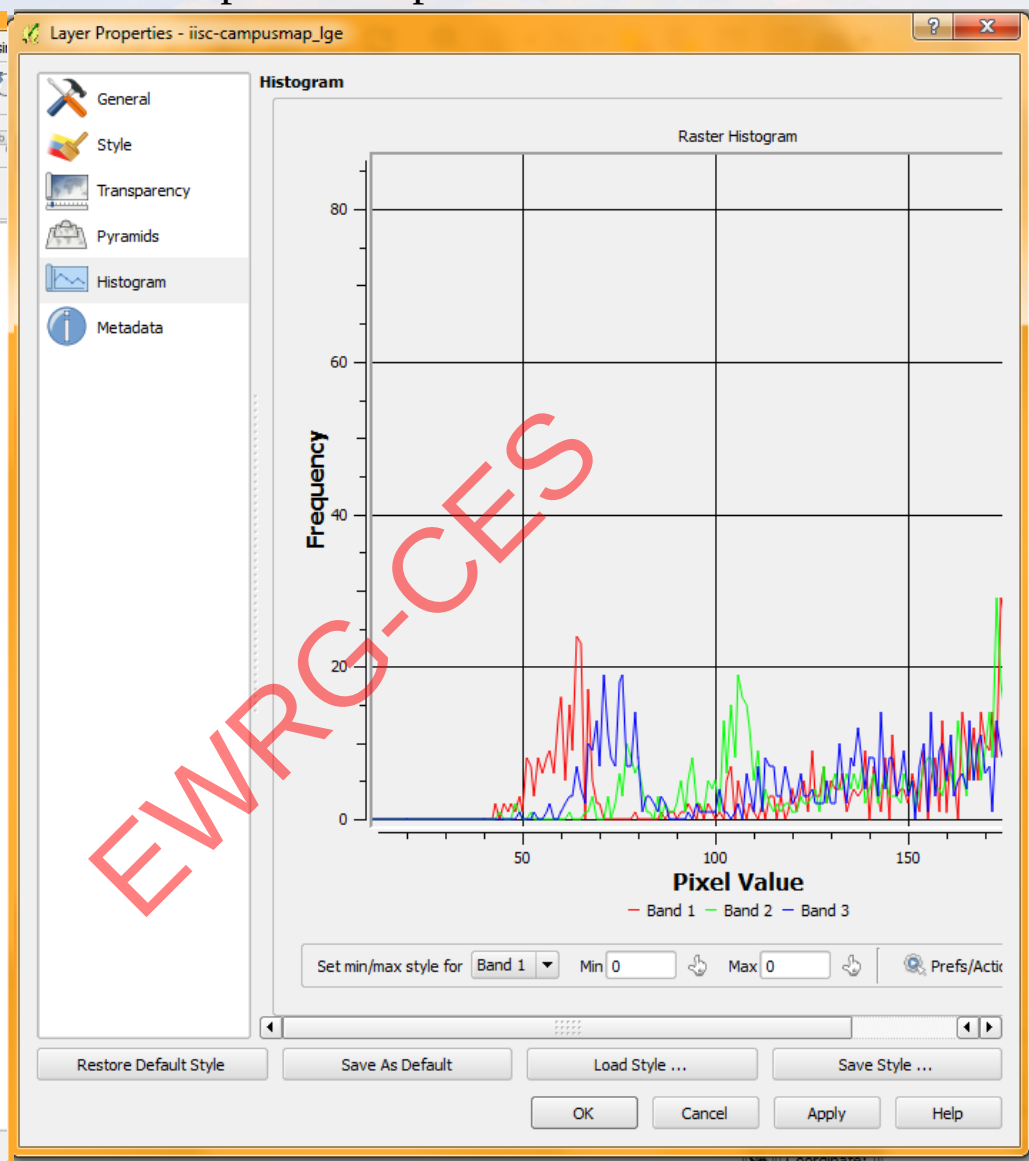
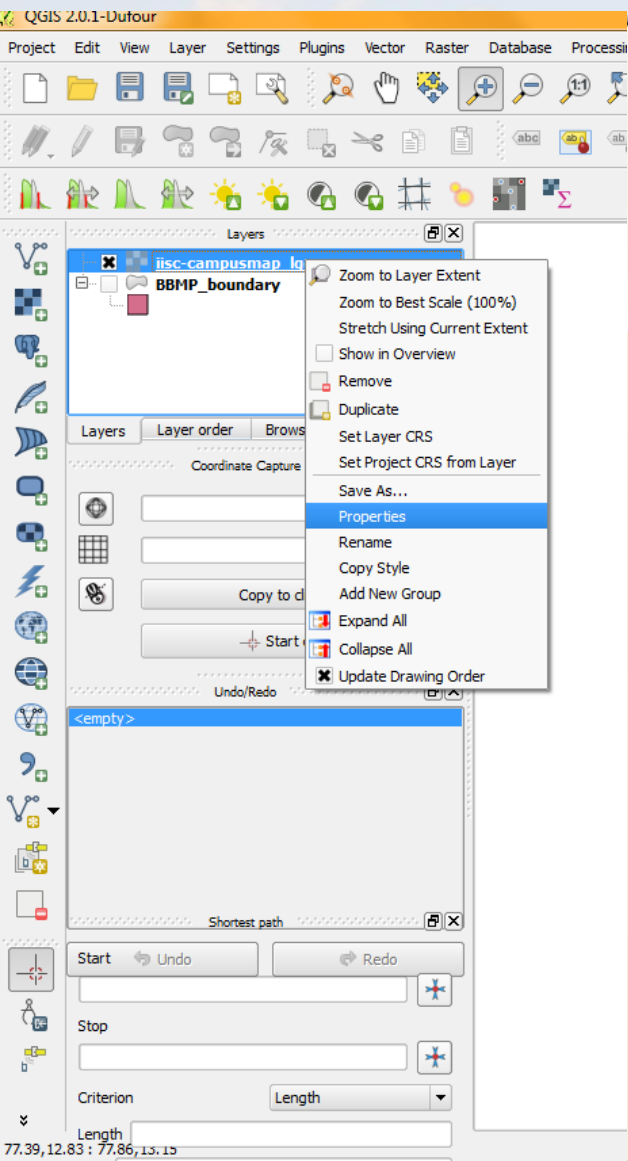
QGIS supports a number of different raster formats and uses **GDAL** libraries

- Arc/Info Binary Grid
- Arc/Info ASCII Grid
- GRASS Raster
- Geo TIFF
- JPEG
- Spatial Data Transfer Standard Grids (with some limitations)
- USGS ASCII DEM
- ERDAS Imagine(.img)



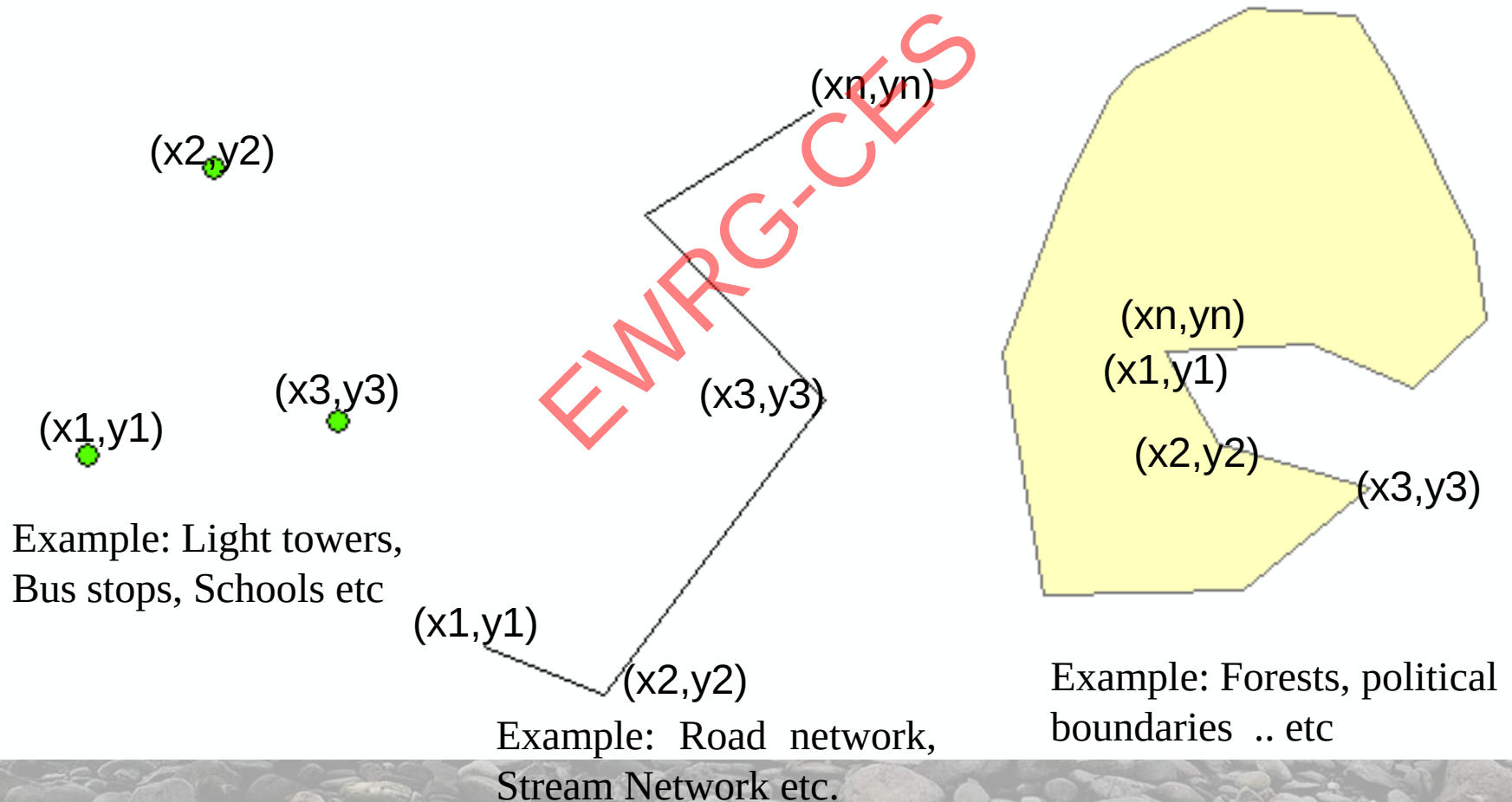


Improve the performance



Digitising

- Process of representing features as points, lines and polygons.



New

- New Shapefile Layer... Ctrl+Shift+N
- New Spatialite Layer ... Ctrl+Shift+A

Raster calculator ...

Add Vector Layer... Ctrl+Shift+V

Add Raster Layer... Ctrl+Shift+R

Add PostGIS Layer... Ctrl+Shift+D

Add Spatialite Layer... Ctrl+Shift+L

Add WMS Layer... Ctrl+Shift+W

Open Attribute Table

Save edits

Toggle editing

Save as...

Save Selection as vector file...

Remove Layer(s) Ctrl+D

Properties...

Query...

Add to Overview Ctrl+Shift+O

Add All to Overview

Remove All From Overview

Hide All Layers Ctrl+Shift+H

Show All Layers Ctrl+Shift+U

Labeling

Create a New Shapefile layer

New Vector Layer

Type

☐ Point☐ Line☒ Polygon

CRS ID +proj=longlat +ellps=WGS84 +datum=WGS84 +no_defs

Specify CRS

New attribute

Name

Type Whole

Width 10

Attributes list

Name

NAME

AREA

ID

Save As

Look in: C:\Users\BHARATH_SHARAVATHI\Desktop

Name	Size	Type	Date Modified
My Comput			
BHARATH_			
OUT_ARC		Fil...der	1/28/2...:47 PM
PCAOUT		Fil...der	2/8/20...:29 AM
018BHARATH_SE...METRICS.docx	24 KB	doc...ile	1/13/2...:30 PM
1973pca_f.dat	1 KB	dat File	2/3/20...:53 PM
1973pca_f.xls	4 KB	xls File	1/13/2...:29 PM
1973pca_N.xls	27 KB	xls File	1/23/2...:08 PM
2013pca_f.xls	29 KB	xls File	1/11/2...:04 AM
Academic Regulations forPhD.pdf	442 KB	pdf File	1/10/2...:36 AM
ArcMap.exe	1 KB	Ink File	1/23/2...:33 AM
BHARATH_SETTU...IIIT_HYD.docx	41 KB	doc...ile	1/10/2...:59 PM
BHARATH_SETT...JOURNAL.docx	1.4 MB	doc...ile	2/3/20...:15 PM
BHARATH_SETT...AL_SPSS.docx	1.5 MB	doc...ile	2/7/20...:15 PM
BIOPHYSICAL.docx	20 KB	doc...ile	2/5/20...:26 PM
BISGOD_N.geprint	5 KB	gep...ile	1/26/2...:11 PM
CPCA_13.xls	39 KB	xls File	2/3/20...:37 PM

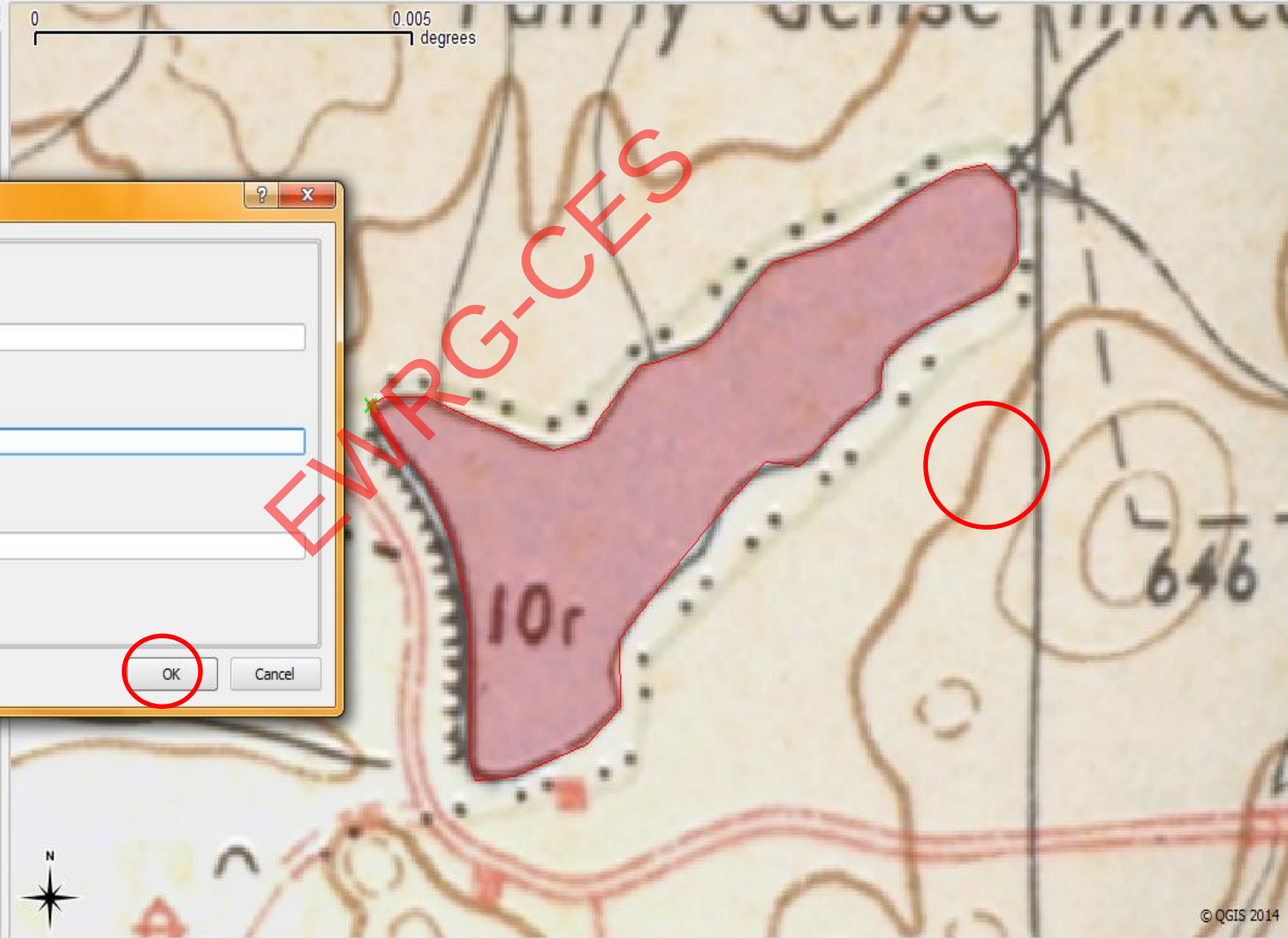
File name: NEW_WATERBODY

Save

Files of type: All Files (*.*)

Cancel

Encoding: UTF-8



Attributes - WATER_DIG

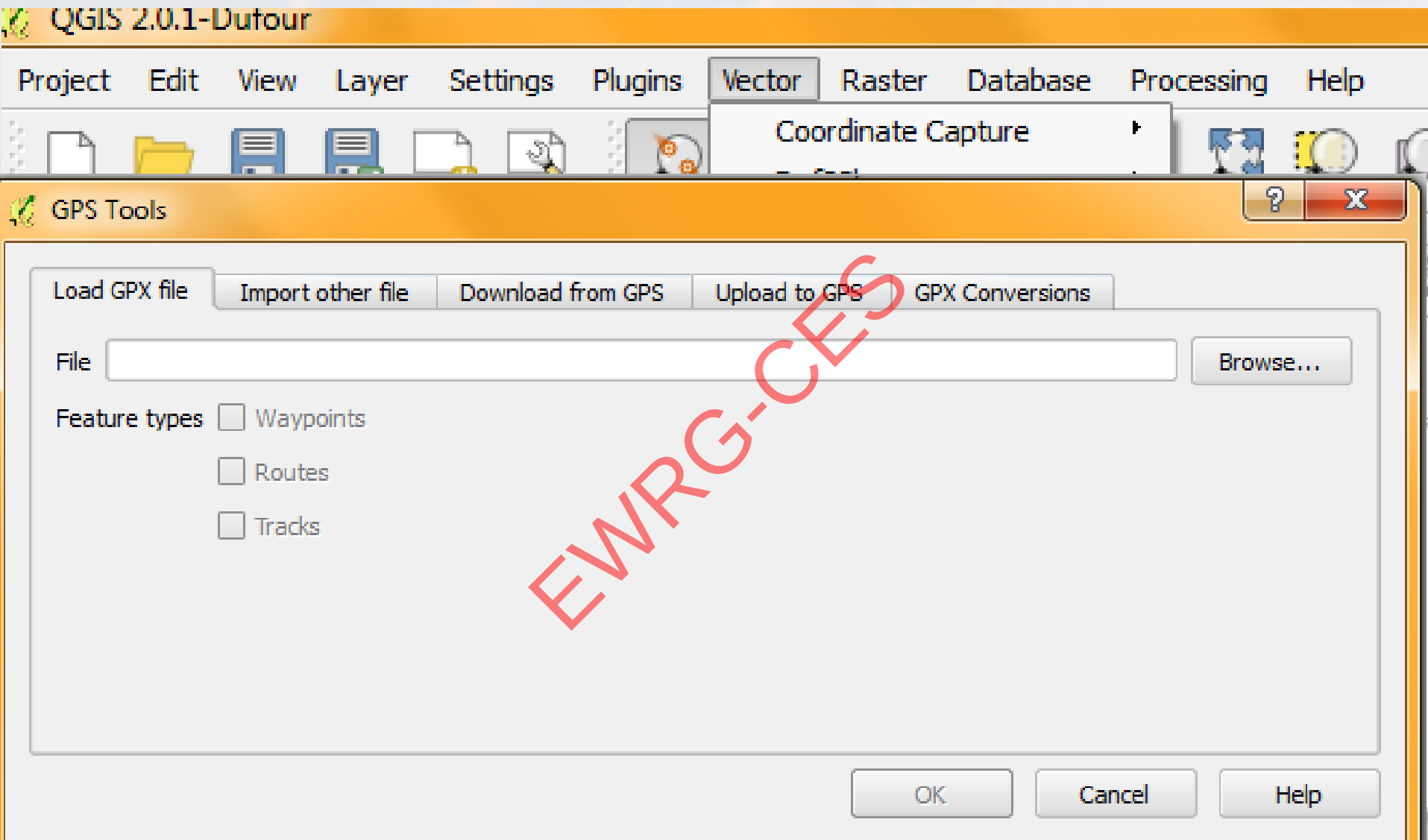
ID (int) 1

NAME (txt) NULL

AREA (int)

OK Cancel

Importing GPS data



QGIS Plugins

Plugin Manager provides a resource to load or unload plugins.

- **Core Plugins** 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 can be added to QGIS using the Plugin Installer.

Interpolation

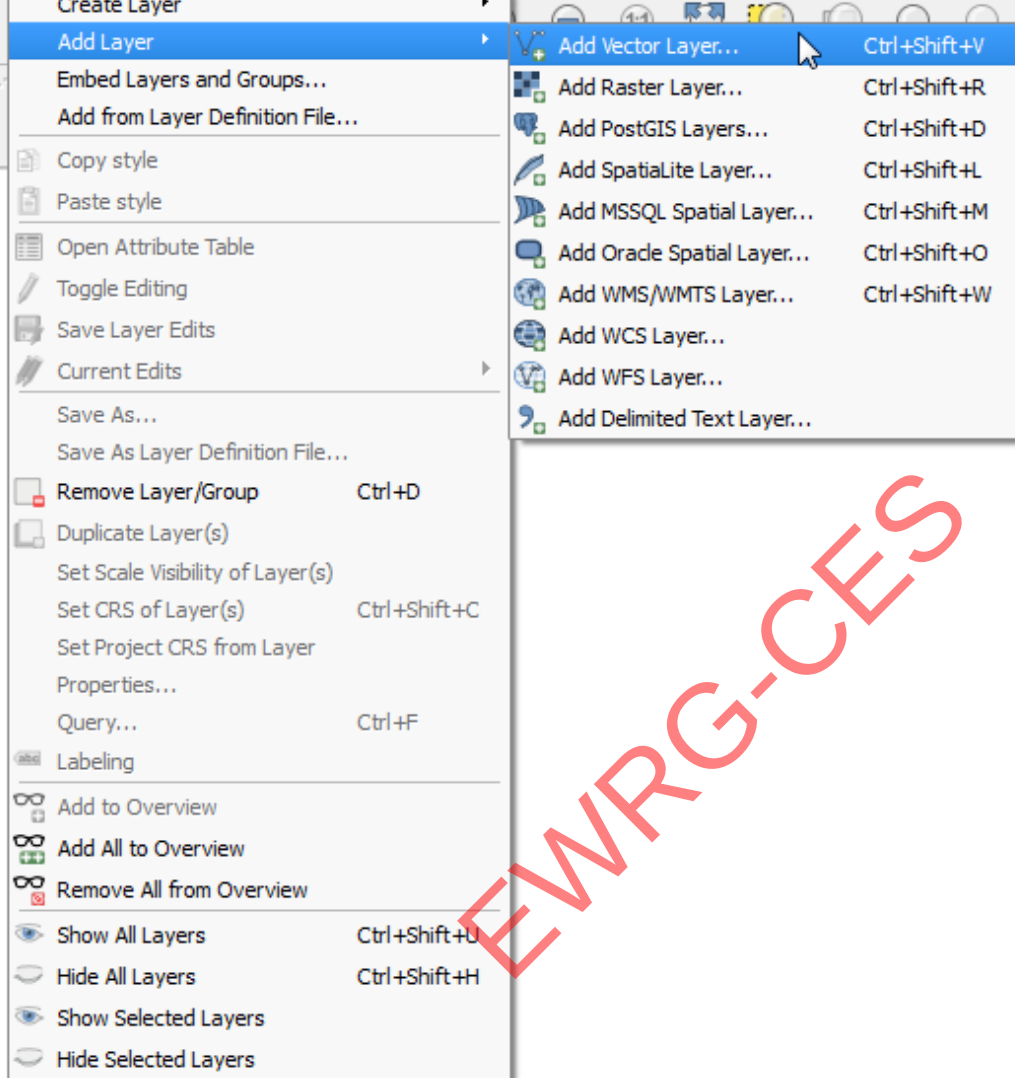
Interpolation is used to create continuous surface from discrete points.

A lot of real world phenomena are continuous - elevations, soils, temperatures etc.

If we wanted to model these, it is impossible to take measurements throughout the surface.

Hence, the field measurements are taken at various points along the surface and the intermediate values are inferred by a process called 'interpolation'.

In QGIS, interpolation is achieved using the built-in Interpolation plugin.



Browser

Layers



Coordinate:

-0.633,0.994

Scale

1:1,268,468



Render

EPSG:4326



Import rainfall data and display it

Open attribute table to see the details

QGIS 2.8.1-Wien

Project Edit View Layer Settings Plugins Vector Raster Database Web Processing Help

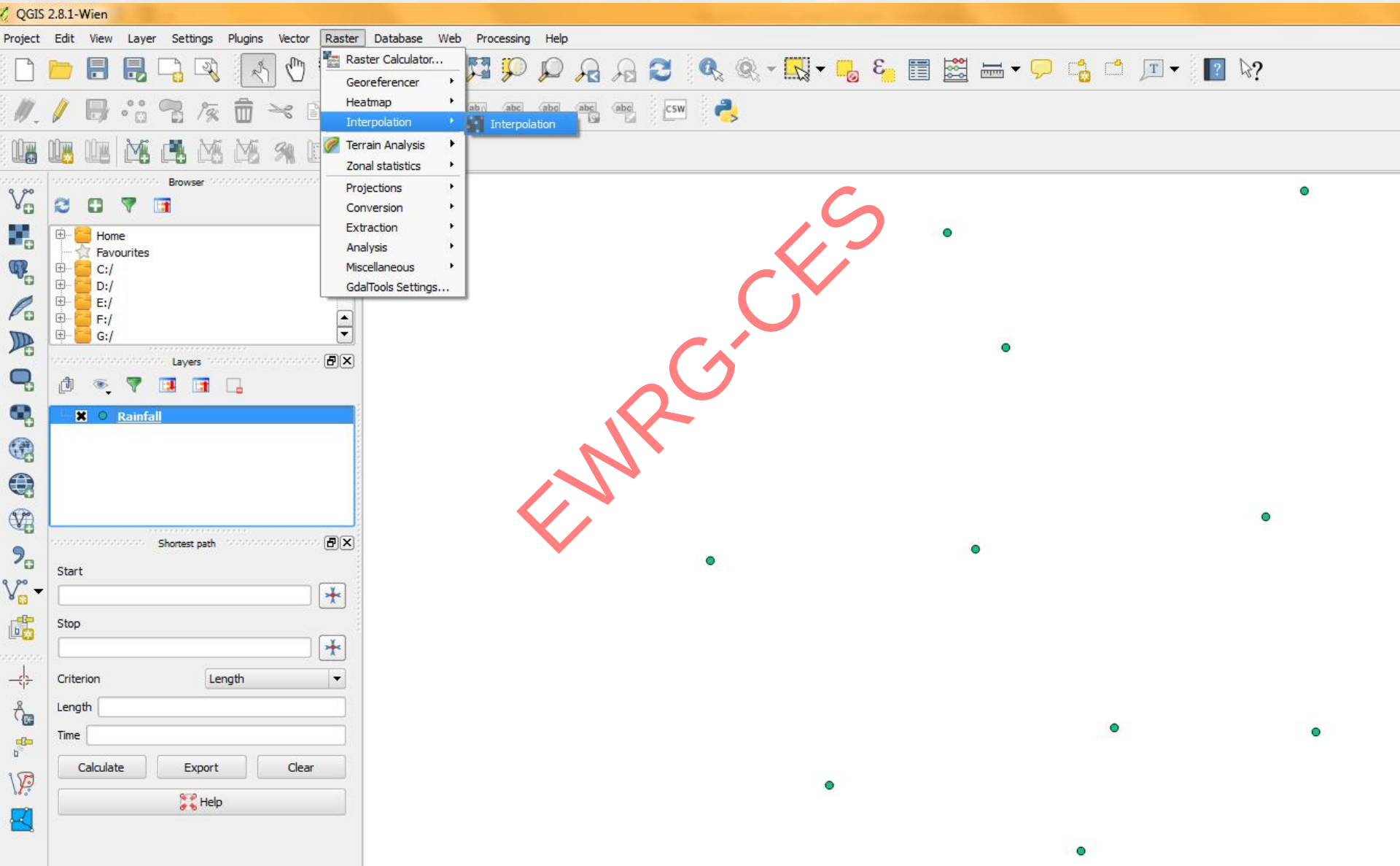
Attribute table - Rainfall :: Features total: 10, filtered: 10, sel...

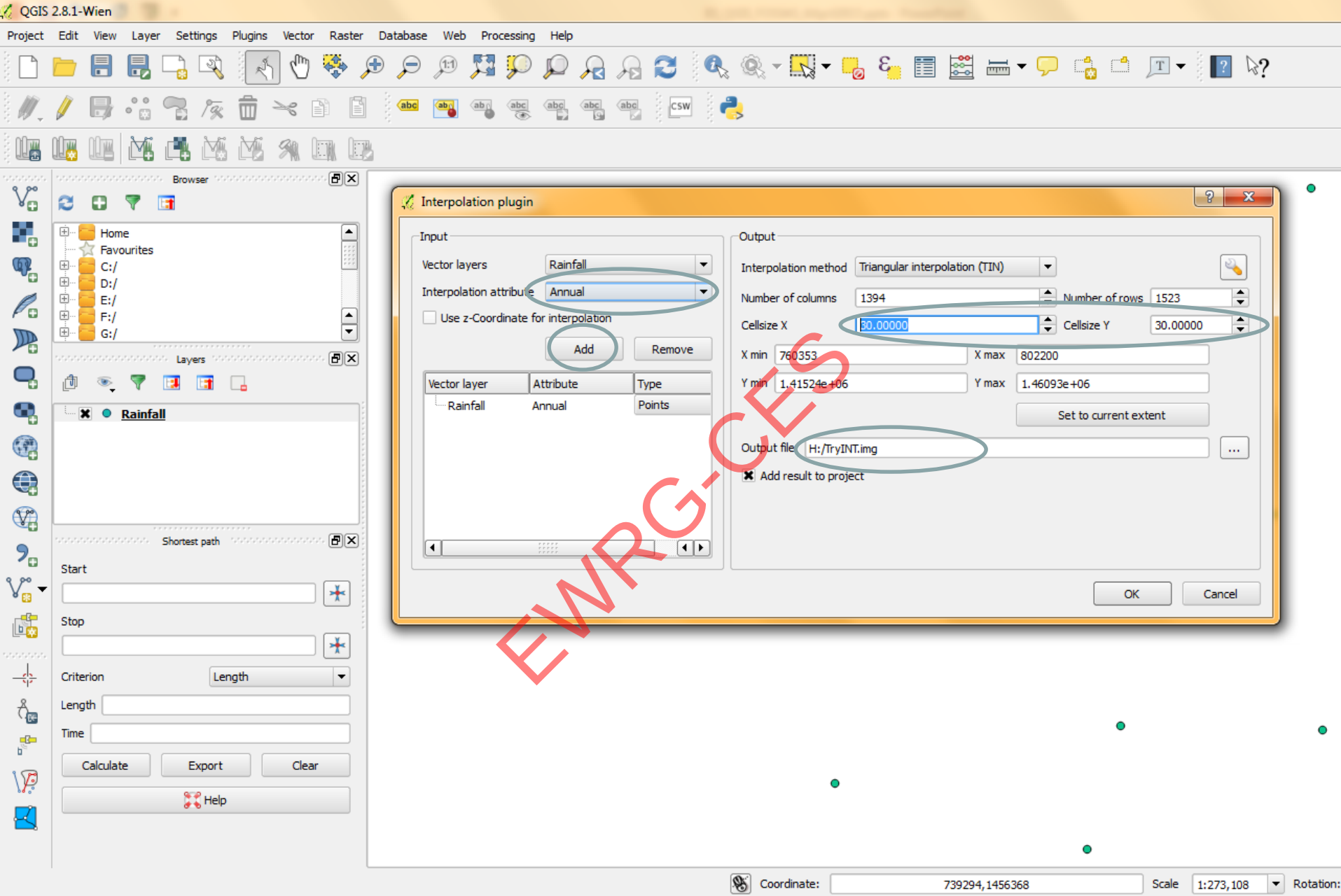
	RGN	Annual
0	30202.000000	1094.943997
1	30203.000000	967.384722
2	30301.000000	900.522573
3	30103.000000	988.682035
4	30104.000000	851.723990
5	30310.000000	853.793333
6	30209.000000	882.871599
7	30306.000000	785.613333
8	30305.000000	839.138645
9	30309.000000	758.800000

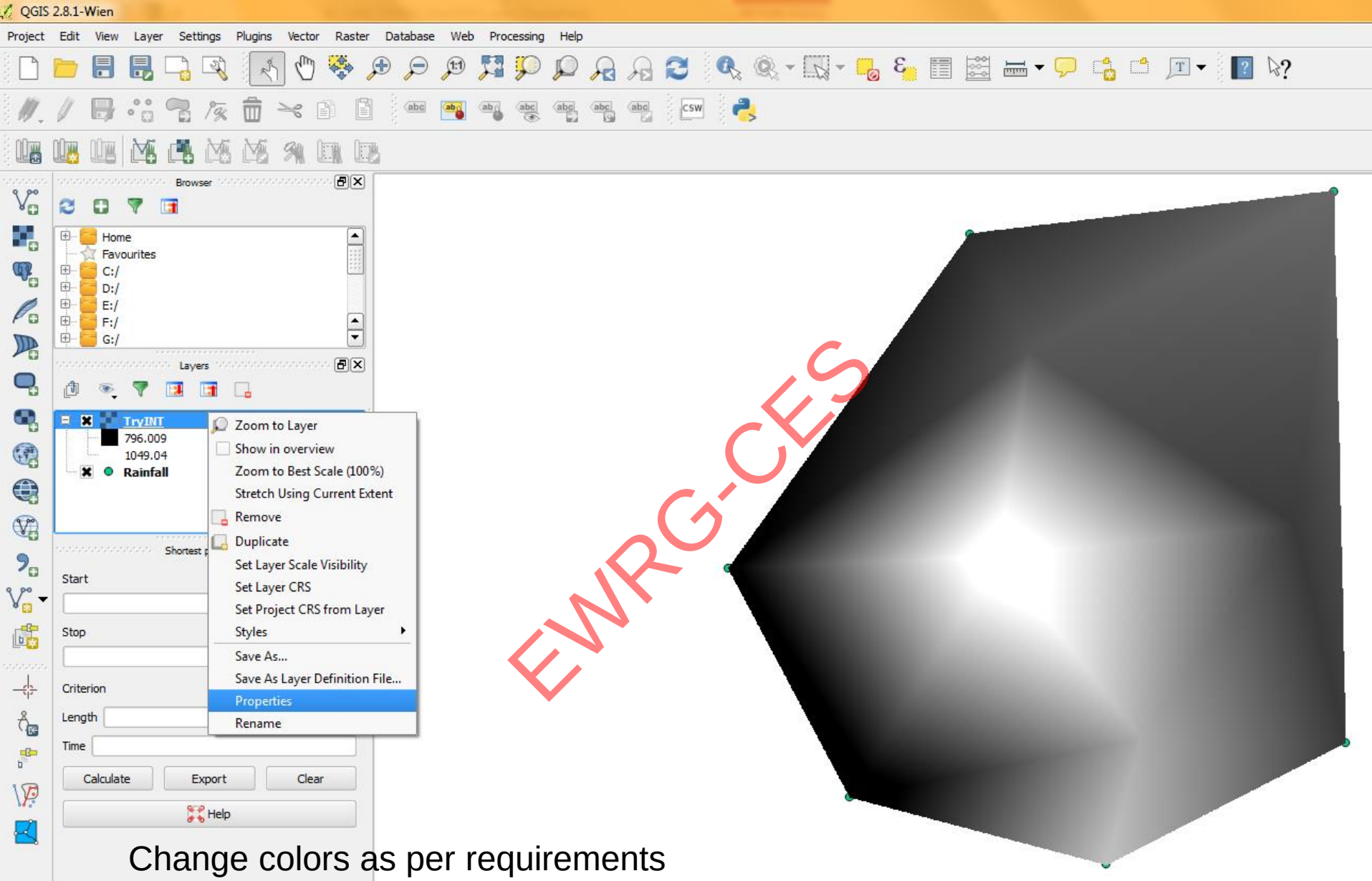
Show All Features

Coordinate: 824271,1415975 Scale: 1:273,108 Rotation: 0.0 Render EPSG:32643

Click on Raster → Interpolation → Interpolation







Print Composer

- Simple maplayouts made easy
- Apply map, legend, north arrow and text
- Using external programmes (inkscape) for finetuning.
- Lots of paperformats supported
- Logo inclusion, legend, labels, northarrow
- PNG/SVG/PDF support
- Adjustable drawing scale
- Separate DPI settings

Icon	Purpose	Icon	Purpose
	Load from template		Save as template
	Export to an image format		Export as PDF
	Export print composition to SVG		Print or export as Postscript
	Zoom to full extend		Zoom in
	Zoom out		Refresh view
	Add new map from QGIS map canvas		Add Image to print composition
	Add label to print composition		Add new legend to print composition
	Add new scalebar to print composition		Add basic shape to print composition
	Add arrow to print composition		Add attribute table to print composition
	Select/Move item in print composition		Move content within an item
	Group items of print composition		Ungroup items of print composition
	Raise selected items		Lower selected items
	Move selected items to top		Move selected items to bottom
	Align selected items left		Align selected items right
	Align selected items center		Align selected items center vertical
	Align selected items top		Align selected items bottom

HELP FROM QGIS

?

??

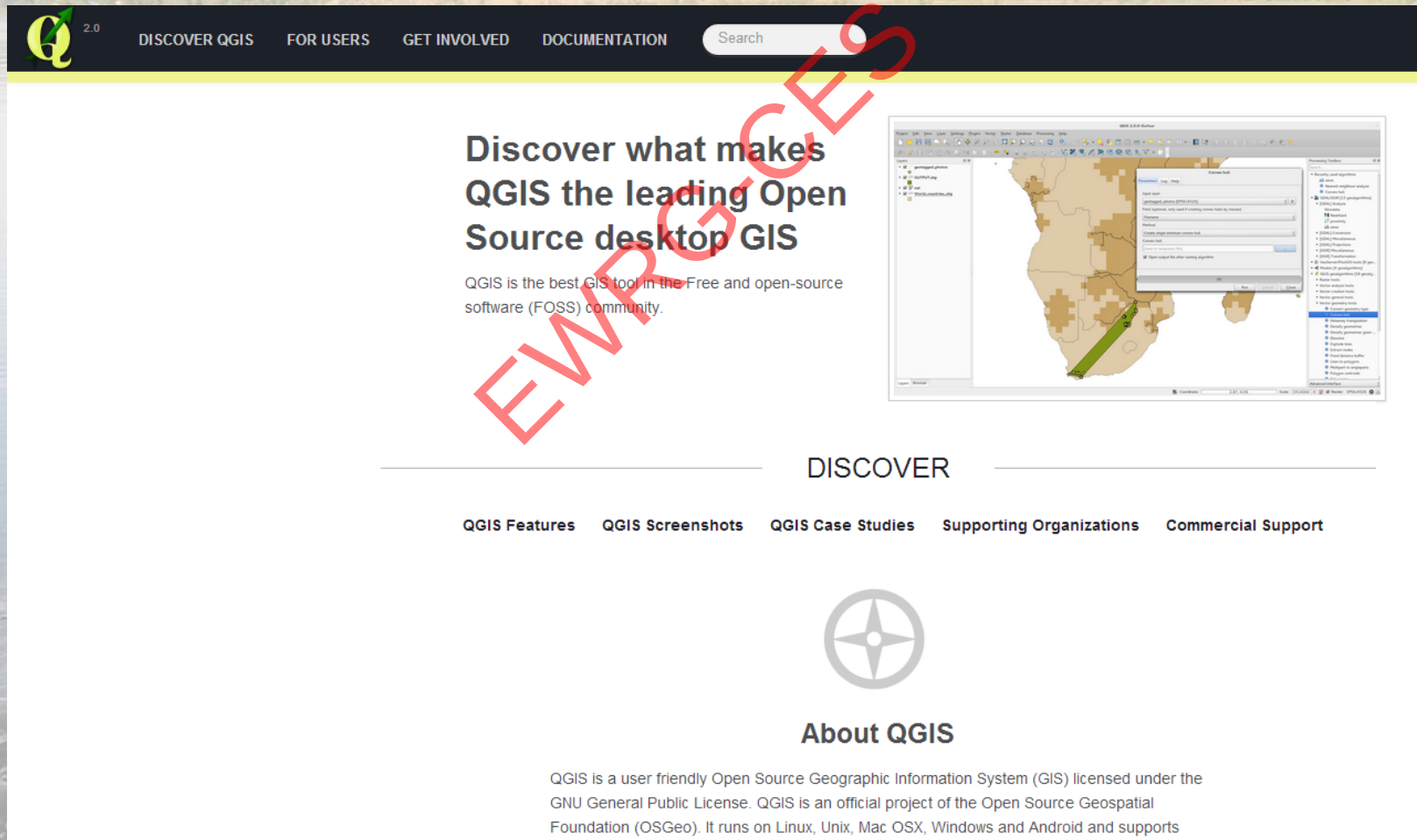
?

EWRG-CES

WEB SITE

(www.qgis.org/en/)

QGIS has active community support, update and upgrades



Discover what makes QGIS the leading Open Source desktop GIS

QGIS is the best GIS tool in the Free and open-source software (FOSS) community.

DISCOVER

- QGIS Features
- QGIS Screenshots
- QGIS Case Studies
- Supporting Organizations
- Commercial Support

About QGIS

QGIS is a user friendly Open Source Geographic Information System (GIS) licensed under the GNU General Public License. QGIS is an official project of the Open Source Geospatial Foundation (OSGeo). It runs on Linux, Unix, Mac OSX, Windows and Android and supports

QGIS Support

Mailing Lists

QGIS has a bunch of mailing lists. See [Mailinglists](#) for the different available lists.

If you are going to ask questions please read this: [How to ask a QGIS question?](#)

Searchable Mailing Lists

Nabble (<http://nabble.com> *nr*) keeps a history of a lot of mailinglists.

If you go to the osgeo section of it: <http://osgeo-org.1560.x6.nabble.com/> *nr* you see there is a QGIS section also, where you can do a search over all QGIS lists, or refine it to eg. only the users list.

Forums

QGIS does not have a forum. Please either search in StackExchange (see below), or via <http://nabble.com> *nr* in the history of our Mailinglists (see above)

StackExchange

On <http://qgis.stackexchange.com> *nr* you can ask QGIS questions also. If you use the tag 'qgis' you'll see all QGIS related questions and answer: <http://qgis.stackexchange.com/?tags=qgis> *nr*

Chat

A lot of the development buzz will be spoken on IRC.

There is a #qgis channel on freenode.net

You can also use a web interface: <http://webchat.freenode.net/?channels=#qgis> *nr*

TODO: write something about the IRC etiquette?

User Groups

TODO

Issue Tracker

If you want to file bugs or issues, you need an osgeo ID. You can create an account here: https://www2.osgeo.org/cgi-bin/ldap_create_user.py *nr*

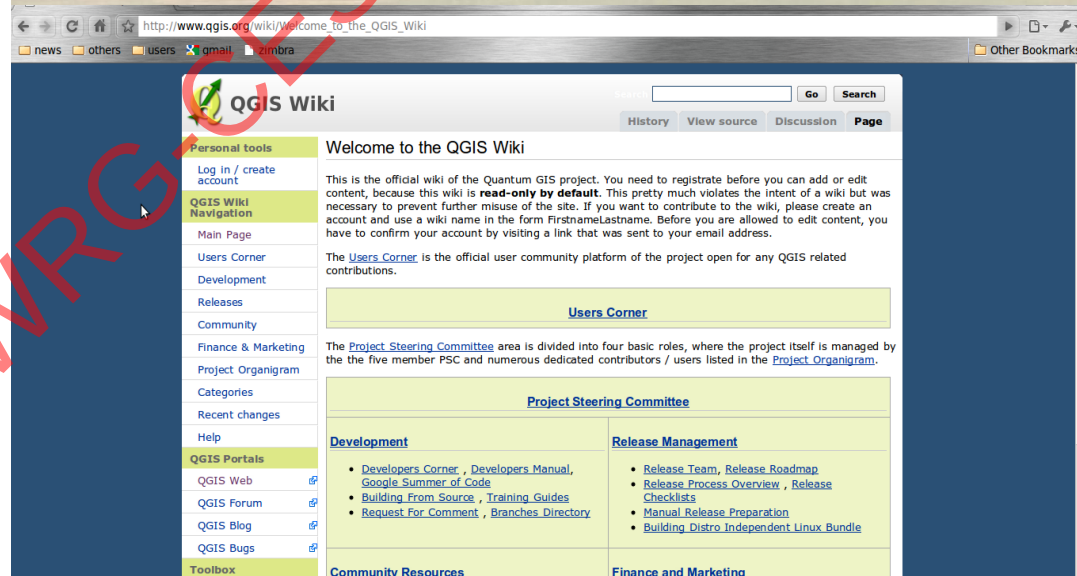
More info to be found here: <http://hub.qgis.org/wiki/quantum-gis/Bugreports> *nr*

All issues can be browsed here: <http://hub.qgis.org/projects/quantum-gis/issues> *nr*

Commercial Support

You can also get support from companies near you, please visit this page: [Commercial support](#).

WIKI



The screenshot shows the QGIS Wiki homepage. The browser address bar displays http://www.qgis.org/wiki/Welcome_to_the_QGIS_Wiki. The page features a sidebar with navigation links: Personal tools (Log in / create account), QGIS Wiki Navigation (Main Page, Users Corner, Development, Releases, Community, Finance & Marketing, Project Organigram, Categories, Recent changes, Help), QGIS Portals (QGis Web, QGIS Forum, QGIS Blog, QGIS Bugs), and a Toolbox. The main content area is titled 'Welcome to the QGIS Wiki' and contains introductory text about the wiki's purpose and a 'Users Corner' button. Below this, a 'Project Steering Committee' section is visible, which is divided into a table with four columns: Development, Release Management, Community Resources, and Finance and Marketing. The Development column lists links to Developers Corner, Developers Manual, Google Summer of Code, Building From Source, Training Guides, and Request For Comment / Branches Directory. The Release Management column lists links to Release Team, Release Roadmap, Release Process Overview, Release Checklists, Manual Release Preparation, and Building Distro Independent Linux Bundle. The Community Resources and Finance and Marketing columns are currently empty.

Project Steering Committee			
Development	Release Management		
• Developers Corner , Developers Manual, Google Summer of Code • Building From Source , Training Guides • Request For Comment , Branches Directory	• Release Team, Release Roadmap • Release Process Overview , Release Checklists • Manual Release Preparation • Building Distro Independent Linux Bundle		
Community Resources	Finance and Marketing		

BLOG

BUGS



Quantum GIS Blog

Dev-Speak and other QGIS Ramblings...

Bugs | Forum

Recent blog posts

- Quantum GIS on steroids
- Annotation tools
- Announcing the release of QGIS 1.4.0 'Enceladus'
- Carson Farmer's report back on the Vienna Hackfest
- Vienna Hackfest 2009 Report Back
- Introducing the QGIS Hackfest (Vienna 2009) crew
- Announcing the release of QGIS 1.3.0 'Mimas'
- Announcing the releases of QGIS 1.0.2 (stable) and QGIS 1.1.0 'Pan' (unstable).
- Summer of Code project: Label placement
- QGIS and Google Summer of Code 2009

[more](#)

Category

- Developer
 - Building QGIS
- News
- Releases
- Tutorials

Quantum GIS on steroids

Submitted by Martin Doblas on Mon, 2010-05-10 19:20. [News](#)

I'm very happy to announce that I've been accepted for this year's Google Summer of Code program! The full list of participants within OSGeo can be found [here](#).

My proposal aims to improve speed and responsiveness of Quantum GIS when doing commonly used operations such as map browsing. This should be achieved by adding threading support to the process of rendering and by optimizing related routines. The user interface should feel snappy even when browsing large datasets.

Read on for the proposal details.

» [Martin Doblas's blog](#) | [Login](#) or [register](#) to post comments | [Read more](#) | 813 reads

Annotation tools

Submitted by mhugent on Sat, 2010-04-03 13:52.

Since a few days, the annotation tools are contained in the developer version of QGIS. In this blogpost, I'd like to explain what those tools are and how to use them.

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Announcing the release of QGIS 1.4.0 'Enceladus'

Submitted by Tim Sutton on Sun, 2010-01-10 22:16. [News](#)

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Welcome to the Quantum GIS Project Management Site

This site provides project management support, bug/issue tracking, and viewing of the Subversion source code repository. For more information, see [Using Trac with QGIS](#).

Login

To submit issues you need an [OSGeo id](#)

Report a Bug

Use the [New Ticket](#) button to report a bug. You must have an account and be logged in to submit a bug. But you should probably read [Using Trac with QGIS](#) for a brief explanation first.

Project Statistics

Project statistics and developer activity can be viewed at <http://www.ohloh.net/projects/3663>.

Useful bug queues and Bug Triage

What is a bug triage? It's a short term focussed period of bug squashing. Click the triage links for more info.

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Check out our visual changelog, for what is changed since QGIS 1.8

[Visual Changelog for 2.0](#)



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