Sustainable and Affordable Sanitation Solutions for Small Towns
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Lecture - 05
Context setting for the Alappuzha Project

The issues of sanitation Kerala gets reflected in Alleppy also one is the freely flowing black and grey water. Rampant pollution of water bodies, septage management by fly by night operator. So, all this gets a problem and what we need is a deeper awareness about these things and action to kind of take it forward.

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Coming back to Allepey there is anincreasing number of roads you know in the last 20-30 years the mode of transportation also changed. Earlier it is through small boats and big boats and you know and this was part of the larger Kuttanad ecosystem, but that is all changed over a period of time. So, roads began to be developed and these are the linear features you know. So, every canal became part of a road also. So, canals got encroached.

And then over a period of time you know the when there was no usage for this because Kerala water authority water came and because of that water, bathrooms could be built in houses; so then that use was gone. So, slowly the utility of the canals came down and

then this slowly became dumping ground of waste and one of the major utility of the canals is as drains.

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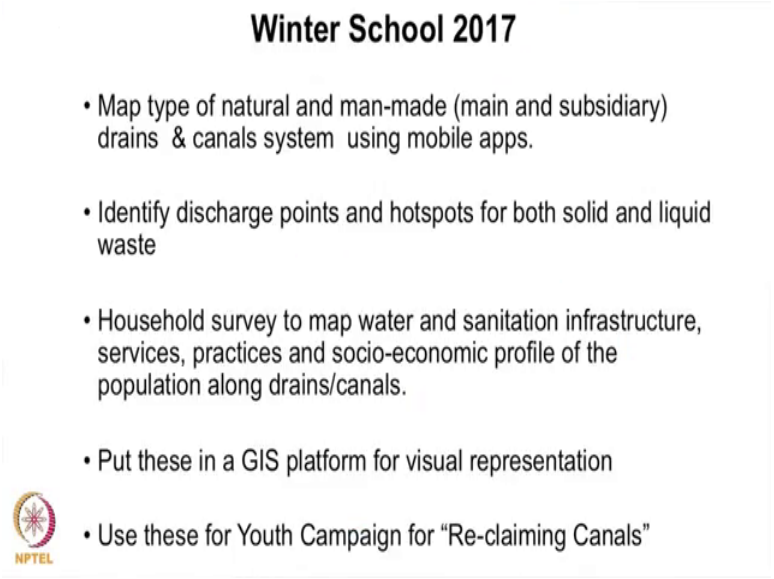

So, these wereour you know kind of major objectives of our winter school, one map the natural and man made drains and canal systems using mobile apps. Identify discharge points and hotspots for both solid and liquid waste management, household survey to understand the sanitation infrastructure, services, practices and socio economic profile of the households, put this in a GIS platform and use this for the youth campaign reclaiming of our canal that is the canalpy. So, these were the five major objectives.

So, from Alibaug and Nedumangad what we found was we develop these mobile apps in the during the winter schoolthis is the ODK collect which will be introduced to you today. So, we have another one called OSM tracker. So, you go with your mobile phone you can track the entire linear kind of a canal and then you have can have point source of information also like if there is a waste dump there, you can take a photograph and you can note it down also.

And this ODK collect also you can actually kind of you know do it in your mobile phone the survey, then the you do not need any data entry it can be directly you know kind of imported to excel and you can have the analysis done and this can be you know kind of put into a GIS platform you can visualize it also. So, this will be one of the major take away for you this is the skills that you will learn from this winter school. And in summer

school I told you we actually scaled it up to 300 students, we map the entire stretch I am not going into the details of that because we will be kind of putting it.

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So, these are the kind of principles that we work on; one is the principle of subsidiarity; that means, whatever can be done at the lowest level should be done there at the individual level, at the household level do it there. Rest of it can come to community and only the rest can go to the town level. So, that is the principle of subsidiarity.

Second is the noninvasive technology options. Especially less energy intensive, less capital intensive you know kind of technology options third is local capacity building. For even for planning, for technology operations, for institution building all this can be have local capacity building and then local institution building for management. You know you do not need other external institutions like government institutions or market institutions to come into that, can peoples institutions you know kind of manage this things.

Social regulation and accountability you know one is state regulation by policing, you have environmental protection act which tells you all water body should not be polluted, but why is being polluted? Because regulation by policing is very difficult, but if we kind of control each other that is social regulation. For example, groundwater regulation India has work because of this. You know many of the you must have heard about Anna Hazare you know the Ralegan siddhi experiment, you know people came together and

decided that you will you know kind you wont kind of not dig tube wells you wont cultivate sugarcane like you know water guzzling crops and that is how groundwater could be regulated.

So, people have to come together. So, people in the canals and come together and tell that you know. So, in our pilot canal we found that there are forty nine households which are very marginal households, ex manual scavengers they were kind of freely polluting it because they do not have the wherewithal to not do that. So, now, we have given them a system, then we found that there are three other you know big polluters two of them were catering units. So, one of them was given notice by our you know environmental engineer, who is a friend of ours who works with us a lot the pollution control board engineer Mr Biju, you may meet him also.

So, they shifted it to a next town or a kind of more of village kind of a thing, where you know there is no such kind of a canal polluting kind of an environment there and the other one is still we are in the process of doing it. So, there are only three major sources of pollution to that lake and there are 800 households there. So, how can you kind of regulate the minority major polluters by the larger community that is where the institution building becomes and social regulation become.

And the last one is can you incentivize these things like you know whatever interventions that you have like biogas bins or you know plastic collection and all this, can you incentivized it with jobs. So, that people who want to continue this jobs we will make ensure that this will continue, so green jobs.

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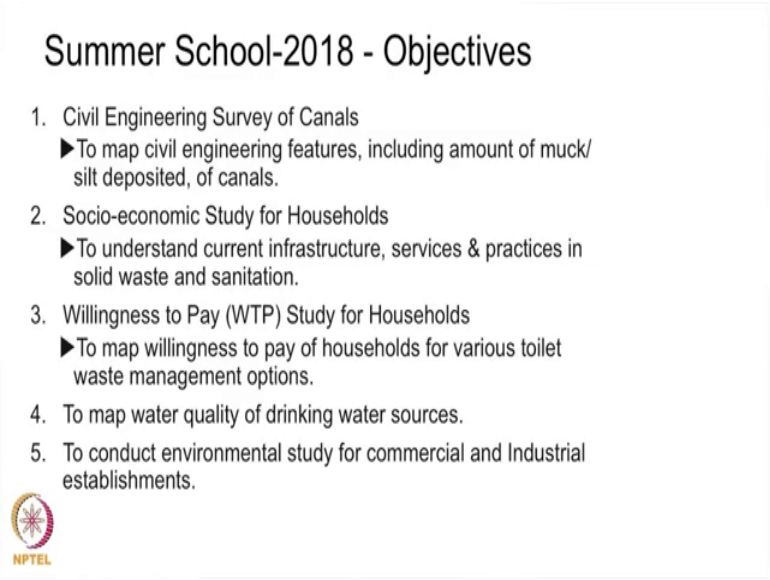

So, these were the aspects we did a complete civil engineering survey, we did a socio-economic study, we did a willingness to pay study and water quality studies and the last is a big establishments like you know commercial establishments and industries what are the kinds of. So, these are the five major elements. So, we had something like 300 students. So, 60 of them could kind of you know look at each of these issues.

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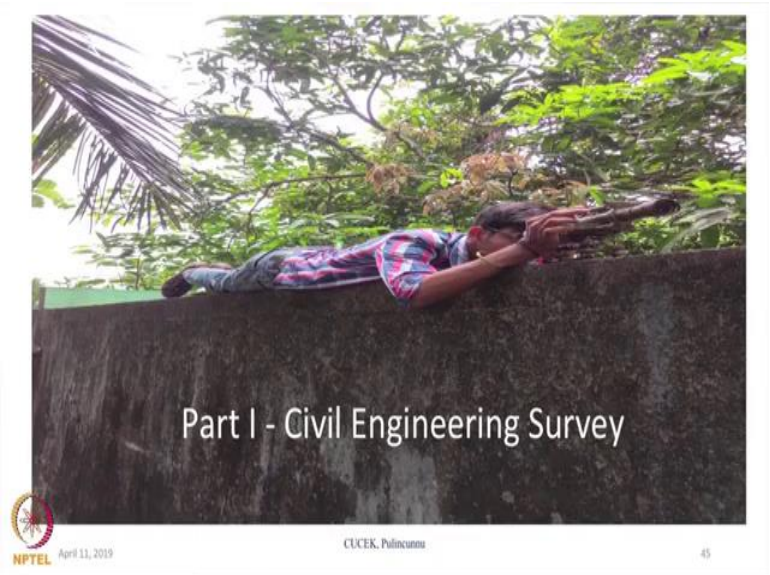

This is the level of commitment that we had and so, drain mapping was the first one I told you.

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So, you go with the tracker and then these are point source of pollution which we can mark we can take a photograph also and upload it.

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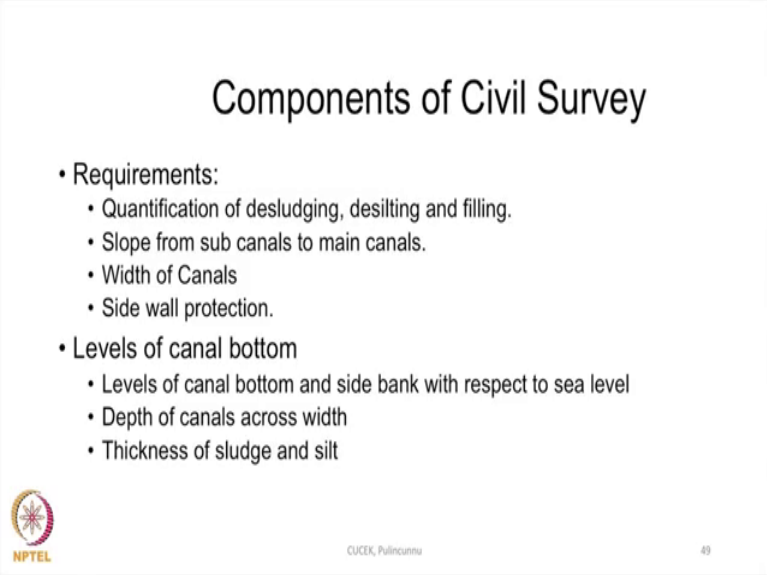

So, this is the first element. Components of civil survey, quantity ofdesludging, slope, width of the canal, side wall protection, bottom depth of canals thick of sludge.

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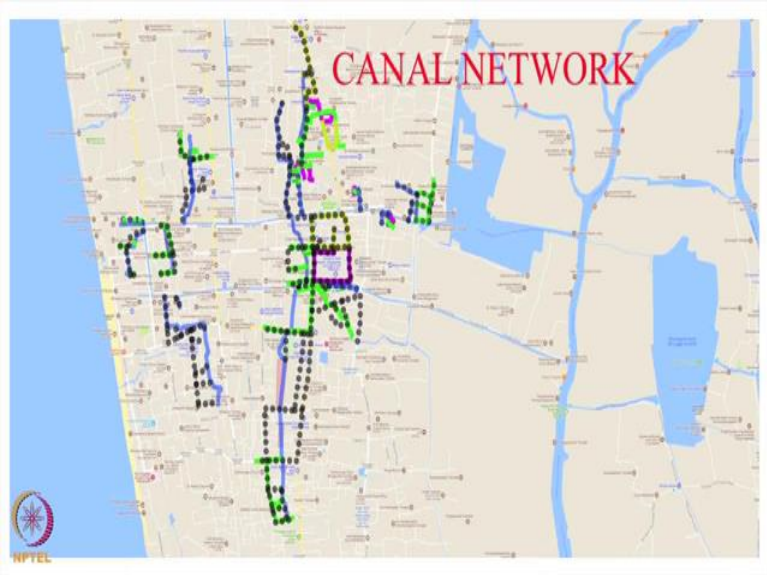

So, these are the various canals that we have marked.

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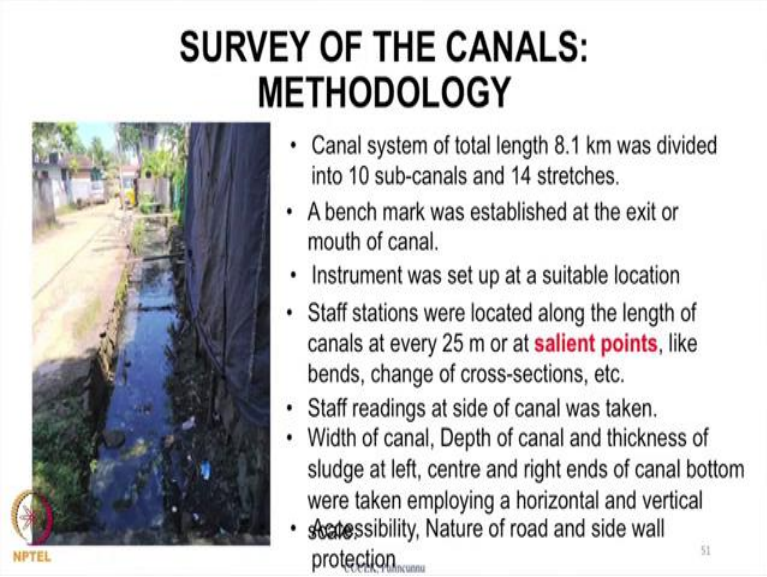

Basically civil engineering methodology with staff readings and you know that you know that the basic civil engineering survey we did.

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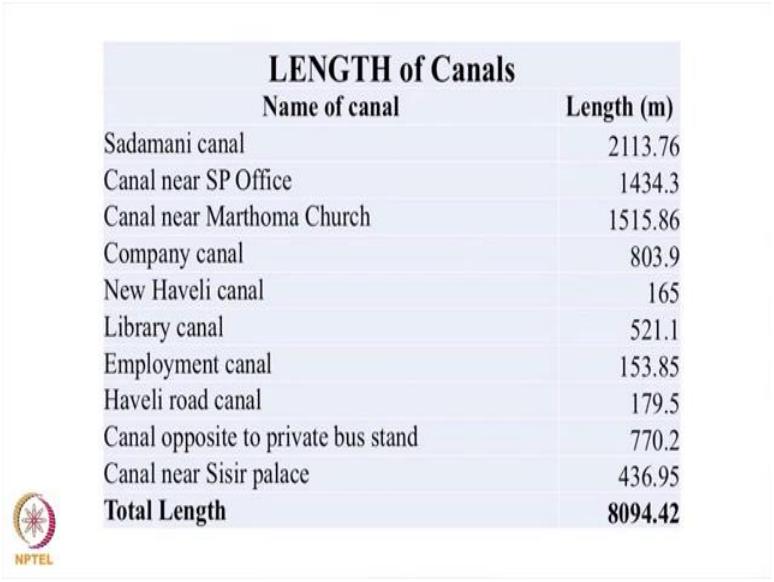

This is the result length of the canal varies from 2.1 kilometers to 165 meters. So, our pilot canal is this one which is actually second biggest canal 1.5 kilometers what you will be doing is the biggest canal that is 2.1 kilometer Sadamani there is the canal that you are going to do.

Volume of sludge also we have calculated and you know sidewall protection needed also we have calculated you know actually what does this bring? This brings in a lot of transparency and the government has also kind of the irrigation department also has tried to do this. When you when they do it becomes ten times more costly. That is the contractor engineer nexus.

Here engineering students you know kind of proved that they can do the design and the irrigation give department gave them a software which can then give the kind of estimates also. So, we proved that even engineers can, engineering students can do this up to the estimates. So, two things, one better analysis at the local level otherwise you know the contractors people will not do such good analysis to kind of arrive at this, second thing is transparency of governance.

Now, they can actually kind of ask the irrigation department, ask the municipality this is not it we know what is the cost of it. Which can be which can actually bring in. So, if next year also the same students the same college sends these students ask this questions, over a period of 3-4 years governance should improve isnt it.

Student: Hm.

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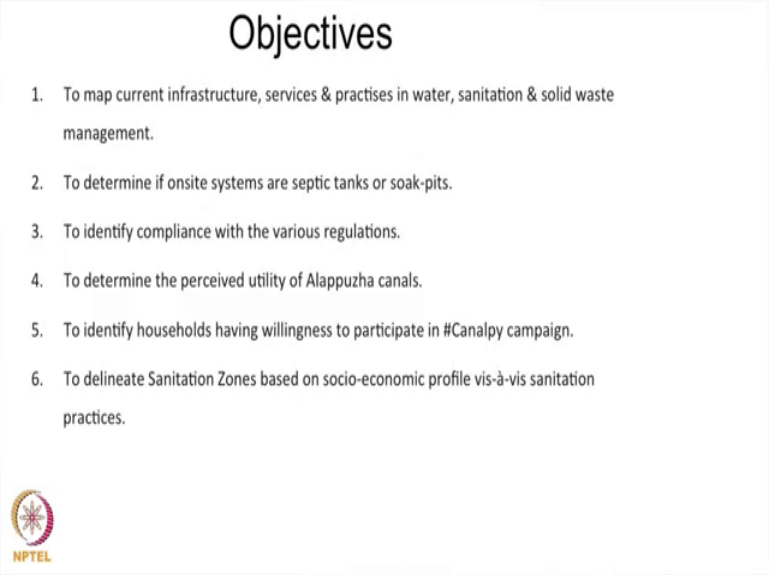

So, that is our major strategy that we are kind of and socioeconomic survey is all these you will be kind of dealing with this. So, I am not going to do this.

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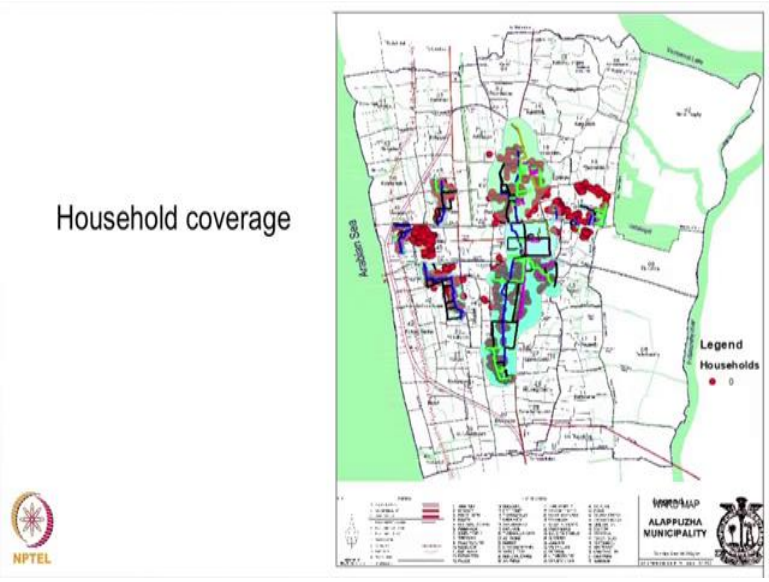

We can actually get such kind of maps out of this, findings are not very very important you know because these are all kind of findings that you know one of the major things is that you know 83 percent of the people thought that they had septic tanks and then we

trained them how to kind of you know identify whether its a septic tank or not, then we found that that is that is only 32 percent which are septic tanks.

Another major thing was you know distance. So, 750 water samples were collected by our students which is a very transparent exercise, there is a hydrogen sulphide vial you know into which this water can be poured and we kept it in their own households. So, after 2 days when you go back if it turns black; that means, there is e coli contamination bacterial contamination which is actually a sign of fecal contamination.

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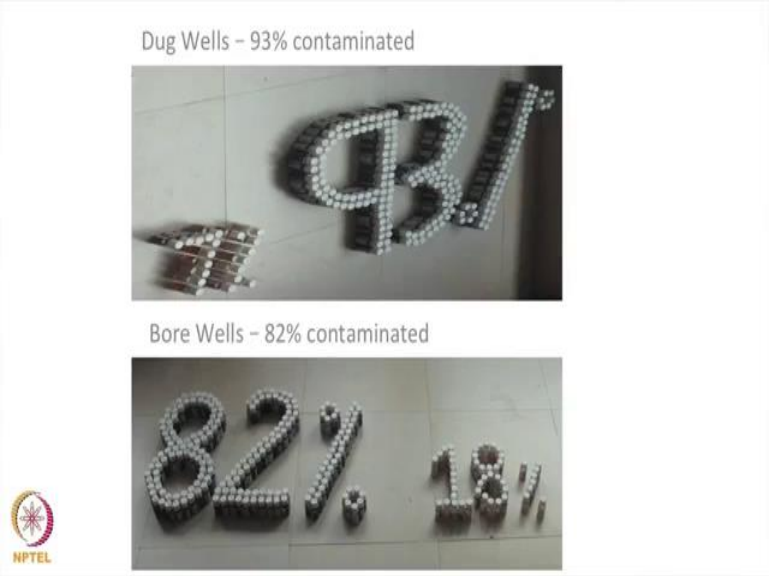

So; that means, toilet and this water source are connected. So, 93 percent of the wells had e coli in Alleppey and then 82 percent of the shallow tube wells, and 39 percent of the Kerala water authority supplied water also had.

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So, this means its serious, that you know the that water quality is into serious proportions. So, this is one of the major findings that came out .Another thing was you know average distance between the septic tanks and the wells in your own plot.

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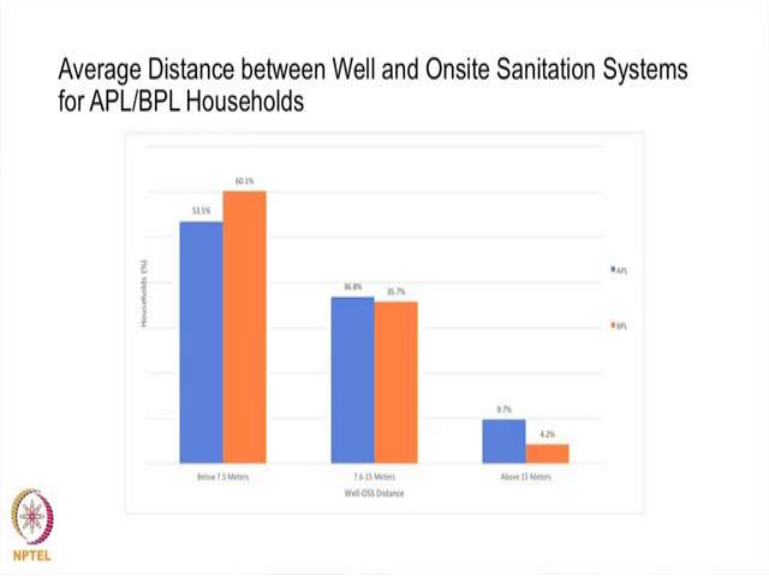

What municipality has given is 7.5 meters and then we found that you know almost 53 percent of the APL household that is above poverty line and 60 percent of the BPL household below poverty households it is actually you know below 7.5 meter so; that means, actually very serious issue.

And then this is 7.5 to 15 meters is also that because below 15 metres is actually dangerous in a sandy terrain. So, this is also another thing that kind of came out. Another thing that we did not questioned .These are all kind of scope of the you know GIS that we are using, you know people actually, many of them segregate and people who are segregating many of them do it at the household level also as aerobic bins as biogas units and things like that the rest of it goes to public aerobic bins. So, we try to look at what is that average distance of this.

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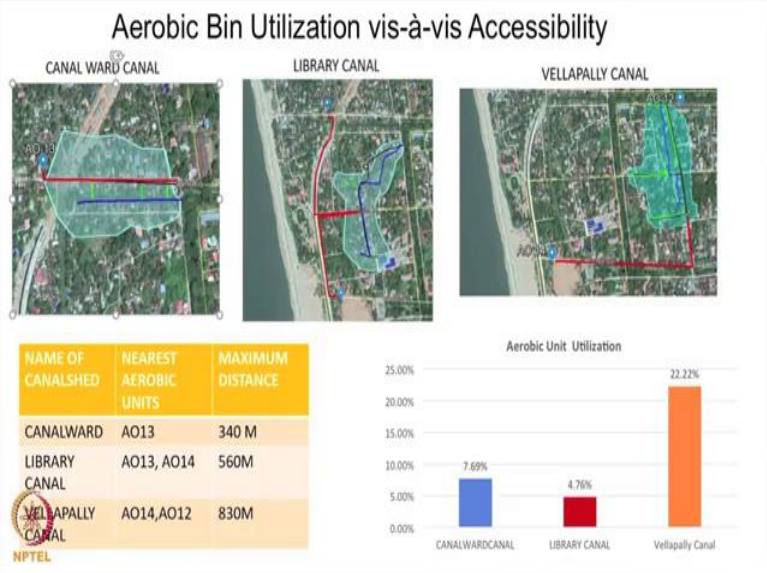

Then we found that actually its ok, 340 to 830 meters and now we can actually kind of plan better the distance you know can you reduce the kind of you know aerobic bins is one question that we are asking, then utilization is very small like 8 percent to 22 percent. So, another question is can we increase the kind of usage of this and kind of individual systems. So, this is the scope of our you know kind of study that we are going to you are also going to do all this.

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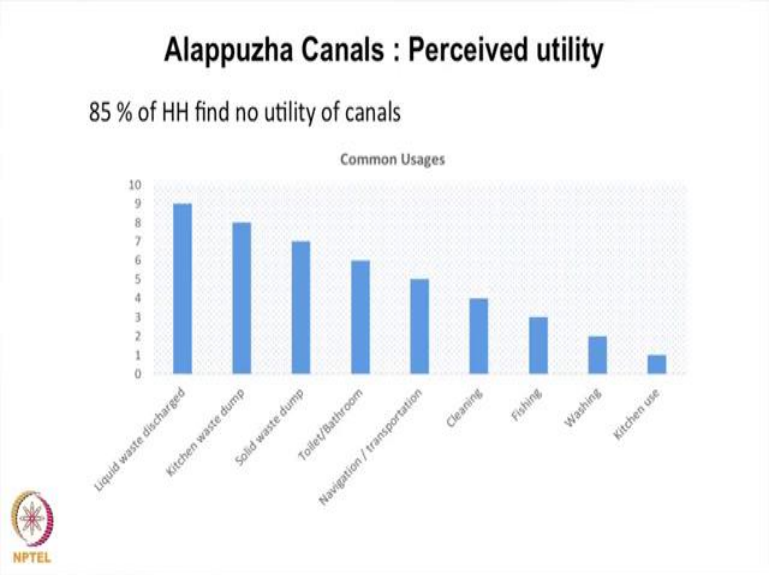

Very curious thing 85 percent of the households find no utility of the canals and the major utility of the canals is as waste dumps.

Student: Waste dumps.

Which is also kind of very curious understanding; where several recommendations which I am not going to environmental study of institutions commercial and industrial institution also were studied.

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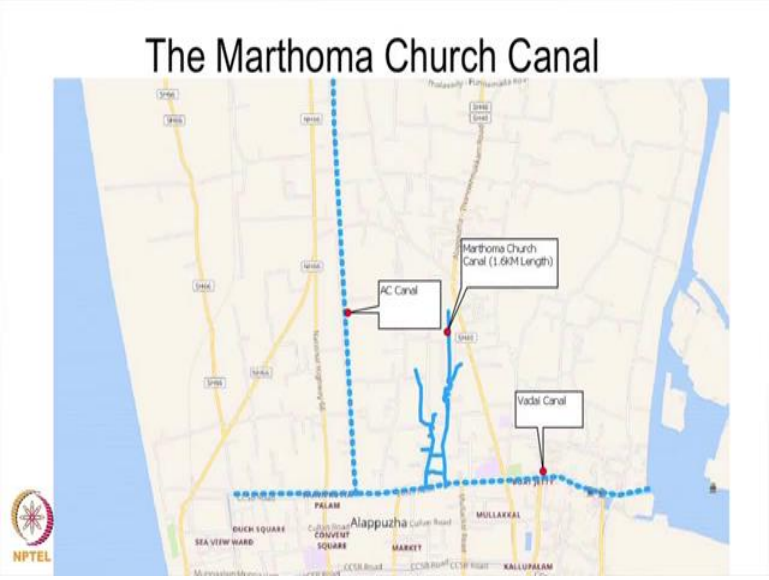

This is what you should be concentrating on pilot interventions in one canal we will be seeing all this. So, this is the canal which is 1.6 kilometers long, we wanted to kind of demonstrate that this is possible I told you there are there are three major interventions. So, this is what we did technological intervention says you know primary cleaning is done, then we found that actually 70 percent of that gets cleaned because aeration happens you know when the flow happens.

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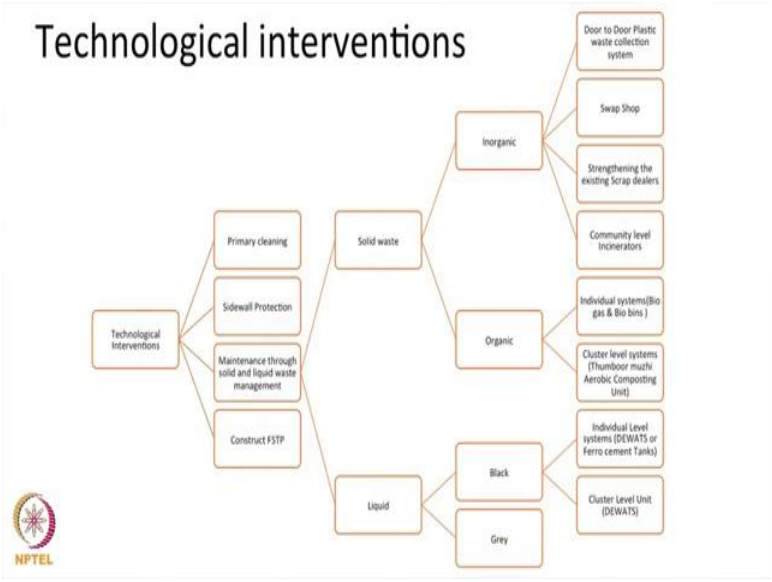

And then side wall protection maintenance through solid and liquid waste management construction of an FSTP which is actually on the, we are planning that. Solid waste management inorganic and organic- inorganic goes to door to door a plastic collection swap shops which can actually kind of get these things done, strengthening the existing scrap dealers because they have the existing chain. So, we should actually utilize them and then community level incinerators for you know, sanitary pads and things like that. Organic it goes to individual systems like biogas and bio bins in own houses, individual houses, cluster level systems like what we have see seen as the you know that Aerobic bin that I showed you.

liquid waste management- black water has to go into individual septic tanks - and cluster level units like dewats that that we will show you. Lata will be explaining you how they constructed this, flow measurements were done, waste water sampling was done and

then they arrived at a unit, you know, a cluster level unit that experience we will explain to you tomorrow.

Some of these scope you know. So, this is black water disposal methods in the pilot watershed you will see that you know leach pit means it is directly going into leach pit and then its polluting the groundwater.

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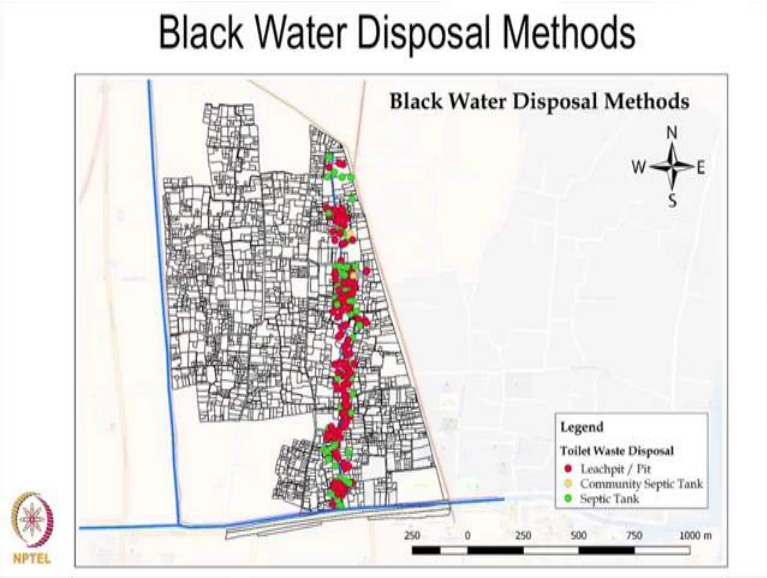

That is the red ones and green ones is when you have a septic tank and there is only one community septic tank that we are building. So, look at the observation, the observation is that majority of the toilets are opening up into as a leach pit; that means, our ground water is getting contaminated that is why 93 percent of the wells have e coli.

So, this is a visual representation when earlier I showed you as tables its not this impressive and this is actually both sides of the canal. So, we took two rows of the canal which actually showed why the canal is you know getting polluted. So, you will a kind of you know do the same exercise in this second canal.

Student: Households the households for the adjacent.

Yes two rows of households we took. Actually you know our civil engineers 19 of them, they are they are doing this survey on two rows of the households in even in your canal that you are going to do. So, they will have that data because that needs a bit more of you know plan of that and because we need to know what system has to be installed up, you

will be actually taking data from outside, but during compilation we will bring in all these data together.

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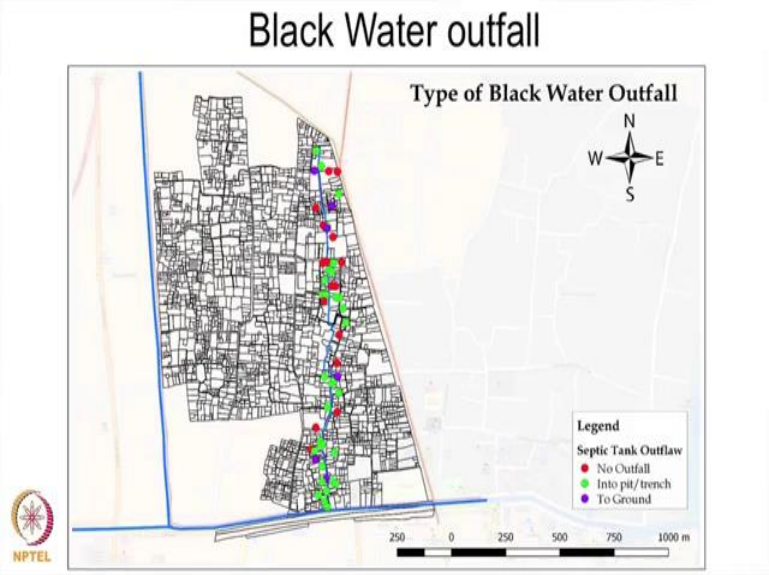

This is the a black water outfall you know who is actually you know this is no outfall is this is the outfall into the canal into. So, all these are kind of dangerous ways of you know bringing water out. .

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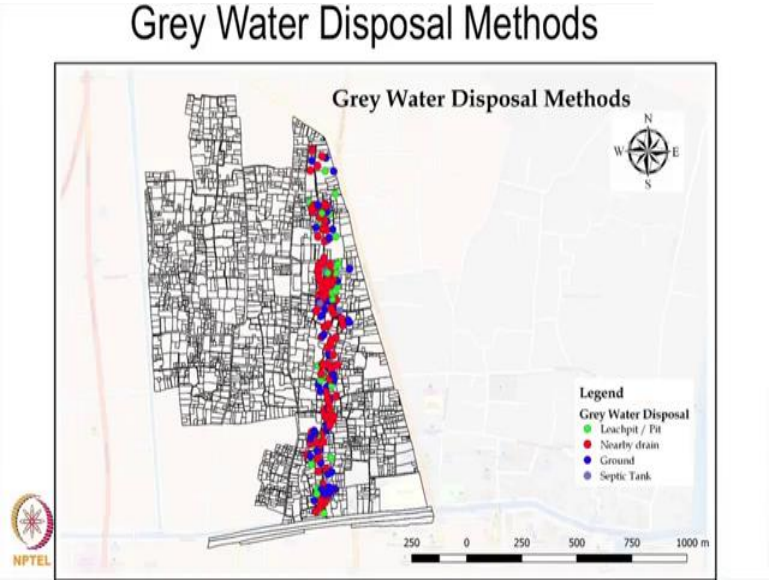

A grey water disposal methods this is also you know directly to the drain is the red the red ones are and then blue are directly to the ground also that also will ultimately pollute the kind of ground water. So, majority of the systems are not safely disposed.

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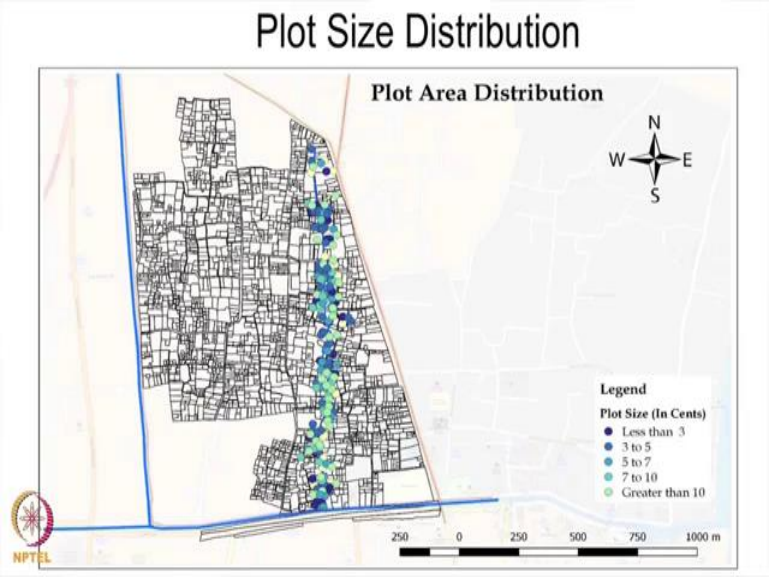

This is the plot area size where we say that you know less than 3 cents is the kind of the dark ones and you know. So, the lighter ones are only very few in a way. So, you know this is actually again it is social you know, are they better off households, how are they kind of disposing their waste and both these should have very different types of interventions because if it is a BPL household we can give them a subsidy; so is for that. So, merging these you know will give us some kind of understanding for interventions what kind of interventions do we need.

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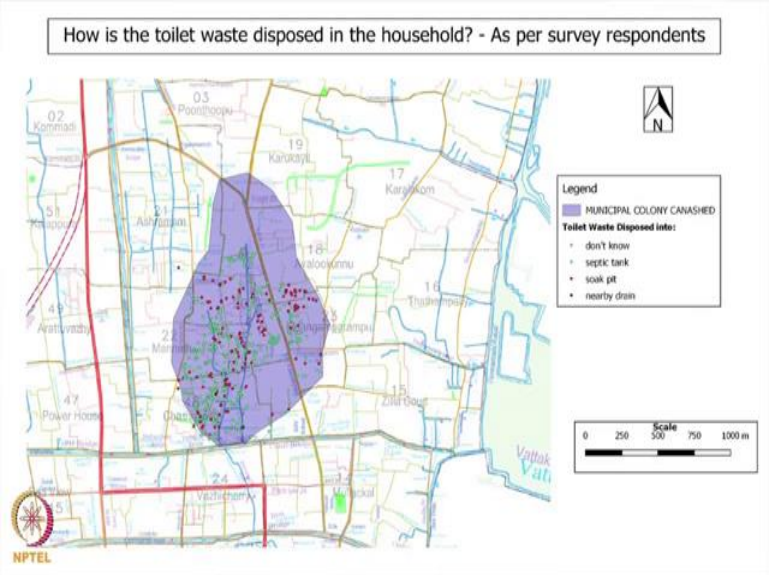

So, this is a heat map where we. So, that in the toilet waste is disposed into a septic tank and a soak pit. So, majority of them are soak pits. So, ones over a period of time in the next 3-4 months if we kind of make this another map, all the red dots will come down isn't it, that is called a heat map. So, this can be a community monitoring tool. So, if after 6 months after our intervention we again geo tag because these are all geo tagged households.

Since you are going with your mobile app you know each of the households is geo tagged. So, if you go to the same household again it will become green. So, this exercise becomes a heat map, becomes an exercise of community monitoring also. This is another serious thing , unscientific ways of disposal, majority of them are red. So, our exercise over a period of time should be to make it all into green. Solid waste management this is the kind of cluster level aerobic units that you have.

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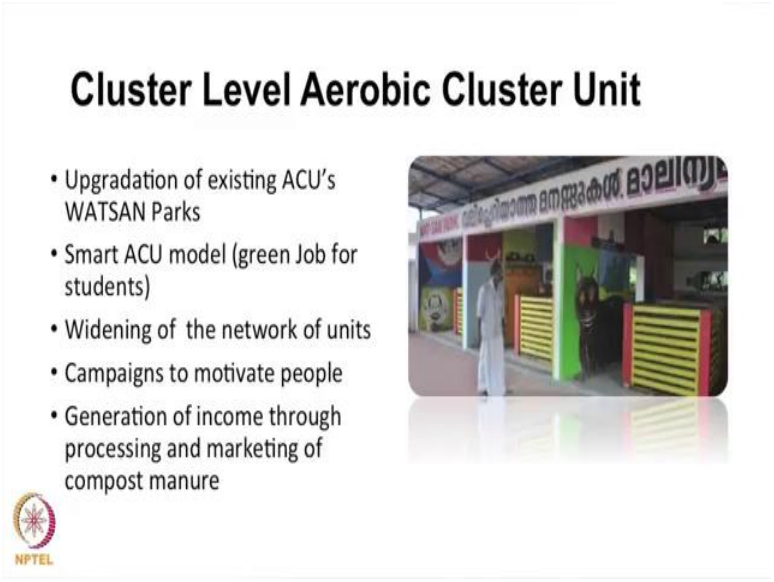

Where you will be seeing this you will be kind of you know we will get more interesting you know kind of ideas about this in the next solid waste management session that we have.

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This is the biogas bins.

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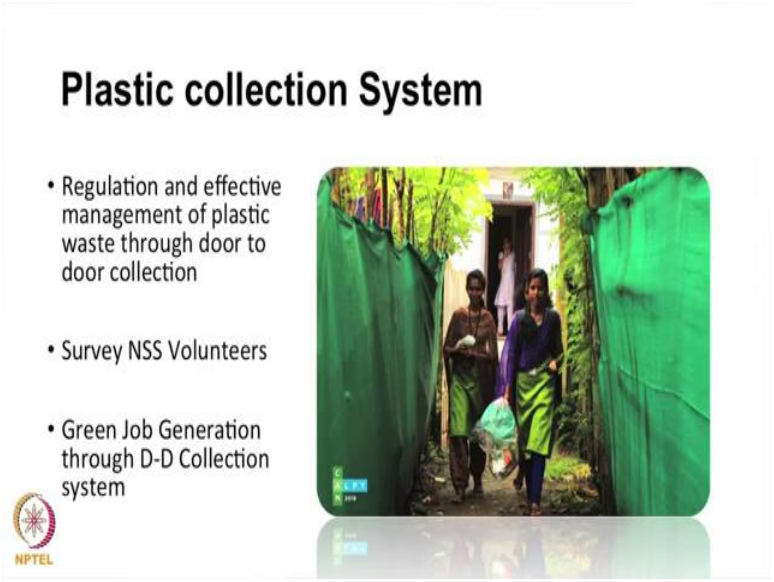

And plastic collection what we are doing, she is collecting it you know we gave them bags for a month 2 weeks and we have collected that and now we know one we know which brands are actually the kind of most polluting. Second we know what kinds of plastics are kind of happening and which one can go into the market like for example, our the milk one you know that is a huge market actually. So, plastics are divided into kind of some is I think Sridhar will be explaining that today you know how this happens.

So, for that we did this a kind of you know a collection two times. So, we have a fairly good idea of you know what is a type of plastics and what could be the market of that and the quantity of that across various class of households. So, we will be planning this monthly collection of this.

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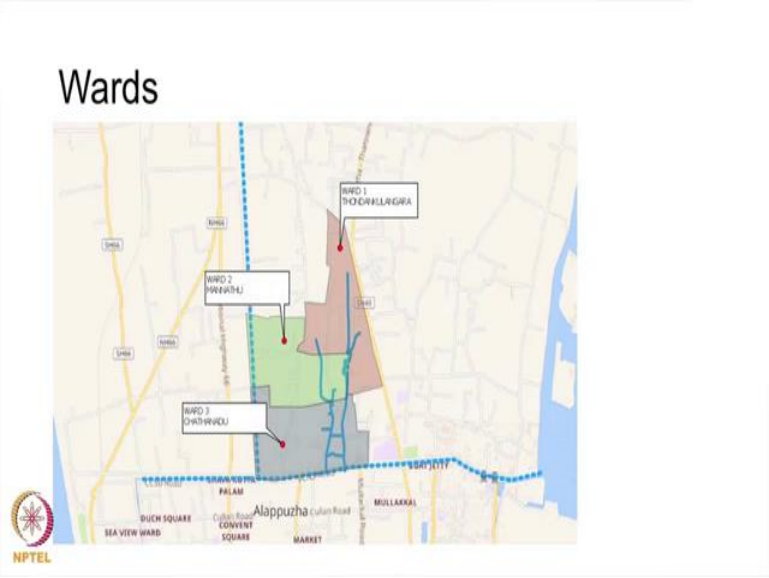

So, these are the wards, the three wards that are there in the pilot area we have divided them into polygons and then now we are kind of.

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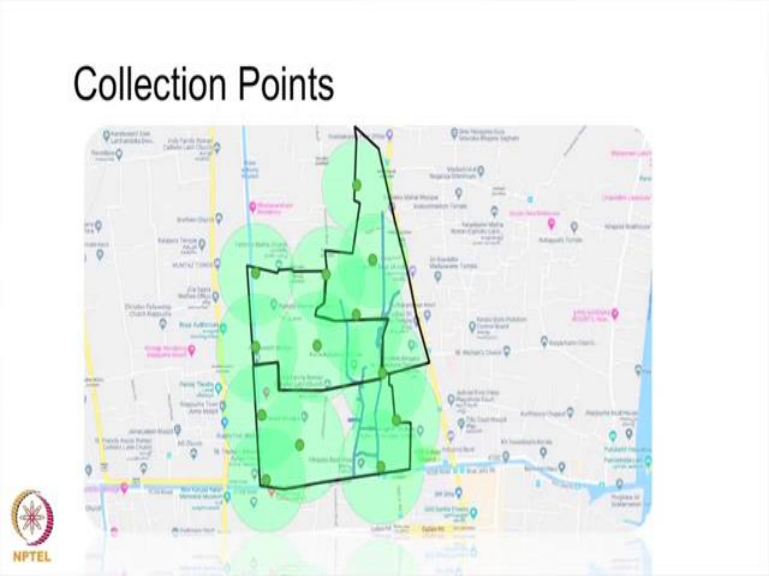

These are the points from which plastic will be collected in the future, this maybe a small shop or a kind of anganwadi or something like that which is a. So, that you know people does not have to walk more than 80 to 100 meters to give this which is which becomes an incentive for people to kind of you know give that which we have to expand it to all the wards now. This is the aerobic bins which are there you know, this is the distance of

the nearest aerobic bin from various houses. So, we have to make it all light, now we can see all the aerobic bins are outside our study area. So, if you bring in new aerobic bins, where will you be placing it and how much of this can you may become light is one question that we can ask. this is the segregation.

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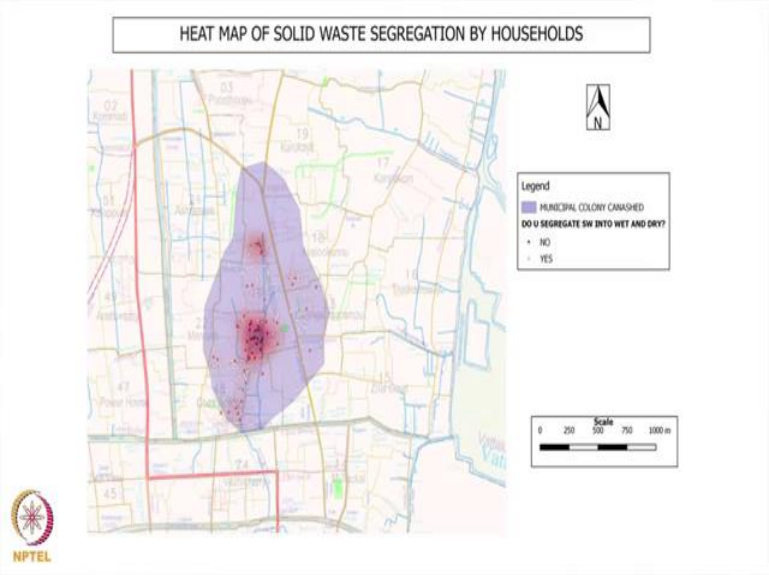

Now, we know this in this cluster there is no segregation happening at all. So, in this entire ward we can see where we should concentrate on, in our future interventions to make segregation better. So, this visual tool can be very interesting; one for identifying, second as a heat map to kind of monitoring tool. This is a pad disposal…, grids collection points... Then green income generation, what it can go into; these are the canal shedcommittees which we are planning.

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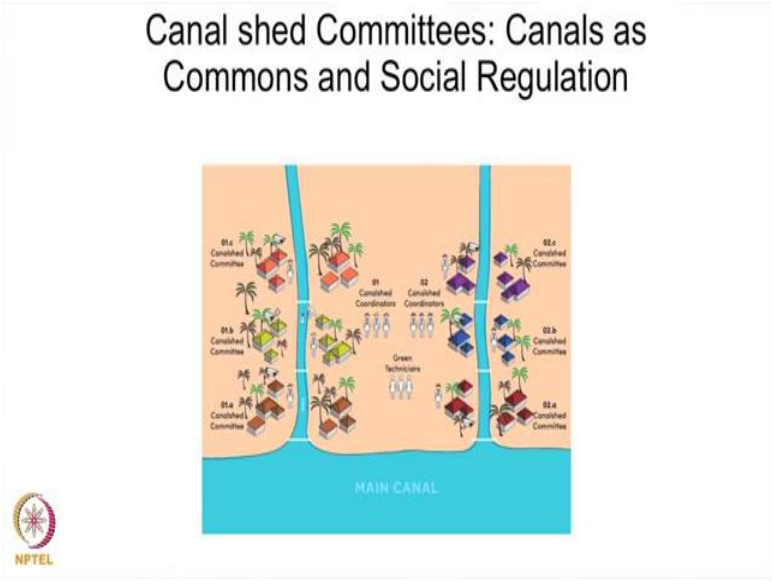

You know, so every 250 meters of the canal there will be a committee the and then there will be 3 people who are going to kind of work in this committees which will have a larger committee. So, that is an institution building for social regulation that is happening, we have already started the institution building.

Fecal sludge management you know we will have a two sessions on fecal sludge management, how is it presently done and how it could be done this is called the honey suckers.

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You know earlier you should it used to be manual scavenging which is actually a very inhuman practice. So, this is a kind of heavy suction, it will come to this and then there should be a fecal sludge treatment unit which can safely. So, you shit it we take it satisfaction guaranteed.

Student: Hm.

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This is the first regional waste FSTP which is being done Devanahalli near Bangalore airport. So, we took all the counselors to there and now they are convinced about it. So, they have identified a plot of land also for that and from the AMRUT project they have put in you know kind of funds also into it. So, hopefully within kind of one year we will have an FSTP in Alleppey. Canalpy I think you will hear more about that how these initiative is coming up.

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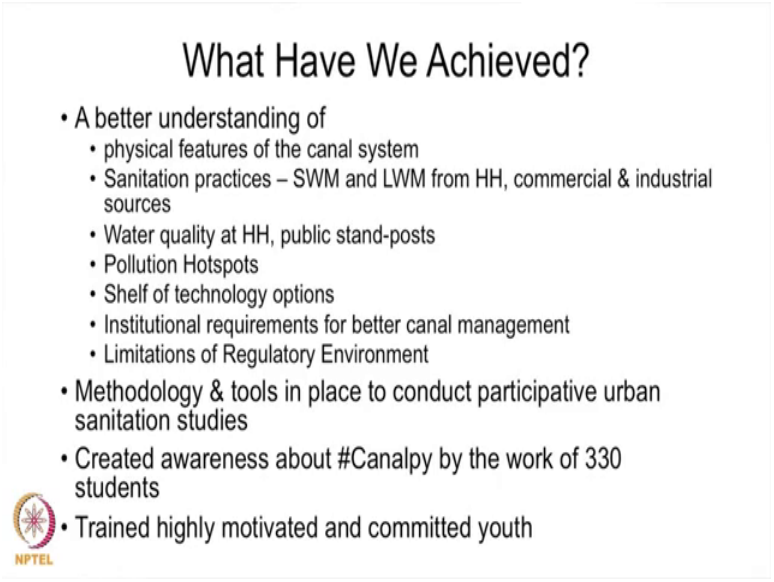

So, these are our conclusions what have we achieved, a better understanding of the physical system, sanitation practices, water quality, pollution hotspots, shelf of technology options, institutional requirements for better management, limitations of the regulatory environment. For example, is it pollution control board, is it municipality or is it water authority we are trying to figure out you know what is the regulator.

Methodology in tools in place to conduct participatory urban sanitation studies, created awareness about canalpy by the work of 330 students in our summer school, train highly motivated and committed youth.

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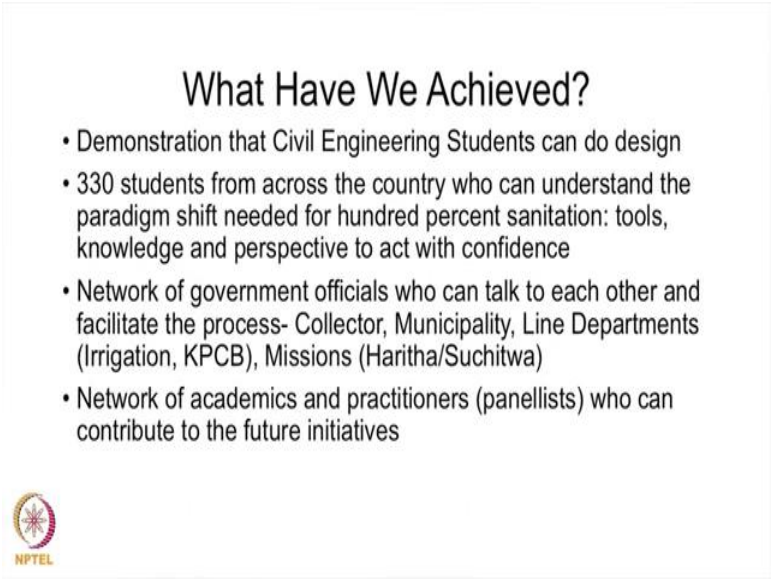

Demonstration by civil engineering students can do design and you know we have a network of government officials now, from right from collector to kind of the institutions that deal with sanitation.

A network of academics, here last time we had 40 academics from different places who came and did the classes, we absorbed all their knowledge, now we are kind of doing it as a practice this time this time is much more hands on. So, you will benefit by that.

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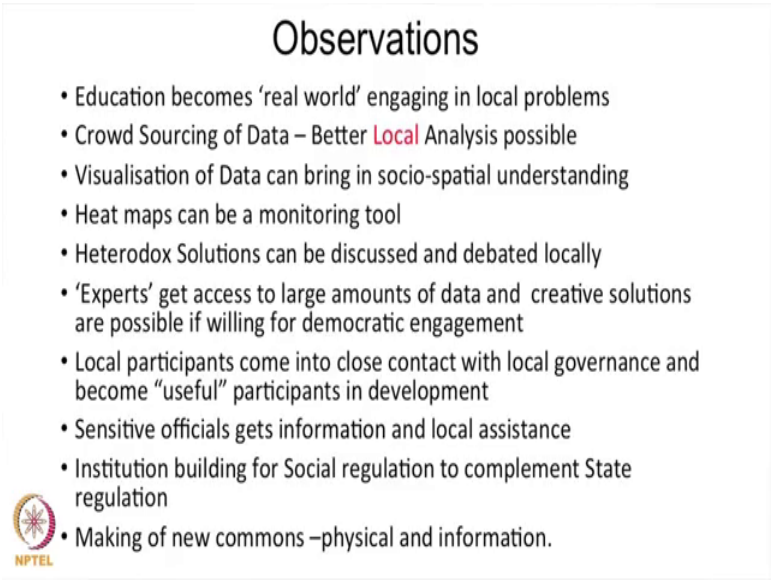

Observations - education becomes real world engaging in local; this is as a teacher what is a what I am taking it you know. So, education can become very much real world, crowd sourcing of data for better local analysis otherwise you have a you always complain about lack of data isn't it now you can crowd source data so, that you know it can be used also.

Visualization of data can bring in socio spatial understanding and heat maps can be a monitoring tool, we have seen how the red dots can be reduced to more green dots and where. Heterodox solutions can be discussed and debated locally. So, if experts come they will get more access to data, they can come out with more creative solutions, Local participants can close contact with local governance become useful participants in development.

This happened when floods you know struck Alleppey our whole canalpy team used this mobile apps to locate relief camps to make you know the kind of relief material get into the camps, during the camps they made better sanitation arrangements, they travel they mobilize 500 volunteers who travel with this people when they went back to their homes. We click photographs of their homes uploaded it IIT Bombay civil engineering department divided that into three different categories red category you should not enter that home, green category you can start living blue category another expert has to look at it.

We did the kind of health surveillance you know. So, we identified where are the diseases we gave it to the DMO who could actually kind of you know direct their teams to wherever those doctors help is needed. Our team did flood mapping they looked at the levels and now they are developing a digital elevation model. So, we know the hotspots of flood and this is all done by without help of any of us because they have the weapon of ODK this tool which is what you are also going to do. So, this can be a major weapon to kind of make better analysis and better action possible.

So, sensitive officials who get information local assistance, institution building making of a new commons that is what we want. We want to say that the youth are going to reclaim this canals this canals are our commons not state property, it has to be utilized well because this is our future of public health or tourism or whatever.

Limitations of community and citizen participation you know we found that you know there are no citizens who will participate. So, we made a student citizen to make participate and they can be future citizens who will participate otherwise we did not say any readymade citizen who will come and participate with us. So, community participation and all will very quickly tell you know, but are they people who are ready to that?

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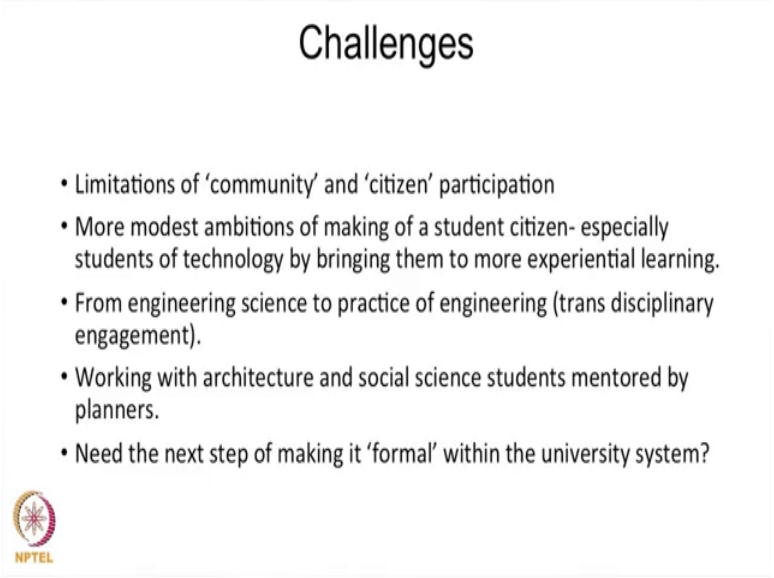

From engineering science to the practice of engineering, trans disciplinary engagement working with a problem that is trans disciplinary engagement. Working with architecture and social science students mentored by planners and next step is to making it formal within the university system. We are all going to oppress you telling the university, bring them all to the field for 2 months. So, that is our dream to make you all come to the field for 2 months within your academic curriculum because that is your social responsibility. Then many things can happen in many sectors better analysis, better monitoring which can lead to better governance.

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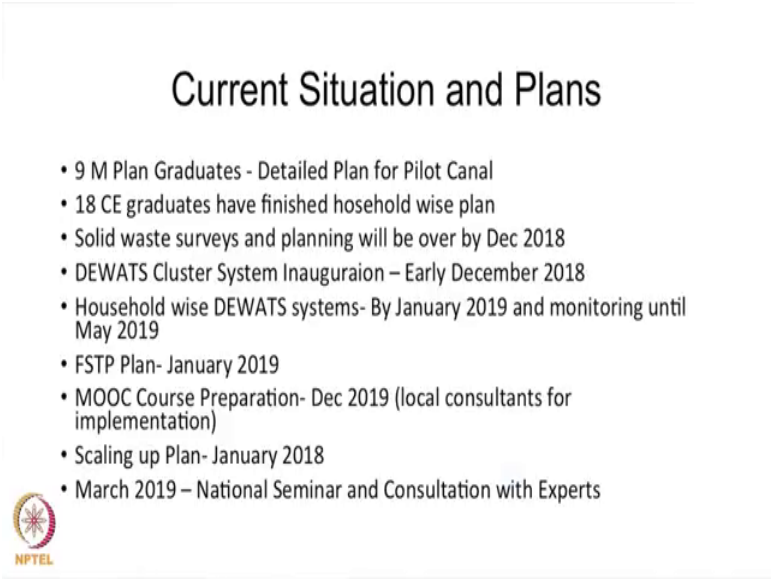

Path ahead this is what you are doing now we have your team leaders were making detailed plans, you have 18 civil engineering graduates who are part of your team, solid waste surveys are already done, we will have a plan by December 2018, DEWATS cluster system will be inaugurated in we said early December, unforeseen problems because there is a big leak that happened from the settler tank. So, that was unforeseen. So, it will be in end of December, but we will go and see the system.

Household DEWATS systems we are already doing the survey and we will replace 20 of them by January we will monitor those 20 is different types of systems we will put in and we will see which one works best and then we will scale it up. FSTP plan will be January 2019 MOOC course that is what they are doing now which being and that will be ahead by July, we have a scaling up plan by January and March 2019 we will have a national seminar and consultation with experts whether we are going in the right direction otherwise we are just doing things you know. So, we are going to reflect on what we are doing and then you know kind of moving ahead. Winter school is what you will be doing two more slides one is this.

Student: Yeah.

You know you will be having you will be looking at socio technical options.

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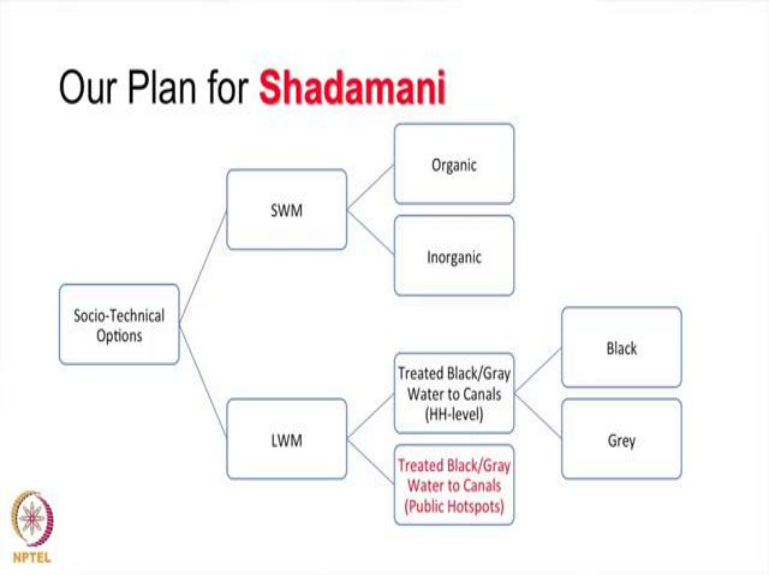

Student: (Refer Time: 31:10).

That is why you will be doing social analysis as well as technology analysis. Solid waste management, organic inorganic, you will be looking at what is the kind of production of that, in liquid waste management treated black water grey water into the canals household level and public hotspot this we will not be doing now. And treated water what is the black element what is the grey element of this. So, this is the kind of you know crux of what you are going to do. Steps in the plan one is delineation of watersheds which is already done, civil engineering survey is done.

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So, we have done this job for you, what you will be doing- a socio economic survey practices and effluents, then you will be arriving at sanitation zones and hotspots through GIS. Socio technical analysis for solutions, you should tell us, stakeholder consultationss and technical- this you may not be able to do, this we have to take from your thing get into more stakeholder. Stakeholders are households to municipality to NGOs, technology providers, we will have to talk with all of them to arrive at specific technology solutions.