

Remote Sensing and GIS for Rural Development
Professor. Pennan Chinnasamy
Centre for Technology Alternatives for Rural Areas (CTARA)
Indian Institute of Technology, Bombay


Week - 4

Lecture no. 05

QGIS tutorials for vector analysis and data searching

Hello, everyone, welcome to Remote Sensing and GIS for Rural Development. This is week 4, lecture 5. In this week, we have been looking at the data types for GIS and we have focused on vector data type in this week's lecture. Most of the data that we get from government resources and observation data is in the form of point, line or polygon. And that data is easily converted into a vector database in GIS.

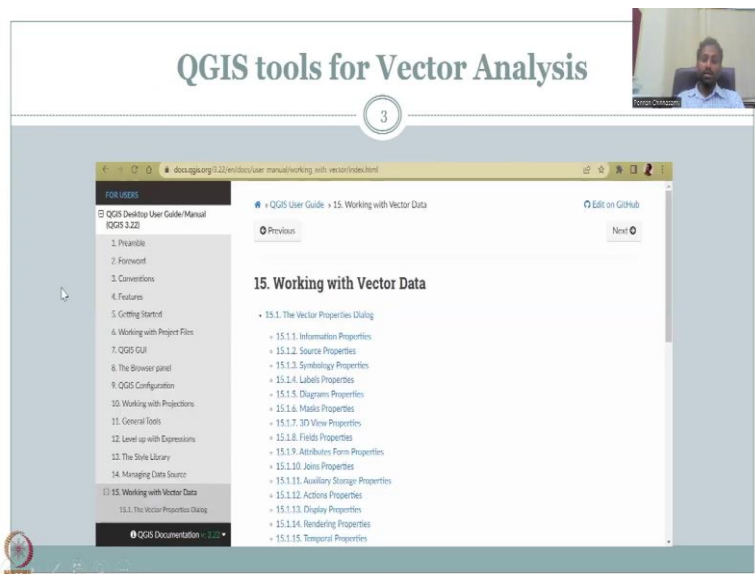
(Refer Slide Time: 1:06)



Slide 2: QGIS tools for Vector analysis

- Link to QGIS
 - <https://qgis.org/en/site/>
 - <https://qgis.org/en/site/about/index.html>

The slide features a title bar with the text 'QGIS tools for Vector analysis' and a small video feed of the presenter in the top right corner. A circular icon with the number '2' is centered below the title. The main content area is light blue and contains a bulleted list with two links. The NPTEL logo is visible in the bottom left corner.



Slide 3: QGIS tools for Vector Analysis

15. Working with Vector Data

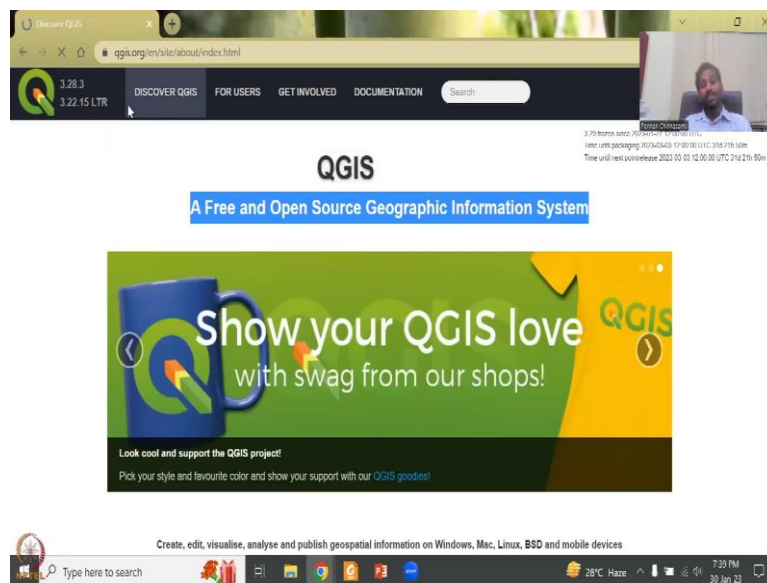
- 15.1. The Vector Properties Dialog
 - + 15.1.1. Information Properties
 - + 15.1.2. Source Properties
 - + 15.1.3. Symbolize Properties
 - + 15.1.4. Labels Properties
 - + 15.1.5. Diagrams Properties
 - + 15.1.6. Mask Properties
 - + 15.1.7. 3D View Properties
 - + 15.1.8. Fields Properties
 - + 15.1.9. Attributes Form Properties
 - + 15.1.10. Joins Properties
 - + 15.1.11. Auxiliary Storage Properties
 - + 15.1.12. Actions Properties
 - + 15.1.13. Display Properties
 - + 15.1.14. Rendering Properties
 - + 15.1.15. Temporal Properties

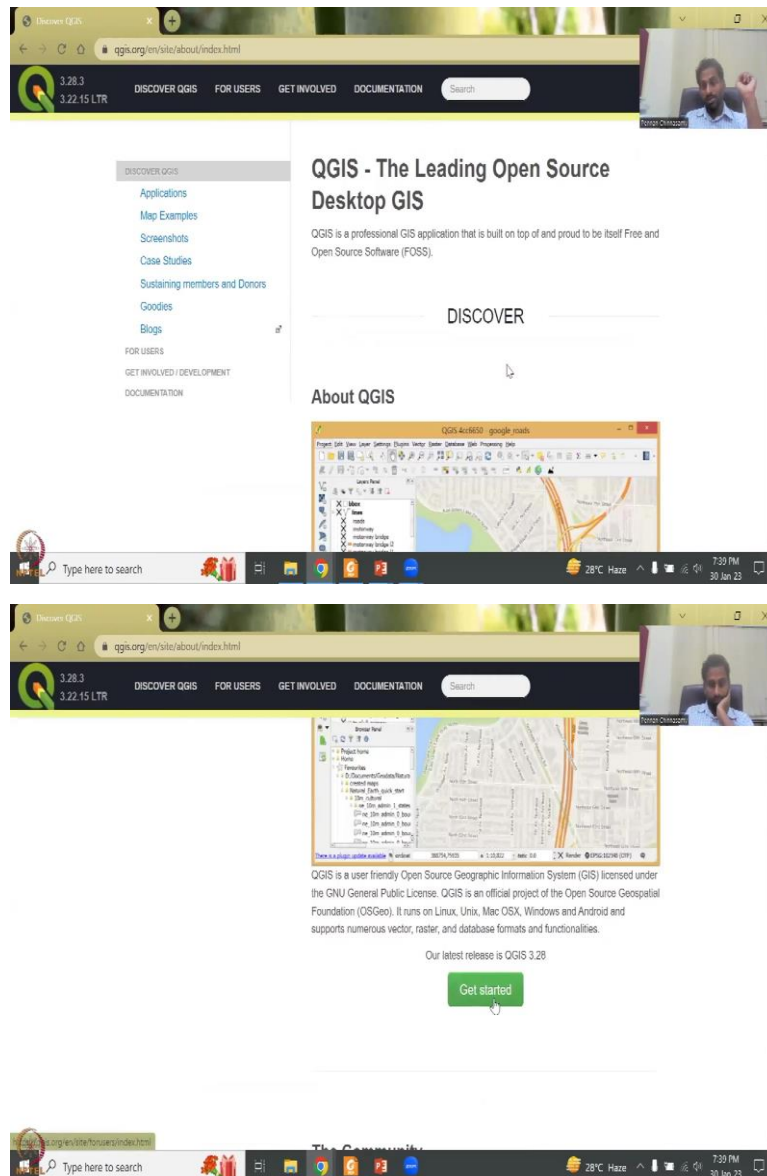
The slide features a title bar with the text 'QGIS tools for Vector Analysis' and a small video feed of the presenter in the top right corner. A circular icon with the number '3' is centered below the title. The main content area shows a screenshot of the QGIS User Guide manual, specifically the '15. Working with Vector Data' section. The NPTEL logo is visible in the bottom left corner.

So, moving on, we have seen the panel of QGIS. And we also looked at some major tools that we can use for vector analysis. Some examples were given as in buffer width. And the use of these tools were also discussed. For those who have to get more introduction of QGIS tools, I will share today's lecture time in looking through the documentation of QGIS, especially for vectors.

So, these two links I have already given in the previous day's lectures. And I hope you had time to look at these links. These are the same links that we use to read about QGIS, look at the forum's, log in and create questions, wait for answers etcetera. Now, we will look at specific documentation that we can use for better analysis in QGIS. Once we click this, and through some steps, we will arrive at this web page which talks about working with vector data. So, let us check it out. I am going to click this link. It will open page I will have to share the page.

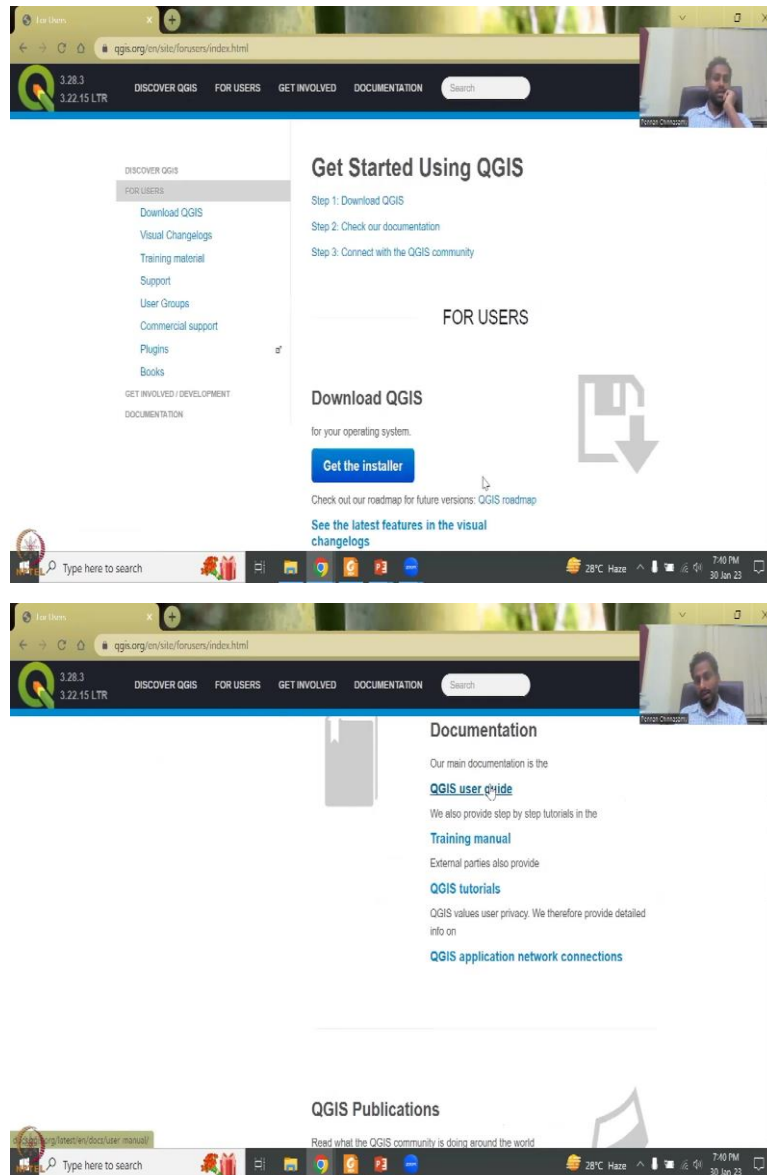
(Refer Slide Time: 3:33)





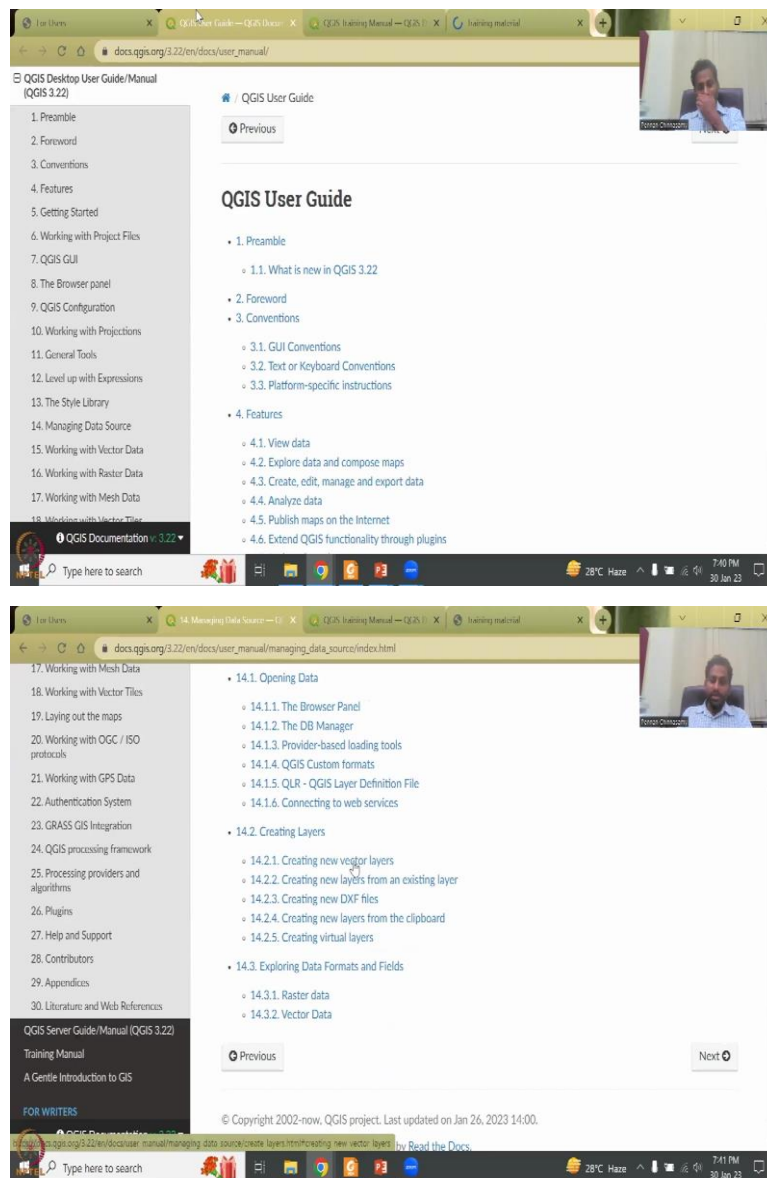
Yes, so in this page, what you see is the in this page is where we went and downloaded GIS because link so you click on Discover QGIS, in the discover you can get a get started, again to remind this is the most recent version 3.28. But we had gone to the stable version, stable version has been checked long enough on the system. And so it is called stable. 3.28 will one day become a stable version when QGIS goes to 3.4 3.5 etcetera. But for now, most users find 3.22 to be more stable.

(Refer Slide Time: 4:18)



So, they use that you click on the Get Started. And then we have downloaded this checkout documentation connect with the community. So, this is where as I mentioned, you will go and discuss with community on your spatial data issues, tool issues etcetera. And then we'll get support. But we are going to go to the user guide and open it in another tab and then the menu and tutorials.

(Refer Slide Time: 4:47)



So, the first thing the user guide, the left is the contents. What we are very sure about is the data source that we have discussed. How do you do the data source, creating the data and putting it in the browser panel etcetera etcetera. Creating new vector layers is what I would like to go through here.

(Refer Slide Time: 5:13)

This screenshot shows a web browser displaying the QGIS documentation page for 'Managing Data Source'. The page is titled 'docs.qgis.org/3.22/en/docs/user_manual/managing_data_source/index.html'. The left sidebar contains a table of contents with items 17 through 30. The main content area lists sections 14.1 (Opening Data) and 14.2 (Creating Layers). Section 14.1 includes sub-sections 14.1.1 to 14.1.6. Section 14.2 includes sub-sections 14.2.1 to 14.2.5. Section 14.3 (Exploring Data Formats and Fields) includes sub-sections 14.3.1 (Raster data) and 14.3.2 (Vector Data). Navigation buttons for 'Previous' and 'Next' are visible. The footer indicates '© Copyright 2002-now, QGIS project. Last updated on Jan 26, 2023 14:00.'

This screenshot shows the QGIS documentation page for 'Creating new vector layers'. The page is titled 'docs.qgis.org/3.22/en/docs/user_manual/managing_data_source/create_layers.html#creating-new-vector-layers'. The left sidebar shows the 'QGIS Documentation' logo and version '3.22', along with an 'Index' search bar and a table of contents for 'FOR USERS' (1-8). The main content area has the heading '14.2.1. Creating new vector layers' and a paragraph explaining that QGIS provides tools for creating GeoPackage, GPX, and Temporary Scratch layers. Below this is the sub-section '14.2.1.1. Creating a new GeoPackage layer', which includes a paragraph and a screenshot of the 'New GeoPackage Layer' dialog box. The dialog box shows fields for Database, Table name, Geometry type, and a 'New Field' section with Name, Type, and Maximum length.

This screenshot is identical to the previous one, showing the QGIS documentation page for 'Creating new vector layers'. It displays the same content, including the table of contents, the main heading '14.2.1. Creating new vector layers', the introductory paragraph, the sub-section '14.2.1.1. Creating a new GeoPackage layer', and the 'New GeoPackage Layer' dialog box screenshot.

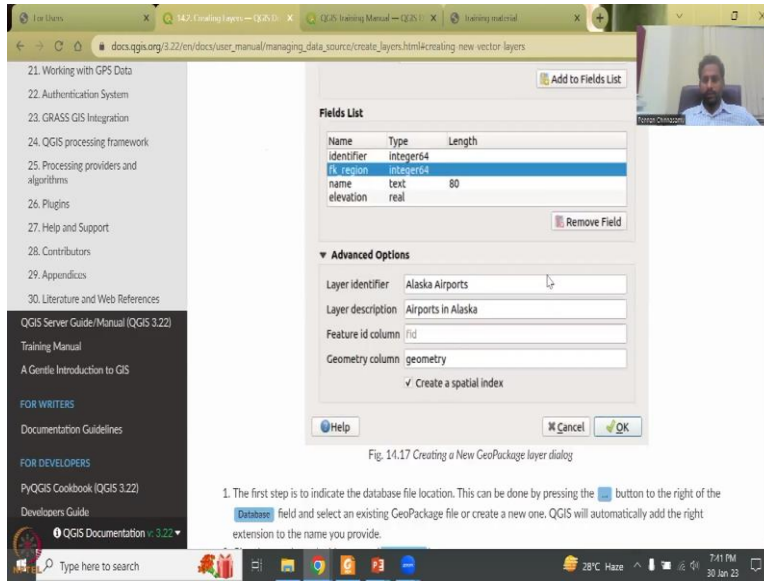



Fig. 14.17 Creating a New GeoPackage layer dialog

1. The first step is to indicate the database file location. This can be done by pressing the  button to the right of the **Database** field and select an existing GeoPackage file or create a new one. QGIS will automatically add the right extension to the name you provide.

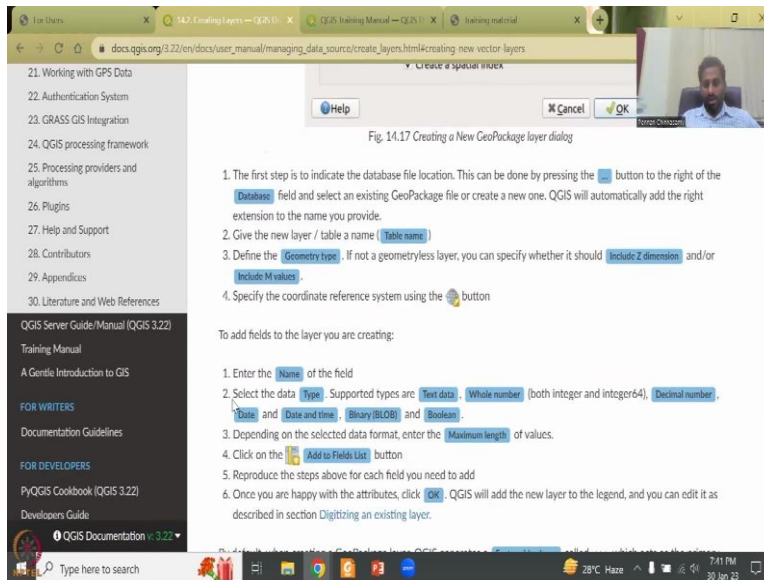



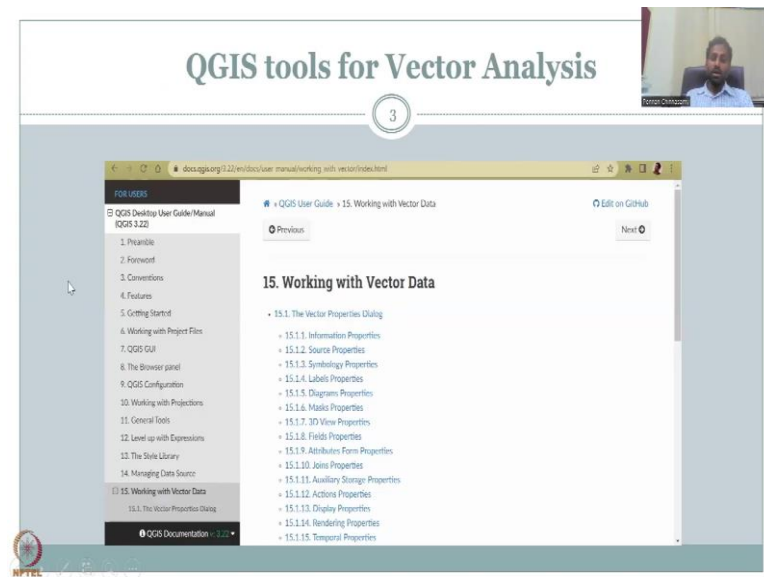
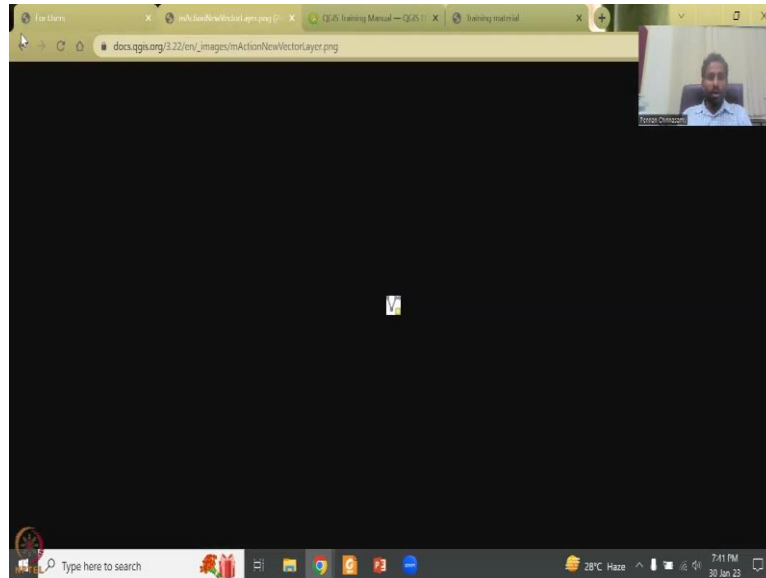


Fig. 14.17 Creating a New GeoPackage layer dialog

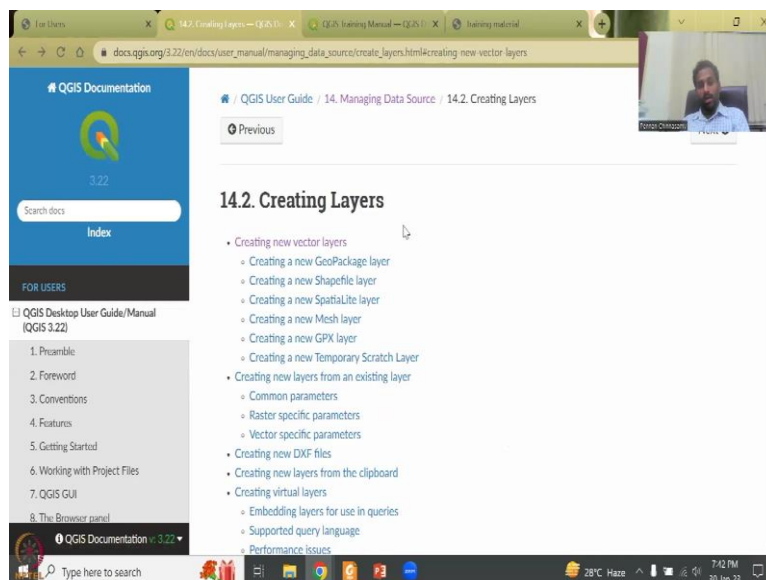
1. The first step is to indicate the database file location. This can be done by pressing the  button to the right of the **Database** field and select an existing GeoPackage file or create a new one. QGIS will automatically add the right extension to the name you provide.
 2. Give the new layer / table a name (**Table name**).
 3. Define the **Geometry type**. If not a geometryless layer, you can specify whether it should **include Z dimension** and/or **include M values**.
 4. Specify the coordinate reference system using the  button.
- To add fields to the layer you are creating:
1. Enter the **Name** of the field.
 2. Select the data **Type**. Supported types are **Text data**, **Whole number** (both integer and integer64), **Decimal number**, **Date** and **Date and time**, **Binary (BLOB)** and **Boolean**.
 3. Depending on the selected data format, enter the **Maximum length** of values.
 4. Click on the  **Add to Fields List** button.
 5. Reproduce the steps above for each field you need to add.
 6. Once you are happy with the attributes, click **OK**. QGIS will add the new layer to the legend, and you can edit it as described in section Digitizing an existing layer.

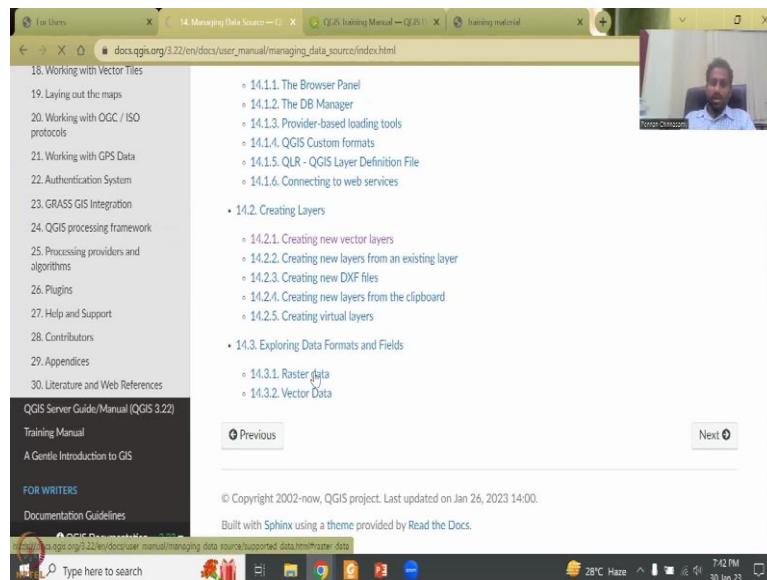
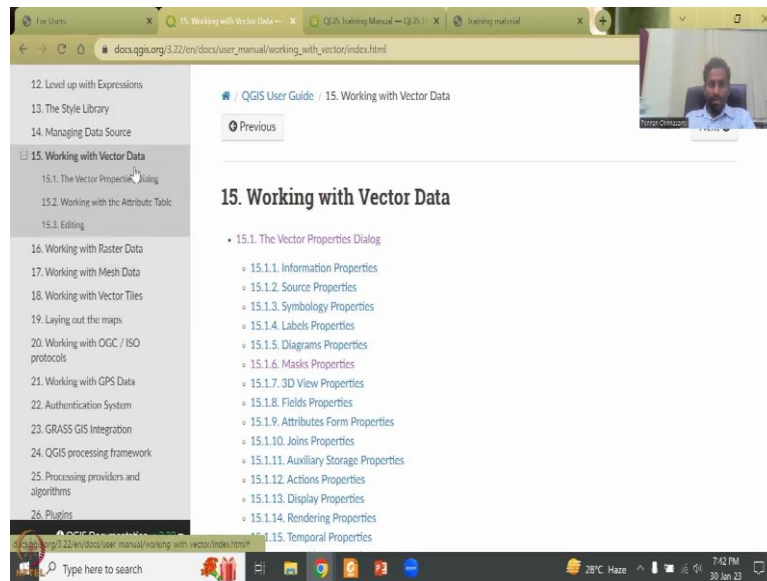




So, here there has been a tutorial given step by step and with a image of creating a point shape file with some data they have given, so you can see that they have used airports in Alaska as a tool and then they go Step, enter the name enter the field and then create a new shapefile by using the plus symbol create a shapefile button. If you do not know this, you can click and it will also open the image to zoom in and then you will do the projections and coordinate system you put in what is needed etcetera etcetera.

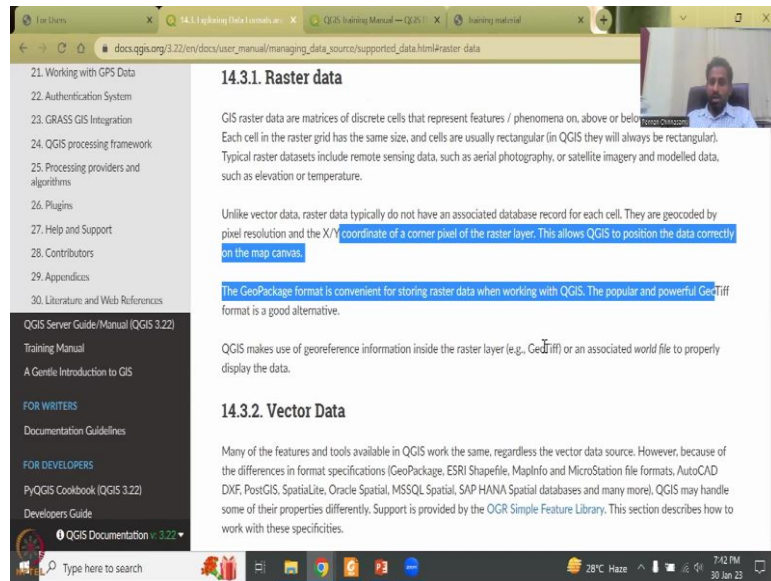
(Refer Slide Time: 6:09)





As I said, this is not a QGIS or GIS specific course it will be introducing that so I am going to go to the data sources that this software looks at. So, there are two data sources working with raster data, working with vector data. In the bottom you can see the 14.3.1. They discuss the raster data.

(Refer Slide Time: 6:40)



The screenshot shows a web browser displaying the QGIS documentation page for Raster data. The page is titled "14.3.1. Raster data" and contains the following text:

GIS raster data are matrices of discrete cells that represent features / phenomena on, above or below the ground surface. Each cell in the raster grid has 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 elevation or temperature.

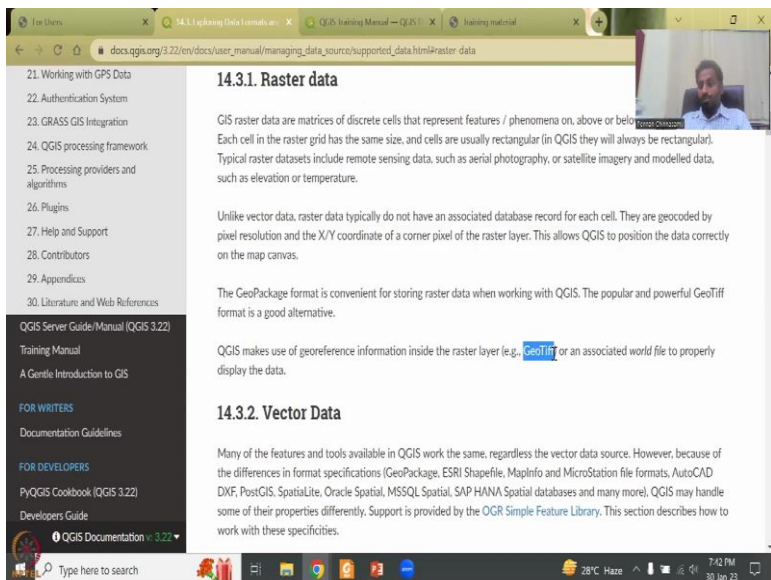
Unlike vector data, raster data typically do not have an associated database record for each cell. They are geocoded by pixel resolution and the X/Y coordinate of a corner pixel of the raster layer. This allows QGIS to position the data correctly on the map canvas.

The GeoPackage format is convenient for storing raster data when working with QGIS. The popular and powerful GeoTIFF format is a good alternative.

QGIS makes use of georeference information inside the raster layer (e.g., GeoTIFF) or an associated world file to properly display the data.

14.3.2. Vector Data

Many of the features and tools available in QGIS work the same, regardless the vector data source. However, because of the differences in format specifications (GeoPackage, ESRI Shapefile, MapInfo and MicroStation file formats, AutoCAD DXF, PostGIS, Spatialite, Oracle Spatial, MSSQL Spatial, SAP HANA Spatial databases and many more), QGIS may handle some of their properties differently. Support is provided by the OGR Simple Feature Library. This section describes how to work with these specificities.



The screenshot shows a web browser displaying the QGIS documentation page for Raster data. The page is titled "14.3.1. Raster data" and contains the following text:

GIS raster data are matrices of discrete cells that represent features / phenomena on, above or below the ground surface. Each cell in the raster grid has 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 elevation or temperature.

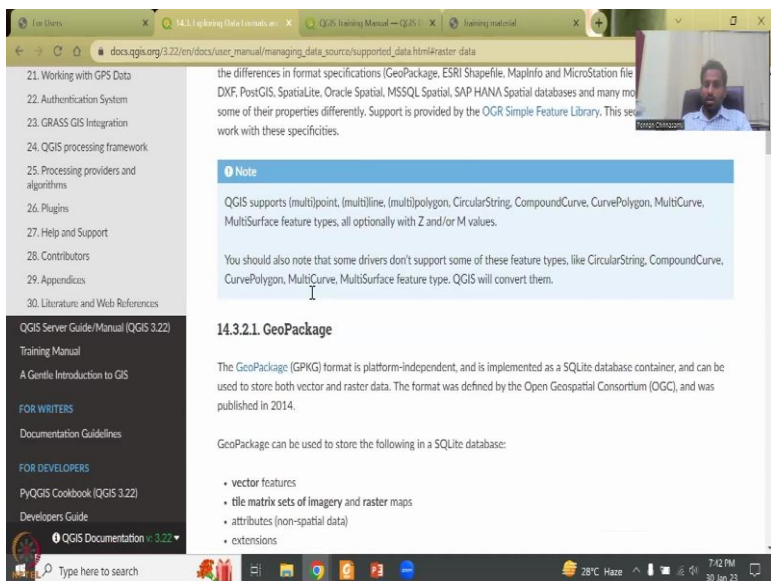
Unlike vector data, raster data typically do not have an associated database record for each cell. They are geocoded by pixel resolution and the X/Y coordinate of a corner pixel of the raster layer. This allows QGIS to position the data correctly on the map canvas.

The GeoPackage format is convenient for storing raster data when working with QGIS. The popular and powerful GeoTIFF format is a good alternative.

QGIS makes use of georeference information inside the raster layer (e.g., GeoTIFF) or an associated world file to properly display the data.

14.3.2. Vector Data

Many of the features and tools available in QGIS work the same, regardless the vector data source. However, because of the differences in format specifications (GeoPackage, ESRI Shapefile, MapInfo and MicroStation file formats, AutoCAD DXF, PostGIS, Spatialite, Oracle Spatial, MSSQL Spatial, SAP HANA Spatial databases and many more), QGIS may handle some of their properties differently. Support is provided by the OGR Simple Feature Library. This section describes how to work with these specificities.



The screenshot shows a web browser displaying the QGIS documentation page for Vector Data. The page is titled "14.3.2. Vector Data" and contains the following text:

Many of the features and tools available in QGIS work the same, regardless the vector data source. However, because of the differences in format specifications (GeoPackage, ESRI Shapefile, MapInfo and MicroStation file formats, AutoCAD DXF, PostGIS, Spatialite, Oracle Spatial, MSSQL Spatial, SAP HANA Spatial databases and many more), QGIS may handle some of their properties differently. Support is provided by the OGR Simple Feature Library. This section describes how to work with these specificities.

Note

QGIS supports (multi)point, (multi)line, (multi)polygon, CircularString, CompoundCurve, CurvePolygon, MultiCurve, MultiSurface feature types, all optionally with Z and/or M values.

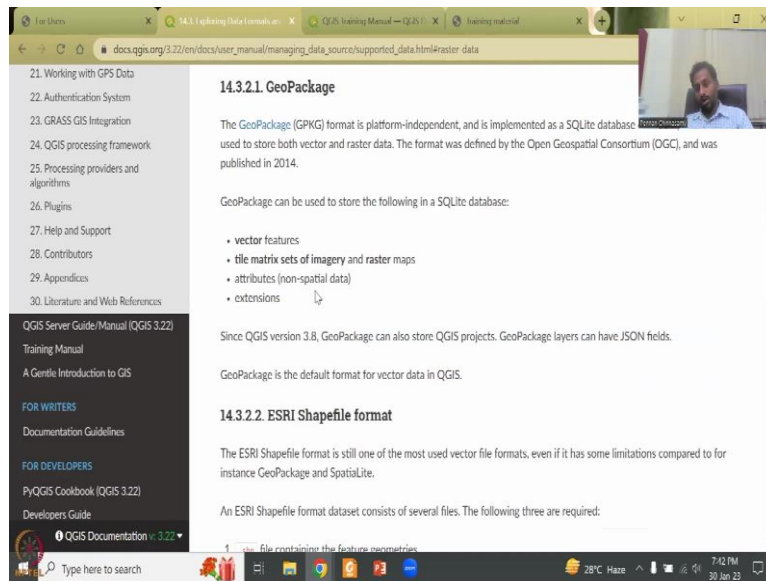
You should also note that some drivers don't support some of these feature types, like CircularString, CompoundCurve, CurvePolygon, MultiCurve, MultiSurface feature type. QGIS will convert them.

14.3.2.1. GeoPackage

The GeoPackage (GPKG) format is platform-independent, and is implemented as a SQLite database container, and can be used to store both vector and raster data. The format was defined by the Open Geospatial Consortium (OGC), and was published in 2014.

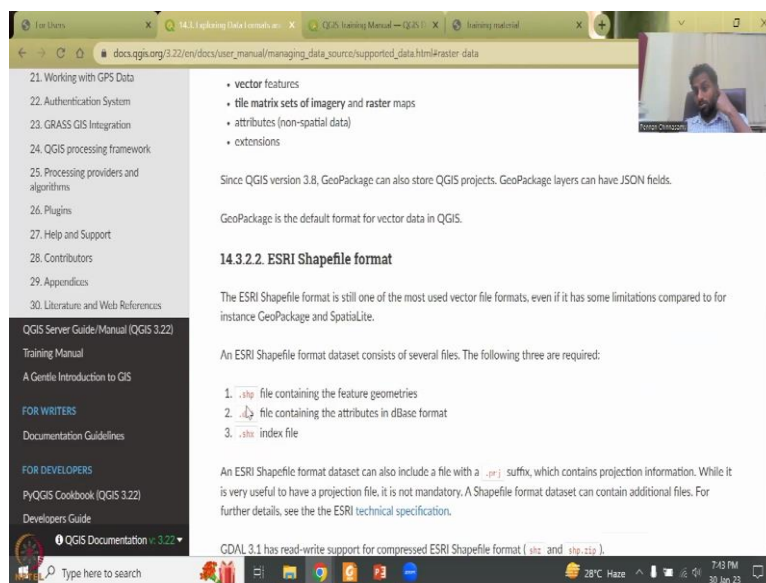
GeoPackage can be used to store the following in a SQLite database:

- vector features
- tile matrix sets of imagery and raster maps
- attributes (non-spatial data)
- extensions



Let us click the raster data, what is the difference between the raster and then how it is continuous data, what kind of format it is stored etcetera. Whereas the vector data has is point, line and polygon and they talk about exceptions that are given.

(Refer Slide Time: 7:00)



docs.qgis.org/3.22/en/docs/user_manual/managing_data_source/supported_data.html#raster-data

21. Working with GPS Data
22. Authentication System
23. GRASS GIS Integration
24. QGIS processing framework
25. Processing providers and algorithms
26. Plugins
27. Help and Support
28. Contributors
29. Appendices
30. Literature and Web References

QGIS Server Guide/Manual (QGIS 3.22)
Training Manual
A Gentle Introduction to GIS

FOR WRITERS
Documentation Guidelines

FOR DEVELOPERS
PyQGIS Cookbook (QGIS 3.22)
Developers Guide

QGIS Documentation v. 3.22

Improving Performance for ESRI Shapefile format datasets

To improve the drawing performance for an ESRI Shapefile format dataset, 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 `.shx` extension.

Use these steps to create the index:

1. Load an ESRI Shapefile format dataset (see The Browser Panel)
2. Open the **Layer Properties** dialog by double-clicking on the layer name in the legend or by right-clicking and choosing **Properties...** from the context menu
3. In the **Source** tab, click the **Create Spatial Index** button

Problem loading a .prj file

If you load an ESRI Shapefile format dataset 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 in the **Layer Properties > Source** tab of the layer by clicking the **Select CRS** 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 ESRI Shapefile format dataset with QGIS, two different projection files are created: a `.prj` file with limited projection parameters, compatible with ESRI software, and a `.qpj` file, providing all the parameters of the CRS. Whenever QGIS finds a `.qpj` file, it will be used instead of the `.prj`.

Type here to search

28°C Haze 7:43 PM 30 Jan 23

docs.qgis.org/3.22/en/docs/user_manual/managing_data_source/supported_data.html#raster-data

15. Working with Vector Data
16. Working with Raster Data
17. Working with Mesh Data
18. Working with Vector Tiles
19. Laying out the maps
20. Working with OGC / ISO protocols
21. Working with GPS Data
22. Authentication System
23. GRASS GIS Integration
24. QGIS processing framework
25. Processing providers and algorithms
26. Plugins
27. Help and Support
28. Contributors
29. Appendices
30. Literature and Web References

QGIS Server Guide/Manual (QGIS 3.22)
Training Manual
A Gentle Introduction to GIS

FOR WRITERS
Documentation Guidelines

FOR DEVELOPERS
PyQGIS Cookbook (QGIS 3.22)
Developers Guide

QGIS Documentation v. 3.22

1. `.shp` file containing the feature geometries
2. `.shx` file containing the attributes in dBase format
3. `.shx` index file

An ESRI Shapefile format dataset can also include a file with a `.prj` suffix, which contains projection information. While it is very useful to have a projection file, it is not mandatory. A Shapefile format dataset can contain additional files. For further details, see the ESRI technical specification.

QGIS 3.1 has read-write support for compressed ESRI Shapefile format (`.shz` and `.shp.zip`).

Improving Performance for ESRI Shapefile format datasets

To improve the drawing performance for an ESRI Shapefile format dataset, 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 `.shx` extension.

Use these steps to create the index:

1. Load an ESRI Shapefile format dataset (see The Browser Panel)
2. Open the **Layer Properties** dialog by double-clicking on the layer name in the legend or by right-clicking and choosing **Properties...** from the context menu
3. In the **Source** tab, click the **Create Spatial Index** button

Problem loading a .prj file

If you load an ESRI Shapefile format dataset with a `.prj` file and QGIS is not able to read the coordinate reference system

Type here to search

28°C Haze 7:43 PM 30 Jan 23

docs.qgis.org/3.22/en/docs/user_manual/managing_data_source/supported_data.html#raster-data

21. Working with GPS Data
22. Authentication System
23. GRASS GIS Integration
24. QGIS processing framework
25. Processing providers and algorithms
26. Plugins
27. Help and Support
28. Contributors
29. Appendices
30. Literature and Web References

QGIS Server Guide/Manual (QGIS 3.22)
Training Manual
A Gentle Introduction to GIS

FOR WRITERS
Documentation Guidelines

FOR DEVELOPERS
PyQGIS Cookbook (QGIS 3.22)
Developers Guide

QGIS Documentation v. 3.22

If you load an ESRI Shapefile format dataset 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 in the **Layer Properties > Source** tab of the layer by clicking the **Select CRS** 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 ESRI Shapefile format dataset with QGIS, two different projection files are created: a `.prj` file with limited projection parameters, compatible with ESRI software, and a `.qpj` file, providing all the parameters of the CRS. Whenever QGIS finds a `.qpj` file, it will be used instead of the `.prj`.

14.3.2.3. Delimited Text Files

Delimited text files are very common and widely used because of their simplicity and readability - data can be viewed and edited in a plain text editor. A delimited text file is tabular data with columns separated by a defined character and rows separated by line breaks. The first row usually contains the column names. A common type of delimited text file is a CSV (Comma Separated Values), with columns separated by commas. Delimited text files can also contain positional information (see Storing geometry information in delimited text files).

QGIS allows you to load a delimited text file as a layer or an ordinary table (see The Browser Panel or Importing a delimited text file). First check that the file meets the following requirements:

1. The file must have a delimited header row of field names. This must be the first line of the data (ideally the first row in the text file).
2. If geometry should be enabled, the file must contain field(s) that define the geometry. These field(s) can have any name.
3. The X and Y coordinates fields (if geometry is defined by coordinates) must be specified as numbers. The coordinate

Type here to search

28°C Haze 7:43 PM 30 Jan 23

So, this tutorial can also be reading material for you and they do look at the ESRI shape format. So, ESRI is a proprietary software for mapping like QGIS there is an ESRI. It came before QGIS and hence, it has more features, tools, user community et cetera. But it is very expensive for a lot of people. So, that is why open source has been created. So, we promote a lot of open source in IIT Bombay through the FOSSEE program, which is free open source software for science and education and engineering. So, it is very, very widely accepted across the globe this program. And so I would like to also follow that and take QGIS in this NPTEL lecture.

(Refer Slide Time: 7:54)

The screenshot shows a web browser displaying the QGIS documentation page for 'Managing data source/supported_data.html#raster_data'. The page content includes:

- Some things to note about the text file:
 1. The example text file uses ; (semicolon) as delimiter (any character can be used to delimit the fields).
 2. The first row is the header row. It contains the fields x, y and HAV.
 3. No quotes (") are used to delimit text fields
 4. The X coordinates are contained in the x field
 5. The Y coordinates are contained in the y field
- Storing geometry information in delimited text files**

Delimited text files can contain geometry information in two main forms:

 - As coordinates in separate columns (eg. x; y; ...), for point geometry data;
 - As well-known text (WKT) representation of geometry in a single column, for any geometry type.

Features with curved geometries (CircularString, CurvePolygon and CompoundCurve) are supported. Here are some examples of geometry types in a delimited text file with geometries coded as WKT:

```
Label;WKT_geom
1;100;100;LINESTRING(10.0 20.0, 11.0 21.0, 14.0 25.0)
CircularString;CIRCULARSTRING(260 415.227 505.227 406)
CurvePolygon;COMPOUND CURVE((1.5 4.5, 4.5 1.5, 1.5 1.5))
CompoundCurve;COMPOUND CURVE((1.5 4.5, 1.5 1.5), CIRCULARSTRING(1.5, 1.5, 2.12, 1.5, 2.12, 2.12), CIRCULARSTRING(2.12, 2.12, 3.12, 2.12))
```

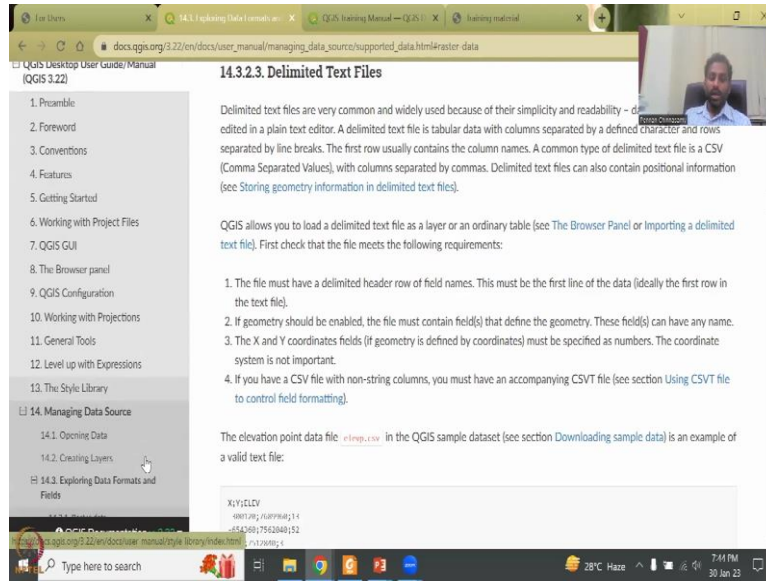
The screenshot shows the same QGIS documentation page, but scrolled down to show additional content:

- Delimited text files can contain geometry information in two main forms:
 - As coordinates in separate columns (eg. x; y; ...), for point geometry data;
 - As well-known text (WKT) representation of geometry in a single column, for any geometry type.

Features with curved geometries (CircularString, CurvePolygon and CompoundCurve) are supported. Here are some examples of geometry types in a delimited text file with geometries coded as WKT:

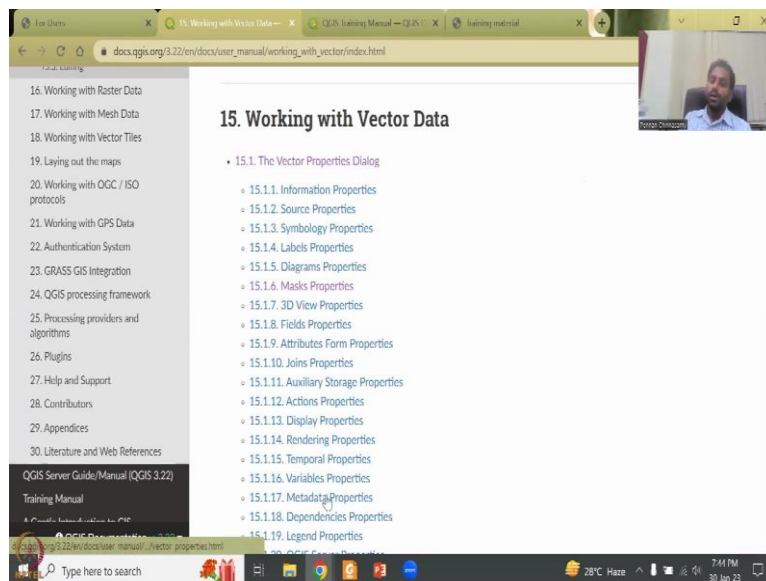
```
Label;WKT_geom
1;100;100;LINESTRING(10.0 20.0, 11.0 21.0, 14.0 25.0)
CircularString;CIRCULARSTRING(260 415.227 505.227 406)
CurvePolygon;COMPOUND CURVE((1.5 4.5, 4.5 1.5, 1.5 1.5))
CompoundCurve;COMPOUND CURVE((1.5 4.5, 1.5 1.5), CIRCULARSTRING(1.5, 1.5, 2.12, 1.5, 2.12, 2.12), CIRCULARSTRING(2.12, 2.12, 3.12, 2.12))
```
- Delimited text files also support Z and M coordinates in geometries:

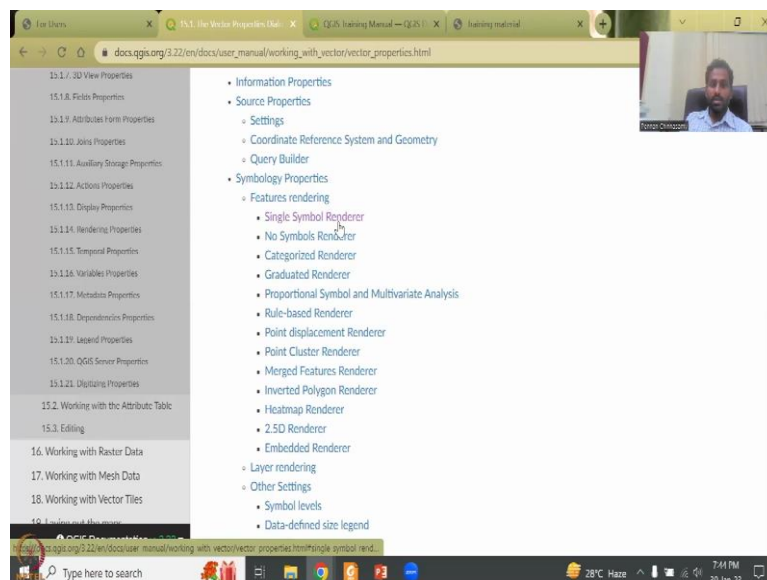
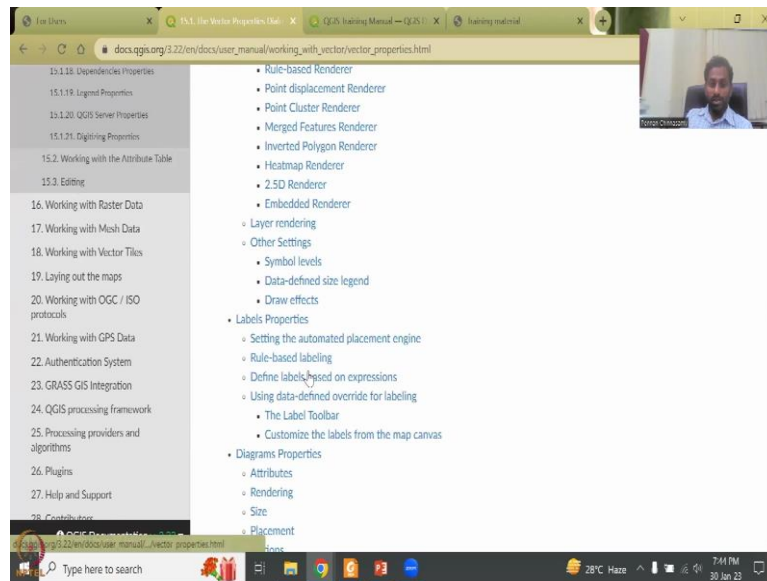

```
1;100;100;100;LINESTRING(10.0 20.0 40.0, 11.0 21.0 41.0, 11.0 22.0 40.0)
```
- Using CSVT file to control field formatting**



So, you could see some other formats and how it is being stored et cetera. As I said, those who would like to brush up on the basics, the materials here, you could go ahead and read through it.

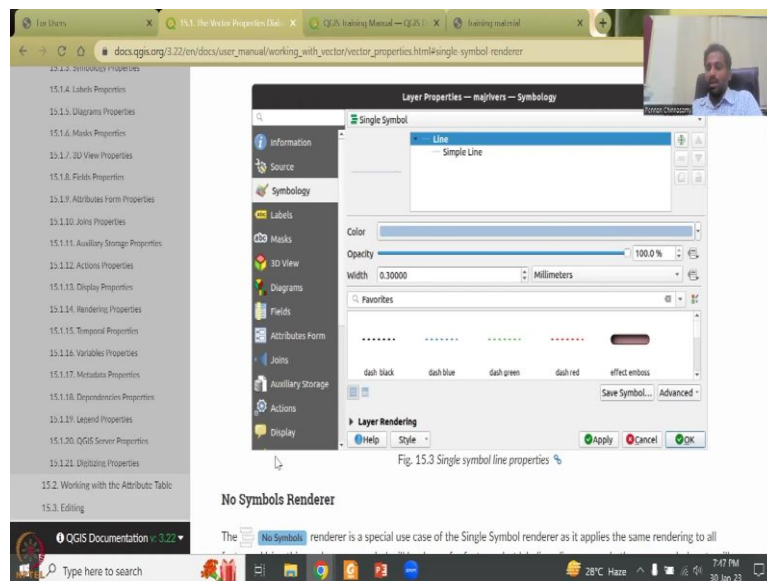
(Refer Slide Time: 8:07)





So, we will go to working with vector data, so you will have multiple multiple points to discuss the vector properties dialog what it means. Then it will go through each and every point that you would like to discuss in using vector data.

(Refer Slide Time: 8:32)



Let us say see, single simple render. If I click the single sample render, you could see that how you style your vector data in the database can be done. For example, sometimes the data may come in a particular style and format. It will not look that appealing in a map. So, here is where if you right click on the data and then go to properties you will get into this layer property data for data visualization tool and dashboard.

In the dashboard you can see source, symbology, labels, masks, 3D view diagrams, fields, attributes, etcetera, etcetera. The most key I would say is source where you find information about the data, which is called the meta data. Whereas, the other important aspect in this properties is the symbology. Please understand that maps you can do to analyze and get data out or analyze the data that is fine. But at the end of the day, you are also creating a visualization tool. So, you are going to visualize the results maps.

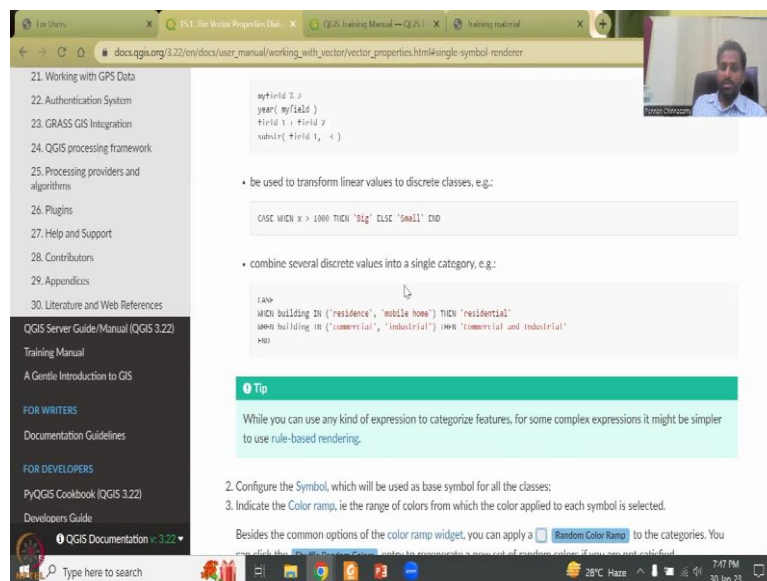
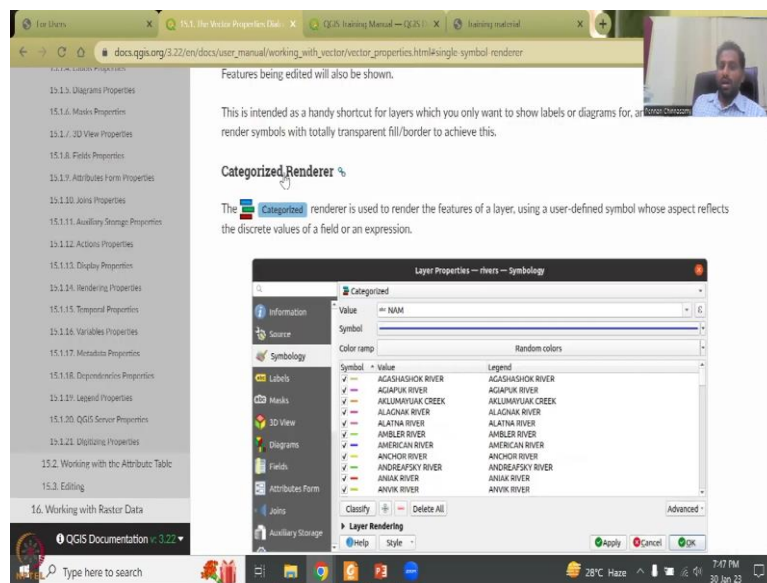
So, the maps have to be well observed by the viewer and stakeholder for which the styling is very important. In some software is called styling. Here is called symbology. And it gives you about, for example, here, the line is a simple line, it is not dash dash line or a star star line, it is a simple solid line. And the color of the line is given. Opacity is when you place it on the top of a map is it blocking the data below it because maps are in layers.

So, these kinds of very, very important aspects are given, the thickness of the line, what you get is the thickness. If you would like to have a template of design, you have dashed black, dashed blue, dashed green, and effect emboss. These kind of things are there. These are saved styles that you can quickly use without changing color, obesity with unit etcetera. Again, if

you do not know all this, we can always go with the default setting. Some of the data here are default. So, you can just click and then say accept, apply, and then it will come up.

The other thing I would like you to notice, sometimes the dashboard visualized here on the page will not be the same as your software. This is because the software would have updated, the bullets, the points on the left hand side would have changed. However, most of it will be there. So, do not worry that the system, the way you use, it will change it that will not change. Only thing is there will be addition and some tools will be removed or some bullets on the left would be removed.

(Refer Slide Time: 11:51)



docs.qgis.org/3.22/en/docs/user_manual/working_with_vector/vector_properties.html#single-symbol-renderer

- You can **hide** categories, **hide** selected categories or **lock/unlock** or **freeze**.
- A class can be disabled by unchecking the checkbox to the left of the class name; the corresponding class is hidden on the map.
- Drag-and-drop the rows to reorder the classes
- To change the symbol, the value or the legend of a class, double click the item.

Right-clicking over selected item(s) shows a contextual menu to:

- **Copy Symbol** and **Paste Symbol**, a convenient way to apply the item's representation to others
- **Change Color...** of the selected symbol(s)
- **Change Opacity...** of the selected symbol(s)
- **Change Outline Line...** of the selected symbol(s)
- **Change Width...** of the selected line symbol(s)
- **Change Size...** of the selected point symbol(s)
- **Change Angle...** of the selected point symbol(s)
- **Merge Categories**: Groups multiple selected categories into a single one. This allows simpler styling of layers with a large number of categories, where it may be possible to group numerous distinct categories into a smaller and more manageable set of categories which apply to multiple values.

Tip

Since the symbol kept for the merged categories is the one of the topmost selected category in the list, you may want to move the category whose symbol you wish to reuse to the top before merging.

- **Unmerge Categories** that were previously merged

docs.qgis.org/3.22/en/docs/user_manual/working_with_vector/vector_properties.html#single-symbol-renderer

The **Advanced** menu gives access to options to speed classification or fine-tune the symbols rendering:

- **Match to saved symbols** - Using the symbols library, assigns to each category a symbol whose name is the classification value of the category
- **Match to symbols from file...** - Provided a file with symbols, assigns to each category a symbol whose name represents the classification value of the category
- **Symbol levels...** to define the order of symbols rendering.

Tip

Edit categories directly from the Layers panel

When a layer symbology is based on a categorized, graduated or rule-based symbology mode, you can edit each of the categories from the **Layers** Panel. Right-click on a sub-item of the layer and you will:

- **Toggle items** visibility
- **Show all items**
- **Hide all items**
- Modify the symbol color thanks to the color selector wheel
- **Edit symbol...** from the symbol selector dialog
- **Copy symbol**
- **Paste symbol**

Graduated Renderer

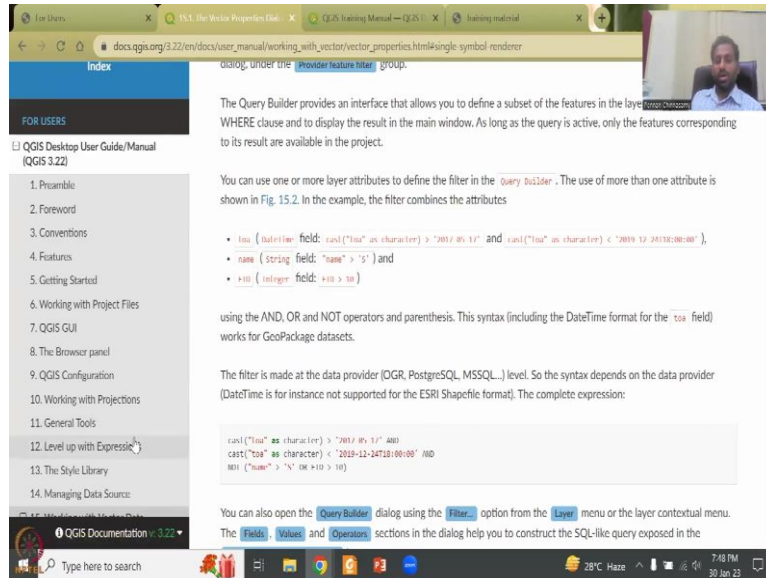
docs.qgis.org/3.22/en/docs/user_manual/working_with_vector/vector_properties.html#single-symbol-renderer

Heatmap Renderer

With the **Heatmap** renderer you can create live dynamic heatmaps for (multi)point layers. You can choose the radius in millimeters, points, pixels, map units or inches, choose and edit a color ramp for the heatmap style and use a slider for selecting a trade-off between render speed and quality. You can also define a maximum value limit and give a weight to points using a field or an expression. When adding or removing a feature the heatmap renderer updates the heatmap style automatically.

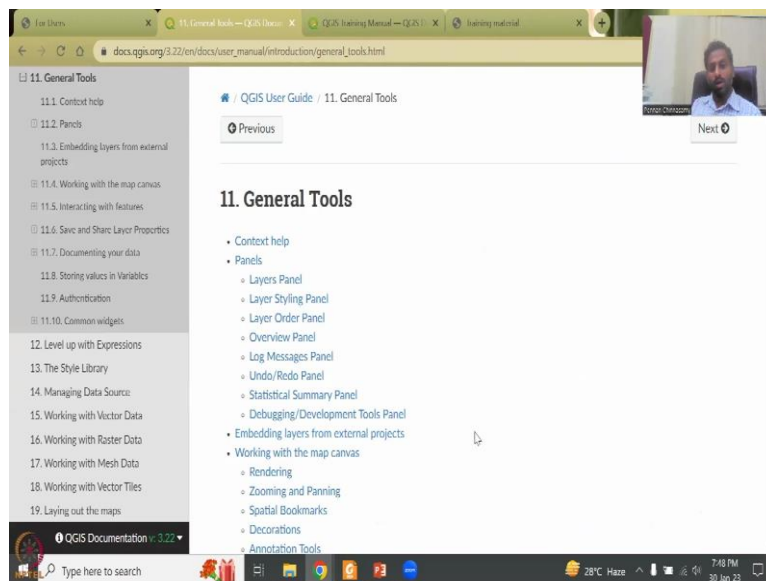
The screenshot shows the 'Layer Properties' dialog for a heatmap. The 'Symbology' tab is active, showing a 'Heatmap' style. The 'Color ramp' is set to a blue-to-red gradient. The 'Radius' is 10.000000 Millimeters. The 'Maximum value' is set to 'Automatic'. The 'Weight points by' is set to '1.1 cat'. The 'Rendering quality' is set to 'Best'. There are 'Apply', 'Cancel', and 'OK' buttons at the bottom.

Fig. 15.11 Heatmap dialog



So, you could see how you could do CAD categorization, and then rendering it with names, labels, etcetera, etcetera. It is very extensive. It runs through multiple pages. I will not again cover all this. But it will be good for those who have limited basics to look at this.

(Refer Slide Time: 12:14)



The Z-ordering behavior can be overridden by the Layer Order panel.

At the top of the Layers panel, a toolbar allows you to:

- Open the layer styling dock (F7): toggle the layer styling panel on and off.
- Add new group: see Interact with groups and layers
- Manage Map Themes: control visibility of layers and arrange them in different map themes.
- Filter layers in the legend tree:
 - Filter Legend by Map Content: only the layers that are set visible and whose features intersect the current map canvas have their style rendered in the layers panel. Otherwise, a generic NULL symbol is applied to the layer. Based on the layer symbology, this is a convenient way to identify which kind of features from which layers cover your area of interest.
 - Show Private Layers: a convenient shortcut to display and interact with private layers in the Layers panel without modifying the project settings.
 - Filter Legend by Expression: apply an expression to remove styles from the selected layer tree that have no feature satisfying the condition. This can be used to highlight features that are within a given area/feature of another layer. From the drop-down list, you can edit and clear the expression currently applied.
- Expand All or Collapse All layers and groups in the layers panel.
- Remove Layer/Group: currently selected.




Fig. 11.1 Layer Toolbar in Layers Panel

Tools to manage the layers panel are also available for map and legend items in print layouts

11.2.1.1. Configuring map themes

The Manage Map Themes drop-down button provides access to convenient shortcuts to manipulate visibility of the layers in the Layers panel:

- Show All Layers
- Hide All Layers
- Show Selected Layers
- Hide Selected Layers
- Toggle Selected Layers: changes the visibility of the first selected layer in the panel, and applies that state to the other selected layers. Also accessible through `space` shortcut.
- Toggle Selected Layers Independently: changes the visibility status of each selected layer
- Hide Deselected Layers

Beyond the simple control of layer visibility, the Manage Map Themes menu allows you to configure Map Themes in the legend and switch from one map theme to another. A map theme is a snapshot of the current map legend that records:

- the layers set as visible in the Layers panel
- and for each visible layer:
 - the reference to the style applied to the layer
 - the visible classes of the style, ie the layer checked node items in the Layers panel. This applies to symbologies other than the single symbol rendering
 - the collapsed/expanded state of the layer node(s) and the group(s) it's placed inside

To create a map theme:

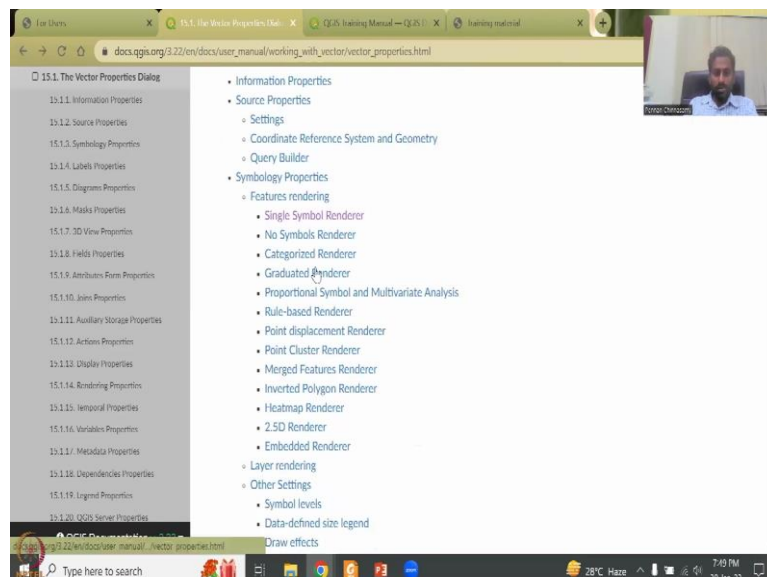
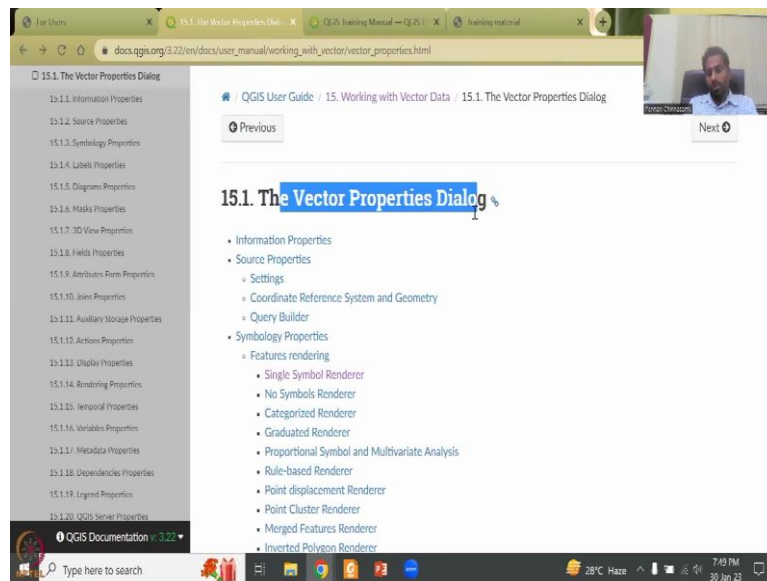
1. Check a layer you want to show
2. Configure the layer properties (symbology, diagram, labels...) as usual
3. Expand the Style menu at the bottom and click on Add... to store the settings as a new style embedded in the project

Note: A map theme does not remember the current details of the properties: only a reference to the style name is saved, so whenever you apply modifications to the layer while this style is enabled (eg change the symbology rendering), the map theme is updated with new information.

4. Repeat the previous steps as necessary for the other layers
5. If applicable, expand or collapse groups or visible layer nodes in the Layers panel
6. Click on the Manage Map Themes button on top of the panel, and Add Theme
7. Enter the map theme's name and click OK

So, then what you do is you can also come to the general tools, where you have layer panels, what does it mean? Like it gives you the styling tog, new group, filters the legends tree, and then configuring a map themes, show all layers, hide all layers, select layers, all these things, because you will be layering your data, it is good to have only those data that are needed for your map to be visualized. You can have it in your stack on the background, but make sure that you do not have to show all the data upfront. It is not needed. So, this is about your general tools about in QGIS.

(Refer Slide Time: 13:09)



docs.qgis.org/3.22/en/docs/user_manual/working_with_vector/vector_properties.html

- 15.1. The Vector Properties Dialog
 - 15.1.1. Information Properties
 - 15.1.2. Source Properties
 - 15.1.3. Symbology Properties
 - 15.1.4. Labels Properties
 - 15.1.5. Diagrams Properties
 - 15.1.6. Masks Properties
 - 15.1.7. 3D View Properties
 - 15.1.8. Fields Properties
 - 15.1.9. Attribute Form Properties
 - 15.1.10. Joins Properties
 - 15.1.11. Auxiliary Storage Properties
 - 15.1.12. Actions Properties
 - 15.1.13. Display Properties
 - 15.1.14. Rendering Properties
 - 15.1.15. Temporal Properties
 - 15.1.16. Variables Properties
 - 15.1.17. Metadata Properties
 - 15.1.18. Dependencies Properties
 - 15.1.19. Legend Properties
 - 15.1.20. QGIS Server Properties
- No Symbols Renderer
- Categorized Renderer
- Graduated Renderer
- Proportional Symbol and Multivariate Analysis
- Rule-based Renderer
- Point displacement Renderer
- Point Cluster Renderer
- Merged Features Renderer
- Inverted Polygon Renderer
- Heatmap Renderer
- 2.5D Renderer
- Embedded Renderer
- Layer rendering
- Other Settings
 - Symbol levels
 - Data-defined size legend
 - Draw effects
- Labels Properties
 - Setting the automated placement engine
 - Rule-based labeling
 - Define labels based on expressions
 - Using data-defined override for labeling
 - The Label Toolbar
 - Customize the labels from the map canvas
- Diagrams Properties

docs.qgis.org/3.22/en/docs/user_manual/working_with_vector/vector_properties.html

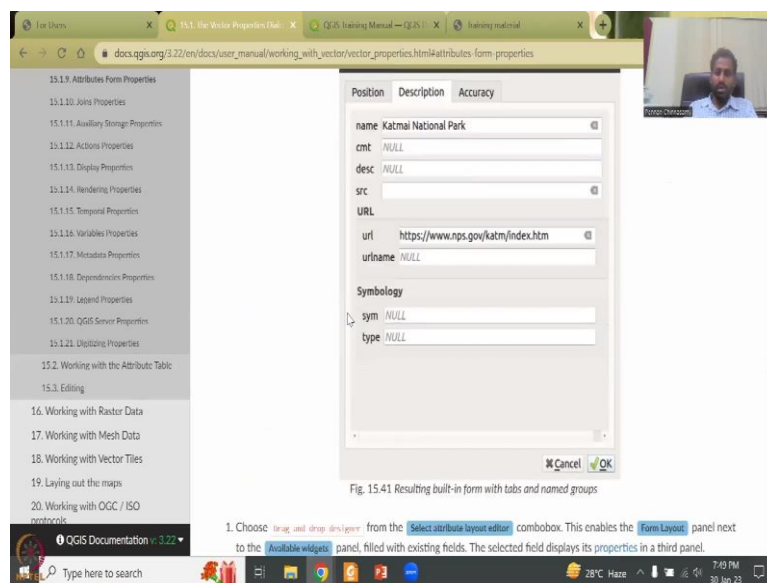
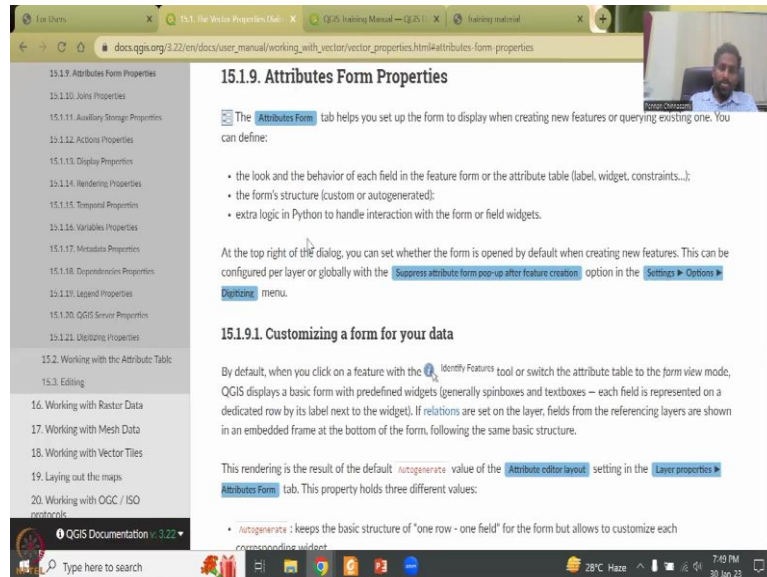
- 15.1. The Vector Properties Dialog
 - 15.1.1. Information Properties
 - 15.1.2. Source Properties
 - 15.1.3. Symbology Properties
 - 15.1.4. Labels Properties
 - 15.1.5. Diagrams Properties
 - 15.1.6. Masks Properties
 - 15.1.7. 3D View Properties
 - 15.1.8. Fields Properties
 - 15.1.9. Attribute Form Properties
 - 15.1.10. Joins Properties
 - 15.1.11. Auxiliary Storage Properties
 - 15.1.12. Actions Properties
 - 15.1.13. Display Properties
 - 15.1.14. Rendering Properties
 - 15.1.15. Temporal Properties
 - 15.1.16. Variables Properties
 - 15.1.17. Metadata Properties
 - 15.1.18. Dependencies Properties
 - 15.1.19. Legend Properties
 - 15.1.20. QGIS Server Properties
- Labels Properties
 - Setting the automated placement engine
 - Rule-based labeling
 - Define labels based on expressions
 - Using data-defined override for labeling
 - The Label Toolbar
 - Customize the labels from the map canvas
- Diagrams Properties
 - Attributes
 - Rendering
 - Size
 - Placement
 - Options
 - Legend
- Masks Properties
- 3D View Properties
- Fields Properties
- Attribute Form Properties
 - Customizing a form for your data
 - The autogenerated form
 - The drag and drop designer
 - Using custom ui-file
 - Enhance your form with custom functions
 - Configure the field behavior
 - Common settings

docs.qgis.org/3.22/en/docs/user_manual/working_with_vector/vector_properties.html

- 15.1. The Vector Properties Dialog
 - 15.1.1. Information Properties
 - 15.1.2. Source Properties
 - 15.1.3. Symbology Properties
 - 15.1.4. Labels Properties
 - 15.1.5. Diagrams Properties
 - 15.1.6. Masks Properties
 - 15.1.7. 3D View Properties
 - 15.1.8. Fields Properties
 - 15.1.9. Attribute Form Properties
 - 15.1.10. Joins Properties
 - 15.1.11. Auxiliary Storage Properties
 - 15.1.12. Actions Properties
 - 15.1.13. Display Properties
 - 15.1.14. Rendering Properties
 - 15.1.15. Temporal Properties
 - 15.1.16. Variables Properties
 - 15.1.17. Metadata Properties
 - 15.1.18. Dependencies Properties
 - 15.1.19. Legend Properties
 - 15.1.20. QGIS Server Properties
- Attributes
- Rendering
- Size
- Placement
- Options
- Legend
- Masks Properties
- 3D View Properties
- Fields Properties
- Attribute Form Properties
 - Customizing a form for your data
 - The autogenerated form
 - The drag and drop designer
 - Using custom ui-file
 - Enhance your form with custom functions
 - Configure the field behavior
 - Common settings
 - Widget display
 - General options
 - Default values
 - Constraints
 - Edit widgets
- Joins Properties
- Auxiliary Storage Properties

And more importantly, your user guide gives you how to work with vectors, symbols and then all the symbols styling, different symbols, drawing effects, label properties, et cetera. And then all the left hand side that you saw masks, label, join attributes, everything are given here.

(Refer Slide Time: 13:32)



So, you do have attributes from properties, where you can collect data, and then added in the Attributes section. So, you can customize your data, you can auto generate your data all these kinds of things can be done. Again, we will be working mostly with data that is taken from government resources, and then applied here as a tool. So, we have already seen Bhuvan, NASA Data etcetera. Most of them are raster data, but we can also look at how to collect data from observation data and then added as attributes here.

(Refer Slide Time: 14:15)

The screenshot shows a web browser displaying a form for 'Katmai National Park'. The form has three main sections: Position, Description, and Accuracy. The 'name' field contains 'Katmai National Park'. The 'url' field contains 'https://www.nps.gov/katm/index.htm'. The 'Symbology' section has 'sym' and 'type' fields, both set to 'NULL'. The form is titled 'Form Properties' and has 'Cancel' and 'OK' buttons at the bottom.

Fig. 15.41 Resulting built-in form with tabs and named groups

1. Choose `drag_and_drop Designer` from the `Select attribute layout editor` combobox. This enables the `Form Layout` panel next to the `Available widgets` panel, filled with existing fields. The selected field displays its properties in a third panel.

The screenshot shows the '18. Working with Vector Tiles' section of the QGIS documentation. The left sidebar contains a table of contents with '24. QGIS processing framework' selected. The main content area has the heading '18. Working with Vector Tiles' and a list of sub-sections: 'What are Vector Tiles?', 'Supported Formats', and 'Vector Tiles Dataset Properties'. The 'Vector Tiles Dataset Properties' section is expanded, showing 'Information Properties', 'Symbology and Label Properties', and 'Metadata Properties'. Below this is the sub-section '18.1. What are Vector Tiles?' with a paragraph of text.

18. Working with Vector Tiles

- What are Vector Tiles?
- Supported Formats
- Vector Tiles Dataset Properties
 - Information Properties
 - Symbology and Label Properties
 - Metadata Properties

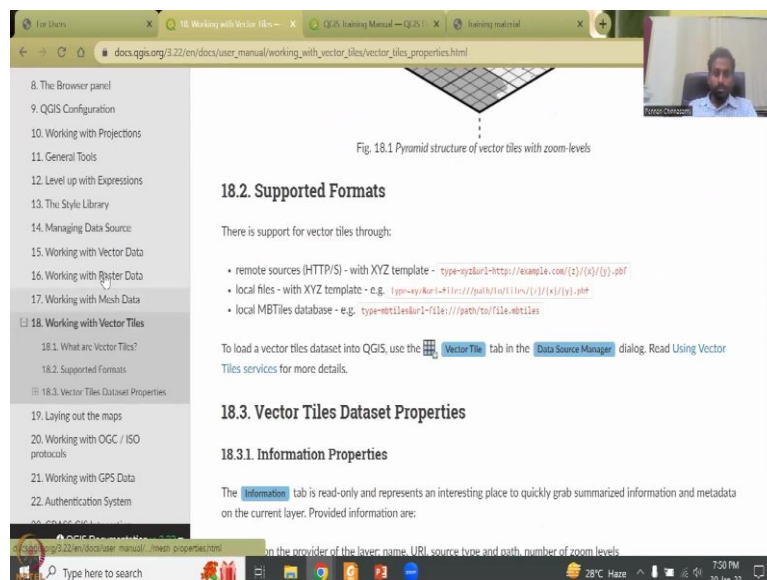
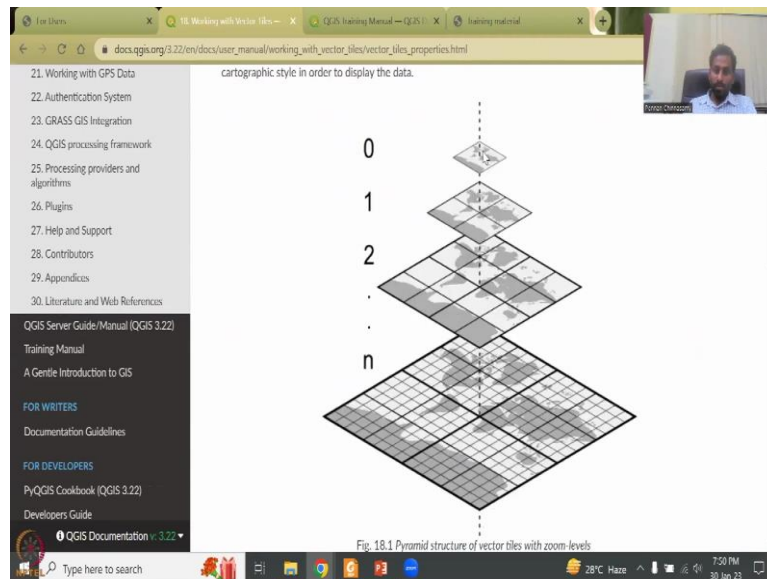
18.1. What are Vector Tiles?

Vector tiles are packets of geographic data, packaged into pre-defined roughly-square shaped "tiles" for transfer over the web. They combine pre-rendered raster map tiles and vector map tiles. The vector tile server returns vector map data, which has been clipped to the boundaries of each tile, instead of a pre-rendered map image. The clipped tiles represent the zoom-levels of the vector tile service, derived from a pyramid approach. Using this structure, the data-transfer is reduced in comparison to un-tiled vector maps. Only data within the current map view, and at the current zoom level need to be transferred. Also, compared to a tiled raster map, data transfer is also greatly reduced, as vector data is typically much smaller than a rendered bitmap. Vector tiles do not have any styling information assigned so QGIS needs to apply a

The screenshot shows the '18.1. What are Vector Tiles?' section of the QGIS documentation. The text explains that vector tiles are packets of geographic data, packaged into pre-defined roughly-square shaped "tiles" for transfer over the web. It describes how they combine pre-rendered raster map tiles and vector map tiles, and how the vector tile server returns vector map data, which has been clipped to the boundaries of each tile. The text also mentions that the clipped tiles represent the zoom-levels of the vector tile service, derived from a pyramid approach. A diagram below the text illustrates this pyramid approach, showing a series of tiles at different zoom levels, labeled 0, 1, 2, ..., n. The tiles are arranged in a pyramid shape, with the top tile being the smallest and the bottom tile being the largest. The diagram shows a central vertical axis with a dashed line, and the tiles are arranged in a grid pattern that tapers towards the top.

18.1. What are Vector Tiles?

Vector tiles are packets of geographic data, packaged into pre-defined roughly-square shaped "tiles" for transfer over the web. They combine pre-rendered raster map tiles and vector map tiles. The vector tile server returns vector map data, which has been clipped to the boundaries of each tile, instead of a pre-rendered map image. The clipped tiles represent the zoom-levels of the vector tile service, derived from a pyramid approach. Using this structure, the data-transfer is reduced in comparison to un-tiled vector maps. Only data within the current map view, and at the current zoom level need to be transferred. Also, compared to a tiled raster map, data transfer is also greatly reduced, as vector data is typically much smaller than a rendered bitmap. Vector tiles do not have any styling information assigned so QGIS needs to apply a cartographic style in order to display the data.



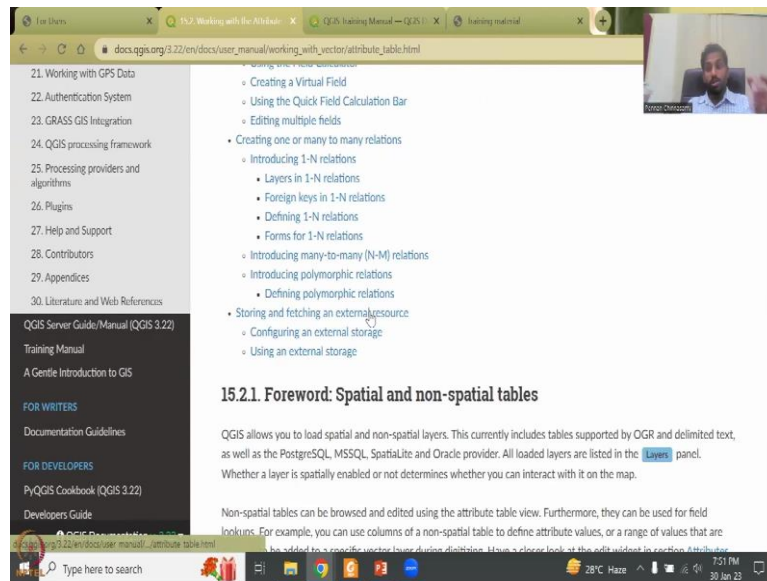
Then we also have vector tiles, which tiles are packets of geographic data packed together. because as I said, when you send data or when you share data, sometimes it is better to share as a pack as a database. That can also be done here, where multiple data are added, and then given us a vector tile.

(Refer Slide Time: 14:43)

The screenshot shows a web browser displaying the QGIS documentation page for 'Working with the Attribute Table'. The page is titled 'docs.qgis.org/3.22/en/docs/user_manual/working_with_vector/index.html'. The left sidebar contains a navigation menu with categories like 'FOR WRITERS' and 'FOR DEVELOPERS'. The main content area lists various topics under '15.2. Working with the Attribute Table', including '15.2.1. Foreword: Spatial and non-spatial tables', '15.2.2. Introducing the attribute table interface', '15.2.3. Interacting with features in an attribute table', '15.2.4. Using action on features', '15.2.5. Editing attribute values', '15.2.6. Creating one or many to many relations', '15.2.7. Storing and fetching an external resource', and '15.3. Editing'. A video feed of a presenter is visible in the top right corner.

The screenshot shows the main content of the '15.2. Working with the Attribute Table' page. The page title is '15.2. Working with the Attribute Table'. Below the title, there is a paragraph: 'The attribute table displays information on features of a selected layer. Each row in the table represents a feature (with or without geometry), and each column contains a particular piece of information about the feature. Features in the table can be searched, selected, moved or even edited.' Below this paragraph, there is a list of topics: 'Foreword: Spatial and non-spatial tables', 'Introducing the attribute table interface' (with sub-points: 'Table view vs Form view', 'Configuring the columns' (with sub-points: 'Resizing columns widths', 'Hiding and organizing columns and enabling actions', 'Sorting columns'), 'Formatting of table cells using conditions'), 'Interacting with features in an attribute table' (with sub-points: 'Selecting features', 'Filtering features', 'Storing filter expressions', 'Filtering and selecting features using forms'), 'Using action on features' (with sub-points: 'Saving selected features as new layer'), 'Editing attribute values' (with sub-points: 'Using the Field Calculator', 'Creating a Virtual Field', 'Using the Quick Field Calculation Bar', 'Editing multiple fields'), and 'Creating one or many to many relations' (with sub-points: 'Introducing 1-N relations' (with sub-points: 'Layers in 1-N relations', 'Foreign keys in 1-N relations', 'Defining 1-N relations', 'Forms for 1-N relations'), 'Introducing many-to-many (N-M) relations', 'Introducing polymorphic relations', 'Defining polymorphic relations'). A video feed of a presenter is visible in the top right corner.

The screenshot shows the main content of the '15.2. Working with the Attribute Table' page, continuing from the previous slide. The page title is '15.2. Working with the Attribute Table'. Below the title, there is a paragraph: 'The attribute table displays information on features of a selected layer. Each row in the table represents a feature (with or without geometry), and each column contains a particular piece of information about the feature. Features in the table can be searched, selected, moved or even edited.' Below this paragraph, there is a list of topics: 'Resizing columns widths' (with sub-points: 'Hiding and organizing columns and enabling actions', 'Sorting columns'), 'Formatting of table cells using conditions', 'Interacting with features in an attribute table' (with sub-points: 'Selecting features', 'Filtering features', 'Storing filter expressions', 'Filtering and selecting features using forms'), 'Using action on features' (with sub-points: 'Saving selected features as new layer'), 'Editing attribute values' (with sub-points: 'Using the Field Calculator', 'Creating a Virtual Field', 'Using the Quick Field Calculation Bar', 'Editing multiple fields'), and 'Creating one or many to many relations' (with sub-points: 'Introducing 1-N relations' (with sub-points: 'Layers in 1-N relations', 'Foreign keys in 1-N relations', 'Defining 1-N relations', 'Forms for 1-N relations'), 'Introducing many-to-many (N-M) relations', 'Introducing polymorphic relations', 'Defining polymorphic relations'). A video feed of a presenter is visible in the top right corner.

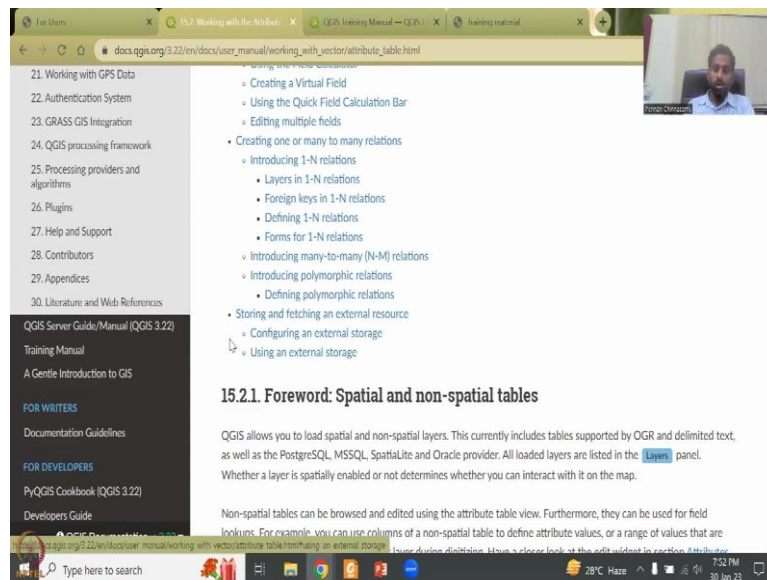
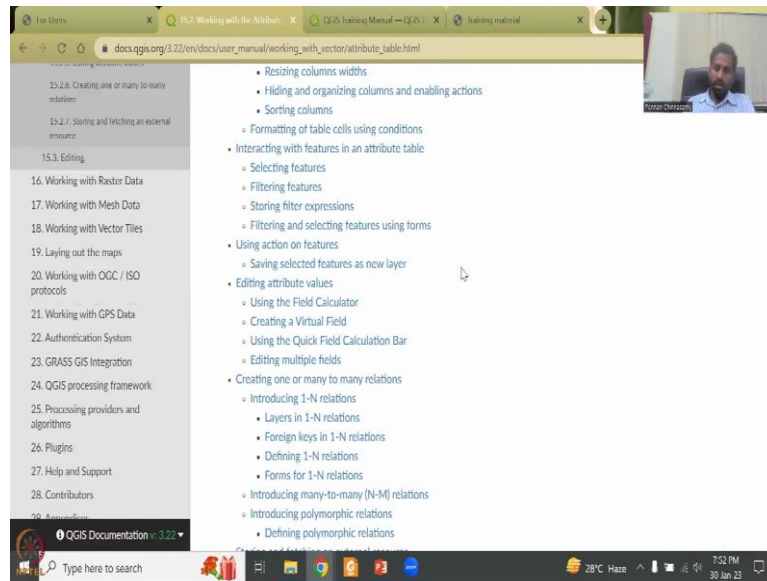


I will go back to the vector data working with the vector data, working with the attribute table. You have multiple table columns and rows. The columns define the objects whereas rows or attributes, how many entries are there. And then you could do some spatial joining of tables, because in one table there will be location like city name, whereas the other table will not have it. But you know that the ordering is linked to the city.

So, you can merge the tables. This is very important while working with vector data. Because sometimes government and non-government data has the city name and the district name implied, which means they will have a code. City 1, city 2, like as a PIN code, the PIN code tells you where the location is, for example, you have 400076 for IIT, Bombay, and Hawaii is linked to that PIN code.

But if you do not want to label it as Hawaii, you can always leave it as a number, if at all the government is collecting like that. So, my point is, if you have a data with shapefiles of districts, cities and towns, you can merge these two together by joining tables or a join tables function.

(Refer Slide Time: 16:12)



These are kind of advanced, but again, sometimes your data requires you to join and merge the data. So, that is what we are discussing here. So, that is all about this function working with vector data function. Again, as I said, there are multiple ways you could label your data, there are multiple ways you can access the data. And there are multiple ways you can store the data. So, all these have been given here, please go through it.

(Refer Slide Time: 16:44)

The screenshot shows a web browser displaying the QGIS documentation page for the Field Calculator. The page title is "15.2.5.1. Using the Field Calculator". The text explains that the Field Calculator button in the attribute table allows users to perform calculations based on existing attribute values or defined functions. It also states that the field calculator is available on any layer that supports edit. Below the text, there are two numbered steps: 1. apply calculation on the whole layer or on selected features only, and 2. create a new field for the calculation or update an existing one. A screenshot of the Field Calculator dialog box is shown, with the "Create a new field" option selected. The output field name is "length_lin", the output field type is "Decimal number (float)", and the output field length is 10 and precision is 3. The expression field is empty.

This screenshot shows the QGIS Field Calculator dialog box with the "length" function selected in the function editor. The "Create a new field" option is checked. The output field name is "length_lin", the output field type is "Decimal number (float)", and the output field length is 10 and precision is 3. The expression field contains the formula "length / 1000". The function editor shows a list of functions, with "length" selected. A tooltip for the "length" function is visible, explaining that it returns the length of a linestring. The output preview shows "34.8822218320249".

This screenshot is very similar to the previous one, showing the QGIS Field Calculator dialog box with the "length" function selected. The "Create a new field" option is checked. The output field name is "length_lin", the output field type is "Decimal number (float)", and the output field length is 10 and precision is 3. The expression field contains the formula "length / 1000". The function editor shows a list of functions, with "length" selected. A tooltip for the "length" function is visible. The output preview shows "34.8822218320249".

Fig. 15.71 Field Calculator

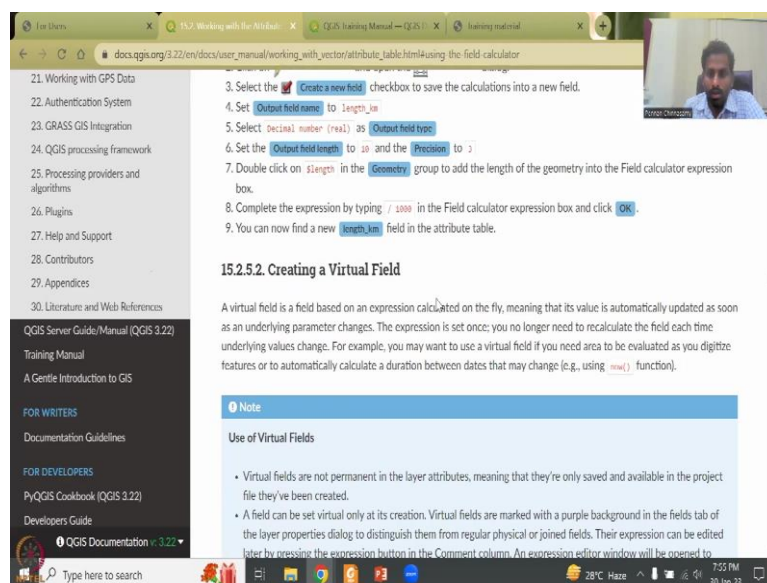
If you choose to add a new field, you need to enter a field name, a field type (integer, real, date or string) and if needed, the total field length and the field precision. For example, if you choose a field length of 10 and a field precision of 3, it means

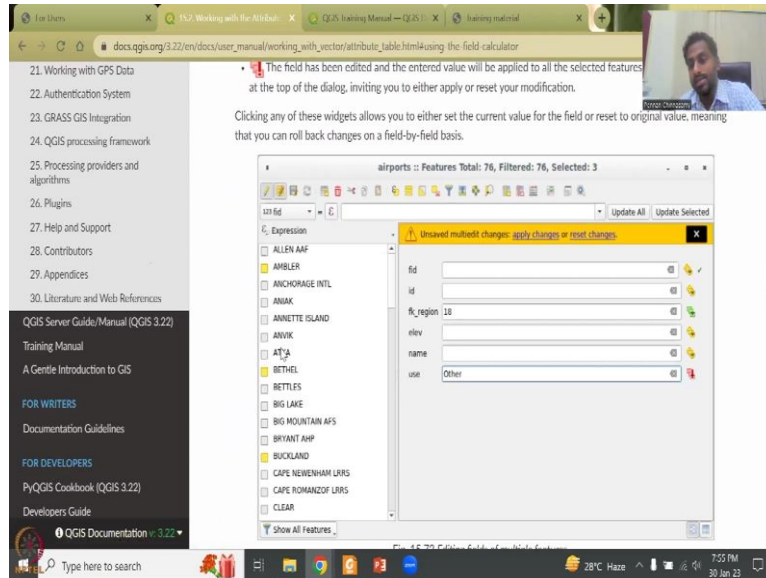
One tool that we will use more is the Field Calculator. It is actually used to create new fields, or create new rows and columns based on a existing column. For example, you have length divided by 1000. And so the function length, dollar length is how you write it the syntax, it returns the length of a nine string, if you need the length of a border of polygon, use dollar perimeter instead. So, here you could see that dollar length has given the output, the syntax is how you write the code. Here, there is a lot of codes sometimes that is where proprietary software will have this as a tool. But here, you will have to type it as a code.

If you just type it here in the search box and show help, it brings about a lot of lengths. And you know that you want to create the length of the create a new field where the length of a particular shapefile is stored. So, you could see here it is create a new field. So, in a table, you are creating a new field, a new column, and the column name is called length underscore kilometer, which means the output field is a decimal, it is a number with kilometers. So, maybe it was in meters the length, so length gives you the meter, the length of a line string in meters. So, what you would do is you divided by 1000 to get the kilometer.

So, some simple coding you will have to do. And you have to tell which column, which field you are going to take and then map it. So, you can also go and create a new field or update an existing field. If you update, the data will be corrupted or the data would be updated. So, as I always said, it is always easier to have a create new field and then preserve the old field so that you do not if you do a mistake in these kind of codings and stuff, you do not lose the initial information. So, field calculator is where you would go and delete a field, edit a field, convert a field or even create new fields as given here.

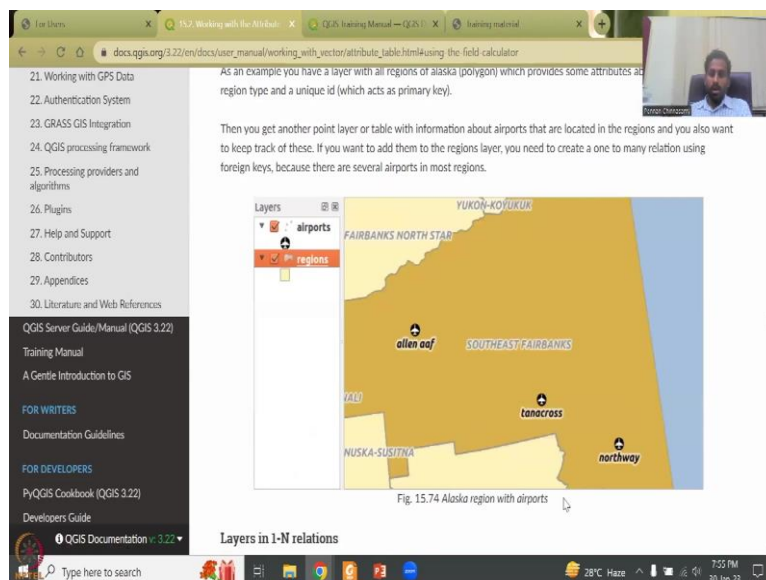
(Refer Slide Time: 19:07)





Multiple examples given editing multiples field how you would edit, use the toggle sign, the pencil sign, if you click and then say Edit, and then it will start editing. So, all these as I said, you could go through these tutorials. It has been given in the videos tutorial also. But for those who like to go through the exercise, you can go through this. It is like a cookbook recipe we say where we click click click and then each picture each image that comes is also given in the website so you can compare and then work through these homeworks.

(Refer Slide Time: 19:43)



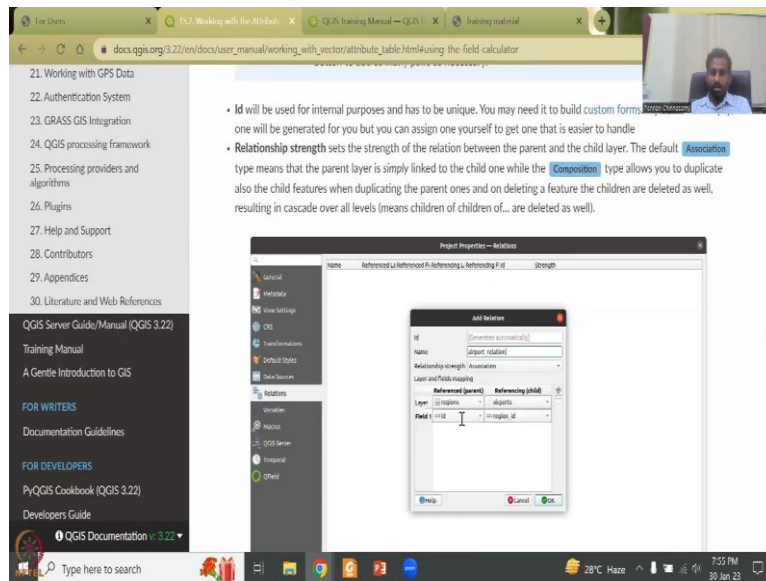


Fig. 15.75 Adding a relation between regions and airports layers

From the **Relations** tab, you can also press the **Discover Relation** button to fetch the relations available from the providers of the loaded layers. This is possible for layers stored in data providers like PostgreSQL or Spatialite.

Forms for 1-N relations

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 identity 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.

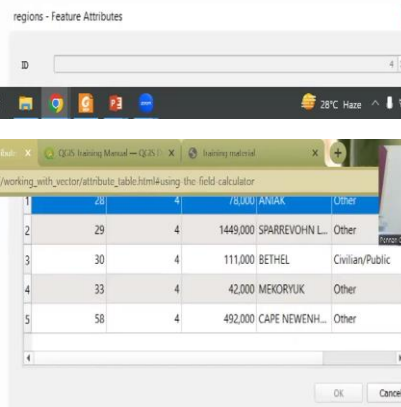


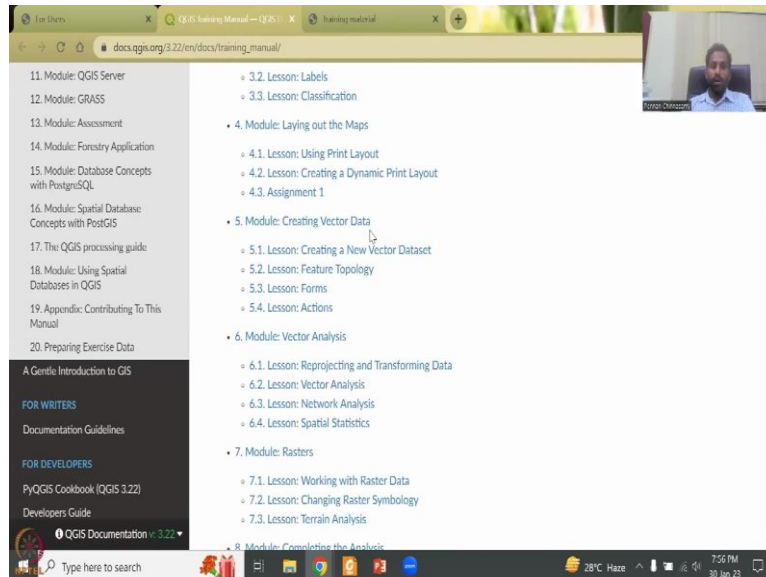
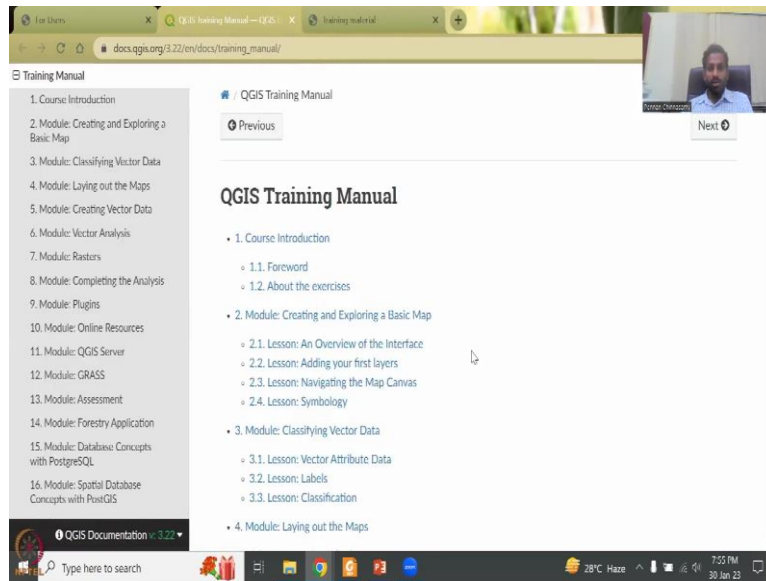
Fig. 15.76 Identification dialog regions with relation to airports

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 is for saving all the edits in the child layer (airport).
- The button lets you digitize the airport geometry in the map canvas and assigns the new feature to the current region by default. Note that the icon will change according to the geometry type.
- The button adds a new record to the airport layer attribute table and assigns the new feature to the current region by default. The geometry can be drawn later with the **Add part** digitizing tool.
- The button allows you to copy and paste one or more child features within the child layer. They can later be assigned to a different parent feature or have their attributes modified.

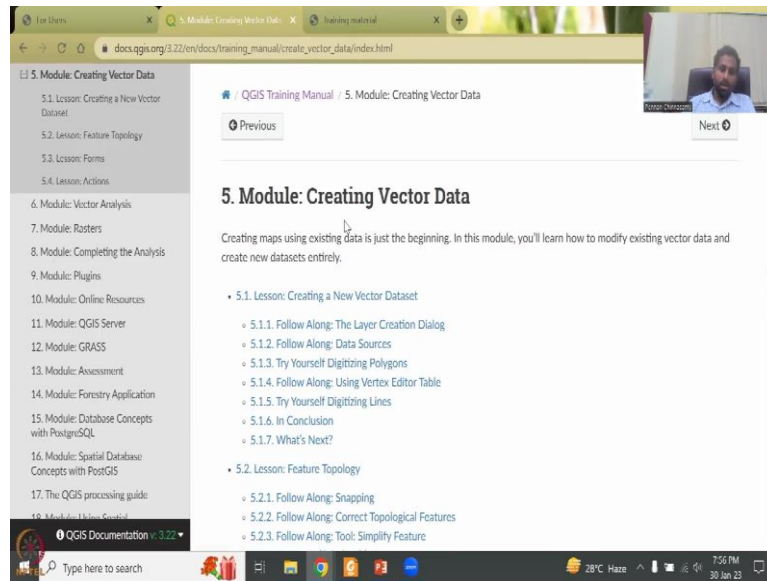
They are given some example data and gone through these exercises.

(Refer Slide Time: 19:54)

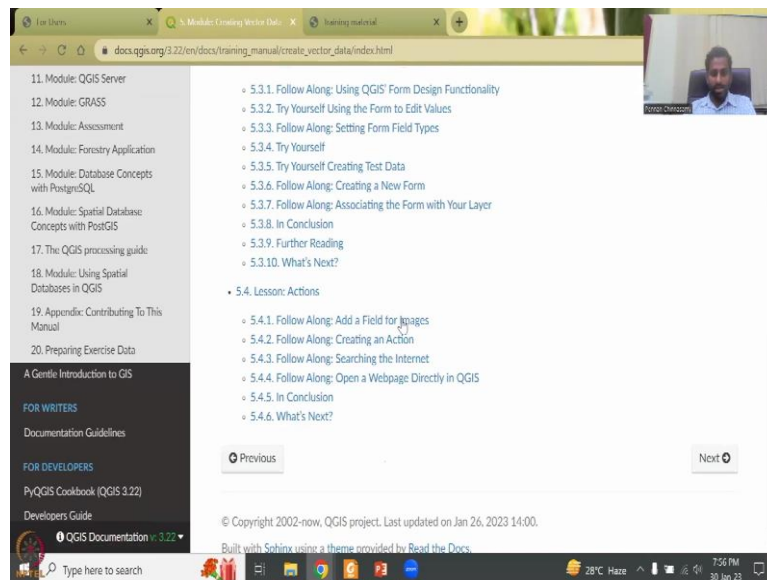


So, I will close this and then the manual is about using a QGIS tools, there are multiple modules, I would like you to concentrate on the creating vector data.

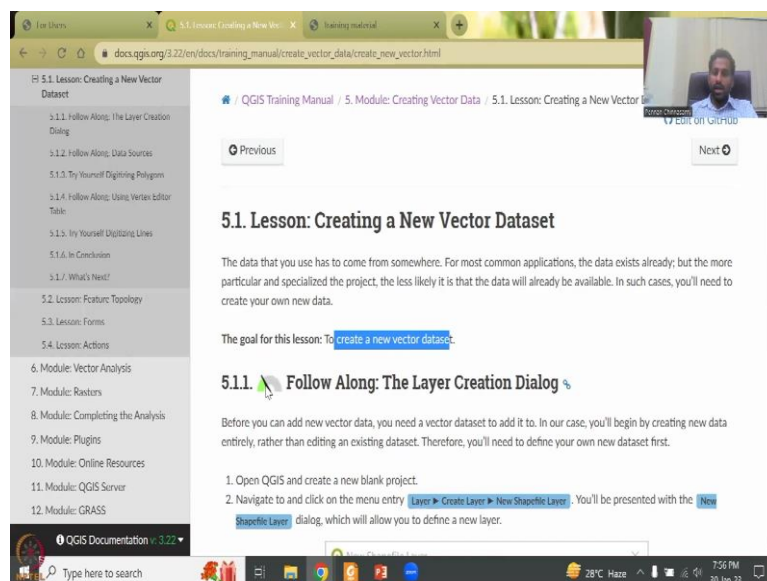
(Refer Slide Time: 20:11)



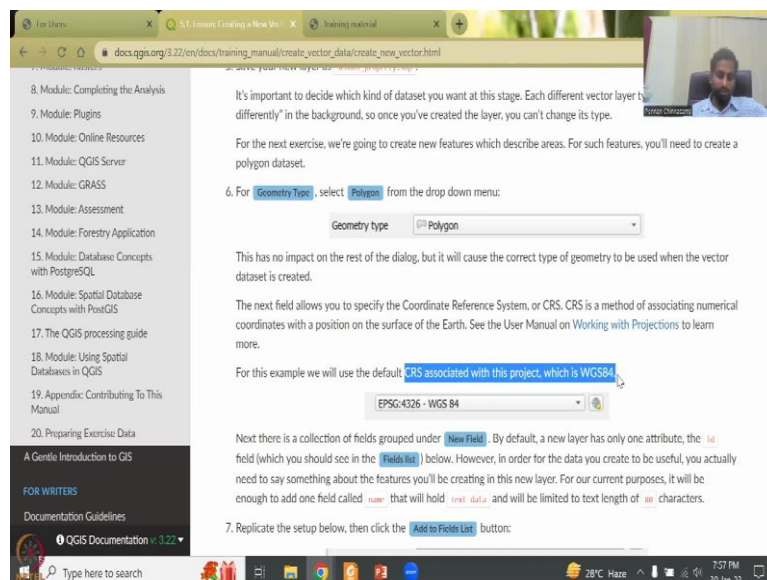
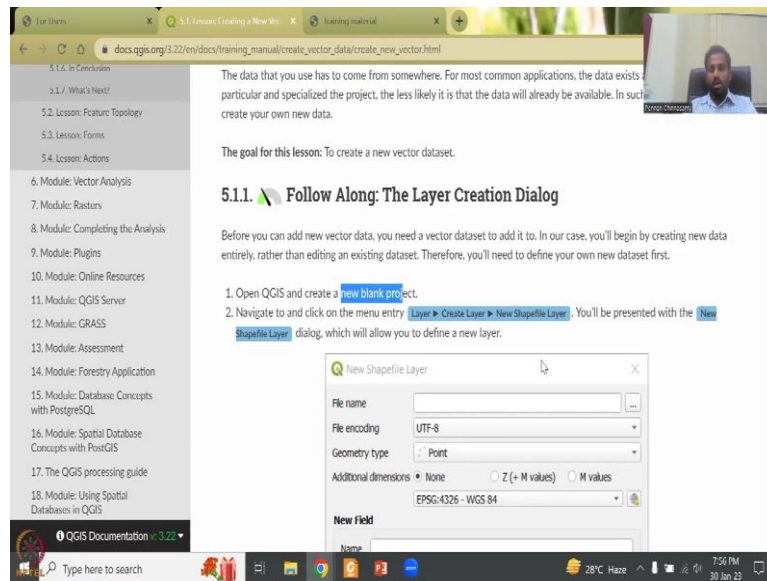
The screenshot shows the QGIS Training Manual page for "5. Module: Creating Vector Data". The left sidebar contains a table of contents with items 5 through 19. The main content area has a breadcrumb "QGIS Training Manual / 5. Module: Creating Vector Data" and "Previous" and "Next" buttons. The title "5. Module: Creating Vector Data" is followed by an introductory paragraph: "Creating maps using existing data is just the beginning. In this module, you'll learn how to modify existing vector data and create new datasets entirely." Below this is a list of lessons: "5.1. Lesson: Creating a New Vector Dataset" (with sub-lessons 5.1.1 to 5.1.7) and "5.2. Lesson: Feature Topology" (with sub-lessons 5.2.1 to 5.2.3). A video call window in the top right shows a man speaking.



The screenshot shows the QGIS Training Manual page for "5.3. Lesson: Creating a New Form". The left sidebar shows items 11 through 20, plus sections for "A Gentle Introduction to GIS", "FOR WRITERS", and "FOR DEVELOPERS". The main content area has a breadcrumb "QGIS Training Manual / 5.3. Lesson: Creating a New Form" and "Previous" and "Next" buttons. The title "5.3. Lesson: Creating a New Form" is followed by an introductory paragraph: "Creating maps using existing data is just the beginning. In this module, you'll learn how to modify existing vector data and create new datasets entirely." Below this is a list of lessons: "5.3. Lesson: Creating a New Form" (with sub-lessons 5.3.1 to 5.3.10) and "5.4. Lesson: Actions" (with sub-lessons 5.4.1 to 5.4.6). A copyright notice at the bottom reads "© Copyright 2002-now, QGIS project. Last updated on Jan 26, 2023 14:00." A video call window in the top right shows a man speaking.



The screenshot shows the QGIS Training Manual page for "5.1.1. Follow Along: The Layer Creation Dialog". The left sidebar shows items 5.1.1 through 5.1.7, 5.2, 5.3, 5.4, 6, 7, 8, 9, 10, 11, and 12. The main content area has a breadcrumb "QGIS Training Manual / 5.1. Lesson: Creating a New Vector Dataset / 5.1.1. Follow Along: The Layer Creation Dialog" and "Previous" and "Next" buttons. The title "5.1.1. Follow Along: The Layer Creation Dialog" is followed by an introductory paragraph: "The data that you use has to come from somewhere. For most common applications, the data exists already; but the more particular and specialized the project, the less likely it is that the data will already be available. In such cases, you'll need to create your own new data." Below this is the goal for the lesson: "The goal for this lesson: To create a new vector dataset." The sub-section "5.1.1. Follow Along: The Layer Creation Dialog" begins with the text: "Before you can add new vector data, you need a vector dataset to add it to. In our case, you'll begin by creating new data entirely, rather than editing an existing dataset. Therefore, you'll need to define your own new dataset first." Below this is a list of steps: "1. Open QGIS and create a new blank project." and "2. Navigate to and click on the menu entry Layer > Create Layer > New Shapefile Layer... You'll be presented with the New Shapefile Layer dialog, which will allow you to define a new layer." A video call window in the top right shows a man speaking.



So, here you would say first lesson is to create a new vector data set, feature topology, forms actions, it will go through the create a new data set, and then it will tell you the goal is to create a new data set, it is not as difficult. It is green in color, so follow along, which means it just says open very, very simple basic steps, they will give you. Open QGIS, create a new blank project, navigate to create menu, and then we add the field.

So, each image is given to show you what we are going to do. So, this is a create a new shapefile and the shapefile type is a polygon. So, you have three-point line and polygon, they have taken the polygon. So, then you also have once you create it, you will have to give a projection and a coordinate system where the reference coordinate system has given us WGS 84. Again, if you do not know for your location, whatever here, the forum helps you, you can go and say for example, what is the CRS for Indian region and then you will get it.

(Refer Slide Time: 21:25)

Next there is a collection of fields grouped under **New Field**. By default, a new layer has only one field (which you should see in the **Fields List**) below. However, in order for the data you create to be useful, you actually need to say something about the features you'll be creating in this new layer. For our current purposes, it will be enough to add one field called **name** that will hold **text data** and will be limited to text length of **80** characters.

7. Replicate the setup below, then click the **Add to Fields List** button:

New Field

Name: name
Type: Text data
Length: 80
Precision:
Add to Fields List

8. Check that your dialog now looks like this:

New Shapefile Layer

File name: training-Data-2.0/exercise_data/school_property.shp
File encoding: UTF-8
Geometry type: Polygon
Additional dimensions: None Z (+ M values) M values
EPSG:4326 - WGS 84

8. Check that your dialog now looks like this:

New Shapefile Layer

File name: training-Data-2.0/exercise_data/school_property.shp
File encoding: UTF-8
Geometry type: Polygon
Additional dimensions: None Z (+ M values) M values
EPSG:4326 - WGS 84

New Field

Name:
Type: Text data
Length: 80
Precision:
Add to Fields List

Fields List

Name	Type	Length	Precision
id	Integer	10	
name	String	80	

9. Click **OK**

New Shapefile Layer

File encoding: UTF-8
Geometry type: Polygon
Additional dimensions: None Z (+ M values) M values
EPSG:4326 - WGS 84

New Field

Name:
Type: Text data
Length: 80
Precision:
Add to Fields List

Fields List

Name	Type	Length	Precision
id	Integer	10	
name	String	80	

Remove Field

OK Cancel Help

So, then you add fields. So, once you create a Polygon Shapefile new database for vector, you will have to have columns where new fields or objects are going to be put, for example, you have a shapefile of states, then one of the field will be name. You want to give the district name or the state name and then the area the population, male or female. So, all these are fields of objects. And within the field, you have data, the rows become the attributes.

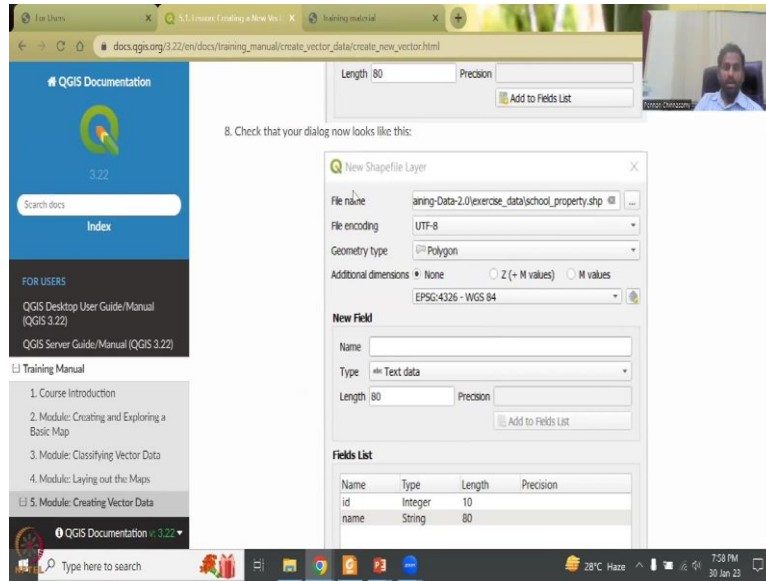
So, it says look at this new field, what type of field is a string? Is it a number, you will have to, since it is a name, it is a text data, how much length of the data you want to give, etcetera. So, all these are kind of self-explanatory, you would give within the field there are two in this polygon there are two, one is name. And then the other is ID name. For example, state Tamil Nadu and ID is number 1, 0 1 would be the ID and it is 10 in number. So, maybe the zip code can also or the PIN code can also be kept here for a unique identifier.

(Refer Slide Time: 22:39)

The screenshot shows a web browser displaying a QGIS training manual page. The page title is "5.1.2. Follow Along: Data Sources". The content explains that when creating new data, it should be about objects that exist on the ground. It lists various methods to obtain data, such as using a GPS, surveying with a theodolite, or digitizing from remote sensing data. The page provides a list of steps for using the digitizing approach:

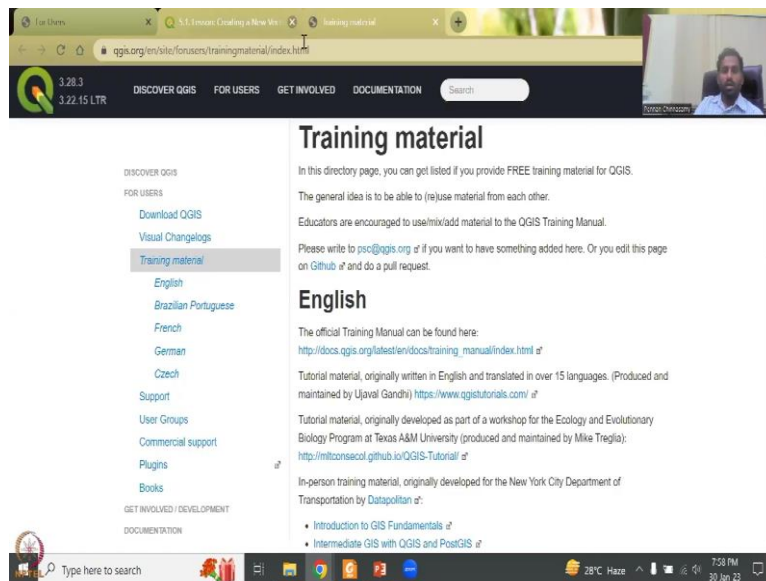
1. Click on **Data Source Manager** button.
2. Select **Raster** on the left side.
3. In the **Source** panel, click on the **+** button.
4. Navigate to `exercise_data/raster/`.
5. Select the file `rs432c_2013_202_302_UTM10G.tif`.
6. Click **Open** to close the dialogue window.

The screenshot also shows a QGIS interface at the bottom with the "Data Source Manager" dialog box open, displaying the "Raster" source type and the file path.



So, then you go to rasters another one. But we will come to this when we discuss the raster. So, we will keep this part alone for today.

(Refer Slide Time: 22:50)



3.28.3
3.22.15 LTR

DISCOVER QGIS FOR USERS GET INVOLVED DOCUMENTATION

Download QGIS
Visual Changelogs
Training material
English
Brazilian Portuguese
French
German
Czech
Support
User Groups
Commercial support
Plugins
Books

GET INVOLVED / DEVELOPMENT
DOCUMENTATION

Educators are encouraged to use/mix/add material to the QGIS Training Manual.
Please write to psc@qgis.org if you want to have something added here. Or you edit this page on [GitHub](#) and do a pull request.

English

The official Training Manual can be found here:
http://docs.qgis.org/latest/en/docs/training_manual/index.html

Tutorial material, originally written in English and translated in over 15 languages. (Produced and maintained by Ujaval Gandhi) <https://www.qgistutorials.com/>

Tutorial material, originally developed as part of a workshop for the Ecology and Evolutionary Biology Program at Texas A&M University (produced and maintained by Mike Treglia): <http://mlbconsecal.github.io/QGIS-Tutorial/>

In-person training material, originally developed for the New York City Department of Transportation by Datapolitan:

- [Introduction to GIS Fundamentals](#)
- [Intermediate GIS with QGIS and PostGIS](#)
- [Source code for training materials](#)

Online course material for QGIS training developed and maintained by [Spatial Thoughts](#). Available for self-study and adaptation by other trainers:

[Introduction to QGIS](#)

28°C Haze 7:59 PM 30 Jan 23

docs.qgis.org/3.22/en/docs/training_manual/index.html

Training Manual

1. Course Introduction
2. Module: Creating and Exploring a Basic Map
3. Module: Classifying Vector Data
4. Module: Laying out the Maps
5. Module: Creating Vector Data
6. Module: Vector Analysis
7. Module: Rasters
8. Module: Completing the Analysis
9. Module: Plugins
10. Module: Online Resources
11. Module: QGIS Server
12. Module: GRASS
13. Module: Assessment
14. Module: Forestry Application
15. Module: Database Concepts with PostgreSQL
16. Module: Spatial Database Concepts with PostGIS

QGIS Training Manual

Previous Next

QGIS Training Manual

- 1. Course Introduction
 - 1.1. Foreword
 - 1.2. About the exercises
- 2. Module: Creating and Exploring a Basic Map
 - 2.1. Lesson: An Overview of the Interface
 - 2.2. Lesson: Adding your first layers
 - 2.3. Lesson: Navigating the Map Canvas
 - 2.4. Lesson: Symbology
- 3. Module: Classifying Vector Data
 - 3.1. Lesson: Vector Attribute Data
 - 3.2. Lesson: Labels
 - 3.3. Lesson: Classification
- 4. Module: Laying out the Maps

QGIS Documentation v. 3.22

28°C Haze 7:59 PM 30 Jan 23

docs.qgis.org/3.22/en/docs/training_manual/index.html

6. Module: Vector Analysis
7. Module: Rasters
8. Module: Completing the Analysis
9. Module: Plugins
10. Module: Online Resources
11. Module: QGIS Server
12. Module: GRASS
13. Module: Assessment
14. Module: Forestry Application
15. Module: Database Concepts with PostgreSQL
16. Module: Spatial Database Concepts with PostGIS
17. The QGIS processing guide
18. Module: Using Spatial Databases in QGIS
19. Appendix: Contributing To This Manual
20. Preparing Exercise Data

A Gentle Introduction to GIS

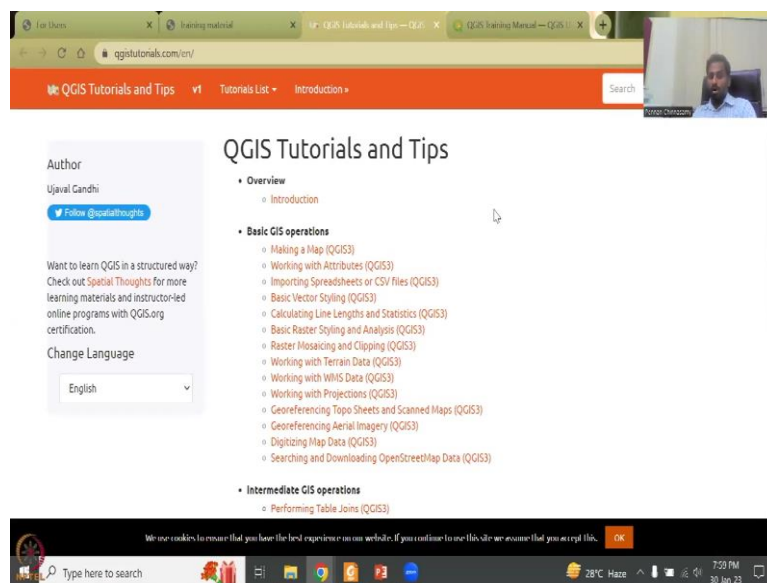
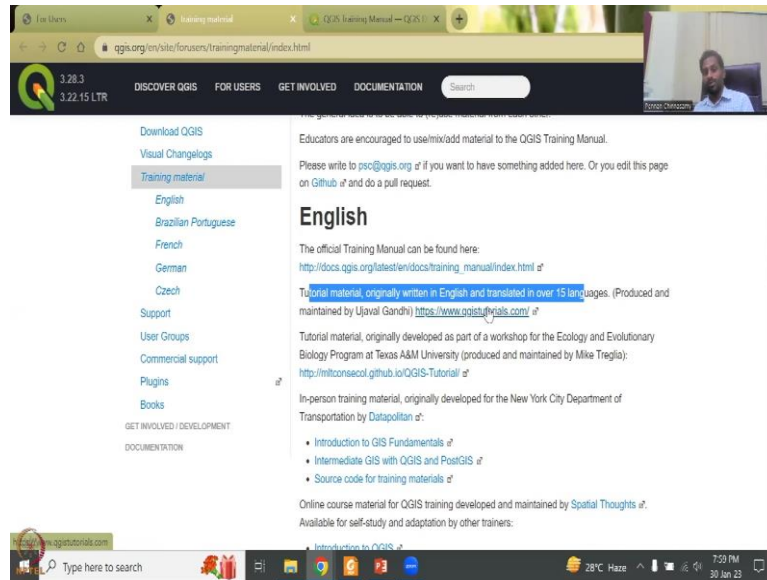
- 1. Course Introduction
 - 1.1. Foreword
 - 1.2. About the exercises
- 2. Module: Creating and Exploring a Basic Map
 - 2.1. Lesson: An Overview of the Interface
 - 2.2. Lesson: Adding your first layers
 - 2.3. Lesson: Navigating the Map Canvas
 - 2.4. Lesson: Symbology
- 3. Module: Classifying Vector Data
 - 3.1. Lesson: Vector Attribute Data
 - 3.2. Lesson: Labels
 - 3.3. Lesson: Classification
- 4. Module: Laying out the Maps
 - 4.1. Lesson: Using Print Layout
 - 4.2. Lesson: Creating a Dynamic Print Layout
 - 4.3. Assignment 1
- 5. Module: Creating Vector Data
 - 5.1. Lesson: Creating a New Vector Dataset
 - 5.2. Lesson: Feature Topology
 - 5.3. Lesson: Forms
 - 5.4. Lesson: Actions

QGIS Documentation v. 3.22

28°C Haze 7:59 PM 30 Jan 23

So, moving on, they also have a training materials and English, Brazilian French, German and Czech. There are a lot of tutorials that they say available. So, for example, it says the official training materials can be found here. If you click it opens on the QGIS training modules, classifying vector data creating vector data, we just went through this tutorial.

(Refer Slide Time: 23:17)



ggstutorials.com/en/

QGIS Tutorials and Tips | Tutorials List | Introduction

Author: Ujaval Gandhi

Want to learn QGIS in a structured way? Check out Spatial Thoughts for more learning materials and instructor-led online programs with QGIS.org certification.

Change Language: English

- Importing Spreadsheets or CSV files (QGIS3)
- Basic Vector Styling (QGIS3)
- Calculating Line Lengths and Statistics (QGIS3)
- Basic Raster Styling and Analysis (QGIS3)
- Raster Mosaicing and Clipping (QGIS3)
- Working with Terrain Data (QGIS3)
- Working with WMS Data (QGIS3)
- Working with Projections (QGIS3)
- Georeferencing Topo Sheets and Scanned Maps (QGIS3)
- Georeferencing Aerial Imagery (QGIS3)
- Digitizing Map Data (QGIS3)
- Searching and Downloading OpenStreetMap Data (QGIS3)

- Intermediate GIS operations**
 - Performing Table Joins (QGIS3)
 - Performing Spatial Joins (QGIS3)
 - Performing Spatial Queries (QGIS3)
 - Nearest Neighbor Analysis (QGIS3)
 - Sampling Raster Data using Points or Polygons (QGIS3)
 - Calculating Raster Area (QGIS3)
 - Creating Heatmaps (QGIS3)
 - Animating Time Series Data (QGIS3)
 - Handling Invalid Geometries (QGIS3)

What we use cookies to ensure that you have the best experience on our website. If you continue to use this site we assume that you accept this.

ggstutorials.com/en/

QGIS Tutorials and Tips | Tutorials List | Introduction

Author: Ujaval Gandhi

Want to learn QGIS in a structured way? Check out Spatial Thoughts for more learning materials and instructor-led online programs with QGIS.org certification.

Change Language: English

- Automating Complex Workflows using Processing Modeler (QGIS3)
- Automating Map Creation with Print Layout Atlas (QGIS3)
- Multi Criteria Overlay Analysis (QGIS3)

- Network Analysis**
 - Basic Network Visualization and Routing (QGIS3)
 - Locating Nearest Facility with Origin-Destination Matrix (QGIS3)
 - Service Area Analysis using Openrouteservice (QGIS3)
 - Travel Time Analysis with Uber Movement (QGIS3)
- Hydrology**
 - Calculating Areal Mean Rainfall (QGIS3)
- Python Scripting (PyQGIS)**
 - Getting Started With Python Programming (QGIS3)
 - Running Processing Algorithms via Python (QGIS3)
 - Using Custom Python Expression Functions (QGIS3)
 - Writing Python Scripts for Processing Framework (QGIS3)
 - Building a Python Plugin (QGIS3)
 - Building a Processing Plugin (QGIS3)
 - Running and Scheduling QGIS Processing Jobs
- Web Mapping**
 - Web Mapping with QGIS2Web (QGIS3)
 - Creating Basemaps with QTiles

What we use cookies to ensure that you have the best experience on our website. If you continue to use this site we assume that you accept this.

ggstutorials.com/en/

QGIS Tutorials and Tips | Tutorials List | Introduction

Author: Ujaval Gandhi

Want to learn QGIS in a structured way? Check out Spatial Thoughts for more learning materials and instructor-led online programs with QGIS.org certification.

Change Language: English

- Calculating Areal Mean Rainfall (QGIS3)

- Python Scripting (PyQGIS)**
 - Getting Started With Python Programming (QGIS3)
 - Running Processing Algorithms via Python (QGIS3)
 - Using Custom Python Expression Functions (QGIS3)
 - Writing Python Scripts for Processing Framework (QGIS3)
 - Building a Python Plugin (QGIS3)
 - Building a Processing Plugin (QGIS3)
 - Running and Scheduling QGIS Processing Jobs
- Web Mapping**
 - Web Mapping with QGIS2Web (QGIS3)
 - Creating Basemaps with QTiles
- Appendix**
 - Using Plugins (QGIS3)
 - QGIS Learning Resources
 - Data Credits

What next? Hungry for more QGIS materials? Work through my full length QGIS courses completely free. See Spatial Thoughts OpenCourseWare ?.

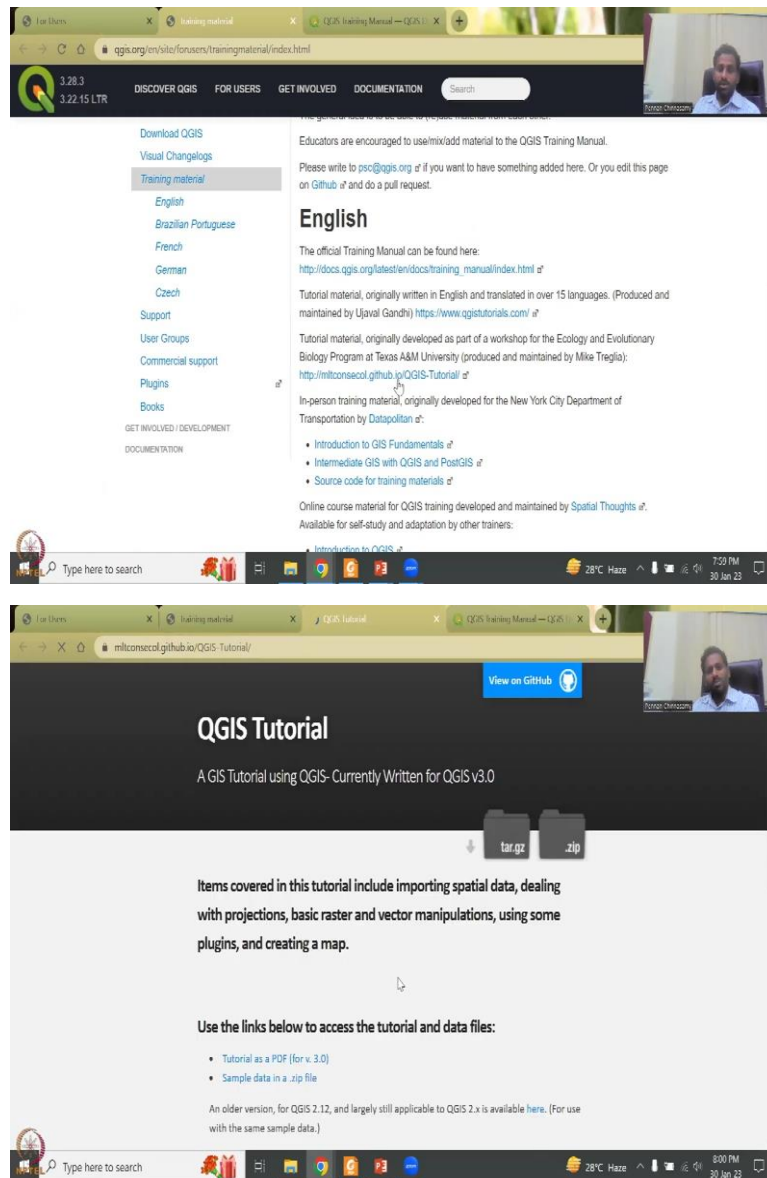
© Copyright 2021, Ujaval Gandhi. Last updated on Nov 14, 2022. Content under Creative Commons License CC BY 4.0

Back to top

What we use cookies to ensure that you have the best experience on our website. If you continue to use this site we assume that you accept this.

And then there is a workshop written in English translated in both languages done by Ujaval Gandhi, who is like, as I said, a volunteer who gives lot of time on these. So, if you click this, you can also get into some other tutorials, all open source free based on QGIS. So, you have different versions, you have basic operations, you have the intermediate, advanced and then water specific etcetera.

(Refer Slide Time: 23:51)



Items covered in this tutorial include importing spatial data, dealing with projections, basic raster and vector manipulations, using some plugins, and creating a map.

Use the links below to access the tutorial and data files:

- Tutorial as a PDF (for v. 3.0)
- Sample data .zip file

An older version, for QGIS 2.12, and largely still applicable to QGIS 2.x is available [here](#). (For use with the same sample data.)

Alternatively, download all materials (including archived versions) as a .zip or Tarball file using one of the icons above, or go to the main [GitHub repository](#).

[Click here to see other tutorials available from the QGIS Website](#)

English

The official Training Manual can be found here:
http://docs.qgis.org/latest/en/docs/training_manual/index.html

Tutorial material, originally written in English and translated in over 15 languages. (Produced and maintained by Ujaval Gandhi) <https://www.qgistutorials.com/>

Tutorial material, originally developed as part of a workshop for the Ecology and Evolutionary Biology Program at Texas A&M University (produced and maintained by Mike Treglia): <http://mlconsecol.github.io/QGIS-Tutorial/>

In-person training material, originally developed for the New York City Department of Transportation by [Datapolitan](#):

- Introduction to GIS Fundamentals
- Intermediate GIS with QGIS and PostGIS
- Source code for training materials

Online course material for QGIS training developed and maintained by [Spatial Thoughts](#). Available for self-study and adaptation by other trainers:

- Introduction to QGIS

Available for self-study and adaptation by other trainers:

- Introduction to QGIS
- Advanced QGIS
- Customizing QGIS with Python

Brazilian Portuguese

Roberio Ilacqua wrote a manual for image classification in QGIS: [Manual do QGIS para Classificação Supervisionada de Áreas](#), full version, 200 p - 2017 or [Manual do QGIS para Classificação Supervisionada de Áreas \(short version\)](#), short version, 34 p - 2017.

French

The French Ministry of Environment supports the QGIS project. Training material from them is available here: <http://www.geoformations.developpement-durable.gouv.fr/qgis-formations-et-supports-pedagogiques-947.html>

Other resources from them are available here: <http://www.geoformations.developpement-durable.gouv.fr/qgis-626.html>

The French National Center for Scientific Research (CNRS), created an online QGIS tutorial: <http://owinr.pessages.cnrs.fr/tutoqgis/>

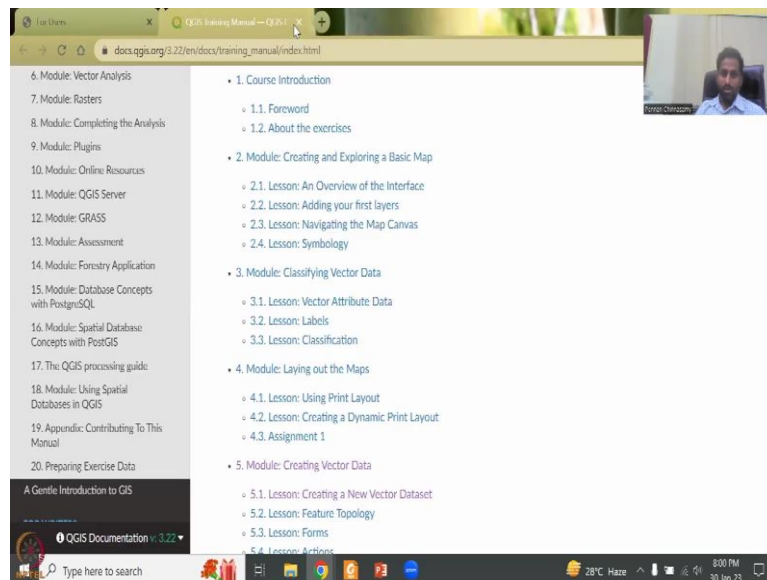
German

HSR material: <http://jgswiki.hsr.ch/QGIS-Materialien>

And then there is also a tutorial material download as part of the workshop on ecology and evolutionary biology program at Texas, A&M university. So, you can click here and then go in. Most of them are not videos. So, however, it is still okay to go through and do like cookbook recipe.

As I said, step one, they will ask you to add in an image is there. So, you will have it. It is written in simple English, it is not difficult. So, please go through it. There is a fundamental GIS, intermediate of GIS with QGIS and post GIS. And then a lot of coding, if you would like to do the advanced part can be done here. So, this introduction, advanced and customized QGIS, plugins and Python. You could definitely use these. These are the training materials.

(Refer Slide Time: 24:41)



And the training materials that we find online are also usable, for example, every entity private or government agencies do spend a lot of time on these kind of tutorials to support students, researchers and anyone who would like to use QGIS. So, coming back, I would like to again stress the fact about QGIS.

(Refer Slide Time: 25:14)

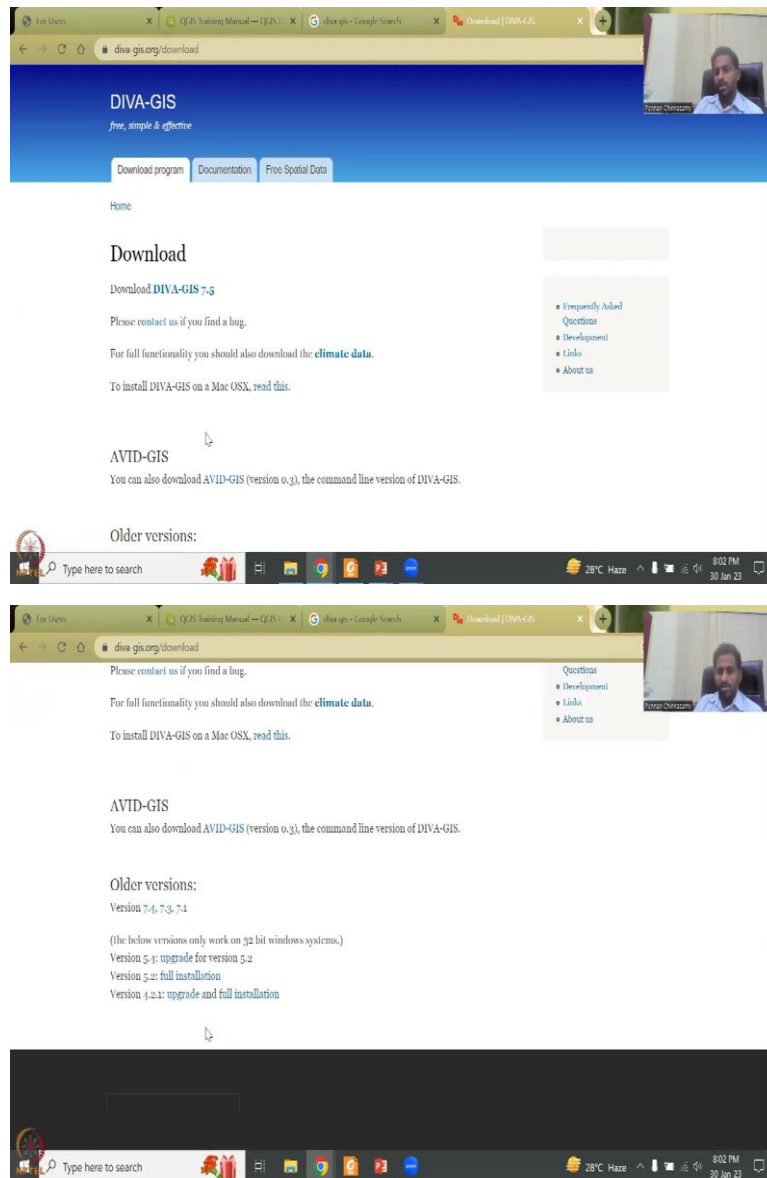
A screenshot of a Google search page. The search bar contains the text "shapefile download for India". Below the search bar, there are several search results. The first result is from "http://www.indiaremolesensing.com" with the title "Download India Shapefile with official India Boundary". The second result is from "https://www.diva-gis.org" with the title "Download data by country - DIVA-GIS". The third result is from "https://www.igismap.com" with the title "Download India Administrative Boundary Shapefiles - IGISMap". The page also shows a "also ask" section and a taskbar at the bottom with the date "30 Jan 23".

A screenshot of a Google search page. The search bar contains the text "diva gis". Below the search bar, there are several search results. The first result is from "https://www.diva-gis.org" with the title "DIVA-GIS | free, simple & effective". The second result is from "https://www.diva-gis.org" with the title "Download data by country". The third result is from "https://www.diva-gis.org" with the title "Free Spatial Data". The fourth result is from "https://www.diva-gis.org" with the title "Download". The fifth result is from "https://www.diva-gis.org" with the title "DIVA". The page also shows a "People also search for" section and a taskbar at the bottom with the date "30 Jan 23".

A screenshot of the DIVA-GIS website. The page has a blue header with the text "DIVA-GIS free, simple & effective". Below the header, there are three tabs: "Download program", "Documentation", and "Free Spatial Data". The main content area is titled "Download data by country" and contains the text "Select and download free geographic (GIS) data for any country in the world". There are two dropdown menus: "Country" with "Afghanistan" selected and "Subject" with "Administrative areas" selected. Below the dropdowns is an "OK" button. The page also shows a "Sources" section and a taskbar at the bottom with the date "30 Jan 23".

But before that I would like you to look at how do you search for meta data. So, you have type shape file, download for India just say for searching. So, in QGIS you can see that lot of downloads shapefiles boundaries, DIVA-GIS etcetera is there. I will explain DIVA-GIS here. So, how you ever searched for if you want is just DIVA-GIS. It opens like this. It is a very useful data archive for point data and some raster data.

(Refer Slide Time: 25:53)



Far Ubers x QGIS Training Manual - QGIS x diva.gis - Google Search x Documentation | DIVA-GIS x

diva.gis.org/documentation

DIVA-GIS
free, simple & effective

Download program | Documentation | Free Spatial Data

Home

Documentation

Manual
English version (pdf) (last updated December 2011)
Spanish version Versión en español (last updated January 2001)

Training manual
New: The Scheideeman and Van Zonneveld (Biodiversity International) Training Manual on Spatial Analysis of Plant Diversity and Distribution.
Basic mapping and GIS techniques using DIVA-GIS, by Chris Legg, IITA - handout: English, French - data

- Frequently Asked Questions
- Development
- Links
- About us

Type here to search 28°C Haze 8:02 PM 30 Jan 23

Far Ubers x QGIS Training Manual - QGIS x diva.gis - Google Search x Documentation | DIVA-GIS x

diva.gis.org/documentation

DIVA-GIS
free, simple & effective

Download program | Documentation | Free Spatial Data

Home

Documentation

Manual
English version (pdf) (last updated December 2011)
Spanish version Versión en español (last updated January 2001)

Training manual
New: The Scheideeman and Van Zonneveld (Biodiversity International) Training Manual on Spatial Analysis of Plant Diversity and Distribution.
Basic mapping and GIS techniques using DIVA-GIS, by Chris Legg, IITA - handout: English, French - data

Tutorial
Download the tutorial (pdf) and the accompanying data. Some help with climate data, niche modeling, and clim files. By Julian Ramirez and Aaron Bueno-Cabrera.

Exercises

- Frequently Asked Questions
- Development
- Links
- About us

Type here to search 28°C Haze 8:02 PM 30 Jan 23

Far Ubers x QGIS Training Manual - QGIS x diva.gis - Google Search x Free Spatial Data | DIVA-GIS x

diva.gis.org/Data

DIVA-GIS
free, simple & effective

Download program | Documentation | Free Spatial Data

Home

Free Spatial Data

Country level
Download country level data for any country in the world: administrative boundaries, roads, railroads, altitude, land cover, population density.

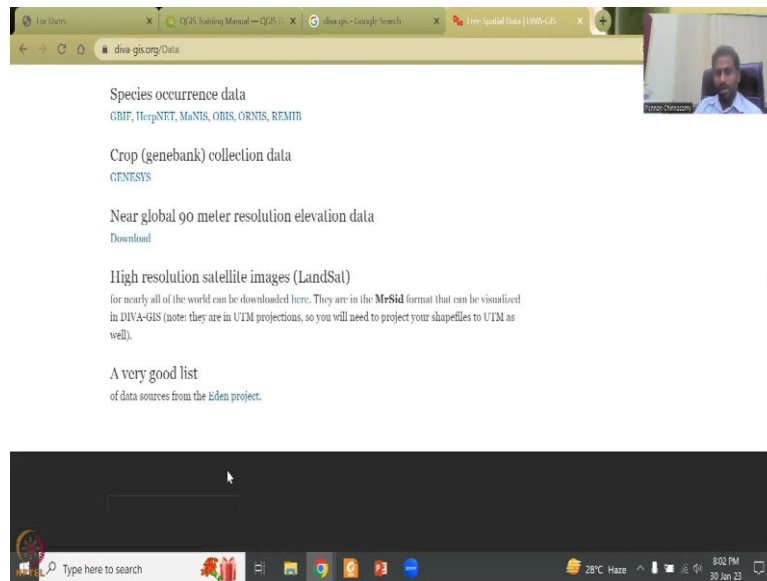
Global level
A new file with the (2011) global country boundaries

Global climate data
See WorldClim or diva-gis specific data here

Species occurrence data
GBIF, HerpNet, MaNIS, OBIS, ORNIS, RFEMIB

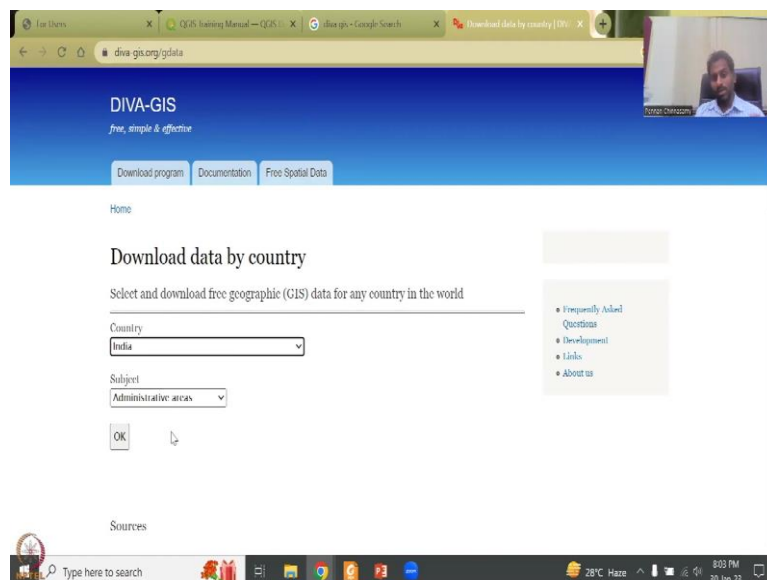
- Frequently Asked Questions
- Development
- Links
- About us

Type here to search 28°C Haze 8:02 PM 30 Jan 23



Once you click DIVA-GIS or download data by country, you will go through the download program to look at what is this DIVA-GIS is about, how is it free and then documentation English and different language and then how it has become free spatial data and all of this what are the data that you can collect? Sometimes it also brings data from multiple resources for example, here you have Eden Project and Landsat data from different resources. The elevation data is also here.

(Refer Slide Time: 26:35)



Sources

Subject	Description	Source	Format	Resolution
Administrative areas	Country outlines and administrative subdivisions for all countries. The level of subdivision varies between countries.	GADM, version 1.0	Vector (area)	-
Inland water	Rivers, canals, and lakes. Separate files for line and area features.	Digital Chart of the World	Vector (line and area)	-
Roads	Roads	Digital Chart of the World	Vector (line)	-
Railroads	Railroads	Digital Chart of the World	Vector (line)	-
Elevation	SRTM30 dataset. CGIAR-SRTM data aggregated to 30 seconds	CGIAR SRTM (3 seconds resolution)	Grid	30 seconds
Land cover	Land cover, original data resampled onto a 30 seconds grid	GLC2000	Grid	30 seconds
Population	Population density (old)	CIESIN, 2000. Global gridded population database	Grid	30 seconds
Climate	Monthly climate data	WorldClim	Grid	30 seconds
A gazetteer is a list of place names and their coordinates. The files you can download here		U.S. National		

(boundaries) between countries

Inland water	Rivers, canals, and lakes. Separate files for line and area features.	Digital Chart of the World	Vector (line and area)	-
Roads	Roads	Digital Chart of the World	Vector (line)	-
Railroads	Railroads	Digital Chart of the World	Vector (line)	-
Elevation	SRTM30 dataset. CGIAR-SRTM data aggregated to 30 seconds	CGIAR SRTM (3 seconds resolution)	Grid	30 seconds
Land cover	Land cover, original data resampled onto a 30 seconds grid	GLC2000	Grid	30 seconds
Population	Population density (old)	CIESIN, 2000. Global gridded population database	Grid	30 seconds
Climate	Monthly climate data	WorldClim	Grid	30 seconds
A gazetteer is a list of place names and their coordinates. The files you can download here are for use in DIVA for automatic georeferencing (to assign coordinates to places). The files should be placed in the 'gacet' directory. (old, use Biogeomanator). They can also be used to map localities, however you can download more recent files from NIMA.		U.S. National Imagery and Mapping Agency's (NIMA) database of foreign geographic feature names	DBF	-

Formats

Gridfiles are used in DIVA-GIS. From DIVA-GIS they can be exported to a number of other grid formats including IDRISI and Arc or to shapefiles. (More info on format; for developers).

A gridfile with "country mask" indicates that the areas outside the selected country are masked out. For these areas, the value is "NODATA" (indicating the absence of data for those cells). For the other gridfiles, NODATA is only used for areas covered with water, except for the land cover grids, on which water is a separate class.

A DBF (dBase file) is a dBase format database table.

Resolution

The resolution is the size of each grid cell expressed as the length of one side of one (square) cell. The units are in (arc) degrees, minutes or seconds. When the cell size is small (e.g., 30 seconds), resolution is high. The size in square meters varies with latitude. A cell with a 30 seconds resolution is about 0.8 km² at the equator and smaller at higher latitudes. High resolution files for large areas (countries) can be very large. This means that it may take a while to download these files, and that you will need a fast PC to work with them.

So, I would like to conclude by just going through this exercise of how do you get country level data. So, click DIVA-GIS. Again, the boundaries may be different, they keep updating, they keep changing these boundaries. So, please be very cautious about using it. Use mostly the Indian government websites, some data if it is not available, yes, you can use these kinds of resources, but be very careful on the northern boundaries and other boundaries of India because sometimes they do not have accurate information, which is the full coverage. But they will give you what is the data about.

For example, I have click India. And they tell what are the data that they have and what is the source. So, sources this one so, you have unrestricted boundaries, this is where I am talking about the boundaries may or may not be correct. There is no vouching of these who are the government agency telling that this is the correct data to use like this, there will be multiple data online. Please do not use them unless otherwise it has been verified and the government of India approves it.

Here this has not been approved as the boundaries. So, be careful in using it. Maybe you can go to the source and if that is approved, you can use it. But for the southern part, most of these data are accurate especially the administrative boundaries, inland water which is the rivers canals, road network, railroads, elevation data is same, you do not have boundaries, it is a raster. It is a continuous data.

So, you can take it the land use land cover is their population from the census and then put it in as GIS format. World Climate data, world climate or World Climate data is pretty good and well used by researchers around the world. It gives you rainfall, wind speed, temperature, humidity, most of the parameters for climate are given here and also name or coordinates which gives you some administrative data also, the formats whatever formats, what is the resolution, all these can be obtained from here the format and resolution.

Resolution is mostly given as spatial resolution. It is not talking about temporal for example, land use land cover is for a particular year 2000. It is not every year every 5 years once and the units is 30 seconds, you can always convert the unit to matrix by using some formulas.

(Refer Slide Time: 29:16)

The first screenshot shows the 'Download data by country' page on the DIVA-GIS website. The 'Country' dropdown is set to 'India' and the 'Subject' dropdown is set to 'Administrative areas'. An 'OK' button is visible below the dropdowns. A table of sources is displayed below, with the following data:

Subject	Description	Source	Format	Resolution
Administrative areas (boundaries)	Country outlines and administrative subdivisions for all countries. The level of subdivision varies between countries	GADM, version 1.0	Vector (area)	-

The second screenshot shows the 'Spatial Data Download' page. The 'Country' is 'India' and the 'Subject' is 'Administrative areas' with a link to 'GADM'. A 'Download' button is visible below the subject selection. A 'Frequently Asked Questions' sidebar is on the right.

So, once you get okay it will ask you to download the data as a zip folder. You can download it and apply it in GIS, but again be careful on understanding the data is it been approved by government of India.

(Refer Slide Time: 29:35)

A screenshot of a Google search for "data gov". The search results show "Open Government Data (OGD) Platform India" as the top result, with a description: "Open Government Data Platform (OGD) India is a single-point of access to Resources ... Get details of Open Data Events, Visualizations, Blogs, and Infographics." Below this is the "Data.gov" result, described as "The home of the U.S. Government's open data. Here you will find data, tools, and resources to conduct research, develop web and mobile applications, ...". A "People also ask" section contains two questions: "What is the purpose of data gov?" and "How do you get datasets from data gov?". A taskbar at the bottom shows the system time as 8:05 PM on 30 Jan 23.

This is a duplicate of the screenshot above, showing the same Google search results for "data gov".

A screenshot of the data.gov.in website. The header includes the "data.gov.in" logo and navigation links for HOME, CATALOG, APIs, SECTORS, CDS, METRICS, LOGIN, and REGISTER. A large banner for "JAL JEEVAN MISSION - RURAL HAR GHAR JAL" is displayed. Below the banner is a statistics table for "Tamil Nadu water":

RESOURCES	CATALOG	APIs	CHIEF DATA OFFICERS	SOURCED WEBSERVICES/APIs	VISUALIZATIONS	TIMES VIEWED	TIMES DOWNLOADED
595,577	12,953	176,870	578	152	2,847	32,35 M	9.52 M

Below the statistics are four sections: "Recently Added Datasets" (Village and Gender-wise Beneficiaries Count of Ulupi District of Karnataka under the PM-KISAN scheme for 6th Instalme...), "Most Viewed Datasets" (All India Pincode Directory), "Min./Dept. Contributed New Datasets" (Department of Agriculture and Farmers Welfare), and "High Value Datasets" (Village and Gender-wise Beneficiaries Count of Ulupi District of Karnataka under the PM-KISAN scheme for 6th Instalme...). A taskbar at the bottom shows the system time as 8:06 PM on 30 Jan 23.

data.gov.in/search?title=Tamil%20Nadu%20water

A Digital India initiative

data.gov G20

HOME CATALOG APIs SECTORS CDOs METRICS LOGIN REGISTER

Tamil Nadu water

Related Visualizations (10)

State/UT-wise Tap Water Connections in Rural Households during 2022-23

State/UT-wise Women Trained for Water Quality Testing using Field Test Kits (FTKs) / Bacteriological Vials as on 02.08.2022

State/UT-wise Drinking Water Quality Testing Laboratories as on 02.08.2022

Surface Water Quality Tamil Nadu 1978-2021-CWC

Type here to search 28°C Haze 8:06 PM 30 Jan 23

data.gov.in/search?title=Tamil%20Nadu%20water

A Digital India initiative

data.gov G20

HOME CATALOG APIs SECTORS CDOs METRICS LOGIN REGISTER

Tamil Nadu water

Bacteriological Vials as on 02.08.2022

Surface Water Quality Tamil Nadu 1978-2021-CWC

Views 16 Downloads 30

Download Preview Export Data API Visualize

- Surface Water Quality Puducherry 2005-2021-CWC
- Surface Water Quality Andhra Pradesh 1972-2021-CWC
- Surface Water Quality Assam 1986-2021-CWC
- Surface Water Quality Bihar 1986-2021-CWC
- Surface Water Quality Gujarat 1979-2021-CWC

More Similar Results →

Type here to search 28°C Haze 8:06 PM 30 Jan 23

data.gov.in/search?title=Tamil%20Nadu%20water

A Digital India initiative

data.gov G20

HOME CATALOG APIs SECTORS CDOs METRICS LOGIN REGISTER

Tamil Nadu water

- Surface Water Quality Bihar 1986-2021-CWC
- Surface Water Quality Gujarat 1979-2021-CWC

More Similar Results →

Water bodies under Corporation/Municipal and other areas in Tamil Nadu

Views 648 Downloads 1228

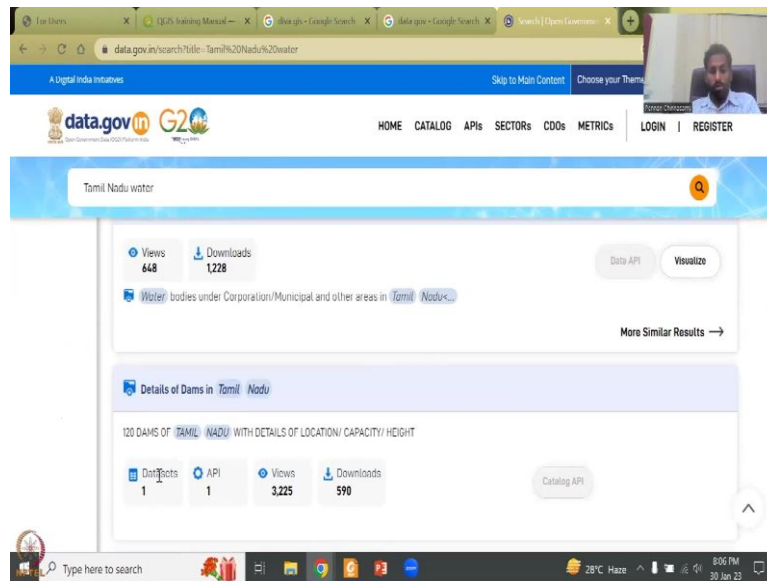
Data API Visualize

Water bodies under Corporation/Municipal and other areas in Tamil Nadu...

More Similar Results →

Details of Dams in Tamil Nadu

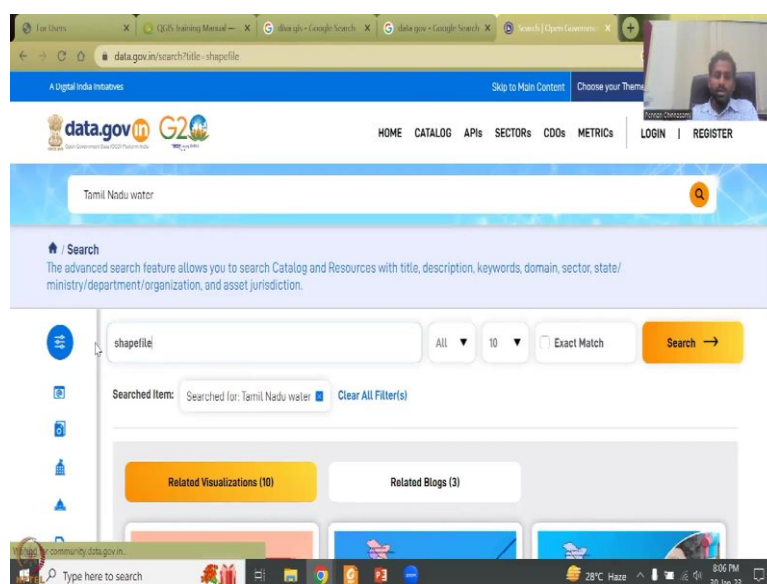
Type here to search 28°C Haze 8:06 PM 30 Jan 23



So, one more link that I would like to share is data dot go dot in. So, this is a good data set that we can use. Open data platform. Here also you can get good amount of shapefiles and point data. The point data can go into, you can make a shapefile or you can make a vector shapefile as discussed in the tutorials earlier.

So, for example, you can go here and click, I put Tamil Nadu water and click and then it will, it will tag whatever data it has. So, for example, surface water quality from Puducherry on the Pradesh, water bodies, number of water bodies, et cetera. You can, it is all in a data set module like a table and then you know that table is there, you know is Tail Nadu, you can link it with the GIS database.

(Refer Slide Time: 30:40)



data.gov.in/search?title=shapefile

A Digital India Initiative

HOME CATALOG APIs SECTORS CDDs METRICS LOGIN REGISTER

shapefile

Searched Item: Searched for: Shapefile Clear All Filter(s)

Shapefile of Rivers

Views 120 Downloads 173

Download Through URL Export Data API Visualize

Shapefile of Airports of entire Country

Views 33 Downloads 27

Download Through URL Export Data API Visualize

Type here to search 28°C Haze 8:07 PM 30 Jan 23

data.gov.in/search?title=shapefile

A Digital India Initiative

HOME CATALOG APIs SECTORS CDDs METRICS LOGIN REGISTER

shapefile

shapefile of One Degree Grid of Rainfall Points

Views 10 Downloads 16

Download Through URL Export Data API Visualize

Useful Links/Support

About Portal National Data Platform Connect with Us

Terms of Use Open Data Champions Suggest Dataset

Policies Link To Us Suggestions

Accessibility Statement Newsletters Tell A Friend

data.gov.in @DataPortal... 7h

Year-wise Funds Allocated under Jal Jeevan Mission (JMM) from 2019-20 to 2022-23 community.data.gov.in/year-wise-fund... #DataPortalIndia @MoISDWRDRGR @ajeevan

NIC Digital India my GOV india.gov

Type here to search 28°C Haze 8:07 PM 30 Jan 23

data.gov.in/resource/shapefile-one-degree-grid-rainfall-points

A Digital India Initiative

HOME CATALOG APIs SECTORS CDDs METRICS LOGIN REGISTER

Search Catalog/Resources/APIs

shapefile of One Degree Grid of Rainfall Points

File size: NA

Download: 16

Granularity: One-time

Published on: 28/09/2022

Updated on: 28/09/2022

Reference URL of Resource: There is no Reference URL for this resource.

Sourced web/services/APIs: NA

Note: This zip contains the various formats i.e. .shp, .shx, .dbf, .prj, .shn, .cpq, .dgn. This zip contains all the information of all one degree grid of rainfall points of entire country

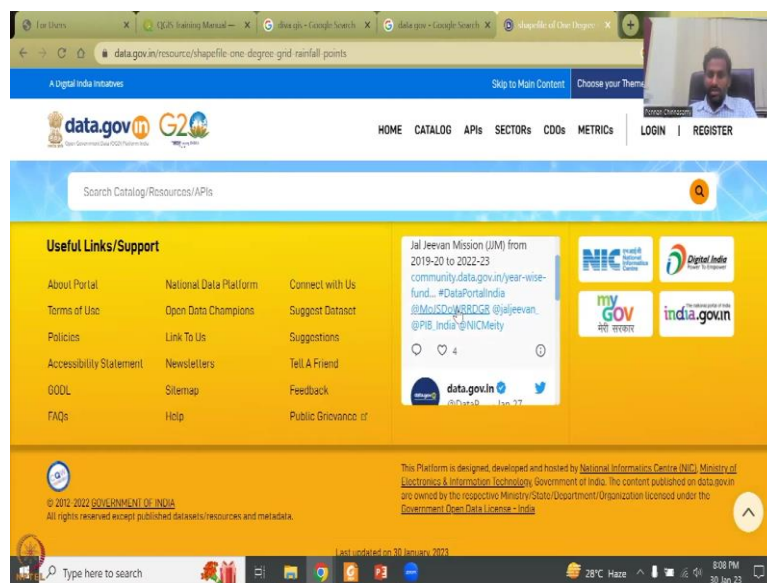
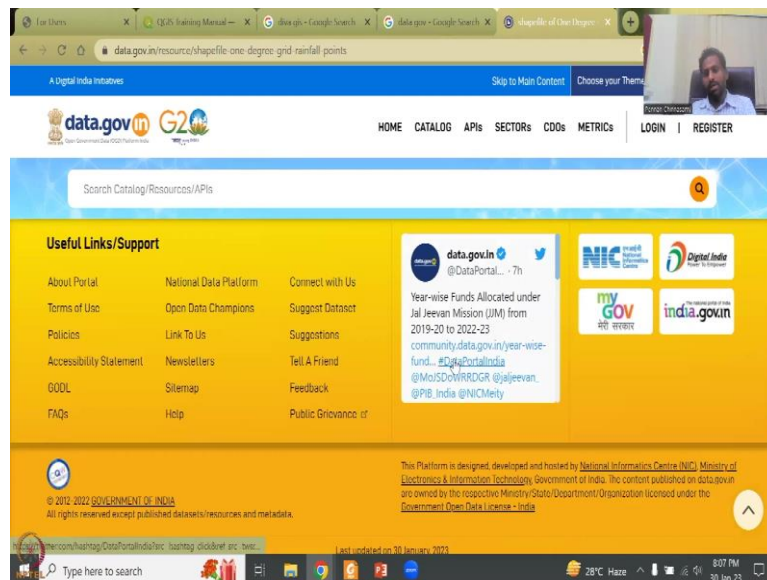
Request API Visualize Export

Type here to search 28°C Haze 8:07 PM 30 Jan 23

Sometimes shapefiles are given as formats. So, you can click shapefiles of rivers. So, you can see here the government of India, this is a government of India data so you can use it, it has been approved and put as data in the data dot gov. You can download as a zip through the URL, how many downloads, etcetera.

So, shapefiles of rivers, airports, and then rainfall points where exactly you can get rainfall points. If you click here, more and more information about the data comes up. And then you can see that published date updated, what it contains the data about the data, gridded rainfall points of the entire country. So, all these are pretty well established. And it is also having lots of other data.

(Refer Slide Time: 31:30)



community.data.gov.in/year-wise-funds-allocated-under-jal-jeewan-mission-jjm-from-2019-20-to-2022-23/

GOVERNMENT OF INDIA | Digital India Initiative

Home Communities Topics Blogs Visualizations Infographics Apps

Home » Visualizations » Year-wise Funds Allocated under Jal Jeevan Mission (JJM) from 2019-20 to 2022-23

Year-wise Funds Allocated under Jal Jeevan Mission (JJM) from 2019-20 to 2022-23

January 27, 2023
Author: OGD PMU Team

This step chart provides information about the year-wise funds allocated under Jal Jeevan Mission (JJM) from 2019-20 to 2022-23 (as on 12th July, 2022). A total of Rs. 8,274.16 crore funds were allocated under JJM. The highest of Rs. 3,590.16 crore fund was allocated in 2022-23 and the lowest of Rs. 390.31 crore fund was allocated in 2019-20.

Note : Source – Rajya Sabha Unstarred Question No. 106. Data Figures are in Rs. Crore.

Dataset URL: <https://data.gov.in/resource/year-wise-funds-allocated-under-jjm-jal-jeewan-mission-12th-july-2022>

Type here to search

28°C Haze 8:08 PM 30 Jan 23

community.data.gov.in/year-wise-funds-allocated-under-jal-jeewan-mission-jjm-from-2019-20-to-2022-23/

GOVERNMENT OF INDIA | Digital India Initiative

Home Communities Topics Blogs Visualizations Infographics Apps

community.data.gov.in

VISUALIZATION OF THE DAY
27 JANUARY 2023

Year-wise Funds Allocated under Jal Jeevan Mission (JJM) from 2019-20 to 2022-23

This step chart provides information about the year-wise funds allocated under Jal Jeevan Mission (JJM) from 2019-20 to 2022-23 (as on 12th July, 2022). A total of Rs. 8,274.16 crore funds were allocated under JJM. The highest of Rs. 3,590.16 crore fund was allocated in 2022-23 and the lowest of Rs. 390.31 crore fund was allocated in 2019-20.

Note : Source – Rajya Sabha Unstarred Question No. 106. Data Figures are in Rs. Crore.

Dataset URL: <https://data.gov.in/resource/year-wise-funds-allocated-under-jjm-jal-jeewan-mission-12th-july-2022>

Resource Title: Year-wise Funds Allocated under JJM (Jal Jeevan Mission) as on 12th July, 2022

[View in Visualization Tool](#)

Type here to search

28°C Haze 8:08 PM 30 Jan 23

community.data.gov.in/year-wise-funds-allocated-under-jal-jeewan-mission-jjm-from-2019-20-to-2022-23/

GOVERNMENT OF INDIA | Digital India Initiative

Home Communities Topics Blogs Visualizations Infographics Apps

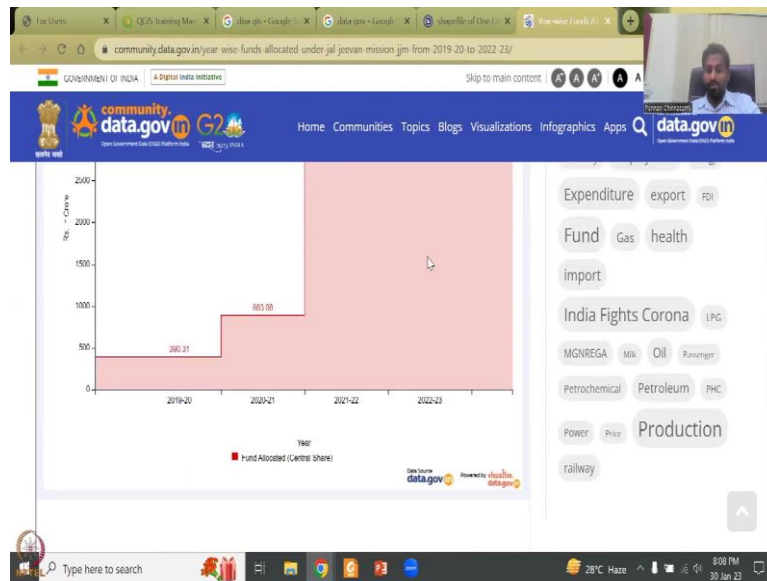
community.data.gov.in

Year-wise Funds Allocated under Jal Jeevan Mission (JJM) from 2019-20 to 2022-23

Year	Funds Allocated (Rs. Crore)
2019-20	390.31
2020-21	983.08
2021-22	3410.01
2022-23	3590.16

Type here to search

28°C Haze 8:08 PM 30 Jan 23

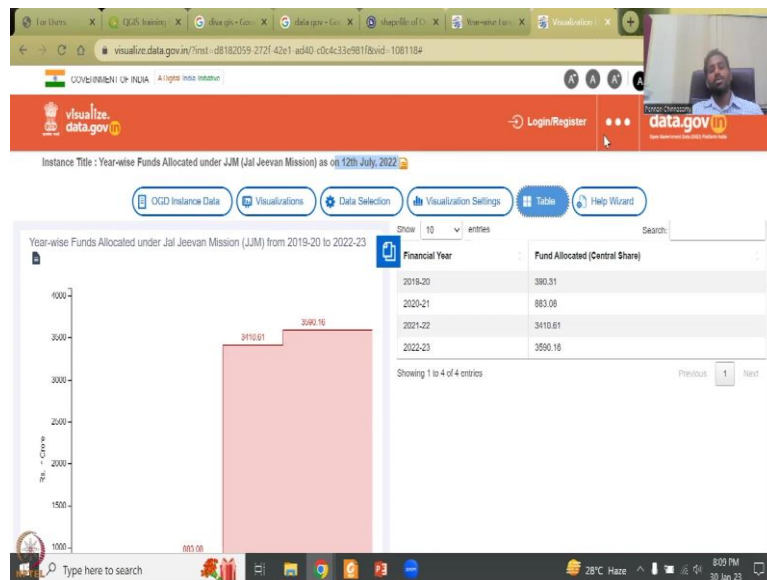
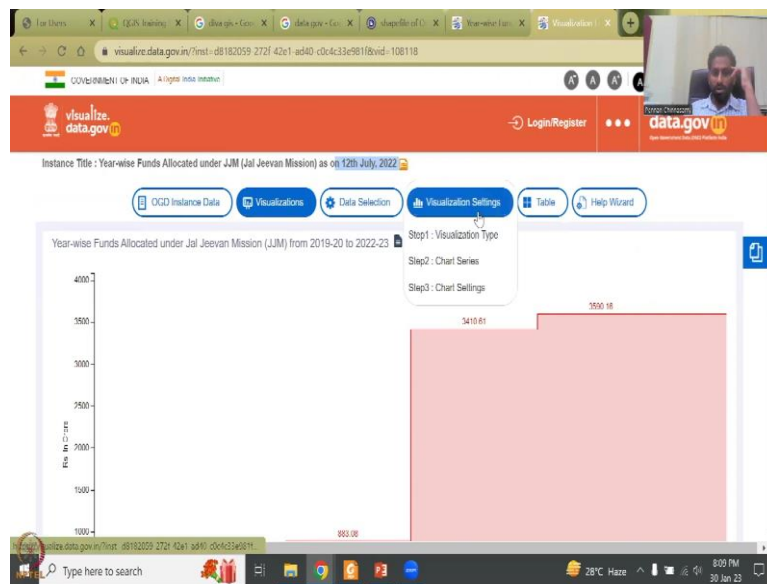


For example, here, you have year wise funds are located under Jal Jeevan Mission. So, this is a very rural development scheme. We have discussed this in the first two weeks of the lecture. So, basically, this gives you data about how much funds are located. Now for rural development, we need this information because we are going to put it in a map and show that this is the how much funds have come, but how is the benefit.

So, funds versus benefit ratio, you can analyze and work it through, it is shared in Twitter, but the links are coming take you back here, for example, I am going to click this, it will come back basically it is a Twitter handle there, but then it goes and comes back to the data dot gov dot in where the data is being stored.

Some other so, you can see primary data are brought in and then you will have all the data in visualized Excel sheet or some format. So, you do have a running database. So, you can also take these data and then put it in your computer new shapefile. For example, if this is a year fund allocated central share for entire country, you can see that around 390.31 crores has risen to 3,590 crores in 2022. So, in this this, you can also type it as a attribute value in your database. So, lot of lot of data can be taken. One goal of this is also to give students a link to where you can find data.

(Refer Slide Time: 33:14)



Google diva gis

About 56,30,000 results (0.42 seconds)

<https://www.diva-gis.org> :
DIVA-GIS | free, simple & effective
DIVA-GIS is a free computer program for mapping and geographic data analysis (a geographic information system (GIS). With DIVA-GIS you can make maps of the ...
You've visited this page many times. Last visit: 23/8/22

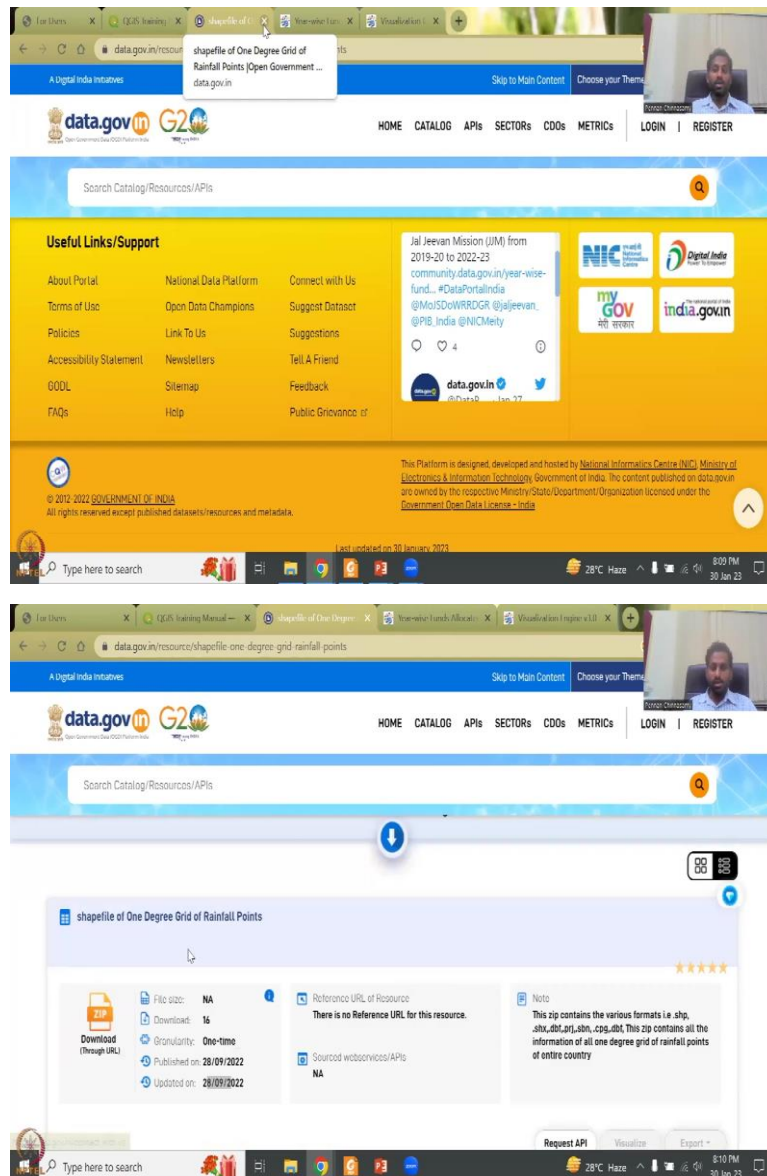
Download data by country
Each "shapefile" consist of at least three actual files. This is a ...

Free Spatial Data
Country level - Global level - Global climate data - Species ...

Download
To install DIVA-GIS on a Mac OSX, read this. AVID-GIS. You can ...

DIVA
DIVA-GIS is a free computer program for mapping and ...
More results from diva-gis.org >

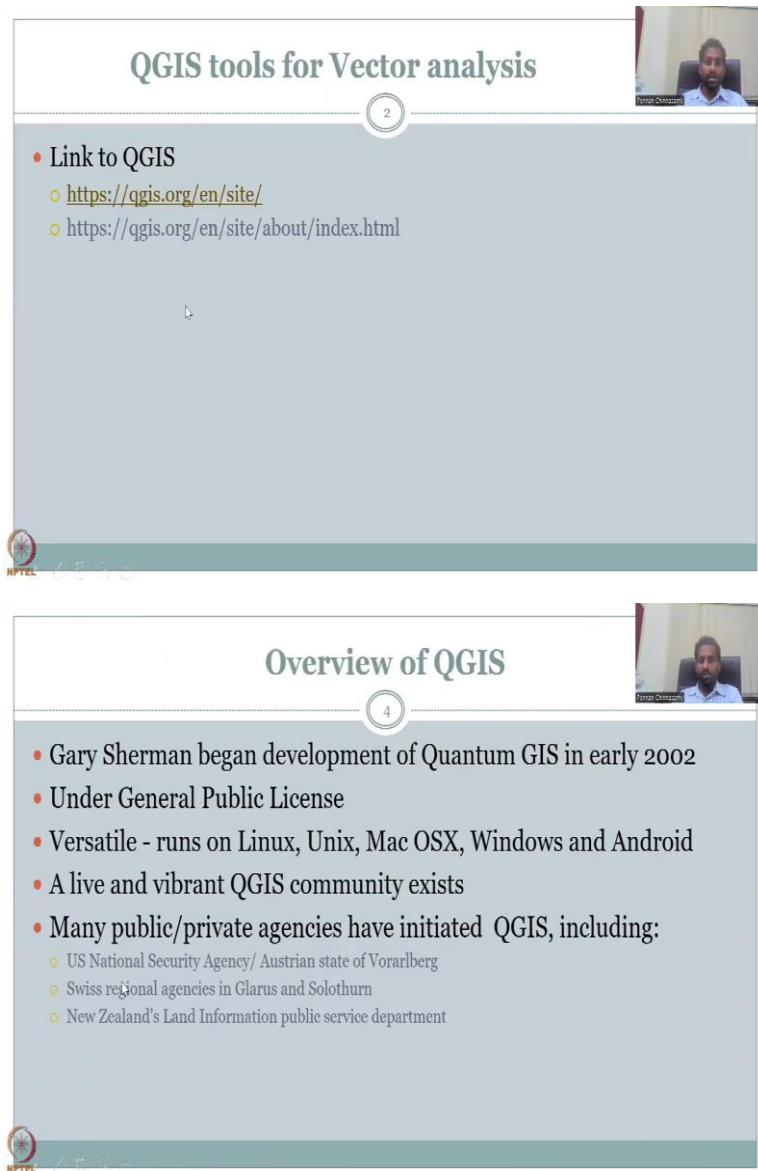
DIVA-GIS < System software
DIVA-GIS is a free geographic information system software program used for the analysis of geographic data, in particular point data on biodiversity. The software was first designed for application to the study of wild potatoes in South America. Wikipedia
Stable release: 7.5
People also search for View 10+ more



So, there is a visualization tool you can go through, which has been updated on 12 July and then you can download the data as a table. So, you can see here the table was there as I said, you can convert the table back into shape file and put it across India. So, these are the ways you could find data. I will cover two datasets one is DIVA-GIS, lot of people use it. However, the boundaries could be wrong and there is no guarantee the boundaries are working, but data dot gov dot in has most of the data scrutinized by the Government of India.

So, it is actually a trustable data source. Sometimes there is a less speed updating and that is why people use open source data's like DIVA-GIS and other sources, but slowly this is also picking up because spatial data and mapping has been key indicators for nations development, which has been covered in programs like Gati Shakti and mapping of India water bodies et cetera.

(Refer Slide Time: 34:31)



QGIS tools for Vector analysis

2

- Link to QGIS
 - <https://qgis.org/en/site/>
 - <https://qgis.org/en/site/about/index.html>

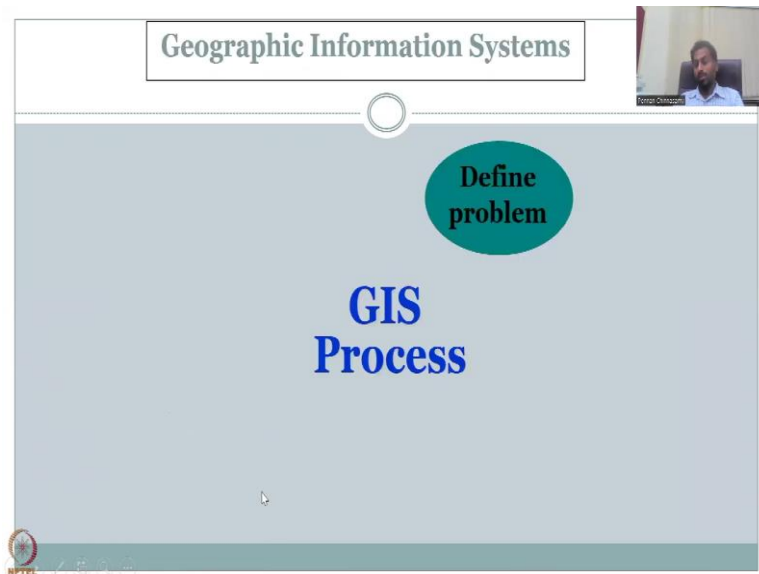
Overview of QGIS

4

- Gary Sherman began development of Quantum GIS in early 2002
- Under General Public License
- Versatile - runs on Linux, Unix, Mac OSX, Windows and Android
- A live and vibrant QGIS community exists
- Many public/private agencies have initiated QGIS, including:
 - US National Security Agency/ Austrian state of Vorarlberg
 - Swiss regional agencies in Glarus and Solothurn
 - New Zealand's Land Information public service department

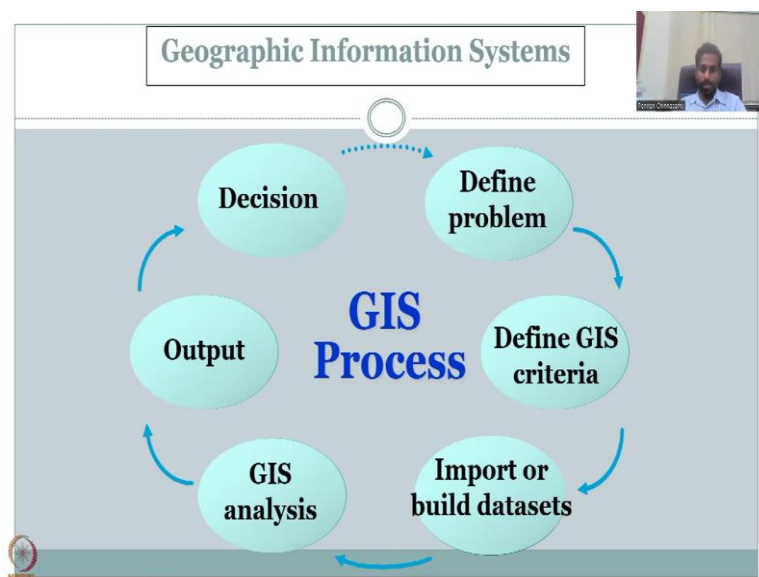
So, with this, I would like to get back to what we have been discussing on the links. We have worked through this tools. As I said QGIS has been use from 2000 to 20 years at least. Public License works on all software open source software's and operating systems and multiple agencies are being using it the US, New Zealand etcetera.

(Refer Slide Time: 34:57)



The process is cyclic in terms of using and defining the problem. But please understand that always there is a possibility of from the decision coming back into redefining the problem, creating more datasets and then updating the data sets.

(Refer Slide Time: 35:16)



With this I would like to conclude week 4 lecture. There will be lot of discussions on Agriculture and Rural Development, which is put up by the NITI Aayog vision of New India. And there is lot of mapping and data that can be used remote sensing and GIS. I will see you week 5 lecture. Thank you.