agMOOCs
Drought and Characteristics
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Welcome to AG MOOC course on GIS application. And now we will be seeing about -- we have seen what all the land degradation, water availability, water demand, what is the differences. What I mean the extreme event which is expected during this climate changes is drought. So now it is -- before we go into what are the different and how to do that, there is a need for what is drought. What is the drought? How the drought could be characterized, because drought is of importance to all the people those who are on the surface of the earth.

Now, what we try to do is we will try to characterize what all the different features and how it is classified and how we can able to understand that parameters and then make our agriculture profitable or it is productive.

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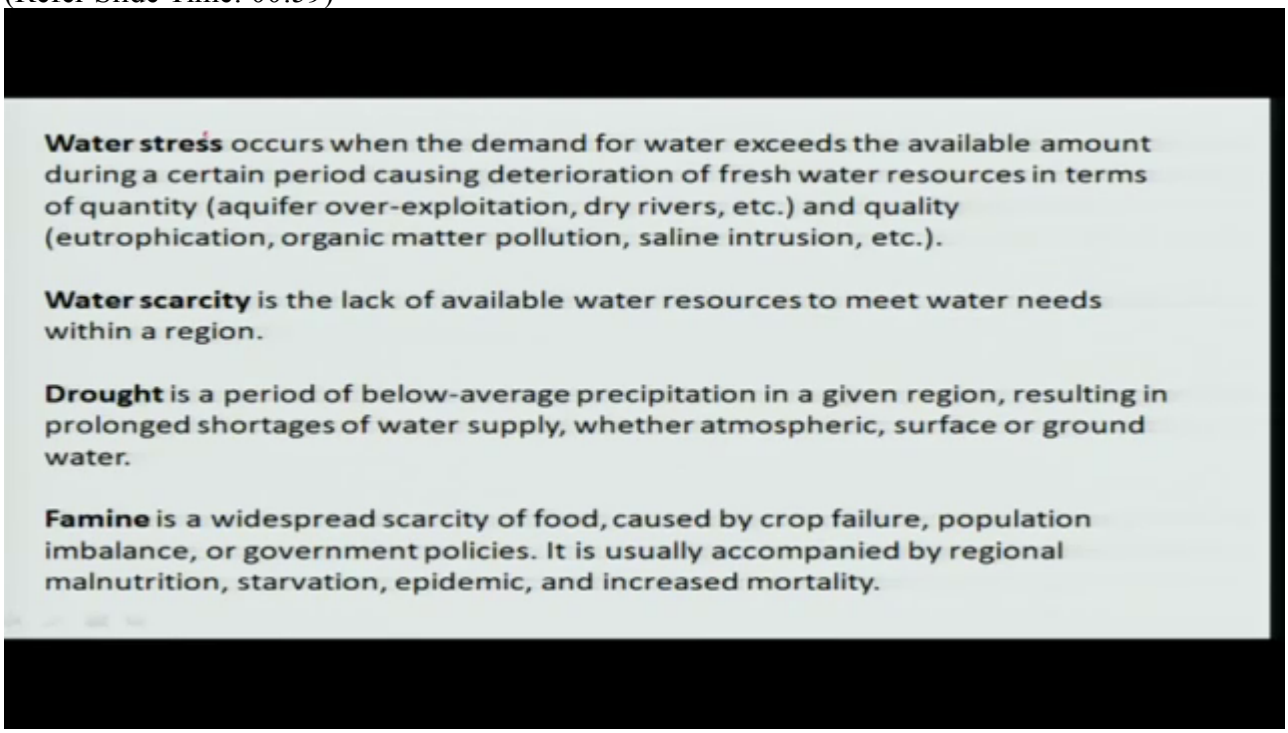

Before going to drought, we have to understand what is the water stress and different terms which are being used in the water-related issues. One thing is a water stress and another thing is about what is the water scarcity? What is a drought? And what is a famine? These are all the different wording, different terms which are used to define what is the water stress is or what is the water non-availability conditions for the plant and other activities.

Now when you look at it what is the water stress. And when the demand exceeds the need then we call it as a water stress, so which causes some trouble for the freshwater resources either in the form of a quantity and/or in the form of a quality issues that makes the difference. This water stress which induces plant degeneration of the leaves and other activities that causes, that growth pattern there is some amount of deficiency which is being done on that. That is what is water stress. We are stress means, we are overloaded and we don't get the normal activity to complete it possibly. Whereas when it comes down to what is a water scarcity, it is the availability of the water to meet the requirements of the region. That

is what we call it as a scarcity. Suppose if you want about 100 litres and if you get about 50 litres, so your requirement is not fulfilled. So what do we do with the unfulfilled water, where do you get the water, how do you complete your activities. That is what the water scarcity which is there.

Whereas when it comes down to drought, when you say drought it is – it starts with the below average precipitation in a given region that leads to water supply to the plants, drinking water and other activities whether including surface water as well as ground water which is not able to support the production of the crops. That is what the drought. It is a temporary period, maybe for a 15 days, maybe for a month and if there is going to be a rain again things will come back to the normal. So that is what. It is not a permanent feature. It is the temporary feature, maybe for a shorter period or maybe for a longer period.

Now, what is the -- another term which is associated term is famine. Famine is nothing but it is a prolonged conditions of drought conditions which leads to scarcity of food caused by crop failures and as well as there is a population imbalance that means population moves from one place to another place. There is a government policies that has led to epidemics, starvation as well as increased mortality. So here the term is you have total integrated impact on the region because of the water or because of the total drought condition leading to mortality at all. So, if you understand what all the different definitions of a different terms which we are doing it, it will be easier for us to remember and then do that.

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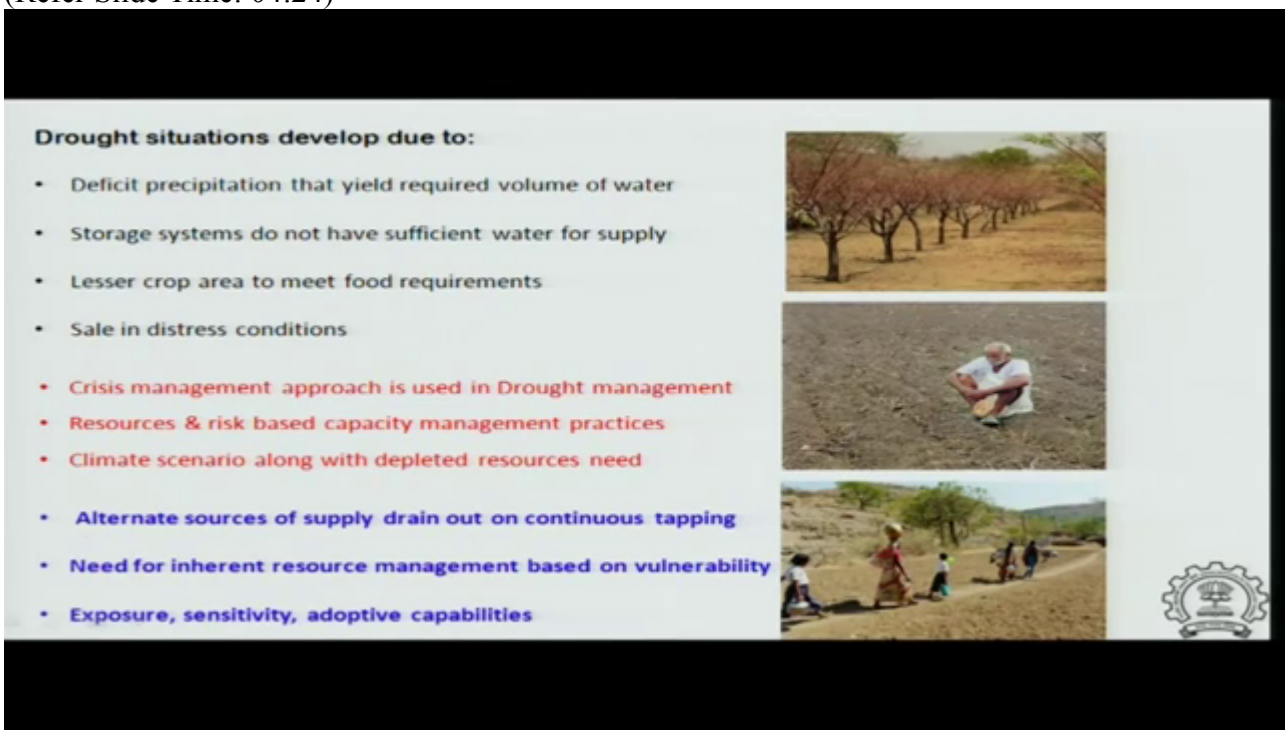

Now what happens due to the drought? It's a common feature there is all the crops are not growing and it is all deceased and it's weeded out, people just move out for water from so many – so much of distance. And here it is the plants whereas these big trees which are there they also get into some sort of a trouble, their leaves becomes grey, yellowish and it goes to brownish color, that means, there is not much of water at the root zone to support the growth.

Now what is the situation? When it will develop it? It is deficit of precipitation; that means, less rainfall and so that the desired amount of water is not available. The storage system like reservoirs, lakes and they do not have a sufficient water for supply. When crops get lesser water to meet the food requirements and there is a sale in distressed condition, sale in distress condition means when there is no productivity, no livelihood then what happened is the existing things, resources are sold at a distressed condition, so that he has to survive.

Now what is the difference now is why we may need to understand better is, the drought instead of making a pro-approach so we make it as a crisis approach. As and when it comes we just move here and there and spend our resources instead of phased out your process is not being done. So now resources also there it is you are likely to use it here and there without a proper accounting activities; whereas it is risk-based capacity management practices need to be done. Whereas when it comes down to see climate scenario and climate scenario what it says is that there is frequent droughts conditions are possible and in this case what we have done is we have already depleted because of the drought without unprepared drought conditions.

Now what is left out is alternative sources we have tapped out really. So now what is happening is there are resources managed, vulnerability analysis is needed depending upon exposure to that, sensitive to that and also adaptive capability. That is what is needed now in the drought management.

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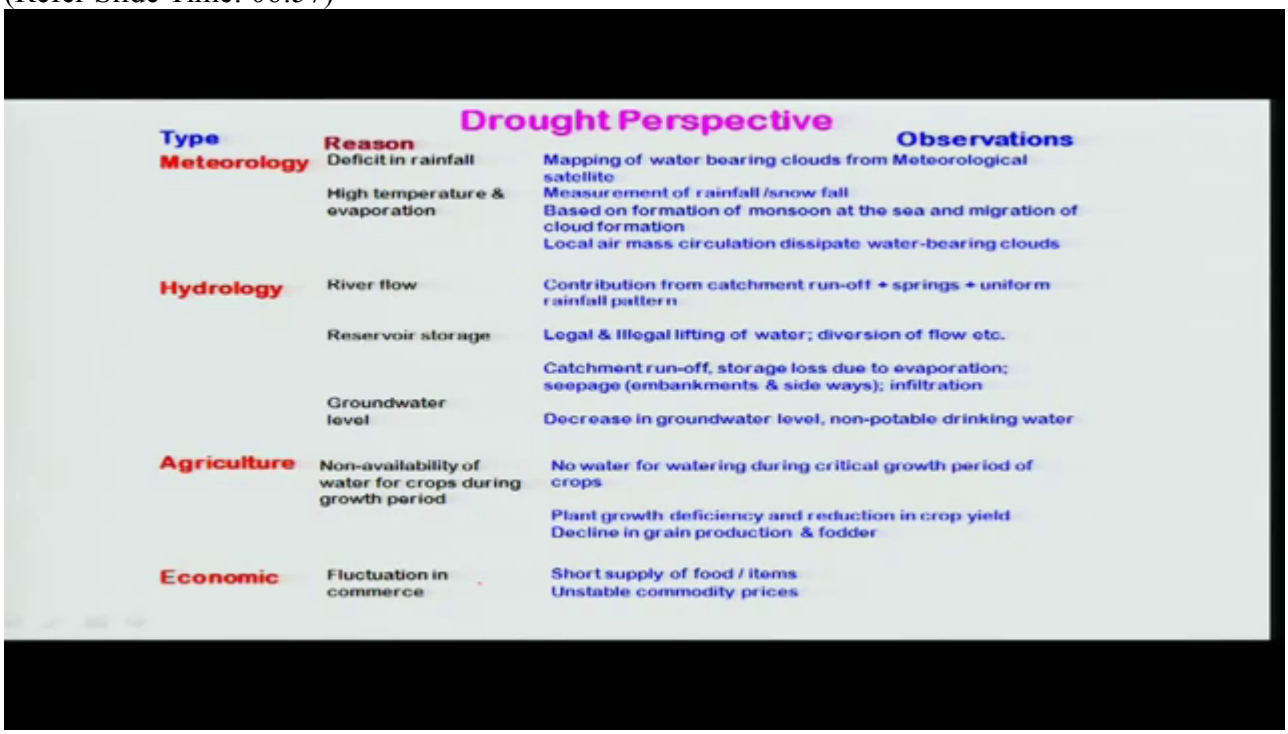

Now drought, everybody looks at the drought. Everybody says that they are on the drought and they have the importance. Because it is the less rainfall, so meteorologists they talk about drought that is what we call it as a meteorological drought. The happenings; why it is happening is it is because of the deficit in rainfall. There is a high temperature and evaporation that means water losses are very heavy. What do we do in this type of thing is

water -- mapping the water cloud, cloud bearing clouds that is what we did it in the weather clouds, then measurements of snow and rainfall which contributes in quantifying them information. And we have to look at the local air mass circulation and whether it is able to dissipate the water bearing clouds in this area.

So this is what people call it as meteorological drought. When it is going to be from the – when it is different from the mean average temperature we call it as a meteorological drought. That is what we're trying to do that. Another thing is about the hydrological drought. What hydrologists they try to say is, it is they based on the river flow based indexes, river flow based assessments are possible or that is what is being done. Then they look at it, the contribution in a river basin is based on the runoff, springs and the uniform rainfall pattern which we need to do that to understand the river flow from the mean if it is going to be less than the mean of the average over for 10 years or whatever it is that is what people call about river flow related.

The river reservoir storages, see, reservoir when we try to store water then there are storage levels may come down. If the storage levels if they come out then I may not be able to store enough water to meet their demands. So then we need to understand what all the legal and illegal lifting of water, diversion and flow rates are needed. Then another part of the water is groundwater level, so groundwater is our supplementary thing. When whenever we have some shortages we try to depend on the groundwater, there are certain places where groundwater is the only source of water where they use it out. If they don't get the water then they will be in trouble. Then groundwater level it is for a level meaning then as well as non-potable water, drinking water it needs a quality type of thing. If there is any fluctuation if there is any deviation in the existing pattern then that is comes under the hydrological drought.

Then as a agriculture what we want to know is we want sufficient amount of water to grow the crops as well as get the food security done. But when I – this agriculture what they need is it is not only a one-time water at every subsequent weeks there is a need for the irrigation, there is need for water, if it is not available either to the demands requirement then we try to say the growth, critical growth of the plants or the crops they will come down and that plant growth deficiency will be shown in the form of a crop yield. So grain production as well as the fodder. So when there is -- how do we do that is, agriculture crop area, type of crop, deduction in the area of the crop and if the crop conditions if it is differs from the normal growth pattern then we call it as a agriculture drought is happening.

There is one more term which people, they use about is the economic drought. This is here it is a fluctuation in commerce, commerce is nothing but a business, there will be more distress sale, distress sale in the sense I need money I have to sell it whatever I have got. So that is happens because of the short supply of food items are unstable commodities. So these are all the criteria which is used in estimating the economic drought. Now, when you look at all the four different type of drought even everything is possible in this world. So what is happening is, they don't occur simultaneously. The first one to happen is, reducing the rainfall pattern

followed by the agriculture activity, followed by the utility aspect that is the agriculture aspect followed by the economic aspect.

This entire cycle is possible and that cycle can be improved upon provided if there is going to be a good amount of rainfall then everything gets eased out and you are coming back to the normal system. So this is a cyclic process. One after another it does it. First when it happens you say it's a drought. Then second thing is whereas these people they have got enough water to take care of the thing. That means next year even if it is a good rain this proportion, the hydrological portion where they have enough water to cultivate and then come up.

Whereas this is the agriculture, it is a phase-wise activity from the face of sowing, from this face of maturity then you harvesting season, so it is based on the phases of the crop growth activities; whereas the economic is always the backbone about that. So this is what the different perspective of drought, wherever -- whichever person when the person who is going to affected is the person on the ground and he may be affected because of all these factors.

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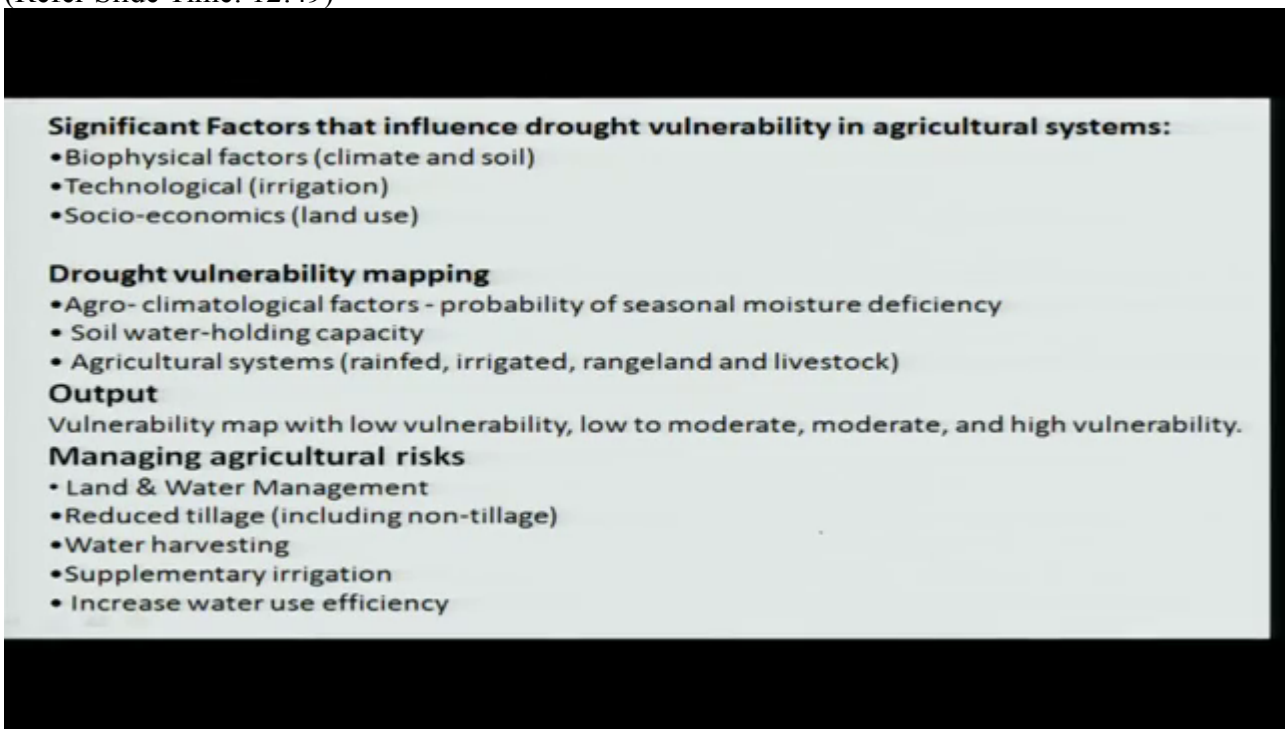

Now when you try to do what all the different significant, drought vulnerability in the agricultural systems is, one thing is biophysical factors like climate and soil, whereas the technological activity that is because of the irrigation, irrigation depends upon water availability in a local scale or in a watershed scale or in the river basin scale and whereas the socio economic activity is nothing but depends on the land use. Land use is nothing but a crop area activity.

So when you want to do a mapping, mapping is vulnerability mapping. The vulnerability mapping should be based on the agro-climatological factors, then water -- soil holding capacity of the things and as well as the agricultural system, what are the different type of agricultural system based on rain-fed, rangeland and other things. Based on this mapping what we try to do is areas which are vulnerable to drought on so many factors. So it leads to

how do you manage this vulnerable areas is the agriculture risk that is based on the land water management is one thing, tillages another thing, storing that is water harvesting, then supplementary irrigation is having enough water for untoward incidences, then where is the increase in the water use efficiency. This is how you will be able to manage the agriculture risk, develop because of the drought activities. This is what is needed in this area.

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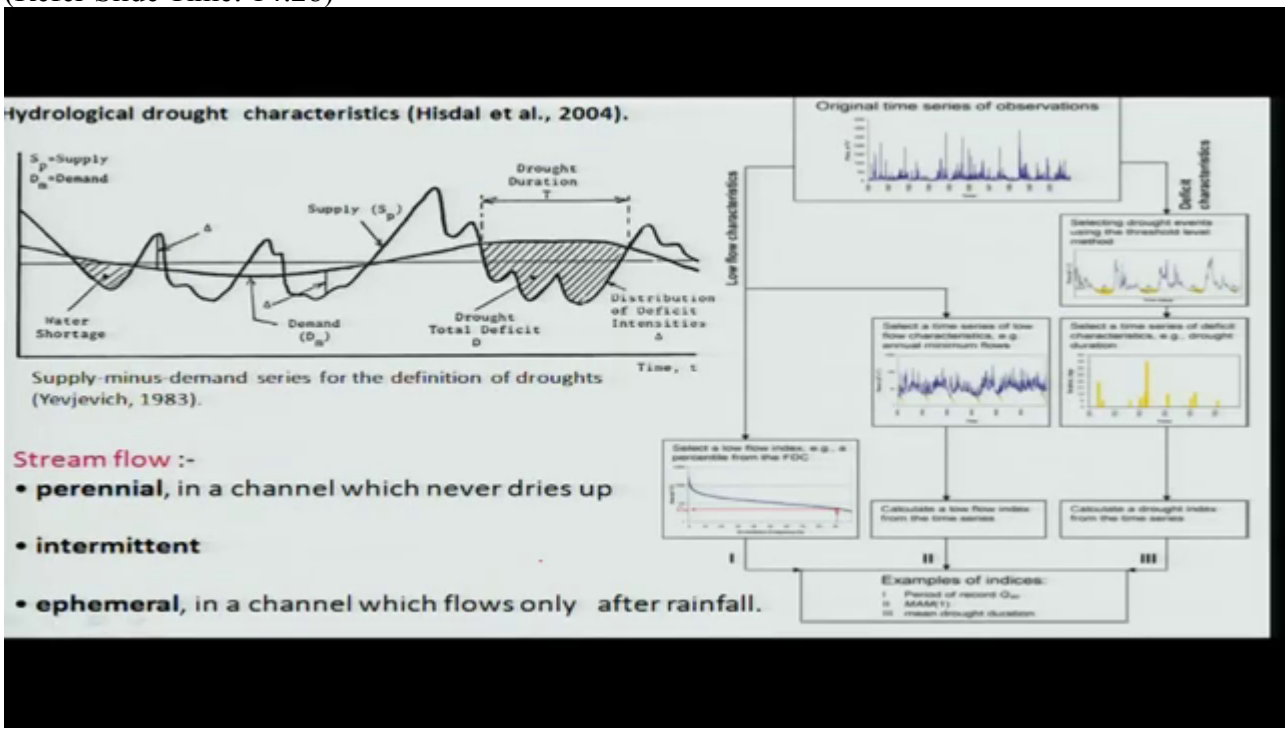

Now this slide shows about river flow, river flow could be when it is less when compared to the normal mean then we call it as a drought. Whereas the stream flows there are -- we may have to understand there are two things; one is the perennial stream where you get water every throughout the year, whereas intermittent things somewhere it goes somewhere it is not going, where as the ephemeral channels, they flow water only during the immediately after the rainfall. So what we have seen in this lecture is; what is a drought? Drought is nothing but a non-availability of water because of the rainfall or storage or anything for our growth purpose either in the agriculture, in the crop growth period, which leads to some amount of a deteriorating condition of the plant growth that leads to the crop ill which we are talking about as a drought situation. This drought situation is a temporary period. It is not for a longer period, and if it gets improved up provided if there is going to be a rainfall. Okay. So that is what we have seen it. We will try to see and what is the different drought vulnerability and risk management in the next lecture. Thank you.