Types of input
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Now the second thing is what is the scale that is what the GIS is, GIS is available in three platforms. One is the desktop another is web then it is a web browser. Now what do we do with that; what type of implications which you have to do. Now in the agriculture what we want to do is we want to talk about the farm level this is of an interest for a farmer or for the people in that place. So, his interest is about managing; his interest is only about the crop yield management then usage of different fertilizers and pesticides then crop rotation and estimation of soil. Loss loss which goes along with the fertilizers that is what his interest is whereas if you combine all the farmlands into together then it becomes an area that area could be at the village level.

So, that is what I call it as area level. So, here I am interested in what are the different storage structure which is available in the villages, the different network systems that brings water into the lake or the reservoir and the network which takes water out of the places. Now this is also equally important is the groundwater availability which is being used as a supplementary water supply during the cropping period. So now his interest is what is the demand which I have got; how much is the shortages which I am likely to get, how much water groundwater I should do even if it is not available; what should I do that means he will be the water stress will affect the cropping pattern as well as to some extent if the rainfall is less; water storage is less then he gets into the system. This area or the village goes into the drought area and heats vulnerability needs to be assessed.

So how many years there is a drought in that particular village. So what they were doing it, how do we improve it or is there a possibility that they can stop agriculture or go for some other type of activity that is all; it will be decided by this type of things. Now from the villages then you go on to the regional level or a zonal level; here what we are interested is, we are interested in the variation between as all have seen it. So it rains in one place but it doesn't rain in the other place within 100 meters, 200 meters or 500 meters. So, what does it indicate is; the weather pattern is controlled by the atmospheric characteristics or the cloud pattern which is moving around that area. So that is why there is a variation in the rainfall as well as how do we use that word resources that information there is a cloud pattern information for the resources manager that is the issue which we may have to do that is and also prioritization of management, see management prioritization is nothing but it is a water as well as the best research and things like that. So, policy decisions now for a region assume that there is a Tahsil or it is a district there are about 300 or more than 20 villages are there each village has got its own problems.

It’s own problem and it has to be sorted out and which is immediate which is not immediate. So, that you'll be able to prioritize; prioritize in the sense I will take up this activity in this particular village then towards the water resources management as well as for the prioritization of watersheds then you try to give a ranking of the villages where you prioritize and then start working similarly; you develop a policy to do this this is what the scale of activities in the agriculture practices.

Now what is a scale what is the scale? Scale is the relationship between the – relationship between the relationship between the distances on the map as well as on the surface. Suppose if you see a point here; one point and another point. Now it is maybe about 2 centimeters or 2 centimeters; so this centimeter if it is going to be 1:1000 scale which we normally represent it that means it is 2,000 centimeters on the ground, on the ground. If it is going to be 1:50,000 then it becomes one kilometre. So, this is what we do that when you measure it if it is accurately presented it on the map then the distance what you would observe on the ground will be twice what we have shown it here; this is what the scale is why the scale factor comes into picture in GIS is there are this farm level information or a village level information, it comes somewhere around 1:5000 whereas area level, village level or regional level it goes to 10,000 scale whereas in the other area then we have 25,000 scale.

So, all the scales either this has to be blown up or this has to be brought down as a single scale. So, that everything we see is or is related to each other in terms of distance and other activities. In addition to that scale another problem is the map projections; see map projection is nothing but the globe is like a ball. So, when you want to make it as a paper or in a XY coordinate.

See, this much of portion needs to be adjusted. So, that equal area is presented on the map. So, that is why equal area projection sometimes; we try to use it up and at the same time what we may have to do is we may have to confirm shapes should be preserved. This type of shapes should be preserved then the direction; direction is nothing but this is the north and south. This is the northern direction. So, direction should be preserved and distance, distance between one place to another place. It should be distance between one place to another place that is also need to be preserved that is all to be done before you project it on a map or if they are they're from a different projection cylindrical conical and transverse, oblique whatever you see it here.

If it is there then it has to be brought in a single thing. So, that there is not overdoing from one map to another map. So, normally the Universal Transverse Mercator coordinate systems that is been used in a better way or it is used in the mapmaking; in addition to the map can I use only map; I don't know how to read the map then there are other methods of input. One thing is the map should be converted from a paper maps to a computer site. So, that is what we call it as a digitization; in the digitization what do you do is when you give a map where everything comes out in the pixel scale then it has to be digitized that means operator has to click and that means he has to create so many point. So, that all these points can be joined together either to represent a line or to represent an area of its own. So, that is one way of doing it; another way is the geography that you can take information directly from the images from the earth orbital satellite images, orbital satellite images, what it does it? It does it scans the entire Earth surface with a sensor that will be corrected with ground control point so that this equal area net and other related projection areas are taken into consideration.

Now another one is that the satellite data is available from the around 900 kilometers above the surface but whereas you can use aerial photographs or airborne aerial surveys can be done

that means the camera or a sensor is mounted on the aircraft and it is being flown across that particular area. So, that either it senses, it senses or it takes a picture that picture can be directly taken on to the system and the digitization can be done in addition to this nowadays what is happening is UAVs, UAV is nothing but unmanned aerial vehicle that means it has got a sense, it has got its own sensors inside. So, that it will be; there will not be any piloted, man operated system and it will be controlled from the ground and it will be able to do the same thing as the satellites do or the aircraft do that.

Only difference is the elevation from the surface can vary whatever you want to vary it out whereas another one drones. Drones are nothing but they're remotely controlled robots. So, these robots what you can do is you can have a closer look at the surfaces and it will be operated at the ground. So, he will be able to adjust, able to adjust the height as well as its efficient properties the another one is; there is a laser scanning LIDAR, LIDAR is nothing but the LIDARs also can be used. This digitization is carried out directly from the images. So, that we don't have to first trace out and what are the patterns and the patterns are again converted into other activities. So, this is the advantages in the present day. So, now what we are capturing, data capturing what happened is either in the form of a paper or in the PET form PET films it can be done and many of them whatever you get is; is the raster data.

Now let us see what is the raster data at a later date. Now we have one is a maps another is field service. If you are interested in updating your activities; what you try to do is; you pay and then get your field service done and that information from the total stations. It can be directly brought into the GIS system. So that it will be better for us to merge it with that. Another, done if the cameras; cameras, digital scanners and LIDARs these are all the things which are available which we were talking about. So, the advantages and disadvantages between the camera images. Camera images normally comes with the film and the film has got its own problems whereas the digital scanners they are better off because it is in a digital mode so you can always you will be able to transfer from one end to another end and LIDARs they have got a low level activities, low level posturizing or a low level scanner capability.

So, that is also being used in the cameras digital and aerial photographs the aircraft, aircraft is also done and aircrafts can be 10,000 scale or it could be helicopters. Helicopters are also nowadays being used depending upon the mission which you want to do that is also done now what are the different which we are talking about is there are data is represented in two ways one is a raster and another is a vector the raster is a point which you are able to see that on a diagram whereas if it is connected in one dimension then it becomes a line then if it is there if there is going to be a shape like this then it is called as a polygon. So, this is what the raster images which are there and this; they are stored in the GIS as the shape files, the vector has got there it is there in the shape files whereas the raster images. Raster images; it is nothing but a grid cell whereas the vector one is a point line and the continuous points and either it is single or it is one dimension or it is a multiple dimensions that is what the vector files, raster files are there then what is happening is your field which you are able to see it. So, it will be seen as a raster file and where the size of the pixels; size of the pixel is nothing

but if you are able to see it like this if it is going to be one meter by one meter on the ground so that is what we call it as a raster data. So, this has got; so here there are certain advantages and disadvantages in the rest in the raster images which we will see it at a later date. So, now the polygons which is there as a multi-dimensional thing and it is in the GIS you can create a polygon and the polygon attributes; attributes are nothing but the information you want to attach it. So, you will be a to see like this; this is the room and this is the building and this building can be addressed like this.

So, any information can be addressed in the form of a table and towards the vector data. So, this is the one good advantage where you can use it in the agricultural practices. So, it will be; if it is in an agriculture practices what happens is you draw a polygon and the polygon you will be able to say what is the ID number of the plot and who owns it, ownership and what type of information, soil, land everything whatever you wanted is, whatever it is available on the 7/12. So, that can be added into the system that is the advantage over here.

Now advantages and disadvantages are vector data can be easily registered and you will be able to see rescale it and you can able to re-project it. See this is the advantages when you are having information coming from two different method of survey. Okay, so and also it has got a it occupies smaller storages and the sharing with them is easier in the smallest storages what is what is happening in the small storages you will be able to save multiple images in the same way. So, when compared to the raster. Now what is the manipulation? Manipulation in the sense using the coordinate system different scales different scales may be; they may be adjusted against each other suppose I have got a smaller map and it can; it is their part of the bigger map so then I will be able to adjust too many maps like this and then everything will be either with reference to your coordinates, with reference to your coordinates you will be able to accommodate; you will be able to either zoom in and then zoom out of the things.

So, transformation which you include whatever we are talking about is the projection changes can be possible, data aggregation is possible and also reading out unnecessary data which is there in the previous data form that can be removed in this area; this is what the database management software which is available in the system does it.