Availability and Management of Groundwater Resources

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Lecture - 45
Groundwater Resources Planning and Management

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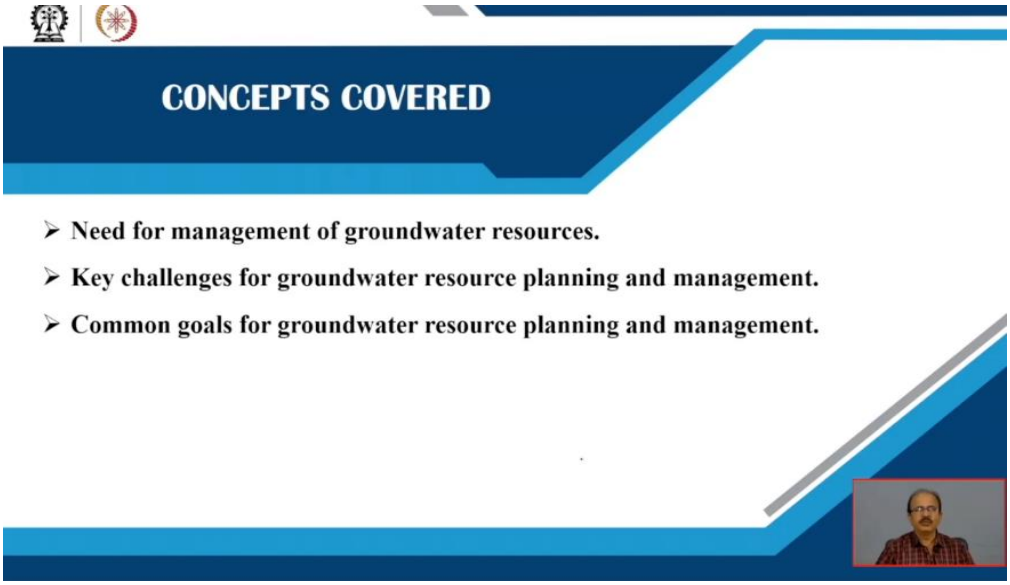

Welcome you all in the module 10 part 1 groundwater resources planning and management. So, till now we have covered the details about the availability of the groundwater resources through the precipitation, infiltration, percolation and then reaching to the aquifer. So, groundwater stores within the rock formation that is an aquifer. Now, in this module we will discuss the need for management of the groundwater resources.

The key challenges for groundwater resource planning and management and the common goals for groundwater resource planning and management. So, these things will be discussed in this module 10 part 1.

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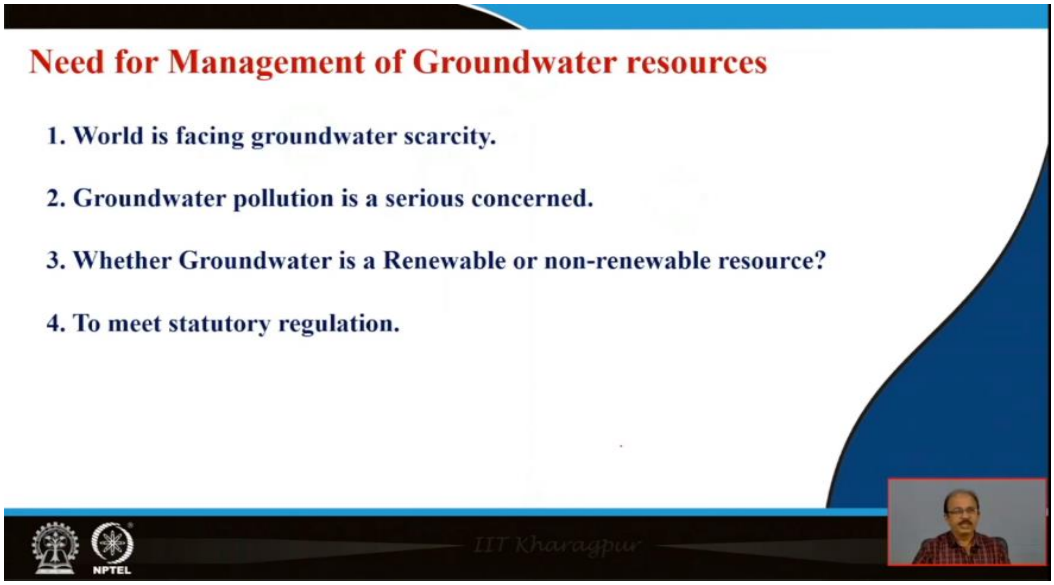

Now the salient points related to the need for management of groundwater resources at the present day is with the following facts that world is facing groundwater scarcity. Entire world including our country also we can see that the groundwater scarcity problem is being faced by every locality. Secondly the groundwater pollution is a serious concern, groundwater pollution suppose the groundwater availability is cooled at certain places.

But if it will remain polluted then, it is very difficult to have a different uses, say for portable purposes or for any other uses where pollution is a very dangerous event. Third whether groundwater is renewable or non-renewable resource a question mark has come whether it is renewable or non-renewable because of the scarcity and pollution aspects and the fourth is the to meet the statutory regulation. So, these four points are the basis for the need for management of groundwater resources.

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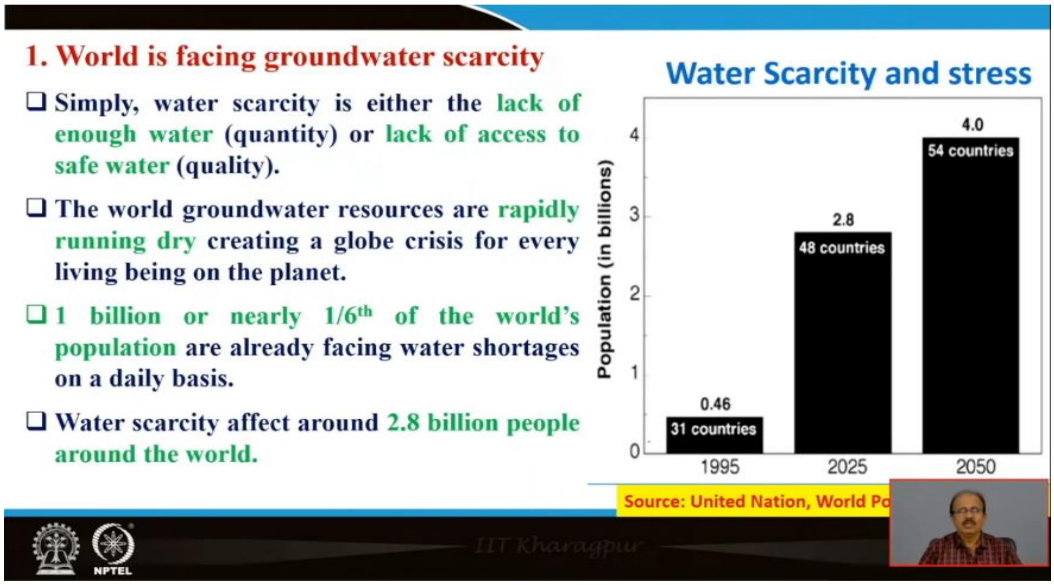

Now, the first point boldly facing groundwater scarcity, see water scarcity is either the lack of inner water means quantity wise. Suppose quantity wise whether the lacking in any sort of it is quantum or lack of access to save water means whatever water is available is it safe to have it is use. So, for this water scarcity problem is a bigger problem at any place. So, we are also seeing that the wall ground water resources enter in the entire world are rapidly running dry, they are running dry.

And creating a global crisis for every living being on the planet. So, since the groundwater resources are drying at several places, so a crisis has developed and these crises are being faced by the all individuals living on the planet. One billion or nearly one sixth of the world population as per the statistics one billion or nearly one sixth of the world population is already facing water shortages problems on a daily basis.

So, water scarcity affects around 2.8 billion people around the world, this is a just a statistical figure which I have tried to show you that in this way the world is facing the water scarcity problem because of the lacking of enough groundwater resources quantity wise or if quantity wise groundwater resources are available because of the lack of access to save water the water is not safe that is polluted.

So, in both the terms the ground the world will face the groundwater scarcity problem and global crisis has developed on the planet and it needs some sort of your resource planning and management issues. In the graph also, if you see; just a graph by some statistical figure which has been denoted by a bar diagram. That in the year 1995 around 0.46 billion people were affected in 31 countries were affected by the groundwater scarcity problem.

Whereas, in the year 2025 see it has increased 31 countries are increased now at 48 countries are facing the groundwater scarcity problem and in the year 2050 it has been predicted that 54 countries will be affected by the groundwater scarcity problem throughout the globe. So, in this way the population wise; also see the number is gradually increasing. People are facing the water scarcity problem either due to the lack of enough water or lack of the good quality of water.

That is qualitative wise and quantitative wise both the water scarcity problem will develop around 4 billion peoples on the globe will face such type of problem. So, this is the facts about the world is facing groundwater scarcity.

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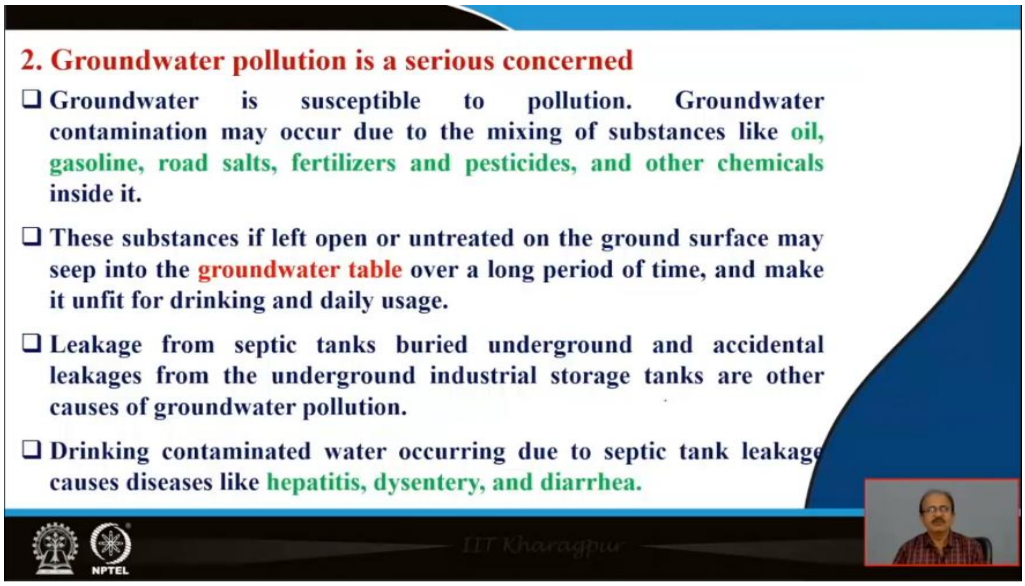

Now, second issues where the groundwater pollution is a serious concern. So, what we have seen, we have seen that the precipitated water is infiltrated and then percolated and then it stores within the rock formation that is the within the pore spaces and that is within the aquifer. So, this

groundwater which stores in the rocky formation that is an aquifer gets polluted because of some sort of mixing of your toxic materials.

So, if suppose the large amount of water is stored somewhere but suddenly gets polluted. Then it is of no use that is why groundwater is susceptible to pollution groundwater contamination may occur it may occur due to the mixing of substances like oil, gasoline, road salts, fertilizers, pesticides and other chemicals inside it. So, these will create pollution within the groundwater.

These, substances if left open the above mentioned that is the oil, gasoline, road salts, fertilizers, pesticide what I have told you. If it is left open or untreated then, what will happen if it will be left on the ground surface untreated then it may seep. And ultimately it may reach to the groundwater table. So, once these substances which will seep and reach to the groundwater table over a longer period of time what will happen; it will make the water ground water table means what the upper layer of the any confined aquifer.

So, that is a rocky formations which is holding the water, yes it is an unconfined aquifer because water table the your these toxic materials have reached to the groundwater table over a longer period of time and making the groundwater which was stored in that very rock formation unfit, unfit forward for drinking and easy uses. So, large amount of groundwater was stored in an aquifer but, what happened?

Some toxic materials because groundwater is susceptible to pollution. So, some toxic material they have reached through seepage and we released to the groundwater table and make the water within the aquifer unfit for drinking and delusions. So, we have also seen that the leakage from septic tanks, septic tanks which are usually constructed in the residential premises.

So, leakage from septic tanks buried underground and accidental leakage from the underground industrial storage tanks. So, some of the industry they are sending their chemicals through the underground your industrial tanks also. So, suddenly the some of the accidental leakages take place and then what happens because of this accidental leakage or the leakage from the septic tanks makes the groundwater polluted, it just pollutes the groundwater.

So, it is also one of the causes of the groundwater pollution. Drinking contaminated water suppose, the groundwater has become contaminated and some person or some people are drinking it. So, drinking contaminated water occurring due to the; septic tank leakage or due to the accidental leakages. It causes various diseases and the diseases are hepatitis, dysentery, diarrhoea etcetera.

So, see the groundwater pollution is also a serious concern and because of this there is a need of the ground water resource planning and management then only these all problem can be solved. Because lots of groundwater is available at one place but once it has become polluted. So, it is of no huge. Why? Because the contaminated water will ultimately cause various diseases and then the people may suffer from it, so that is why it is a serious concern.

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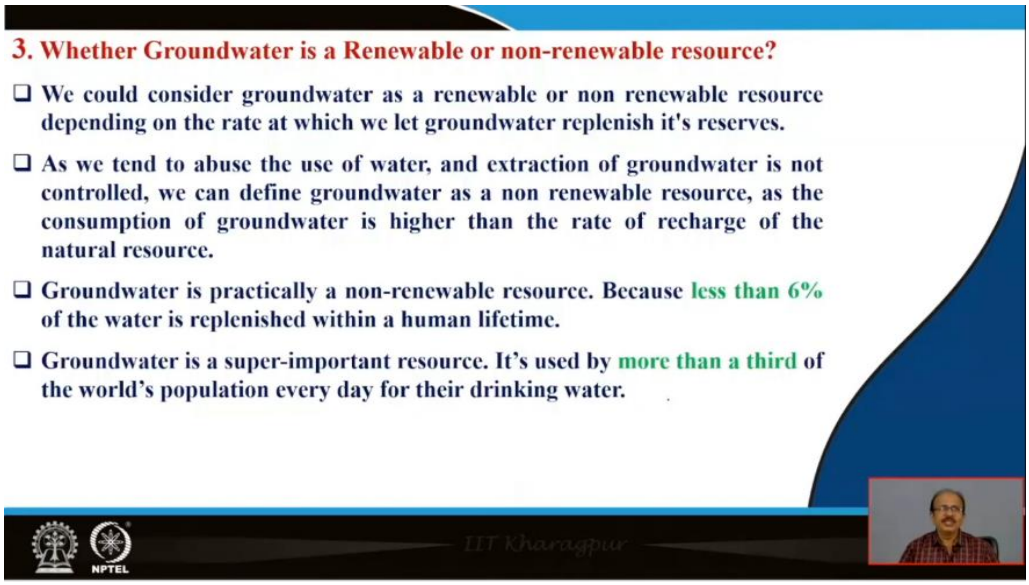

Now next now the question is whether the groundwater is renewable or non-renewable resource? It is a very important issue. We could consider groundwater as a renewable or non-renewable resource depending on the rate at which we let groundwater replenish it is reserves. So, this depends upon the replenishment of ground water resources at a place. So, the renewable resource means the precipitation is good so infiltration, percolation is good.

So, it will gradually recharge the aquifer which is underlying underneath the surface and if the precipitation is not good precipitation, we have discussed already precipitation is the only source

through which the groundwater remains in the aquifer or the replenishment of groundwater take place. So, if it is not good then what will happen? Infiltration and population, they will not take improper amount.

Then ultimately there will be less recharge in the underlying aquifer. So, this depends upon the replenishment of the groundwater resource underneath the earth surface. As we tend to abuse the use of water because, we are generally using, misusing the water and extraction of groundwater is not controlled because we are extracting groundwater resources for different purposes which is not so important.

So, what will happen? We can define groundwater as a non-renewable resource; in that case we can define groundwater as a non-renewable resource. Why? Because the; consumption of groundwater is higher than the rate of recharge of the natural resource. So, already I have discussed this thing that suppose your consumption is more and the recharge is less than what will happen it will become non-renewable, it will become a non-renewable resource.

Because your consumption is too much and recharge is very less. So, ultimately the quantity will become lesser. Groundwater is practically a non-renewable resource because less than 6% of the water is replenished within a human lifetime. So, it is a non-renewable resource it has become a non-renewable resource converter has become nowadays a non-renewable resource groundwater is super important resource.

It is used by more than a third of the world population every day for their drinking for water. So, for drinking purposes it is being used groundwater is being considered as a safe water to drink. So, this resource the groundwater resource has different criteria for renewable or non-renewable and therefore this generally there is a need for non-verted resource planning and management.

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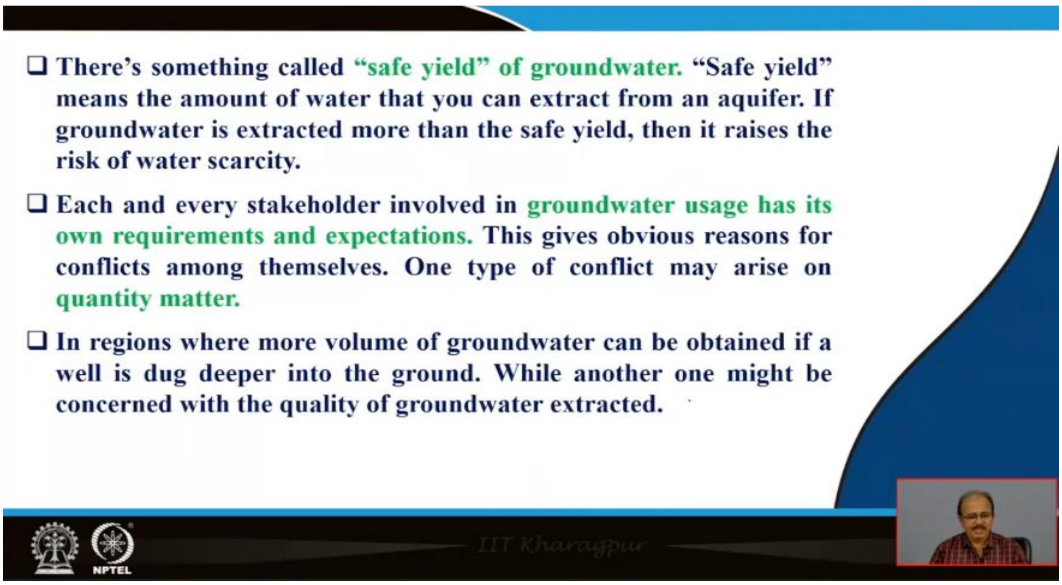

Now next is there is something called safe yield of groundwater, this is also important we have discussed already a safe yield of groundwater. Safe yield means what the amount of water that you can extract from an aquifer whatever remote you are just extracting from any aquifer that is called as a safe yield. And if groundwater is extracted more than the safe will suppose the groundwater extraction is more than the safe yield then what will happen; it raises the risk of water scarcity.

Because it is a safe yield any aquifer is having the safe yield value. So, if the extraction is more than the safe yield value then, it raises the risk of water scarcity. Each and every stakeholder involved in groundwater uses has it is own requirements and expectation, it is own requirement and expectation remains for each and every stakeholder. So, this gives obvious reasons for conflicts among themselves also.

The different types of conflicts take place one type of conflict may arise on quantity matter; I am not getting the proper amount of water you are getting the proper amount of water. So, this creates some conflicts and this conflict is mainly because of the quantity matter of the groundwater resources in regions where more volume of groundwater can be obtained. Some of the regions are very good in terms of quantity of the groundwater ability also.

So, if there any regions where more groundwater volume of ground water can be obtained and suppose a well is dug deeper into the ground while the another one might be concerned with the

quality of groundwater extracted. So, where more volume of groundwater is can be obtained a deep dug well can be created there can be constructed there because, there are chances of getting good amount of good volume of groundwater.

While, another the remains second factor is the quality of groundwater. So, this quantity and quality both are very important for the groundwater resource planning and management.

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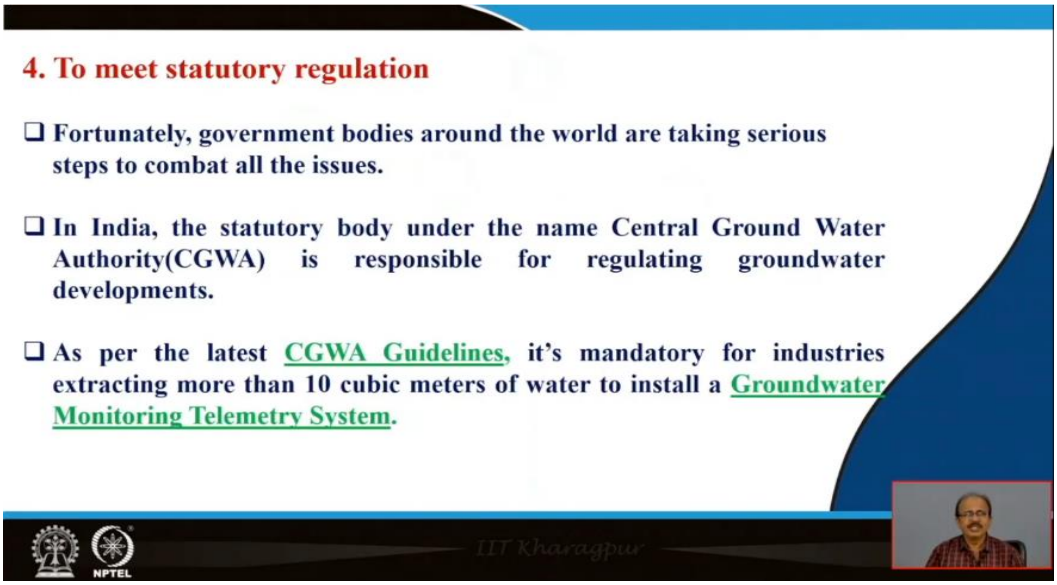

Next point was to meet the statutory regulation. Fortunately, government bodies around the world are taking serious steps to combat all the issues. Several regulatory authorities are at the present days and they are just watching the scenario they are taking serious steps to combat all the issues. In India, the statutory body under the name central groundwater board the central groundwater authority CGWA is responsible for regulating the groundwater developments.

CGWA is responsible in Indian case, as per the letter CGWA guidelines it is mandatory for industry extracting more than 10 cubic meters of water to install a groundwater monitoring telemetry system. So, it is it has become mandatory for those industries which are extracting more than 10 cubic meters of water for it is industrial purposes. For it is other industrial application to install a groundwater monitoring telemetry system in their premises. So, this also needs your groundwater resource plan and management issues.

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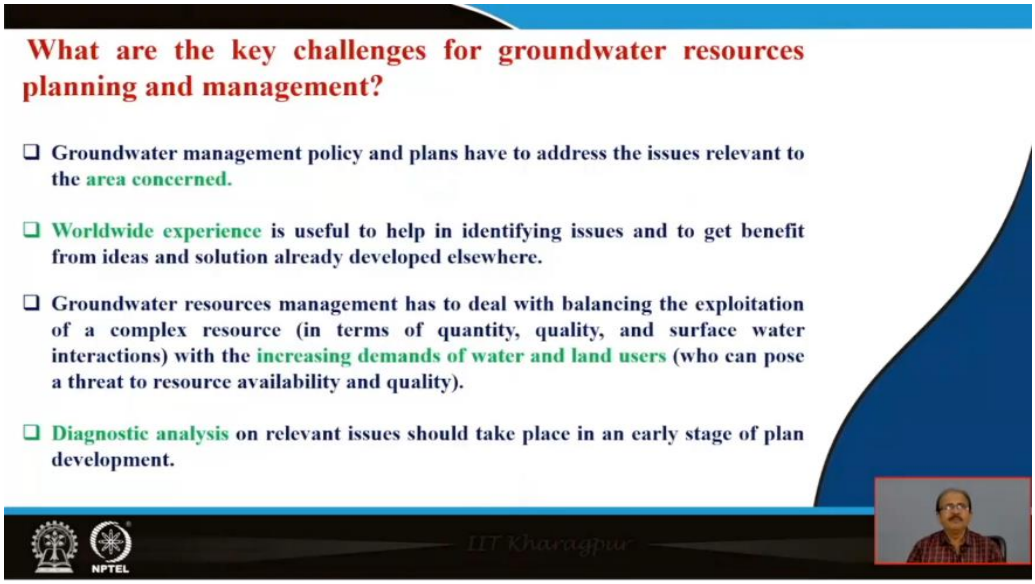

Now the challenges what are the key challenges for this groundwater resource planning and management. So, first we have discussed about the need of the groundwater resource planning and management. Now we I will discuss the key challenges. Groundwater management policy and plants have to address the issues related to the area concerned because we have read already different types of rocks remains at different locations different types of precipitation take place at different locations.

So, the availability of the groundwater resources is also remains different. So, for groundwater management policy and plants the address it should be addressed the issues relevant to the area concerned only. Worldwide experience is useful to help in identifying issues and to get benefit from ideas and solution already developed elsewhere. So, if some ideas or solution has been developed in some other places it can be just, we can take the help of those ideas and solution for solving the problem of some other areas.

Groundwater resource management has to deal with balancing the exploitation of a complex resource. Why it complains? Because in terms of quantity in terms of quality and surface water interaction is also remains with the groundwater. So, this resource management should deal with the balancing of the exploitation with the increasing demands of water and land users. So, who can pose a threat to resource availability and quality.

Day by day the land users are increasing day by day the demands of water uses are increasing. So, the groundwater resource management issue should be deal very intelligently diagnostic analysis on relevant issues should take place in an early stage of plan development. So, just to diagnose the problem diagnose the relevant issues and then a plan accordingly for the development. So, these are the few key challenges for groundwater resources.

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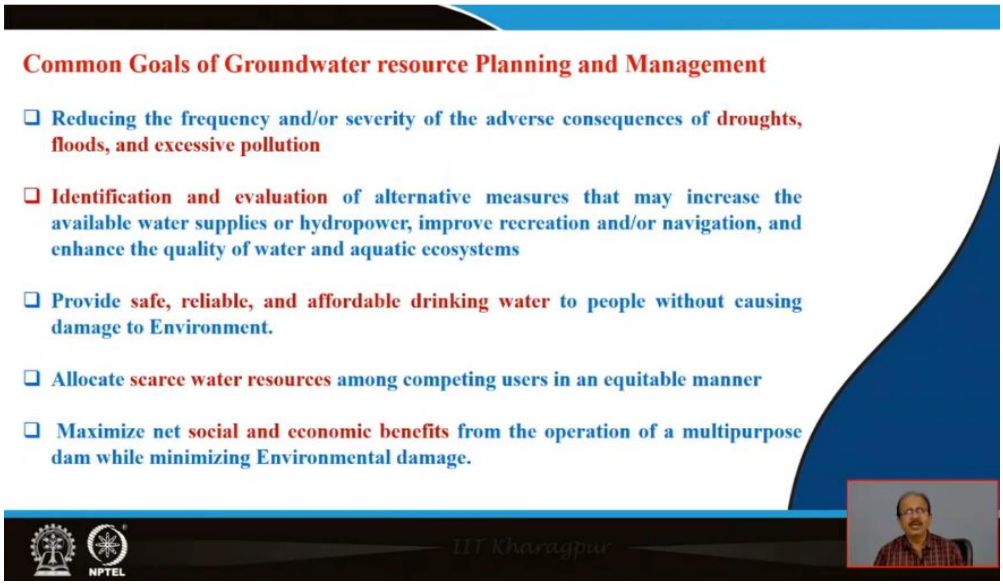

Now what are the common goals of groundwater resource planning and management. So, this is also important what are the common goals. So, the first is the reducing the frequency and or severity of the adverse consequences of droughts floods and excessive pollution. So, it should be reduced the frequency of the flood or drought we should think over, because we are discussing about the groundwater resource planning and measurement there should be some goals.

And within the common goals this is one of the important point reductions of the frequency or severity of the advanced consequences of droughts floods and successive pollution. Second is the identification and evaluation of alternative measures that may increase the available water supplies improve recreation or navigation and enhance the quality of water and aquatic ecosystems.

So, this identification and evolutions are very important for the groundwater resource planning and management. Next is the; provide safe reliable and affordable drinking water to people without causing damage to the environment. This is very important goals or it is a very common goals for

providing in a safe reliable and affordable drinking water to the people without damage of any sort of environmental issues.

So, this goal is very important with respect to the groundwater resource planning and management allocates scars water resources among competing users in an equitable manner. So, just delineate the scars water resources among competing users in an equitable manner and maximize net social and economic benefits from the operation of a multi-purpose dam while minimizing environmental damage.

So, these are few common goals for the groundwater resource planning and management. We will discuss some other issues for the groundwater resource management and planning in next part. Thank you very much to all.