

LECTURE – 08

REPROJECTION OF DATASETS AND BASIC VECTOR ANALYSIS

Course Instructor:

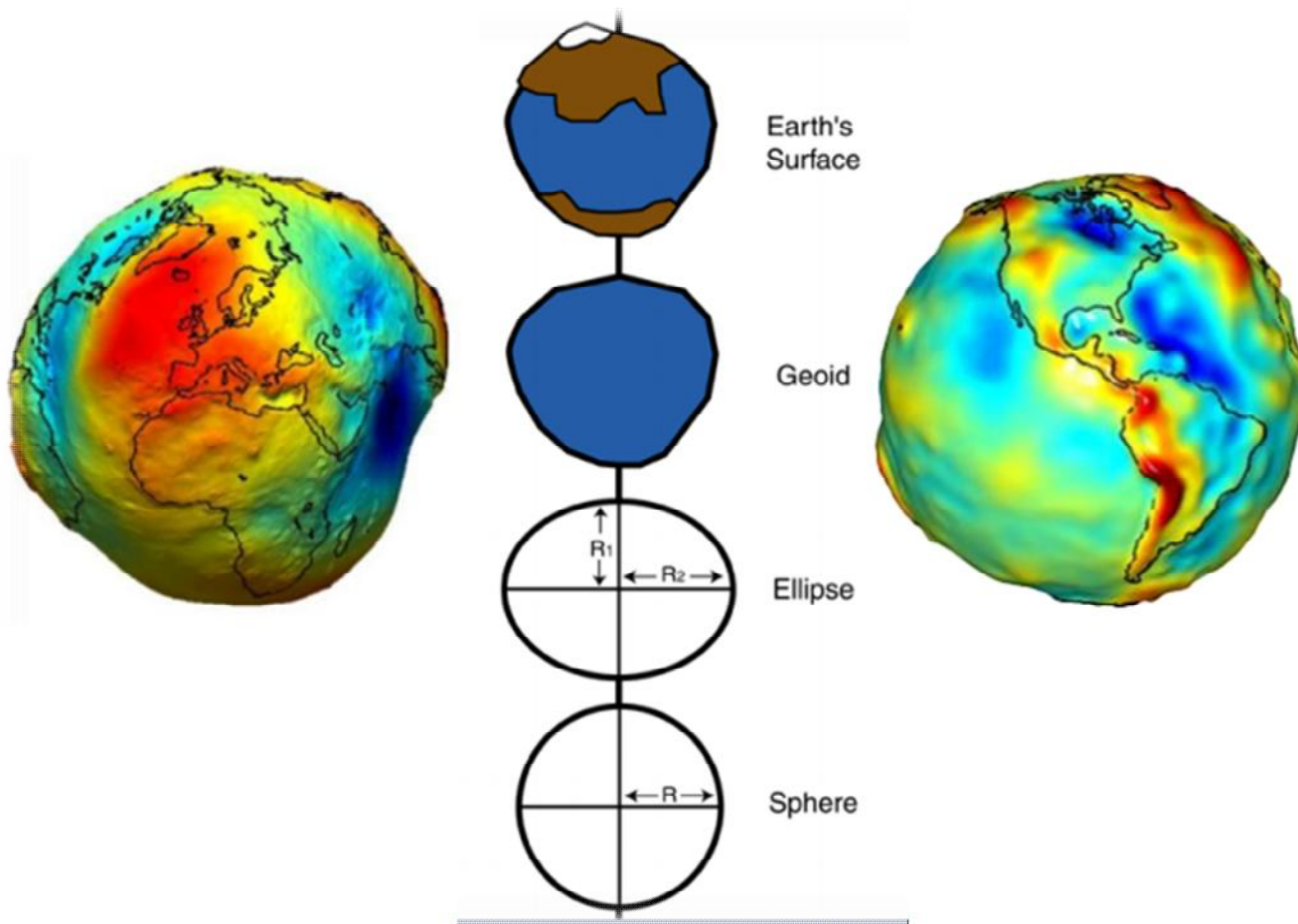
Engr. Hizb Ullah Sajid

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- Calculating Lengths for Vector Dataset
- Calculating Basic Statistics for Vector Dataset

Projections

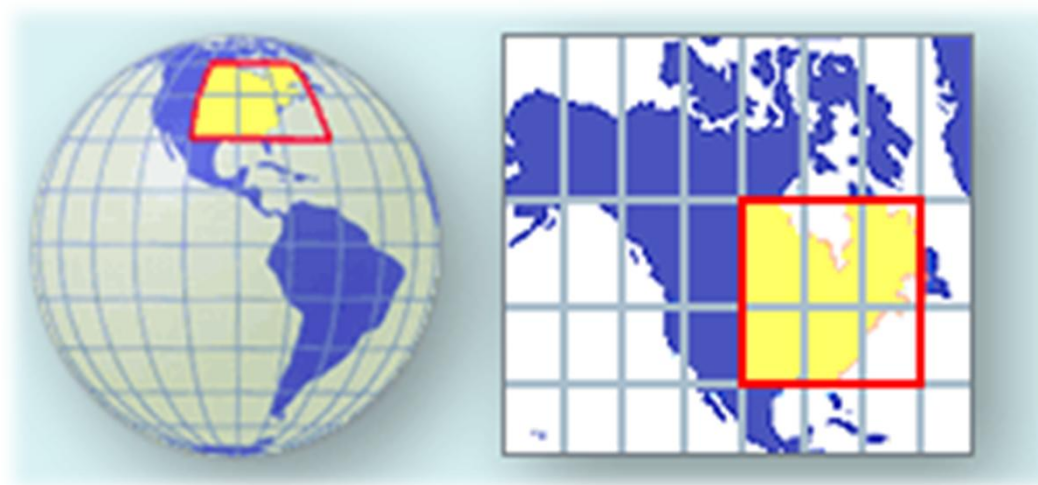
■ What is a Projection?



Projections

■ What is a Projection?

- A method by which the curved surface of the earth is portrayed on a flat surface.



- WGS-84 is one of the most common CRS

Projections

Types of Coordinate Reference Systems

```
graph TD; A[Types of Coordinate Reference Systems] --> B[Geographic Coordinate System (GCS)]; A --> C[Projected Coordinate System (PCS)];
```

Geographic Coordinate System (GCS)


- The earth as a sphere, with location in latitude and longitude, with units in degrees.
- WGS-84 is GCS.

Projected Coordinate System (PCS)

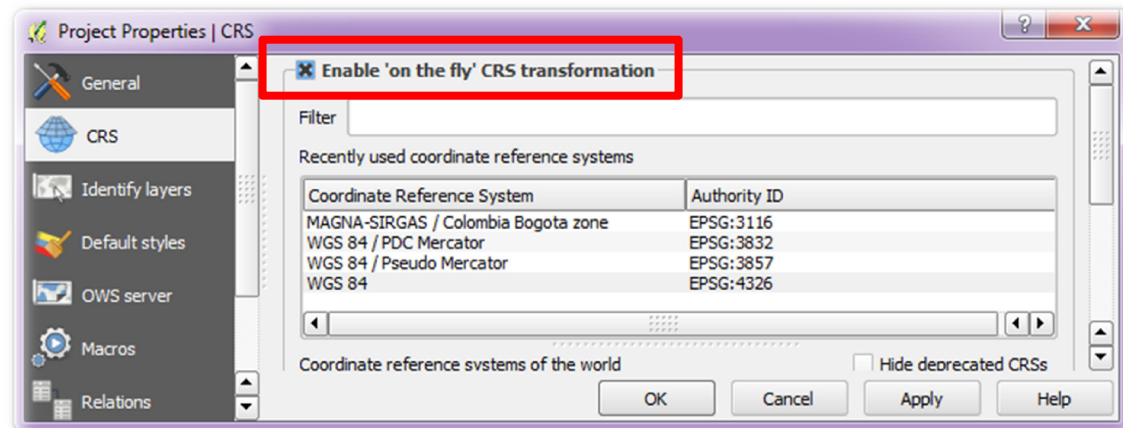
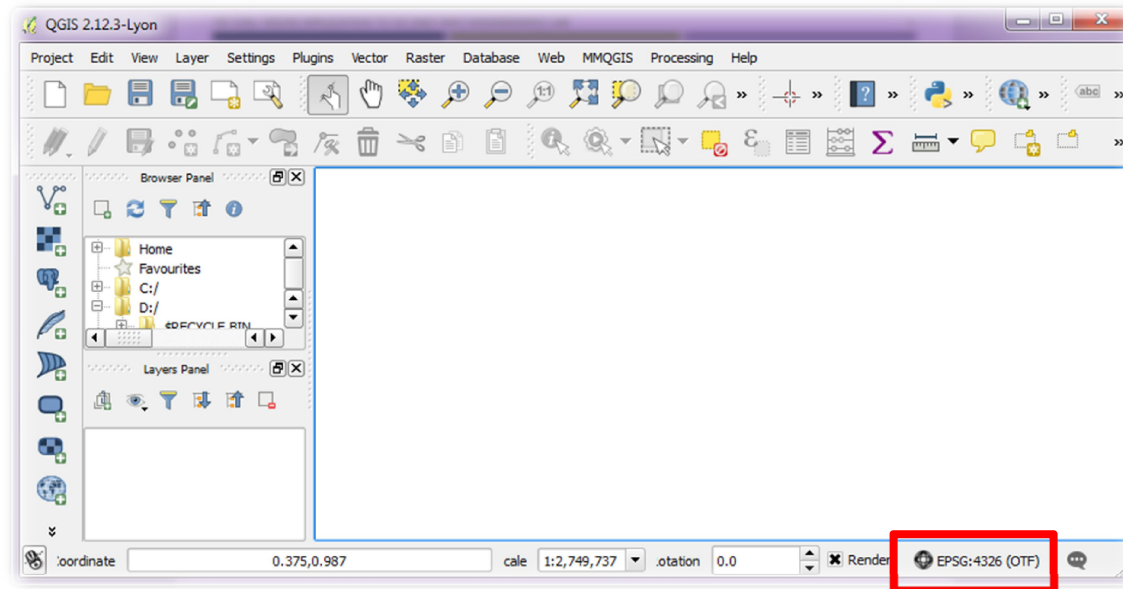
- The earth, or parts of it, flat, with location in constant units.

- **There is a common problem of distortion in GCS, that's why we need to convert GCS to PCS to solve distortion issue.**

On The Fly (OTF) Mode

- QGIS allows you to reproject data **“on the fly”**.
- It means even if the data itself is in another CRS, QGIS can project it as if it were in a CRS of your choice.
- To enable **“on the fly”** projection, click on the **CRS Status button** in the Status Bar along the bottom of the QGIS window: 
- In the dialog that appears, check the box next to **Enable ‘on the fly’ CRS transformation**

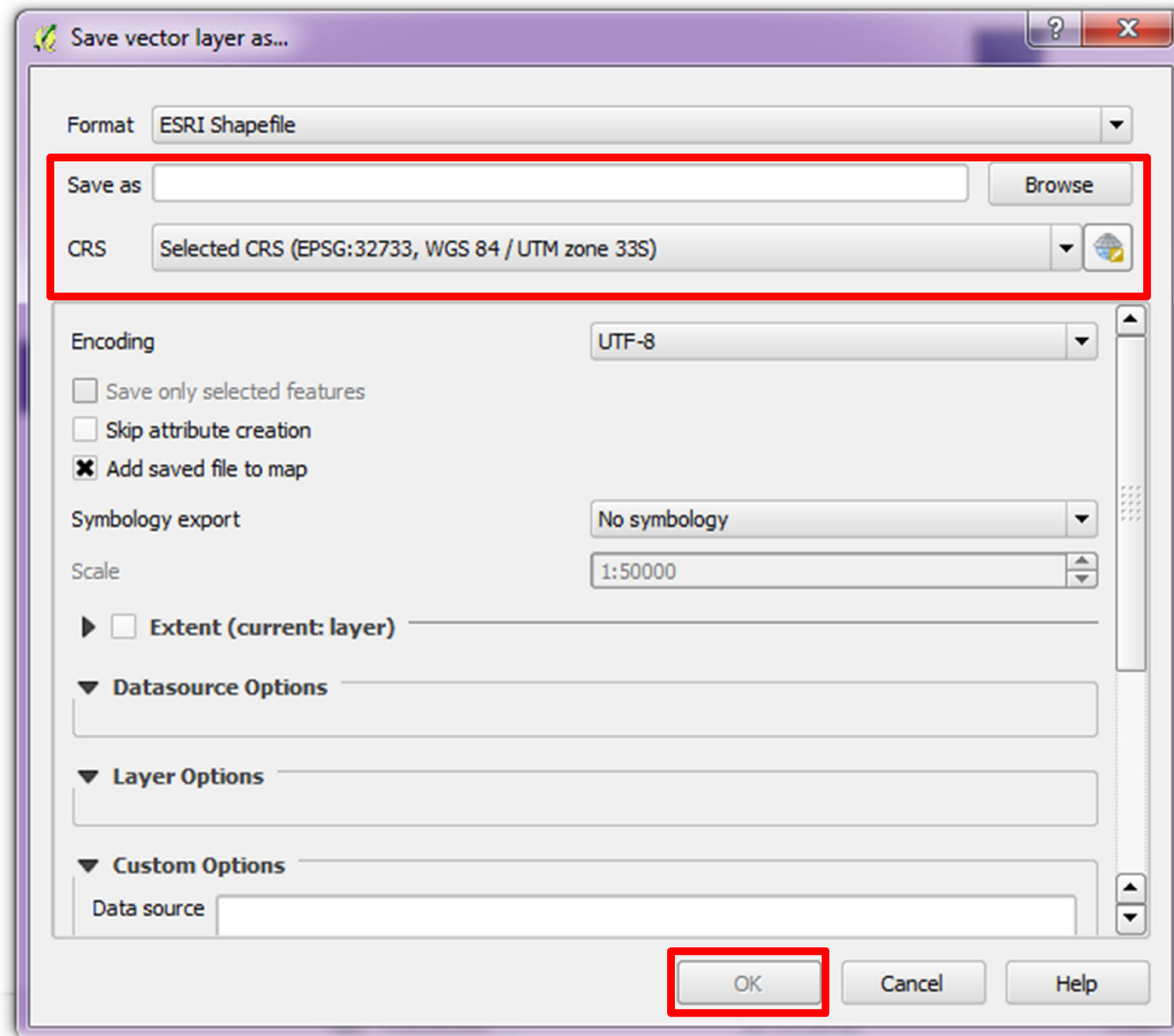
On The Fly (OTF) Mode



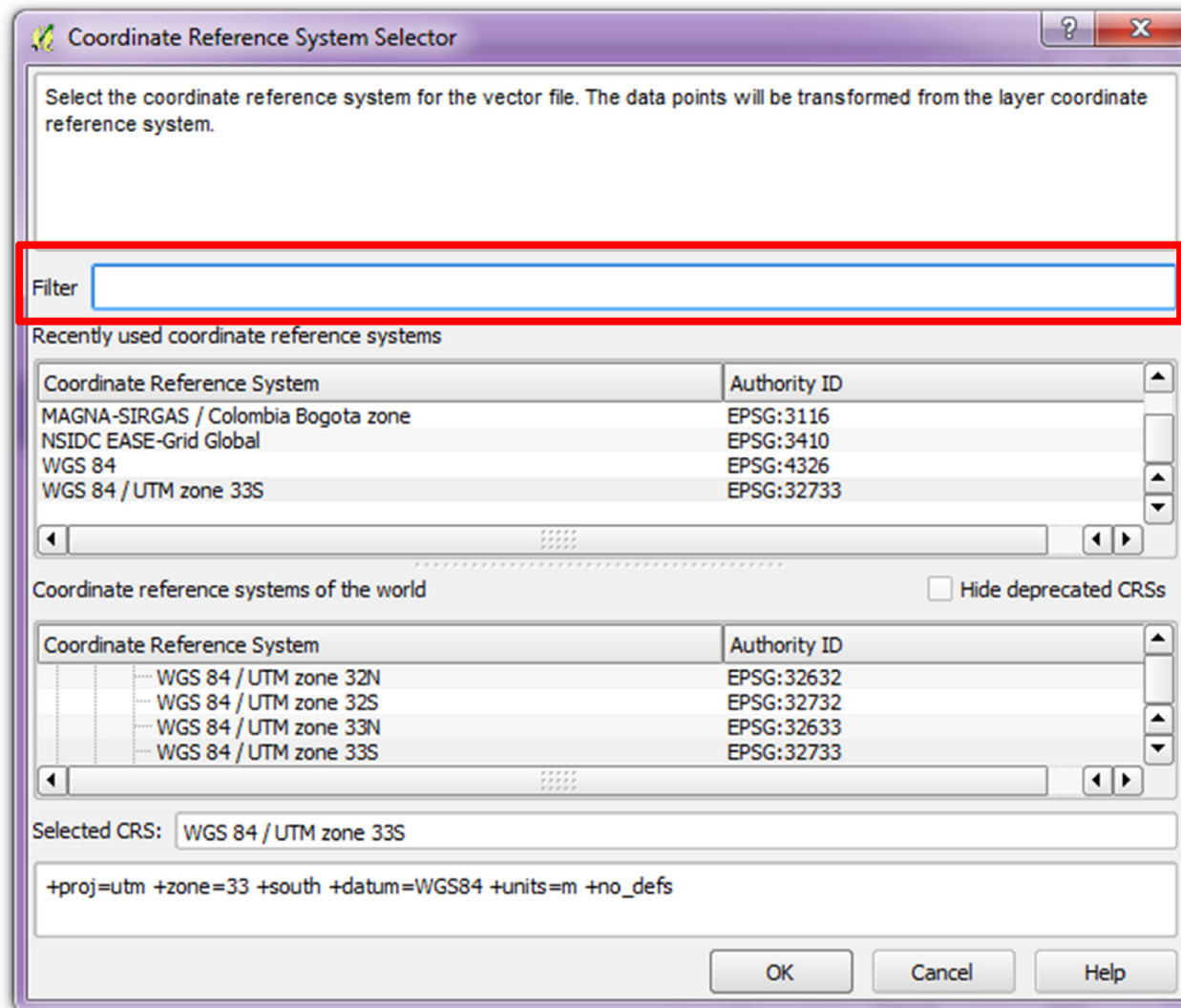
Saving a Dataset to Another CRS

- OTF only reprojects the layer as they appear on the map. It does not change the projection of the data.
- To change the projection of the data, it must be exported to a new file with a new CRS.
- For saving a dataset to another CRS:
 - Right click on the layer and click **Save As**
 - Give output layer name
 - Change the value of **CRS** by clicking the CRS name or **specify**.
 - Click **Ok**.

Saving a Dataset to Another CRS

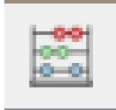


Saving a Dataset to Another CRS



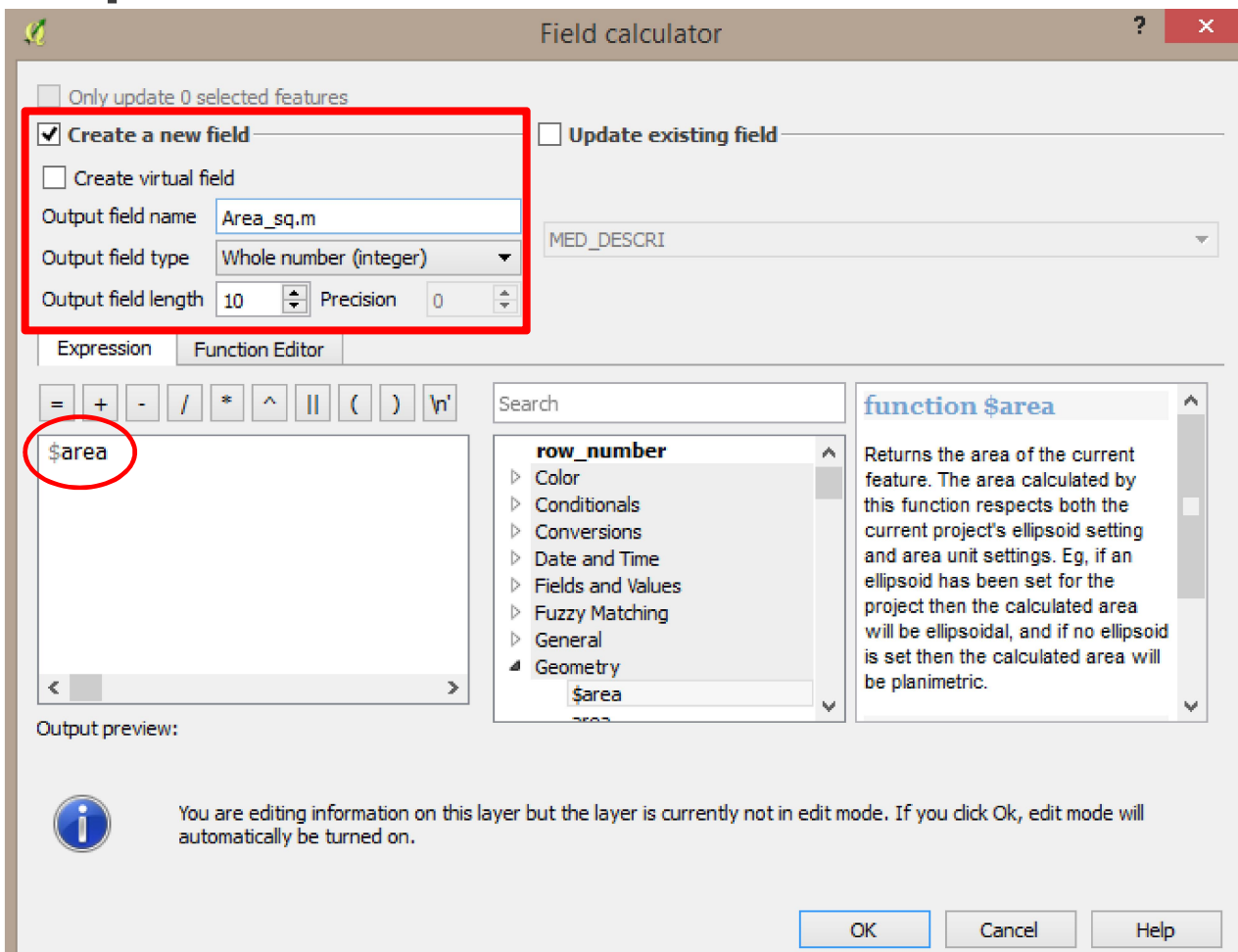
Calculating Areas for Vector Dataset

■ Stepwise Procedure is as follows:

- First Change projection of the vector dataset (containing polygon features) to projected coordinate system (e.g. units = m)
- Open the attribute table
- Click on Field Calculator icon 
- Give details for output Field (Name, type, length)
- Write the following expression: \$area

Calculating Areas for Vector Dataset

■ Stepwise Procedure is as follows:



The screenshot shows the 'Field calculator' dialog box with the following settings:

- Only update 0 selected features
- Create a new field
- Update existing field
- Create virtual field
- Output field name: Area_sq.m
- Output field type: Whole number (integer)
- Output field length: 10 Precision: 0
- Expression: \$area
- Function Editor: \$area
- Function list: \$area
- Function description: Returns the area of the current feature. The area calculated by this function respects both the current project's ellipsoid setting and area unit settings. Eg, if an ellipsoid has been set for the project then the calculated area will be ellipsoidal, and if no ellipsoid is set then the calculated area will be planimetric.

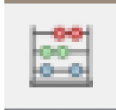
Output preview:

You are editing information on this layer but the layer is currently not in edit mode. If you click Ok, edit mode will automatically be turned on.

OK Cancel Help

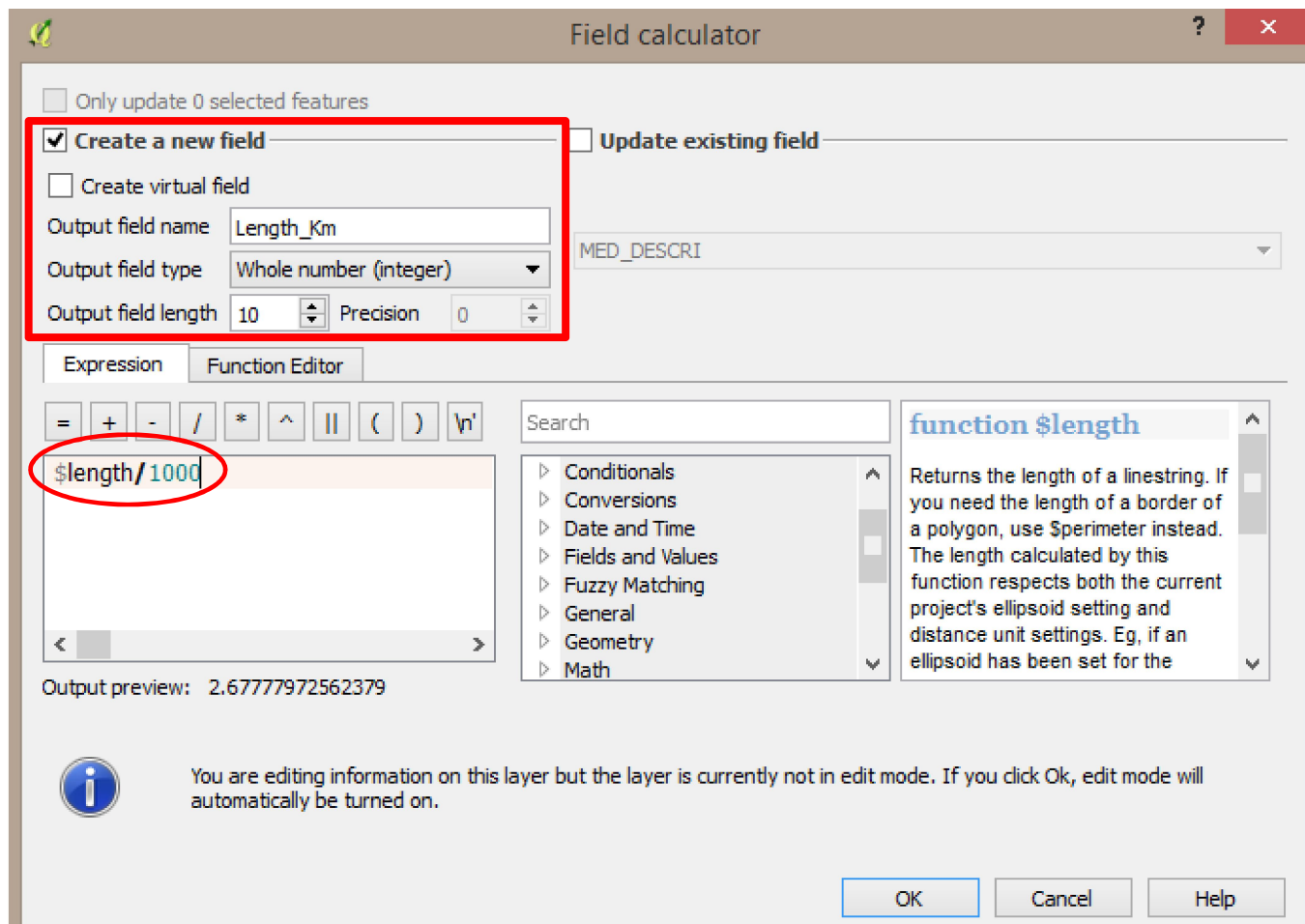
Calculating Lengths for Vector Dataset

■ Stepwise Procedure is as follows:

- First Change projection of the vector dataset (containing polygon features) to projected coordinate system (e.g. units = m)
- Open the attribute table
- Click on Field Calculator icon 
- Give details for output Field (Name, type, length)
- Write the following expression: \$length

Calculating Lengths for Vector Dataset

■ Stepwise Procedure is as follows:



The screenshot shows the 'Field calculator' dialog box with the following settings:

- Only update 0 selected features
- Create a new field
- Update existing field
- Create virtual field
- Output field name: Length_Km
- Output field type: Whole number (integer)
- Output field length: 10
- Precision: 0

The 'Expression' tab is selected, and the expression `$length/1000` is entered in the text box. The 'Function Editor' shows the '\$length' function selected.

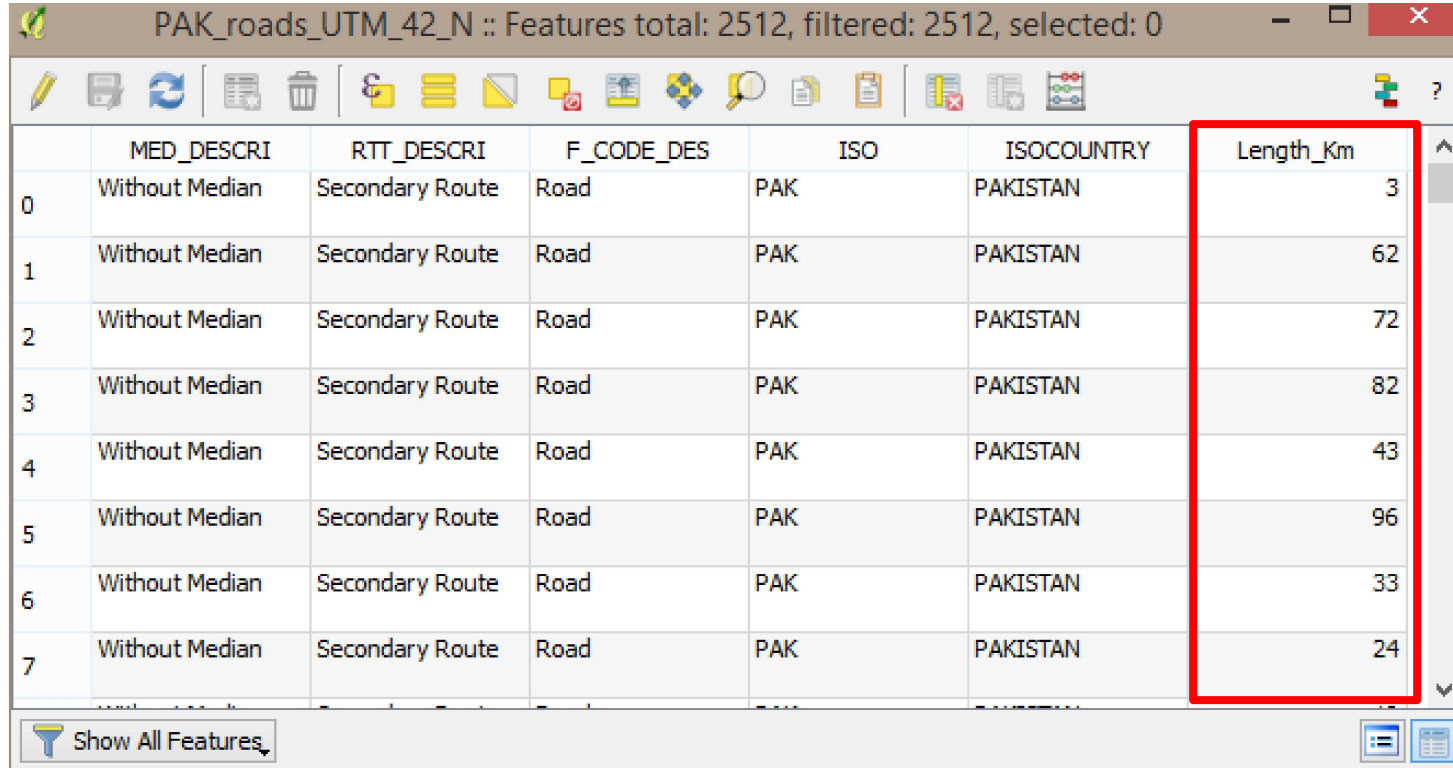
Output preview: 2.67777972562379

You are editing information on this layer but the layer is currently not in edit mode. If you click Ok, edit mode will automatically be turned on.

OK Cancel Help

Calculating Areas for Vector Dataset

- A new field containing length values will be created



The screenshot shows a GIS software window titled "PAK_roads_UTM_42_N :: Features total: 2512, filtered: 2512, selected: 0". The window displays a table of road features with the following columns: MED_DESCRI, RTT_DESCRI, F_CODE_DES, ISO, ISOCOUNTRY, and Length_Km. The Length_Km column is highlighted with a red border. The table contains 8 rows of data, all with "Without Median" as the median description and "Secondary Route" as the route type. The length values in kilometers are 3, 62, 72, 82, 43, 96, 33, and 24.

| | MED_DESCRI | RTT_DESCRI | F_CODE_DES | ISO | ISOCOUNTRY | Length_Km |
|---|----------------|-----------------|------------|-----|------------|-----------|
| 0 | Without Median | Secondary Route | Road | PAK | PAKISTAN | 3 |
| 1 | Without Median | Secondary Route | Road | PAK | PAKISTAN | 62 |
| 2 | Without Median | Secondary Route | Road | PAK | PAKISTAN | 72 |
| 3 | Without Median | Secondary Route | Road | PAK | PAKISTAN | 82 |
| 4 | Without Median | Secondary Route | Road | PAK | PAKISTAN | 43 |
| 5 | Without Median | Secondary Route | Road | PAK | PAKISTAN | 96 |
| 6 | Without Median | Secondary Route | Road | PAK | PAKISTAN | 33 |
| 7 | Without Median | Secondary Route | Road | PAK | PAKISTAN | 24 |

Calculating Basic Statistics for Vector Dataset

- After we have determined length for all the line features in a vector dataset, we can use Basic Statistics tools to calculate sum, max, min values, etc.
- **Command path is as follows:**
 - Vector > Analysis Tools > Basic Statistics
 - Select Input Vector Layer
 - Select Target field (this field should contain the length values)
 - Click Ok

Calculating Basic Statistics for Vector Dataset

Basics statistics

Input Vector Layer
PAK_roads_UTM_42_N

Use only selected features

Target field
Length_Km

Statistics output

Press Ctrl+C to copy results to the clipboard

0% OK Close

Basics statistics

Input Vector Layer
PAK_roads_UTM_42_N

Use only selected features

Target field
Length_Km

Statistics output

| Parameter | Value |
|-------------------------|---------------|
| Mean | 22.7233280255 |
| StdDev | 23.2114408098 |
| Sum | 57081.0 |
| Min | 0.0 |
| Max | 216.0 |
| N | 2512.0 |
| CV | 1.02148069085 |
| Number of unique values | 127 |

Press Ctrl+C to copy results to the clipboard

0% OK Close

References

- QGIS Training Manual