Ground Water Hydrology and Management
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Week 10
Lecture 3
Groundwater Data – Water level data download

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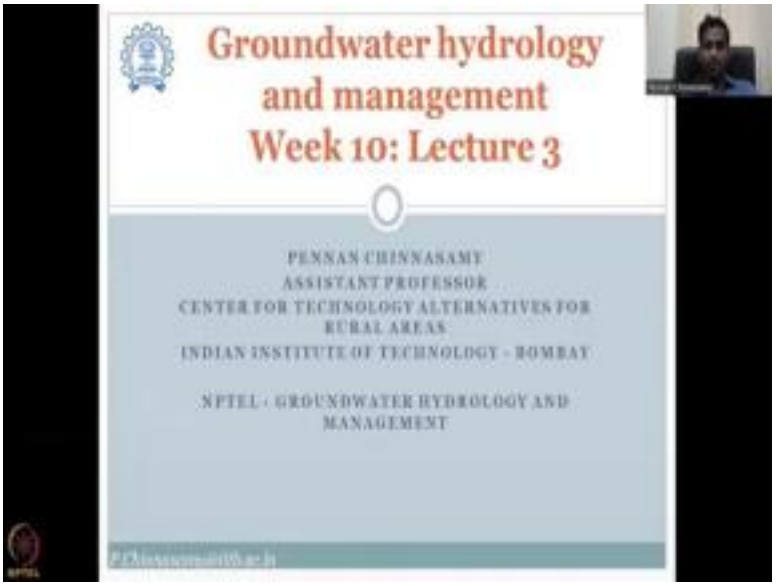

Hello everyone, welcome to NPTEL course on Groundwater Hydrology and Management. This is week 10 lecture 3. In this week, we have been focusing on collecting groundwater data for assessing the aquifer properties. The previous classes, we looked at the different data that is required to understand the physical properties and we saw that the government has done very in depth analysis in certain states like Tamil Nadu and Tamil Nadu data tells there is some characterization of the aquifer. Similarly, other states have been populated and slowly the entire country data would be put on the WRIS website. So, please log in often and check for updates.

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So, in today's lecture, we will be going through the WRIS is ground data. As I explained earlier ground data can come from different sources especially on this website from Central groundwater board which is under the government of India and there is state government budgets that have been put for groundwater monitoring which is the state data. So, there is central old data and then state owned data all these data are now shared in the WRIS website you can click and choose which ones you want for understanding because maybe some state water data is collected at multiple intervals so, you could have better access to it.

Then you have the data properties we looked at is station name trends long term average we will go through this today also to look at specific data and how do we look at the long term average and then short term average etcetera.

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So, individual wells we will look at and download. I will not show you the tables that I do with Excel or any other software because many of you may not have these software's for example, so all I will show you is how to download and then making the graphs etcetera is you could learn from graphing techniques.

Basically, the same graph you see on the screen can be reproduced by these maps by these data that we want to collect. So let us start with showcasing the central groundwater boats data, we will pick one location and then we will look at how the wells have been looking at let us say Maharashtra will take and then we will compare it to some regions in Rajasthan to see why the groundwater levels are declining. So what actually is measured we will tell. So let me share my screen.

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So we are on the homepage again, as I said go to water data and then groundwater never click it and based on the time it takes, you will see how the populated the area's populating it will take some time just give it for the Internet to pick it up there it is. So, in the last class, we looked at where this water levels are declining and increasing for the whole of India. As I said, we can look at the one location so how did I pull the map up and down is by left click your mouse and then move hold on to the left click and then move.

The whole picture will move. You can zoom in zoom out, go to the last view or zoom to area. You can say I can draw a box and then zoom to area, the last view was India whole I had so I can go to the last or the new I can zoom in by putting plus and zoom out by putting negative. So these are the basics and some details about the data, mobile apps, etcetera as given. So for

example, I pull a box and that is where the, I can take the box off and then I will say I need you can also use a scroll button from your mouse to move out and end.

So here is where I am, I am going to look at a particular well, where let us pick one from here. And I am going to see just central motorboat data for first it is a monthly or seasonal let us keep monthly and then I am going to use the same default time, let us say Jan 2022. Let us go a bit further.

So I am clicking the calendar and clicking the year not the month click the year and then you can have various months go to 2012, for example and Jan so I am going to take 9 years of data so depending on your internet, just we are practicing so you can take what you would like.

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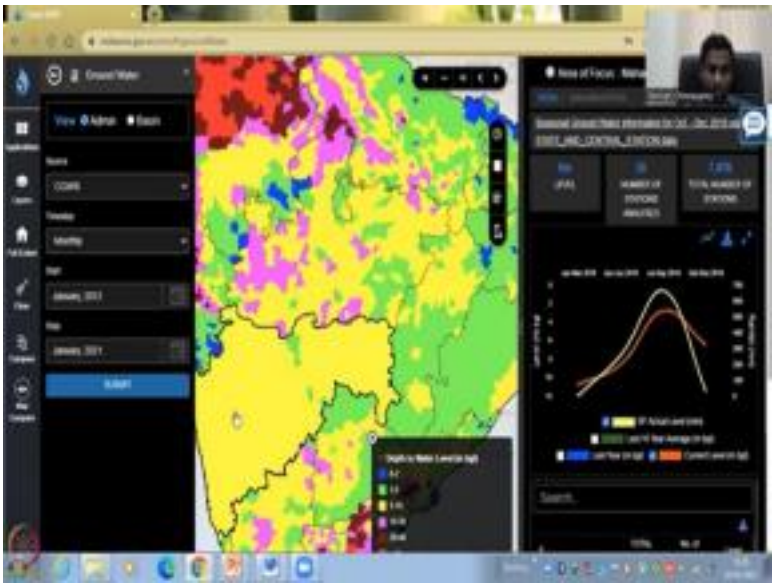

So I am going to click Maharashtra to populate Maharashtra you can see Maharashtra has now populated I have to click not in the center also but on the line. Then you can come this one and then you have for October the default thing will come so you can see all these. So what you can see is the levels of Maharashtra are improving slightly and then coming back down in this one year that 2018 default. I have not clicked this yet so once I click it you will see the entire India now doing the map and then you can pick your specific location I will show you how to do it we have taken this out.

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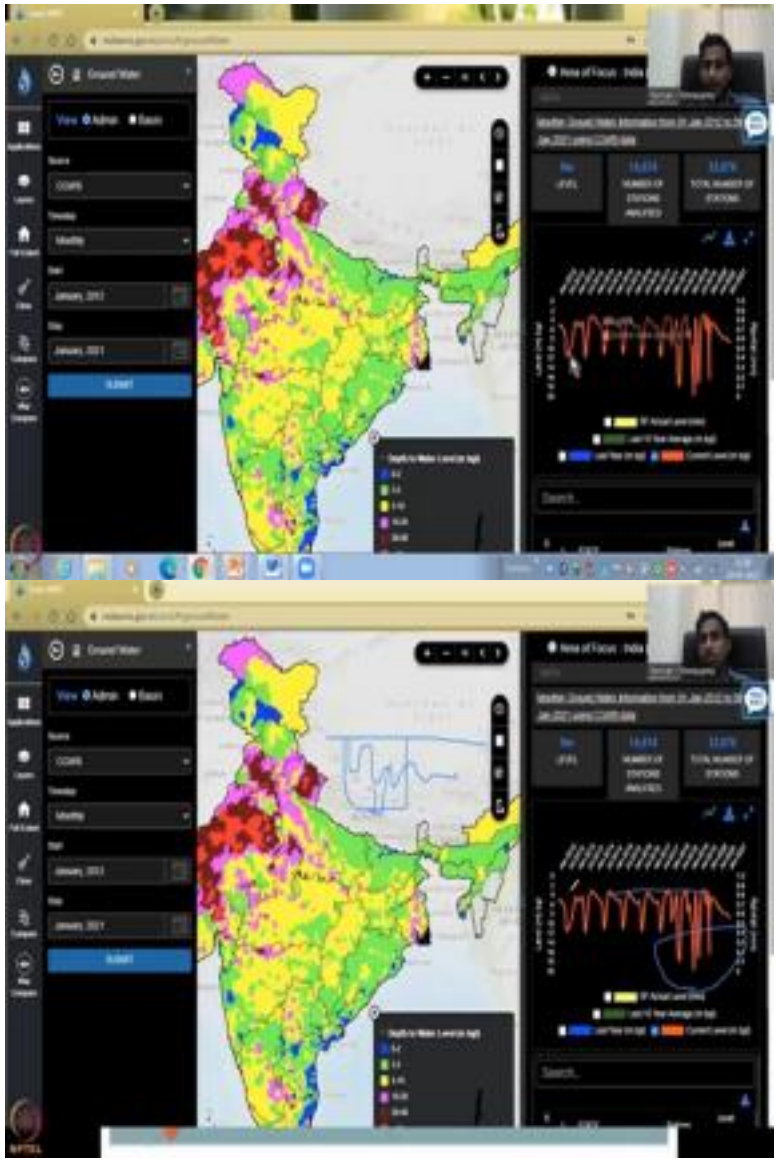

So as I said the entire India from 2012 to 2021 it is almost same it is average the trend is not down or up almost at the same it does go really down which means the pumping has increased the groundwater level has fallen I will have to draw this so that you could see what I am looking at. So, this is your ground level. So this GL ground level and meters below ground level. So, this is your well and what is happening is the water level goes down and then up down up down. So it is almost stabilizing here you could see what has happened in this part is the water level has gone a little bit down but it has come up again so this this is the top surface.

So the water level has come down but it is gone up again which is which means it is the aquifer is not stress of the whole of India. So how many wells are there in CG WB 32,678 I have been turning 50,000 15,000 that includes the wells that are operative. See, total number stations can be 32 how much you can access is within 15,000 range. And also some data are not there I will

show you the things. So the graph is now based on this value which is 15,000 approximately 15,000 wells so 50,000 wells average is taken here.

All this is running behind the servers and cloud space so you do not have to worry that is going to take my computer time or my computer processing limit all you have to have is a good internet to get this data. So moving on we will also see that the average level is 9 meters below the ground and it goes up and down. So 9 is still deep compared to the locations. So now you could see that I have it for all of India you can pull down this slider you can see the slider if you want I can put my spotlight so this slider I am saying this slider you can bring down to see the states and there is another slider here to see the data show you here. So you can pull this down to see the data so the multiple sliders within the frame. You have to be careful which ones you choose.

So on overall 9 meters is the water level for India in that period and we had 15,000 wells analyzed for it. Now what we have to do is we have to look at how much wells are there for Maharashtra. So I am going to put a search here just for state Maharashtra. It comes up and it says number 22. When you go to number 22, it does not open but you can go here the pointer changes to a finger and that is what you want you can click it.

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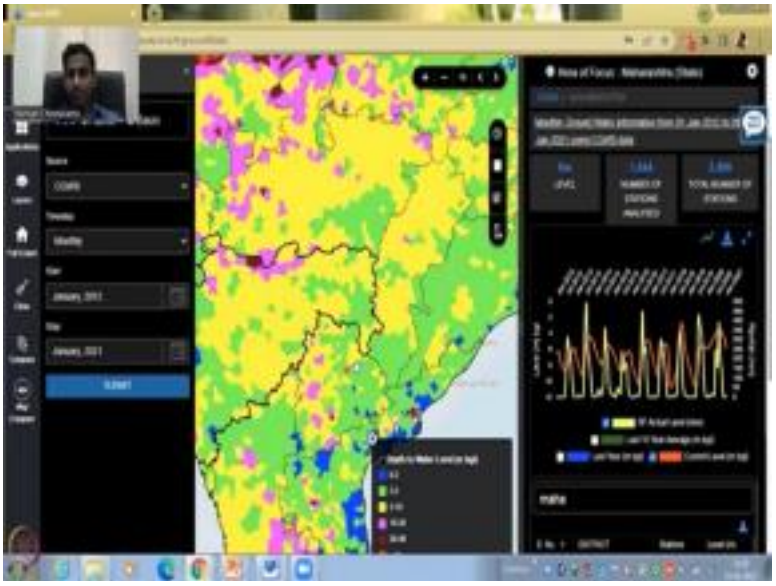

And see now it zooms into the Maharashtra state and the data for which I ran the analysis is there so I did not have to do anything just select the Maharashtra state, how do you know the Maharashtra state has been selected? You can see from the top I will come here India,

Maharashtra if I click India, it will go back to the India view. And now, I am in Maharashtra how many wells 1644 wells have been put here for analysis out of 2500 wells and the level is 6 meters. So in India it was 9 meters depleted for Maharashtra is 6 meters depleted, which means Maharashtra is doing better than the overall average India size.

Now you can move this it is fine, you can move and do but still as long as this is saying Maharashtra, you are still in the Maharashtra page. I am going to remove the rainfall, rainfall is given by IMD I will come to those data later. And you can see the current level fluctuating up and down in almost stabilizing at 6 mark. So 6 is the average across and then it goes above 6 and below 6. Remember the well diagram I draw. So it goes above and below the 6 level.

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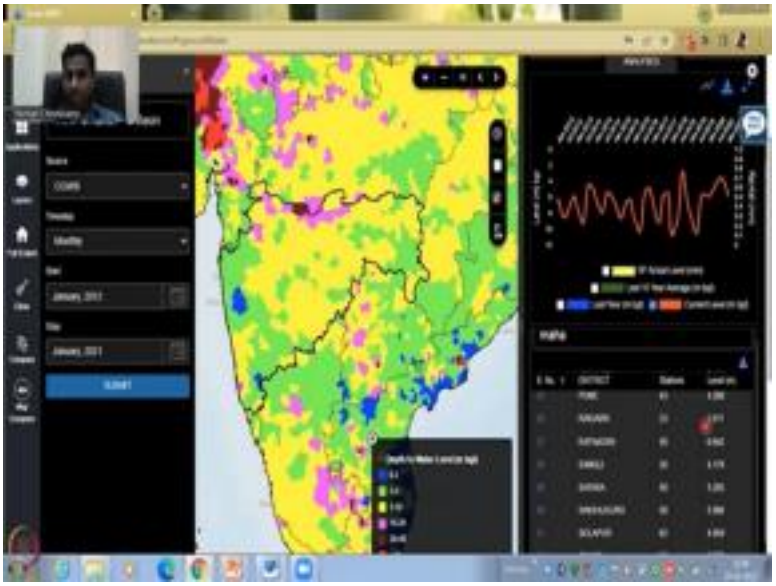

In Maharashtra there is many states. So the districts are in districts and these districts are given here, how many districts are there, at least the data, you can pull down this slider and pull down this slider. So you have 36 total 35 districts total and row column. And each district has its own number of stations. So let us say Thane is known, so let us click Thane or me check Jalgaon one because I know Jalgaon one is a little bit drier, Jalgaon is there 51. Let us click Jalgaon one, now it is turning see 6 meters for entire Maharashtra.

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Now I am going to click Jalgaon 1 and it goes to Jalgaon. And this screen goes to Jalgaon and what you could see here is I have to pull this up and then go up 11 meters. So as I said, 11 meters depletion in Jalogaon and within Jalgaon there are blocks, there are one block two blocks, etcetera. And each block has its own different readings.

So there are 51 stations analyze out of 88. And the overall trend is at lower level and it is still fluctuating along 11 but it is much lower than the India average, which is 9, and also the Maharashtra average, which is 6. Now we have come to one district Jalgaon 1. And then let us say this one, I want to look at this, and this is the source CGWB. If I did all sources, then all the sources will come. And it will tell me if it is central groundwater board or the state data.

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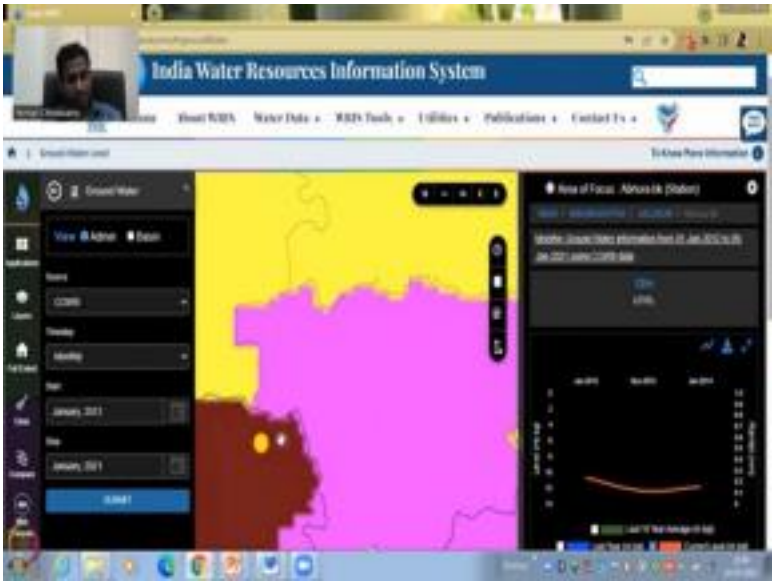

So I am going to click abora and that is the well. So when I click the station name, it goes to the well and stops. And now it populates the data. So what do you find that this data it is not full, which means I said start in January 2012, we can see here, and then go to January 2021. It starts in January 2012 but then it does not go beyond 2014. So this is one such station where the data is not there it is started well and there is no rainfall data. So the rainfall does not pick up, but there is no other data. So this is where you need to be careful in downloading only the data that you have full term.

What is the point if for example, if you want to understand 10 years of data, groundwater depletion. What are you going to do with just using five data points you need more. So that is where I am trying to get at you need to take 5 years of data, at least in a 10 year period. And since this does not qualify, we can go back how do you go back come down, you do not see any back button so be very careful in pressing the back button. What I would recommend is go up and click Maharashtra So this blue color will turn, the hand will turn into a finger, the pointer will turn into a finger. And that means you can click.

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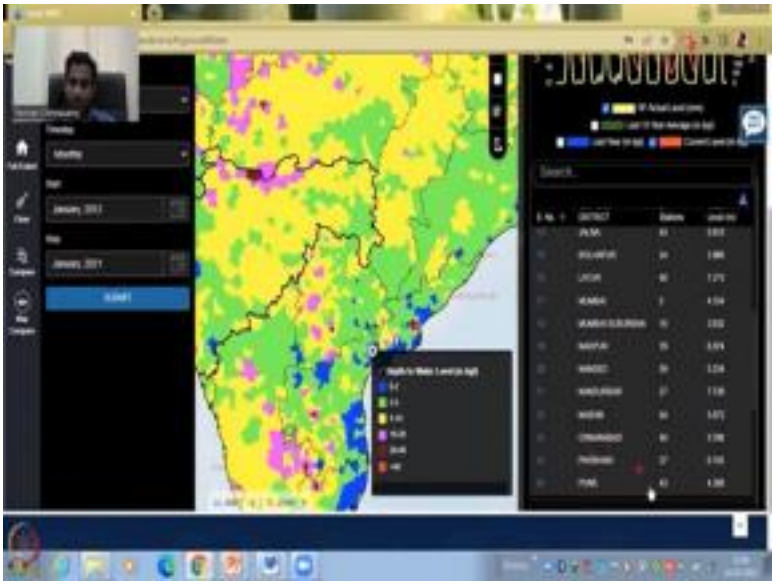

So if I click Maharashtra now the entire Maharashtra comes up, so see now it is populating the entire Maharashtra, all the data is back. So this is how you could zoom into particular wells, particular districts, and then look at where which wells are there. we could have gone back to the, you know, just the district itself. But, that is fine, we will go back to another, we will pick another district. Let us pick a district where the water level is down. So that we can look at.

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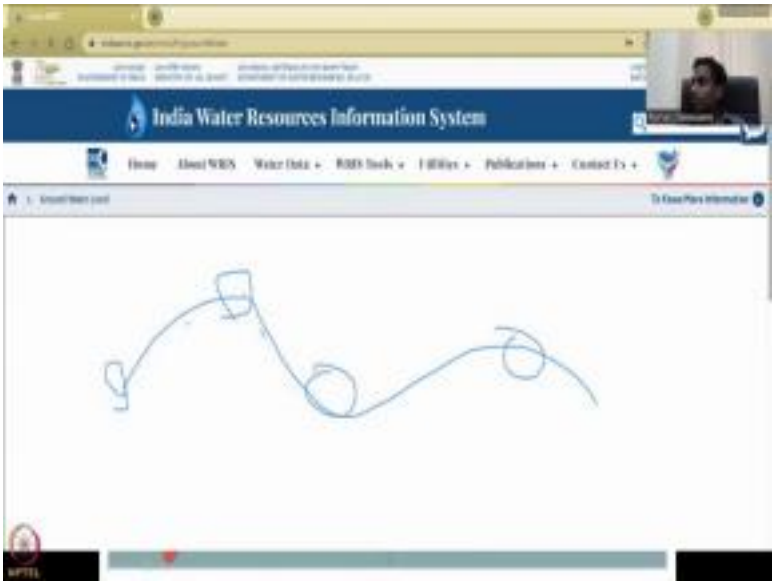

Let us take Parbhani, so Parbhani district is a very highly agricultural district, you see a lot of sugarcane growing there, and it is populating now Parbhani. So in this blue box comes, please give it time. But sometimes it goes long time, so just stop it and then go to another one. Maybe the data is getting stuck somewhere, so it is okay. And always these kinds of things, you can come back and then select it will still work. And this blue line has to go but it is not going. So as I think it may be, it is stuck, it is let us click another district. If it does not work, just click Submit again. Let us see if it populates.

So while it is populating, I will also say that you have multiple other extent, and layers that we can use to reduce the internet, you know, downloading data, all these are downloading a lot of data. So since it is getting stuck, let me refresh this page, I am going to reload, you can see this button, it just clicked that it will reload. So now we know if it is an issue with the entire WIRS Data System, or just the Maharashtra one we looked at. So while it is populating, I would like to stress that, please, first use Central Groundwater Board data, because it has a longer timeframe of data. And also try to be consistent with which station you are using, because each station has its own data issues.

There might be a full data term for the study period, or very less. And when you download it, you will know that it is not a continuous data, what you saw was a line. You saw a line like this for the data, that it does not mean that you have a data here, here, here, here, here here along the line. No, it is only at some points, some points along the data, there is line that is along the line that is data. And that has been connected through this software. So you have to be careful in using this software.

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So now it is working it took some time for bringing back the screen so let us select another state, and then click on where we want to go. So I am going to click India back. And then under India, I am going to take, I am just going to use one less data set so that we can quickly download the data. I am clicking Maharashtra, I am clicking Parbhani.

You can see how many total stations are there and the source. And you could say that here there is no well record. So you need to come to well record which has the data. So looks like none of this has the data for this period that is fine. We can go back to another data set. Go to Maharashtra again. I am just using one year data to because of the internet and the web page which is creating an issue.

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So let us say Mumbai, in Mumbai, this is the Mumbai area and you have Church gate for example, and that is the location of the station. So, now, what I wanted to show you is if you come down in the website, you could see that the name of the station has given us, Mumbai, Bombay Church gate, it is CGWP, where which basin which River Basin is it located in.

This is located in the west flowing rivers from Tapi Tadri basin, the state is Maharashtra and this is the lat long. So those who know the GIS and GPS coordinates, this is where the exact location of the wealth is on the planet. So, every inch of the planet has a GPS GIS location, it is called lat long latitude and longitude. So, that gives you the exact location of your, well, if you are going to use a MODFLOW Groundwater model or a GIS map, you need to know exactly where it is located.

And that is where this number helps. And this is the average level 1.68 meters. So below 1.68 meters, you have groundwater, it is good groundwater in quantity, why? Because it is very shallow, within a meter you dig you get water out. However, because it is next to the ocean, or the salt water bodies, you can get some water coming in, the CU salt water coming in.

So the taste may not be as good. But we will not get into that aspect. We are only looking at quantity in this class. So now I have this data for this period. And I can also select here, I could go different seasons or I could say I want a date from 2. So right now, because of the website actually causing some issues when we download large data, I am just going to show the principal to collect one data. So one data one well.

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So you can click here, it will ask again, are you government professional Academy? So since I am an academician, I am a professor, I will put my name and my email id submit, it starts to download. It will ask you where to download it I will put it on my desktop and then I will show to you how to open it and use it. It is downloaded, sticky, little bit more time. The website is having some issues. But again, this is how you could download one data. Let us try one more time doing the longer time period.

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So I am going to click here I am going to say all agencies. Let us say CGWB for now, it changes, and then start and end date I will give 2018 Jan 2021 summit. So for India, it has repopulated

again, I am going to do the same thing. I am going to say Maharashtra clicking Maharashtra zooming in and you could see that the rainfall is fluctuating fine. And as the infrastructure is the current level from 2018 to 2021 also fluctuates.

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And I am going to select district you can say Mumbai there are in the district there are five stations and all the fire station average is pulled up. You can actually download all the five stations, you can click here it will download all the stations together or you can select which stations you want. So if you look at here, you have some stations at level one meters below the ground.

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See it is asking where to download it I am going to download it on my desktop I just put it here on my downloads and then it is downloaded. So I will just click to show you how it looks like for all the districts. So I have collected how many districts now, 7 districts within Mumbai I am sorry 7 stations within Mumbai urban.

So the district name is Mumbai and within Mumbai I have selected 7 districts. It will ask this question, Are you trusting the source? You will have to say yes, because it is a government data, we hope there is no virus. So we will just say yes, open the file now. And you can see the levels. This is the average level for each and every each and every station for the time period. So it says is Thursday, I took it, it does not tell you what is the time period of the data, it is up to you, you have to make note of this details.

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So coming back let it populate while we work on this one. And then if you click the Bombay church, for example, then it goes to that station now you can download the individual data for that period. And click it stores again now it says groundwater station Mumbai church gate, you can click Save.

I will open it says yes, do you want to open the file. So you have this lat long where the location of the well is and the average for that period from 2018 to 2021, I have the average. So this is how you build a groundwater data set. By clicking on each and every well you want take the locations and the average well reading.

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You can also download this data which is your time series of data what you downloaded here is just the location data but if you want the time series you can click on the time series it last do you want a PDF or CSV which is the Excel say Excel and it will save as CSV file. I will open it now you can see for Mumbai Churchgate from 2018 to 2021 the monthly or whenever they took Jan may August, November, Jan, May, August, November.

So all the data has been taken the last 10 years data has been given and this is also there all the units are meters below ground level last year is also meter below ground level this also. So you have the last year's data current data and so whatever you select here, whatever you select on the webpage will be shown I did not put rainfall so rainfall is not on that list.

So in the next class, we will look at two different scenarios using the data from the groundwater

board. And then we will try to see how the resources are estimated. So I have clearly shown you an example of how to zoom into a state zoom into a district and then you can come down and check the number of wells and then you select a well.

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After you select a well then you could look at the data as a time series you can download the data as an Excel or an image you can click here an image can also come. You can also make the as a chart line or a column if you want to call them and you can make it big or small however you want you can you can play with all these all these tools are always being updated by the WRIS site. So, with this, I would like to stop today's class, please spend time on this website to download the data. And every time the method would change a little bit, but the idea is said you

will get the location of the entire India with the average. Then you can zoom into the district you can zoom in to the particular state and then district and then within the district you can look at how many you have. How many wells you have not all wells are recording and always do not have the full time record of the data. There are some issues so you select which data as you can and then use it for your study. With this I will stop today's class. I will see you in the next class. Thank you.