Sustainable and Affordable Sanitation Solutions for Small Towns
Prof. N C Narayanan
Centre for Technology Alteration for Rural Areas
Indian Institute of Technology, Bombay

Lecture – 15
Introduction to faecal waste management

So, let us get started. So, how many of you already know this sanitation service chain? Wow only so many? Right. So, this is called as sanitation service chain in few cases its always called as sanitation value chain.

(Refer Slide Time: 00:38)

So, what is happening there that is called interface or captured, this tank is called containment, this is emptying and transportation, this is treatment, this is reuse. So, that is the service chain. And the reason why I am talking about this is that as you can see there is you do not see any sewer lines in right there is no sewerage, its called an onsite sanitation system what do you mean by an onsite sanitation system?

Student: (Refer Time: 01:09) away from original place.

Student: Away from original place.

Away from original place?

Student: on the site itself .

On the site itself right. So, in case of onsite sanitation systems of sanitation systems, where the waste is somewhere near the toilet itself its not moving very far away what is the other system that we know?

Student: Offsite off site.

Off site true and the only system that we know is.

Student: (Refer Time: 01:37).

A sewerage system right. So, a sewerage system sewerage is the network of pipes and what passes through that is sewage right. So, a sewer system or sewerage and what passes through that is sewage. So, and that is the only off site system that we know off and let us see why we have to focus on faecal sludge management. The reason why I call it faecal sludge management or is it movement is the question we will come to that very soon. For example, what is happening in terms of whatever the classes that you have had so far. So, you have your sewerage network and the sewage is passing through that and what happens at the end of it?

Student:

Student:

What happens at the end of it what is there at the end of the sewer?

What is there at the end of the sewer network?

Some kind of treatment system what else?

Student: Water bodies.

Student: Water bodies .

Water bodies right. So, just to give you an understanding of what is happening with respect to our country how much of India is urbanized?

Student: .

Student: 40 percent.

40 percent two more guesses.

Student: 31.

Student: 32.

32 point.

Student: 30.

32.4 percent is urbanized. And actually rural areas you cannot find sewer network in most of the rural areas even in urban areas only how much of urban area is sewer do you think?

Student: 16.

Student: 16 one an average of 10 percent.

30 percent one third of urban area. So, would you consider (Refer Time: 03:33) to be urban place or a rural place?

What do you consider to be urban or rural?

Student: Urban (Refer Time: 03:40).

Is it a town or a village?

Student: Town.

Its definitely a town right. So, it could be classified as an urban area is that a sewer network here?

Student: No.

And this is the case, but almost 70 percent of urban regions in our country. So, if 30 percent is urban, only 30 percent of that 30 percent is sewered. So, what aspect if you really look at the whole India how much of India is sewer then? What is 30 percent of 30?

Student: 10 percent.

10 percent right 30 percent is the urban in that only 30 percent has sewer line. So, only 10 percent has sewer network all of India 10 percent and pollution control board says that only 70 percent of the sewage that actually gets into the sewer networks is treated adequately.

What is 70 percent of 10 percent?

Student: (Refer Time: 04: 34).

So, more or less 90 to 93 percent of the waste generated in this country on a daily basis ends up somewhere without treatment correct? Is not that fascinating 1.3 billion people?

Student: No.

Every day we all have to poop right. Its the necessity of life that is the reality of life right and that is one thing that I can say that we have in common, we may not read similar books, but we have to use toilet I know that right. So, when that is the case 1.3 billion people 90 percent. So, almost 1.2 billion, people their waste is going out in the environment without any treatment. And 1.2 billion people is the combined population of whole North American continent plus some of the countries in South America, more or less whole of African continent or Europe plus other countries that is 1.2 billion frame.

Student: So, people.

And it is just going somewhere like in its vanishing as soon as we. So, that is where I am saying is it managed with our movement right now. Its mostly movement because we are not really treating it you are just moving waste from one place to another. The interesting part when it comes to sewage is that you can actually track how the sewage flows right. So, you know where your large canals are and most of the drains they flowing only one direction what is that direction? Its usually based on.

Student: Gravity (Refer Time: 06:22).

Gravity right then why do we convert our rivers into sewer lines? Its easy.

Student: topography

Topography right. So, that it helps. So, we just said into a particular type of canal or and really large whatever drain that uses gravity to flow and in case of sewage it makes it easy. At least you know where the drains are, but when it comes to on site systems your waste gets stored in a pit, but whatever we will get to them it gets stored somewhere.

And then what do you will usually do? You call somebody to come and if take let us assume that there is a truck that is actually coming to empty it. And I am assuming that you know how this I know that all these other types of sanitation systems have been covered treatment types have been covered. So, that is why I am focusing very much on faecal sludge management. So, my toilet is connected to a pit, I call a truck operator and that truck operator comes and empties it and now what does that person do? That person does not have to follow gravity right that person can just take that sludge with him wherever he wants its a gravity defying act with the help of diesel when you think about it.

So, the interesting aspect of faecal sludge management in India is that, it has become a new mechanism to shift risk socially, spatially and temporally. What I mean by this is that socially in the sense sanitation work in India is still done by a specific sub caste among Dalit caste and even after the arrival of trucks some of the pits need to be opened in specific ways because sludge would have dried, we will get to all of that in detail for you to help to understand. So, it is still done by the drudgery of actual work is still done by people who belong to a specific social class. So, that is why I said we shift that risk why because that risk shifting is happening because they are not paid well they have to get exposed to certain types of health risks.

So, that is why I am saying that its a socially and shifting risk. Spatial shifting risk what I mean by that is, that my waste from my pit is just going at ending up somewhere in another place there is no management happening, there is no treatment happening it is just going and ending in some other place that is why I am just shifting waste from one place to another place using truck as a mechanism spatial movement.

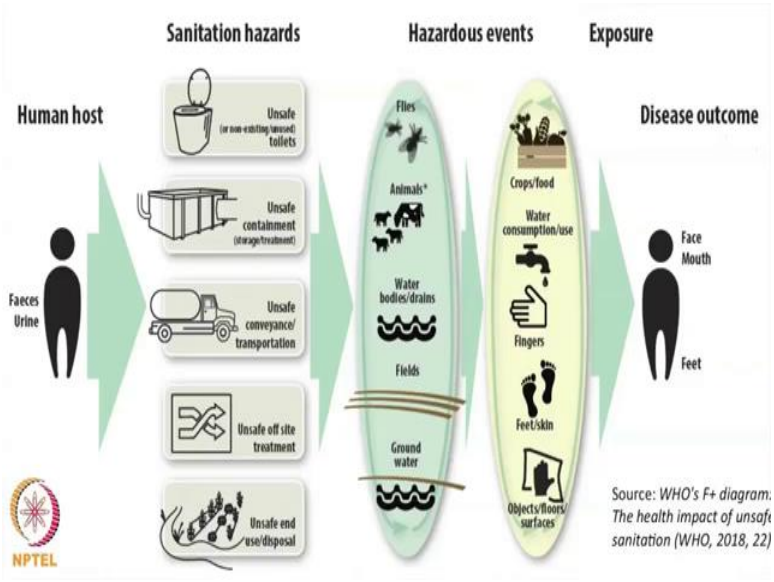
(Refer Slide Time: 08:48)

So, we keep talking about open defecation right oh India should get rid of open defecation oh look at those people. If those people go out in the field its perfect we can go, we can shame them, we can ask them to use toilets, but as long as the waste from our toilets go and end up in our canals or lakes its more or less the same.

When the waste from a pit gets emptied and gets downed by a truck its as good as 4000 people defecating in open at a time that is what it is, but we would not even think about that. Its all mechanized and its going somewhere, but it is actually worse than ODF in some cases when you think about it. So, that is why I mean spatial and temporally we are shifting risk in the sense its very similar to climate change. When 1.2 billion people are just sending the waste out without any treatment, it will come back to bite us. If not today sometime in future our children our grandchildren will get affected by the environmental quality at some point you know its just we are delaying it that is it.

But it will come back to bite humanity. So, that is what I mean by these three things. So, in a way I do not know how many of you have heard of something called as a F diagram have you heard of F diagram?

(Refer Slide Time: 10:18)



F diagram is a way in which we talk about faecesis on one end on the other end you have a new person who gets infected on the right hand side. Left hand side you have faeces and on the right hand side you have a person who becomes the victim of some waterborne disease. So, the challenge why we need to manage waste why do we have to manage waste by the way? Why should we care about managing human waste? What is the primary reason?

Student: Hygiene.

Student: Hygiene.

Student: Hygiene.

Hygiene ok.

Student: Health diseases.

Student: Health.

Student: Public health.

Student: Health.

Student: Public health.

Student: Health.

Health. See the thing is that, we can become the carriers we are the vectors of some of the waterborne diseases; our bodies can carry certain pathogens which when we defecate can actually spread to other places and with speed ,once I defecate right it could be my hands which is fingers, again F diagram is all about fff fingers. It could be somewhere in the field somebody might be walking barefoot, it could be things like which is a towel or some kind of a cloth or something like that our food for that matter fingers.

So, through this it can reach another person fluids is another f it can reach another person. So, that was the definition of F diagram ok, but now as you can see a badly managed sanitation adds to that hazard you know so, that is where badly contained you know badly transported, badly treated or badly reused.

So, all along that service chain if you do certain things properly that itself can become a hazard which can go and affect someone else. The interesting thing is this that when we talk about oh health how many of you have been sick? Because of we all know that 1.2 billion people are defecating and sending their waste out how many of us have been sick here right? How many of you have been affected by any waterborne disease in the recent past? Do you even know anybody who lost a child to a waterborne illness? Its interesting right like the kind of people we surround ourselves we are so, privileged though so, much of pollution is happening somebody is getting affected, but its not us.

So, that is the other interesting part when all of this is happening there is again a another section of society which is actually paying the cost of all of this. So, that is also something that I want you to realize. We are actually benefiting how many of you had to go out in the open? I am assuming none of you right, I never had to. So, I have the benefit of using a toilet, but my family has never suffered the burden nobody has been ill, but somebody is actually bearing this burden somewhere we are not even sure of that.

So, we have actually in a way appropriated someone elses comfort and dignity and health and claiming that for ourselves. So, that is what has become these sanitation systems have become when we do not learn to manage them properly, that is why managing it is so, important because not only it not affects our health, it affects health of someone else all together its just like you eating sugar and someone else getting diabetes..

You know would not you be upset that I eat all the fat and sugar and you become obese, its worse than that right like and also the thing is this, when I get sick we all have this way of I have sick leaves, I do not have to worry about it right. But think about a daily wage earner if that person does not actually do that living for that day, then its a huge issue right he would not eat. So, those are some of the repercussions of bad sanitation you know its not just about or health yeah, but whose health is also something you need to think about. So, going forward, let us first try to understand what happens when these pits fill up? How is India currently managing when pits fill up and then we will go to the solutions.

You have a question no ok. So, the reason is as I said only 10 percent of India is sewer right that is 30 percent of urban India is sewer.

Almost half of urban India is dependent on septic tanks and septic tanks they will.

Student: Fill up.

What happens if you keep using septic tank?

Student: Fill up.

Student: Its spill out.

Why do they fill up?

Student: It does not have more space.

Its a tank, eventually it has to fill up. So, how many of you live in a place which you think is connected to a septic tank ok? Among the students has it ever been full?

Student: No idea.

Student: Yes.

Student: No.

Student: No idea.

So, when it is full what do you usually do?

Student: Desludge.

Desludge.

How do we desludge?

Student: Call the municipality.

Student: We contact this municipality if we.

You contact municipality and they come and do it ok.

Student: Either at the away clear it.

Student: Private agencies.

Are private agencies and in some cases its also done by manual.

Student: Manual emptying.

Emptying is also there how do we find these?

(Refer Slide Time: 16:07)

These private truck operators how do we find them?

Student: Like there will be the advertisement.

Student: Advertisement.

Student: Channels.

Where? I have never seen them on television.

Student: Posters (Refer Time: 16:22).

See almost half of urban India is dependent on septic tanks and you guys do not even know where to find a truck operator if the pit is full.

Student: (Refer Time: 16:36).

And that is the reality there is one place to find them actually no and what they have done is these truck operators have found really innovative ways of advertising themselves. Can you see what might be happening there in that picture? Maybe its way too far. So, actually there are numbers are written on this electric pole on the compound wall its from Guntur, I do not know whether any of you can read Telugu maybe it might be too far away from wherever you are sitting. So, it is saying septic tank cleaner and then it has its number ok. In different towns this kind of advertising happens differently, advertising in a newspaper or a television is very expensive. But this is a very essential service they know that people will notice this.

(Refer Slide Time: 17:28)

So, they do this or what they usually do is, they park their trucks in a busy intersection whenever they are having lunch or something like that they make sure that they park their trucks in a busy intersection. And many of the operators they have multiple trucks. So, when one of the trucks is not really servicing again they park them in specific places because the truck itself becomes a.

Student: Advertisement.

Advertisement right. And they actually handout business cards in these neighborhoods and they also put these pamphlets in the newspapers. So, they have their own ways of reaching out to their customers and of course, let us say you find one of the truck operators, you call them interestingly they also have their own ways of manipulating the caller. For example, when the pit is full ok. So, you are desperate it all depends probably see in your case its very different in my case of course, my family this is the best age sometimes you do not have to worry about a pit being full probably your parents will take care of that.

You know in my case I have to call the truck operator and there are some operators in Bangalore, who would list 2 or 3 numbers ok. The first number he would always say no sir we are completely booked second number no sir we have completely booked it is the same person ok. Third number you call him and he is like yes and you do not even want to negotiate because you are so, desperate, you know you are like sure.

So, there are such interesting business models when it comes to how they manage this business and the way they play with psychology because your toilet is filling up, your wife is upset with you, your parents are pissed. You know you do not want to keep on negotiating for 500 rupees, you are like please come right away right so, there is one way.

Another interesting model is that some people they do not even own trucks they list their numbers, I call you and then you call the trucks and you negotiate you do not your own trucks, you just have a phone number ok. So, there are also such business models where the trucks. So, what I want you to understand in this case is the informality.

As you said you do not know where to find them and when you find them you have no idea whether the truck really belongs to the person or not and these people they buy

trucks from each other. So, sometimes let us say I was owning the truck and I started business right. So, this is the truck let us say I started this business my driver is the one who is driving around right he knows the business better than I do.

So, he will start his own business undercutting me he will start his own business because he knows the business so, well that I end up losing more than half of my business and they end up buying used trucks from other people, they would not change even change the names because it is not required, its better to have an truck in a someone elses name when you are violating things.

Right because you have to dump it somewhere we will come to that ok. So, now, next is I call them I am desperate I am willing to pay you whatever you want and how many different types of pits do we can be usually find any idea? What types of pits are there?

Student: (Refer Time: 20:48).

Shapes let us think about shapes.

Student: Circular.

Circular.

Student: Rectangular.

Student: Square.

Square right. So, the typical capacity of a truck is about 4000 liters and the way they charge you if you have rings they charge you by the number of rings, each ring is about I would say 16 inches slightly more than it slightly less than one and half feet you know. So, each ring either they will charge you by ring or they will charge you for the volume based on which house they are going and again there is no real way for you to know whether the tank that comes to your house, whether it has any water or sludge earlier because the indicator starts at about half of the tank. So, that is also another thing I will show you the indicator at a later point. So, they come to you the emptier truck. But the challenge is this where is the septic tank.

(Refer Slide Time: 21:45)

Many people would not even know you ask the shape, when it was last emptied and things like that and some people would not even know they will be like, I do not know even before my grandfather was born or something right like the answer is are fascinating. And same thing happens once that truck guy comes to your house you will be in office, your wife will be at home and she is like I have no idea I where our septic tank is.

But some of them get emptied once in 7 years, once in 10 years you know we forget the floods that happened last year such a devastating flood do you remember? Really remember the septic tank of your own house many people do not. So, these people they have to go looking for that.

(Refer Slide Time: 22:31)

You know. So, that itself they charge you extra to find the septic tank because they really have to dig because once they know where the toilet pipes are coming out they have to start digging and they will eventually end up finding it ok. Then they know this business really well. So, once you do that it comes in different shapes and its made of different things right. So, what are the different ways in which septic tank as you said circular? It could be watertight; it need not be watertight if what if it is not water tight what happens?

Student: It leach (Refer Time: 23:08).

Student: (Refer Time: 23:09).

It leaches. So, what happens to the solids? It stays there and after 10 years all the water is gone what is left?

Student: Solid.

Student: Solid.

Just this monolith right like this hard concrete like block, it could be very hard to break can a truck really suck it out?

Student: No.

So, what do we do now?

Student: Add water.

I can add a water, but its not boost no I can just add water and like mix it up now.

Student: [laugher].

Right its not its like its. So, its like a rock. So, what happens is the reason why I am telling you these things is because just because there is a truck, do not assume that its all magic you know a truck can only suck a liquid of a specific viscosity right like I heard many of you are engineers. So, you understand what viscosity is. So, it cannot really suck solid so; that means, it has to be broken its really hard. So, it is manually actually broken then you add water and then you suck it that is where you need manual labor. Can you guess where else you might need manual labor? Even if the sludge is not completely solidified where else you might need it?

Student: Where that some cannot go.

Student: Remote areas.

Remote areas.

Student: Drain.

Student: For the drains.

For the drains, but I am talking one in terms of the pits itself let us stick to the pits yes drains probably.

Student: Well.

Where the truck itself cannot if the roads are narrow let us say.

Student: Narrow.

Then you cannot drive the truck.

Even if you can drive the truck in some places the toilet is in the backyard.

Student: Pipes.

Probably the pipe cannot go all the way there.

You know it usually the range is about 150 to 200 feet on a flat ground. So, the pipe cannot reach there. So, in some cases even if the truck can reach the toilet is not accessible is all I am trying to say. Even if this sludge is not solidified it still cannot easily be emptied by the truck. So, we still are dependent. So, why is that happening? We will come back to that, but remember why is it that happening?

That some septic tank is not accessible, somewhere sludge is not has completely solidified. So, why you need to keep that in mind I will come back to that question, what could be the reason why it is varying ok. And in some cases some people might have told you that they empty once in 6 months and some people might have told you they empty once in.

Student: 7 years.

7 years. So, what do you think is happening to the sludge that you are emptying once in 6 months in terms of composition?

Student: (Refer Time: 26:08).

It will be quite fresh right.

Compared to something that you have to empty once in 3 years compared to something that you have empty once in 7 or 10 years.

Student: Right.

And again we will come to this the longer it stands there is something called as digestion that happens we will come to that ok. So, in few cases its lot easier to find its just a small lid that you have to open and its very easy very clean. So, there is also that way of emptying. So, that happens.

(Refer Slide Time: 26:46)

And once they are transporting it so, now when they are transporting it interesting things happen the police they just stopped it for one or the other reason you know. So, I worked with them very closely and the this is like you might recognize this picture like he is actually talking to a police officer there and it was a very polite conversation you know I have never seen police so, polite.

You know he got down he just handed a 100 rupees he asked something and he just said something he came back it was so, quick and that is it. He said sir if they want they can stop us for hundred things and he is just stopping me for whatever reason. But the interesting thing is this sometimes the valve at the back side of the truck, it would not be completely closed and our roads are quite bad sometimes it will it loosens a bit you know based on the bumpy roads then what happens?

Student: Leak.

Sludge starts to?

Student: Leak.

Leak and in some cases of course, there is wind.

So, it can go and splash some people who are actually riding behind the truck.

Student: [laughter].

Right it can happen, but the interesting thing is this, the person who is actually riding behind the truck would not go and tell the truck driver that your valve is leaking tighten it no.

In India how do we resolve conflicts? We drag people.

Student: [laugher].

Right like the justice is served there and then right.

So, imagine the kind of harassment they go through, I am not saying that every truck operator gets beaten I am not saying that, but they get beaten for something that they could have just communicated. You know and human waste is a taboo that is a nice ring tone by the way.

Student: [laugher].

So, human waste is a taboo and if it gets spilled on your face, you would be very upset because we do not even wear helmets.

No.

Student: [laugher].

It right.

Student: [laugher].

Of course its very upsetting when right its ends right on your face.

So, when this happens, they get beaten up there is violence in that sense you know and people can do a lot of crazy things because this person also belongs to a caste; who you load you know and it is someone elses waste look at what he has done to you. You are totally touching him and beating him there and then because you want to teach him a lesson.

And then where do you dispose. So, it is very easy to make a phone call, right unlimited packs, you even you can call a truck operator just like that for fun.

Right and he comes, he finds your pit he empties it where should he take it now where do you think they take?

Student: (Refer Time: 29:49).

Do you guys even think about these things?

When you use your toilet, do you ever worry where the water comes from and where the water goes? Do you guys know how screwed your generation there is actually right now you are like we have messed it up for you to be very honest, climate change is coming for you.

Student: [laughter].

Its not just game of thrones last season.

Student: [laughter].

Here the monsoon is coming in Kerala right.

Student: [laughter].

Its not winter [laugher] its coming and then we are messing up the environment for you and you are not even thinking about any of these things.

Student: [laugher].

Student: There is no rain in Kerala.

Right? Do you know like where whether it is put up like any idea where the where water is coming from and where is it probably you know where it is going. Where is the water coming from? Where is it going see that is the thing that there is just ignorance and because of that, we really do not know what is happening to a waste. Once we flush we think it just disappears it has to go to a sewer line or it has to go to a pit these are the only two options. And in this case we know that there is no pit sorry sewer line there is a pit and that pit has to get emptied now, it has to get dumped somewhere. So, if you are the

truck operator let us say where would you dump it, let us play that game right. Where would where should we dump it? Let us say we all own a business together.

Student: Nearest possible.

Student: Nearest possible.

Student: no (Refer Time: 31:32).

Student: As far as possible.

As far as possible as nearest like as far. See if I go very far then I can only service probably only one house.

Student: Less populated area.

Less populated are ok.

Student: Diesel issue.

Student: I mean it should be fuel efficient.

It should be fuel efficient we should have a Tesla trucks to emptying.

Student: [laugher].

Student: (Refer Time: 31:54).

Ok.

Student: Even (Refer Time: 31:55).

So, what is it; what is it that, you are trying to do you do not have a place to dump it, but you know that people will be very pissed if they know that you are dumping right like even if its splashes, then you are upset. So, what would you do?

Student: Right.

You will find places where people do not see you, it could be far, it could be close right. So, there are different ways of doing that and in a place like Bangalore what truck operators do is that, they use that is called curiosity by the way.

(Refer Slide Time: 32:31)

She would not be super interested when her teacher is telling her something about maths or science she is like, but what exactly is happening?

Student: [laugher].

Now that is the type of enthusiasm we need in our students, you know she is a real student.

Student: [laugher].

Even outside the class she is learning.

Student: [laugher].

You know. So, this is a sewer line and this septic tank is actually dumping waste into the central sewer line easy solution right. So, from the outskirts take it to the central line where you have access again this is illegal you cannot do that, but this is the real country right. They keep talking about the US as the land of the brave home of the free actually it is India when you really think about it.

Student: [laugher].

You know you can do whatever you want.

Student: [laugher].

Actually it is for educational purposes this guy is doing that you know they do not teach much in their school, I might as well just get them interested in something. So, that is one way of dumping another way is called agricultural reuse again this is in the outskirts of Bangalore you know the land use is slowly changing. So, there are still some farmers and human waste is a fantastic fertilizer and also when you have to suck it, you will mix it with water. So, you need water. So, it is a great fertilizer in different mix.

So, you can use that you can dump it in an field or right next to the road not in the outskirts its looked like there is nobody it is not very far, it is not very close, but there is nobody who would object. So, these are the different ways as you can see are this is again on the side of the road, it has completely dried up because it is also a hot country it does not take much time for the water to evaporate even it will seep into the ground or it will evaporate. So, this is how it looks or you can take it to a farm land again you know. So, there are different ways of disposing this. In all these cases there is no trick right? I t is direct dumping . So, where is the treatment right? So, that is what the point I am trying to make.

So, India has about 9000 towns and cities how many faecal sludge treatment plants do we have any idea?

Student: 300.

They all are quite new and we have just about 16 operational right now and all of them came into operation just in last 1 year more or less. So, 9000 towns and cities only 16 and that too they are treating to very specific neighborhoods not to all the neighborhoods. So, that is the situation you know in terms of treatment. So, but there are some people who are reusing this in really innovative manners right what would you prefer? The waste ending up right next door or waste ending up in a field where it is actually reused right.

Student: (Refer Time: 35:49).

And the thing is this the reuse is very interesting in the sense that there are people who have created pits.

(Refer Slide Time: 35:55)

Where you go and dump it in this pit you know and sometimes a pig is also dead in the same pit as you can see. And then once it is full you are allowing to dry it for a bit and then you use it in different fields you know you can grow banana, grapes different things because the challenge is this.

Though farm owner loves it farm workers they do not want to touch it farm owner he loves it because he gets better yield right. So, I am very happy to use it, but if I ask my workers you do not want to do that. How many of you have observed that the domestic help that comes to your house, will sweep will even clean the bathroom floor they will not clean the toilet right? In the same way in many places domestic help is not allowed to use the toilet that is another case all together. So, touching human waste is a huge taboo and based on the caste of the worker some workers they do not even want to go there.

(Refer Slide Time: 37:06)

So, interestingly this farmer was super happy with the bananas and the way he uses it is through he is a very rich farmer. So, how would he use it then? And he loves faecal sludge he is look at it he is so, [laugher] happy. When have you ever seen a happier person?

Student: [laugher].

He is like happy that people are shitting more they do not want it.

Student: [laugher].

Its like he is so, happy. So, now, tell me if your workers are not interested in touching it, but you see a lot of value in human waste what would you do? How would you use it?

Student: (Refer Time: 37:45).

Student: (Refer Time: 37:46)

Ideas people.

Student: Machines.

Automation is coming most of you will not have jobs either by the way. So, you have to be very creative.

Student: (Refer Time: 37:57).

Student: (Refer Time: 38:00).

Student: Machines.

Even it is organic my worker wont touch it.

Student: (Refer Time: 38:06).

How will I use it?

Student: So, (Refer Time: 38:10).

So, I am a rich farmer, I have access to machines right. So, I can use machines to apply fertilizer, but the thing is to do that the whole field has to be cleared. So, I can apply this only once right before I actually sow the seeds. I cannot do it in the middle of the crop season ok. So, he does that; he has access to machines and he does that because his workers these are the workers.

(Refer Slide Time: 38:41)

They are taking down. We are not interested in touching it ok, but they said that you know yes we know that we are walking on this ground where this guy has actually applied all of this, but they were talking about see how most of the banana leaves they

fall and it creates a kind of a carpet and they have no problems that is one way. Another way what is happening here?

(Refer Slide Time: 39:06)

Student: (Refer Time: 39:10).

Student: The fluid is.

Student: (Refer Time: 39:13).

In India cow is holy right.

Student: (Refer Time: 00:00).

So, I will just mix it with cow on you.

People would not even see the thing is that I am not saying that everybody is doing these things, I am giving you some examples of how things are done in the field because people have really realized the value of faecal sludge. So, reuse is a reality its already happening. Waste water is being used in the periphery of some of the larger cities to grow all types of vegetables and greens and these farmers they love faecal sludge and they are using it in very innovative ways.

The problem is this the problem is that sometimes the workers would not even know what they are actually handling and the farm labor is actually shifting more and more

towards females, because men are finding jobs in nearby towns in construction in some are the other small industry tile cutting that this all of that, but women are ending up working more and more in the farm lands.

And they are also responsible for taking care of children and older people you know women are lucky we understand is not that sad, when you think about it and also majority of the agriculture that happens in our country is rain fed, there is no water to wash as soon as you do your job ok. And you have to drink water while you are working some people smoke, some people chew paan all these things happen right and if they do not know then they are actually getting exposed to a different set of diseases. So, that is something that we have to be aware of when you think about reuse.