EXERCISE 12

ATTRIBUTE DATA LINKAGE

Outline of Experiment

12.1 INTRODUCTION

You have learnt to digitize and create point, line/segment and polygon maps. Spatial data is incomplete without the non-spatial or attribute data because spatial analysis is generally performed based on the attributes. Theattribute data isstored in theform oftables with rows and columns. Each row in an attribute table represents aspatial feature and each column describes its characteristics.

In this exercise, you will learn to work with the attribute data. You can perform several functions such as create, edit, join, import/export and perform computations on the attribute data in QGIS software.

Expected Learning Skills

After performing this exercise, you should be able to:

- open and create attribute data and tables;
- link an external attribute data;
- create new attribute through data computation;
- import and export attribute data; and
- create a new vector layer from a part of the attribute data.

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12.2 REQUIREMENTS

To perform this exercise successfully, the following are the requirements:

- computer with QGIS installed in it,and
- data generated in exercise 10.
- QGIS sample data used in exercise 8.

12.3 STEPS

There are several functionalities using the attribute data in QGIS. Some of the commonly used functions are shown here.

12.3.1 Working with Spatial and Non-spatial Attribute Tables

You can load spatial and non-spatial tables in QGIS such as the tables supported by GDAL and delimited text as well as the PostgreSQL, MS SQL server, SpatiaLite and Oracle provider. When you load the tables, you can see it in the layer panel. You can use the non-spatial tables for field lookups or just browse and edit using the table view. You can open it with the *Open Attribute Table* tool and then edit like any other layer attribute table. 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. To know more about It you can explore the edit widget in section attribute form properties .

12.3.2 Opening Attribute Table

Attribute table display features of a layer. You can open attribute table of a vector layer by clicking on it in the map legend area. When you click on it the layer becomes active. Then choose *Open Attribute Table* from main menu *Layer.* You can also open the layer by the right clicking on the layer and choosing *Open Attribute* Table from the dropdown menu. A new window will open, which displays the feature attributes in the layer as shown in Fig.12.1.The attribute table title shows the number of features, filtered features, and the number of selected features. You will notice that there are several rows and columns. Each row in the attribute table represents one map feature and each column contains a particular piece of information about the feature.

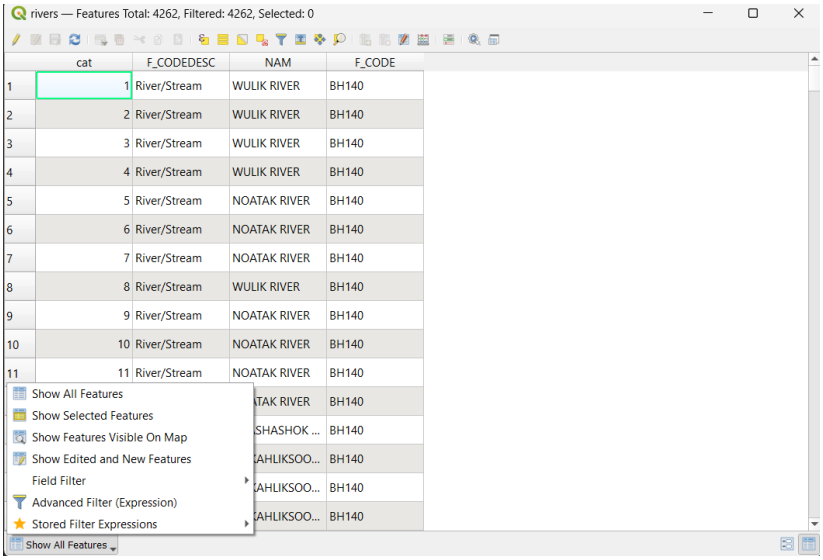

Fig. 12.1: Attribute table for a layer. There are several buttons at the top of the attribute table window (Fig. 12.2), which provide the following functionality:

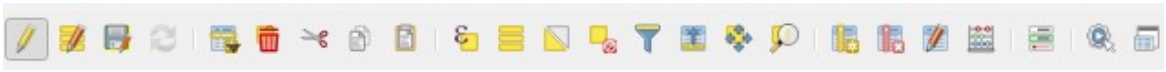

Fig. 12.2: Buttons appear at the bottom left of the attribute table window.

- Toggle editing mode (*Ctrl+E*)
- Toggle multi edit mode
- Save edits (*Ctrl+S*)
- Reload the table
- Add feature
- Delete selected features
- Cut selected features to clip board (*Ctrl+X*)
- Copy selected features to clip board (*Ctrl+C*)
- Paste features from clip board (*Ctrl+V*)
- Select features using an Expression
- Select all (*Ctrl+A*)
- Invert selection (*Ctrl+R*)
- Deselect all features from layer (*Ctrl+Shift+A*)
- Select/ Filter features using form (*Ctrl+F*)
- Move selection to top
- Pan map to the selected rows (*Ctrl+P*)
- Zoom map to the selected rows (*Ctrl+J*)
- New field (*Ctrl+W*)
- Delete field (*Ctrl+L*)
- Organize columns
- Open field calculator (*Ctrl+I*)

- Conditional formatting
- Action
- Dock attribute table

12.3.3 Selecting Features in an Attribute Table

You can select a feature in the attribute table by clicking on row number on left side of the table. Each selected row int he attribute table displays the attributes of a selected feature in the layer. If you change the set of features selected in the main window, the selection is also updated in the attribute table. Similarly, if you change the set of rows selected in the attribute table, the set of features selected in the main window will be updated. You can select multiple rows by holding the *Ctrl* key and select required rows.You can make continuous selection by holding the *Shift* key and clicking on several row headers. It will select all rows between the current cursor position and the clicked row. You can sort the table by any column (ascending/descending order) by clicking on the column header. A small arrow indicates the sort order. Downward pointing arrow means descending values and upward pointing arrow means ascending values from the top row down.

You can perform search by attributes. If you want to perform a simple search on only one column, you can use the 'select/filter features using form' and then write the text or value in that field. The *Case sensitive* checkbox allows you to select case sensitive. Filter will select the matching rows and show the total number of matching rows in the title bar of the attribute table and in the status bar of the main window. There is a Filter features button that lets you define and refine filters when choosing or filtering features from the attribute table. By using it, the Advanced filter (Expression) option is activated, and the associated filter expression is shown at the bottom of the form in an editable text widget. If features have already been filtered, you can further refine your search using the drop-down menu next to the button labelled "Filter features." The choices are: (1) Filter within ("AND") (2) Extend filter ("OR") (3).To clear the filter, either choose Show all features from the pull-down menu in the bottom left corner, or remove the expression and press Enter or Apply.

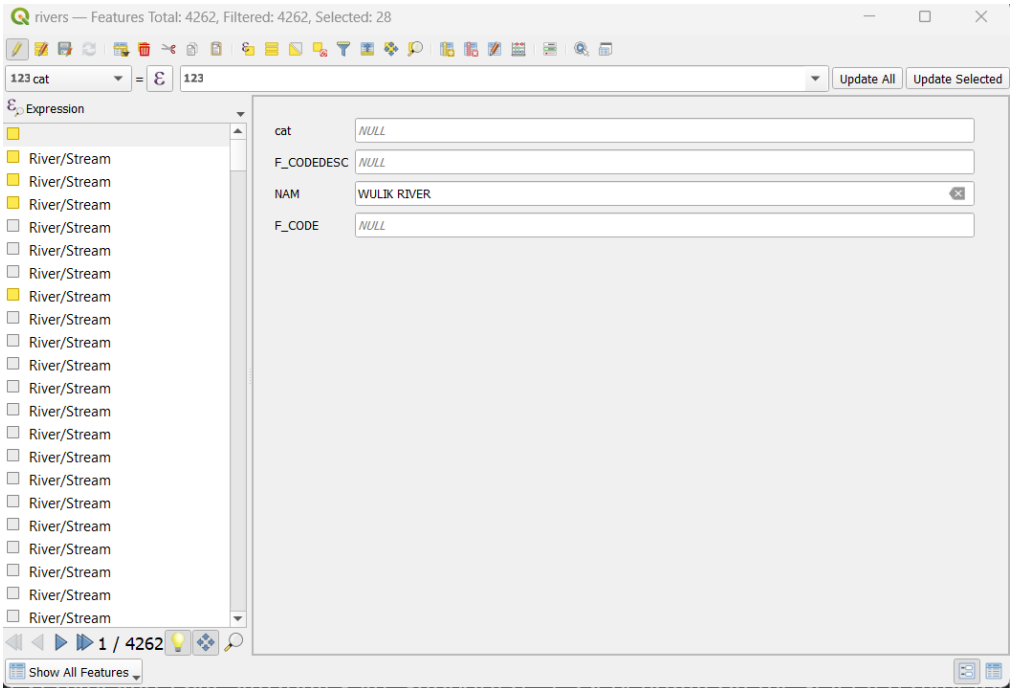

Fig. 12.3: Filtering/selecting features.

12.3.4 Adding New Field or Delete Existing Field

You can add fields at the time of creation of shape file. You can also add new fields or delete existing fields after digitizing all the features.To add fields to the layer or attribute table follow these steps:

1. Open attribute table.
2. Click on toggle editing mode to start editing.
3. Click on add new field it will open a new dialog box (Fig. 12.4).

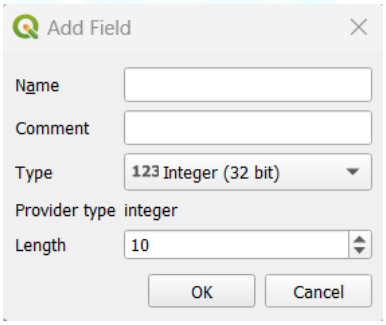

Figure 12.4: Add field dialog box.

4. Enter the Name of the field and select the data type. Only Decimal number, Whole number, Text data and Date attributes are supported.
5. Depending on the selected data format, enter the Length and click OK.

QGIS will add the new field to the attribute table.

To delete an existing field from the table, after entering editing mode click on delete field it will open a dialog box showing all the existing fields in table (Fig. 12.5) select all the fields you want to delete and then click on ok. It will delete selected features from the table.

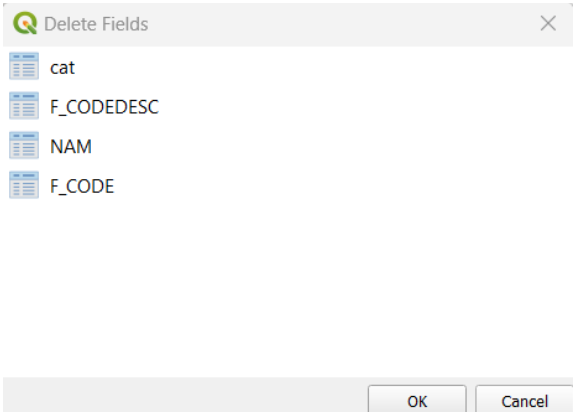

Fig. 12.5: delete fields.

12.3.5 Performing Calculations on AttributeTable

You can do calculations based on current attribute values or defined functions using the Field Calculator button in the attribute table, such as calculating the length or area of geometry features. The results may be used to create a new field (which may be a virtual field) or edit an existing field.The field calculator is available on all layers that supports editing. When you click on the field calculator icon the dialog box appears (Fig. 12.6). If the layer is not in edit mode, the field calculator will cause the layer to be put in edit mode before the calculation is made. The field calculator dialogue box, which is based on the Expression Builder dialogue, provides a comprehensive interface for defining an expression and applying it to an already existing or newly created field.When you want to use the field calculator dialogue, you must first decide whether to 1. apply calculations to the entire layer or just to chosen features. 2. Create new fields or edit an existing one for the calculation.

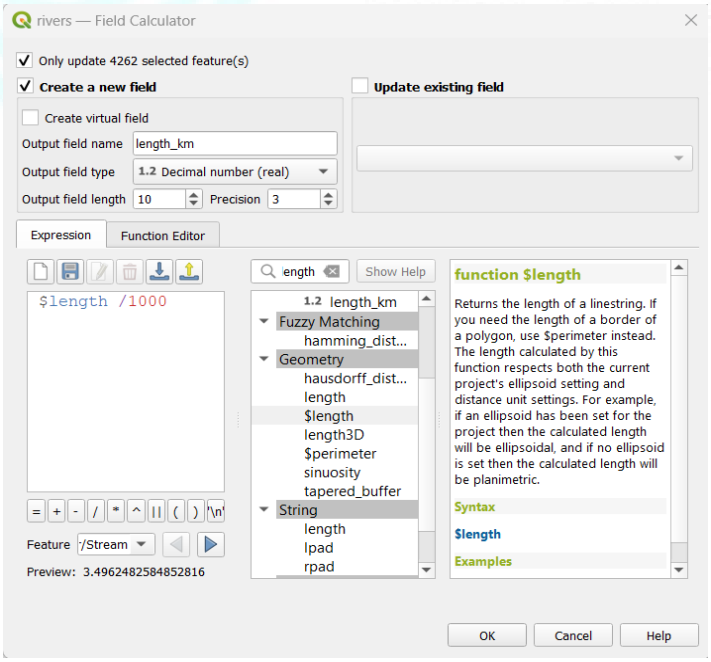

Fig. 12.6: Field Calculator dialog box. We will demonstrate how the field calculator works using the QGIS sample data that we use in exercise 8. We will determine the lengths of the various rivers in the river shapefile. To perform this calculation, follow these steps.

1. Add shapefile rivers.shp in QGIS and Open Attribute Table.

2. Click on Toggle editing mode to start editing this layer and open the Field Calculator dialog by clicking on open field calculator .
3. To save the calculations into a new fieldselect the create a new field checkbox and set the output field name as length_km (Fig. 12.3).
4. In output field type select Decimal number (real)
5. Search length and double click on $length in the geometry when you double click on $length it will be added in the expression box of the Field calculator.
6. Type / 1000 ($length/1000) in the Field calculator expression box (Fig. 12.3)as the length will be calculated in meters to convert it into kilometers, we must divide it by 1000. After writing the expression click OK.
7. Once calculation process completed you can find a new field 'length_km' in the attribute table.

12.4 LABORATORY EXERCISES

Submit answers to the following questions to the counsellor for evaluation:

1. Snapshot of the new field added in the attribute table of the features you have digitised.
2. Snapshot of the new field added i.e.,'length_km' showing length of the different rivers.

12.5 EXERCISES: EXPLOREYOURSELF

1. Calculate the length of the linear features you have digitized.
2. Calculate the area of polygon features created by you.

12.6 FURTHER/SUGGESTED READINGS

- https://docs.qgis.org/3.28/pdf/en/QGIS-3.28-DesktopUserGuide-en.pdf
- https://docs.qgis.org/3.28/en/docs/user_manual/working_with_vector/attribute_table.html
- http://www.qgistutorials.com/en/docs/3/working_with_attributes.html

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