Urban Services Planning
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Lecture 14
MSWM Plan Preparation Part II

Welcome back. In lecture 14, we will talk about municipal solid waste plan preparation, this is the second part of the lecture.

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The different concepts that we will cover around municipal solid waste management plan preparation for urban local bodies. We will talk about the seven-step approach recommended by CPHEEO. We will conduct gap analysis, baseline estimation, infrastructure and service characteristics determination, baseline financial information, and finally, preparation of draft municipal service market plan.

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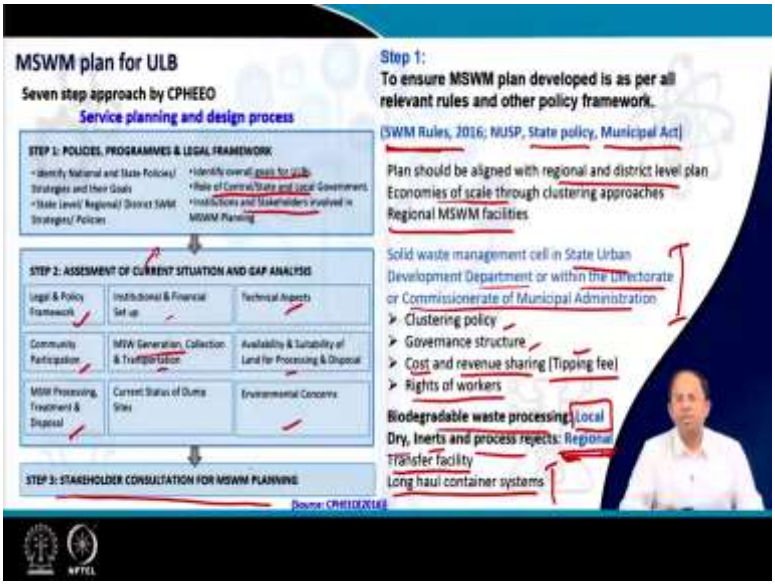

So, the seven-step approach given by CPHEEO, it is given over here. So, you can see the first three steps over here, but, overall, we can say that we have already learned the approach for service planning and design process. So, when we plan for services municipal solid waste management is also one of those services. So, more or less both of them are similar, it is, we can say that municipal solid waste management is aligned with the service planning and design process that we have learnt earlier.

But there are some specific steps which are also, which are, which has to be conducted because it is municipal solid waste and not some other service. So, that is what we will stress on. So, the seven-step approach provided by CPHEEO starts with step one which talks about policies programs and legal frameworks. Step two is assessment of the current situation and gap analysis, which is similar to what we have learnt earlier.

And step three, stakeholder consultation for municipal solid waste plan. And after that comes the draft plan preparation and then implementation plan, then stakeholder consultation and all these things are also part of that. So, we will come talk about that later. But first, let us talk about the step one, which is to understand what are the policies programs and legal frameworks which influences the preparation of municipal solid waste management plans.

So, first of all, we have to ensure that municipal plan is developed as per all the relevant rules and policies or policy framework that has been developed in our country. For example, we have already learnt about software management rules, Solid Waste Management Rules, Solid

Waste Management Rules 2016, National Urban Sanitation Policy, the state policy and also the municipal, different municipal acts and the bylaws that has been formed.

So, this is all what we have to follow. And not only that, we have to understand that what are the goals of that you will be. So, we have already learned about the general or the general, we have talked about the general guidelines that has to be followed for plan preparation, but every ULB can have some specific guidelines that has to be followed, and we have to look into the roles of different authorities.

So, we have also seen in the municipal solid waste management rules for 2016 it specifically gives us the roles of different authorities and that we have discussed in earlier lectures. So, those roles has to be, each one of those roles has to be looked into and then you have to determine how it has to be implemented and what are the institutions and stakeholders which are involved in that municipal solid waste paragraph plan.

Now, once the rules and all these things are studied and the responsibilities are studies, we should also see that the plan that we prepare should be aligned with the regional and district level plan. So, we may have a regional or a district level plan for solid waste management in a, in an urban area or in a overall larger area and usually my plan should be a part of this overall regional or district level plan.

So, why we do that, sometimes as we have discussed earlier, because of economies of scale, sometimes it is difficult to provide a lot of facilities and infrastructure or even a for a small local body instead if I can and if there are multiple local bodies in near proximity, we can combine the services for this local body. But of course, to do that, you need to have certain considerations that means in terms of the institutions and stakeholders involved, because there are two urban areas, how we are going to manage it all this thing needs to be determined.

So, we can think of regional municipal solid waste management facilities. And when we have this kind of facilities, both run by private or government organizations we have to also think about the organization structure, how this will be administered, because these are regional facilities shared by multiple ULBs.

So, solid waste management cell the State Urban Development department or within the Directorate or Commissionerate of municipal administration, they are the ones who determine that clustering policy, that means, which you will be should be taken together.

They also determine what will be the governance structure of the facilities or infrastructure or services that are provided in this clustered approach.

And how to share the cost and the revenue because this we are serving multiple ULBs each has got different population, each is generating different kind of waste, how we should share the cost and also if some revenue is generated, how we can share the revenue. For example, tipping fee that means, if there is a private organization, which is there is a regional landfill site and a private organization is depositing garbage over to this landfill site.

So, of course, they will pay a tipping fee, how to share this particular revenue. So, and the rights of the worker so, this all has to be determined from this state body because it is clustered approach, its facility provided at a regional scale. So, usually what we think is for biodegradable waste processing where organic matter is involved, it is better to go with a local facility or a local compost plant, we do not go for clustered facilities.

Whereas for dry waste, inert waste and process rejects from different recycling processes and all this for this kind of waste, where we have to deposit them to a landfill facility, we can go for a regional facility. So, in that means the landfill serves multiple ULBs. And particularly if we have some sort of ULB which is common to multiple ULBs, some landfill which is common to multiple ULBs, in that case, we require transfer facilities that means how do I transfer the waste from the ULB to this particular landfill and also the long we have to use container systems to transfer this waste.

So, transportation system transfer facilities, this also has to be designed along with regional landfill facilities or regional waste processing facilities. Now, once we have done with step one, the next step is to definitely go for assessment of current situation and gap. So, assessment of current situation and gap means, one is to estimate what there is now, which we also know term has baseline and gap analysis, which we have learned today that is what is the difference between the current service or infrastructure and the expected service and infrastructure. So, that gap has to be determined.

Now, this gap is determined not only for infrastructure and facilities or services, this gap has to be estimated for all aspects of municipal solid waste management plan. For example, we have to look into the gaps in the legal and policy framework, that means is there a need for new rules, new policies and so on. Community participation, existing condition of, existing nature condition of community participation and what should be done in future.

Then the technical part that is municipal solid waste processing, treatment and disposal or generation, collection and transportation, so infrastructure facilities services, what is the gap in that. Then availability and suitability of land processing and disposal, are their land available to set up new facilities at all. Current status of that existing landfill sites or not sanitary landfill but tendered dump sites.

Environmental concerns, technical aspects or technical gaps and institutional and financial setup and the gaps in those. So, these are all the gaps that we need to study. And finally, along with gaps, we also need to do a stakeholder consultation. That means before we even start preparing the draft plan, you have to take into consensus different stakeholder groups public of that particular urban area and we have to build a consensus on what we should do. So, that is what all this first three steps are all about.

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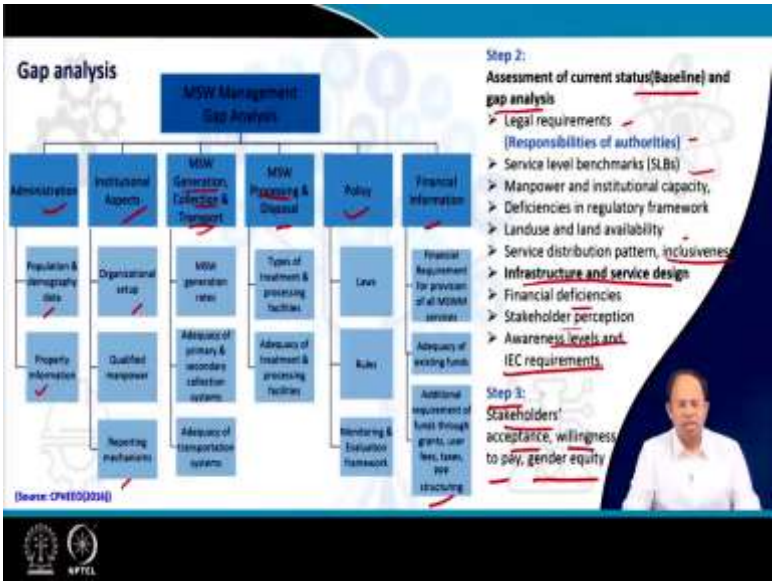

Now, coming to step two in detail, as you can see, this particular figure shows the MSW gap analysis for different aspects administration part, institutional part, the technical part, the which is two part, which is again divided into two parts which is generation collection, transport and processing and disposal.

And then the policy part which is laws, rules and monitoring frameworks, and the financial part that is adequacy of existing fund, requirement of funds through, in future through grants, user fees, taxes, or by structuring the PPS and so on. So, this is the gap that has to be analyzed. And in case of administration, how much tax is collected from which property,

what is the population, demographic characteristics and in future what would happen those has to be determined.

Institutional aspects include organizational setup, manpower requirements, reporting mechanisms, all these are part of institutional aspects. So, in step two the first job is to assess the current status of the baseline that is for each of these aspects, what is the current situation and then subsequently we have to conduct the gap analysis. So, few things to again summarize legal requirements, responsibilities of authorities as per the MSW rules, we can check which are the rules which are followed, which are the rules which are not followed now.

Service level benchmarks how far away we are from the different attributes or the different service level benchmarks that the government has provided, accordingly, we have to bridge those gaps. Manpower and institutional capacity deficiencies in the regulatory framework, land use and land availability in future. Service distribution pattern, which is again infrastructure and service design, it is part of that, but how is the service distributed currently, what is the, is it inclusive, is it, does it considers all income groups all zones of the city.

Financial deficiencies, stakeholder perception, awareness levels currently in the city and what amount of new awareness campaign, IEC requirements are there for the city, so these are also part of this gap analysis or assessment of current status. And in step three, like where we have to involve the stakeholders take their feedback and all.

Stakeholders' acceptance can be tested for different kinds of suggestions that the experts have for developing this particular solid risk management plan in this urban area, willingness to pay for different technologies, different solutions, and also considerations in regards to gender equity. So, this is part of step two, step three, sorry.

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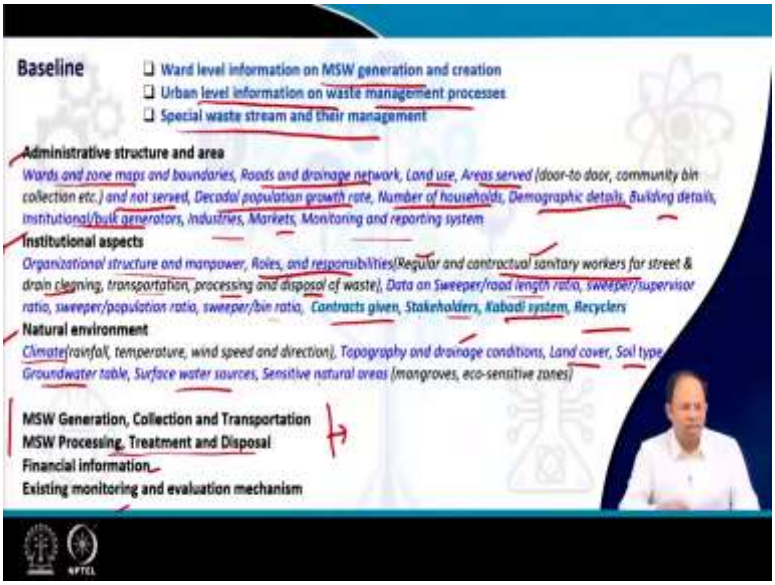

So, now going in details of step two, I have to create the baseline. So, what exactly data that we require. So, baseline is all about data collection, and to understand that situation in that particular urban area. So, when we create, when we determine the baseline, we should give a list of what sort of data we need to collect it any kind of solid waste management study that we conduct in urban areas. So, there are three kinds of data, one is ward level data, ward level information on generation and creation of waste.

Urban level information on waste management process, because waste management is an urban level process, even though some decentralized approach, we can also some amount of collection and management is done at the local level, but overall, it is guided by the ULB, so it is an urban level process. And how special waste stream is handled and how those are being managed. So, to get this kind of data, we have to collect data on different aspects.

So, these are administrative structure of that particular ULB in the area, the institutional aspects that we discussed, and the natural environment for that particular urban area. Along with that, we have to have detailed data on the different generation collection and transportation processes on the processing treatment and disposal. So, we need to have data on the infrastructure facilities and services that are provided in that urban area for solid wase management.

Finally, financial information and existing monitoring and evaluation mechanism for solid waste management plans. Now, in case of administrative structure, an area you see these are the data that is required, for example, ward and zone maps and boundaries, zones means the

solid waste management zones as we have discussed earlier in administrative structure, we can divide the city into multiple zones, road and drainage network, land use, areas served by door to door collection, areas served by community being collection, areas which are not served at all, so how, which are the areas in the city, decadal population growth rate, number of households, demographic details, building details, which are the bulk generators, industries, markets, monitoring and reporting system and so on.

Now, when we talk about institutional aspects, we have to understand the organizational structure of this particular ULB that different manpower, their roles and responsibilities, and particularly, we have to take careful about regular stuff and contraction sanitary workers, because in solid waste, a lot of work is actually given on contracts to different agencies. So, this data is difficult to get because private companies do not want to share their data but we need that data because that helps us to estimate on their efficiency, productivity and all this.

And this data has to be collected for drain cleaning, transportation, processing, disposal for solid waste. Data on sweeper per road length ratio, sweepers per supervisors supervisor ratio, sweeper per population ratio, sweeper per bin ratio, what contracts have been given, who are the stakeholders, the Kabadi system in that particular city and what is the who are the recyclers that are available in that urban area.

Then coming to natural environment, we need to understand about the climate, the different parameters of it, the topography and the drainage conditions of the city because that helps us to determine location of solid waste management facilities and sites, land cover, soil type, groundwater table, surface water sources and sensitive natural areas in that urban body. So, these are the basic data that we collect.

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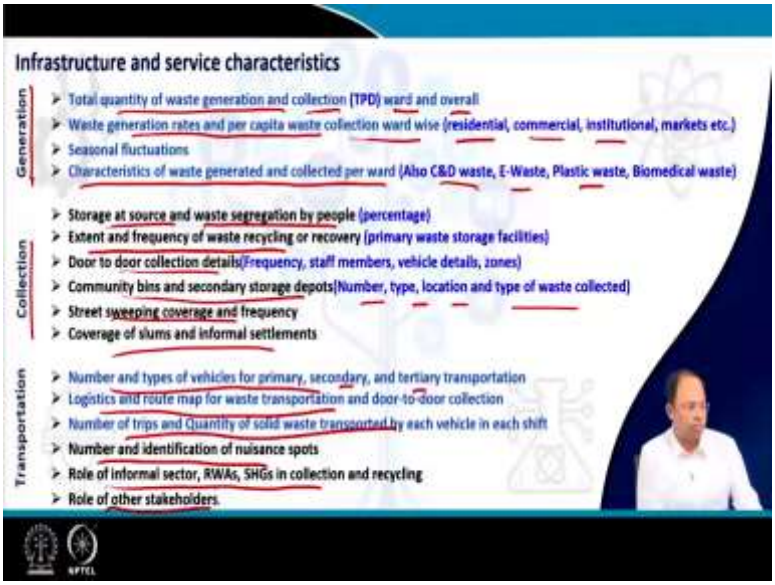

And then coming to the detailed data on infrastructure and service characteristics or infrastructure facilities and service characteristics. These are the data which are related with the waste generation that is total quantity of waste generated and collected for each ward and the overall urban area. Waste generation rates per capita waste collection ward wise for and per capita waste collection.

So, what is generation and collection and it has to be done for residential households, commercial establishment, institutions, markets and so on. Seasonal fluctuations in vitiated regeneration, how this varies are different seasons that will play a role in the transportation system design maybe, and also the characteristics of waste change in different season, so the incineration plant has to be processes has to be adjusted and many other things needs to be changed.

Characteristics of waste generated and collected per ward like C, in addition, in the normal municipal waste we have to look into C and D waste, e-waste, plastic, biomedical waste, because these are considered separate. Then regarding the collection process, how much is stored, our people storing the waste at source or they are throwing it away to the bins or just throwing it away.

Waste segregation, how much percentage of people are segregating waste in that urban area. The extent and frequency of waste recycling or recovery. Door to door collection details, how it is conducted, how many people for how many households, what are the routes those people follow and so on. Community bins and secondary storage depots their number, type, location,

types of waste collected in those particular bins, street sweeping coverage and frequency, coverage of slum and informal settlements.

So, you can see a huge amount of data that needs to be collected to understand what is the current infrastructure and service characteristics of the baseline for that particular urban area. Finally, coming to transportation, similar to collection of course, we have to do collection via transportation or vehicles. Number and types of vehicles for different stages of collection and transportation primary, secondary and tertiary transportation.

Logistics and roadmap for waste transportation in which route the truck goes which bins it goes in which order because we may have to modify those routes in future. Number of trips and quantity of waste transported in each vehicle in each ship. From here we generate we calculate how much amount of waste has been transported.

Number and identification of nuisance spots which are the areas where people create problems or they do not throw garbage properly. Role of informal sectors, Resident Welfare Associations, self help groups. Role of other stakeholders. So, all this needs to be also collected.

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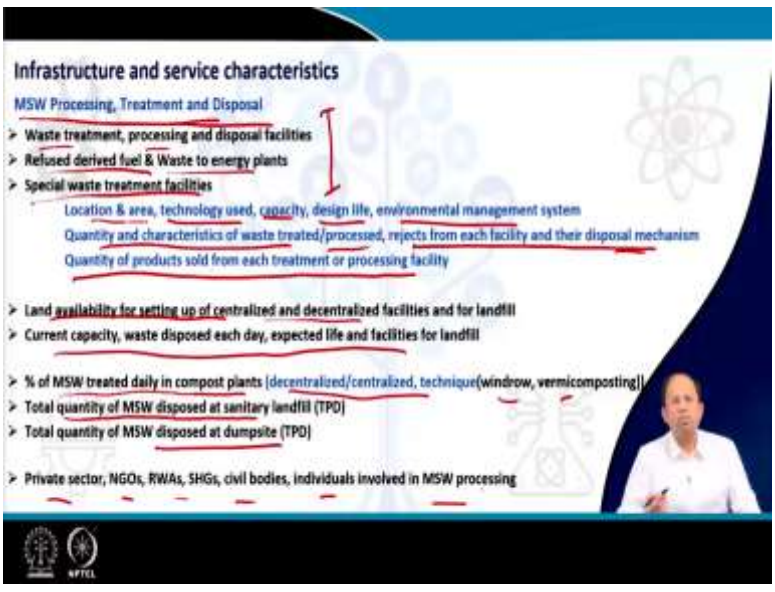

Now, coming to the next part of infrastructure services that is municipal solid waste processing, treatment and disposal. This is where we are talking about large scale infrastructure of waste treatment, processing and disposal facilities and infrastructure of course. So, three kinds of facilities are there.

One is refused facilities which deal with refused derived fuel or waste to energy plants, incineration facilities and also. Waste treatment processing and disposal facilities. Special waste treatment. So, these are the different kinds of facilities which has to be set up in an urban area for dealing with different kinds of waste or waste (())(19:38). So we need to understand the location and area of this facilities current and potential areas in future.

Technology use, capacity of these plants, design life of these plants, environmental management system adopted by these plants, the quantity and characteristics of waste treated and process. Whatever is collected not everything goes over there maybe they do for the sorting of waste before that waste is accepted because they have to accept waste of a certain characteristics, because every industrial process is designed for a certain characteristics if it varies, then the process the system will fail.

Rejects from each facility and their disposal mechanisms. That means, once the processing is done at those particular facility, what happens with the rejects, that means after incineration, what happens with the ash, so, how it is disposed where it goes. Quantity and product sold from each treatment and processing facilities. So, we understand that some amount of recycling generates some amount of products and some amount of profit. So, that has to be understood.

Future land availability for setting up centralized and decentralized facilities. Current capacity, waste disposed each day, expected life and facilities for landfill. Percentage of MSW treated daily in compost plant, decentralized, centralized and including which kind of technique windrow and vermicomposting. So, this is for decentralized facilities.

Total quantity of MSW disposed in sanitary landfill and in non-sanitary landfill or dump sites, then involvement of private sector, NGOs, RWAs, SHGs, civil bodies, individuals in the MSW process for the provision of this processing, treatment and disposal. So, these are the huge, this is the data that has to be collected for first preparing the baseline.

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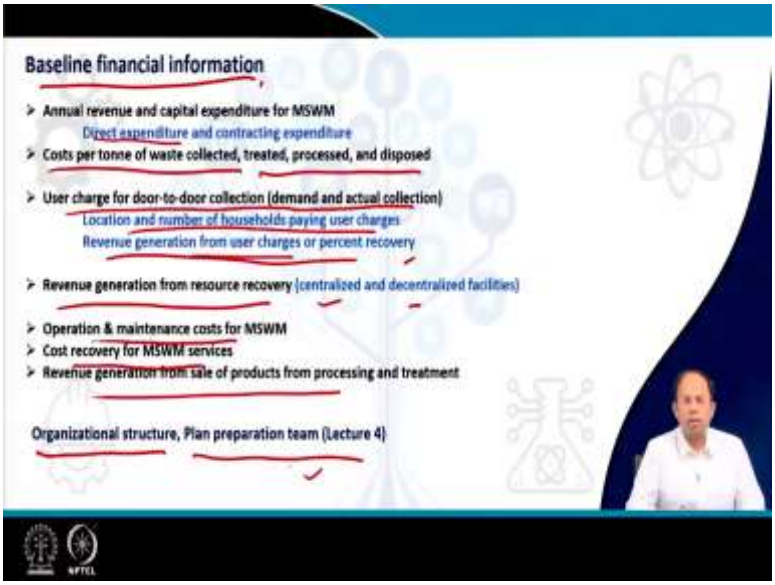

Now, along with all this infrastructure data, the climate data, the institutional capacity, we also need to understand the baseline financial information. So, without final starting works, so, we until the project is viable financially, there is no point of preparing a plan. So, financial viability is very, very important and that has to be checked. First of all, we need to understand what is the baseline financial condition.

So, annual revenue and capital expenditure for the municipal solid waste management for that particular urban area. So, we need to understand both the direct expenditure of the ULB as well as indirect expenditure, which includes contracting expenditures, that means, I will give a contract based on that some services will be provided. So, that is an indirect expenditures.

So, I am not accounting for those things, but it has to be done by that particular agency, which is providing that service. Then cost per ton of waste collected, treated, processed and disposed. So, what is the cost per ton of waste that we are spending in that UBL? Is there a provision for improving that? Are we spending too much money? That means the processes are inefficient.

The user charges for door to door collection, what is the demand, which areas we are collecting, what is the actual percentage of people paying those money. Location and number of household paying user charges within a particular zone, which households pay, which household do not. So, we have to records of those.

Revenue generation from user charges or percent recovery that is if I do some amount of recycling at decentralized level and all, some amount of revenue could be generated and what percentage of total so that can be recovered, and similarly, revenue generation from user charges, what percentage of revenue user charges contribute to what percentage of overall revenue. So, these are the different things that needs to be understood.

Overall revenue generation and resource recovery from centralized facilities and decentralized facilities so that in future we can determine which is more efficient. Operation and maintenance cost, cost recovery for different services, revenue generation from sale of product from processing and treatment. So, that is what we are discussing right now. And finally, we need to look at along with the baseline financial information, because we are dealing we have to think about manpower, salaries and all.

So, organizational structure is very, very important. So, we have discussed about organizational structure earlier also and we will discuss in future as well. And the plan preparation team in lecture 4 we have covered that what should be the plan preparation team for an urban local body for municipal solid waste management. So, that we have discussed.

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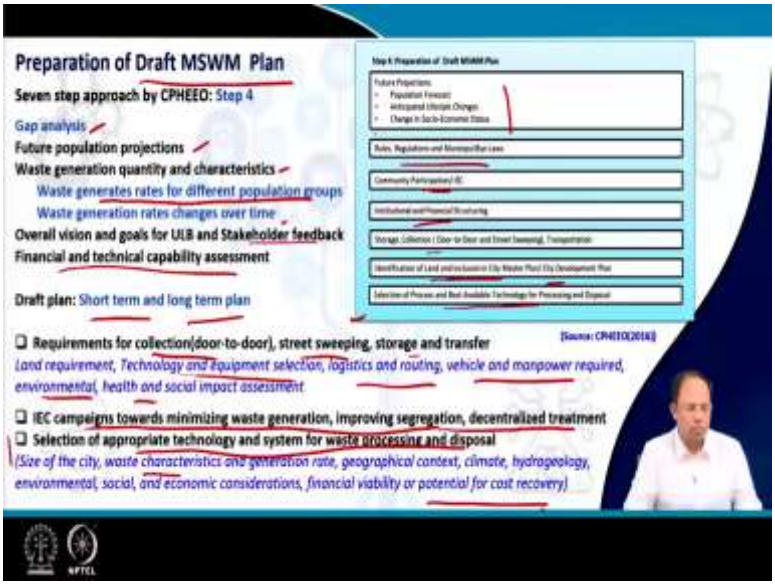

So, finally, once this plan preparation team and all this basic data is available, we can start preparing the draft MSWM plan. why it is called draft? Because after preparing this plan, we have to take it towards to the stakeholders or to the people. So, for the revaluation or for them to first approve it. And then we have to also check for how to implement this particular plan.

We have to determine what is the contracting mechanisms going to be, what would be the viability of even conducting those particular services via contract and so on. So, that is the final steps of this plan preparation, but within this draft plan preparation step, as you see that, over here, you can see that after conduct of the baseline and we have to determine the gap, we have to determine the gap in the service.

So, once the gap analysis is done, as we have seen we were conducting in the previous slides, we have to determine what is the future population for a particular urban area, we have to determine the waste generation quantity and characteristics in future. So, we have learnt about how to estimate that. So, based on GDP and all these other indicators, which help us to determine the future rates and all.

So, sometimes we have to go in much more detail that means, waste generation rates for different population groups even. The waste generation rates changes over time. So, that means how this population grew not only the how this varies as per different population groups in that area or different income groups in that area, but how this rate changes over time. So, these are the two things that we require.

The overall vision and ULB of the ULB and the stakeholder feedback that goes into the preparation of the plan. And finally, financial and technical capability assessment which helps us in determining what should be the plan itself. So, we can go for a short-term plan or a long-term plan, we have discussed short term plan is for around five years whereas long term plans to be for 25 years.

And we need to determine requirements for collection, door to door collection, street sweeping, storage and transfer. So, land requirement, technology and equipment selection, logistic and routing of vehicle and manpower required, environmental health and social impacts for this kind of plan. Then, IEC campaigns towards minimizing waste generation improving segregation and decentralized treatment.

Selection of appropriate technology and system for waste processing, which technology to select. This depends on the size of the city, the waste characteristics, and generation rate, geographical context, climate, hydrogeology, environmental, social and economic considerations, financial viability or potential for cost recovery for those particular technology or that particular facility or that particular system that you are proposing for this area.

So, we will learn about all this in detail in the subsequent modules that what sort of IEC campaigns should be conducted for waste minimization. So, we learn that in solid waste generation we will talk about selection of technologies in subsequent lectures as well. Then we will design this kind of street sweeping system or door to door collection system for different urban area.

So, we will learn about doing all these things in subsequent lectures, but this is what that draft plan preparation is involved or includes. So, this is actually summarized in this particular figure. As you can see that we require future population, then rules regulation and municipal bylaws that has to be added to community participation, institutional financial structuring, storage and collection and transportation, identification of land, which has to be included in the master plan and selection process and best available technology.

So, all this has to be done which are itself each of these steps are very large. You have to do a lot of estimates calculations for each of this. And first, once we conduct that then we can prepare a draft plan for another medium.

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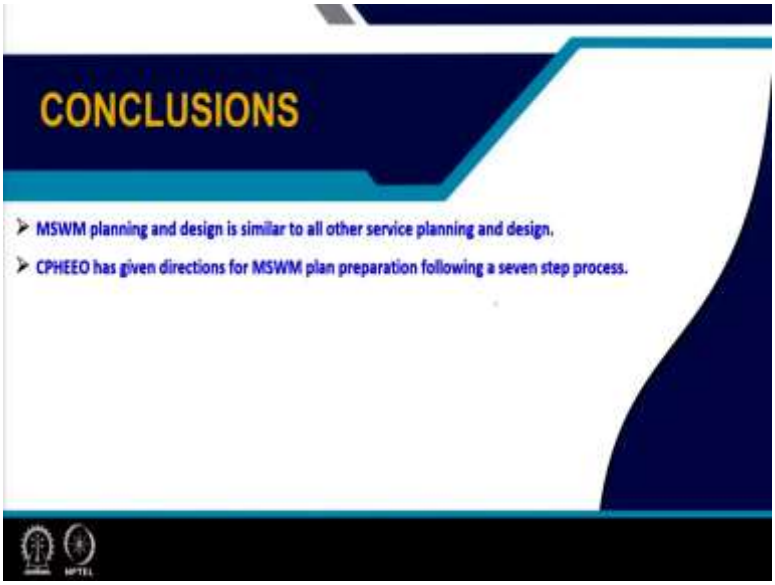

So, these are some of the references that you can follow. So, to conclude, MSWM planning and design is similar to all other service planning and design. CPHEEO has given directions for MSWM Plan Preparation following a seven step process. But overall, when you prepare this MSW plan for an urban area for prepare it both as per this guidelines CPHEEO guidelines as well as what we are taught in service planning and design. Thank you.