**Laboratory Practices in Earth Sciences: Landscape Mapping**
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**Week- 06**
**Lecture- 27**

Hello everyone. So, in our last lab we have understood the digitization of the Ah river and terraces. So, today we will continue from the same lab and today we will trace some more geomorphological features. So, here you can see. So, in our last lab we have a trace of the different levels of flow wheel terraces and the river system. So, now, today we will add some more geomorphological features.

So, ah here you can see here you can see this is the alluvial fan surface and this alluvial fan surface has been deposited by this river. So, this is the river called the Gullah river and all the sediment has been deposited by this river. So, you can trace a different level of alluvial fan surfaces also. So, to trace the alluvial fan surface similarly you have to create a new shapefile name the alluvial fan surface or you can save it as AFS that is alluvial fan surface and you assign the directory and the geometry would be ah the your polygon and with the same EPSG 4326 and WGS 84.

So, you can ah similar to the terraces you can add a new field in which you can assign the ah different level of alluvial fan surface. So, it says the alluvial fan surface is also deposited as you're in a different phase of river depositions. So, you can trace all those different phases of deposition as a separate fan surface. You can mark those layers as a separate fan surface. So, you can here assign a new field that would be your type of fan surface and that is in text format you can assign the length of the word and you click on the add to the field list. So, here you can see your new field has been added or you can click on ok.

So, on the layer panel you would see a new layer that is your AFS alluvial fan surface has been added. Now, you can start the digitization part by the toggle editing option and here you can see a symbol with this editing toolbar you can trace your fan surface. So, when you will use this your 3D glass because this is an anacolive. So, you can use your 3D glass to get a 3D representation of the surface. So, here you can see that this part is the youngest fan surface.

So, you can mark this part as a youngest fan surface or you can start from the AFS 0 that is similar to the similar as we did in case of terrace. So, here you can also mark this one as an AFS 0. So, to start your digitization you have to start from one bank of the AFS and you can trace the bank or the outer part of the fan surface. So, you can trace another bank. You

can also trace another bank of the fan surface and once you complete your tracing part you right click on you on your mouse and you assign a random id number and this one is your youngest fan surface. So, I will write it as an AFS 0.

So, this AFS 0 means the youngest fan surface. So, here you can see your AFS 0 has been here you can see the AFS 0 on your screen. So, now on your layer panel because your river is just below your AFS that is why here on the screen you are seeing the AFS above the river. So, you can simply drag your river over the AFS. So, now here you can see the river flowing over your AFS.

So, similarly you can trace another level of fan surface. So, you use your digitization tool and here you can see this is all these all are part of the alluvial fan surface. So, this fan surface has been deposited over the time by the sediment deposition which is brought by the river. So, you can simply trace all this part. So, this is a large alluvial fan surface and this fan surface has been formed by the sediment brought by the river.

So, you can trace all the parts of this fan surface. So, in this tracing part you have to do it very carefully to generate a precise geomorphological map. So, now I have completed the tracing part. So, now you can assign an ID number and this one is my AFS 1. So, I am writing it as an AFS 1.

So, here you can see your AFS 1 a part of AFS 1 has been generated over here and you this part is also the alluvial fan surface 1. So, because these are at the same level at the same height. So, you can categorize it as an AFS 1. So, now I will trace the remaining part of this fan surface. So, you have to start from here.

So, these are all part of your alluvial fan surface. So, again I am telling you that this tracing you have to do it very carefully for demonstration purpose I am doing it very vaguely, but you have to while you are generating your own map that time you have to spend some time to digitize all this geomorphological feature because that will ultimately give you a precise or accurate geomorphic map. Here I am giving you a demonstration of how to digitize the different geomorphological features and when I complete this demonstration part then I will show you how a geotechnological geomorphological map looks like which we have done from our research point of view. So, that map I will show you I will open all the shapes file and I will give you a view of how your tectonal geomorphological map looks like. So, here this one is also your AFS 1.

So, now when you complete the digitization part you click on the save because all the vector files which you have to generate have to be saved. So, when you go to your attribute table here you can see 3 ID or the 3-vector file you have generated but here on the layer on

your screen you can see only one color is showing over here. So, you can categorize this different AFS surface through your properties panel. So, you go to your property panel or over your property panel you can see so you can change this at the categorize. So, when you are in the categorize panel, you have to assign the value which you want to categorize or differentiate.

So, here is the type where I have mentioned the different types of fan surfaces so you can simply classify this type. So, here you can see these two types of fan surface I have digitized so here you can see AFS 0 and AFS 1 has been marked. So, you can apply or here you will see your different color for your AFS. So, you can change the color also by going to the color chart so here you can choose a color or you can apply the color so here you would see that a new color has been assigned to your AFS 0 and similarly you can also change your AFS 1 also. So, here now you can see the color has been all changed.

So, similarly you can digitize your different fan surfaces as well as the terraces, the river system, drainage pattern all these geomorphological feature you can trace and you can also trace the tectonic features that would be your fault or all kind of this tectonic features also you can trace by this digitization process. So, till now we have shown you how you can trace different geomorphological features with the help of a polygon tool. So, now we will trace some features which we will use as the line tool. So, as we know that the fault is a kind of linear feature so when you are tracing the faults you have to select the line as your shape file. So, now we will trace the fault.

So, in our last lab, I have explained to you how you can identify the tectonic features. For example, here you can see when you use your 3D glass and you will see this high resolution anacolip. So, you can see over in this area some topographical warping you can see over this area so this topographical warping is basically generated due to the faulting. So, this block is moved over this block so this is your shivalik hills and this is your endogangetic plain but in this area you can see that this fluvial deposit the quaternary sediment is also barbed or it is this portion this is the toward the northern part and this is the southern part if you use your 3D glass so you will see that this is at a different elevation and it is at a lower elevation so it is basically at a height compared to this part. So, this is in structural geology this type of features are generated when you are in a deep slip environment so this block has been overriding this block is basically moving on this block so this is basically a kind of scenario where this was your surface and then a faulting event has occurred. So, this if suppose this is your fault and if this is your north direction and this is south direction so your fault is suppose in dipping in north direction and due to this movement of this fault this block is just overriding on this block so this part which is moving so this is called your hanging ball and this one is your foot ball.

So, in this image you can see that if we consider this as a thrust environment, this would be your foot ball and this one is your hanging ball. So, you can identify these types of structures and you can trace your faults. So, to trace your fault you have to generate a new shapefile so you go to the layer panel and you generate a new shapefile so suppose I want to trace the fault so I will name it as faults so you and then from the geometry type because fault is a linear feature so you have to select the line as your vector file. Earlier for the river terraces for the and the alluvial fan surface and the river we have chosen the polygon as our vector file but to trace the linear features for example to trace the fault you have to choose a line for your vector file so we will choose the line and then you can also add the type of your fault. For example, you are able to identify different types of faults in your selected image or in your area so you can categorize those faults based on the sense of movement or the environment.

So, for example, if you are in your area or in your image if you can identify the deep silif fault or you can identify the strike slip fault so you can categorize those faults by adding a new field so that could be your type. So, in type you can assign whether it is a deep silif fault or in deep silif fault whether it is normal fault or it is thrust fault or if it is a strike slip fault so whether it is left lateral fault, strike slip fault or whether it is right lateral strike slip fault. So, these are basically sense of movement so based on your environment or sense of movement you can categorize different types of faults so to categorize the different types of faults you can add a new field and you can assign the different nomenclature with the help of that field. So, for example, I am just to do that you can simply write here type and add a new field so here you can see in the field list a new field has been added. So, now if I want to trace this fault a new layer here you can see that this layer is a linear feature and you can start your editing by enabling the toggle editing option.

So, here you can see this with the add line feature you can trace your fault. So, here first you have to identify your fault and then you can start tracing. So, here I can see this is my fault so I would trace the fault with the help of this digitization. So, again I am telling you that this is a time taking process and you have to do it very precisely to accurately mark the all these features whether it is fault or whether it is the river terraces or any kind of features geomorphological features you have to mark it very precisely to you should first spend some time to identify those features and then you start tracing. So, when you finish your tracing part you just click the right click with the help of your mouse and you assign a number so this fault is the thrust fault so I will just write the thrust fault.

So, in the type option you can categorize your fault based on the sense of movement or based on the environment. So, this fault is the thrust fault so I wrote the thrust fault in my type. Similarly, if you are confident enough that this fault you can easily identify on your satellite image so you can categorize based on whether it is active or potentially whether it

is active thrust fault or somewhere you might not get the clear view of your map or your surface expression of your fault is not present on your map or you cannot trace the fault in entire section. So, in that case you can use some dotted line and you can categorize that portion of fault as a different nomenclature. So, that also you can do for example in this portion where I am not getting this kind of fault scar so this here I can also categorize this part of the fault as a fault scarf but in this portion where I am not able to identify the fault scarf so in this area I can trace the fault or I can name it as a thrust fault or as a active fault or so similarly you can add a new field or you can also categorize the fault based on the expression.

So, for example this fault which I am tracing is basically your Himalayan frontal thrust. So, in the Himalaya if you have some basic idea about the Himalayan tectonics you might know that in the Himalaya you have the MCT in the northern portion that is the main central thrust and then MBT and then the frontal thrust of your HFT. So, this fault system has been developed over the time since the formation of the Himalaya so it is considered that Himalaya is formed way back in 50 to 60 million year and since then the due to the collision of Indian and Eurasian plate the different thrust faults has been developed over the time and due to the forward propagation and due to this forward propagation first the MCT has been formed that is your main central thrust and then MBT the main boundary thrust and now the present day the active fault which is considered as a Himalayan frontal thrust. So, this Himalayan frontal thrust is considered as one of the most active faults of the Himalaya. So, this part where I am doing the tracing part so this is your Himalayan frontal thrust.

So, based on your interest or your area of interest you might trace the different kind of fault or faulting environment so you can digitize those fault or the geomorphological feature with the help of this QGIS or even you can use the ArcGIS that is also a GIS platform but you can use this QGIS because QGIS is freely available and a easy handy software to use. So, here I trace the fault so here I can also categorize this as a thrust fault. So, now here you can see that I have marked the fault or suppose this if I want to categorize this one as a scarf so you can simply go to your open attribute table and here you can see the first ID where I have marked this one as a thrust so you can select your attribute also. So, you can simply click so if you have to save these features and once you have you save your feature here you can use this option so here this option you can use to select your features which you have marked. So, if you can see this shape file I have selected and now you can open your attribute table you would see that this one is yours. This one is the feature which we have selected so you can if you want to change the name so you can directly change from here.

Suppose I want to give it the name as a fault scarf so I can change it from here and when

it changes you can save it. So, now you can see this one is categorized as a fault scarf. So, you can do this with the help of the attribute table and once you have completed the digitization part you can change the color and you can also assign the different shapes to your fault or the geomorphological feature. Suppose I want to keep it as a red color so you can choose the red from here and here you can see your color has been changed. So, now it is selected to deselect this feature you can simply click over the deselect feature from all layers.

So, now you can see this is now deselected so you can also change the width of this line because right now it is a linear feature so you can also change the width of this line you have to increase the bit and here you can see a preview of how your line would look like. So, you can change when you are satisfied with the width you can apply or here you can see your fault has been marked. So, similarly you can use the linear vector file to trace all the linear features or linear structures so you can use this linear vector file. So, now I will give you a demonstration to add location in your map because adding location is one of the important parts and that you would be able to do with the help of a point vector file. So, we have learnt to trace the feature with the help of polygon and we also have seen how you can trace the linear feature with the help of a line vector file and now we will see to add the location in our map with the help of a point vector file.

So, to add the location first you have to add the base map and because in your base map you can clearly see the location. So, in this case we have opened the Google satellite and you can also choose the Google hybrid map. So, in this Google hybrid map you would be able to see the different nomenclature of your map. So, you can simply close this image and here you can see the different features which you have traced or digitized. So, with the help of this Google hybrid map you can simply add the location on your map or you can nomenclature in your map because the nomenclature or adding location is one of the important parts of any kind of map.

So, to do that you have to first add the layer. So, you can simply go to the layer panel and you can add location you can save, you can give the output directory and from the geometry type to add the location you have to choose the point as your vector file. So, you choose the point as your vector file and you press ok. Now you would see that a new layer with a name of location has been added to your layer panel. You can start the tracing with the help of toggle editing mode and you can put the layer. So, suppose this is Halwani so you can put a point over here and here you can see you can assign a name 1.

So, here you would see the new point has been added and then another area is this one you can choose this as another location. So, similarly you can assign the name of the locations and once you have marked your point so you can add you go to your open attribute table

and from the open attribute table you can add a new field. So, with the help of this attribute table here you would see a new option for a new field. So, this new field would be your location. So, I want to just add the name of the point which I have just added.

So, location would be in the text string or the your you can increase the length and here you can see. So, the first location you can simply select which one you want to give the name. So, here you can see your point has been selected, you go to your attribute table and you can assign the name. You can save it and another name is your choice, select the point and here you can give the name of this location also. Now you save all the points which you have marked.

Now you can close your map once you are done with the selection of the location you deselect your selected point you can add a label to this point to get the name on your map. So, to do that you have to go to the property and you would see the label panel just below the symbology. So, on the label panel by default it would be on the no label option you have to change it to the single labels. Once you click on the symbol label you would see that you have to change the value. So, because we have saved the name of the location on the location panel.

So, you have to change it to the location and once you do that now you apply and here you can see your name of the location has been added on your map. So, the breadth of the breadth and the text format you can change all these things from this using this option you have to explore all this option to do the these all options are related to the labeling part. For example, the text from this text menu you can change the font size or font style or you can also increase or decrease the size of the text. So, all these things you can do from the text option and from the buffering menu you can create a buffer zone on you on your map. So, for example, you can also increase the size of the buffer.

So, here you can also change the color for example if I choose the black. So, now you would see that buffering. So, this buffering you can use or you can also create the mask or background you can assign a background for your selected label. So, all these things you can do from these options you have to explore these options and these all options are related to the labeling part only. So, by the labeling part you can do the labeling.

So, similar kind of labeling you can do also for another geomorphic feature. For example, if you want to label your terraces, so you can do that by going to the label you have to first go to your terrace layer and then you go to the label from the symbology option and here you have to choose the single label and from the single label you have to choose the type and now you click apply. So, here you can see your terraces are also labeled. So, similarly you can also label your alluvial fan surface also. So, with the help of these options you can

do the labeling part.

So, once you are done with all the mapping part, all the digitization part then you have to go to the print layout map or print layout manager. So, you can go to the print layout manager that is mentioned over here. So, here you can see a new print layout option. On this new print layout option, you would be able to export all your shape files into a map format. So, in our next lab we will show you how with the help of all this vector files you can generate a map in the jpeg or png format.

So, that we will see in our next lab. In our next lab I will also show you how I will also give you a demonstration of a map that we have generated for our research purpose. So, that I will show you and with the help of that map because in that map I have traced all the shape files or all the geomorphological or tectonic features with the help of this type of an eclipse. So, I will show you all those shape files, I will generate, export or import all those shape files over here on the QGIS and then I will show you how you can export that map into a jpeg or png format. So, that we will see in our next lecture. Thank you.