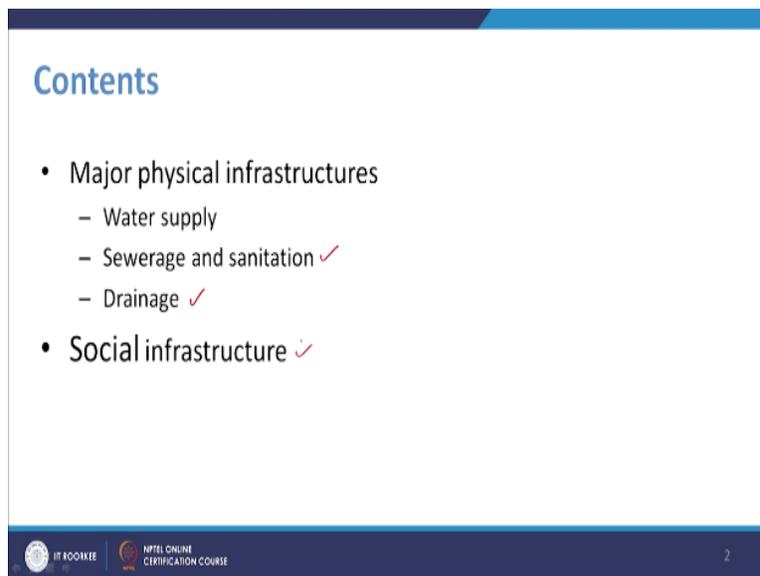


Urban Governance and Development Management (UGHM)
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Lecture - 25
Urban Infrastructure and Services - 2

Welcome to the lecture 25. In this lecture we will continue the discussion on Urban Infrastructure and Services. In this class we discussed various categories of infrastructure, basic differences of the infrastructure and services and also we had discussion on transportation aspect as a basic infrastructure. Today we are going to discuss the following aspect of the Urban Infrastructure.

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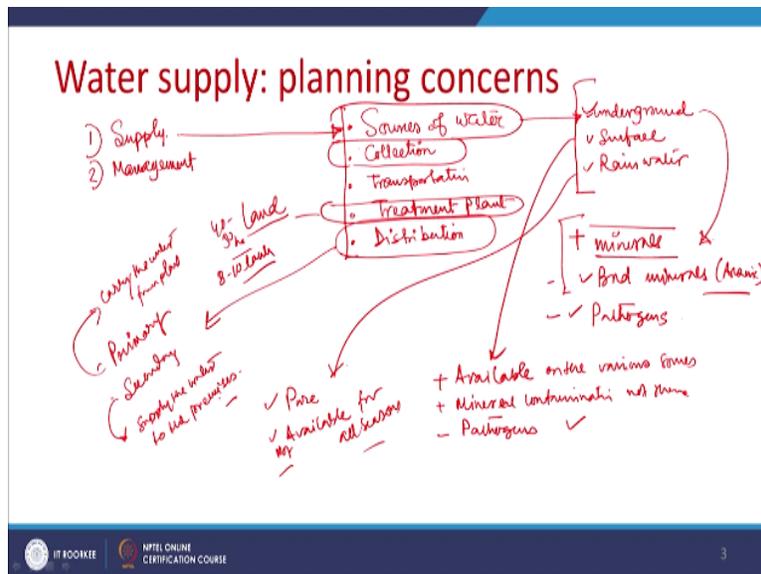
The slide is titled "Contents" in blue text. It lists two main categories of infrastructure:

- Major physical infrastructures
 - Water supply
 - Sewerage and sanitation ✓
 - Drainage ✓
- Social infrastructure ✓

At the bottom of the slide, there are logos for IIT Roorkee and NPTEL Online Certification Course, along with the number 2.

The Water supply, Sewerage and sanitation, drainage and also social infrastructure, but definitely this discussion will not be very detail discussion since many things are clubbed in this lecture but definitely will have some overview and so that you get some idea and also your sensitized some issues and concerns so that whenever you are in your area you can take the appropriate action.

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So let us start with water supply. Now, water supply you have seen that in 74th Constitutional Amendment that water supply is the one of the major job of a municipality or urban local government which is given by the constitution. Now the water supply is the most important criteria for which the people decide their government at the local level because this is the basic necessity of water supply.

So for the planning and governance of the water supply there are various aspect of the water supply. So those are first one is the supply and management. And for supply there are various steps we should also know. So supply involves the source, sources of water and then collection of the water source and then transportation at the treatment and then distribution. These are the basic attributes or elements of the water supply planning and governance.

Now, sources of water as you know that there are sources like one is underground sources, then the surface water and also rain water. Now underground sources and surface water and rain water these three sources are basic sources of the drinking water and apart from these sources other water sources like sea water and all those are not drinkable. And underground sources surface water and rainwater they all of them have their positives and negatives, the merits and demerits.

For example, underground water is basically having minerals and essential minerals which is good for the health and sometimes it has bad minerals for example arsenic all those

contamination. But however, the underground water there is minimal pathogens which causes diseases whereas in the surface water there; so these are the positives and these are the negative for the underground water. In the surface water the positives are physically that, that it is available abundantly, available on the various source like river, lake, canals etc.

And it does not have mineral contamination not there, but it is having the, the contamination due to pathogens which causes diseases. On the other hand, the rainwater is basically pure, it does not have any contamination but it is not available across for all season, so not available for all seasons. So based on our geographical advantage or geographical condition we can choose between the sources of drinking water.

Another aspect is that underground water sources is limited. We cannot continue extracting underground water sources for long because it is limited. And underground water sources are there beneath the water in the aquifers and the amount of water in the aquifers is limited. If we extract more water it creates contamination and it extracts other contaminates from the underground sources. That is why underground water sources extraction is limited and it is not encouraged.

Therefore, surface water is the basic source and the rainwater is also basic source. But rain water since it is not available throughout the season throughout all the time of a year therefore, surface water has to be the main source for the drinking water supply. Now the surface water has; the source is like river, canals, lakes etc. It has to be collected from the source.

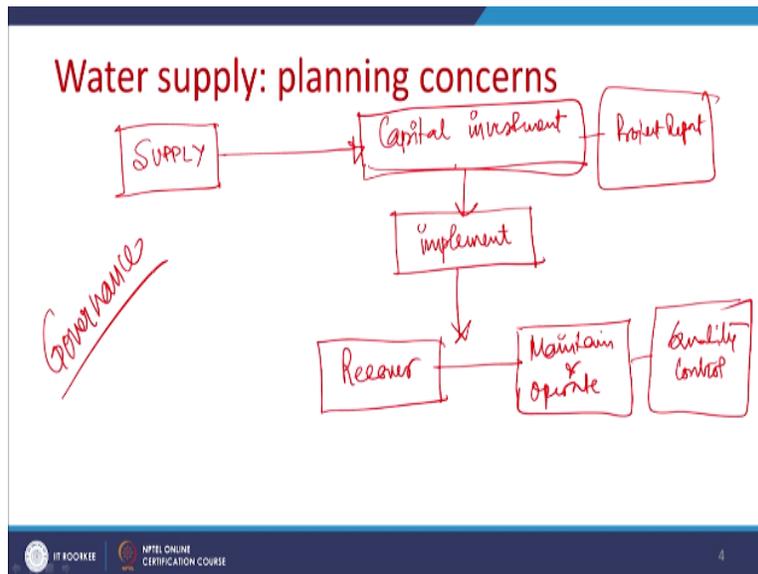
Usually we take the water from the river sources or the canal or the; those kind of sources and collect the water and transport the water from there sources through pipeline through the water treatment plant. Now usually the treatment plants are setup in a large amount of land for providing a large amount of population for example 2,00,000, 3,00,000 minimum population and more than that, but the treatment plant for smaller population area may not be feasible.

Therefore, treatment plant, transportation and its distribution needs a critical mass of the population to satisfy that. And then we distribute; so treatment plant needs land, large land for

example 40 to 50 hector of land for a population of say 8-10 lakh population. And for distribution, there are two set of network, so primary and secondary. So primary networks are basically done to carry the water from plant and secondary distribution which is basically done to supply the water through the premises, right?

So these are basic silent features of a water supply network or water supply planning in your urban area.

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And therefore, once it is supplied, so one is your supply; once it is supply it has some amount of capital investment and because of the investment you have to make a robust project report mentioning all the details of the water supply treatment plant and then you implement; after implementation the main question is that whether how you recover the investment and then how you maintain and operate the installation operate and also quality control.

Do not forget that because of the water contamination most of the water bound diseases and other diseases are also there in the urban area. Therefore, at the management level at the governance of the water supply these are the basic elements but to make or to provide a better water supply. Now the supply sources, collection, transportation, the treatment plant, distribution all these are infrastructure because we have to install physically to get some advantage.

But it does not ensure a better services, better services is that good quality of water which is supplied at the doorstep at the premises level within the duration which you need for your day-to-day life. So that is the services which is required for the water supply. So water supply is something which is infrastructure and services both at the same time. And the major concern is that it needs a huge capital investment for large treatment plant and network and how to rework that in the investment that is the question.

So to maintain a better service basically we streamline few benchmarks and few standards for maintaining the water supply services at the desired level of quality. So let us have a look what are those benchmarks.

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Benchmark

Water supply

CPHEEO Guidelines

1. Coverage of water supply Connections *100%*
2. Per Capita supply of water *→ 200 lpcd*
3. Extent of metering of water connection *75 lpcd*
4. Extent of non-revenue water (NRW) *20%*
5. Continuity of water supply *24x7 smaller duration*
6. Quality of water supply
7. Efficiency in redressal of customer complaints
8. Cost recovery in water supply services
9. Efficiency in collection of water supply

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So first benchmark is that at the city level whether the coverage of the water supply connection is there for all the population or not, usually 100% coverage is desired. But in slum areas in low income group areas there may not be 100% coverage but at least a community water supply can be there for cluster or group of people. Second is the Per Capita water supply, how much you are giving.

For example, a large city like Delhi or Kolkata or Mumbai must have 200 LPCD that is Liter Per Capita Per Day for large cities starting from 200 to even 75 LPCD could be there for the smaller towns. Then for the recovery what is the Extent of the metering. Metering is required for

charging the water supply that based on your consumption. More the consumption more the charges for the water, may be some amount of the water can be given free of cost and beyond that cut off the additional consumption of the water could be chargeable.

So Extent of metering is another benchmark. Fourth is the Extent of non-revenue water. For every water supply design and the services of the network there are some amount of leakage, distribution loss and some amount of water which is given to the lower income group or the slum areas which is not suppose to bring revenue or bring the recovery. So those are called non-revenue water.

So percentage of the non-revenue water usually should not be more than 20%. And then Continuity of water supply. Basically, continuity of water supply ideally it should be 24*7 but some of the municipality they smaller duration also. But water you commit that should be consistent in terms of supply. Then quality of water supply in terms of the biological quality, the chemical quality all these quality has to be maintained for the water supply.

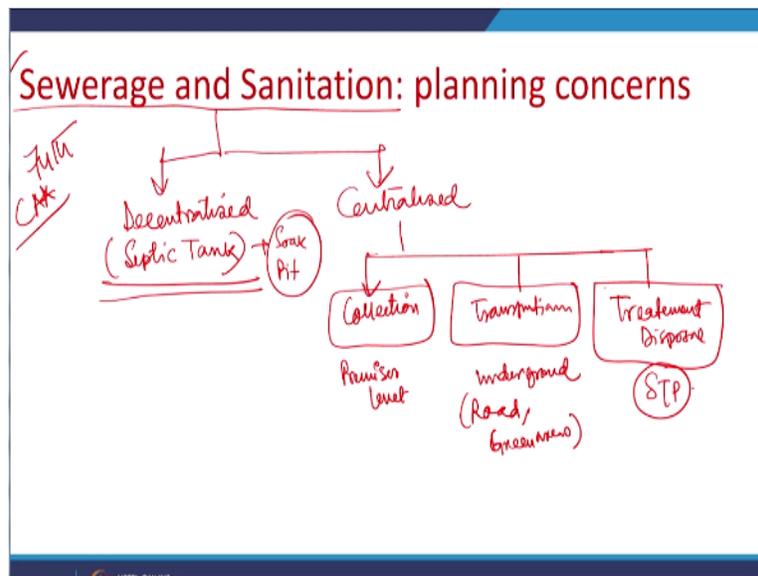
Now this quality is time to time benchmarked or standardized by the Central Public Health Engineering and Environmental Organization. So they have their guidelines and water supply and all other services. So please go through the guidelines, what are the quality aspects they have maintained. Efficiency in redressal of customer complaints. The second part is that if you fail to required service what is the level of grievances and what is the level of redressal of the grievances. Is it 100%?

Usually, we do not accept redressal of the grievances less than 80% so 80% and above is the basic benchmark. Second is the Cost recovery in water supply services. I told you that water supply is a major capital investment subject, so recover in terms of the money and investment is very important. Usually the investment also 100% is the target within a time of period of maximum 20 years but it varies time to time. Some of the municipalities or the corporations they even cannot recover even 50-60% so that is really a major concern.

Next is the Efficiency in collection of the water supply. So this efficiency depends on how efficient your systems installation and manpower is there in your water sources and the collection and based on that, because if your collection is fulfill collection ensures the better quality and the large amount of quality definitely you will be able to transport that quality. So these are the silent points in terms of the desired benchmark, desired standards of the water supply in your municipality.

So briefly we have seen the water supply and it is a major aspects of the planning and governance.

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Next I come to the Sewerage and Sanitation planning and management in the municipality. Now, the terms Sewerage and Sanitation you have seen that in 74th Constitutional Amendment. This is also given another basic important task. And most of the municipalities they do this task especially for making the sewerage pipeline network, making sewerage treatment or ensuring at least the Septic tank is there.

So that this sanitation practice is maintained in the municipality. Now a sewerage and sanitation practice could be various type it could be Decentralized or it can a Centralized. Now in the decentralized system it can be done by like Septic tank. I hope you know all these the septic tank so I am not going into detail. The Septic tank is basically a underground installation where the

human excreta is carried and stored there for the decomposition and septic tank along with the soak pit is created to give the opportunity of that installation so that the surrounding soil can observe the decomposition when excreted.

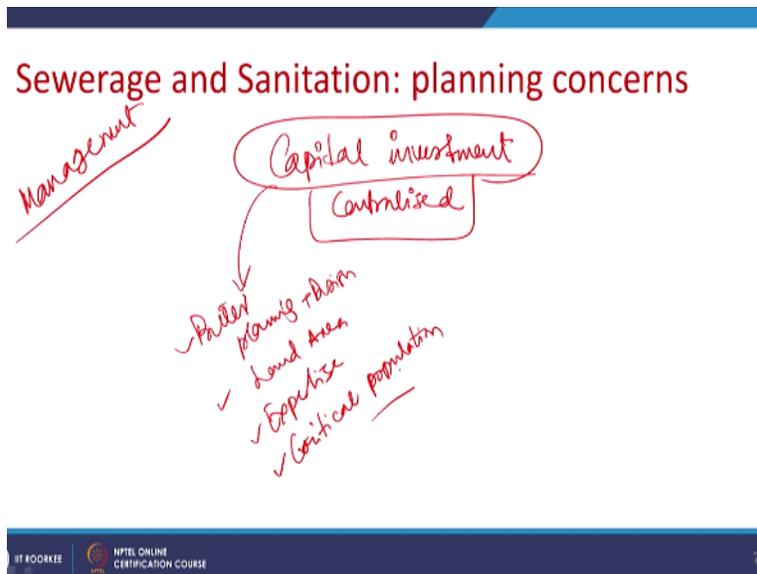
And centralized system it is again like the water supply it is the collection then transportation then treatment and disposal. So therefore, at the city scale it is a collection, transportation, treatment and we dispose. So this collection at the premises level is done. Transportation is basically underground basically it can be underground, below the road or sometimes it can be green areas also, areas and then in the treatment plant basically STPs are Sewerage Treatment Plants are setup in the municipalities and this Sewerage Treatment Plant can be various types.

I am not going into that detail. The basic objective of Sewerage Treatment Plant is that they will, it will be able to decompose and treat the sewage and it will definitely make the sewage in the meaningful output which is worth and which can be used as either manual or either some better byproduct which can be used for any other developmental purposes. Now the sewerage; so sewerage is the whole system which we design at the city level including the collection, transportation and the treatment.

And sewage is basically the material which is being carried throughout the network that is called sewage. And the sanitation is a general term which is used for basically scientific sanitation is required either in decentralized or centralized mechanism. The objective of the sanitation is to make and health and scientific method so that it does not contaminate the water, does not contaminate the soil, does not contaminate the surrounding environment.

So that it cannot make the disease or create the epidemics. So that is the objective of the sewerage and sanitation planning.

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Now in the management or governance again the concerns are again it is a large capital investment. Investment is require for centralized installation. Now advantage of the decentralized sanitation practice like septic tanks etc in village areas or the semi-urban areas there are 2 feet latrine which is also used. Now it is you know that under Swachh Bharat Mission the toilet and the elimination of 100% open defecation is one of the objectives.

So the sanitation practice is given the maximum weightage and the priority at the National level. So the major issue in this aspect is that if it is decentralized the decentralized practice have some advantage in terms of that it can be done very easily with small investment of the money with minimum land requirement at the individual level. On the other hand, if it is not done properly and if it is not done, it can contaminate the soil sub-soil or the sub-water.

So that is the disadvantage of the decentralized system whereas the centralized system the advantage is that it can offer you a better scientific method but it needs lot of capital investment that is why it need better funding agency better planning, so it need better planning, better planning and design both, land area and also expertise and a critical population to serve. But the good news is that after the jnnurm in the during the jnnurm.

Now the Amurt mission all these National Urban Mission, they are giving the funding for the Sewerage Treatment Plant. Now if a municipality is very small which cannot afford a Sewerage

Treatment Plan, it is possible also to make cluster of several municipalities and make one centralized sewerage treatment plant and that central sewerage treatment plant can be can serve all the surrounding municipalities.

So these are all basic major silent points. Now let us see that what are the benchmark and the guidelines in terms of the standards and the norms related to the Sewerage and the Sanitation.

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-
- ewage Management Sewage and sanitation)**
1. Coverage of Toilets 100%
 2. Coverage of sewage network services
 3. Collection efficiency of sewage network
 4. Adequacy of sewage treatment capacity
 5. Quality of sewage treatment
 6. Extent of re-use and recycling of sewage
 7. Efficiency in redressal of complaints
 8. Extent of cost recovery in sewage management Capital
 9. Efficiency in collection of sewage charges

So number one is the toilet under the Swachh Bharat Mission it is the 100% coverage which is aimed at the National level. So this is the universal coverage, we cannot this is kind of not negotiable parameter, so 100% coverage is require. Second is the coverage of the sewerage network services. Now there could be toilets, there could be decentralized systems of septic tanks. But the sewerage network service is the ultimate objective.

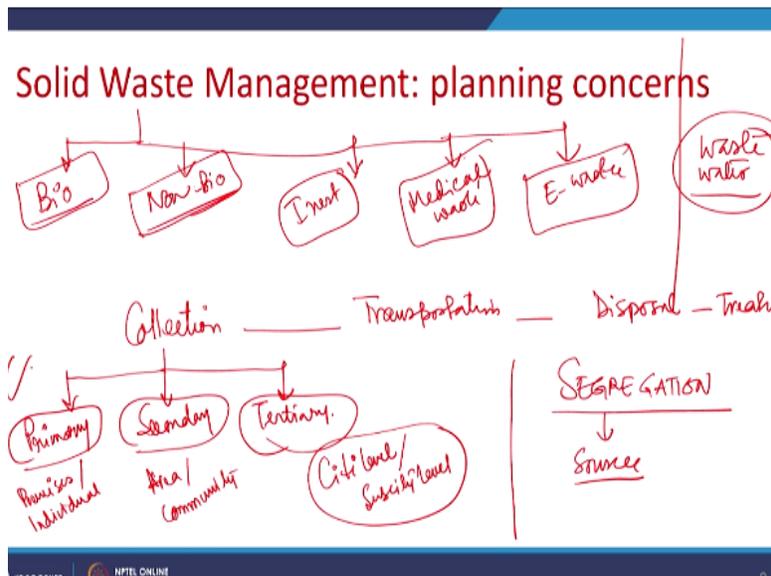
So that it can cover 100% therefore, the centralized system, centralized treatment facility should be there at the municipality level which can cover 100% like the toilets. Collection efficiently of the sewerage network, now this collection efficiency again the target is 100% but right now under Government of India all these mission they have given the target just to initiate as 70, 80 or 90% based on the city sizes.

Then adequacy of the sewerage treatment capacity, adequacy means how much amount they can treat, how much and what is the equivalent population they can serve that is the casement area that is the adequacy of the sewerage plant. Quality of the sewage treatment plant whether it is able to treat all types of treatment is possible so that it can convert the sewage into a meaningful discharge which can be used for developmental purpose that is the quality aspect.

Then extent of re-use and the recycling, it is self-explanatory. Efficiency in redressal of complaints similarly like water supply. 100% is target but definitely the municipalities given mandate as 80% or 90%. Extent of the cost recovery in sewerage management since it is a capital investment project, so here the cost recovery is important. Now for the cost recovery the people, the municipalities can initiate a user charge maybe time or maybe once in a year for operation maintenance of the pipelines and their treatment plant from the user so that is what is required at the urban level.

Then efficiency in collection of sewage charges, so that is also important that how much the efficient your team and installation are there which collects the sewage from premises to premises and distribute and collects and transport the treatment plant, that efficiency also matters. These are the basically major concern and major parameters and benchmark which is given at the National level which is also given in the CPHEEO guidelines which I mentioned earlier. Next I would like to mention some aspect of the solid waste management.

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Now solid waste management is another very important aspect which is also given in 74th Constitutional Amendment Act and also you have seen that in municipality this is one of the very important concern because everywhere in the roads you will find that garbage are dump in the road and it is very dirty condition. So therefore at the; to take the solid waste management and to give a better priority.

And the importance at the National level the Swachh Bharat Mission is created as you know that under the Swachh Bharat Mission the apart from the 100% elimination of the open defecation another very important objective is to make a clean and green urban areas. So let us see that what are the elements of the solid waste management.

Now when you say solid waste management there are various kinds of waste so there could be waste like Bio-waste, Non-bio waste, Bio-waste means the waste which is coming from your kitchen basically which is coming from vegetable or the fruit or any other food item which is biologically possible for decomposing. Non-biological materials which is not possible for decomposition and there could be some inert object, there could be some also medical waste.

And also you know that another aspect is E-waste. At today's time there are various waste in the urban areas which is basically unused computers, unused installations and the printers all these

are making the E-waste. So all these are making solid waste management. Apart from the solid waste management there are waste water which also need to be treated.

So solid waste management and waste water management these dealt together in the urban areas. Now solid waste management has several steps for the planning. The first step similarly like water supply and sewerage is the collection. So similarly with the collection, transportation, disposal and treatment. The solid waste collection is done at three level which is called Primary, Secondary, Tertiary.

Primary level collection is at the your premises level or at the individual level. And Secondary level collection at the area level or community level and Tertiary level collection is done at the city level or sometimes it is a sub-city level also. So therefore you can understand that the solid waste which is collected from the premises level from the houses individual, shops.

And everywhere it is collected from the every flat and premises and transported to a common garbage vat which is created at the area level or community level which serves a population about say 10,000, 15,000 and then finally that waste is collected to the city level where the dumping yard or the landfill site is created maybe little beyond the city. And maybe before going there, there could be space where this is collected.

And then it is transported to the final disposal site. So these are the hierarchy of the collection center. Now one major issue in the solid waste management is that how we segregate the various kinds of category biological, non-biological, inert, medical and e-waste. So usually at the domestic level the; we target to segregate the waste at the primary level that is at the beginning at the door at the premises level or the plot level we try to segregate.

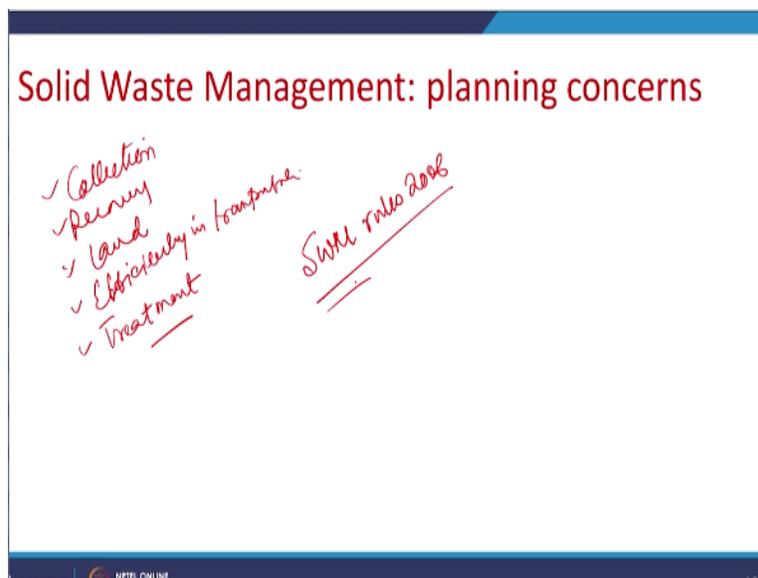
So that concept is caught. So segregation is another very important aspect segregation. So our objective is segregation at source that means at the primary level. Here our target is if we segregate. So usually what is done in the most of the municipality that they create both two types of the smaller bins different color blue and green and they can that can used as for the

segregation, and finally it could be definitely stored in the secondary and the tertiary collection center and then need to be transported and disposed for the treatment.

Now the another issue is that the solid waste dumping yard or landfill site these are creating pollution in the urban area. So this will be located sufficiently distance from the city in such a way so that the prevalent wind flow does not hamper or does not create a foul smell in the city. So therefore, the location of the solid waste dumping ground is very much crucial. And like the sewerage treatment plant it can be also can be central facility of a cluster of the cities or the cluster of the town that is also possible.

Especially where smaller towns these medium size towns there and they cannot afford a very large amount of land, very large amount of landfills site, so those kind of the strategies has to be taken at the cluster at the larger level like the district or the metropolitan level that how many municipalities can be club together to afford or to make a one centralized landfill site for the treatment of the solid waste management. So these are the major planning aspects.

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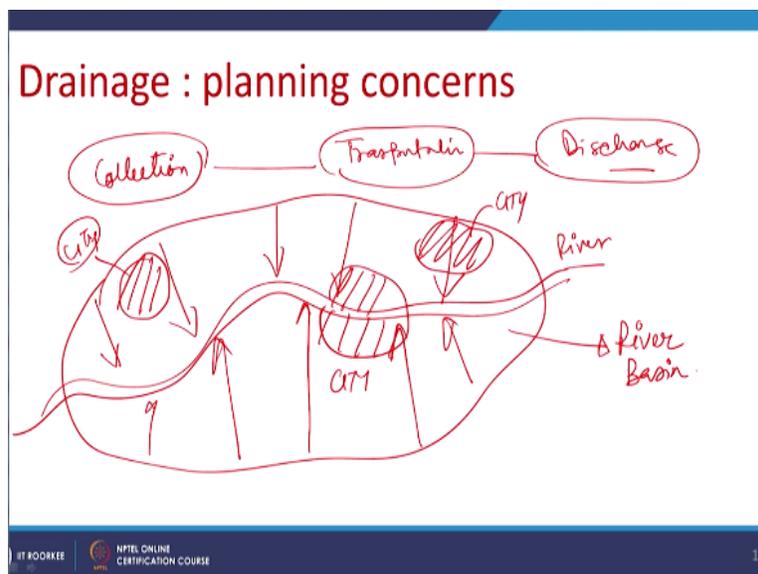


And apart from that the basic management aspect is that the issues are like collection, recovery, land then efficiency in transportation and also treatment. What you are going to do after the treatment of the solid waste. Similarly, for the liquid waste and the E-waste and medical waste what are the what you are doing. Now Government of India time to time they have framed the

rules like we have solid waste management rules 2006 you can go through the consult rules Solid Waste Management 2006 rules.

Under this rules, every municipality they are suppose to make the solid waste management mainstream work, so if is there in 74th Constitutional Amendment government had to make a separate rules to make the solid waste management a basic work and recently and then recently by last three years through this Swachh Bharat Mission municipality doing solid waste management in a great extent. So let us see what are the benchmarks related to solid waste management.

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Okay. So benchmark for the solid waste management also as discussed along with the storm water drainage sometimes, so let us discuss the drainage of the municipal areas, so in the drainage similarly it is the collection then transportation and discharge. Now, suppose this is the, this is one river where the predominant water from the basin is being collected at the river so therefore we are calling it as a River Basin and with the River Basin suppose this is City 1, suppose this is another City, suppose this is another City.

Now the drainage planning of every city need to be done at the drainage basin level. The reason, the simple reason being that since the water is coming not from the city it can come from the any

other areas which is higher in altitude from that city therefore it has to be done at the drainage basin level.

So at the drainage basin level the analysis has to be done that what is the prevalent topographical profile of that region and how that within the region the city situated all those, after all those analysis the drainage plan can be done. Now the fact is that in our cities the drainage plan is done at the city level which is not functional. That is why most of the cities they face the urban flooding and the drainage problem during the raining season and otherwise also.

And; so identification of the outfall so river could be the final outfall but before river there could be other manmade outfall like manmade canals, manmade; larger drainage system which can be used as a intermediate outfall and which can carry the surface and water from the urban areas and the surfaces to the river. So these are the major aspect of the drainage.

Now in the cities drainage, sewerage and the water supply and the your solid waste management these are plant together as a system of network so that everything can perform in a comprehensive way and the same time everything can perform distinctly. So let us see that what are the benchmark for the Solid Waste Management and the Storm Water Drainage.

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Solid Waste Management

- Household level coverage of Solid Waste Management 100%
- Efficiency of collection of municipal solid waste 100%
- Extent of segregation of municipal solid waste 80%
- Extent of municipal solid waste recovered
- Extent of scientific disposal of municipal solid waste
- Efficiency in redressal of customer complaints
- Efficiency in collection of SWM charges

Storm Water Drainage

- Coverage of storm water drainage 100%
- Incidences water logging/flooding 0%

So for Solid Waste Management it is the household level coverage which is required usually we consider 100% coverage. Efficiency of collection, here also our target is 100%. Extent of segregation our target is 100% but municipality there given target of 80% sometimes. Extent of municipal solid waste recovered like the water supply and sewerage the recovery is a major issue here.

Extent of scientific disposal of municipal solid waste, scientific disposal mean how are you treating the waste to make a meaningful discharge. Then efficiency redressal of customer complaint, similarly efficiency in collection of Solid Waste Management charges. And for Storm Water Drainage the benchmarks are coverage or storm water drainage, Incidences water logging or flooding. So the coverage again we target 100% and incident should be as low as 0%, so these are the indicators of the solid waste management and the storm water drainage.

So we have discussed in brief about the water supply; the sanitation sewerage, the solid waste management and storm water drainage. Next we see in short that what are the social infrastructure. In the last lecture we told you that the social infrastructures are the infrastructure we build at the various level local level or the area level or the city level which is aiming to improve the social condition like education like health like cultural aspect all these, but definitely it needs a capital investment also and it is also a physical installation.

For example, you need to create buildings, you need to create some amount of internal infrastructure but definitely the major benefit of the social infrastructure is social and cultural.

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Education

So first is the Education.

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Sr. No.	Category	Student Strength	Population Served per unit	Area Requirement	Other Controls
1.	Pre Primary, Nursery School	--	2500	0.08 ha	To be located near a park
2.	Primary School (class I to V)	500	5000 (NBC, 2005)	Area per School = 0.40 Ha a) School building area = 0.20 Ha b) Playfield Area = 0.20 Ha	Playfield area with a minimum of 18 m x 36 m to be ensured for effective play
3.	Senior Secondary School (VI to XII)	1000	7500	Area per School = 1.80 Ha (NBC, 2005) a) School building area = 0.60 Ha b) Playfield Area = 1.00 Ha c) Parking Area = 0.20 Ha	Playfield area with a minimum of 68 m x 126 m to be ensured for effective play

So I have taken the norms from the URDPFI you know that URDPFI gives the basic standard of the social infrastructure. So we have the Pre-Primary Nursery School Primary, Senior Secondary School and this is the Population category that is the how many population is serve by only one such school. And the Area Requirement in terms of the land, so; and some other controls like most of the cases schools have to be located near the park so that school and the open space can be used together.

And the; here the major planning concern could be that you may not have dedicated land for each and every pre-primary school but definitely you can use or you can allow the pre-primary school even in the residential locality as a mixed used land use so that some amount maybe one floor or maybe some part of the one floor can be used for the pre-primary school. But primary school definitely needs a ideally a dedicated land and a open space so that the students can enjoy, so those kind of local contextualization is required to be taken at the local level.

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Sr. No.	Category	Student Strength	Population Served per unit	Area Requirement	Other Controls
4.	Integrated School without hostel facility (Class I-XII)	1500	90,000 - 1 lakh	Area per School = 3.50 Ha a) School building area = 0.70 Ha b) Playfield Area = 2.50 Ha c) Parking Area = 0.30 Ha	To be located near a sport facility
5.	Integrated School with hostel facility (Class I-XII) (NBC, 2005)	1500	90,000 - 1 lakh	Area per School = 3.90 Ha a) School building area = 0.70 Ha b) Playfield Area = 2.50 Ha c) Residential Hostel Area = 0.40 Ha d) Parking Area = 0.30 Ha	To be located near a sport facility
6.	School for Physically Challenged	400	45,000	Area per School = 0.70 Ha a) School Building Area = 0.20 Ha b) Playfield Area = 0.30 Ha c) Parking Area = 0.20 Ha (NBC, 2005)	To be located near a park or sport facilities
7.	School for Mentally Challenged		10 lakh (MPD, pg 137)	0.20 Ha	To be located near a park and non-noise polluting zone

Other Controls: The schools should preferably face service roads and roads with less traffic intensity.

Next you can see requirement at the higher level like the Residential school with like the school without the hostel facility and residential school with the hostel facility then School for Physically Challenged, School for Mentally Challenged.

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Category	Student Strength	Population Served per unit	Area Requirement
General			
✓ College	1000 - 1500	<u>1.25 lakh</u>	Area per college = 5.00 Ha a) College Building Area = 1.80 Ha b) Playfield Area = 2.50 Ha c) Residential including Hostel Area = 0 d) Parking Area = 0.30 Ha
<u>University Campus</u>	--	--	10.00 to 60.00 Ha area a) Residential (if included) = 25% of tot area b) Sports and Cultural Activities = 15% land area c) Parks and landscape including green 15% of total land area. (MPD)

And then there are College which is required for one college required for 1.25 lakh, University Campus. So these are the large level educational campuses standards which is required at the city level. Now some of the cities they have even large amount of educational campus in their city, those cities can take the advantage of the educational campuses or the universities as a education hub and they can definitely generate much more economic from that.

On the other side if the municipality does not have large amount of or sufficient amount of educational campus definitely they need to build more. Or they need to make transportation network with surrounding larger urban areas so that people can commute and take the adequate educational services. Those kinds of strategies at the city level is required but these guidelines basically indicative in nature.

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Technical institution

Technical Education			
Technical Education Centre (A) - To include 1 Industrial Training Institute (ITI) and 1 Polytechnic	ITI = 400 Polytechnic = 500	10 lakh	Area per Technical Education Centre = 4.00 a) Area for ITI = 1.60 Ha b) Area for Polytechnic = 2.40 Ha
Technical Centre and 1 Coaching Centre include 1 ITI, 1			c) Area for Coaching Centre = 0.30 Ha b) Area for Technical Centre = 2.10 Ha

Then Technical Education. You know that for the technical education you need ITI.
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Professional Education			
Engineering College	1500	10 lakh	Area per College = 6.00 Ha
Medical College	--	10 Lakh	Area per College = 15.00 Ha Area of site including space for general hospital
Other Professional Colleges	250 to 1500	10 Lakh	a) Area of site for student strength up to 250 students = 2.00 Ha b) Additional area of site for every additional 100 students or part thereof up to total strength of 1000 students = 0.50 Ha c) Area of site for strength of college from 1000 to 1500 students = 6.00 Ha
Nursing and Paramedical Institute (MPD, pg 135)	--	10 lakh	Institute Plot area = 2000 sqm (subject to Nursing Council of India/ Ministry of Health Norms)
Veterinary Institute (MPD, pg 135)	--	-	As per Veterinary Council of India/ Ministry of Health Norms (subject to availability of land)

Source: NBC, 2005 MPD 2021

These are the Engineering colleges, Medical colleges, Professional colleges, Nursing and Paramedical Institution, Veterinary Institute, these are the institutions required for the technical education at the city level like for 10lakh population or so, population.

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No. Category	No. of beds	Population served per unit	Area requirement
Dispensary	--	15000	0.08 to 0.12 Ha
Nursing home, child welfare and maternity centre	25 to 30 beds	45000 to 1 lakh	0.20 to 0.30 Ha
Polyclinic	Some observation beds	1 lakh	0.20 to 0.30 Ha
Intermediate Hospital (Category B)	80 beds Initially maybe for 50 beds including 20 maternity beds	1 lakh	Total Area = 1.00 Ha a) Area for Hospital = 0.60 Ha b) Area for residential Accommodation = 0.40 Ha
Intermediate Hospital (Category A)	200 beds Initially the provision maybe for 100 beds	1 lakh	Total Area = 3.70 Ha a) Area for hospital = 2.70 Ha b) Area for residential Accommodation = 1.00 Ha
Multi-Speciality Hospital (NBC)	200 beds Initially the provision may be for 100 beds	1 Lakh	Total Area = 9.00 Ha a) Area for hospital = 6.00 Ha b) Area for residential accommodation = 3.00 Ha

And then we have the medical facilities. There is some; so Dispensaries, Nursing Home, Polyclinic, Intermediate Hospital, Intermediate Hospital various categories, Multi-Specialty Hospitals these are there and population; similarly, with the educational facility the population standard for the health facilities also mentioned you can have a look.

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Speciality Hospital (NBC)	200 beds Initially the provision may be for 100 beds	1 Lakh	Total Area = 3.70 Ha a) Area for hospital = 2.70 Ha b) Area for residential accommodation = 1.00 Ha
General Hospital (NBC)	500 Initially the provision maybe for 300 beds	2.5 lakh	Total Area = 6.00 Ha a) Area for hospital = 4.00 Ha b) Area for residential Accommodation = 2.00 Ha
Family Welfare Centre (MPD, pg 134)	As per requirement	50,000	Total area = 500 sqm 800 sqm
Diagnostic centre (MPD, pg 134)	--	50,000	Total area = 500 sqm to 800 sqm
Veterinary Hospital for pets and animals (MPD, pg 134)	--	5 lakh	Total area = 2000 sqm
Dispensary for pet animals and birds (MPD, pg 134)	--	1 lakh	Total area = 300 sqm
Rehabilitation centres			As per requirement

Then the Specialized Hospital, General Hospital, Family Welfare Centre, Diagnostic Centre, so various categories of the health installation is there. But every municipality every cities may not have all types of health facility but you have see that, that what is the strength of your city in terms of the health and education facility and what is the gap what is the basic lacuna in terms of your education and health facility in your city.

So based on your strength and the weakness you have to develop or make a plan strategy. There are cities which has fantastic educational and the health facility and because of that they attract even not only the National customers they also attract the International customers and because of that, those kind of city has taken are termed as International or National level renowned city. So based on your strength you can strategize that what kind of strength and weaknesses are there and how you can develop further for your cities.

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Socio cultural

Next is the Social cultural.

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Sr. No.	Category	Population Served per unit	Land Area Requirement
1.	Anganwadi - Housing area/ cluster	5000	200-300 sqm
2.	Community Room	5000	750 sqm (NBC)
3.	Community hall, mangalkaryayala, barat ghar/ library	15000	2000 sqm
4.	Music, dance and drama centre	1 lakh	1000 sqm
5.	Meditation and spiritual Centre	1 lakh	5000 sqm
6.	Recreational Club	1 lakh	10,000 sqm
7.	Old age home	5 lakh	Max. 1000 sqm, subject to availability of land
8.	Religious Facilities (MPD, pg 149)		
8a.	At neighbourhood / housing cluster level	5000	400 sqm
8b.	At sub city level in urban extension	10 lakh	4.00 Ha

Apart from the health and education there are some social cultural amenities like Anganwadi, Community Room even though Anganwadi is a requirement at the rural area but in urban areas also there are some rural area at the municipality level or at the outskirts of the city, so Anganwadi sometimes acts as a educational cum cultural unit in the, in this areas. Then Community Room, Community hall, Music or Drama centre, Meditation spiritual centre, Recreational Club, Old age home and Religious Facilities at various level, so these are indicative requirement for your city.

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9. Other Facilities (MPD)		
a. ✓ Orphanage/ Children's Centre (One each)	10 lakh	Max. 1000 sqm, subject to availability of land
b. ✓ Care centre for physically /mentally challenged	10 lakh	Max.1000 sqm, subject to availability of land
c. ✓ Working women - men hostel	10 lakh	Max. 1000 sqm, subject to availability of land
d. ✓ Adult education centre	10 lakh	Max.1000 sqm, subject to availability of land
e. ✓ Night Shelter	10 lakh	Max. 1000 sqm, subject to availability of land
f. ✓ Socio - Cultural centre/ Exhibition cum fair ground	10 lakh	15 Ha (NBC)
g. Science Centre (MPD, pg 148)	10 Lakh	As per requirement
h. International Convention Centre (MPD, pg 148)	City level	As per requirement

Source: UDPFI Guidelines, 1996 and MPD 2021.

Like Orphanage, Children Centre then the Care Centre for the physically challenged, working women or men's hostel, Adult education centre, Night shelter, Socio-Cultural centre, Science centre all these are there. Now the issue is again; I repeat the same thing that it may not be possible that you have each and every category of the specialized Socio-cultural centers but at least identify that which socio-cultural centre is mostly required in your city.

Maybe because of public participation and the consultation you might have got some idea that out of all these socio-cultural center which one is the most important priority. For example, if your city is having base of economic base of say manufacturing or the industry or the commerce more, then you might need a working women's and women's hostel, so give that as a priority, identify the land, identify the developer who can develop and or if the municipal authority can develop those kind of strategy need to be given.

Second like say the old age home. If you find that in your municipality if your city the average structure is different and the old age people, the percentage of the old age people is more than the other age group maybe people need an old age home so you can create that. But if there is no need you do not need to do that. So these are indicative in nature as per the standards concerned.

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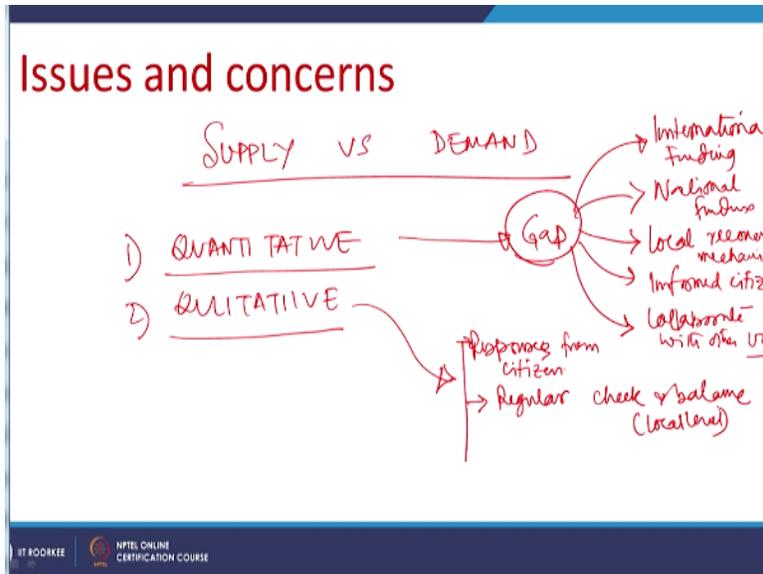
No.	Planning Unit	Number of Organised green spaces
	Housing Cluster ✓	3 - 4 local parks and playgrounds
✓	Neighbourhood ✓	3 - 4 local parks and playgrounds
	Community ✓	2-3 community level park and open space
	District/ Zone ✓	1 district level park and sports centre, maidan
	Sub city centre ✓	1 city level park, sports complex, botanical / zoological garden, maidan

No.	Category	Population served per unit	Area Requirement (H)
✓	Housing Area Park	5000	0.50
✓	Neighbourhood park	15000	1.00
✓	Community park	1 lakh	5.00
✓	District park	5 lakh	25.00
✓	Sub city park	10 lakh	100.00

So apart from that there are open recreational space like the parks, playgrounds, the cluster level, neighborhood level, community level, district level, sub city level or zone level or the sub city center level. Now this district is not the administrative district this district is basically the larger areas or the subsidy created at the city.

And the every level have the number of green spaces which are indicated like say neighborhood level 3 to 4 local parks and playground is required in the cities. Now neighborhood can be determined based on the population size city to city. Similarly, these are the categories of the Housing Area Park, Neighborhood Park, Community Park, District Park and Sub city park and these are the populations by each of the park. This is the land area requirement.

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Now let us discuss some issues and concerns. Now issues and concerns basically for the municipality the infrastructure and services are first is the, the mismatch between the supply and demand. So it is between the supply versus demand. And this supply versus demand can number 1 is Quantitative and another is Qualitative. Now when it is a quantitative gap between the supply and demand definitely the gap between the supply and demand has to be fulfilled by various strategies.

What could be those kinds of strategies? Strategies could be one is International Funding, National Funding then local recovery mechanism and Informed Citizenship and also you and collaborate with other ULB so that you can create a large infrastructure with minimum investment. So collaboration also sometimes minimizes the gap between the supply and the demand.

Whereas the qualitative factors is concern for example maybe you have the financial capacity or you earn some money or revenue to create a new infrastructure but as per the quality or as per the requirement it is not matching with the requirement of the people in terms of the quality or quality requirement. So what to do? So for the quality-wise mismatch you have to first take the responses from citizens.

Now initially in the planning of the mechanism the citizen's responses are the participation was not given much priority but now it is in all the planning mechanism all the planning all the infrastructure creation the responses from the citizens in terms of their priority their requirement is given very importance so that you know what is required and what is what is the phasing of the project, which will be done first and which one will be done second. Second is that, that regular check and balance which can be done at the local level.

There was a time when municipalities need to run each and every time at the state level organization for regular checking of the water supply quality, regular checking of the sanitary quality but some of the municipalities or the bigger corporation they could have localized institution or local institution or they can have their own labs to have regular testing maybe sometimes ones in a year they can do the checking from the other centralized institution.

So those kind of regular check and balance at the local level at the ULB level can be done. Then also you take the, the Expert feedback time to time so that you always come to know that the technology, the service level which you are adopting at the ULB level at the local level is which is at, at par international level or at par with the scientific practices, so those kind of practices. So quantitative and qualitative this two aspects in the; has to be taken maximum care when you plan and govern this municipal services and the infrastructure. Okay.

So with this we conclude this lecture. So today even though we test many aspects, we started with water supply, the sewerage and the sanitation, solid waste management and drainage. We discussed the silent planning concerns and the benchmark of the service delivery of those four major service and the infrastructure then we also touch the educational infrastructure, the health infrastructure and the socio-cultural infrastructure, how it can be; what are the norms and standards for the urban level.

And in the end we told that two types of concerns are there, one is demand-supply mismatch in the quantitative or the in the funding mechanism or the mismatch in the qualitative mechanism, so there are means that how you can definitely cover up the gap funding or the gap between the supply and the demand. And also you can take time to time responses of the citizens so that you

can also; whatever you do, whatever fund you have you can do a meaningful and effective service delivery which is relevant to the need of the people or the requirement of the people.

So after this discussion I hope that in this week we discussed some major aspect of the Urban Governance and the Management like infrastructure, land all these aspects, so you could at least get some idea that to create those kind of infrastructure and land you need substantial amount of finance at the Urban Local Bodies level. So next week we will discuss, the whole week we will discuss about the financial matter.

What are the financial matter and how it can be improved at the municipal level and what are the prevalent that the modern practices of the financing and accounting both which can definitely give or offer a municipality a better system by which they can generate more revenue, they can earn more revenue? They can even use that revenue in a better outcome for creating infrastructure and the services for the people. So with this I thank you very much for attending this lecture.