Soil and Water Conservation Engineering
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Lecture - 54
Improving Land Capability

Hi so, this is again the second lecture of week 12. Mostly we will be talking about improving land capability. So, in the first lecture we talked about land capability classification. So, once you classify the lands so, some lands are you know if you see arable lands non-arable lands.

So, and also first class is the class number 1. And if you go for class number 2 3 4 you may have to you know start using the soil conservation measures. So, and how do you improve the land capability using you know some measures we are going to discuss this in this lecture.

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So, I said maybe let us let us go here. So, the whole the course continue in week 12 again repeated repeating this that the first one land capability classification we finished. And this is lecture number 2 of week 12; we are going to talk about improving land capability and the followed by the other lectures, we will be seeing in the next few classes.

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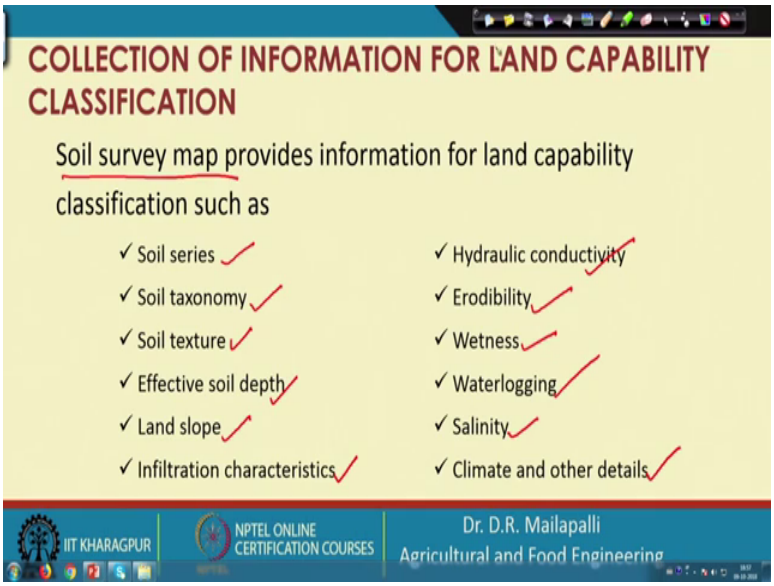

So here the collection of imp information for land capability classification. So, what kind of information really we required to classify the land so that we can you know put the particular land on the class 1, class 2, class 3 or something like that. So, here the information we required here is the soil survey basically this is very important soil survey map. So, that provides information for land capability classification; such as you know soil series, this is also you can get from a soil survey. And soil taxonomy and then texture effective soil depth, land slope infiltration characteristics of the particular land and then hydraulic conductivity, erode ability and wetness.

So, how I mean whether this soil will be capable of holding the soil moisture or not and water logging condition where is the soil has a problem with you know what logging. And the salinity has the problem of the land or not and the climate and other details. So, see all these things once you get the you know information you can you know classify the main class and then the subclasses. So, the soil survey map is very important, and you can get all the information from the using the soil map as well as some other survey maps.

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So, then the next is so, what is land capability, and how can it be improved? So, land capability we defined in the previous lecture. So, the basically the land capability is whether the particular land is you know capable for growing crops or not. So, basically so how can it be improved the class 2, 3, 4 or even (Refer Time: 03:16) classes; mostly I am talking about arable lands here. So, how can we improve the you know land condition for crop grow I mean crop growth. So, basically the 4 common practices; the Irrigation, Erosion Control, Drainage and Forming so, the irrigation so basically helps in so, irrigation in the sense the giving water to the plant artificially.

So, that is for beneficial use of crop growth basically. So, once you give irrigation or irrigating a crop. So, definitely you are wetting the you know the soil root zone right, and that definitely will improve the soil condition, and also improve the macro or you know micro nutrients availability, and also the biological you know condition or biological you know biota, we can say the soil biota will improve.

So, then the definitely the erosion control measures will control the soil moment from the surface. And the drainage will help in you know free drain of water from the top to you know the root zone, and the forming definitely will help in making the, but you know nice grade of land, because that is very important that will give the efficiency of irrigation.

And improve the not only I mean water available to the crop, but also nutrient availability will improve, if you can maintain a good grade of the land.

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So, then next is we are going to see one by one. So, the erosion control here so, basically this is the excessive erosion may result in land, that is no longer fertile. The longer term product, the long term productivity of land can be assured by controlling soil erosion. So, you will be using definitely the soil control soil conservation measure. So, in case of gulley control structures and then or terracing or you know, burns right all these things definitely will help in reducing the soil moment from the for I mean, fertile lands to the to the outset of the land.

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So, the next is the land drainage so, land drainage vertical basically the surface drainage removing water from the surface of the land. Generally, ditches and terraces are most often used for this purpose. And then there is a internal drainage. So, this is the surface and this is all subsurface drainage we can say, it is removal of water within the soil profile.

Basically the tiles or tubes installed below normal plowing will be used in this case of subsurface drainage or internal drainage we can say. So, surface drainage removes the surface water whereas, subsurface drainage removes water from I mean root zone. Or definitely this will be helpful in removing the salts from the root zone.

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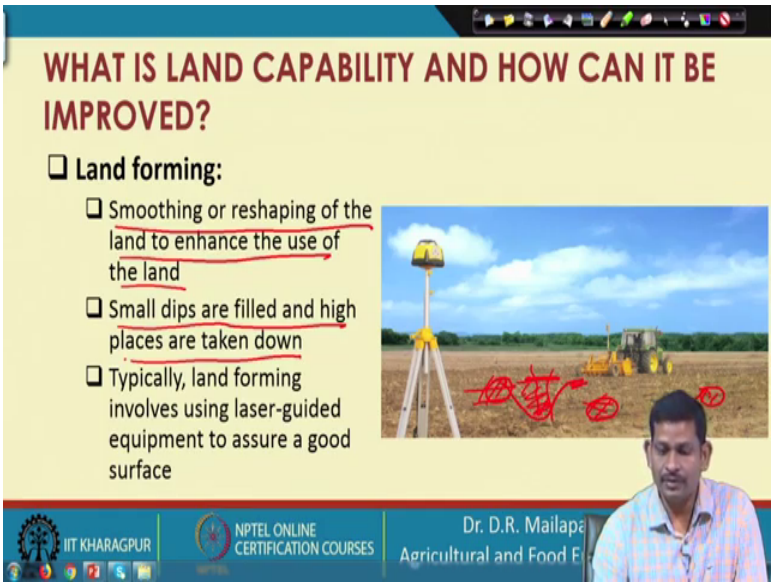

So, the next is the land forming. So, land forming is very important. This is basically smoothing or reshaping of the land to enhance the use of the land for cultivation. So, here a small dips are filled with a high places or taken down because if you have like you know small depressions here. So, the shaping will definitely refill the depressions. And so, that definitely helps in so, what happens if there is a depression here so, more you know water (Refer Time: 07:14) so, here the moisture content will be more here and the less here. So, that kind of non-uniformity can be avoided in case of you know properly graded lands.

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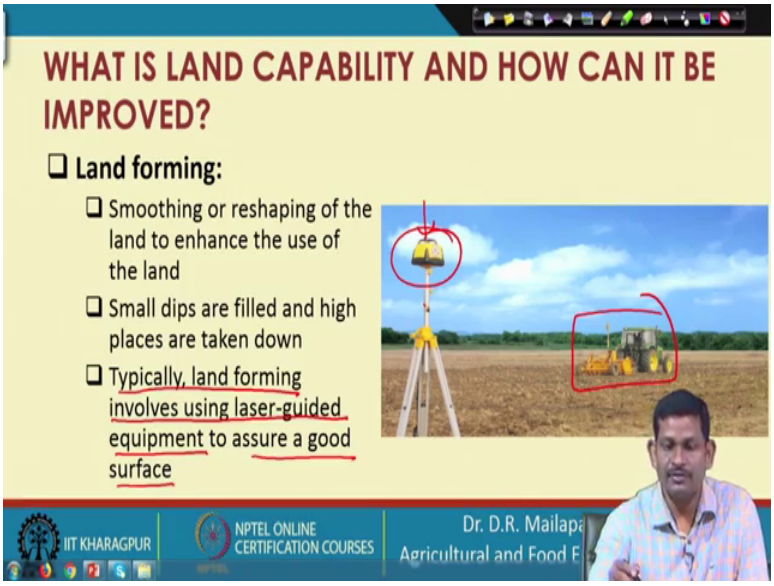

So, the typically the land forming involves using a laser guided equipment to assure the good surface so here if you see laser guided equipment. So, this is a tractor so, which shapes the land. And here this is the laser guide so, it guides the tractor where to you know remove the soil excess oil and where to add that excess soil so that the desired you know grade can be achieved.

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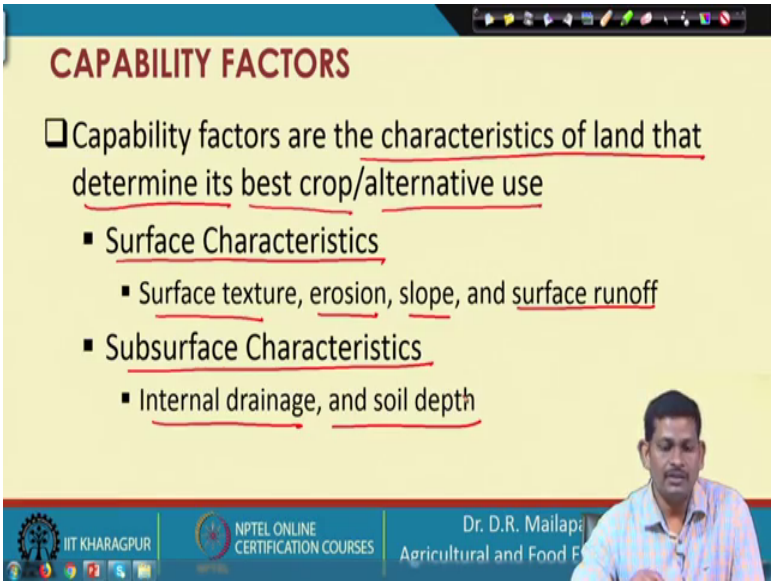

And then capability factors if you see the capability factors or the characteristics of the land the determined it is best crop or alternative use. So, the capability factors are for example, surface characteristics; the surface structure, erosion, slope and surface runoff. So, these are all the factors which defines the land capability. And this is all surface characteristics like, textures and erosion, all these things subsurface characteristics or such as internal drainage subsurface drainage and then soil depth.

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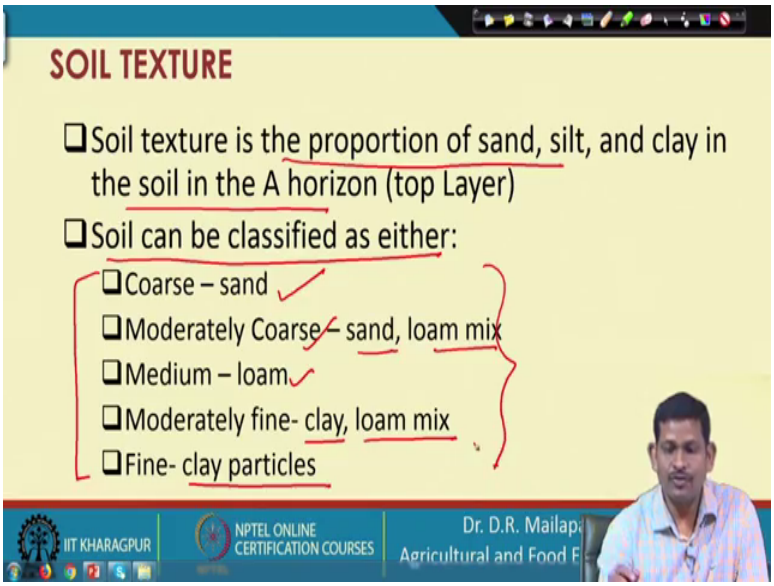

So, you are going to see these capability factors and then first if you see the soil texture is the proportion of sand silt and clay in the soil in a horizon, because since we are talking about the crop production. So, mostly we will be you know concentrating on a horizon, because that is fertile land and used for crop production. And soil can be classified as either coarse sand and moderately coarse for example, sand and loam mix and medium.

So, that is a loam and moderately fine, that is a clay and loam mix, and fines or like a clay particles. So, here the based on soil texture, the soil can be classified as coarser, coarse, moderately coarse, medium, moderately fine and fine based on the different soil, you know, textures.

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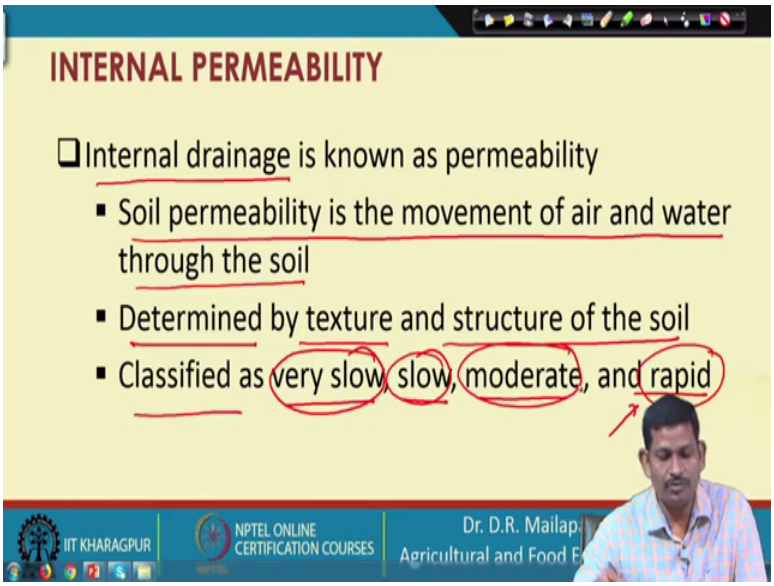

And then internal permeability so, internal permeability this is also called as internal drainage. And soil permeability is the movement of air and water through the soil. So, soil permeability is the property of a media. So, it represents the easiness of a particular you know like air and water passed through soil matrix. So, it determined by the texture and structure of the soil and it can be classified as very slow, a slow moderate and rapid.

So, the permeability the internal permeability so, based on the internal permeability soils are classified as very slow soils and slow soils a moderate soils and rapid, rapid flow soils. Because the flow is rapid if the flow is rapid, and we can say the soils are you know rapid moderately rapid or very slow so, the based on the permeability.

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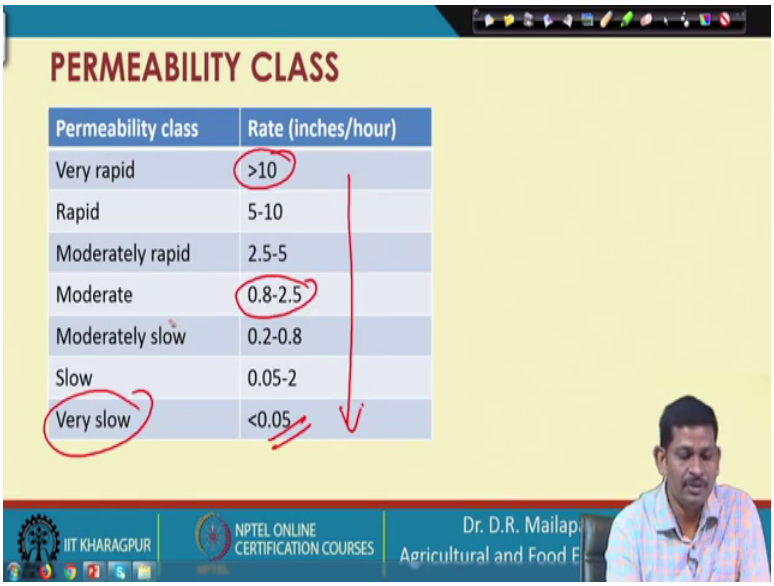

So, the next is permeability classes or like permeability class very rapid. So, mostly the rate of water flow in this class is greater than 10 inches per hour. So, similarly very slow it will be less than 0.05 inches per hour. So, you can go through these numbers, these numbers are very helpful when you talk about the particular, you know, the land class based on the permeability. So, if you knowing the particular permeability range you can put them in a particular class.

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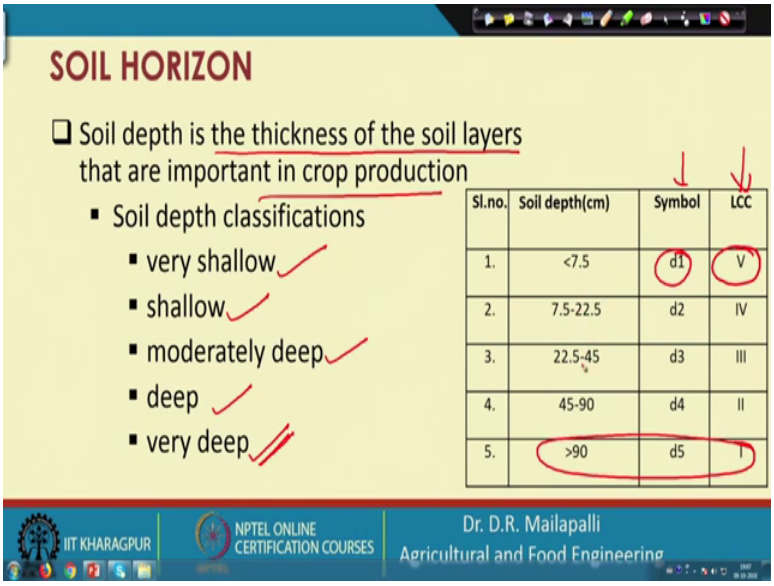

And then the next is the soil horizon. So, soil horizon abc so, something like that o horizon. So, all classes based on that the soil depth is basically here, soil depth is the thickness of the soil layers that are important for crop production. So, for example, the classifications based on the soil depth is a very shallow or shallow and moderately deep and a deep and very deep soils. So, here in the previous lecture we already talked about the soil classes based on this.

So, the symbol d1 is for example, land capability classification 5. So, the shallow it is it is seems the very deep class. So, this is the class number 1 is a very deep, and then deep soil moderately deep shallow shallow and very shallow. So, the classes are here, and the symbols all we mentioned in the previous lecture. So, the depths basically we are talking about you know less than 7.5 all these things. So, knowing the particular depth we can put them in a particular class here.

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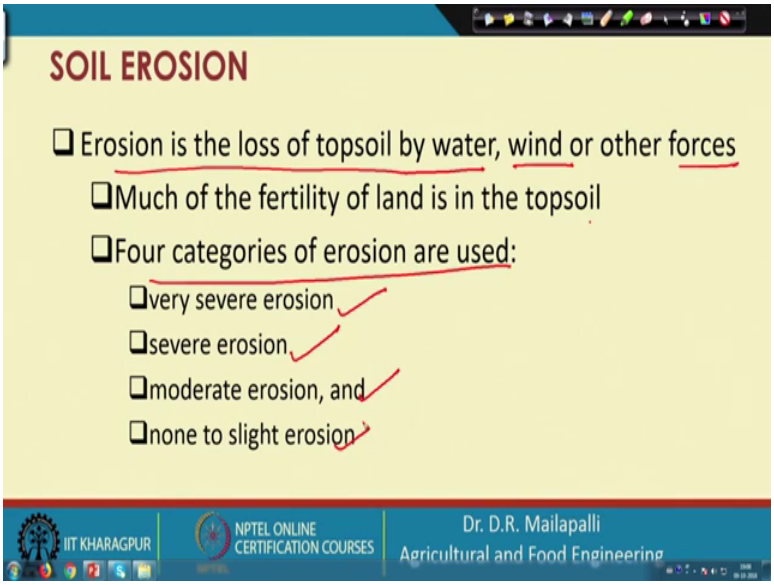

And then soil erosion; soil erosion is another factor you can see. So, soil erosion is the loss of topsoil by water or wind. Or with any other forces you know so much of the fertility of land is in the topsoil. So, since we are talking about fertility so, we focus on topsoil. So, that is important for cultivation. And your 4 categories of erosion we use. The first one is very severe erosion.

So, mostly the gullies so, I mean very severe erosion means the soils or steep I mean, the lands are very steep, and mostly you see in the class, you know, the last class 7 8, and

severe erosion and moderate erosion, and non or non to slight erosions. Under these classes we can put based on the particular erosion factor.

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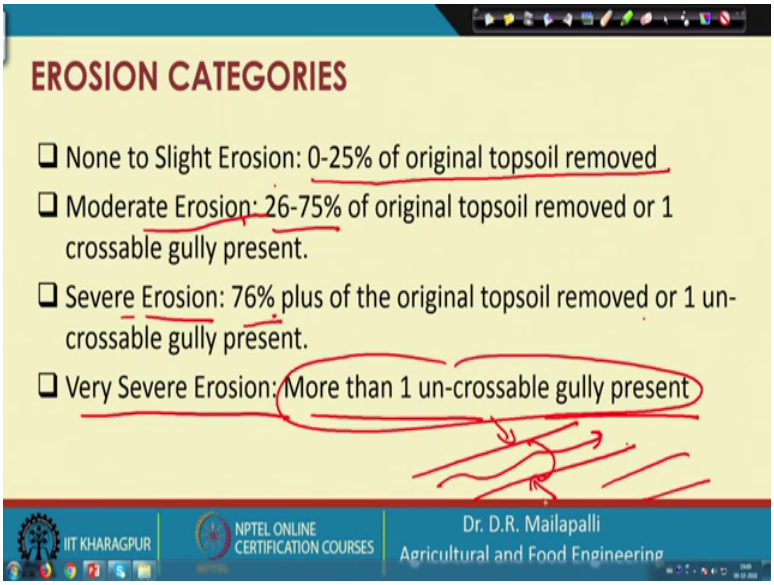

Sorry, so the next. So, next is the erosion categories if you see. So, non to slight erosion generally is 0.0 to 25 percent original top soil is removed. So, if the original top soil is removed, like 0 to 25 percent of original top soil is removed, then we can put them under none to slight erosion category. And if it is a moderate erosion, if the moderate erosion so, that is 26 to 75 percent and the severe erosion. So, that is 76 percent and very severe erosion so, more than one un crossable gully present. Suppose if there is a gully here so, this is that means, one gulley you can say so, this is a difficult to cross right.

So, I mean in order to cross so, if this is the gulley it is a difficult to cross. So, at least if it is a more than 1 crossable gulley presents right, more than one gullies. Then it is a very severe erosion.

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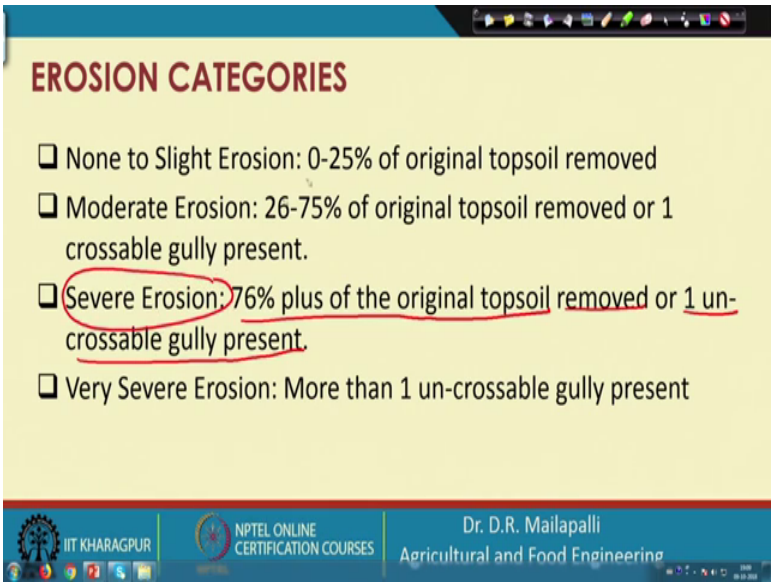

So, or if it is 76 percentage of the original topsoil removed, or one crossable gulley present, one uncrossable gulley present then it is a severe erosion.

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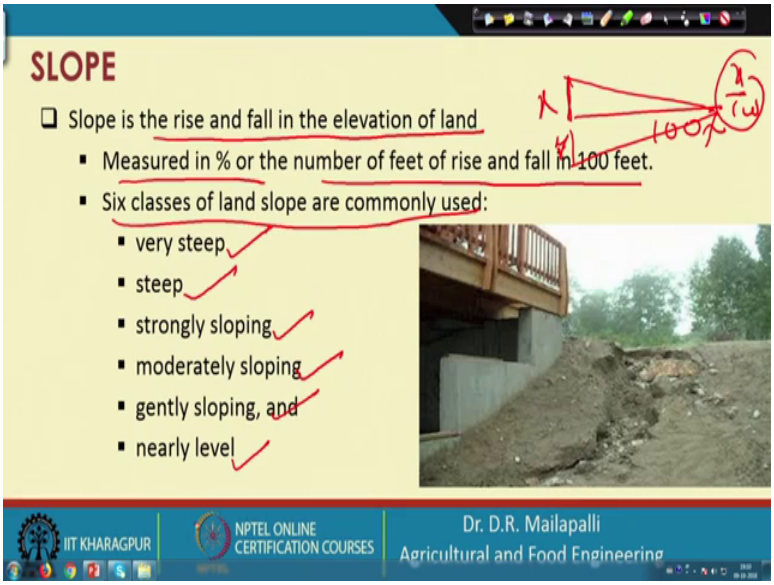

So, like that we can you know describe the erosions into different classes and then next is the slope. So, slope is the rise and fall in the elevation of the land. So, the slope is I mean depression and elevation so, measured in percentage and the number of feet rise and fall in 100 feet.

Suppose in 100 feet so, what is the rise, maybe the x rise or maybe the fall, y fall. So, x by 100 in percentage you get the slope. So, the 6 classes of the land slope are commonly use. Very steep slope, steep slope, strongly sloping and moderately sloping, generally sloping and nearly level slope. So, based on this the based on the slope the land can be classified.

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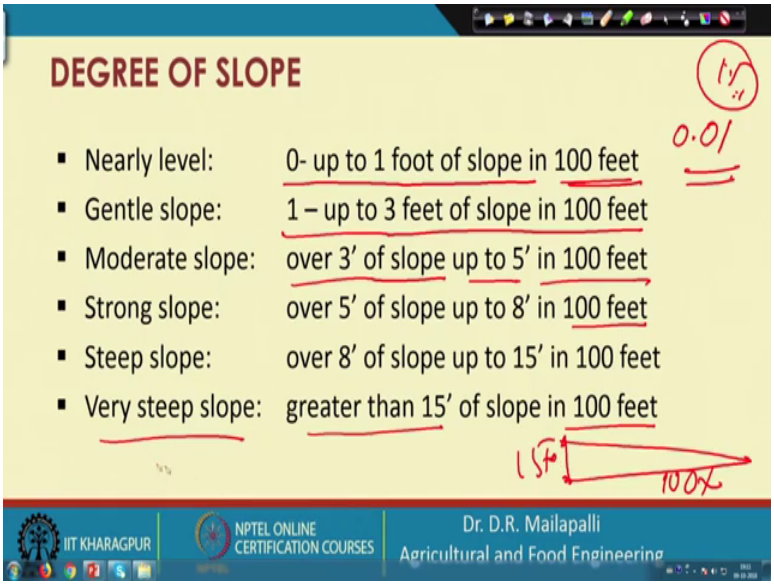

Let us see the many different numbers here. So, nearly leveled 0 up to 1 foot of the slope in 100 feet so, 1 foot divided by 100. So, there will be 0 point you know you know 0 1. So, that is 0.01. So, that will be about 1 percent slope right. So, this is a 1 percent slope.

So, similarly the gentle slope 1 to 3 feet slope in 100 feet. Moderate slope over 3 feet of slope up to 5 feet in 100 feet so, then a strong slope over 5 to 8 feet in 100 feet. Very steep slope greater than 15 feet in 100 feet so, that means, in over 100 feet all right there is a 15 feet rise you can see in case of very steep slopes so this classification.

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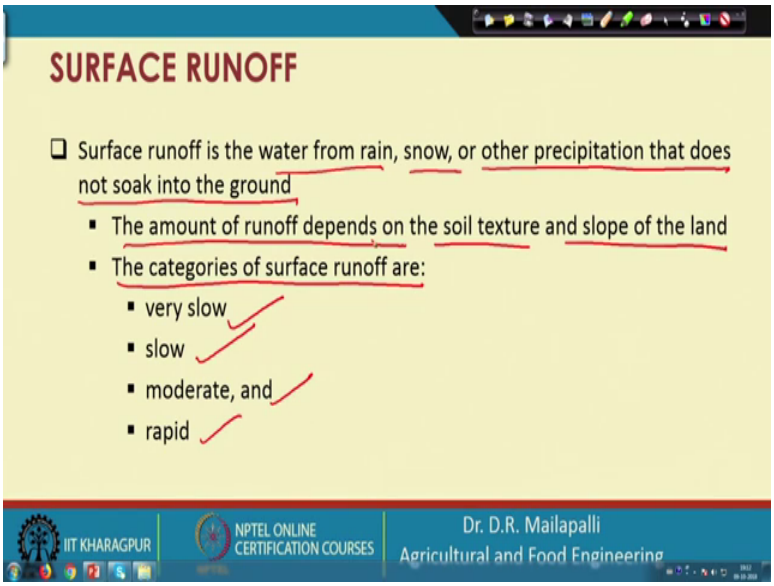

And then so, next is a surface runoff so, surface runoff is the water from rain snow other precipitation that does not soak into the ground.

So, whatever abstractions is done so, the amount of water which is running off from the field, and which is the part of precipitation is called the runoff. And the amount of runoff depends on the soil texture definitely. So, this the sandy soils definitely the abstraction will be more; that means, infiltration will be more, and you will you will see the less runoff and the slope of the land increasing slope definitely increases the water flow and then increases the run off.

So, the categories of surface runoff are very slow, slow and moderate and a rapid so, based on the runoff class based on the runoff that soils can be classified. So, very slow these soils are having very slow runoff, and slow the soils are having slow runoff and moderate the soils are having moderate runoff, so like that.

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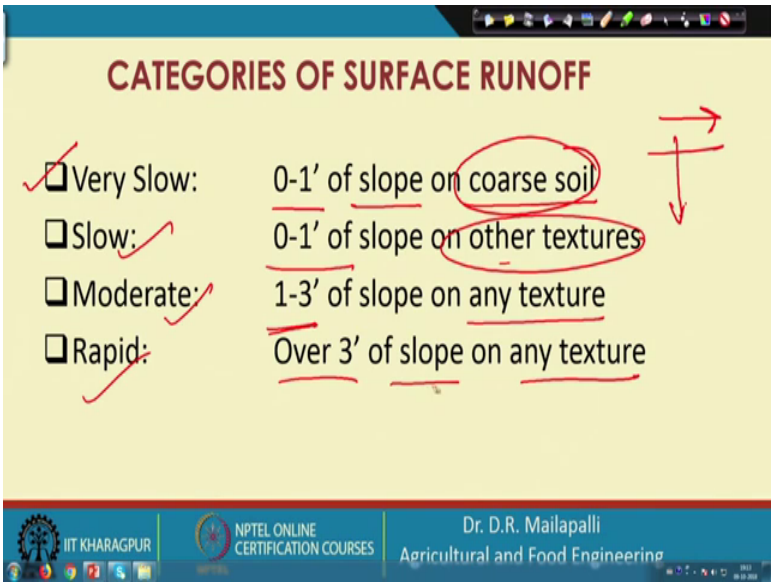

So, let us see the categories based on surface runoff so very slow. So, that is about 0 to 1 feet of slope, on coarse soil, the coarse soil what happens there is the inter stitious 4, I mean, the spaces, interstitial spaces are larger. So, definitely the water will pass through the soil very easily. And so, that is why though the down very easily it will go whereas, the runoff will be very slow because of that. That is why we called varies these soils definitely, I mean the runoff in case of coarse soils is very slow.

And various in other texture soils which has slope from 0 to 1, that is called slow and 1 to 3 feet slope in any texture we call moderate, and over 3 feet of slope on any texture we call a rapid. So, you see the rapid runoff in case of the soils having more than 3 feet of slope, that mean more than 3 percent slope we can say or any other texture.

So, irrespective of any texture so, the slope is basically the good player in deciding there runoff. So, in this lecture mainly we focused on the land capability what is the land capability, and then how to you know improve the land capability using you know irrigation, and using the drainage and then and also the land forming right land forming so it is very important.

And then so based on that there are some factors we discussed on land capability, and then based on the permeability, based on you know the slope, based on the runoff texture and the soil depth. So, we decided or discussed the how the land classes can be called.

So, thank you so much for you know lecture 1 and lecture 2 of this most of the land capability classifications.

And the following lectures we will be talking about sediment transportation. And then the measurements, the devices used to measure you know sedimentation and then I mean erosion, I mean, soil sampling you know other stuff.

Thank you so much.