Sustainable and Affordable Sanitation Solutions for Small Towns
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Lecture – 19
Case studies – Decentralised waste water treatment

As I said we will be working for the last several years on trying to experiment DEWATS applications in different context and all that. So, these were some of the initial units where we try kind of doing it for a single house hold, try to work with basic masonry constructions and this is before the brief application is.

Now in fact, we are trying to move towards prefabricated single household systems. These were a little probably overdesigned at that time, but trying to again have the system of connected number of a settler, baffled reactor anaerobic filter and we actually have done about some 10-15 systems like this and they are working reasonably well, the basic principle continues.

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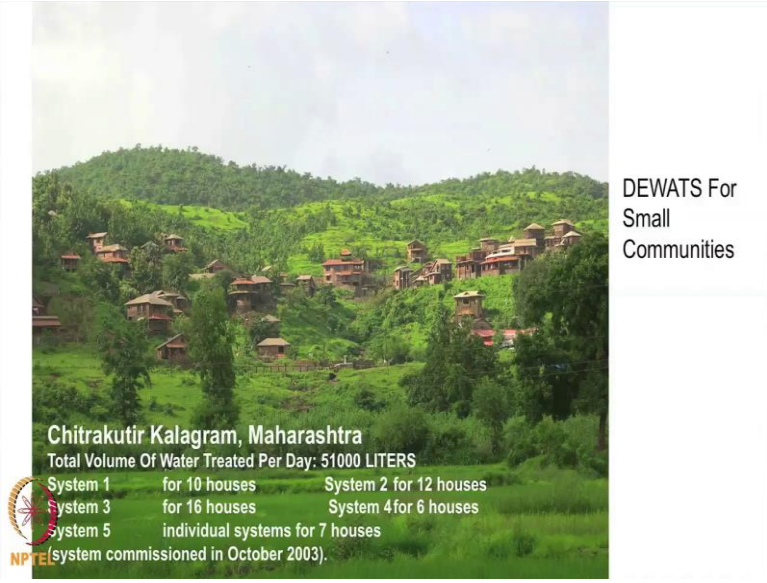

Then, there were also several systems done by CDD on cluster level DEWATS system. This is actually a small artist village that we have done near Maharashtra, where we had about 50 houses, where. So, what we did is that because it was a very challenging terrain we decided to actually go for small cluster level treatment system.

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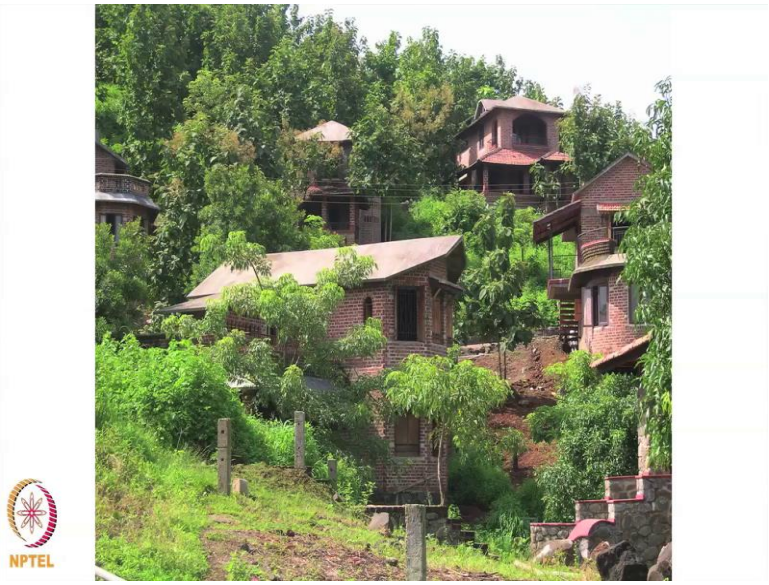

So, each house has a small settler. These are some of the houses. So, essentially the treatment pattern is like this.

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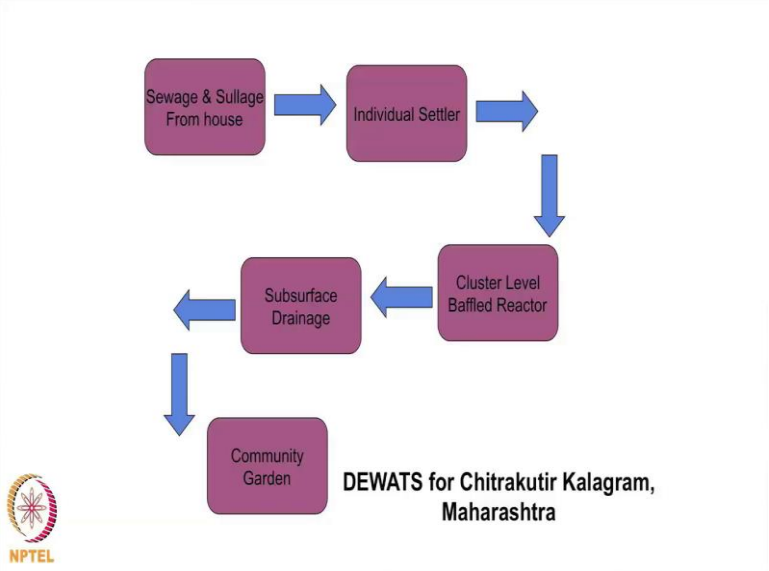

This is sewage and sullage from each house goes to an individual household levels settler and from there only the effluents are piped and they go to a cluster level baffled reactor. And after that we have just kind of let it because this was like a very spread outside, after the baffled reactor and then aerobic filter you just let it recharge the ground water because it was like about 17 acres of land and we have just 50 houses. So, this was and

so, the subsurface when we use that water actually for gardening the, community gardens where they were growing, I mean utilities and all that.

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So, this was just kind of trying to say that you can work with different it means like, this was a baffled reactor that we did. We actually made it as part of the steps going down to the valley because as you see in the first photograph the site is actually a valley. So, you can integrate these things as part of your landscape.

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This was another place where we try to do it. This was basic just to explain that you can do it with basic civil construction

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This is another small community level system, that was actually part of the Tsunami Rehabilitation Tharangambadi, where you have actually each of the houses have their own toilets. The sewage is piped and taken to a cluster level treatment system and treated actually now in Alleppey also we are doing one such similar cluster level system.

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This is another small community in near Nagpur. Actually, were again the waste water is treated at a community level in that. So, this is the community level treatment systems.

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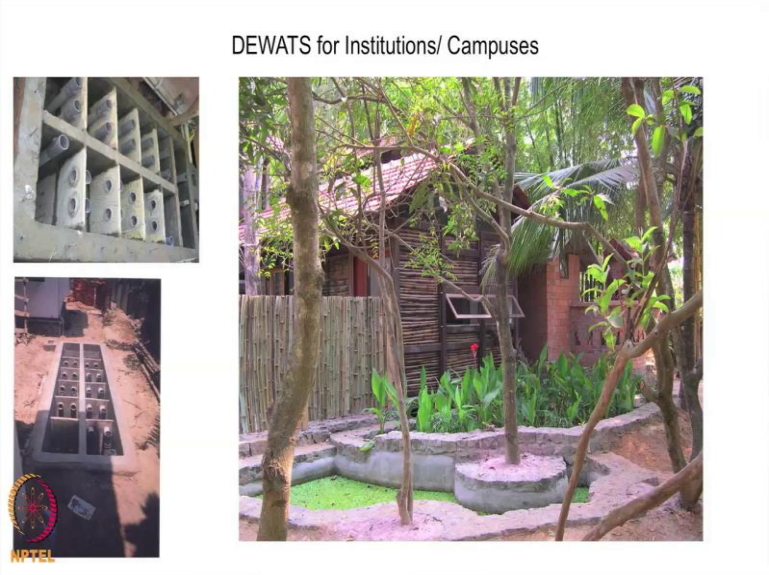

This is again like a small office as our own office in Kochi, where again to went off show that you can actually treat it all as part of your landscape. So, we have the baffled reactor not below the ground this is a planted filter. This is where we actually collect the water and reuse it. This is the baffled reactor that we have actually done below the ground.

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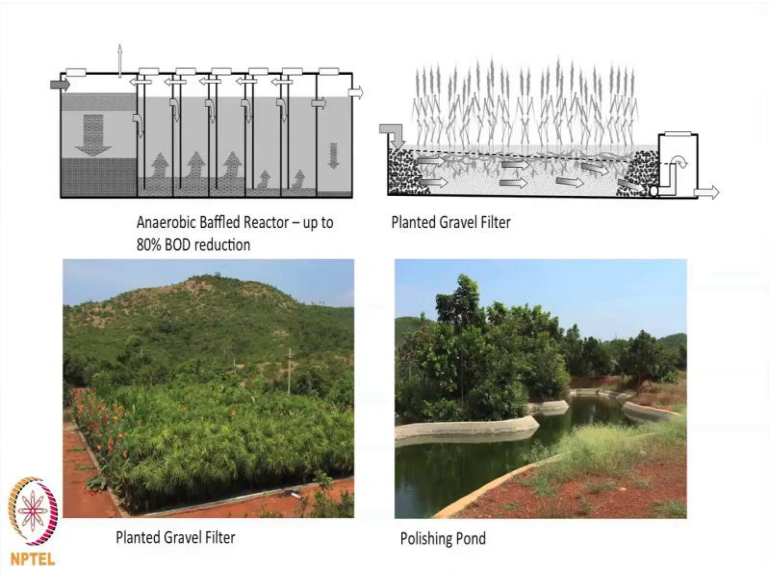

These are slightly larger systems so, but again the you cannot see the baffled reactor because it is below the ground. This is how we have planted gravel filter will look. This is actually a very high end yoga retreat, so it is actually part of very much part of the garden space and this is a large pond where the waste water is collected and from here they reuse it for their irrigation.

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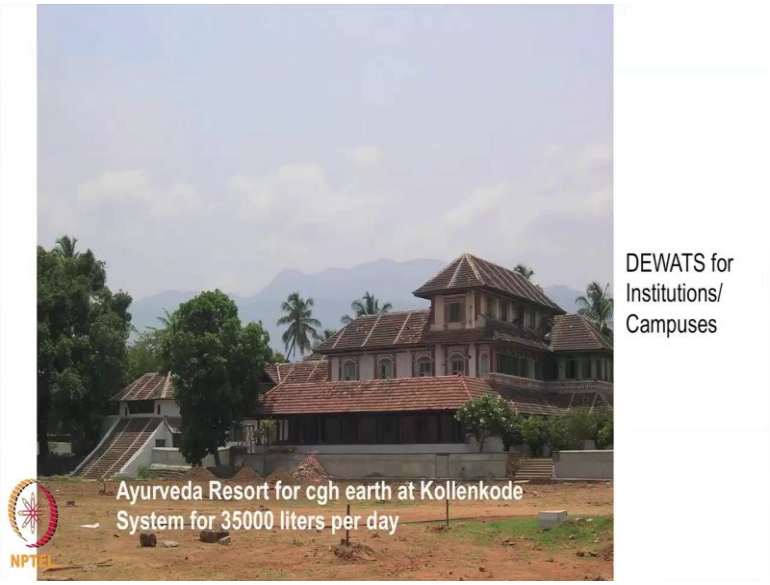

So, this is another project. It is actually a heritage project which is near Kollenkode that is an out of Kerala, North East of Kerala actually. This, this particular project has won a lot of recognition from the pollution control board for the quality of treatment. So, the one of the best working DEWATS systems that probably we have done.

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So, this is under the under construction happening. This is how it fine. We are actually, in this particular DEWATS we try to experiment growing a lot of herbs in the planted gravel filter also which was quite interesting to actually dry out.

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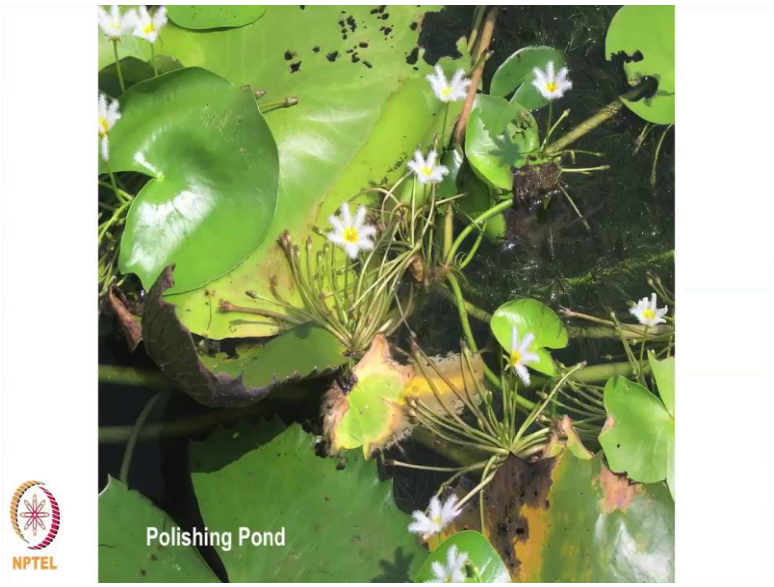

And then we have the last polishing pond which have a lot of water lilies and all that.

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So, it is, these systems you can actually developed as close to a natural echo system as possible, it is. This is one of the bigger one way of very big bigger stuff DEWATS system that CDD has done. This is for Aravind Eye Hospital in Pondichery, which treats about 3 lakh liters of water every day, it is now working for the last almost 10 years of a more I think almost 20 years or something.

So, you can see that this is their entire baffled reactor and anaerobic filter which is completely under the parking areas and this is the large planted gravel filter and the polishing pond which again has been integrated into the landscape.

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So, this is how it was when it was under construction.

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And the other photo was after completion. This is how it is as of now. So, basically, so after doing several upgrades of smaller building level system be it for a house housing colony or hospital or whatever and all that, there has always been this thing to kind of trying to scale it up to a town level whether you can address it to a slightly larger level.

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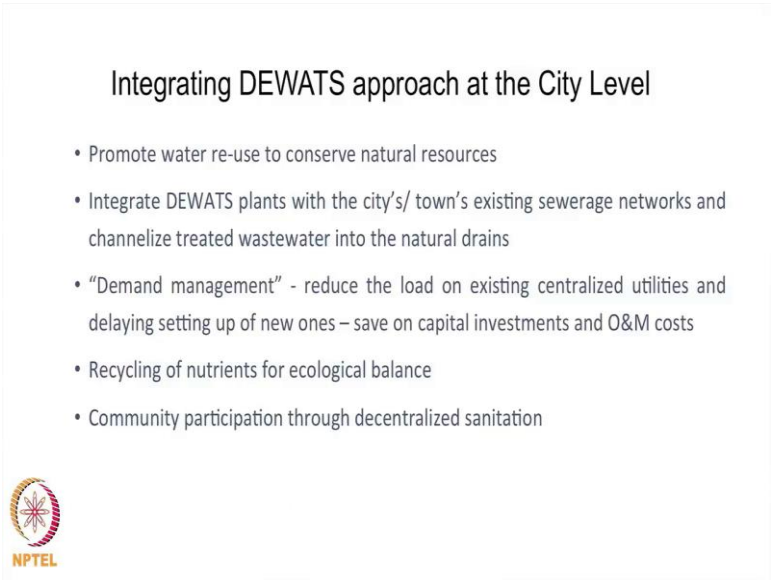

So, we have try to work on DEWATS as probably trying to integrate it to existing sewage networks in places. It can also help as I said in many places the centralized systems are designed, but very often they do not take care of the future expansion. So, this can actually help in DEWATS management, there is reduce a load on existing centralized utilities and delaying setting up of new ones, the thereby saving on capital investments and O and M costs. And as I said it has some recycling of nutrients for ecological balance.

And one significant thing which I think we will come to when we talk about Alappuzha is that the you can there is much more of community involvement that you can do when you are doing a decentralized system as compared to a centralized there was. Centralized system you all know that none of even people like us who we claim to be educated and knowing and all that, we do not even know what kind of systems the government is coming up there are consultants coming from here and there and all that and trying to do something.

So, common man does not get to know anything about what is happening there and you do not even have access to such places to go and see what is actually happening in a cities. Whereas, in a decentralized system you have an opportunity to engage with the community and make them take responsibility for there, that is one of the significant things that we have tried in Alappuzha also; to get people to own that your waste is your

problem kind of thing. So, we have done quite a bit of trying to experiment on projects at the city level.

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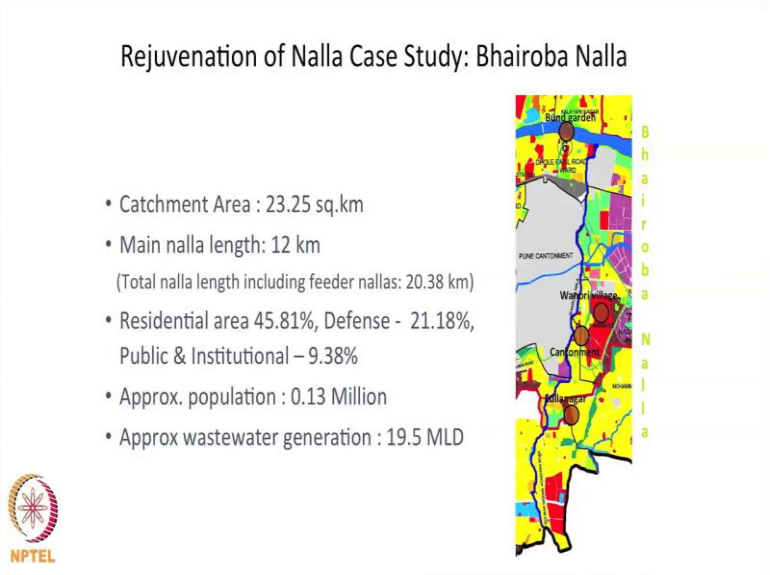

This was a project that we did for a for rejuvenating one Nalla in Pune this is called the Bhairoba Nalla we did it way back in 2007, we did the study. So, it had about 12 kilometers of length. And what happens is that Pune, the Pune city claims that they have got 90 percent sewerage network. I do not know whether any of you are from Pune, but the thing is that there might be the sewage networks, but there are so many places which cannot be connected to sewerage network because of gradient or whatever now that. So, ultimately, lot of these untreated waste water finds its way to the nalla, which is the case every town and city as you know.

So, we took this one nalla which is about 12 kilometers and we did a whole analysis of the catchment of the nalla, we about on all those things and we found that about 19.5 MLD of waste water is actually flow finding its way into the nalla.

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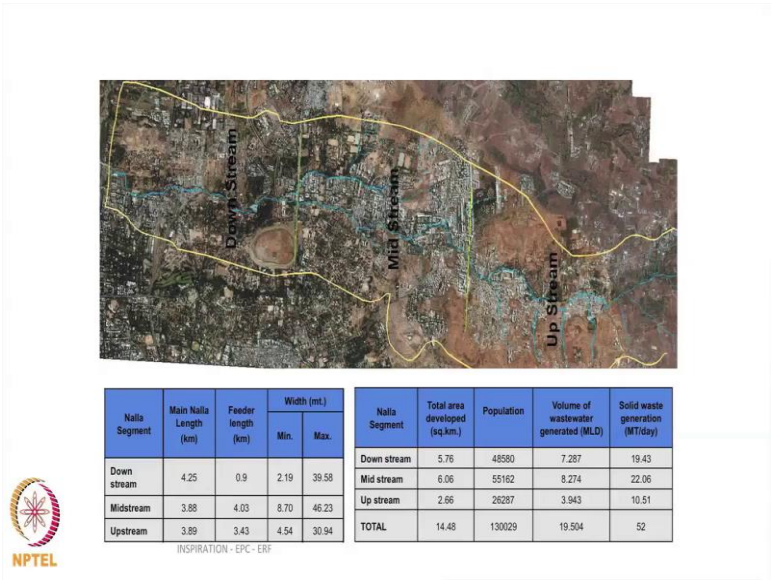

Nalla Segment	Main Nalla Length (km)	Feeder length (km)	Width (mt.)	
			Min.	Max.
Down stream	4.25	0.9	2.19	39.58
Midstream	3.88	4.03	8.70	46.23
Upstream	3.89	3.43	4.54	30.94

Nalla Segment	Total area developed (sq.km.)	Population	Volume of wastewater generated (MLD)	Solid waste generation (MT/day)
Down stream	5.76	48580	7.287	19.43
Mid stream	6.06	55162	8.274	22.06
Up stream	2.66	26287	3.943	10.51
TOTAL	14.48	130029	19.504	52

This was a kind of initial study, so we looked at the upstream the midstream and the downstream parts of it. I am not going into the detail.

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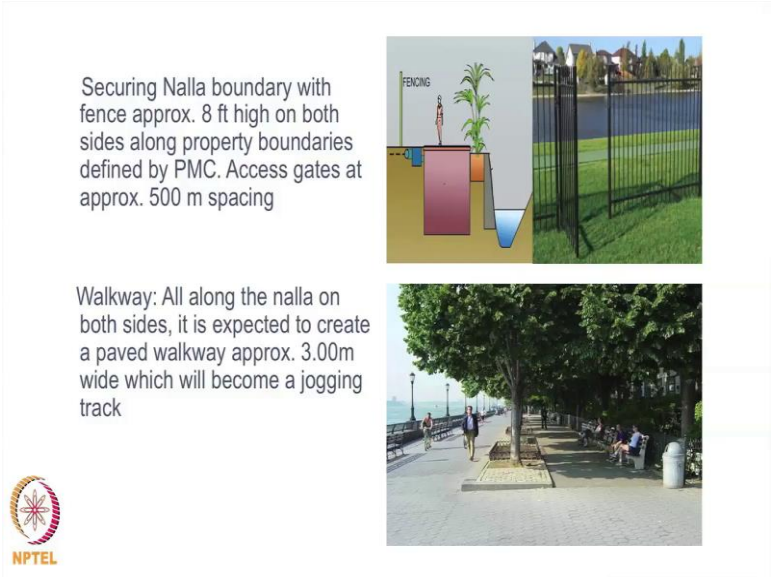

So, what we then worked out as a solution for the for rejuvenating the nalla is that the first thing we said is that we have to actually prevent further encroachments into the nalla which is something that we all find everywhere, is not it. This is like a place where somebody we will just do one wall and then they extends, again extend. So, we said that

let us actually physically put fencings which define the catchment of the boundary of the nalla.

So, probably have like a fencing, but you have openings, you, it is not like you have not you are totally cutting off people, but you have access at every 500 meters of something. And then we said that we can actually do the treatment along the banks of the nalla and create a green walkway, so that was the whole concept. So, you can actually create a an almost 12 kilometer long into 2 green walkways if you are treating the water and letting it flow into it.

So, this is probably how we thought. So, you have these multiple inlets into this schematic thing multiple inlet us into the nalla and this is probably the dry flow of the nalla, but you still have space on both sides to actually treat it. But the issue is that very often where your waste water is discharged you may not have space to actually put up your treatment system. So, we designed something. So, this is a schematic section. So, what we said is that let us fence off the sides, let us put the treatment systems on the side of the nalla.

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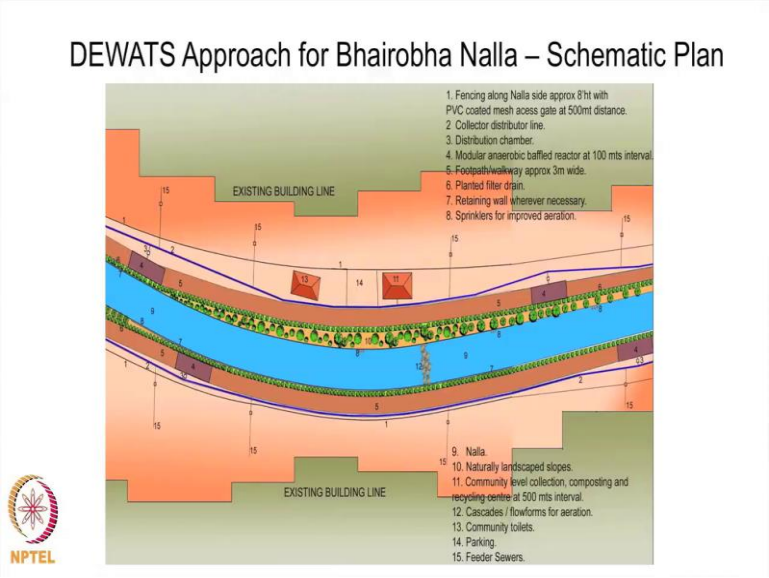

We have, so we have the anaerobic systems below the walkways on both sides and then you have the planted gravel filters along the side of the nalla. And you let the treated water into the nalla itself and you do a lot of aeration and flow forms and all that in the nalla so that, that actually helps in the further aeration of the system.

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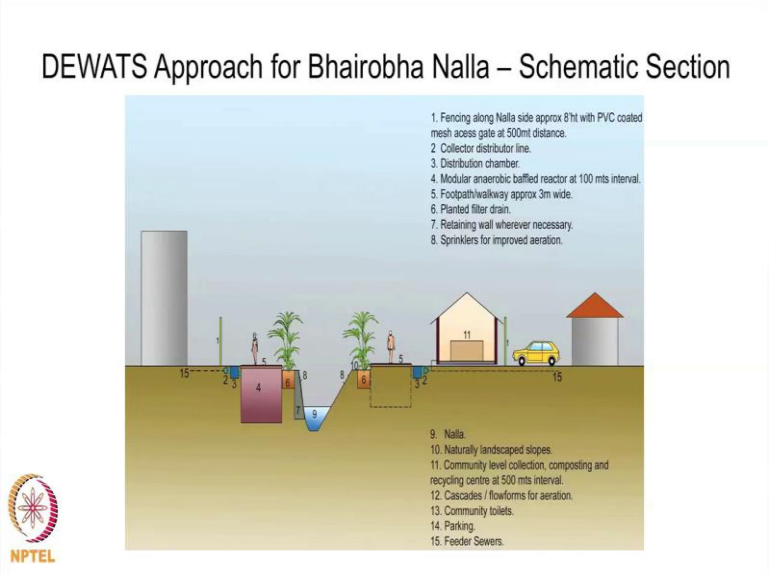

So, to take care of this issue that where your waste is waste water is generated you may not have land what we worked out is that you we suggested that we can run a long sewer all along the length of the nalla.

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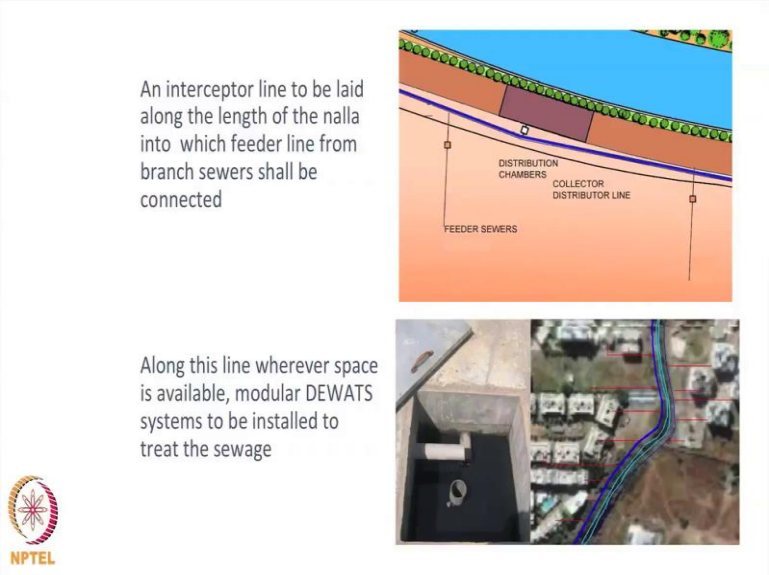

And at every point where the waste water comes and there is space available we do modular system of say 50 cubic meters or something like that we actually decided that 50 cubic meter was a good volume. So, you put a treatment units wherever you have space,

and you have a flow dividing systems such that only 50 cube cubic meters enters into the treatment system. The rest flows again through the main sewer.

The next area where you have land you put another 2 or 3 systems. So, wherever you have land available you put in treatment modules and let the water treated so, and flow back into the nalla.

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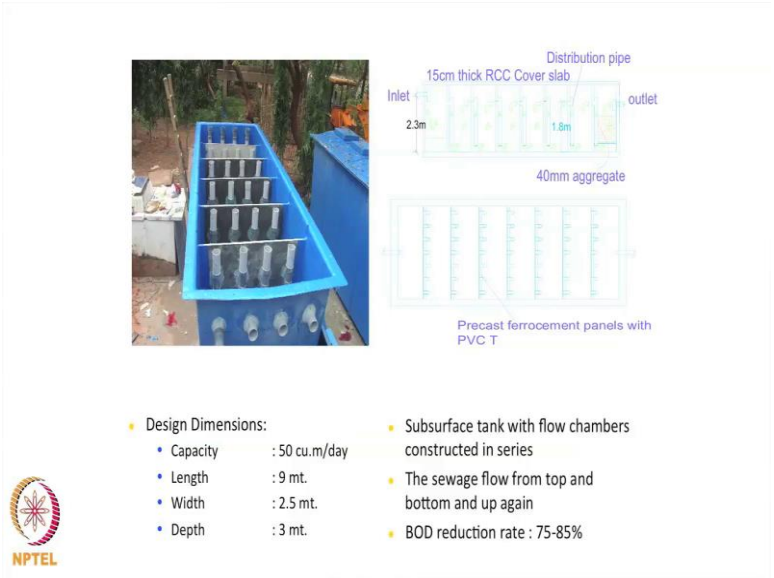

So, that was the, so this was all these details how we worked out and how you can actually control the flow into a treatment system.

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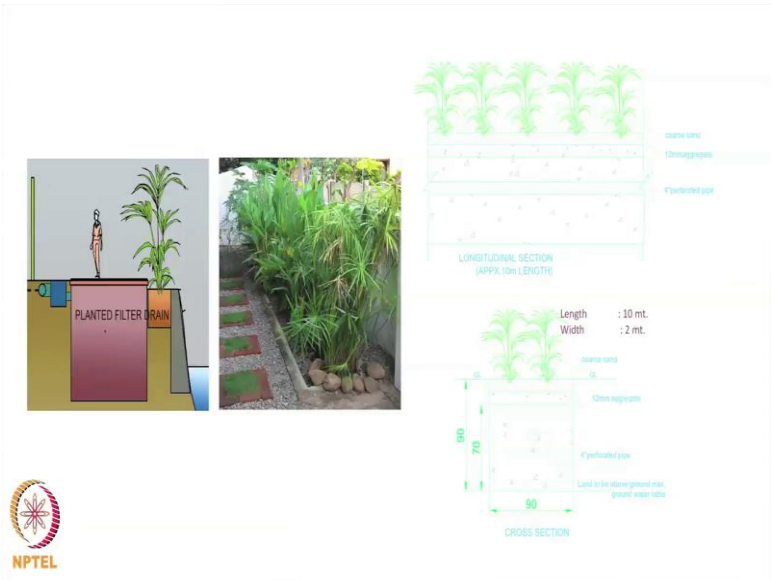

And we decided to put in this prefabricated baffled reactor units the detail for the planted gravel filters.

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And we also suggested that there could be lot of aeration inside the water as well as have these things like flow forms, so you kind of improve the flow of water into the nalla. So, this was actually taken very well, but of course, that is what we come to when you are actually dealing with large systems, the kind of processes through our government process to kind of get acceptance to actually experiment these systems is very very difficult. So, it was taken very very went through a lot of discussion, but it never kind of came out to an execution level.

Similarly, we also try to, but it gave it gave us a lot of insight into how you can actually tackle urban water bodies, it is not like, it is not an impossible task to resolve or something and we did the entire calculations everything and all was done at the point also. Another opportunity was actually to try and work on a decentralized approach to the entire sewage and waste water treatment system of a small town.

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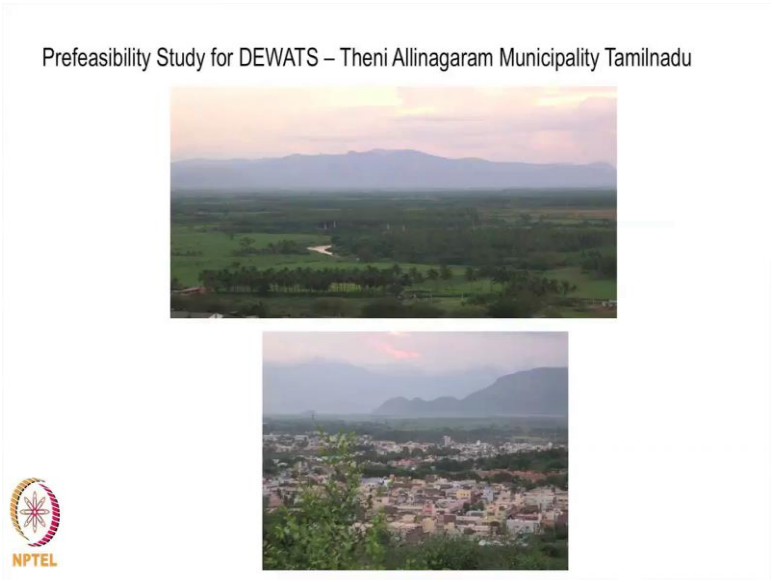

So, this is actually small town called Theni which is in Tamilnadu. It is beautiful small pictures of town about 1 lakh population.

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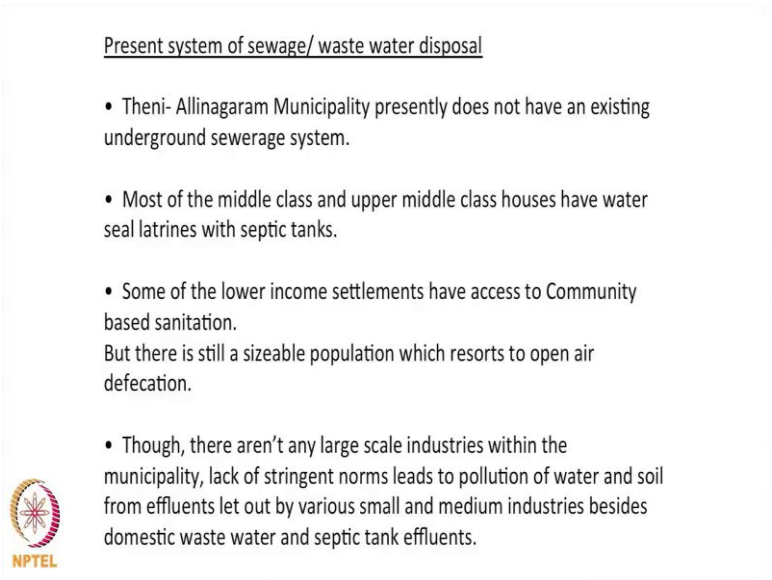

They of course, did not have any existing underground sewage system. So, most of the, as I said most of the middle class and upper middle class also had septic tanks, but some of the smaller economically weaker sections had community level sanitation, but even that was not very effective. There were not too many industries, but whatever was there also was let off to the water body.

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So, eventually, so this is the kind of scene I think I do not have to go into it, typical scene that you find in any of our small and big towns.

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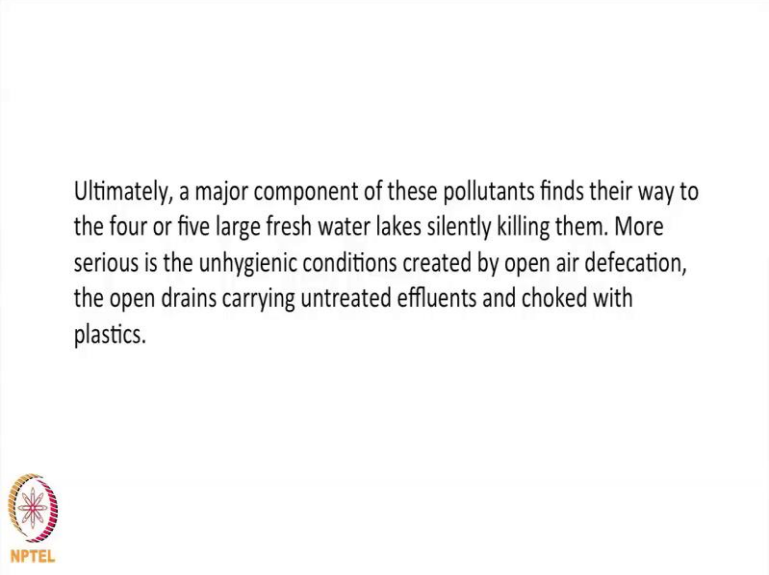

And eventually, Theni had some 3 or 4 large beautiful lakes, with the water found its way to these lakes and the lakes were beginning to die actually.

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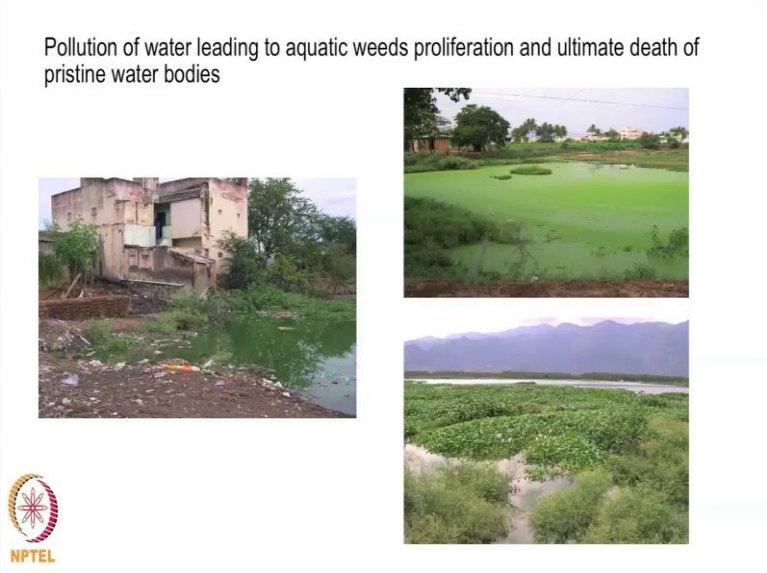

So, that is when they decided that they wanted to set up a some kind of a sewage treatment facility.

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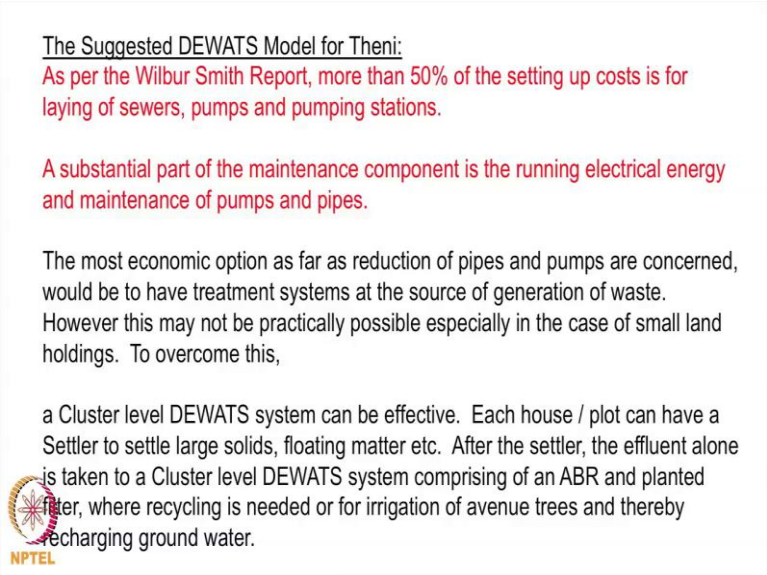

So, they actually had got Wilbur Smith to make a big detail feasibility study for the sewage system and all that and they came up with this understanding that almost 50-60 percentage of the whole cost was actually going into running these sewers, which was a huge amount for a small town like Theni. Plus the fact that they wanted at both 7 acres or something of land in the outskirts to set up the sewage treatment plant which the local

farmers made a big hue and cry as never like stuck on what to do. So, what we suggested on the other hand is that we suggested the same thing.

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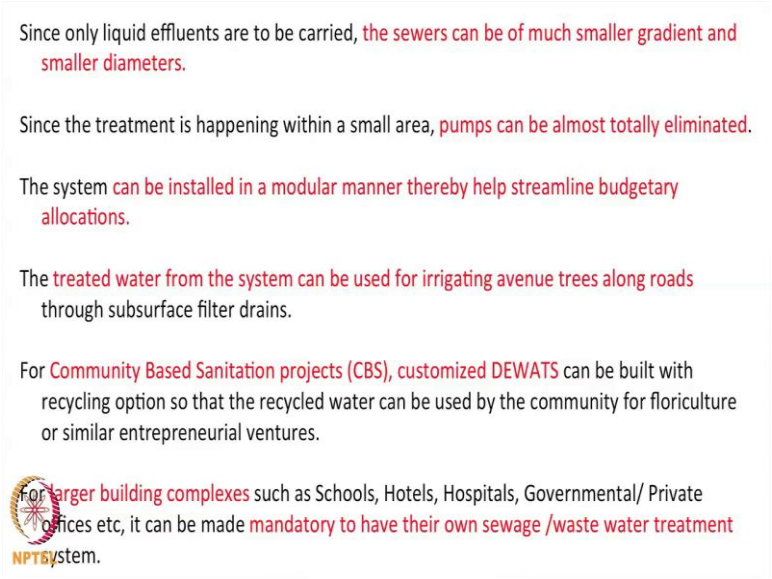

So, we suggested that let there be as we said and as we did in the smaller communities, we suggested that there can be house hold level small septic tanks or settlers and you can actually; Theni the advantage was that the water table is not very high there was some amount of gradient. So, it was probably a softer challenge for us to work with. So, we said that then let there will be small diameter, so as so you know when you have settler you are piping only your effluent.

So, you can use smaller diameter pipes, more shallow gradients and then you take it to a cluster level and you have the treatment systems and after treatment you can actually reuse it for watering your avenue trees or plants or even parks and all that. For community based sanitation system we said we can actually do the toilets and have their own treatment systems. Larger building complexes we suggested that make it mandatory through rules that they set up their own treatment systems to have it. And we also worked out the methodology on how these things can be worked out.

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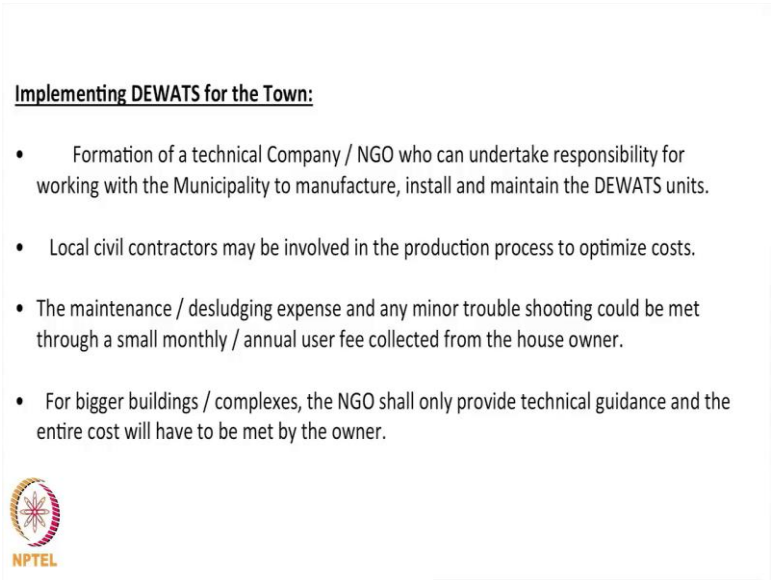

So, we said that actually there can be a company or an NGO can be formed who can take the reasonability of working with the municipality to actually install and maintain these DEWATS units, to involve local civil contractors to actually make the production. And then the only systems that these the town will have to take care of would be the desludging part of it. As I said to have the have a Faecal Sludge Management Unit and do the desludging once in 2 or 3 years might be the responsibility of the municipality.

Again, this was, this went through a lot of discussions and debates, and it even went up to the Tamilnadu water and sewerage board on whether it can be tried out and all that, but the biggest challenge right now in our country on doing anything at a city level is that we are still stuck with a knowledge which is like may be from the pre-independence time.

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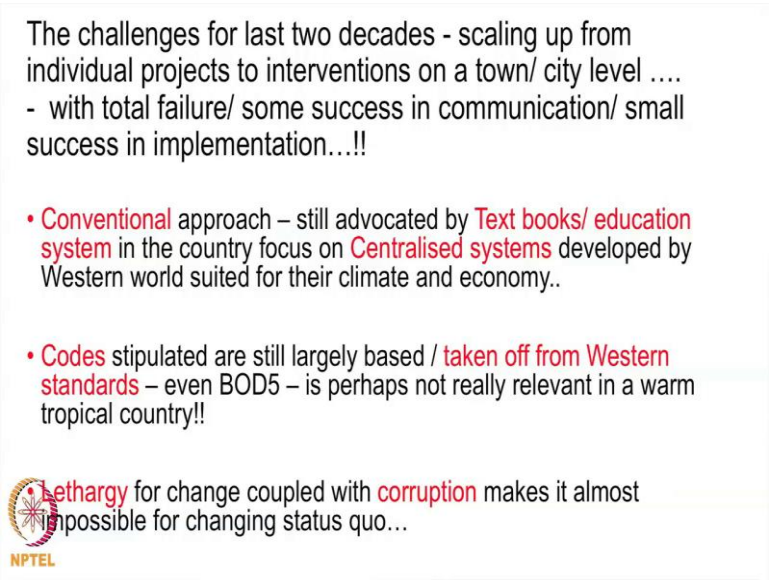

So, as we all as you all also know that what we are learning and what all the decision makers are learnt are still the knowledge of the rest were going for centralized system and all that. So, when we talk about decentralized and having to desludge and all that it faces a lot of opposition.

The other thing is that our codes are still bound by all these again the western standards, like if you are even looking at something like BOD 5 and all that they were actually developed by the British for their climatic conditions and their waste quantity and all those I mean basically BOD 5 was developed in UK considering as a time that the waste water took for the for it to actually reach a sea in their, their climatic condition and they kind of distance which probably is not relevant to our conditions; so, when we. So, these kind of things unless they change, it is kind of very difficult to kind of make any headway.

And then of course, you have when you are working with the government departments you understand that it is very very difficult to actually move on things to kind of get that decision make and nobody wants to kind of change the status quo. So, these are the kind of things that we have also been battling with. But at the same time as I said initially, right now there is a lot of policy changes that is being happened, there are lot of thrust that is going into improving urban sanitation infrastructure particularly.

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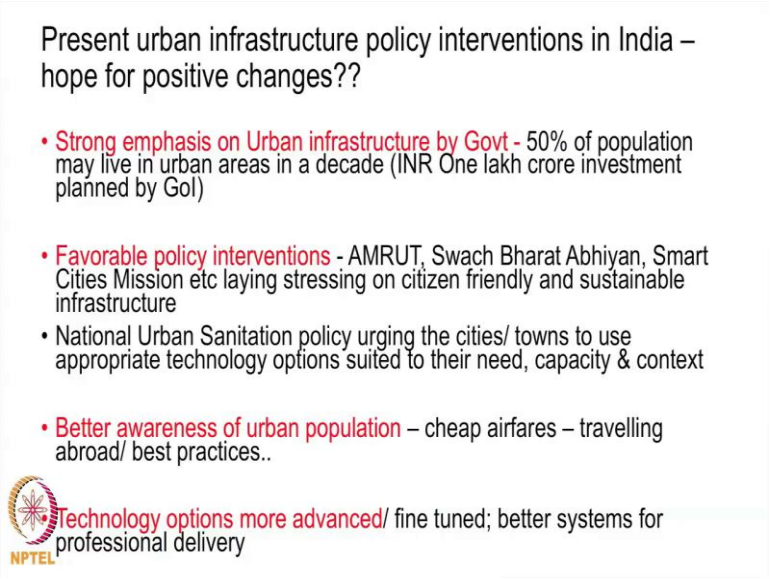

There are projects like Amrut and Swach Bharat Abhiyan and the smart cities missions etcetera, which are actually stressing on citizen friendly and sustainable infrastructure. There is a national urban sanitation policies which is actually urging cities and towns to use appropriate technology options as per their needs and all that not necessarily having to go to large centralized systems alone.

We also have the change happening that the our population is probably much more the awareness is also changing, you have people who are travelling in different parts of the country, everyone has a aspiration to become like a Singapore or at least like a Srilanka for that matter. So, there is a push from the population also to make a change. And it is a fact that the technologies are also are improving every when what was probably 20 years back and there is lot of streamline.

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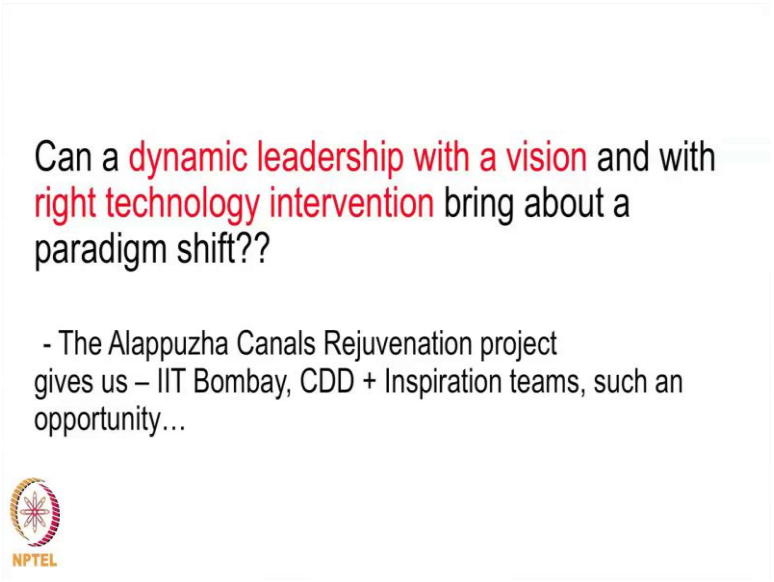

So, I conclude this part of the presentation. So, what coming to the Alappuzha intervention what we have been trying to do in Alleppey is that we were we have this opportunity where we had a very dynamic leadership. So, as you know it is actually the present finance minister who himself has kind him spear headed the projects or there is a dynamic leadership happening and there is this team of us who have been working.

So, we are just hoping with Alleppey that if we can bring the paradigm shift into a public infrastructure project. So, that is kind of setting the background for Alleppey that is all.