

Municipal Solid Waste Management
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Lecture - 39
Integrated Solid Waste Management

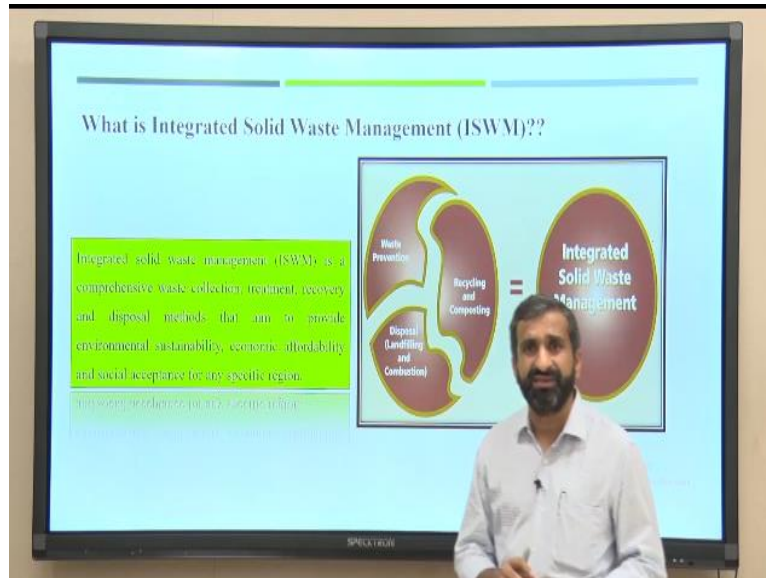
Today, we will continue another module, module 13, and this module is on integrated solid waste management and SWM rule solid waste management rule. So first, I think this module will have two lectures, one on integrated solid waste management. So what is the meaning, and which particular case we can say is an integrated waste management system?

And the second lecture on solid waste management rule, especially the duties and responsibilities, is given to the different stakeholders. So this lecture today, we start from integrated solid waste management is; one very important issue is that when you say is the integrated solid waste management plan. So most people will understand that an integrated process means there will be a different kind of treatment process or disposal facilities.

Like in the same, the plan is including sanitary landfill and composting plants maybe incineration plants also that they usually understood as an integrated solid waste management plan, but it is not true the that is why I thought of to how one particular discussion onto the integrated solid waste management plan or system and also need to know that how the one local corporation or local authority or ULB will prepare the plan.

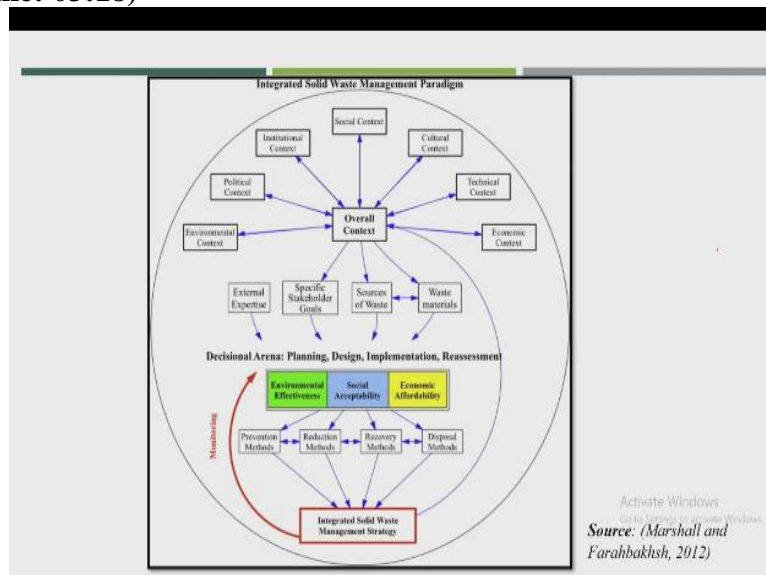
This plan is mainly explained in the manual solid waste manual 2016, so I thought this should be known to the students and how the corporations typically plan the entire solid waste management plan.

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So first, we will start from the integrated solid waste management, so first of all, what is the meaning of integrated solid waste management? It is a comprehensive waste collection treatment recovery and disposal method that aims to provide environmental sustainability economic, proper and unique social acceptance from the specific region. So there are few essential ideas about integrated solid waste management is; it includes all physical elements of municipal solid waste management based on environmental sustainability economically. Finally, it should be accepted by the local areas socially also it should be obtained so this is called integrated solid waste management system.

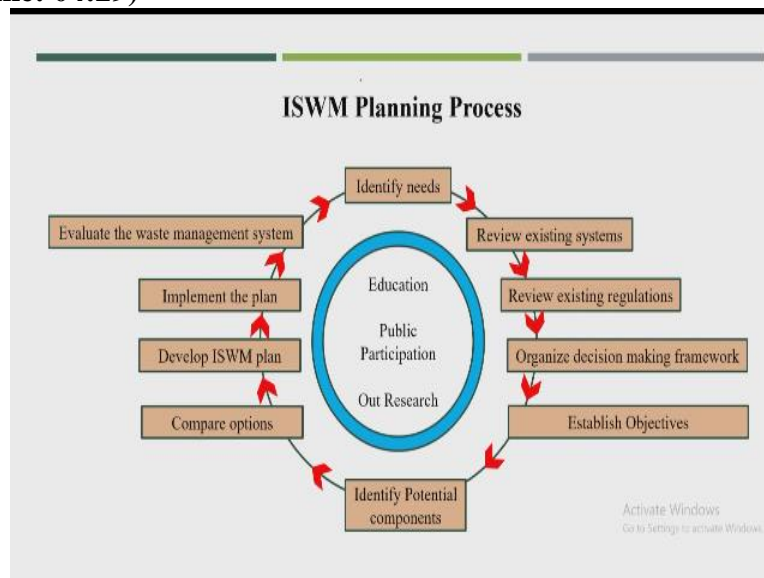
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So when we talk about integrated solid waste management strategy, which includes the entire issue about the solid waste management system that starts from the culture, technical, economic these all the social and economic or technological context and after that, it also includes the waste material. What kind of sources different stakeholders.

And finally, it will go to the planning or designing or implementing an integrated solid waste management plan. That has to be also except on the three bases like environmental. The social and economic constraint has to be except and based on how best we can prevent the waste from reducing the waste recovery or how best we can dispose of the waste that is generally called an integrated solid waste strategy.

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So what is the ISWM or integrated solid waste management planning process normally? It will start from reviewing the existing system, existing regulations available in the particular region, a particular city or particular state and then organise the decision-making framework by calling the different stakeholders, and then finally you establish the objective.

So once the objective is finalised, try to identify the potential component; once the objective comes up, we can go for a treatment process like biological treatment or chemical treatment, which then see the potential element. Then compare the option what are the different options, and based on that, you develop the integrated solid waste management plan and once the plan is ready.

Then try to implement how best we can implement that and then evaluate the complete waste management system. So likewise again you can go by supposing if you are not benefiting the particular object or is not possible to achieve then again go the same way. So likewise, we can go for integrated solid waste planning.

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PHYSICAL ELEMENTS

The **three physical elements** that all needed to be addresses for an ISWM system to work well and to work sustainably over the long period are:

- 1) **Public health (Collection):** Maintaining healthy conditions in urban conglomerates, particularly through a good collection services.

Public Health



Do's

Don't

When you say the integrated solid waste management plan or system or strategy, we will usually talk about the three physical elements and three governance features. So there are six features or components are need to be discussed under the integrated solid waste management plan strategy or process. So first, we will start with the physical elements, so three physical elements need to be addressed.

The first is public health so now what is the benefits of ISWM is that we usually called as a collection by proper collection. So, rather than collection, why not call public health so the objective could be how based we can see the public health of the local people. So, we can maintain public health properly, thereby maintaining the healthy condition in the urban locations, mainly through good collection services.

So suppose these kinds of collection system like the house to house collection systems are available like as it is started in the Swachh Bharat mission that is the best kind of primary collection and secondary collection could be possible but if you have other these kinds of collection or storage. So I think it is not good actually, and because of that, many public health issues will come up.

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PHYSICAL ELEMENTS

The **three physical elements** that all needed to be addresses for an ISWM system to work well and to work sustainably over the long period are:

- 2) **Environment (Waste treatment and disposal):** Protection of the environment through the waste chain, especially during treatment and disposal.



Efficient Treatment facilities for implementing successful ISWM. Activate Windows
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Next is the environment, so know how best we can maintain the environment. So this environmental condition will be maintained especially by waste management and this waste treatment and disposal if you can adequately treat all kinds of collected waste and the proper disposal of entire waste. So then is good for the environmental conditions in the local area so by appropriate protection of the environment where waste chain especially during treatment and disposal.

So if you have these kinds of recycling processes, which I showed in some photographs, proper recycling process, proper treatment process, proper sanitary landfill facilities are available in the city to easily maintain the local area's environmental condition.

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3) **Resource management (Recycling and organic material, "4Rs"):** '**Closing the loop**' by returning both materials and nutrients to beneficial use, through preventing waste and striving for high rates of organic recovery, reuse and recycling.

- Prior to the industrial revolution, most cities had few material resources, money was scarce and households had more needs than they could meet. Wastage should be minimized, products should be repaired and reused, materials should be recycled and organic matter should returned to soil.
- Many developing and transitional country cities still have an active informal sector and micro-enterprise recycling, reuse and repair systems, which often achieve recycling and recovery rates. The informal recycling sector has shown to save the city 20 percent or more of its waste management budget.
- The priorities of good resource management are expressed by the '3 Rs' – reduce, reuse and recycle. The last "R" can be further split between dry recyclables and bio solids or organic wastes.

And the third point is resource management; this is also one of the most important physical element of ISWM under how this resource management could be possible by properly

recycling dry waste and getting the product from the organic material. So in this one, if you talk about the 4R's, we usually know the 3R's that I am showing in the next slide.

The 4R and closing the loop by returning both material nutrient to beneficial use prevent waste and strive for the high rate of organic recovery and reuse and recycling. So these physically they went normally see when you talk about the solid waste management plan. Usually, we will talk about the collection. We will talk about the treatment we will speak of disposal, but these kinds of physical elements are not possible until you talk about resource management.

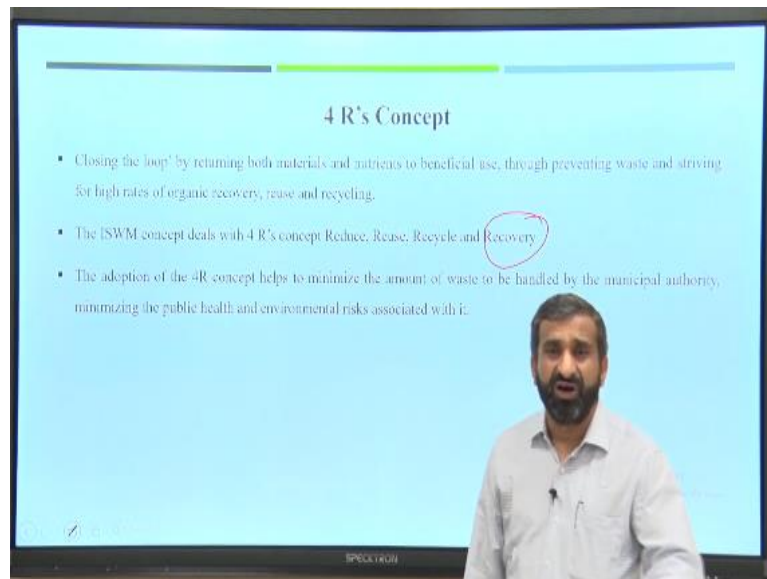
Because many materials are getting recyclable and treated, and getting product out of that is essential. When you talk about the treatment, you always thought about what kind of or how based you can get it some kind of resources out of that like for example, most of the dry matter like metal, glass, paper, rubber, leather this is all recyclable one.

And these this is also becoming one of the very good resources out of that and most of these materials are combustible also you can get energy out of that is also another one kind of very good product will come out of that or resource will generate out of that and when you talk about the biological treatment processes. So in the composting, we will get very good quality compost if you can manage the proper composting plant in anaerobic digestion.

You will be able to produce methane gas. So this is also one very good way to produce renewable energy from our reduction process. So almost all kinds of treatment processes are recycling processes that will produce resource out of that. So usually, this resource management in most of the city is not done by the formal sectors like a corporation.

Because they will be all busy with the collections and disposal only but they never and that kind of funds also was not available with them but is good as the Swachh Bharat mission most of the cities got a good amount of fund. So let us see that many cities will come up with a treatment facility or proper disposal facility. Still, these informal recycling sectors are so it sectors is around saved 20% off more waste management budget because there are several recycling reserve facilities available from the informal sectors. So you know the 3R's is a reduce reuse recycle.

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So this is the 4R's concept, usually this 4th R given for developing countries, especially India. So, closing the loop by returning both material nutrients to the beneficial use, so these 4R's means the first is the reduce so as possible as reduce, reuse as possible and recycle and now the 4th R is an either special this loop will get close by returning material or nutrient to the benefits you this R is a specially I think many textbooks you will find is a recovery their writing.

So but I think I will not say I put it here because most of the textbooks also you will find this recovery one but see this is recycled also is one kind of recovery these other than recovery. The important thought about developing countries like India these R is for return nutrients to soil. I think that is the best word in the by R does return nutrients to soil means what the definition of that is?

The nutrients will be returned to the soil by producing compost from the wet waste, this compost will have a lot of nutrients, and these nutrients are getting returned to the soil because the same waste has been generated in the soil under a lot of nutrients taken from the soil and to come up with the as a portion of food for the humans. So, why not the same nutrients we need to return to the soil. So that is a good idea for the developing countries like India, even the South Asian countries or even the African countries if this kind of idea is very important to propose.

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4 R's Concept

- **Reduce**
Buy less: buy products that use less packaging or that last long
- **Reuse**
Buy reusable: rechargeable, refillable, etc.,
- **Recycle**
Reusing materials or recovering valuable materials from waste or scrap
- **Return nutrients to soil**
By composting or digesting organic wastes ("bio-solids") – Plant and animal wastes from kitchen, garden and agricultural production, together with safely managed and treated human excreta. These are sources of key nutrients for the agricultural value chain, and their proper utilization is important to food security and sustainable development.

So it is a reduce, reuse, recycle and return nutrients to the soil so by composting we can easily have the particular nutrients we can also return to the soil. So it will close the entire loop.

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ISWM Governance Features

- ❑ The governance strategies to deliver a well functioning system of ISWM until the 1990s would probably have been framed primarily around technology; but there is consensus today on the need for a much broader approach.
- ❑ Three interrelated requirements for delivering ISWM are distinguished under the framework of 'good waste governance'.
- ❑ There is a need for the system to:
 - 1) Be **inclusive**, providing transparent spaces for **stakeholders to contribute** as users, providers and enablers.
 - 2) Be **financial sustainable**, which means cost effective and affordable.
 - 3) Rest on a base of **sound institutions and pro-active policies**, without such a strong and transparent institutional framework the system will not work well over a long term.

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Now governance features so there is three governance feature so the governance strategy to deliver the well functioning system of ISWM until 1990 would probably have been framed privately around technology, but there is a need for governance. So government participation is very important, or some of the governance features are also important. So this is the one that earlier even 90s we always talk about the technology.

We required spatial technology to treat mixed waste; likewise, we used to discuss; we never used talk about some governance features also are important to have a proper management system. So this good waste governance there are three major governance features firstly is

inclusive. So is an inclusive providing the transparent space for the stakeholder to contribute as the user.

Next is financially sustainable, and third is the sound institutions and proactive policies. Now here you understand that it should be whatever plan you make it, it should be inclusive. So what is the meaning of inclusive means? All the stakeholders should contribute to it. So this is one of the very important points now what is normally the plan proposed by the local authority that how ways they can collect the waste and dispose of the waste.

But I think they never talk about the generators; they never spoke about the rag pickers or informal sector; several NGOs are working with the waste management. They never used to talk about them so many times see suppose some corporation is starting some insulation facility. They never thought about 100s of rag pickers they are continuously collecting or from the last few years.

They were collecting the recyclable matters for the and so suppose if you have the one particular insulation plan not to collect that waste. So I think you need to discuss with them also their inclusions also is very important for next is the financial sustainability. So this is very important to see a project if it is not financially sustainable and extend that project for 20 years or 25 years.

When you are saying see, when we talk about the treatment processes, we should talk about the resource generation out of that. So is not only the resource generation we you produce the compost is okay. But need to see that whether that compose should get compost can get some kind of fund that can be sold and get some out of some kind of fund out of that can generate fund out of that.

Biogas, see you can install the biogas plant, and you are saying that our city is having a very good biogas plant and reactor. But, suppose, We have installed a biogas plant and not been able to utilise that particular biogas for energy production. What is the benefit of such kind of plan, you can say that you reduce the waste or you maintain the waste by having this kind of treatment facility but how these plants will work for next 20 years or 25 years?

Because, obviously, capital funds can be generated by selling these types of products, but capital funds will be obtained from either the state or federal governments to operate such a facility. Because all of these treatment processes will necessitate a large number of person-hours, as well as a large number of maintenance issues, you will require funds. Now, every year, will you ask these corporations to request funds from the state or federal governments? No.

They must rely on themselves, which necessitates financial sustainability; however, I have yet to see any corporation discuss sustainability. So, while sustainability may not be possible in the first five years, it may be possible in the next ten years. No problem, but at least you're attempting to become self-sustaining. So that is the idea, and the next important governance feature is strong institutions and proactive policy.

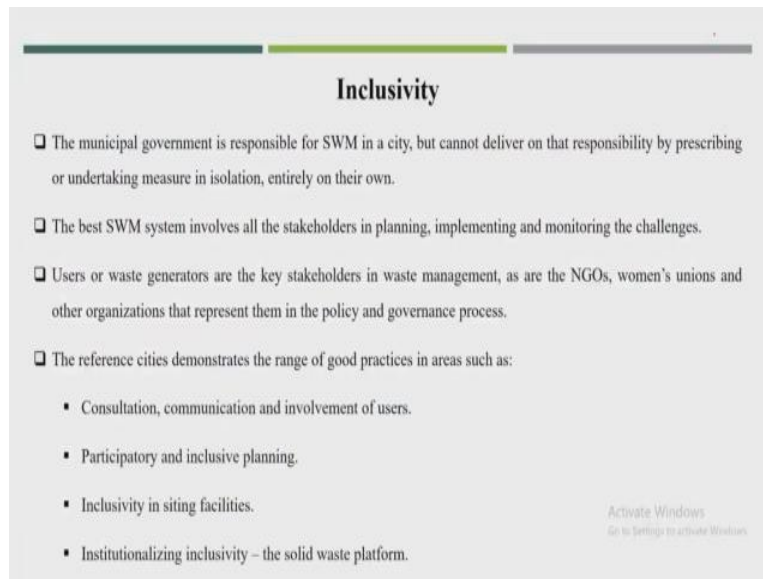
So, in general, we do not have sound institutions in India. I believe you can say that those are also we Swachh Bharat mission started by ministry, but these ministries work for the entire environment. The rules are created by a separate ministry known as the Ministry of Environment. So, they have their ways, but we need sound institutions, some particular institutions, and even academic institutions, which we do not have.

Like did you find anywhere the special degree on solid waste management for even the for solid waste management also. I think these course to study these course are hard to get admission in IITs are very big institutes in India after passing the gate exam in the very good score. Then only you will get admission in such colleges and then only you will study these kinds of courses.

So you use what is required, and the problem is that there is a lot of manpower involved in solid waste management programmes, but we are that skilled manpower. No, they are learning through their work in the plants. As a result, they lack skill; therefore, special institutions are required to develop skill in those manpower and special productive policies. So getting some money to the local government every year is not something that happens once every 15 years or once every 20 years.

You get a capital fund, perhaps a few crores, and as a local authority, starting some plants and running them for the next 20 years is not possible because continuous funding is required. So,

until the local government does not pursue or achieve sustainability, you must fund them, and specific policies must be implemented. (Refer Slide Time: 21:39)



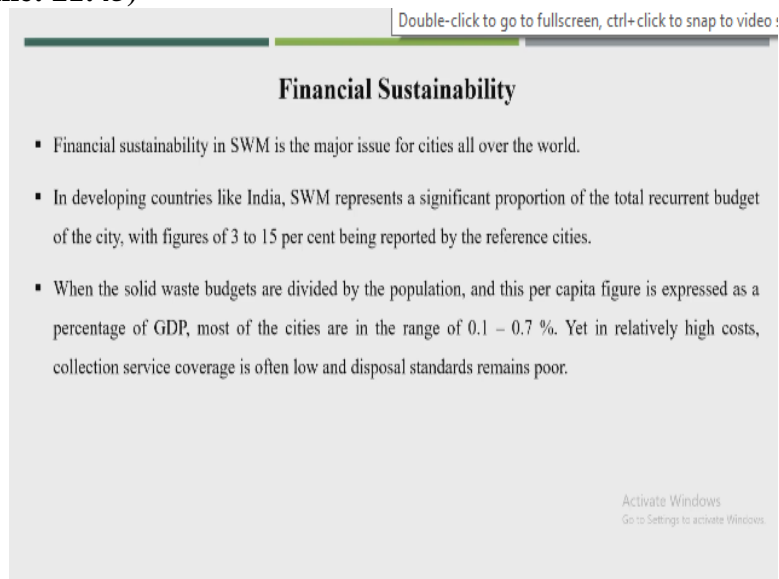
Inclusivity

- ❑ The municipal government is responsible for SWM in a city, but cannot deliver on that responsibility by prescribing or undertaking measure in isolation, entirely on their own.
- ❑ The best SWM system involves all the stakeholders in planning, implementing and monitoring the challenges.
- ❑ Users or waste generators are the key stakeholders in waste management, as are the NGOs, women's unions and other organizations that represent them in the policy and governance process.
- ❑ The reference cities demonstrates the range of good practices in areas such as:
 - Consultation, communication and involvement of users.
 - Participatory and inclusive planning.
 - Inclusivity in siting facilities.
 - Institutionalizing inclusivity – the solid waste platform.

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So same thing here also I wrote it you can read this.

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Financial Sustainability

- Financial sustainability in SWM is the major issue for cities all over the world.
- In developing countries like India, SWM represents a significant proportion of the total recurrent budget of the city, with figures of 3 to 15 per cent being reported by the reference cities.
- When the solid waste budgets are divided by the population, and this per capita figure is expressed as a percentage of GDP, most of the cities are in the range of 0.1 – 0.7 %. Yet in relatively high costs, collection service coverage is often low and disposal standards remains poor.

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So, financial sustainability, as you can see in developing countries like India, is SWM represents a significant proportion of the total recurrent budget of the city, with figures ranging from 3 to 15% being reported by the reference city. When the solid waste budgets are divided by the population, these per capita figures are expressed as a percentage of GDP.

However, in relatively high-cost collection services, coverage is frequently low, and disposal standards remain deplorable; this is the one issue with financial sustainability. As a result, the first and most important step is to establish the current cost of service and a baseline for

comparing the cost of any proposed improvements to the waste management system. (Refer Slide Time: 22:45)

Sound Institutions and Pro-active Policies

- A strong and transparent institution framework is essential to good governance in solid waste. Without such a framework, the system will not work well over the long term.
- Indeed, it was suggested at the 2001 UN – Habitat world Urban Forum that the cleanliness of a city and the effectiveness of its SWM system could be useful as a proxy indicators of good governance.
- If waste services are to be effective, a city must have the capacity and the organizational structure to manage finances and services in an efficient and transparent manner, streamline management responsibilities with communities, and listen to users.

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And similarly, sound institutions
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Reflections of ISWM

Municipal solid waste and climate change

ISWM creates revenue

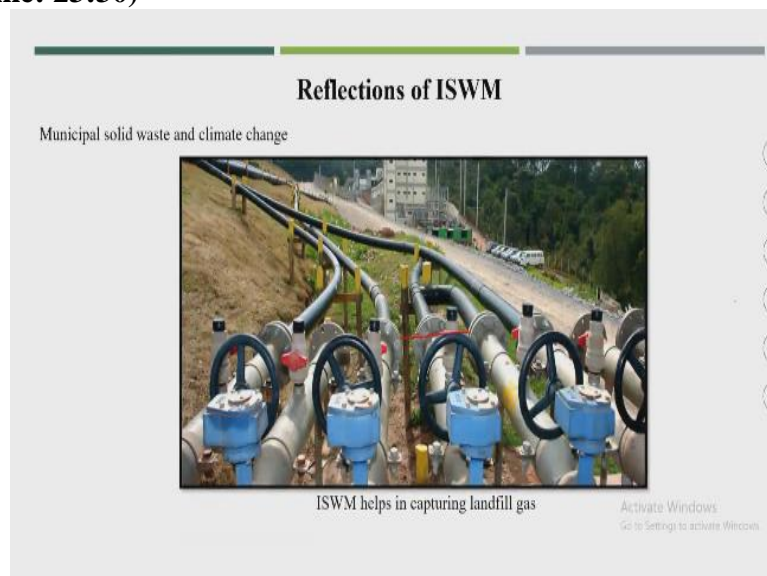
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There are now some ISWM reflections with solid waste municipal solid waste management, and climate change. So, I believe that if you have a proper solid waste management plan and/or an integrated solid waste management plan, you can reduce carbon emissions and, as a result, we can get a lot of funds from a low-carbon scenario. (Refer Slide Time: 23:21)



And waste recycling so obviously we can reduce the, we can maintain proper climate change by waste recycling by capturing landfill gas.

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So that the it would not create problem to the environment.

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Gender equity aspects

- This requires interventions to protect women from the harmful effects of unhygienic practices which also affect their social functions in childcare and family food supply.
- The MSWM system design should therefore consider the health and safety concerns of women.
- The MSWM system should also engage in a social impact assessment to bring gender gaps to the forefront for systematic analysis and corrective and appropriate responses.

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This is one slide for gender equity considerations. I believe I will keep these slides because they are particularly useful in the solid informal sector. If you look at the number of females who work in solid waste management, you will notice that even children are employed in the solid waste management system. As a result, integrated solid waste management must be designed in such a way that proper gender equality aspects can be maintained.

So this is not only the males are working for the waste management and females are not working? So only females will walk for street sweeping under they should not be allowed or they are not allowing at disposal sites it should not be like that. So try to maintain female equity because many man powers are working in solid waste management projects.

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Informal sector integration in MSWM

- ISWM involves various stakeholders
- The integration of the informal sector into the formal MSWM system through resident welfare associations (RWAs), community-based organizations (CBOs), non-government organizations (NGOs), self-help groups (SHGs), and private sector will contribute to the reduction of the overall MSWM costs, provide support to the local recycling industry, and create new job opportunities.



Kabadiwala system

Similarly, we have seen informal sector integration in governance features that are also inclusive. So inclusiveness should include more than just government participation or

participation by government companies or government authorities. However, the informal sector, such as NGOs, CBOs, community-based organisations, self-help groups, and some private sector, should also be included.

Now, in 2006, when these PPP projects were launched under the JREM programme, this discussion was also launched. So, when you hear the term PPP project, it refers to a public-private partnership. So, a local authority is a local government, and a private company is a private company. Now, as these discussions have progressed, only the collaborations between the local corporation and the private company have been raised.

What is the role of other stakeholders, such as generators, household people, or enablers, in this? So that is why this was one, and second, the rag picker has a large population in the city of rag picking, where there are a number of NGOs, CBOs, and self-help groups. As a result, they must be at least to be considered for these types of programmes.

So, I personally believe that, as in NGOs, these are also large groups, so why can't these NGOs be, except that, in the primary collection, they may not be able to go to a treatment and disposal facility. Because it is a massive task for them, at least for primary collection. They can assist in primary collection, which is why I am proposing that NGOs assist in primary collection.

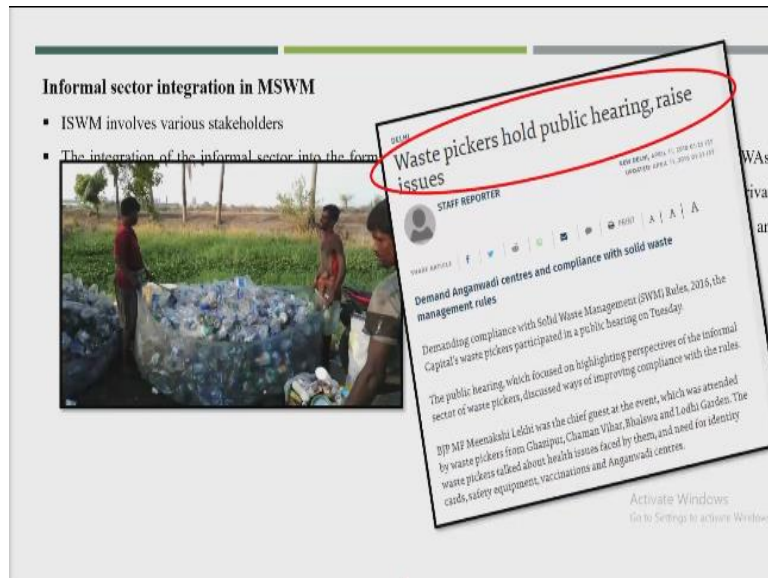
You must first educate the locals, and this includes not only providing proper waste, but also segregated waste. As a result, you will need to be aware of a variety of issues. So, why not delegate that task to NGOs so that they can raise awareness first? Then, they can talk to each household and explain what the benefits of segregation will be and how best they can do the segregation in the house.

So that kind of integration should be required, and also because these informal sectors are no longer coming under official jobs because they are in the informal sector, so by assigning this specific task to them, there are a number of rag pickers if you have one particular type of recycling facility near the disposal site or maybe somewhere very close where a number of rag pickers are required.

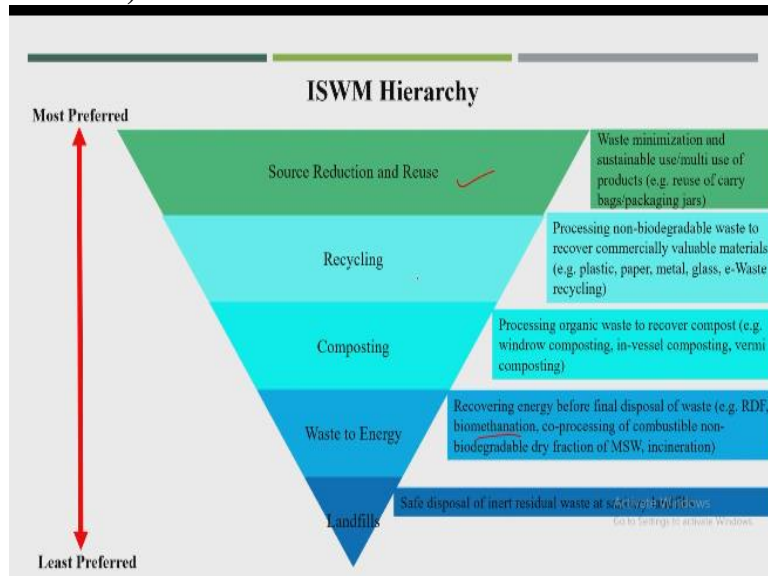
So, and ask them to collect recyclable materials so that we can pay them and give them proper jobs, and as a result, you can ask them to wear proper clothing, shoes, and whatever else you

can provide them. So they will enjoy themselves as well as work for you, as long as they are properly compensated. As a result, they can accept it as one of the working people for the along with the local authorities.

So, similarly, in the Kabadiwala system, there are a number of Kabadiwala present, so why not include such people? Furthermore, there is one piece of news that where speakers hold public hearings raise issues. **(Refer Slide Time: 29:03)**



And also, there is one news that where speakers hold public hearing raise issues. **(Refer Slide Time: 29:16)**

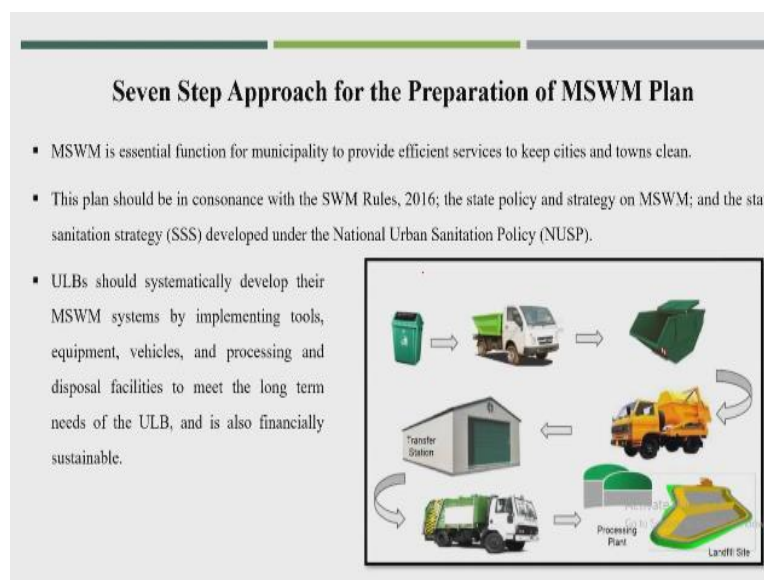


When discussing the hierarchy of integrated solid waste management, what should the hierarchy of integrated solid waste management be? As a result, this is the preferred to least preferred hierarchy of an integrated solid waste management plan. So, starting from the source, the most preferred point is reduction and reuse, followed by recycling. Assume you're making

a plan right now. So, the first thought that should come to your mind or come to the local authorities should be how best you can reduce or reuse the waste. When you have a solid waste management plan or an integrated solid waste management plan, then you talk about composting, which is the best way they can go for recycling, recycling of all valuable matters, and then you talk about how best they can go for reducing reuse and recycling.

All types of biological waste can be taken out and composted, or biogas facilities and anaerobic digestion facilities can be used. You can think about it and then decide whether to convert waste to energy. If possible, waste to energy, and now waste to energy, we can get some kind of energy, perhaps even under these biomethanation or anaerobic digestion, which you can also propose under waste to energy.

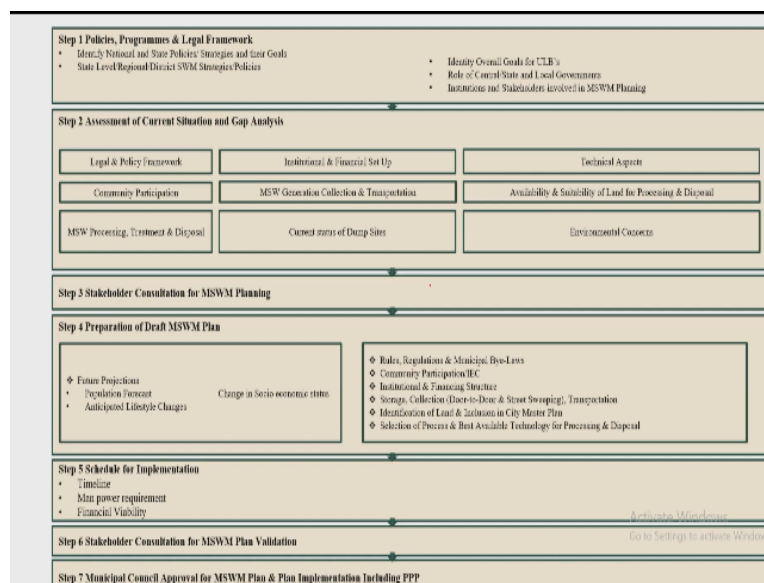
If landfilling is the only option left, then whatever is not possible for source reduction, recycling, composting, or converting waste to energy will end up in the landfill area. This is the proper hierarchy of the integrated solid waste management strategy or plan. However, I believe that in India, rather than discussing this, the first priority will be a landfill, and then we will discuss recycling, composting, or waste to energy, which is not a good idea. **(Refer Slide Time: 31:44)**



Now, the 7-step approach for MSWM plan preparation has been proposed under the solid waste management plan, which I found to be very good. So I'll just share a few key points because I personally believe that this approach is very beneficial to the corporation. Because there are a number of class 2 and class 3 towns in India with populations ranging from 1 million to 0.1 million people recycling at the district or taluk level.

And if you talk to them about solid waste management plans, many of their staff are not well aware of the plan preparation. So these approaches will help those kinds of corporations where the proper or maybe proper staff are not available to understand and by that way, they can come up with a particular plan. So these plans should be along with the SWM Rules 2016 and the states sanitisation strategy developed under the national urban sanitation policy.

So you should systematically develop their MSWM system by implementing tools, equipment, vehicle processing, and disposal facilities to meet the long-term needs of the ULB and these are also financially sustainable, so these are the various steps. **(Refer Slide Time: 33:35)**



So step 1 is a policy programme and legal framework, step 2 is assessing current situation and gap analysis and the stockholders is given here in step 1 what will be the stockholder in step 2 assessment of current situation gap analysis. What are the stakeholders or what are the aspects has to be looked upon into this particular step. Third is the step 3 is a stakeholder consultation of MSWM planning.

So, the third point is that once you have completed the assessment, current situation, and gap analysis, we will conduct stakeholder consultations and prepare a draught MSWM plan based on the consultations. Where there is a population forecast, different rules and regulations apply. You can create a draught proposal, and then once the proper draught proposal is ready, they must follow the step 5 schedule for implementation.

So timeline, manpower, financial viability that will become prepared and once the draft proposal with the schedule again will go first stockholder consultation. So again will go to the

step 3 and will have discussion there with all the stakeholders and once everything is accepted to all the stockholders will go to the step 7 municipal council approval for MSWM plan and implementation including PPP.

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Step 1: Policies, Programmes and Legal Framework

Step 1 entails a detailed review and analysis of national, state, and municipal laws, rules, policies, programmes, and guidance that are related to MSWM. The ULB shall prepare a list of all mandatory and recommendatory actions as per the MSW (M&H) Rules, 2000; SWM Rules, 2016; the NUSP; the service level benchmarks (SLB) for MSWM service provision; the FCO, 2009, 2013; and all other relevant policy guidance to ensure that the MSWM action plan is developed within these framework.

Step 2: Assessment of Current Situation and Gap Analysis

The municipal authority should carry out a critical assessment of the current status of SWM in the city as per national, state, and local level rules, policies, and strategies for MSWM governing the ULBs. The assessment should clearly bring out the deficiencies or gaps that need to be bridged to meet the legal obligations. The assessment should also focus on the waste quantification and characterization. This is essential as quantities and composition of waste vary widely in urbanization and affluence.

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So also I explained step by step, so step 1 is to create the policies or legal framework for the local authority; step 2 is the important step because before making any plan go for first the current situation and gap analysis. Now here to assess the current situation gap analysis. I particularly believe that each corporation needs to talk with some experts; these experts could be private and are in industries or academic institutes.

Several academics professors like in the IIT or NIT or other central colleges or state colleges where the researchers are working. I think I believe that because there are a lot of data that has to be collected and also the quantification and characterisation study has to be performed into this particular step. Otherwise is very difficult to understand what should be the current situation and gap analysis is not possible. This characterisation also is challenging; we had one module on to the characterisation.

So obviously I think if the local authority is involved some academic faculty or professors is good for them also a lot of discussions and a lot of the new understanding will come up in this step.

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Step 3: Stakeholder Consultation for Municipal solid waste management Planning

Due to the number of institutions and stakeholders involved in MSWM, it is important that the MSWM plan, which aims to bridge the gaps or improve the level of service, is developed through a consultative process. Stakeholders' views and their willingness to participate and pay for the service are also to be considered.

Step 4: Preparation of draft Municipal solid waste management Plan

Considering the identified gaps, future population projections and waste generation rates, current and future quality and quantity of waste (based on changing lifestyles and economic status), inputs from stakeholders, financial situation, and technical capabilities of the ULBs, the municipal authority should prepare its draft short term and long term MSWM plan.

Step 5: Schedule for Implementation

The municipal authority should specify needs for institutional strengthening and financing. Subsequently, an operational plan should be prepared as an integral part of the MSWM plan. An implementation plan, indicating allocation of resources and specifying timelines, should be prepared. Public private partnership (PPP) for infrastructure development and service delivery may also be fully explored during this exercise.

So once step 2 is known, we can go to the stockholder consultation and talk to them. This is what the current situations are available and as for current situation will come up with particular gaps like gaps could be like we do not have a treatment facility we do not have sanitary landfill is available under the current situation is saying that the waste is highly biological could produce good quality of product through composting or biological treatment facility.

And also required the particular facility for the sanitary landfill; likewise, we can share with the stakeholders and discuss with them and once the discussion is over. Then we can develop a draft municipal solid waste management plan draft plan by sitting with all technical people in the corporations or with some outside academicians or some researcher can by the researcher's participation also could possible into while in the preparation of a draft proposal.

Then create the schedule for implementation because of the timeline financial viability manpower requirement that has to be discussed.

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Step 6: Stakeholder Consultation for Municipal solid waste management Plan Validation

Provision of effective SWM services is substantially dependent on community behavior and practices. Therefore, citizens and stakeholders should be made aware of the plans and consulted before finalization of the MSWM plan.

Step 7: Municipal Council Approval for Municipal solid waste management plan and plan implementation including Public Private Partnership

The final MSWM plan is to be presented to the elected body of the local authority to seek approval and to officially formalize the plan. Council should be made aware of the short term and long term actions to be taken and should also approve the financial plan and necessary institutional strengthening for implementation of these actions. The services to be outsourced (PPP model) or private operator should be made aware of the MSWM plan made by the ULB. Contracting models should be transparent and performance based. Both the ULB and PPP operator should be accountable for their roles to ensure successful and sustainable project implementation.

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And then once it is over, you go to the exact stakeholder consultation and share them; this is what has been the thought come up into the proposal like the discussion the point I was discussing about. When you plan for an insulation facility, you need to also look upon and talk about the stakeholders, keep them will start some insulation facility. So the all-recyclable matters they will not be able to collect, so maybe they can also oppose and suppose they will oppose or do not find much beneficial.

Again we will go back to the draft proposal preparation so likewise we can go again and again and again have the stockholder; that is why see step 3 and step 6 are mainly given for the stockholder discussions so that every time whatever the proposal you come up. You discuss with the stockholder, and finally, once the stakeholders are accepted, all the points are whatever the local authority has created the proposal.

Then finally, it will go to the municipal council approval for the solid waste management plan. Eventually, this plan will be accepted and implemented, so this is the best way to prepare the solid waste management plan. **(Refer Slide Time: 40:16)**

Role of State and Regional Level Authorities

- The Secretary-in-charge of the Urban Development Department (UDD) of the concerned state or union territory has the overall responsibility for the implementation of MSWM systems in cities and towns in line with SWM Rules.
- UDD is required to prepare a state policy and strategy for MSWM in the state.
- UDD has to report on SLBs for SWM service provision in ULBs to the Ministry of Urban Development (MoUD).
- UDD is also responsible for approval of land transfer from state to ULBs (for all projects).
- States have the power to regulate the creation of staff positions (technical and nontechnical) in the ULBs.
- The State Pollution Control Board (SPCB) is responsible for monitoring the compliance with the MSWM plan and the SWM Rules. And it is authorized to give environmental clearance to facilities as listed in the Environmental Impact Assessment (EIA) Notification, 2006.
- The power to authorize municipal authorities or operators to set up treatment and disposal facilities also lies with the SPCB.

And now the role of state and regional levels authority like a secretary in charge of the urban development department of the concerned state or union territory has the overall responsibility for the implementation of MSWM system in the cities and town the line of ISWM rule and the same urban development department is required to prepare a state policy strategy for MSWM plan and same.

The urban development department has to report to the state bodies for SWM service provision and SLB, ULB to them to the ministry of urban development and same UDD is also responsible for approval of the land transfer from the state to be will be states have the power to regulate the creation of staff position like technical non-technical and also the significant role by state pollution control board is responsible for monitoring the compliance with the SWM plan and SWM rule.

It is authorised to give environmental clearance to facilitate the listed in the environmental impact assessment notification 2006, and the power to charge municipal authority or operators to set up a treatment and disposal facility also lies with the state pollution control board. So I think these are significant roles by state and regional level authorities like especially the urban development department, so the secretary is playing the significant role here and after that for implementation ULB is the important one, and monitoring state pollution control board is essential stakeholders. **(Refer Slide Time: 42:11)**



So this is one news that state commit to waste segregation at source but decentralisation and not yet a priority this was one news.

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Need of Local Solid Waste Management

- To develop the MSWM plan and services, ULB's has to assess the inadequacies in present SWM system and review on the current system.
- Local conditions shall be considered while assessing the inadequacy of existing service and planning for the future with due consideration of local demography, physical location, growth objectives of the ULB, as well as social and environmental conditions.
- The assessment of baseline scenario should consist of existing regulations, considerations, policies and guidelines.

So why because we have a plan, we have a lot of ideas, but still such kind of news are coming why because there is a need of local solid waste management plan? To develop an MSWM planning service, ULBs has to assess the inadequacies of in present SWM system and review the current system. So local conditions shall be considered while evaluating the inadequacy of existing services, and the idea is a local what is the meaning of local solid waste management.

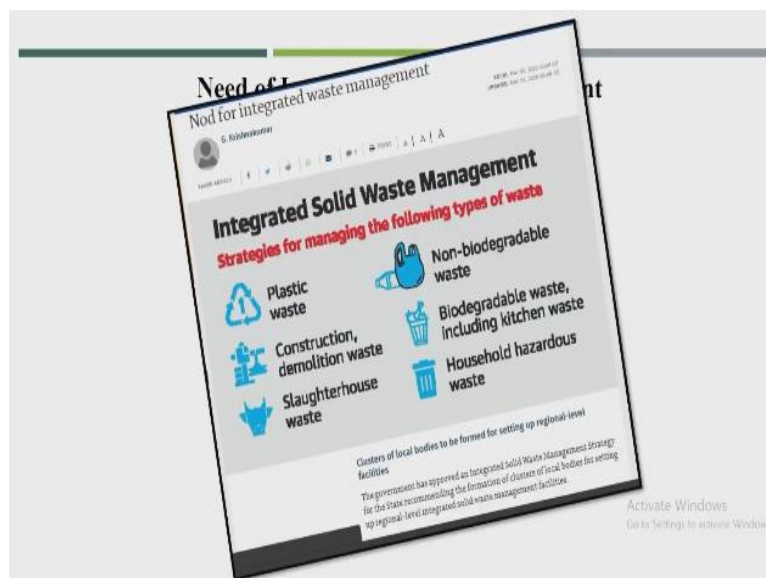
So it again depends upon the local conditions. I will not say it is a climatic condition local geological, climatic condition like take an example of the northeast part of India where rain is more than six months somewhere eight months rain in a year or hilly conditions in especially

in Meghalaya or Arunachal Pradesh so, in that case now whether the priorities in the other part of India.

In the plain areas, like they can have a very big sanitary landfill, they can have an extensive composting facility in the open areas. So is it possible to do it in these kinds of areas? No local condition says the eight months of rain means you cannot have the landfill is very difficult because your groundwater table will be very high. So, it isn't easy to have sanitary landfills in such areas.

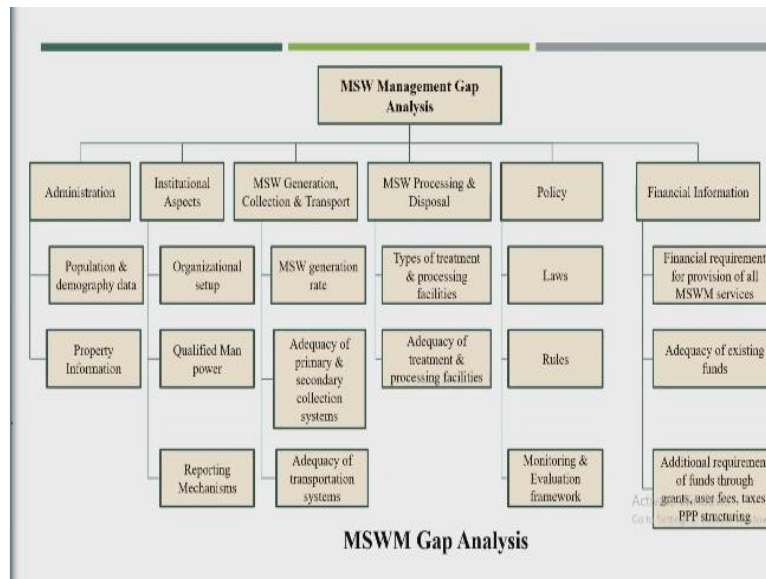
Even the sanitary landfills, the type of sanitary landfills will be different in the hilly regions; we cannot go for simple excavation or area methods. We have to go for depression kind of landfills, but they are also if you how the landfills in the hilly areas. There are many leachate productions, and many pollutions will come up in both the case because the local condition says that need to have more treatment facility should be provided.

So rather than looking onto the other states in the other part of India, they need not have similar facilities. So here we especially will be required more info house to house collection system is very important segregated way under treatment is more priority in other than the landfilling I think that is what the local solid waste management plan also needs to be discussed. **(Refer Slide Time: 45:24)**



So this is solid waste management strategies for managing the following type of waste like this one news.

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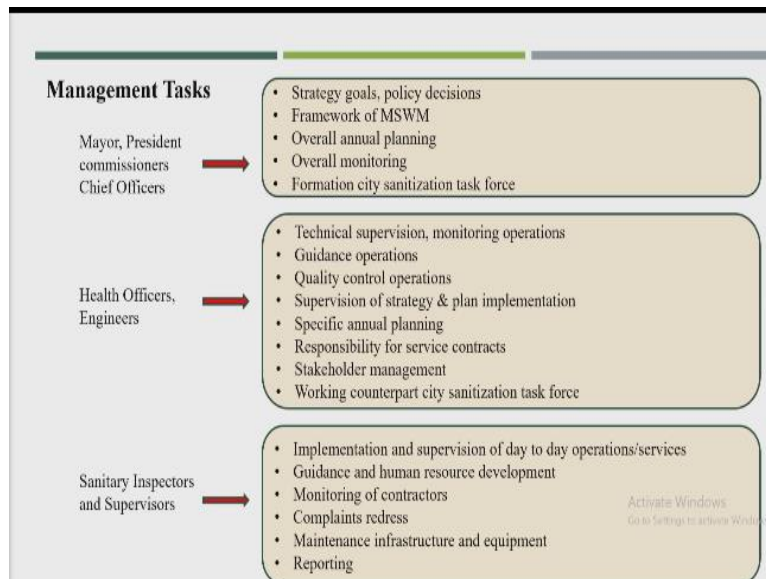
This is the gap analysis of solid waste management when you check up any or when you are going through any solid waste management plan reports. So try to go through this detailed gap analysis and see whether such kind of project or such kind of plan is prepared based on the proper technical and non-technical understanding. **(Refer Slide Time: 46: 04)**

Role of Stakeholders in MSWM Planning

- A core team or advisory team, also called as internal stakeholders, may be constituted for developing the MSWM plan.
- The commissioner or chief executive of the ULB should lead the internal stakeholder team.
- Typical stakeholders for a MSWM system include households, businesses, industries, informal sector, local government, NGOs, CBOs, SHGs, women's groups, secondary school and college students, or members of other institutions who may have a role in ensuring the involvement of the community.

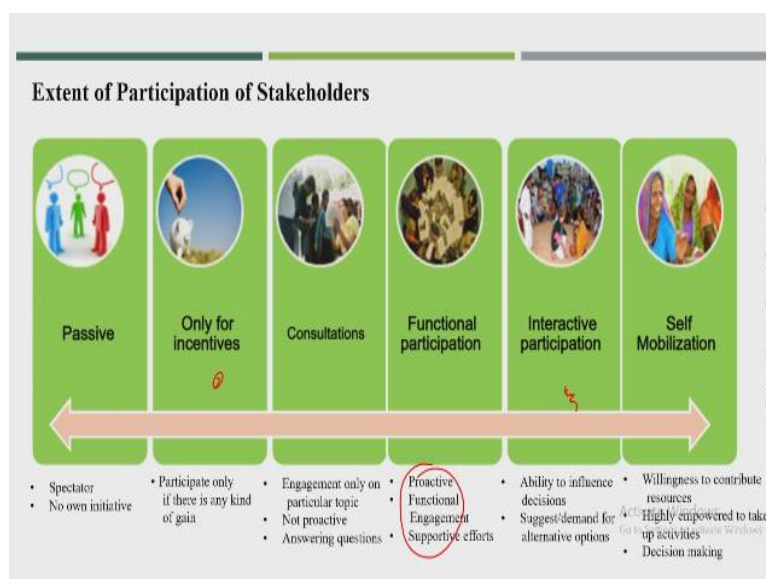
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Now is the role of stakeholders in the MSWM planning a core team or advisory team also called an internal stakeholder to develop the MSWM plan? The commissioner or chief executive of the ULB should lead the internal stakeholder team. And typical stakeholders for the MSWM system includes household, business, industry, informal sectors, local government NGOs, CBOs has self-help group, the woman is group secondary school college students, or other members of the institute is may play a significant role. **(Refer Slide Time: 46:46)**



Now the management task like in the any ULBs you will have the boss of the corporation is the mayor or president or commissioners or chief officers their task will be to strategy goal policy decision, frame working, overall annual planning or all monitoring like say health officers or engineers have further technical supervision guidance operation quality control operation, supervision, stockholder management responsibility of the service contracts.

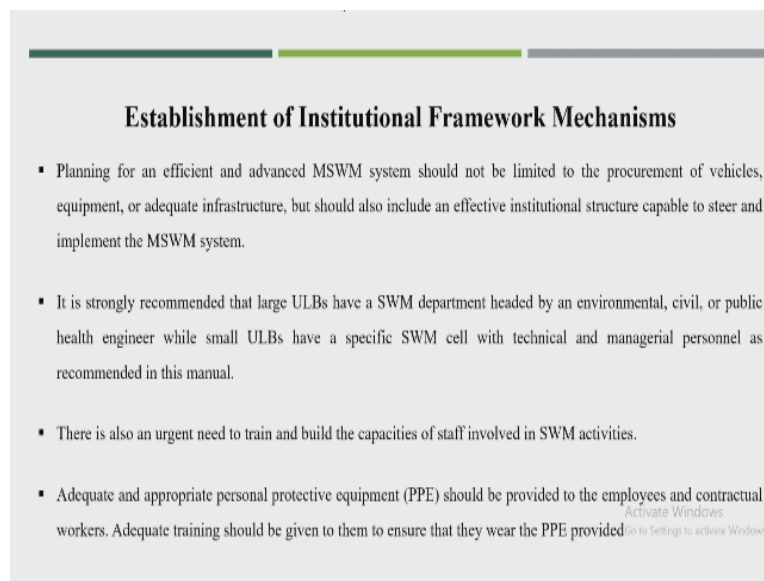
They have to be looked upon by the health officers and engineers and finally, sanitary inspectors and supervisor they have to look for implementation and supervision of day to day operation guidance in human resources monitoring of contracts complaint should be redressed and maintenance infrastructure equipment that has to be examined from the sanitary inspectors and supervisor. **(Refer Slide Time: 47: 54)**



Now, what extends stakeholders' participation could be possible, so I think if you talked about the passive one, passive means they will not get any initiatives and cell self-mobilisation they

have the very good willingness. So there, I think based on this, we can see that what kind of extension or engagement of stakeholders could be possible. So maybe I think here major one is proactive functional engagement.

This is also needed to see that we need not accept only those who are required are coming into the incentive for the only purpose of incentives but also see that how based they will be there beneficial for us and also the interactive participation this is also suitably acceptable for such kind of people. **(Refer Slide Time: 49:10)**

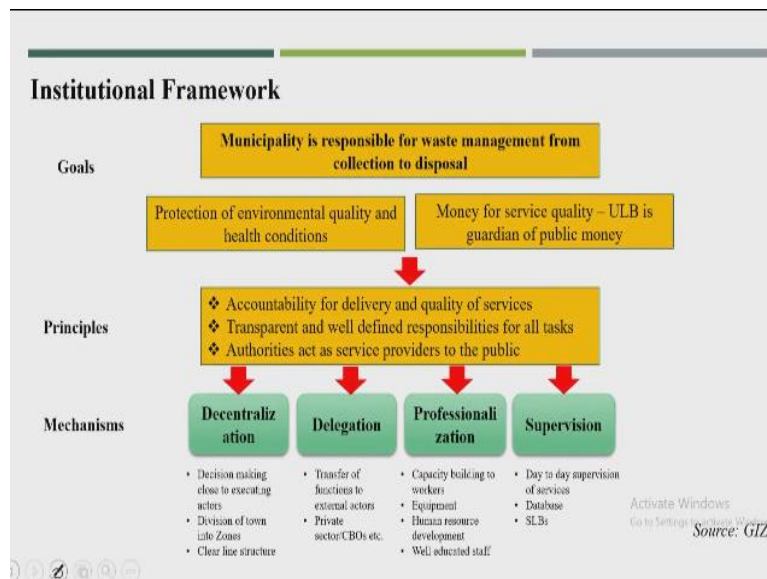


Establishment of Institutional Framework Mechanisms

- Planning for an efficient and advanced MSWM system should not be limited to the procurement of vehicles, equipment, or adequate infrastructure, but should also include an effective institutional structure capable to steer and implement the MSWM system.
- It is strongly recommended that large ULBs have a SWM department headed by an environmental, civil, or public health engineer while small ULBs have a specific SWM cell with technical and managerial personnel as recommended in this manual.
- There is also an urgent need to train and build the capacities of staff involved in SWM activities.
- Adequate and appropriate personal protective equipment (PPE) should be provided to the employees and contractual workers. Adequate training should be given to them to ensure that they wear the PPE provided.

The establishment of institutional framework mechanism so is the planning for efficient and advanced MSWM system should not be limited to the procurement of vehicles. Equipment adequate infrastructure but also include effective institutional structure capable of steering and implementing the MSWM system. It is strongly recommended that large ULBs have an SWM department headed by environmental civil or public health engineer.

While indeed you always have a specifically SWM cell with technical and management person is recommended in these manual this is also an urgent need to train and build the capacities of staff involved in SWM activity and also adequate and appropriate personal protective equipment should be provided to the all the employees or the workers. **(Refer Slide Time: 50:04)**



Now the institutional framework should be like this, have reasonable goals, principle and mechanism. So goals should be the municipalities responsible for waste collection and disposal. The goal should be a product of environmental quality health condition money for service quality. The principle should be like accountability for delivery and quality of service transparent and well-defined responsibility. The mechanism should be by decentralisation or delegations or professionalisation, or supervision. We can achieve the particular goal by having proper principles.

So, I think whatever the plan or strategy we are making for solid waste management should include the understanding of integrated solid waste management strategies. So by that, we will be able to achieve the proper environmental conditions or the proper living conditions for the city while managing solid waste management or during disposal and treatment of solid waste management in the particular region. So thank you.