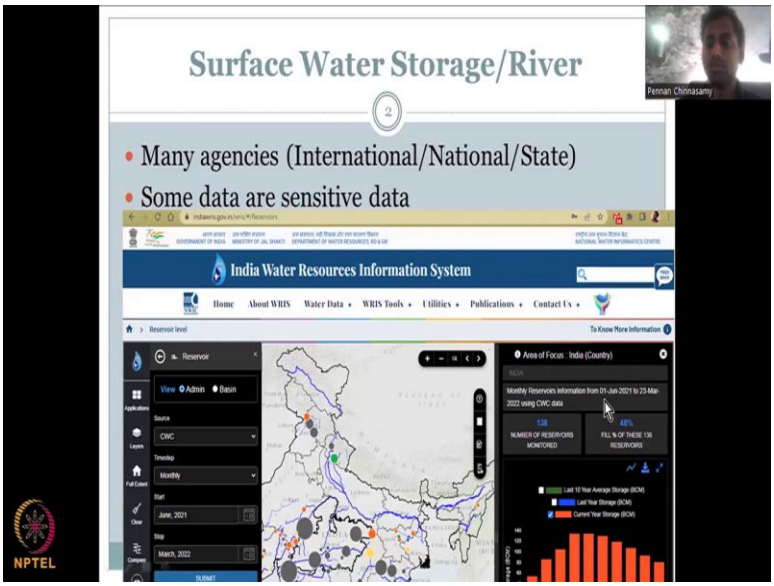
Rural Water Resources Management
Professor Pennan Chinnasamy
Center for Technology Alternatives for Rural Areas
Indian Institute of Technology, Bombay
Lecture 55
Solving case studies in rural water resource management Part - 5

Hello, everyone. Welcome to Rural Water Resource Management NPTEL course. This is week 11 lecture 5. In this week, we have been looking at data for understanding the rural water resources. In the last weeks, we looked at rainfall data and also looked at selecting one data from the set and downloading it. We also noted that there is lot of agencies that are collecting data.

So, it is important to understand which agencies data is good for us. And that is where the focus is in downloading the data, when I mean which agency is good, it is up to the user to find the data sources, and then look at which data is appropriate for the study site at time. There is a study side and a time wait, so both has to be looked upon.

(Refer Slide Time: 01:23)



In today's lecture, we will be looking at surface water storage and river data. In your water budget equations, we notice that there is a storage component, there is a rainfall and groundwater in groundwater out. And then there is a discharge runoff. So, that is what we will be looking at in this lecture Surface Water Storage and River Data. We will cover as much and since I am showing live demo in the tutorial or in the lecture, depending on the internet speed, we will cover the lecture. If it spills too much, we will cover it up in the next class.

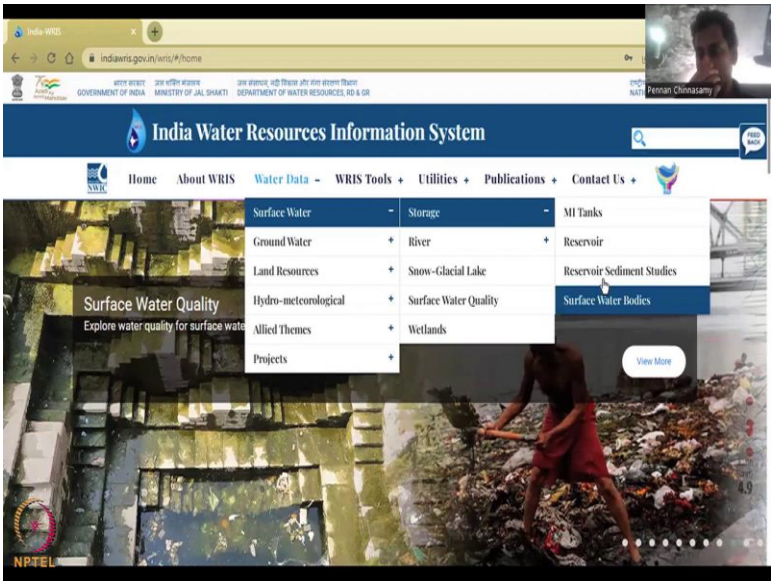
Remember that most of the data downloading method and selecting location is the same even if you change the data. So, from groundwater to surface water or rainfall, everything the method in using the website is the same. We notice that WRIS database has a archive of all these data and that is why we will be focusing on downloading the data from this website and methods on how to download the data. Without further due, let me start with the data for storage and river.

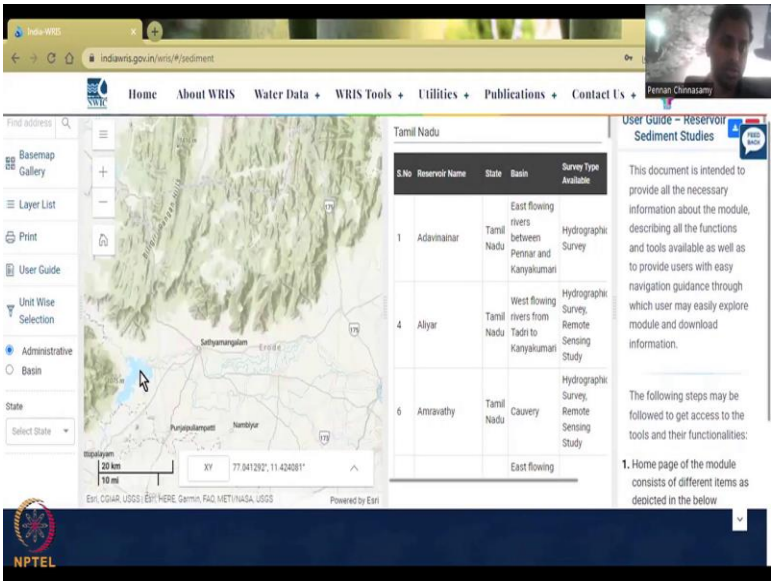
But please understand that we are now jumping into an area which is governed by many agencies including international, national and state. So, it is not going to be that easy to find the data because most of the data is under sensitive umbrella, which means it cannot be downloaded that easily you will have to go to the office and explain why you need the data, it is not available for free for everyone to download. What do I mean that these some structures are transboundary?

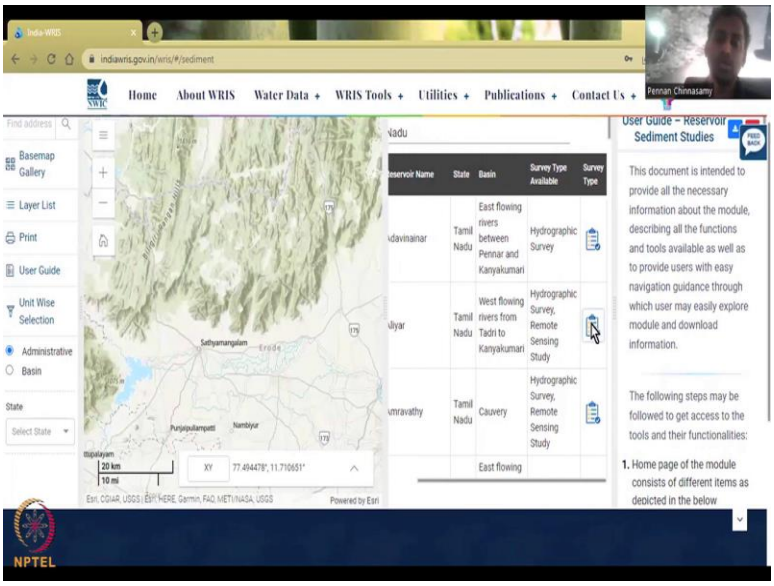
Which means it is international waters. For example, we have the Ganges basin, which starts somewhere in Tibet, China and then comes down to Nepal and then comes down the path to India. So, the boundary or the basin is across nations. So, how do you monitor the Ganges water, same Brahmaputra and then other major rivers in the world? Let us look at India alone. We also have state boundaries. For example, the Kaveri issue is one of the biggest issues which is contested in court, the water sharing issues.

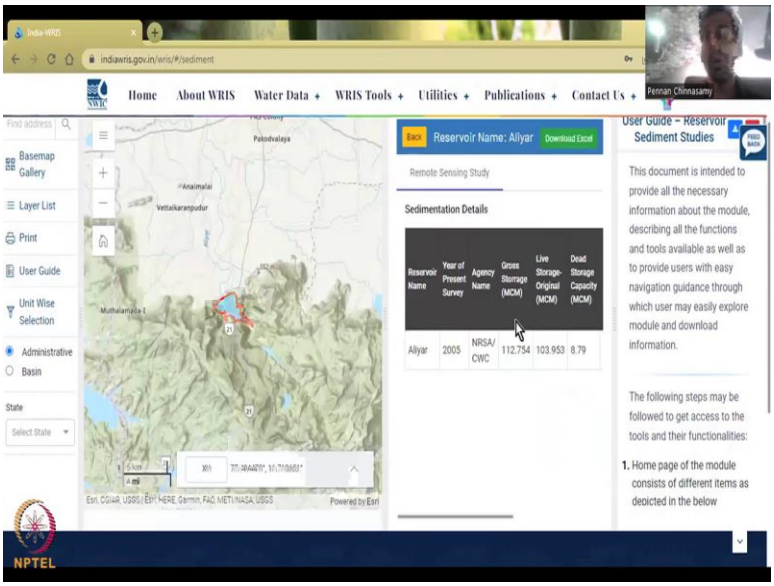
And the data is available but it is not available for free and easily available for others to download. So, these are the data sensitivities that we need to be careful about. So, let us look into the website. It is the WRIS website. And under the WRIS website we need to go to the water data platform and then from the water data platform we have to go to surface storage and then there is river separately. So, let us start with the river storage.

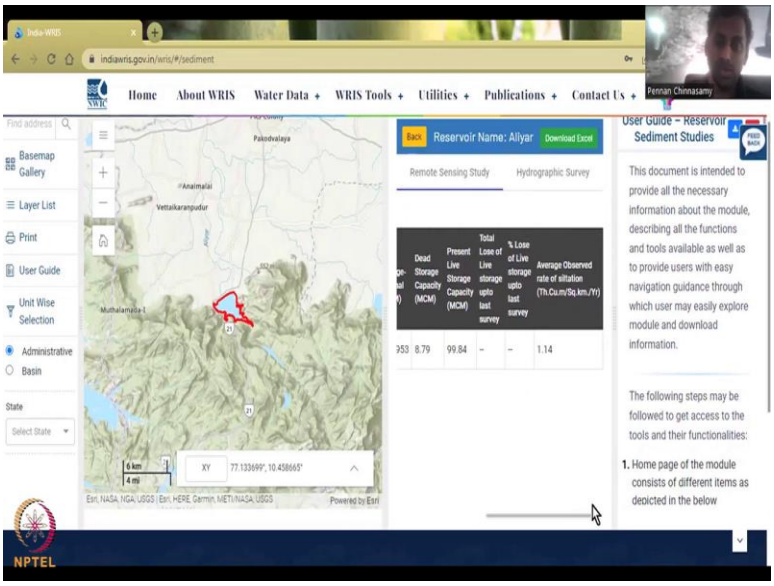
(Refer Slide Time: 05:28)






India-WRIS
indiawris.gov.in/wris/#/sediment
Home
About WRIS
Water Data
WRIS Tools
Utilities
Publications
Contact Us
Pennan Chinnasamy
Basemap Gallery
Layer List
Print
User Guide
Unit Wise Selection
Administrative
Basin
State
Select State
Reservoir Name
State
Basin
Survey Type Available
Survey Type
Tamil Nadu
East flowing rivers between Pennar and Kanyakumari
Hydrographic Survey
Tamil Nadu
West flowing rivers from Tadri to Kanyakumari
Hydrographic Survey, Remote Sensing Study
Tamil Nadu
Cauvery
Hydrographic Survey, Remote Sensing Study
East flowing
User Guide – Reservoir Sediment Studies
This document is intended to provide all the necessary information about the module, describing all the functions and tools available as well as to provide users with easy navigation guidance through which user may easily explore module and download information.
The following steps may be followed to get access to the tools and their functionalities:
1. Home page of the module consists of different items as depicted in the below
NPTEL


India-WRIS
indiawris.gov.in/wris/#/sediment
Home
About WRIS
Water Data
WRIS Tools
Utilities
Publications
Contact Us
Pennan Chinnasamy
Basemap Gallery
Layer List
Print
User Guide
Unit Wise Selection
Administrative
Basin
State
Select State
Back
Reservoir Name: Aliyar
Download Excel
Remote Sensing Study
Sedimentation Details
Reservoir Name
Year of Present Survey
Agency Name
Gross Storage (MCM)
Live Storage-Original (MCM)
Dead Storage Capacity (MCM)
Aliyar
2005
NRSA/ CWC
112.754
103.953
8.79
User Guide – Reservoir Sediment Studies
This document is intended to provide all the necessary information about the module, describing all the functions and tools available as well as to provide users with easy navigation guidance through which user may easily explore module and download information.
The following steps may be followed to get access to the tools and their functionalities:
1. Home page of the module consists of different items as depicted in the below
NPTEL



So, we are back to the homepage go to water data and you can see that surface water is there and under the surface water there are multiple options one is your storage which is your it could be a tank or it says is it could be a tank or it could be reservoir. Tanks are smaller reservoirs are large. And then there is some studies on the reservoirs, for example, what is the sediment load, is it sustainable design, those kinds of things which you can access from the list.

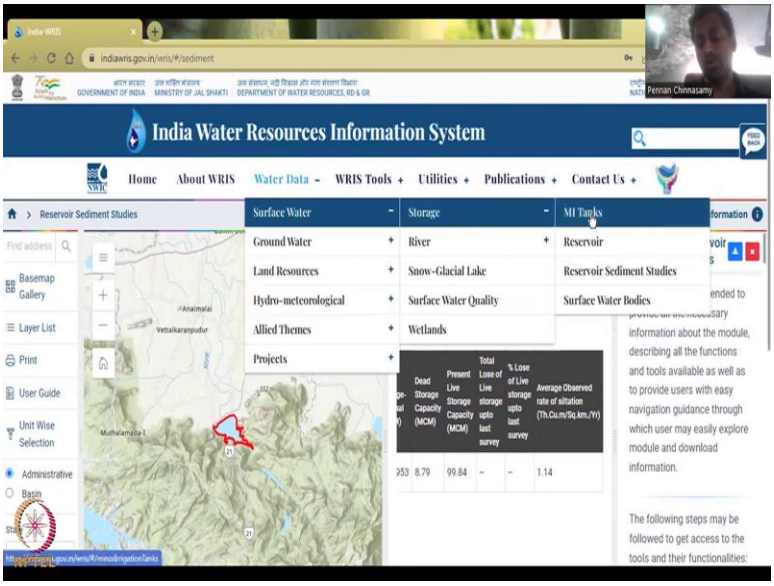
Let us just click on to say how many reports there are and you could see that there are multiple resource sediment studies. Why is this important to understand is because once the sediment builds your storage in your reservoir is lesser, so one of the key rural water management activities is to find the sediment loading and then remove the sediment through activities through machinery, etcetera. So, you can filter this through whichever dam you want.

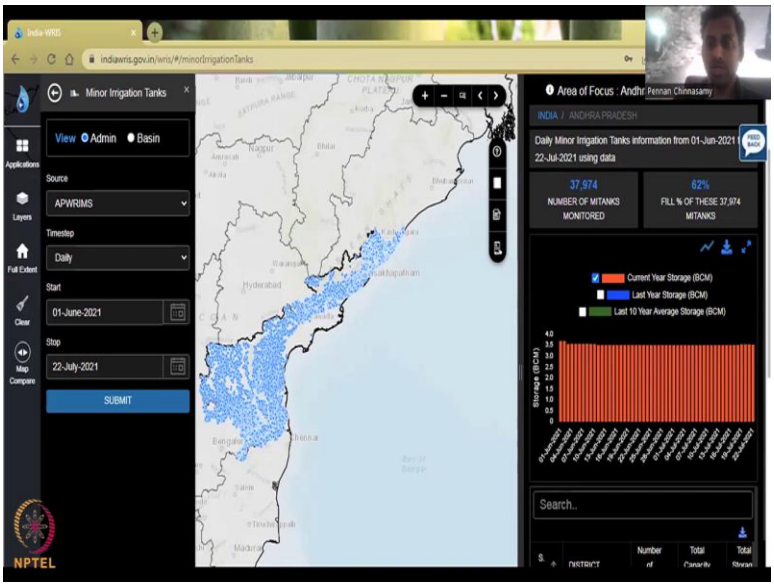
And let us say Tamil Nadu to try to see if it filters by state. So, some of these are still not a filter. So, I just said Tamil Nadu wait for some time. Now, all the Tamil Nadu ones have come up. So, you would see that this one is available and you would go and select that survivor to see the study. So, it will normally be a PDF report if you want to study. So, this one is the Aliyar dam I am just going to go close.

So, if we were to close I think it is stopping to show the highlight. So, you could see here, here is where you have the Aliyar dam and then you could go here and download the report. So, you can see the survey which has been done. If you click on a survey type, here it is the Aliyar dam, it was done in 2005, agency was NRSA and CWC which is the Central Water Commission.

Storage, live storage, dead storage all these storage characteristics are done, it is not a survey with the people but physical survey, present live storage, etcetera, etcetera. So, this is about the sediment studies and you can download the Excel, all this data as Excel if you would like.

(Refer Slide Time: 08:43)

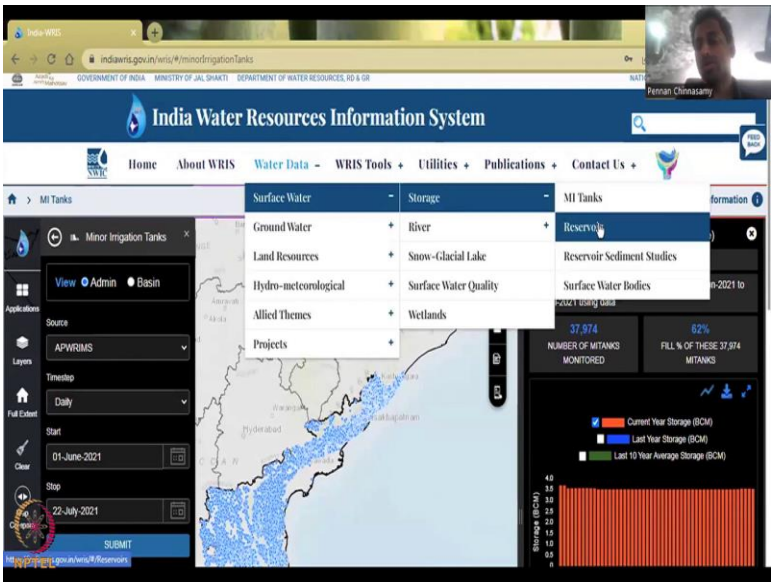


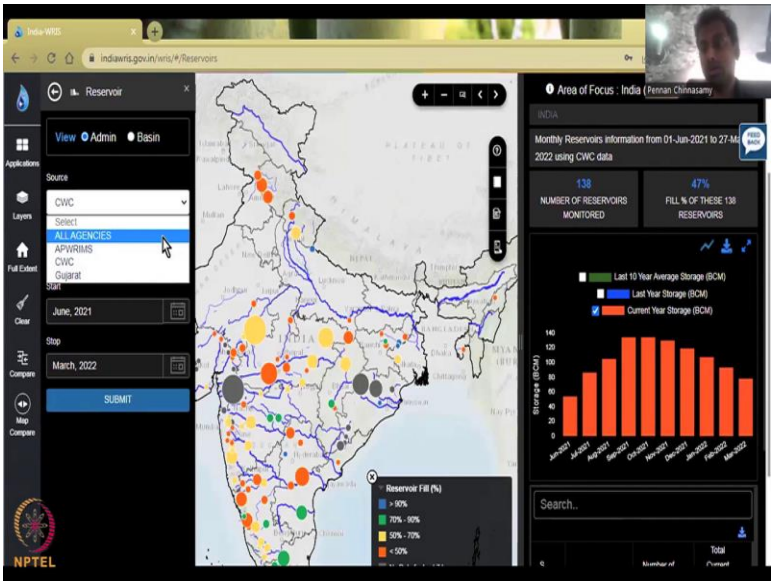


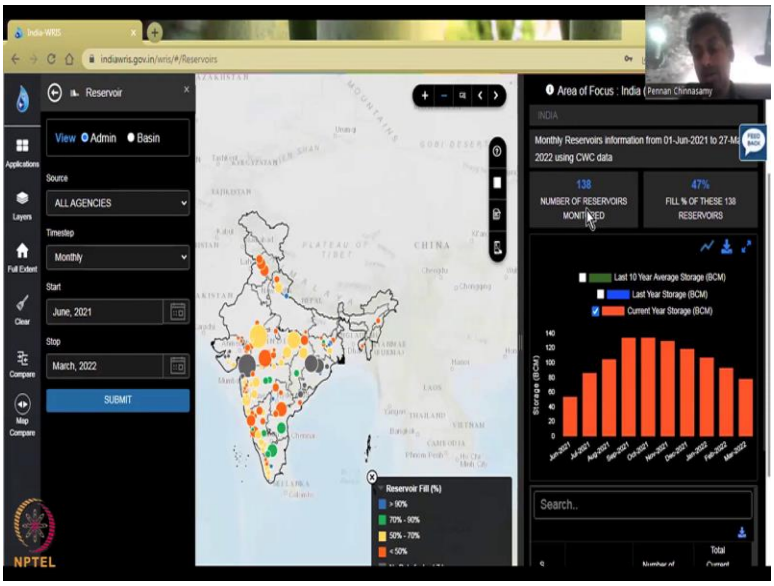
So, I am going to go back to the storage water surface storage and then I also want to show my tanks. So, there are multiple tanks. So, the tanks usage and everything depends on how you would like to use it for agriculture or it is for also domestic use. So, minor irrigation tanks are given, MI stands for minor irrigation and default it goes to AP because that is where the lot of data is there and there is no other data.

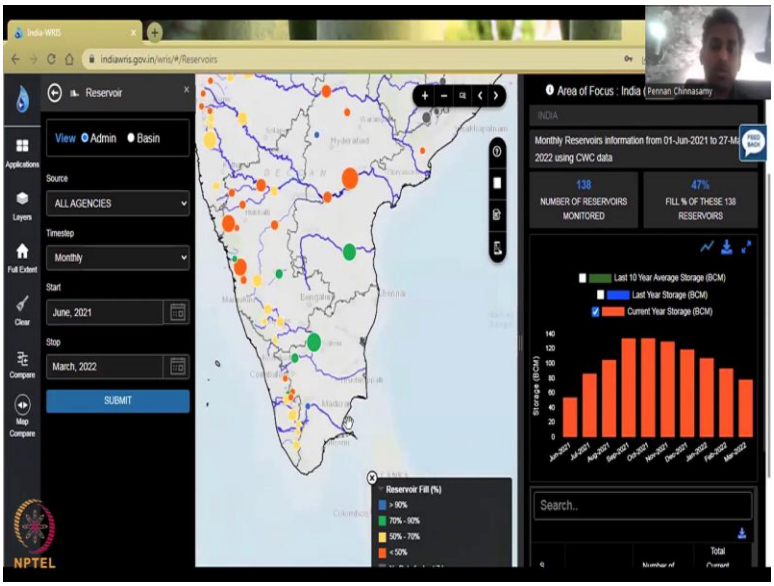
So, you could only select Andhra Pradesh and download it. So, Andhra Pradesh looks like has been a progressive state for having these data locations. We have number 37,000 for that 37,000 tanks and 62 percent of them are the overall average. Fill percent for 1 June to 22 July. So, the average from that area from that period is around 62 percent. Then you can go down and see which tanks are there.

(Refer Slide Time: 10:04)









We are going to focus back on the Reservoir. So, I am going to storage and reservoir. Reservoirs are dams, irrigation dams, bigger dams. The other one which was there was the lakes and ponds, where you have a level, if you want to do a level study and stuff. So, this is the India map that comes up, which I also showed in the slide.

And you could see that, by default, the agency the CWC, which is a Central Water Commission, but just to be clear, let us see what other agencies are no other agency directly can involve like the central agency, but state agencies have their own limits boundaries. So, initially, the whole of water resources can be monitored by CWC, and the state agencies can help in monitoring this or they can also have their own separate data for monitoring these reservoirs.

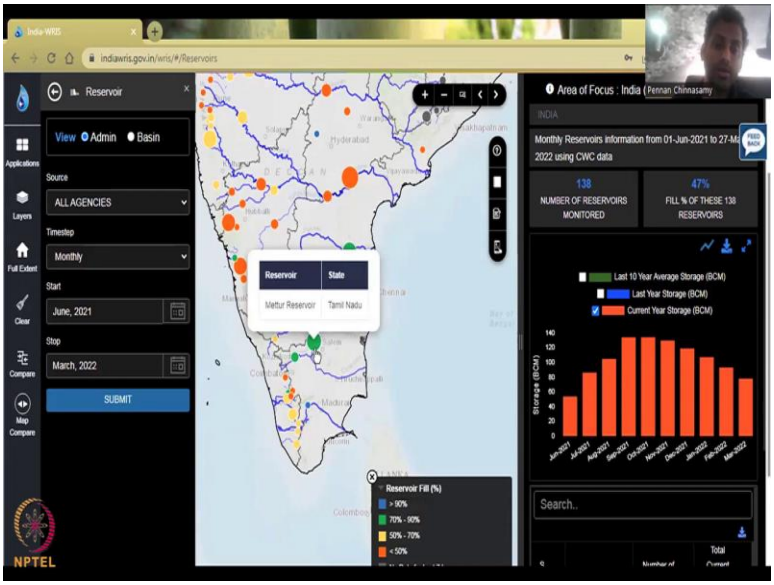
Remember, it is not only the one part of the reservoir can be built all throughout by the state, because some of these reservoirs if you block then downstream communities may protest and these downstream communities could include your downstream states also. So, the case between Karnataka and Tamil Nadu on the Kaveri is the same, you build a reservoir and if the water is stopped, then the downstream communities would ask to release the water based on the need.

And that is where we would see multiple agencies monitoring the need. So, let us say for keeping it more robust, I want to put all agencies and it is monitored daily, similar to the rainfall that we saw in the last class, the reservoir data is monitored daily. And you could see for whole of India, and of a little bit more. So, for the whole of India, you could see 90 percent full for the time period given which is June to March.

See June to March should capture your good seasonal dynamics, because June is when your monsoon starts at least in the Western Ghats region. And then by the next March, it is almost empty, because of the summer period coming and also the water may be used for the Rabi crops and winter crops. So, what you see here is there are 138 reservoirs monitor not total reservoirs in India, it is the number which is being monitored by all these agencies that have given data.

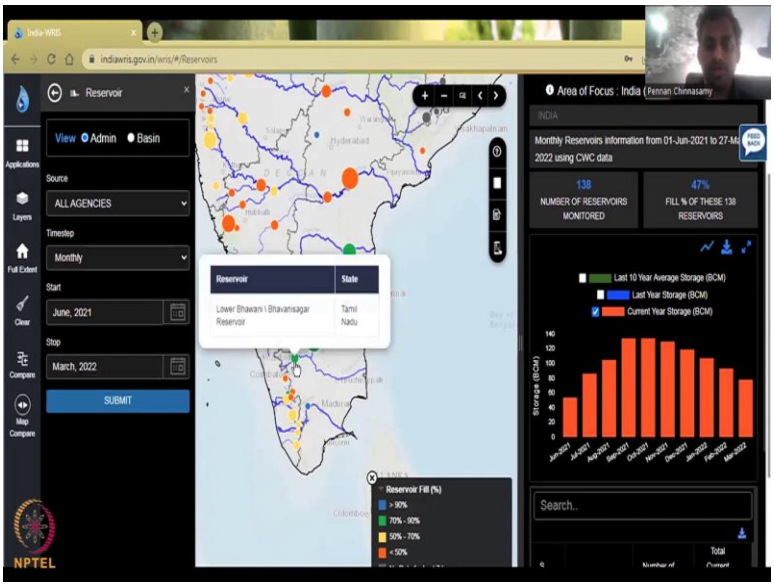
Suppose there is a PWD for example, in Tamil Nadu, if they do not give the data, if I zoom in, you can see. See, if they do not give the data then it is not populated. It is very simple logic. This website only hosts the data and the location of the reservoirs that are provided data. Since there is a lot of sensitivities not all dams, data are shared and the location is also kept sensitive. So, now you could see that for example, the Karnataka is here and then you could see the Kaveri like Kaveri coming and then flowing through and going out.

(Refer Slide Time: 13:54)



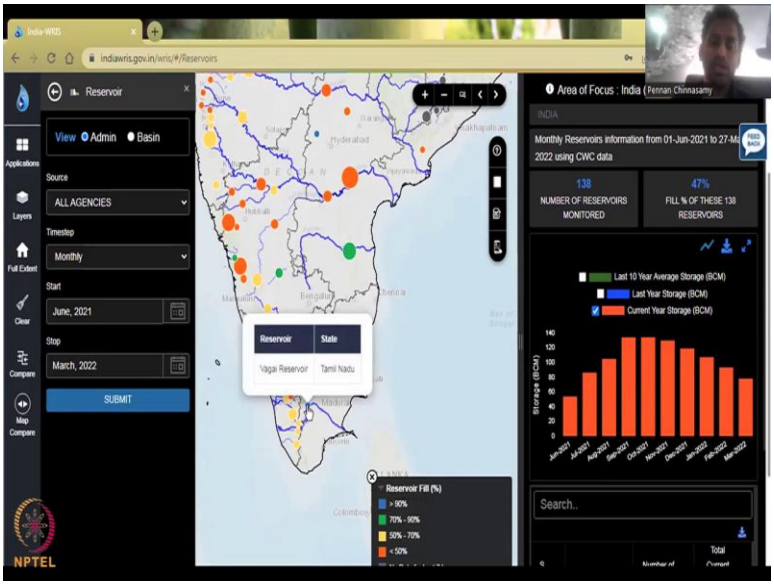
So, there is a dam reservoir along the Kaveri and there is Mettur reservoir, Mettur.

(Refer Slide Time: 14:02)



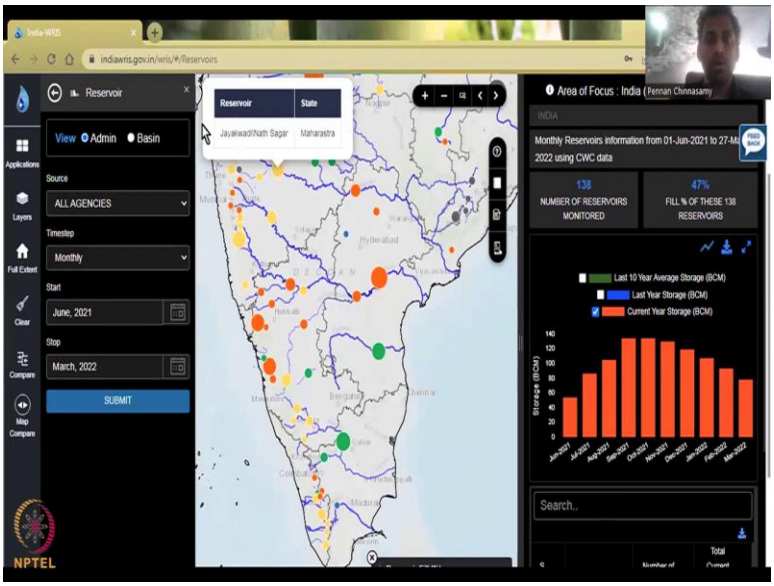
And then this is the Bhavani sagar, lower Bhawani sagar. Let us now look at some of it.

(Refer Slide Time: 14:13)



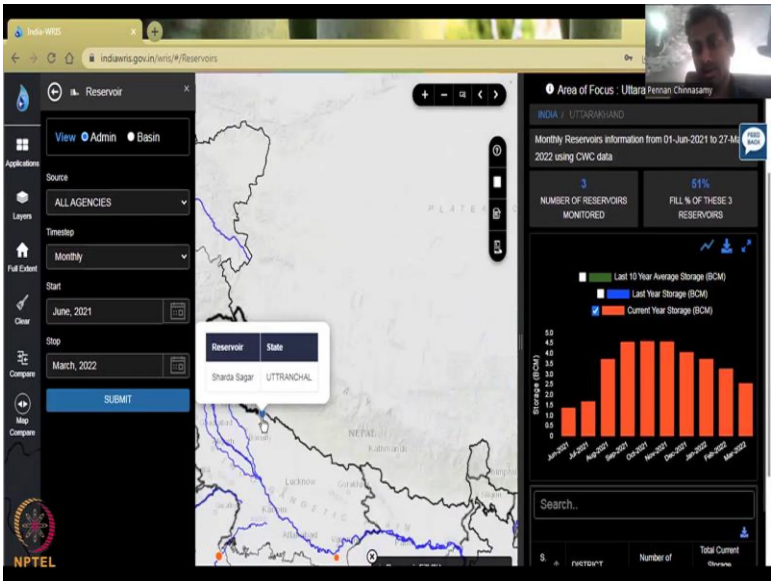
And you could see why only one reservoir at least in Tamil Nadu Vagai is around 90 percent or greater than 90 percent. So, the coloring is given to show that is the water levels coming or if they are having any issue with the water levels. So, what do you see here is the key rivers in India and along it there is reservoirs.

(Refer Slide Time: 14:53)



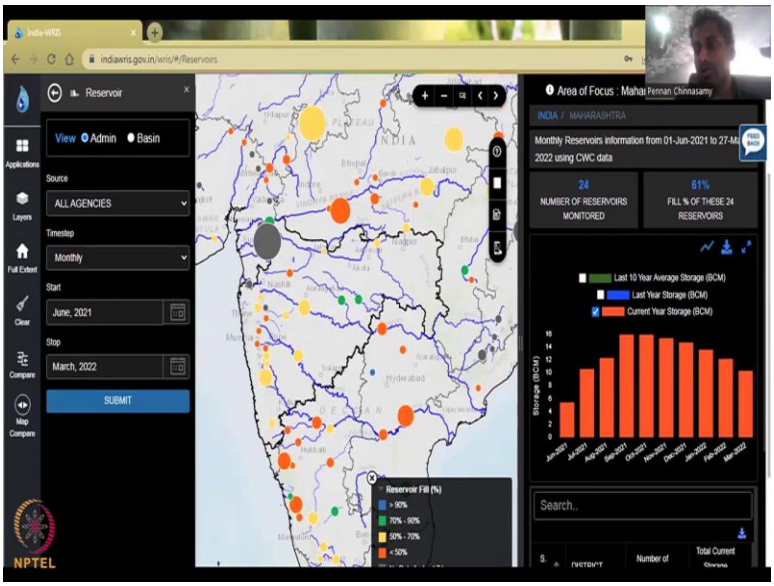
Some are the reservoir you have here the Jayakwadi Nath Sagar reservoir. And one of the key ones are also here where you have enter state transfer. And also, between states when you want to transfer water, these reservoirs play a vital role.

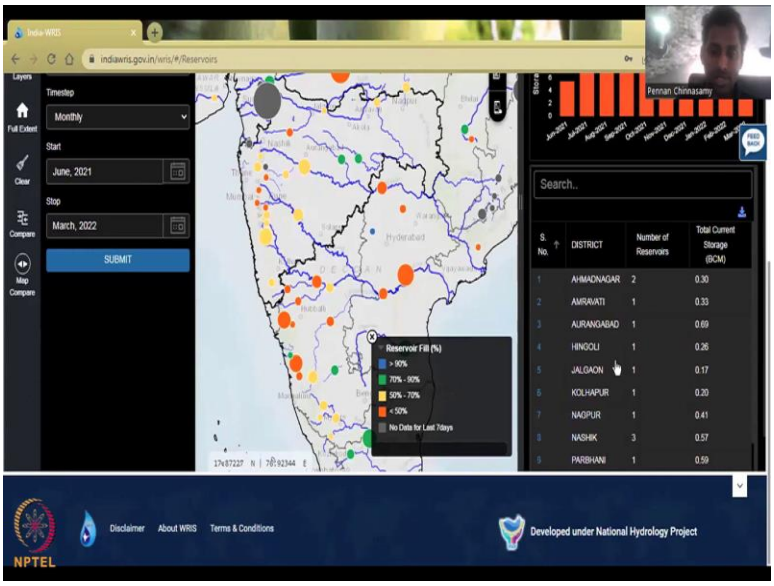
(Refer Slide Time: 15:15)



So, there is one more blue here, if you click the reservoir in the name comes as Sharda Sagar. So, now similar to the rainfall data, we could do a state wise analysis. Again, I am going to go back to Maharashtra why, because you could see here, this lot of data for Maharashtra and a lot of reservoirs being mapped.

(Refer Slide Time: 15:39)

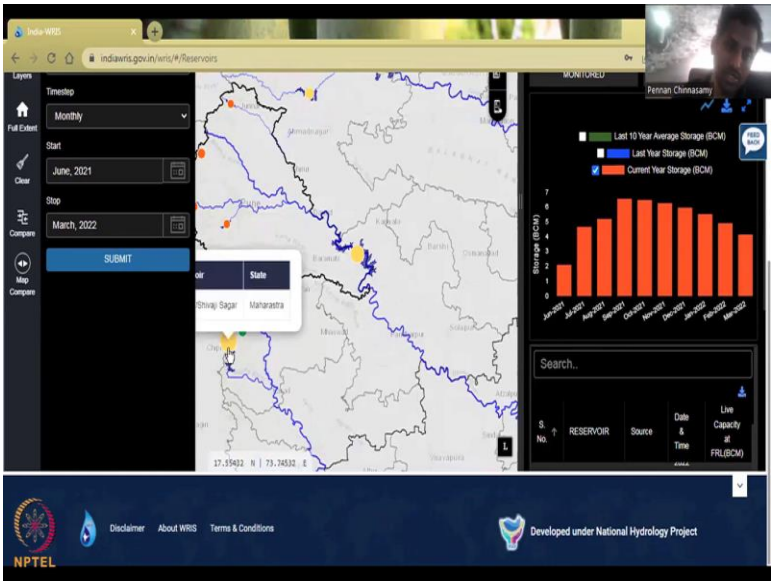


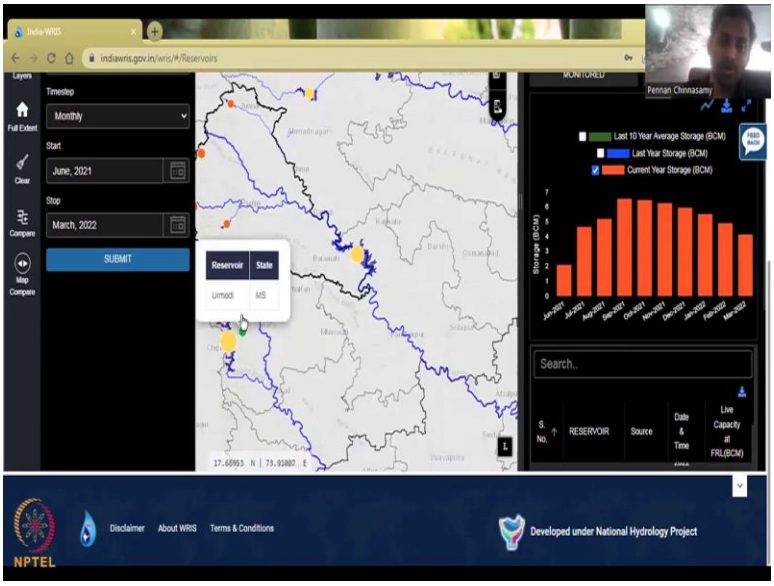


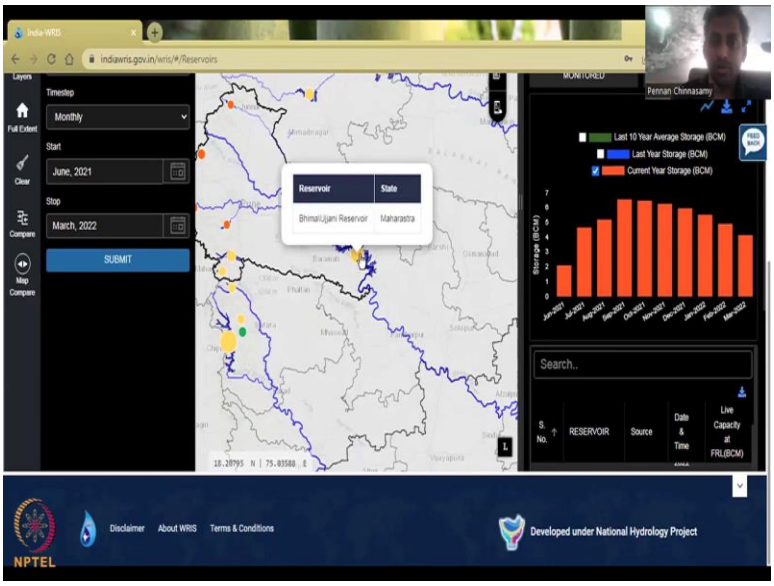
So, let me go to Maharashtra, I just for this period of time, but I am not going to change the time period. Let us keep it. And within that time period, we can definitely mix and match the time to show if it is completely turning blue. Blue means it is 100 percent, almost 100 percent full. So, in this period, the average reservoir capacity is only 61 percent, not more than that. And you could see that the data also shows, the data you can click here the legend, the legend also shows that there is only a couple of classes greater than 90 percent is blue.

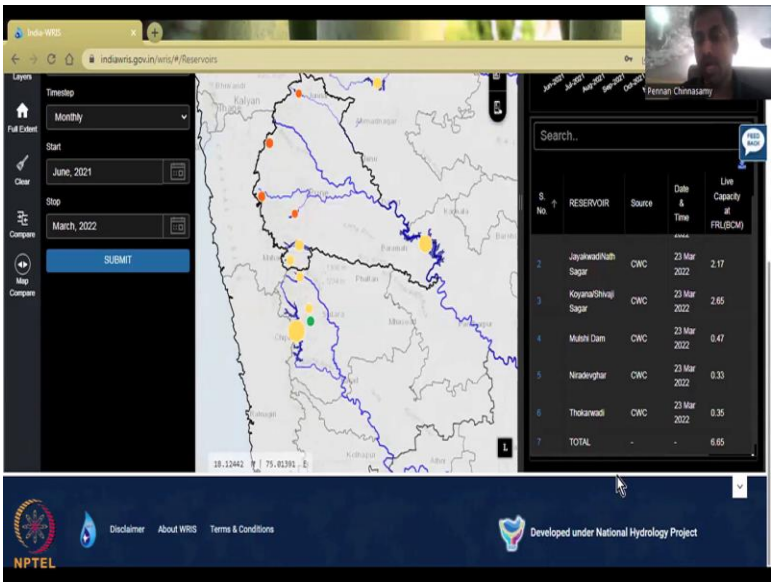
And then you have the 70 to 90 percent, 50 to 70, less than 50 and then no data available. So, there is no data available is also important to show that, maybe it is sensitive so they are not sharing the data. So, in Maharashtra I have clicked so they will know Maharashtra name has come, if you come down you can see how many districts are there and what are the number of reservoirs in each district. So, Pune is known as district with a lot of reservoirs.

(Refer Slide Time: 17:10)





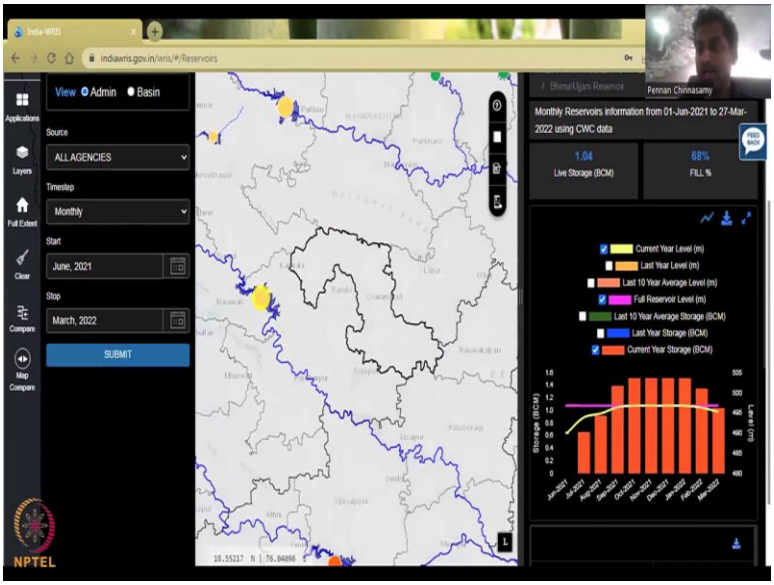


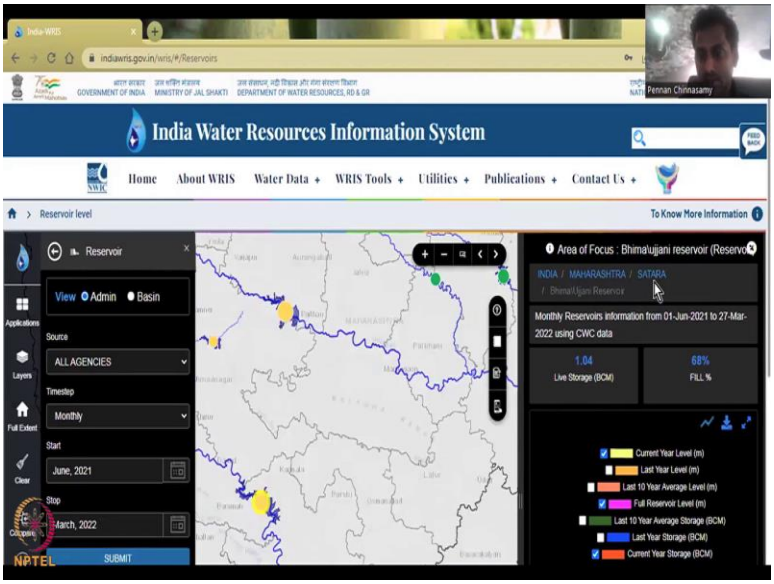


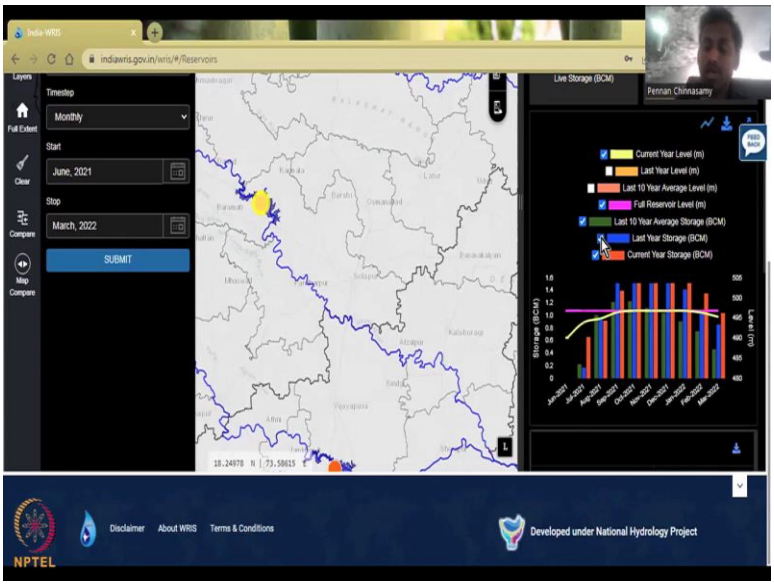
And so, I am going to click Pune. And you can see that the Pune's location has come up, I am just going to because now we know the legend, 90 percent, we are looking at the blue ones, which are very important. So, this is the Pune district and you could see that you have the Shivaji Sagar reservoir and Urmodi, this is the Bhima Ujjain reservoir all these major reservoirs have been captured in the Pune ridge. So, you can see this is the Pune region. And you can count up to see how many reservoirs 1, 2, 3, 4, 5, 6. So, here is also two more, so 1, 2, 3, 4, 5, 6. So, all these six names are given below can see the names and the agency which is monitoring them which is CWC. Here there is no how wild rainfall is monitored by other agencies as well.

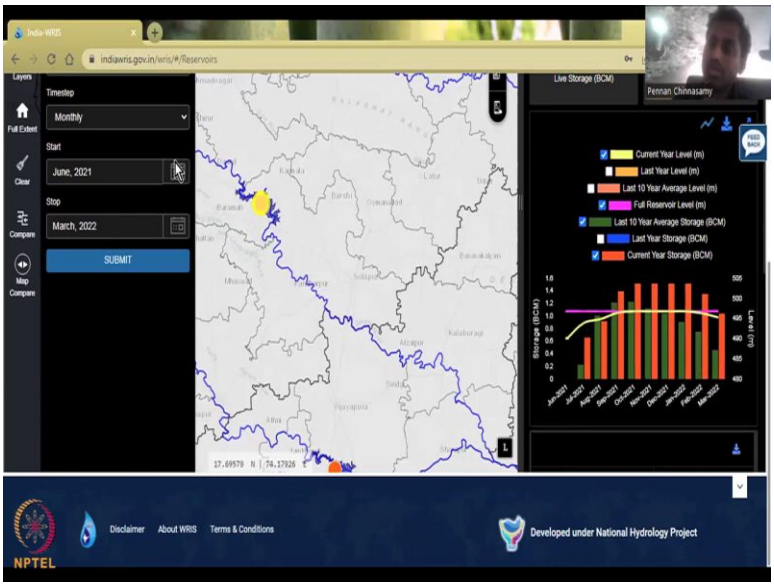
In Maharashtra, most of these water bodies are monitored by CWC as per the data. And the date and time of the last recording is given us 23 March 2022 which is just a week before this recording. So, what I am trying to say is these are live data, it is not that old that you cannot use it so it is kind of live not as daily like right now what is the level, lively means which is just from the last week, it is not too old. So, the farmers can use this to understand that how much water is coming and will it be enough to sustain the agricultural crop.

(Refer Slide Time: 19:04)









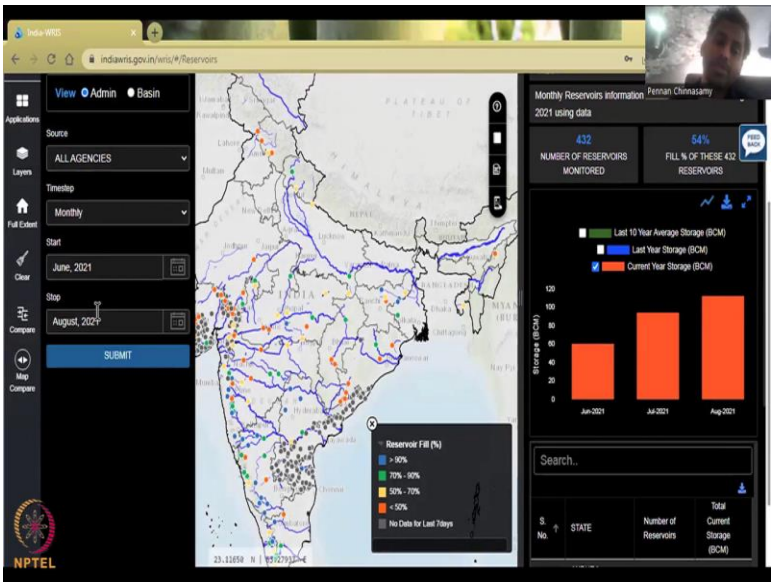
So, I am going to click one of the biggest ones which is the Bhima Ujjain. So, once you click that reservoir the page updates to only the reservoir data so you could see here it is turned yellow as a highlight and also on the top you would see that Maharashtra, Satara district, Bhima Ujjain reservoir. So, even though I said Pune I wanted to have the bigger one to just capture the total capacity and stuff.

So, you could see here the current year level, here just excuse me, which is given in yellow, and then you have the orange level, the pink level which is the full reservoir. So, the full reservoir level is around 1.1 BCM, Billion Cubic Meters. And you can see that in the last year or the current year measurements June to March, you can see that the water level raised and it met the

full storage, after it meets the full storage then water will be released, they will not keep the water storing, storing there is some volume that can be added to the full storage, but it is advised not to do it because it might be dangerous to keep on adding water after a particular level.

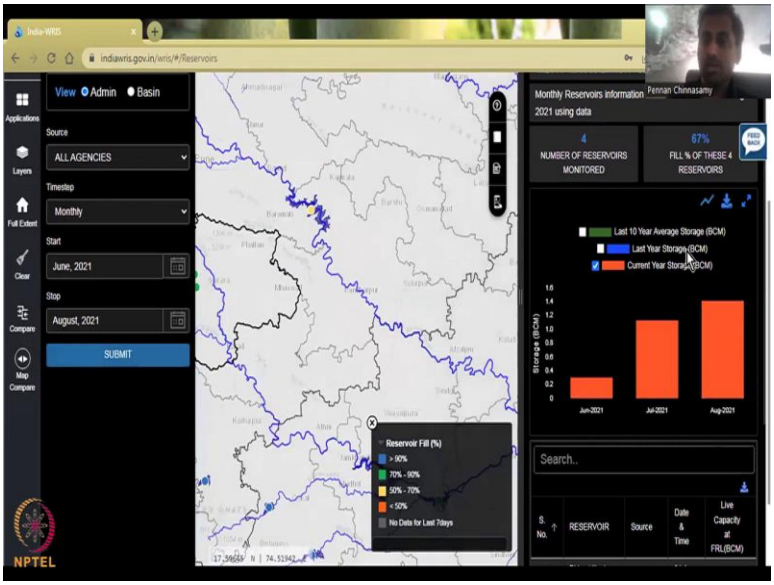
And it might weaken the structure or the irrigation dam and or it might also lead to more flooding downstream. So, you could see that the last 10 years average is up there. And the orange is current year storage which means the current year storage is above the average which is a good point. And the last year storage is also given which is last year and this year, not much difference. And then the 10-year average is going by this line. So, the pink line just tells about is the reservoir storing more water or is losing more water.

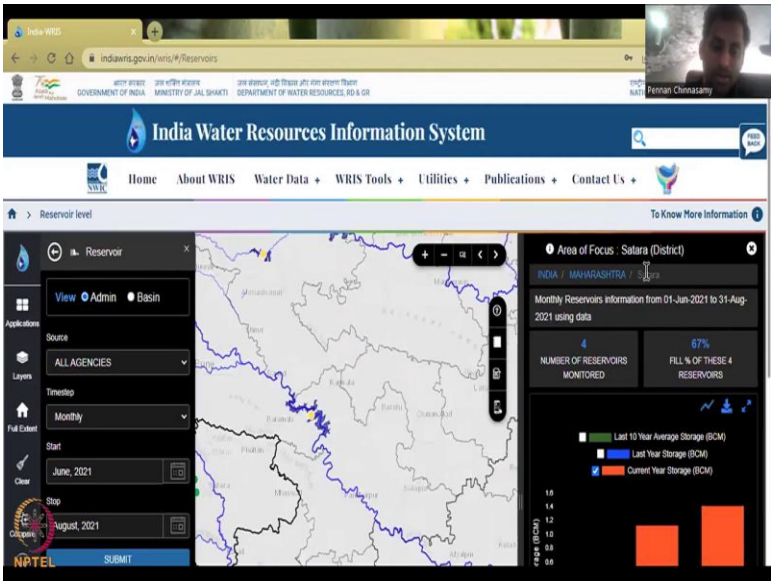
(Refer Slide Time: 21:31)

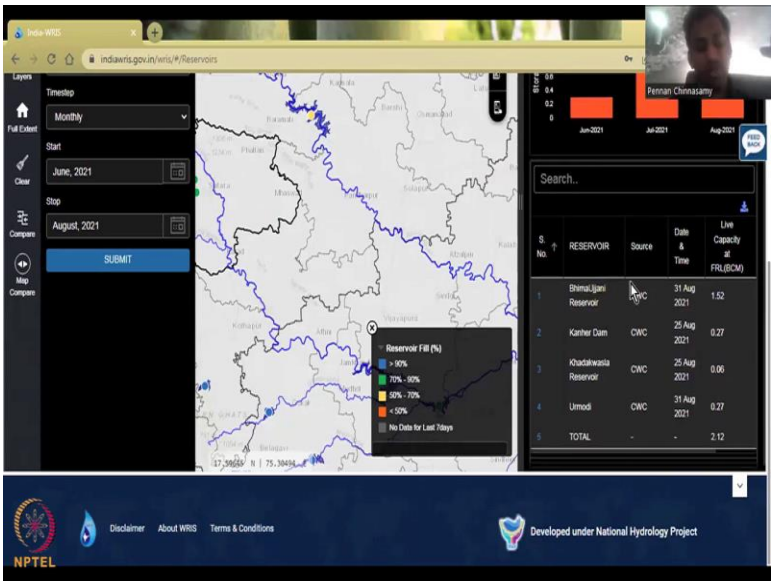


Now since this is Maharashtra, I am just going to do a June to September or August, let us do August, because by that time the capacity is full. And look at it only that reservoir would be shown initially but since we said all agencies all the 432 across this period welcome. Now, if you see the numbers change, the previous one it was only 138. Now, it is 432. What happened now is because we added a shorter timeframe and that timeframe maybe the data is available. So, it is not only that the data is not showing because the data is sensitive, but it may be not showing because those there are data gaps. There is no point of showing the data gap. So, that is where this happens.

(Refer Slide Time: 22:30)

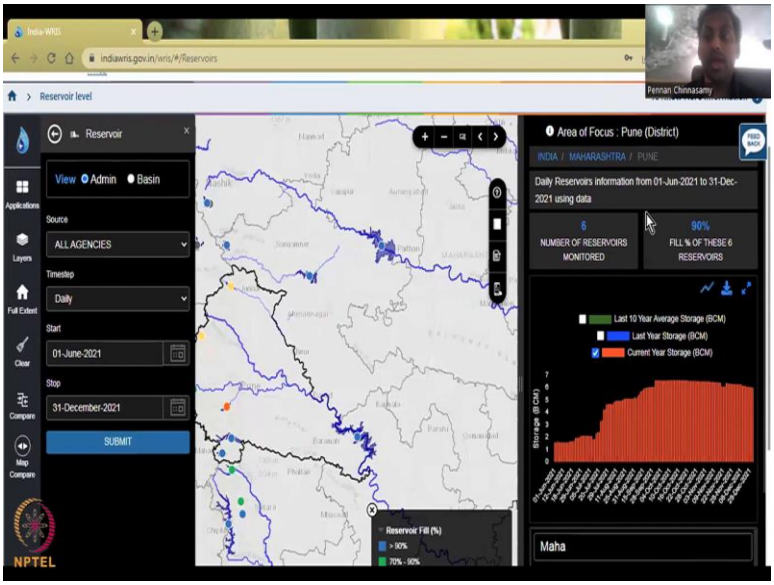


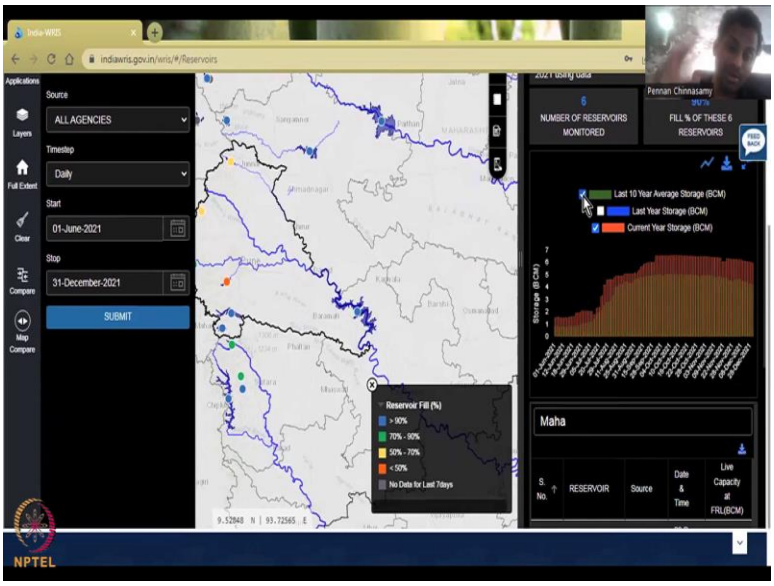




And as I said I was going to show something, I think this is a different district but let us see how much water is available. So, you could see that the district block I have selected is let us see here, is Satara. And in Satara there is four reservoirs, I am just looking down and then see what are the reservoirs and what are the agencies are all of them are CWC, which is monitoring the data. And for that particular timeframe I have got data June, July, August, only three months I have requested data and you will see that it is coming around 1.1, 1.2 billion cubic meters storage. This is how you could collect data monthly from a reservoir, click it and then download the data.

(Refer Slide Time: 23:41)





You could also do daily which would make more sense because your rainfall is coming daily. Your runoff is generated daily. And you can say that okay, from June. See normally here, the monsoon picks up in June. So, I want to say July we have until December, so you automatically give me, yeah. So, let us do one part. So, June, as I said, is starting of your monsoon. So, let us do 1st of June daily until December.

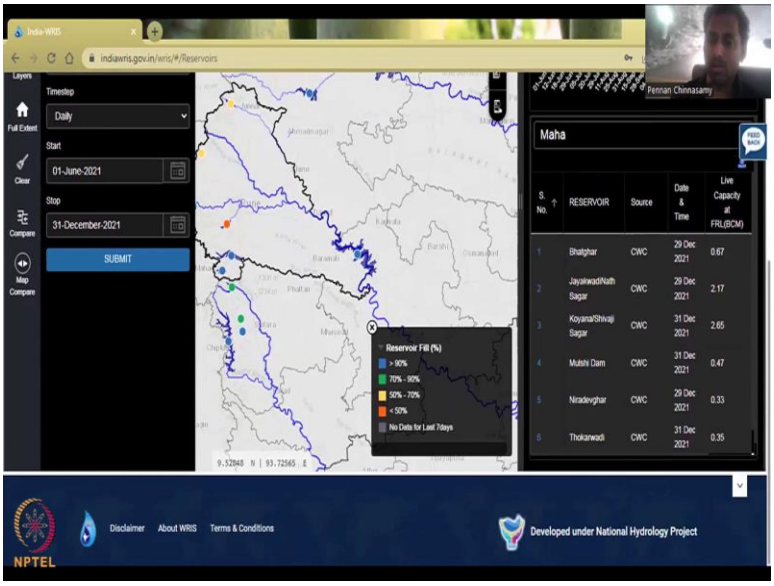
Yes. And then I get submit. One concern it might pull again back to India. Yes, it does. So, you will have to come back to the state which can be done here. This is same to other data also. So, that is why I am not just going to show it one time. You could apply it for the rainfall data, soil moisture, etcetera all these data you could apply. Since it is doing the whole of India you can see how big the chart is, see how big the chart is.

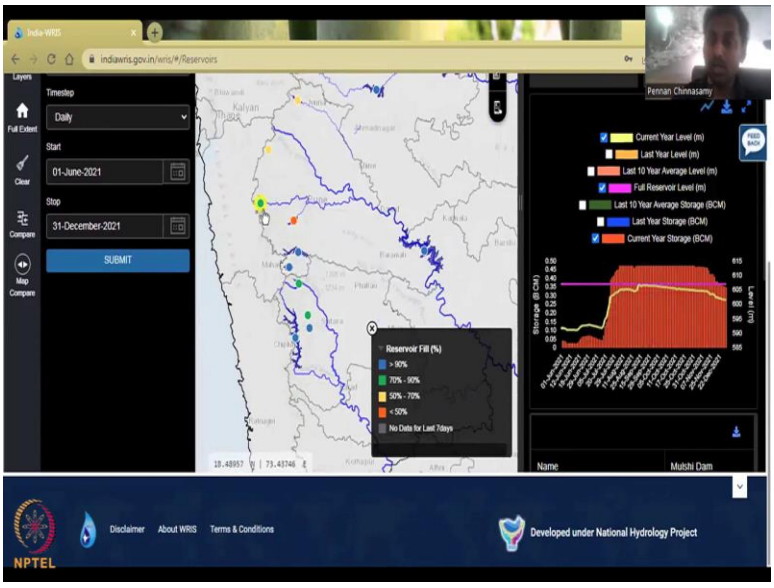
We do not want to entire country to be shown we just want to have the Bheema Sagar. So, I am going to see if it puts it up. Oh, it is only state there is no name, so Maharashtra, so number 10. We are going to click Maharashtra, the line numbers 10, and now 24. So, now there is zoomed in. And as I said, I am just going to go to Pune, because Pune has 6 reservoirs. And the total reservoir is very high in Pune storage.

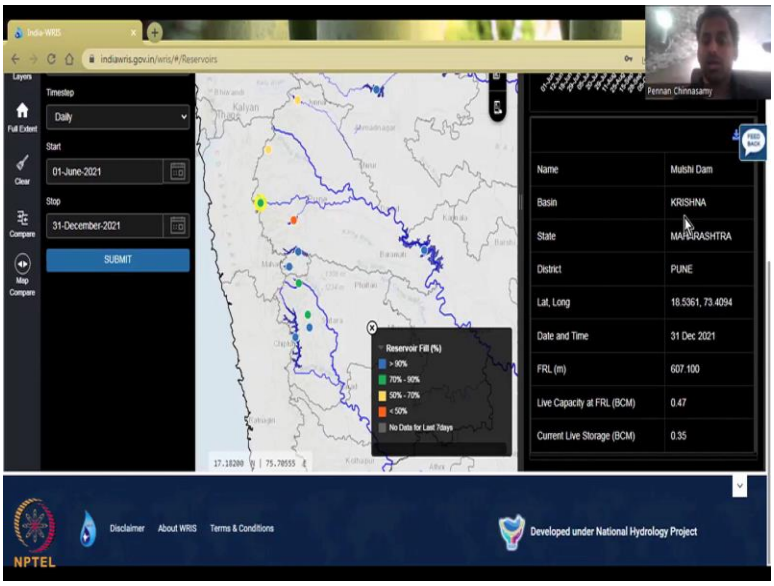
And you could see here the data for all the reservoirs, 6 of them are here, and 90 percent they are full. So, you can see that because of the rainfall, and there is a good rainfall in this region, all the dams are now full of water, or almost full 90 percent. And then most of it is above 90, that is where you get, the average as 90. And then what would happen is you can download the data as

the current year's storage, last year, last year 10 years to just show you that how big the rainfall has increased from August.

(Refer Slide Time: 26:31)







So, now we could come down and see which reservoirs we want to do, you can also click and choose, I think we could say that the Shivaji Sagar is good, Mulshi dam is good. Let us do Mulshi dam. So, now it has been highlighted as a green color. And almost it touched the total capacity of 100 percent. But then it is going down, right now after the monsoon period the rainfall does go down. And as the rainfall goes down, your reservoir capacity also is reduced.

So, this is how you could select one reservoir, go to the location, put up a date and say daily, and then daily data you could download. So, if you click CSV you click download, it can do a download as a CSV, and then move it into the Excel sheet. So, if you do not know how to convert a CSV to excel, that is fine. You just open the CSV it looks like an Excel, copy it into an excel sheet and save it.

So, what is it called the Mulshi dam, what is the basin, Krishna basin, all these data is given in this sheet, even though the Excel sheet it will come, but on this webpage also you can take it. So, the district is Pune, your lat, longs are given where this dam locates. And also, the water levels are given to just show that what is the capacity in that period. So, with this, I will finish off the today's course on downloading the data for reservoirs.

Now, we know from the watershed balance equation, precipitation is known, the reservoir is known, which is basically your runoff water coming into the reservoir. And then slowly we will also talk about soil moisture, evapotranspiration and the river discharge which is very important for the crops lift irrigation those kinds of things.

I will also note that there is currently live storage it does not mean it is now the current storage but the storage during the last day of the time. So, you put December, so it is December. So, date and time is 31st December we put so for that date, what is the live capacity and current live capacity. All these are collected daily. So, there is a good database of it. I have not done the recap as I used to do, but I will do that when I start week 12 which is the last lecture. I will see you soon in the last lecture series. Thank you.