Laboratory Practices in Earth Sciences: Landscape Mapping

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Week- 03
Lecture- 13

Hello everyone. So, in our last lecture we showed you how we can georeference different kinds of satellite images with the help of QGIS software. So, we have given you a demonstration on how we can georeference a toposheet and we can georeference an image with the help of world map service. So, in this lecture we will show you how we can do the merging and mosaicking of different satellite images on the QGIS software. And then we will give you a demonstration on the shape file generation and we will also show you how you can use the attribute table of different shape files and you can generate different kinds of information from those shape files. So, when you open your QGIS software, you have to load the satellite data which you want to merge or mosaic.

So, I have opened here the satellite data of SRTM, this is the SRTM dam. So, I have opened the five images and I will show you how you can first. I will show you how you can mosaic two images. To mosaic two images you have to first select which two images you want to mosaic. So, here you can see in your layer panel five images have been opened and you can see thus this is an image which is slightly a little bit away from these four images. So, to mosaic you have to choose two images which are non-adjacent images and to merge you have to choose two adjacent images.

So, first I will show you the mosaicking part because you have to choose two images which are not adjacent to each other. So, for this exercise I will choose two images. So, to do the mosaicking first you have to go to the raster option because these are all the raster images and all the algorithms which you will use to do the mosaicking that are in the raster option, you will find these plugins in the raster options. So, in the raster option here you can see there are certain plugins that are given here. In the miscellaneous option you will see that here few more options are given such as build a virtual raster, raster information and merge. So, with the help of this build a virtual raster plugin you can mosaic two different images.

When you will open this build virtual raster option then you will see such a type of window will open and here in the input layer you have to select the images which you want to mosaic. So, I suppose I want to mosaic two images for example, these 30 degrees and 78-degree longitude and 28- and 28-degree latitude and 80-degree longitude images. So, for this I have selected these two images and here you can see you have some more

information that you have to give, for example, the resolution that you have to select that the average high or lowest. So, by default you will see that this is set on the average and another option is the virtual raster. So, you have to save your file where you want to save by default. If you are not saving your file a virtual raster file will save in the QGIS platform only, but if you will set a directory then on the directory your file will be saved.

So, to save your file you can click on this option and here you will see that two options you can see over here save to a temporary file. That means, this a temporary file will be generated and that file will be saved in your QGIS platform only, but when you will close your QGIS and at that time your file will be you will lose your file and if you want to permanently save your save your file. So, you have to set a directory for that you have to go to save to the file option and you can give to the directory and on the directory your file will be saved. For now, I will create a temporary file and once you have selected all the criteria then you can just click on the run. So, here you can see a virtual file has been generated on your layer panel and here you can see that if I close this file and these two files have been mosaic.

Now, you can see that a single file has been generated and on this single file your two files are attached or these two files are mosaic. So, similarly you can mosaic many kinds of files whatever based on your interest. So, you can also mosaic multiple files. So, now, I will show you how you can merge two images. As I told you that to merge you have to choose you have to choose those images which are adjacent to each other.

So, again you have to go to the raster option and in this raster option miscellaneous you can see the merge option. With the help of this merge plugin you can merge your images. So, here you have to select the input layer for which you want to merge your images. So, here I these four images are adjacent to each other. So, I will merge these four images.

So, first you have to select these four images and then you have here you can see the again you have to save the file. To save the file you can give the directory for now I will save as a temporary file. So, and then you have to click on the run option. So, your algorithm will run and you can see a virtual file has been generated. So, this is your merge image.

Earlier you can see that these were the four images. These four are four different files which are adjacent to each other, but once we have merged these images. So, you want a single file to be generated and this single file you can see over here. So, as I also told you in one of our earlier lectures, how you can because this is a DEM digital elevation model of SRTM data. So, this is a black and white image, you can fill color in this image and you can also generate the hillshade to get more information from your DEM. So, to generate the hillshade and give the color you have to go to the property.

So, once you are in the property option then you can see this single band pseudocolor. First you can generate the hillshade. So, from the hillshade option you can choose the hillshade and here you have to give the z value you have to assign the z factor and then simply apply. So, here you can see your merge hillshade of the four SRTM images which we have merged and we have generated the hillshade from the from that merge file. Now, to assign the color you have to simply go to the property and choose the single band pseudocolor.

From the single band pseudocolor you have to select the color ramp whichever color you are you will assign that will apply to your DEM and you have to just apply. So, here you can see color has been assigned and if you want to generate a hillshade color map for that you have to first generate the hillshade and then you have to give the color on that hillshade. You just apply the z factor. Now, make a copy of this file duplicate the layer and you just assign color to this duplicate layer single band pseudocolor and the color and from the blending color blending option you choose the multiply. So, this will simply apply color on the hillshade also.

So, here you can see your color has been applied over the hillshade map. So, this exercise I or I will show you how we can generate different kinds of shape files on this QGIS platform. This will help you during the mapping part. In our coming lecture we will also show you how we can map different kinds of geometrical maps. So, this is the first step of the mapping part.

Now, we will go to the next step which will also show you how we can map different kinds of geomorphological features with the help of a DEM or the digital surface model images. So, we will go to the. So, we will show you how we can generate the shape files. So, to generate the shape file you first have to go to the layer option and there is one there is one option is the create layer. So, in this create layer option you will see that the new geo package layer is a default format of the QGIS only and another option is the new shape file layer.

So, you can choose this new shape file layer. So, that will generate your shape file, but if you are choosing this new geo package layer this will also generate a shape file layer, but those shape files you can only open in the QGIS platform only. But this if you are generating the shape file with the help of this h s h p format. So, that format you can open on ArcGIS as well as QGIS. So, we will create the shape file with the help of this h s p format.

So, when you are opening this shape file option. So, here you can see some information

you have to provide to generate the shape files. So, first you have to keep in mind that the shape files are the vector files. So, vector files mean either it is a point cloud or it is a line which is connected with the points or a polygon which is connected with the lines. So, these are all the shape files.

So, here to generate a shape file first I will start with the point. So, point you can point shape file you can use during the labeling of certain places. For example, if you want to label your map and you want to add the location name in that case you have to choose the point shape file. So, to generate the point shape file first you have to give the name file name and that you have to save in a directory. To save a directory you just choose the directory and you just give the name of the file.

So, I am just writing the point and you save the name of the file. So, the file name and then from the geometry type you have to assign which kind of shape file you want to generate either point, multipoint, line or polygon. So, first I will start with the point and then you have to give the other information for example, the reference system for which coordinate system you want to apply on this point shape file. So, I will choose the WGS 84 because this is a widely used coordinate reference system. So, I am choosing this one where you can base on your regional location or based on your base map you can choose a different kind of coordinate reference system whichever is suitable to your area or your map.

So, now I will just click on ok and here in the layer panel you can see a new file has been generated with the name of point. So, when you click on the when you right click over this point here you can see another option is two options have been added one is open attribute table and another is toggle editing and this toggle editing you can also see over your QGIS platform. So, here you can see one pan shape has been generated over here and with this pan shape this is also a toggle editing option you can enable this point shape file. Another option is the open attribute table. So, your attribute table is all the information which has been associated with this shape file that would be saved in your attribute table.

So, in in coming few minutes I will explain you that how you can generate your you can build your attribute table or with the help of attribute table how you can extract information regarding your respective shape files. So, here all this information regarding your shape file will be saved. So, to generate the shape file for the point cloud you have to just enable the toggle editing mode. So, you just simply click on the toggle editing option and this will enable a few symbols and here with this symbol you can simply add the points. So, here you can see one option is add point feature.

So, with this add point feature you can simply mark the point. For example, if I want to

add a location on this map, suppose this is a region called Haldwani. So, if I want to give a name to this particular region. So, I have to just click over this location and once you are clicking over this location a new pop-up window will open and this will ask you to give the id. So, you can start with the 1 and this is a random number. You can assign any number. These numbers are basically associated with this point shape file which you have just generated.

So, I am giving 1 and you can click ok and here you can see one point has been marked over here and with the help of your attribute table you can see that in your attribute table one point has been generated with the id 1. And if suppose you want to give a name on this point. So, you have to simply add a new field here you can see that only id is present right now, but you have to generate a new field on this attribute table to give a location name for that here you can see on this attribute table option certain features are given and with this with this feature you can simply select deselect delete copy paste of your shape files and you can also generate a or add a new field here in this with this help of new field you can add a new field. So, you have to give the name of the field. So, suppose I want to just add the location.

So, you have to give the location and then type, which type of information you want to add on this field. So, you have to choose this type. So, suppose I want to give a text type of information on this location because your location would be your kind of name right then in that on that case you have to choose the text suppose you want to assign a numerical number on that case you either choose the whole number or decimal number or suppose you want to assign a certain kind of information which is related to date. So, in that case you can choose the date option from this type menu. So, for this case I will choose the text because I want to assign the location name and you can also give the length of the length of your text.

So, you can keep it whatever length you want to assign on your name. So, you can accordingly choose the length of the text. Now, click on ok and here you can see a new field has been added on your attribute table and you can assign a name to this attribute table simply you write a name and that will add a name to your location. You save your attribute table. So, you simply click on the save option and now you can see your location name has been added on the point.

So, likewise you can add more points wherever you want to add a point you can simply click over there and a pop up will open and that will ask you to provide some information. So, now, because we have added a new field location. So, now, you can see location is also showing on this pop-up option. Now, I can give it this two-id number 2 and location is for example, this is Ramnagar.

So, I will just assign Ramnagar. So, here you can see 2 points have been added and suppose you want to label the location on your map. So, you have to simply go to the properties option and with this property option you can see that there is one option label just below the symbology. So, you can click over there and now it is by now by default it is on the no label option you have to change this no label to the single label and when you click on the symbol label now you have to assign the you have to choose the location from the drop down menu and once you have selected the location and simply apply. So, now, you can see your map has been labeled you can see over here if you click on the symbol you can also change the color from the label menu here you can see the text and you can see the color option from the color option you can simply change the color whichever is suitable to your map. So, you can assign the color now you can see Ramnagar and Hanlobani are labeled on your map.

So, with the help of this point cloud or the point shape file option you can generate the point shape file or you can as well as you can with this attribute table you can label your location in case you want to add location on your map. Now we will we will go to the second exercise of generation the line shape file to generate the line shape file you have to go to the layer option and create layer again you have to generate a new shape file earlier we have chosen the point from the geometry type now we have to choose the line first you have to assign the file name. So, I will just give the name line and from the geometry type you have to choose the line option. And you have to also choose the coordinate reference system which is WGS 8443-26 projection code and you just click on ok. So, now on the layer panel you can see that one layer has been added that is line and with this toggle editing mode you can enable this line and here you can see one of with this add line feature you can simply draw the line.

So, lines would be used during the supposed in case you want to draw the faults or you want to draw the roads or any kind of linear feature if you want to draw over your map. So, this line linear vector file you have to use this linear vector file. So, suppose I want to just add a simple line. So, to draw the line you have to just first once you enable this toggle editing mode. So, here you can see one symbol which is used to draw the line that has been shown over your map panel.

So, you just simply click with the help of your mouse. So, because the default color is red. So, I just disabled this map. Now, you can see this with the help of your mouse you can simply draw the line. So, to stop the line or drawing option you have to right click on your mouse once you right click.

So, a pop up will come and it will ask you to enter the id. So, you can simply put 1 and

here. So, this line has been drawn and you can see this information on the attribute table. So, you have to open the attribute table where you can see one feature has been added and you can also add another field. For example, I want to just get a length for this line.

So, you simply add a field, name, length and then you choose the type because length is a numerical number. So, I will choose the whole number from the type option and I will just click on ok. So, here you can see length has been added and you can simply calculate the length of this line with the help of a field calculator. So, here in the attribute table one option is to add a field calculator and when you open the field calculator here you can see. So, two options are given, one is creating new fields and updating existing fields.

So, with this help of a field calculator you can create a new field and you can generate the information. For example, I want to get the length for my shape file. So, you can directly create your shape file directly, create a new field called length over here or as we did, we first created the new field and then we will calculate the length. So, for our case we will choose to update the existing field. So, on this update of the existing field from the drop-down menu here you can see two options are given one is id or another is length because our attribute table has only two fields which are id and length.

So, I want to get the length for my shape file. So, I have to choose the length option and once you have chosen the length option here you can see the row number certain options are given from the geometry you will see the area and you will also see the length. So, you have to go to the here you can see the length once you are double clicking over on the length here at the bottom left corner you can see the preview option here your length has been calculated. So, once you are clicking on ok. So, your length will be added to your attribute table.

So, here you can see this is your length. So, now, you have to save this attribute table from the save icon to minimize this and similarly you can draw multiple lines or whatever you want to do you can create any kind of linear features. So, what you can do with this linear shape file. So, you have to save this shape file whichever you have generated. Now we will generate a vector file and now we will generate a polygon. So, to generate a polygon again you have to go to the create layer and then a new shape file and you have to assign the name. So, I have chosen the name and then you have to choose the geometry type that would be your polygon and the coordinate system is WGS 84 and click on ok.

So, to create a polygon here we can see on the layer panel we have just added a new layer which is called a polygon. So, you just right click or you can simply go to the toggle editing mode or enable your polygon option. Once you enable your polygon option here you can see the add polygon feature is enabled and with the help of this add polygon feature you

can simply draw a polygon. So, polygons are basically connected with the lines. So, to draw a polygon you use your mouse and you just simply click and here you can see whatever shape you want to generate that you can generate with the help of polygon and once you are done with your mapping or you want to stop your polygon digitization.

So, you have to just right click and once you are right clicking a pop up will come and that will ask you to id. So, you just give any random number. So, here you can see by default it is filled with a yellowish color, but you can change your color with the help of the property option. Once you are going to the property here you can see whichever color you want to assign in your map that you can do with the help of property.

So, you can see your color has been changed. So, suppose you can add different polygons with this with the help of this feature. Now, suppose I have generated these two polygons and you want to do certain kinds of things with this polygon feature. You will see this is a vector option because all the files which we have generated are either point, line or polygon. These all files are vector files. So, whatever algorithm you want to assign or whatever shapes you want to create with the help of this vector file that the plugins you will see on the vector option. So, in this vector option here you can see on the geoprocessing tool and the geoprocessing tool has been consistent with some more options.

For example, if you want to dissolve this two-vector file. So, you can do this simply by clicking this with the help of this dissolve function. So, once you are clicking over the dissolve function here you can see you have to assign the input layer. So, that would be your polygon and you can simply dissolve these two images. Now, here you can see a new file has been added named dissolve and you can see these two files have been dissolved. Earlier this was the two different kinds of different files and you can simply select these two files with the help of this option select feature by area or single click.

Once you are enabling this option, you simply click over your file. So, you can see this file as it is selected. So, how you would know that your file is selected you can see this cross in each corner of your file. These are basically node points and each node point is shown in a cross and your shape is filled with yellow color. So, this means that your file is selected. So, you can also select different shape files with the help of this option.

So, this was the two different shape files once you dissolve this is a single shape file. So, it is converted to a single shape file. Similarly, few more options are given here. You can use this option and you can see what kind of shapes you can generate according to your interest. For example, there is another option: union. So, what it will do it will just create a union with a union of these two it will create a union of these two different shape files.

So, you can click on the union option and you can simply click on run and here you can see this is your union of for this two-shape file. So, this was for the vector layers. Now, you can also use this raster option. You can explore this raster option and here you will also see many different kinds of options which you can use to create your maps or get more information. For example, suppose I want to get a particular set of, for example, I want to get a small portion of this map for my use or my research or interest. So, that you can use you can get this portion of map by the clipping of this area.

So, how you can do that you can simply use this shape file you have to use this raster option and here you can see that this is the shape file you have to use this raster option and here you can see from the extraction you can clip your map. So, in extraction there are two options one is click raster y extend that means, when you are enabling this option you will get you have to assign the input layer. So, I want to get a file from my merged file. So, this is my file from where I want to get a fraction of map and in clipping extend you can use three options are given one is calculating layer calculate from layer another is use map canvas that will use your entire map and another is draw on canvas. So, you can simply draw which fraction of map you want to use for your interest.

So, I want to just get this much map. So, here you can see your latitude and longitude has been assigned over your input image and you can once you are clicking on run. So, you can see this map has been generated. So, if I just disable this map. So, now, you can see this map has been generated by the clipping method. So, this is also a d m, but this d m is a small fraction of the map which we have merged and another option was suppose this was our map and you want to get a map you want to get a fraction from this map.

So, that you can use that you can get from the shape file. So, for example, I have to just create a polygon. So, to create a polygon you have to simply go to the polygon option and enable the polygon and you draw whichever fraction you want to get. So, once I draw you just give a random number and click and you select this polygon. Once you selected and now you go to the raster option and extraction and the first we extracted the map with the help of clip raster by extent. Now, we will show you how you can clip your map with the help of a mask layer that is your vector layer.

So, once you open this you have to choose your input layer and now polygon. So, you can see here I have drawn several polygons. So, I want to just get a fraction for this selected layer. So, you have to enable this selected feature only and you have to just assign the no data value 0 and you click on the run. Here you can see that your map has been generated. So, with the help of this clipping option you can get a particular set of maps from your region of interest.

So, we will stop here and in the next lecture we will show you how we can generate the anaglyph with the help of cartosat images. Thank you.