Sustainable and Affordable Sanitation Solutions for Small Towns
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Lecture – 16
Faecal Sludge Management for Alappuzha town

Let me begin, but I have a small quiz to begin have you seen this painting.

Student: Yeah yes.

Yes.

Student: Yes.

Do you recognise these buildings?

Student: Yes.

Have you come across them in

Student: (Refer Time: 00:31)

In the town?

Student: Yeah

Yes. So, which was is this?

Student: This is Church.

That is a church and what is this?

Student: Temple

Temple which one? You can very randomly say a temple in India common.

This is the Mullakkal temple in righ,t it is very nearby.

Student: Yes

And this is actually the entire set; they are a replication of some bodies paintings or sketches. Can you guess who?

Student: Laurie baker.

Excellent, thank you.

So, I have now that you are I am hoping that you like Alleppey and you seen things around. Let me tell you what we are doing as part of a improvement yeah improving faecal sludge management or waste body management in Alleppey. What I will be discussing is why do we need for FSM in a town, what is the methodology we adopted and why we adopted that methodology in to understand the current status.

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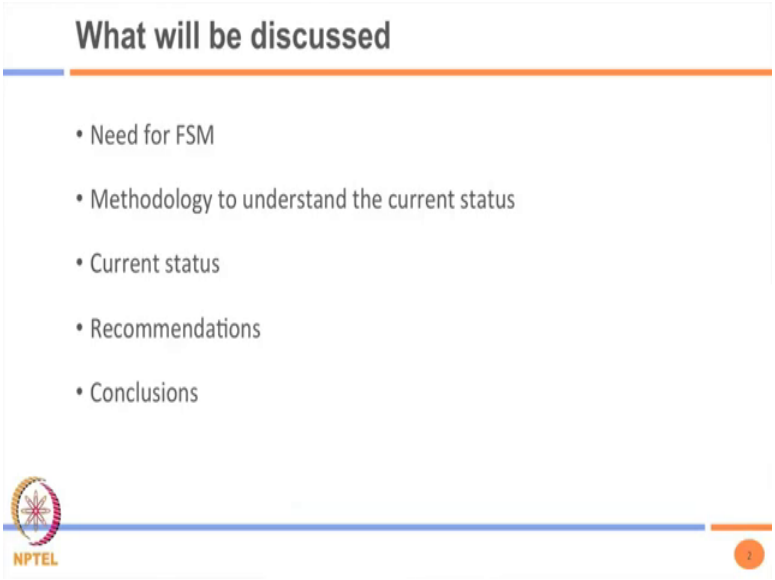

And then I will discuss the outcome of a strategy what are our findings regarding current status, what are we recommending to the local government or municipality and conclude essentially talk about everything that I have talk about I mean summarise in the conclusions. So, this is the chain Sharadha showed right. Keep this in mind always and I will or in my talk I will be following the sequence of user interface collection or containment emptying or conveyance, treatment and disposal or use. Why do we FSM in Alappuzha? Point the simple reason is that most of the toilets in Alappuzha according to census are connected to some kind of all side system; whether they are pit or septic tank

does not matter, but point is all these systems fill up and when they fill up they need to be emptied ok; that is one.

Second and the Alappuzha is also declared open defecation free under the Swachh Bharat mission, Alappuzha has been declare open defecation free.

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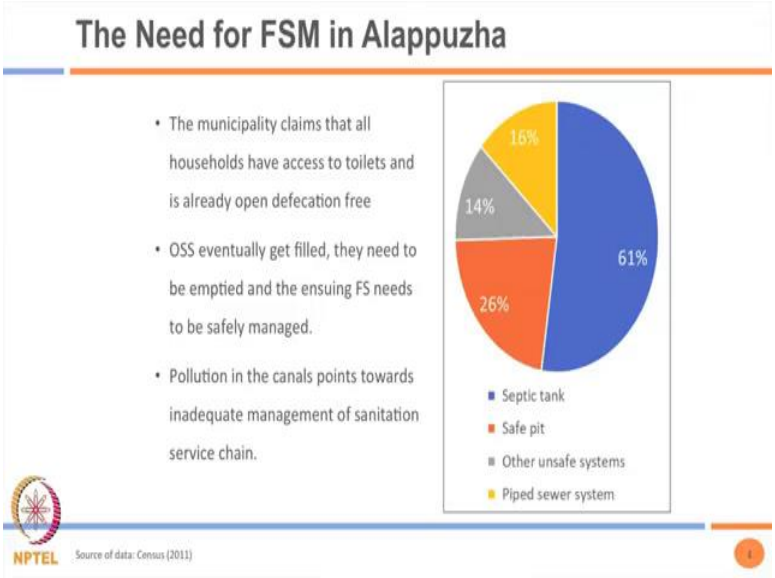

But you continue to see pollution in canals and visually it is my colleague who are experts in understanding pollution, they tell me that it is dissolved or suspended solids or dissolved solids. Essentially meaning that, it is coming from grey water or black water from the domestic waste water. So and then we thought why do we need FSM; we should compare one to the other alternatives that we have.

So, first option obviously is sewerage as Sharadha explained, it is very capital it tell say it is very water intensive. You need water to transport waste and in the waters case future that we are looking at because, of climate change water is going to become probably gold. Second, it is a see so, sewerage system needs a topography which is conducive to it right. You need to the water need or the sewers need what is called as self-cleansing velocity right and in the flat terrain of Alappuzha, it is not possible. So, it is like almost maybe a kilometre down the line, you need a pumping station and plus there are canals in town. So, you cannot take line or sewage lines under the canal. So, there is complexity involved.

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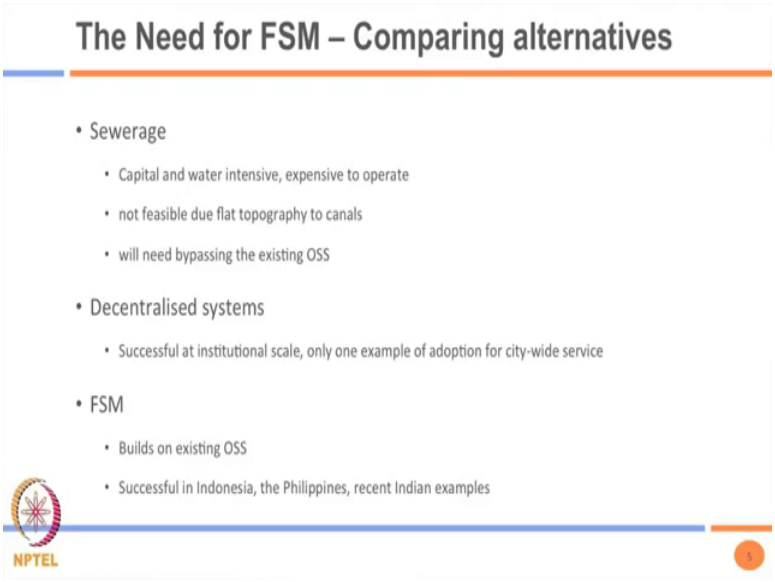

And then sewerage is also needs that you bypass the existing onsite systems also existence, because sewerage systems need a minimum load of microbes and pathogens and nutrients to be treated. If you do not get that, then you are underutilising your treatment capacity and that is why you will have to dismantle the existing systems. And as Sharada explained, it involves money spend by households, which they may not be really willing to do.

There are examples I have come across in Gujarat when I was working where cities have laid sewerage systems but households have not accepted it. Because once they connect to sewerage systems, their taxation increases ok. So, that is one. Then there are decentralised systems; sure you heard of them, but in India except for Bangalore, no city has taken it up as cityscape ok. So, there exists at institutional levels, some school may have it, some industry some IT company will have it in other parts. In Bangalore, they have it for all the areas where there is no sewerage, but decentralised system. So, we do not really have any experience for decentralised systems.

But FSM two advantages; one it builds on the existing onsite systems. So, whatever is there, you can actually use them as it is. And second if there are some successful examples and out of the country and now very recently in India also. Methodology used; we had to now census gives us I mean most planning in India depends on information from census related to; data related to demography comes from census. But when it

comes to sanitation we realise that we cannot rely on it totally and part of the reason you already know. We are asking questions about the type of onsite system in the town right.

In your questionnaire you have those questions right? Yes, that is because we want to know or what is the type of onsite system they have and we want to do that because that has an implication on the quality of FS that will be generated which will intern influence what is the treatment technology or treatment levels needed ok. So, what type of onsite system you have makes a big difference for managing the remaining part of the chain. So, OSS; so onsite system related data from the census, we cannot get totally rely on.

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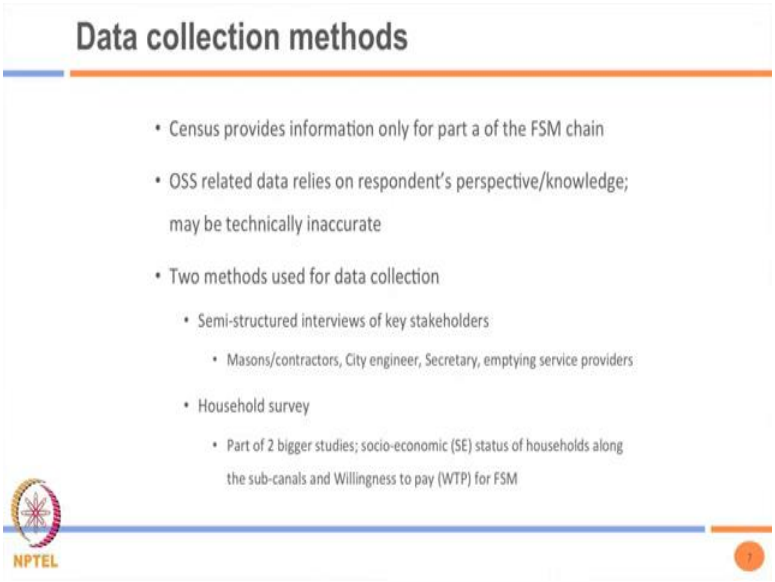

So, we use two types of two methods to collect data one was household survey, and a lot of interviews which preceded the household surveys for two reasons, one we wanted to check what questions we should be asking also you have lot of questions where alternatives are already provided material of the wall, of the bottom etc., right. So, though they all come from those qualitative interviews and we did the households. So, this study relies on two studies that we did as part of a summer school; one was the socio economic survey and one which I think most of the questions you are also using and second was willingness to pay survey for FSM.

And these I mean the both the studies have common questions that the analysis relies on. You already seen the questionnaire right; so I am not going to dwell much on this.

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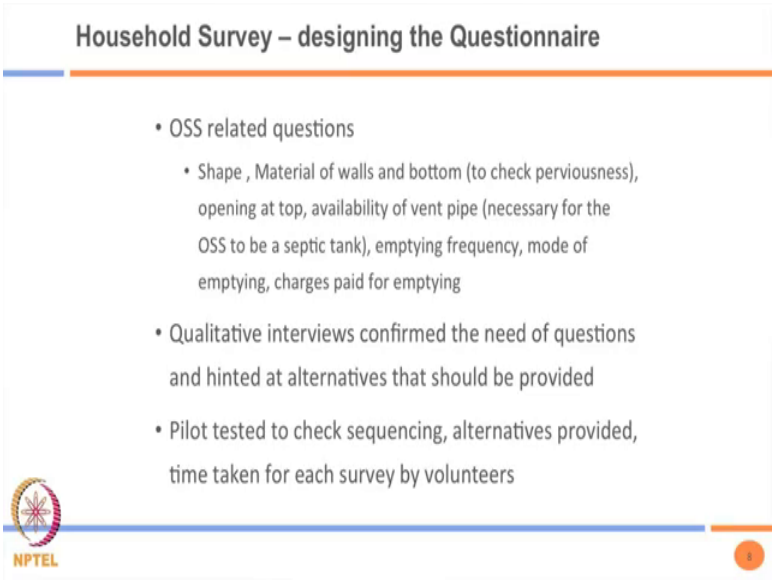

So, these are the questions related to onsite systems, what is the shape material of the wall of the bottom, whether it is it has an opening or no at the top, availability of vent pipe. This is just to ascertain whether the OSS is an septic tank or no not, emptying frequency mode of emptying whether they are going at manually or they use mechanized systems or and the charges paid for emptying. And qualitative interviews we use to confirm the questions and we also pilot tested the questionnaire.

So, the questionnaire that you are using this was pilot tested by group of students from whoever pursuing masters in social work, they pilot tested it, they give us the responses in terms of what is the is the sequencing right, is the options that we are providing and answers are they right and this all place a very important role when you are doing research, because anything that goes wrong here makes an impact on the analysis. And we used ODK collect and we also used maps and all on while using it we also learn on the way.

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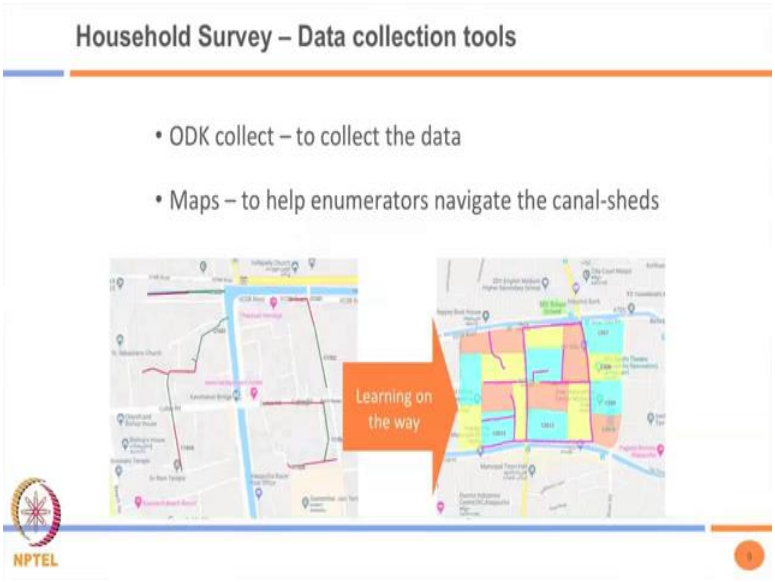

So to begin with we were providing this kind of maps to the enumerators, that is participants where we said that this red line our team will go on this side and cover two houses and this side and cover two houses.

But we soon realise that in areas there were dense lines, it would be difficult for participants to manage. So, then we started using polygon, so that every team knows which area they are exactly focusing on. The strategy we chose for sampling was random sampling. It is benchmark for selecting or sampling and the way we or the way we describe it to participants was you choose; so, every time you are dropped at a location you choose the first house randomly and then each study had their own criteria. So, willingness to pay needed a wider coverage of samples, so we said that you can choose every 6 house and socio economic survey because they were concentrating on a smaller patch of area just 2 rows besides the canals.

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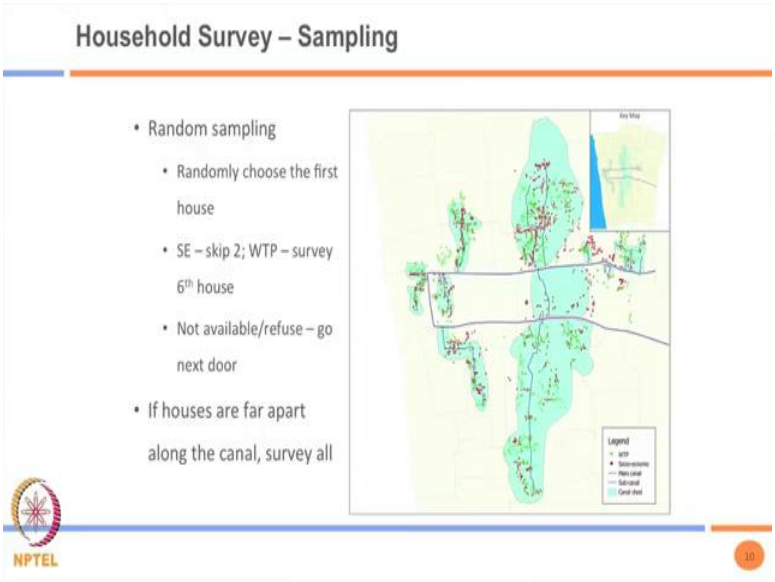

We said they could take every alternate or third also. And if in case that household is locked or not ready to participate, then they can go to either the earlier I mean they may either of the neighbours. And I do not know whether if in the area there you are going; if all along the canal there are no houses. In parts of Alleppey the density varies and some places it is vary less. So, in such places we ask the enumerators to survey all the houses.

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so this is how we and then we carried out training of participants inter for ethics of research, ethics of doing household surveys like all the fact that including a how do you

approach household, how do you ask questions and I hope our teams our team leaders did that for you.

We had volunteers who had done those surveys earlier and they actually carried out mock surveys for them. So, that they understand; so all are questionnaires were in English, but the conversation was to be in Malayalam. So, what exactly are the words to be used, what words are not to be used was very crucial. We trained them for ODK collect maps; we explained each question in detail significance of the question and instructions for sampling as I said earlier.

Data was collected by tour so as you know we have had in the summer school we had two batches. So, for willingness to pay we had 40 participants; so, from the first batch who collect a data and in a for socio economic survey, we had from both the batches we had about 300 students who collected data. And they were as you are going they were always teams of 2, 1 of them have to be Malayalam speaker.

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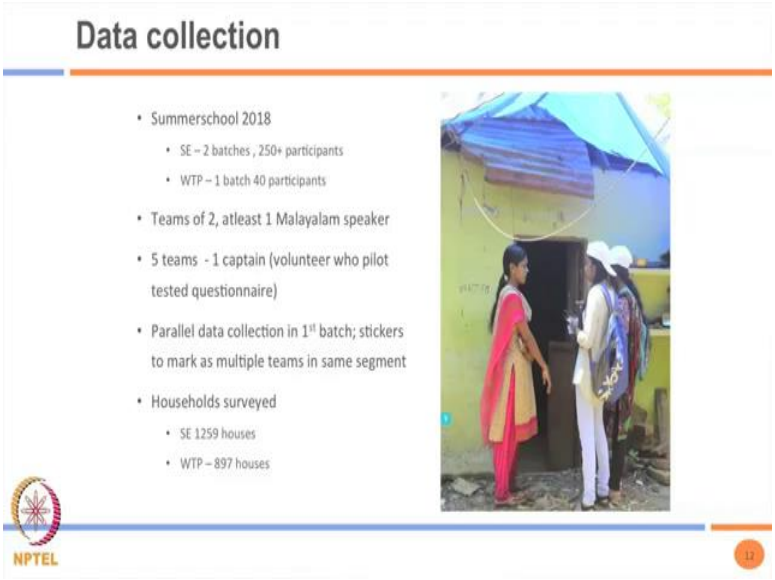

Every 5 teams had a captain and this captain came from one of the volunteers who did pilot testing of the survey. There was parallel data collection between multi. So, two types of teams right willingness to pay and socio economic survey and both of them going to the same area. So, how do you know whether a household is surveyed or already surveyed or not?

So, we gave them stickers that they could stick on a gate of the household and so we surveyed about 2100; more than 2100 households in the process and this is the outcome of that.

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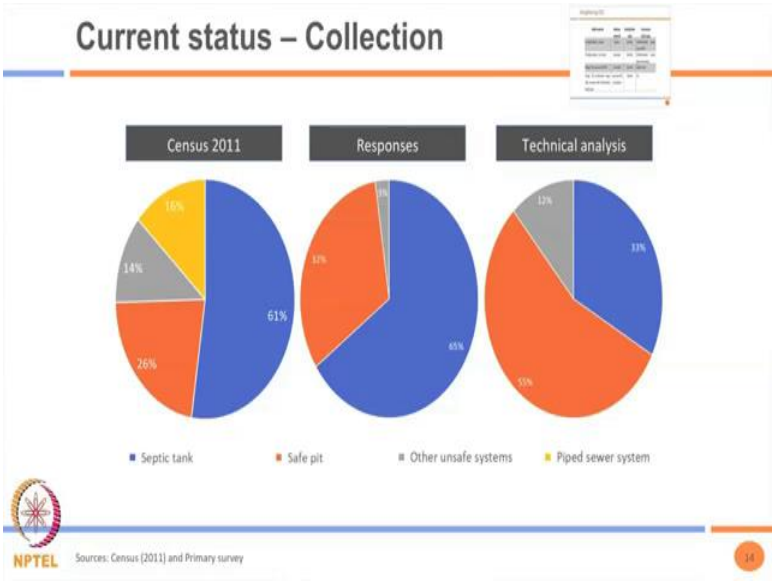

So, this is census which says that 14 percent has 16 percent has a piped sewer network which is not true, 61 percent has septic tank. And our questions we ask respondents to tell us what kind of onsite systems they have and then we also analysed based on their detailed questions we had. We had asked what is the onsite system and we realised that only half the systems that reported that they said that they had septic tank only half of them was actually septic tanks. So, remaining half were not septic tank, they were pits.

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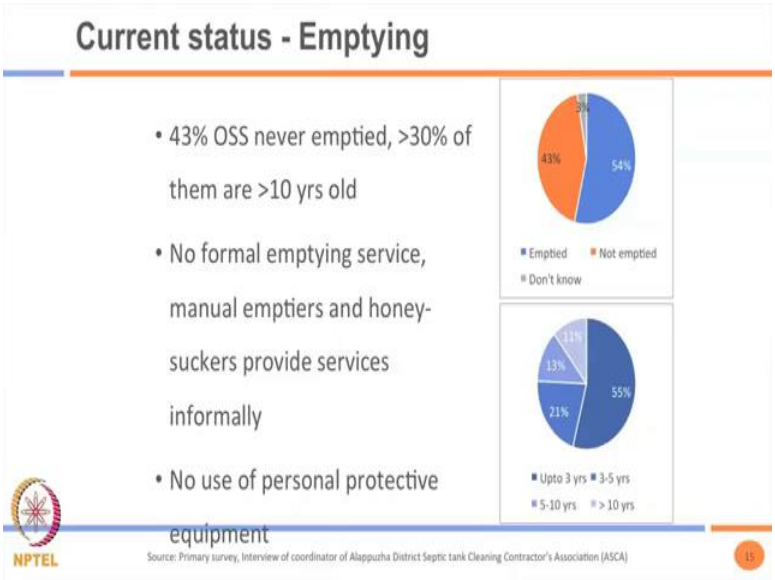

Then we also questioned about emptying practices. So, we realise that 43 percent of onsite systems, they have never been emptied and that could be from anywhere from 1 year and in the age of a septic time could be anywhere from 1 year to 50 years and more. So, that was one; second there is no formal emptying surveys by the municipality and this came from interviews not only from the household survey that the municipality does not provide any service nor as it licensed service providers as Sharada was telling right you have to.

So, in Devanahalli, there they are planning or they licensed service provider so, that you can keep a you can keep an eye on them; you can check them as municipality, you do not want them to dump it everywhere or anywhere. So, you need to bring in some mechanisms of accountability. But that is not the case and there is absolutely no use of protective equipment whether it is done manually or it is done by mechanised MPS.

Also now recognising that manual emptying increase exists is a little tricky because, no government would want to acknowledge that they practice or in their city open manually emptying exists because there is a ban by law.

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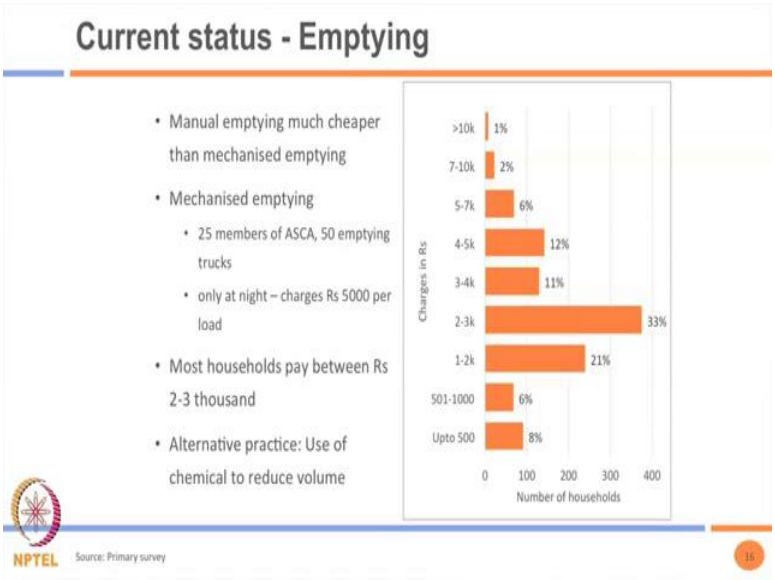

And then there is mechanised emptying is provided by an organisation or an association of septic tank emptiers, they have about 25 members; total 50 trucks. Each truck is capacity is about 5000 litres and they and they operate only at night and Sharada has written a paper in EPW where he describes their operations of emptiers at night in Bangalore and it is very similar here and we got our. So, the when you are here we got our septic tank emptied before the summer school start the winter school started and they came at 4 AM in the morning. They got it emptied the second load, they emptied they went for 20 minutes and came back. So, any guesses where they dumped?

Student: (Refer Time: 16:04).

I am not I do not know we do not know. So, that is a good guess.

Student: (Refer Time: 16:10)

And we also tried to find out with the households how much do they pay. Now if you see a year, this is so some households pay up to 500 a lot of households between 500 and 1000. And these are all because they get it emptied manually, getting emptied manually is much cheaper is much cost effective for households. And this is or most of it is for mechanised emptying and some of them also pay more than 7 to 10 k and more than 10 k 10000 ok.

So, this is where we are trying to figure out if we regulate them can we ensure that they charge a fixed amount for households etc. There is also an alternative practice which we have not come across in literature and but this has come up in two places; one Alleppey one Nedumangad a small town near Trivandrum, where we also did a small case study; where we found that these manual. So, households call these emptiers they come with some chemical and they spread that chemical or mix that chemical in the tank and over a period of few days or couple of days, the sludge volume reduces by too less than half and then it need not be I mean then it need not be emptied ok.

So, we are still figure trying to figure out what is that practice or what is that chemical whether it is safe or whether it is environmental friendly etc, but that is also the case.

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Currently there is no treatment system in the town, the septic tank association coordinator he claims that the trucks take them to a treatment plant to a town which is 24; 25 kilometres away Cherthala. But as I have own experience shows it is that may not really be the case. Also it is I mean as Sharada explained right, you have to spend the money to take your vehicle from here to Cherthala or 25 kilometres away and plus the plant at Cherthala charges some money about 1000 rupees to deposit their load. So, any sound any good business man would not want to do that right. So, our case is that it is not taken there is. So, manual emptiers they would generally either spread that faecal sludge either on the plot on the same plot or neighbour.

Adjoining plot and or they would dig another pit and empty it there. And there are proposals under consideration in the municipality where they are having a 24 KLD plant in general hospital, 10 KLD plant in Wat San Park and they are also planning to have 4 mobile FSTPs. So, this is a mobile FSTP, it is low; it is mounted on truck and it uses electro pyrolysis technology and the owner claims that it can treat about 50000 litres of faecal sludge in 20 hours.

So, every 24 hours it can treat about 10 truckloads of faecal sludge, but yes again this is this photos sir has clicked only yesterday and if we will want to see more of it before we get in. This is a shit flow diagram based on the analysis that we that I presented earlier, so yes.

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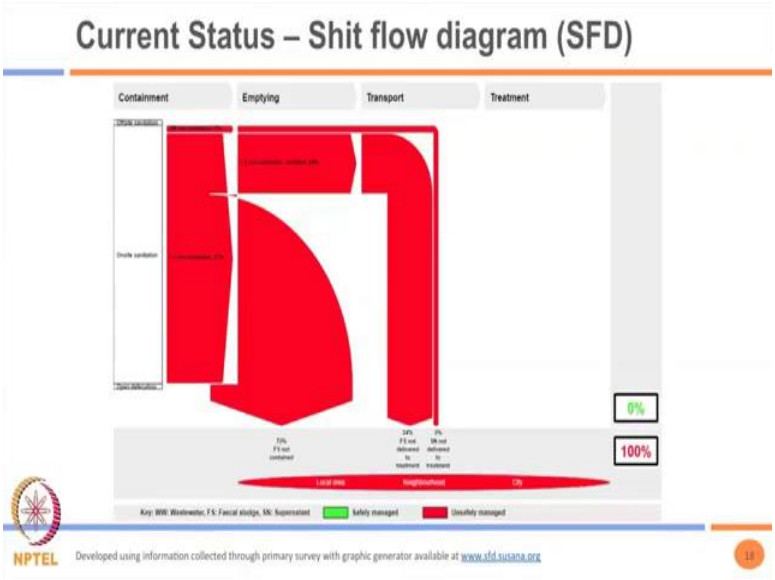

So, this shit flow diagram is a methodology developed by researchers all from all over the world, specially by the world bank and the gate foundation. So, on this side it shows what is the type of containment system. So, this is onsite system, there is no offsite sanitation and there is no open defecation in the town ok. So, all of it is contain onsite; part of it is emptied, but whatever is emptied is going to the environment without any treatment and whatever is not emptied is also not considered safe in the pit and why do you think it is not considered safe in the pit?

Student: Ground water (Refer Time: 20:43) ground (Refer Time: 20:46).

Exactly ground water level the ground water level. So literature says that if you want a pit to be considered safe there has to be a distance of about minimum 2 metres depending on soil type between the bottom of the pit and top of the water table. And here specially in the monsoons and you realise that this area flooded the water and the wastewater all mixed together including flood water etc.

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So, what are our recommendations based on what we have studied here. So, one we recommend that for collection system all the unscientific septic or non-septic tank OSS should be replaced by septic tanks and this can be done gradually. Because it is households will have to spend money, but we also carried out a willingness to pay survey in the summer school and we realised and our I mean our finding is that households are willing to pay to get their onsite system replaced and if it is managed. So, if the entire chain is managed more people are willing to pay. So, all the more reason for the municipality to ensure that the remaining part of the chain is managed right.

It also I mean we would also want to suggest that to standardise sizes, because if you do not standardise sizes, then you cannot I mean there will be situation where a household will emptied every 3 years and a household will not be required to empty it for 10 years. So, if you can standardise sizes, you can more or less standardise emptying and this can be done in two ways; one you must have seen some prefabricated plastic ones the orange coloured ones, if you around in town you must have seen them on the shops.

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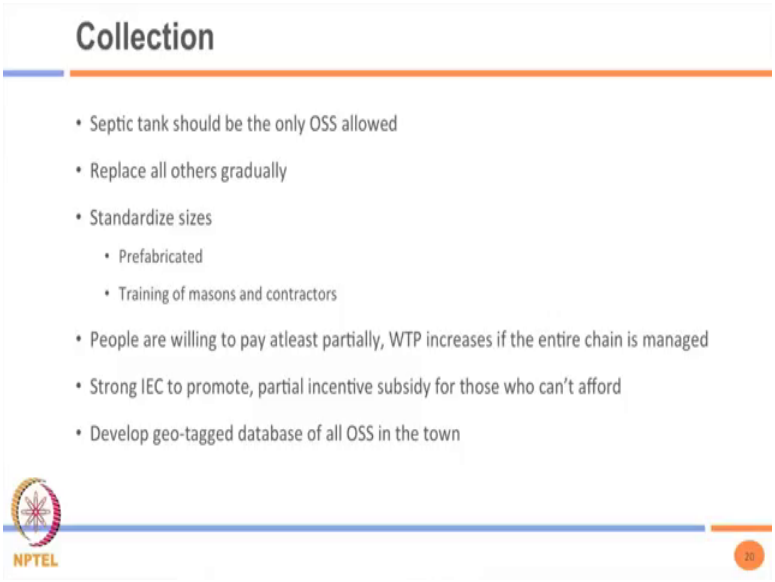

Second you can do so that they so they are prefabricated in fibre reinforced plastic, the other way of other prefabricated material which they are available in is concrete and second you can do training of masons contractors who construct onsite systems so, that they do not exceed the size of onsite systems. And because our onsite or willingness to pay survey found that people are willing to pay, then we advice the municipality that instead of funding it yourself why not you ask or you promote households to get them replaced. And it and you can promote it in several ways. Like for example, in Nasik my hometown, people who install solar water heater heating systems they get a 5 percent rebate in property tax, which is a good enough incentive for households to go for solar. So, similarly you can try and incentivise that.

Similarly, many places in Maharashtra, they get if you want to install a solar water heating system, you get a loans for that at 2 percent interest rates and market rates are about 12 percent. So, all these incentivises people to get their or these are the mechanisms you can use to incentivise people. Then finally, if some households are likely that they will not be able to afford it, so then they can be incentivised by giving a partial subsidy right. Like 50 percent or 60 percent of the or I mean the trend is to go for 100 percent, but if you give 100 percent the other side of the storage that there is no ownership.

Student: Hm.

So, if you let them spend part of the money then there is some kind of ownership and finally the local government or the municipality should develop a database where each septic tank is geo tagged where location is geo tagged. So, that so it and then they have a data of size of when was it last emptied so that say 3 years down the line you want to check which house was emptied in 3 years earlier and then you want to prepare the schedule that these are the households you want to get them emptied.

So, you know exactly when which households are to be emptied. you can. So, we are so emptying there are two aspects to it one who will empty it. So, because the number of trucks involved a there is a quite a number are involved, what do you think (Refer Time: 25:23) ah how many trucks will be required for emptying?

Student: (Refer Time: 25:30).

Yes sorry.

Student: Time (Refer Time: 25:38) time.

Time.

Student: Means how long (Refer Time: 25:41) number of members of households.

But how would that determines all (Refer Time: 25:45) this.

Student: (Refer Time: 25:36).

You are onto something and I am guessing it this.

Student: Both the connector I guess like if there is a co members normally, obviously this (Refer Time: 25:55) number of say 80 percent age of it definitely both are service water and then with due course of time. If it is been like a years long probably that septic tank would take.

No what I am saying is my question is how many, so how a city has say 1000 septic tanks.

Student: Hm.

What will or septic tanks or onsite systems what will determine how many trucks it will require to empty?

Student: (Refer Time: 26:21).

Capacity.

Student: Capacity of the septic tanks.

Capacity of septic tanks yes.

Student: (Refer Time: 26:28).

Time to empty it right.

Student: (Refer Time: 26:33).

Student: Distance.

Distance to the emptying location right.

Student: (Refer Time: 26:40) density population density.

Population density.

In little loud.

Student: Scaling.

Scaling what?

Student: For each of each five or ten houses there should be one.

For each 10 or 5 houses there should be one tank.

Student: No

That is a lot of.

Student: (Refer Time: 26:55).

So, essentially there are three or four characters I mean the number of trucks that are required depend on one number of septic tanks in the city of course. Second how many how many of the OSS can be emptied in a day by one truck and that will depend on in turn depend on location of the treatment truck ok. How much time does it take to empty the onsite system and how much time does it take to transport that faecal sludge to the emptying location. Third is number of working days in the town can you guess how much should be the standard number of working days.

Student: (Refer Time: 27:39) 5 year.

Year 1 year.

Student: (Refer Time: 27:41) 80.

280 all right. So, for this kind of service because it is emergency service also.

Student: (Refer Time: 27:52)

Is generally 300, but it can be substantially reduce in a place like Kerala why.

Student: Strikes (Refer Time: 27:59).

Strikes wow interesting answer.

Student:

But not substantially reduced they are like if you count once a month it will be 12 less.

Student: (Refer Time: 28:09) rains.

Floods rains exactly so if you have if you select treatment systems, that will not be operational during monsoons you cannot empty the tanks during monsoons right. And in Kerala you have 6 months of rain rains and at least the 4 monsoon months it rains almost every day that is what Sridhar tell me ok. So, that will so your treatment technology intern will decide your emptying or number of trucks that you need ok. Again as I discussed earlier the database should reflect when the OSS is emptied.

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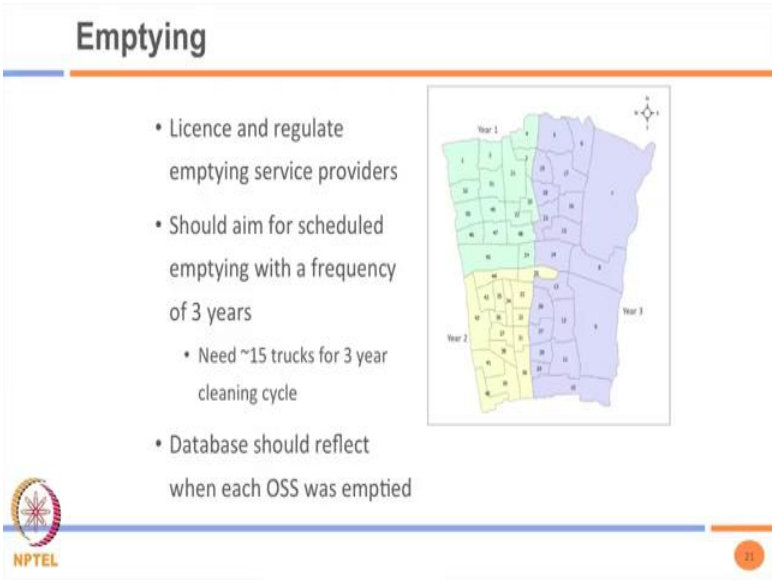

Alternatively you can go for such a plan where you know you decide you divide the city, if you decide that you will have you will empty the onsite system every 3 years. You would you divide the city into 3 zones, you decide that this will get emptied in year 1, this in year 2, this in year 3, this is because the population is more or less similar the number of households is more or less similar in this. So, and then you go back to year 4, year 4 you go back to year 1. So, that is another way instead of if you cannot geo tag or that is difficult then this could be the other.

Treatment and reuse.:

Student: Hm.

There are two ways to going about selecting the treatment technology, one you select the treatment technology and then you look for avenues where you can reuse the products that they produce. The other ways you look for what are the products that are available in the market and what products you want to. So, if there is a demand for say compost, then why do not you design a treatment technology or select the treatment technology that will produce compost right.

So, instead of designing for disposal or planning for disposal, you plan for reuse and there are some advantages of this approach, one is it optimizes treatment. So, depending

on what the reuses you can decide on what is the level of treatment needed if you are going to incinerate.

Student: Hm.

It finally, like if you are using as an industrial fuel you do not have to reduce pathogens to zero level right. But instead if you want to use it for agriculture then you have to ensure that the pathogens reaches 0 ok. Similarly it brings in automatic quality control say the reuse product is used as a compost in farms and the farmers find that they are not getting benefit as projected or as desire. Then they then the demand will automatically drop and that will ensure that you want you improve the quality of your treatment plan or quality of treatment and plus it will generate some revenue for the municipality.

Again a rosy picture it may not actually do so, but there is at least then opportunity to generate revenue. Possible alternatives suitable for Kerala or suitable for Alappuzha; Alappuzha include soil enricher fuel pellets and building material.

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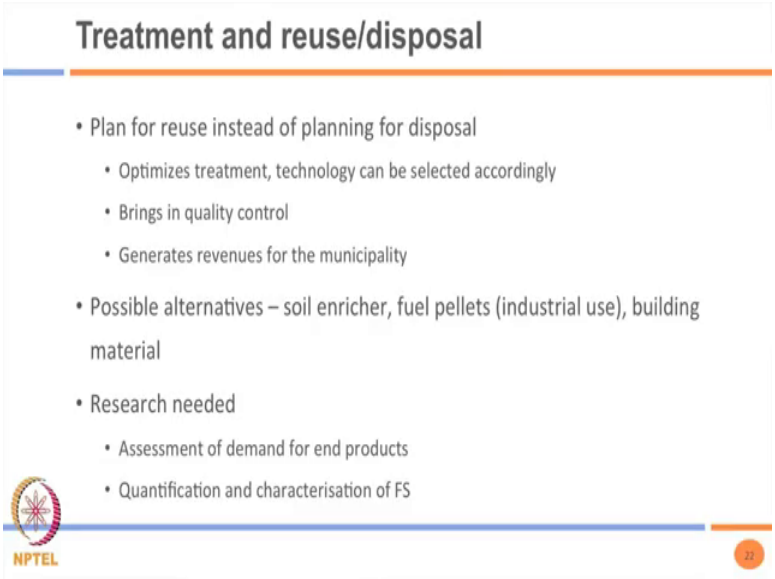

Building material in a sense that you can mix it with something like when you are baking bricks you mix it with the mud and when you.

Student: (Refer Time: 31:35).

Put the brick in kin.

Student: (Refer Time: 31:39).

Ah Or the this organic matter will also get burnt that will effectively reduce the weight of the bricks.

Student: Yeah.

And reduce load on the structure itself and but as we discussed earlier as Sharada discussed earlier that too to decide on treatment technology or treatment capacity needed. You need to know what are the characteristics of Fs that you are emptying and which varied from town to town depending on many many factors and you also need to understand the quantum of FS in each type of OSS.

You need studies to characterize and quantify FS and second you for this to follow this design for service approach or design for reuse approach. You need to have a study of assessment of what is in demand, what end product will be in demand in the town, so these are a recommendations.

Student: Hm.

Finally, to financially sustain the service here are two ways of doing it.

Student: (Refer Time: 32:50).

And there are advantages of doing it and of course the municipality can always choose to start with an on demand service where every time tank is full they can call the municipality and the municipality can charge and then in there.

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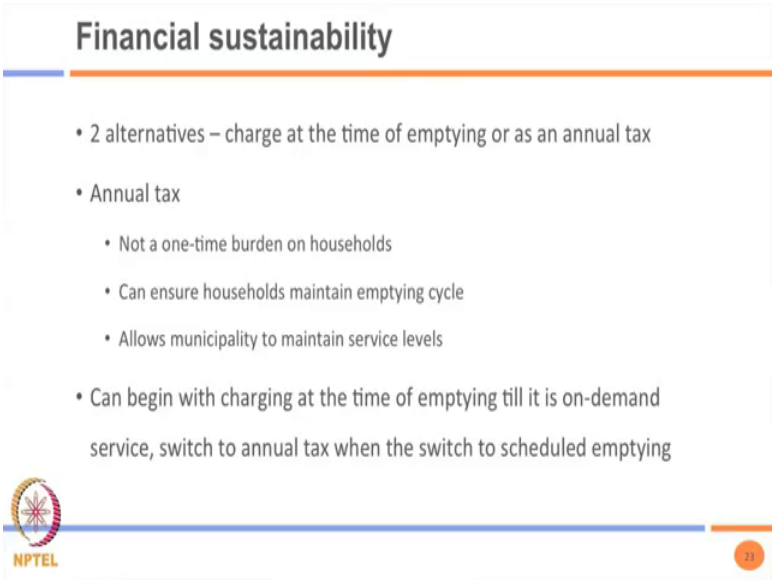

And over a period of time move to one schedule emptying, second make it a tax based system. So finally, conclusions what have we done through these study. So, what we have done is we have developed the methodology to understand the current status moving beyond survey information census information.

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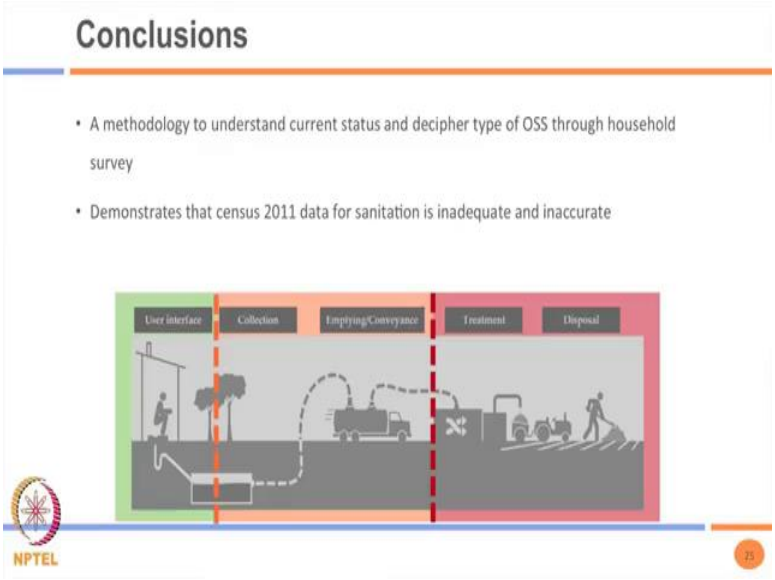

Second we have demonstrated that census is not reliable I mean census information on sanitation is not very reliable, when it comes to planning at city and sub city level. At all India level it does not really matter whether we have 32 percent septic tank or 40 percent

septic tank, it will not really matter because you are making policies depending on that. But at ground you are actually planning in way in much detail right. So, at town level or ward level that planning is very ,what is the word, sensitive to the type of information you have.

Student: Hm.

And therefore at town level it is very important to have as accurate information as possible. Then this picture demonstrates the service chain of service chain in Alappuzha, user interface almost everybody has or everybody has a toilet, there is some practice of collection and emptying not as desired but there is some service and there is no treatment and disposal. Recommended action points include that all we suggest that all onsite systems in the town should be septic tanks, I mean whatever is built in future should be septic tanks and whatever exists other than septic tank should be replaced gradually.

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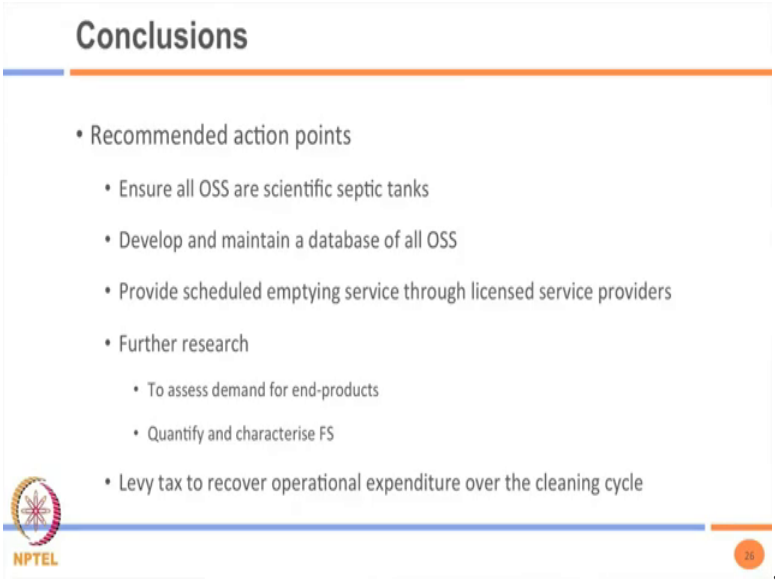

Development maintain a database of all onsite systems provide schedule emptying service through licensed service providers. We need further research to assess demand of end products, quantity and characteristics of FS are needed and levy tax to recover operational expenditure over the emptying cycle.

Thank you.