Water, Society and Sustainability
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Lecture – 17
Urban Water: Historical and Political Ecological Perspectives

Ok. So, this is lecture number 17 on Urban Waters, where I am going to cover urban waters from the social sciences perspective, especially focusing on the Historical and Political Ecological Perspectives. Now, the thing is that we had discussed water in the rural contest, we had also talked about little bit of urban waters, when we talked about urban political ecology, and urban political ecology in the political ecology lecture. But, here I would elaborate on the same, because I very much think that within the recent era of the Anthropocene, and within the recent context of urban sprawl and rapid urbanization that the world is encountering. It is very important for us to understand the complex realities that are going on within urban context more specifically within the urban water contexts.

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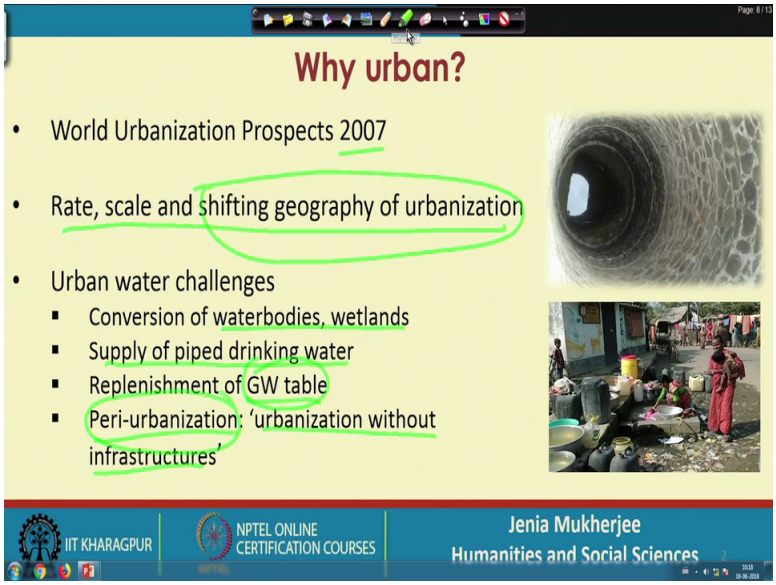

Now, I will elaborate in this first slide that why I think discussion on urban waters, is extremely important these days. If we go through this particular report of world urbanization prospects, then world urbanization prospects came up with the finding that since or from 2008, the demography or the population in the urban area would become

equal to rural area. And these are actually happened. So, what has happened is that 2008 has become the landmark here, where the urban population had actually surpassed the rural population; and now, more people they inhabit urban areas than rural areas. So, this is a significant and landmark development with lot of impact on the environment; or on the ecological footprint.

So, what I am saying is that like urbanization prospect 2007, it says that urbanization is not a new phenomenon. But, what is the new phenomenon, these days is the rate, scale and shifting geography of urbanization. So, this shifting geography of urbanization is extremely important, because we can find growth of urban population, especially in the global south. And this is very much loaded with water challenges.

So, as the urban population is increasing. So, the consumption pattern so far as of urban water is concerned is also shifting to a great extent. And not only consumption, but also we can understand abstraction and extraction of water within the urban context is also taking a rapid turn. So, with the shift in urban population, urban water challenges are becoming severe, where we can find how this water bodies and wetlands are getting converted at a rapid scale.

So, there are lot of problems institutional glitch, technical setbacks, and abstraction is always there so far as this supply of piped drinking water is concerned. Groundwater table is replenishing at a faster rate, because urbanization is today the nature of urbanization if you look into it, we will find that real estate speculation is a major trend with in rapid urbanization or urban sprawl in the contemporary period, so that is effecting the groundwater as well.

And another very significant thing, which I will actually elaborate in the next lecture is what is known as urbanization without infrastructure. So, it is another process where areas, which were rural yesterday, will actually become urban tomorrow. So, they are actually in the transition phase. And this transition phase is conceptualize within a connotation, which is known as the peri-urbanization. And there are manifold challenges that people living in the margins of a city people, you know inhabiting the peri-urban space are encountering. Especially, so far as water provision and sewage water or sewage disposal treatment, and all these things are concerned.

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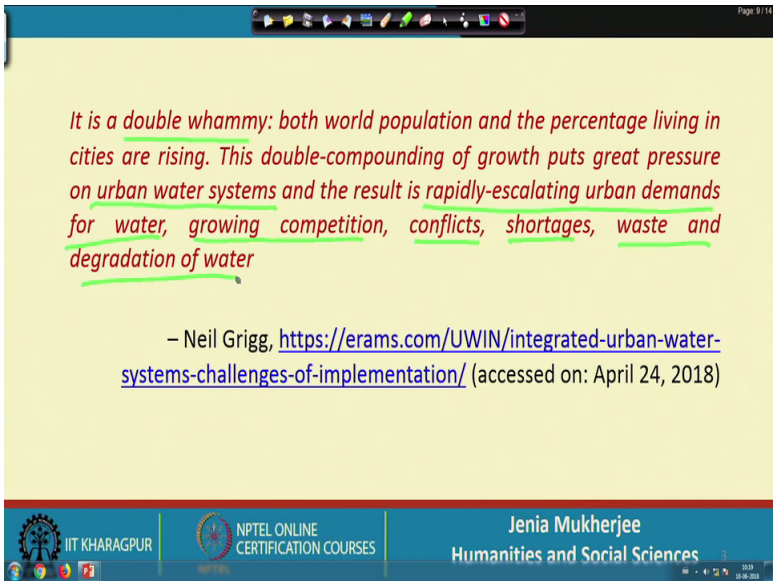

So, this is what I accessed the few days back, it is a particular report called integrated urban water systems challenges of implementation. And here Neil Grigg, grows our attention to what he calls double whammy. So, what is this double whammy, so he says that both are world population and the percentage living in cities are rising.

So the area which had already discussed in the previous slide so, he emphasizes in the whole thing by saying that these double whammy, it is actually compounding growth put it is actually compounding pressure on urban water systems and the outcome is rapidly-escalating urban demands for water, so that is leading to growing competition, conflicts, shortages, waste and degradation of water. This will become more clear when we will look into the next slide, that actually brings out the relationship between urban and the environment.

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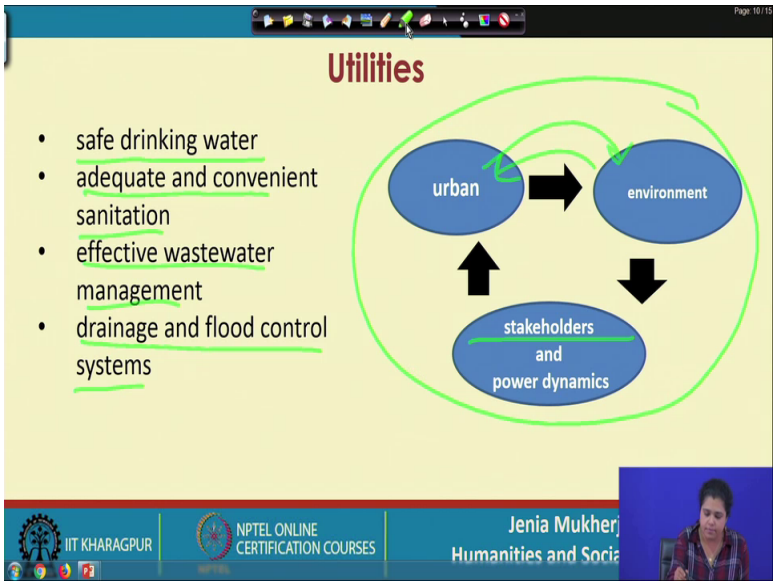

So, what I am going to say is that in the previous report integrated urban water systems challenges of implementation Neil Grigg pointed out that the problem or the challenge that we are facing today is relating to water services. Because water services of a city, it depends on 3 or 4 very important things very crucial things, so which are these are portable water or safe drinking water, which is a primary requirements for all the citizens for all the inhabitants of an urban area.

Then the water service is also to a great extent depends on adequate, and convenient sanitation system. Effective wastewater management and also urban systems or services to a great extent, it depends on effective drainage and flood control systems. Now, the question is the current cities are they able to provide the water services across all these parameters in an equitable or in a sustainable fashion.

If not, if this systems are there, but still the scale is limited; if the systems are there, but they are not functioning well, then that would actually affect the health, and the sustainability of the city that is what Neil Grigg try to point out in his report that we you know quoted previously.

So, this is another diagram that talks about or that brings out the relationship between the urban and the environment. And one must understand that this relationship is actually not linear, but it is thickly loaded with power equations, power dynamics, political equations across multiple stakeholders. Across a wide spectrum of you know people who are

inhabiting the urban area, and who are also affecting the environment. And this stakeholders include the state the nongovernmental organizations, the grass root organizations, and most importantly the people. And there are many other stakeholders as well, who are very much embedded into the whole system.

So, why we are discussing urban water, and why we are discussing urban waters from the social sciences perspective, especially historical and political ecological perspective is that. These perspectives or these frameworks will enable us to understand the complicated or the complex relationship between urban and environment by focusing into the part equations and politics and economic imperatives that to a great extent shape, and determine the relationship between the urban and the environment.

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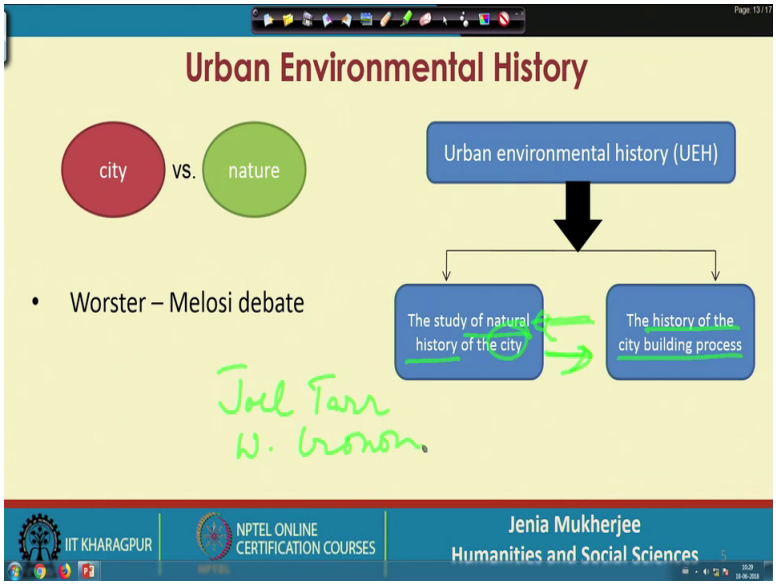

So, now I will come to the urban environmental history, which is the first part of this lecture because, it is divided roughly into two parts, so where in the first part I am going to discuss, the importance of urban environmental history, how urban environmental history can be considered as a very important or a valid lens or framework to understand the complex relationship between urban and ecology; or urban and environment. On the other hand, I will discuss after urban environmental history, urban political ecology, and again I will point out that why urban political ecology is an important framework, which can be applied to capture the complex realities you know, so far as urban waters is concerned.

So, first let us focus on urban environmental history. Now, to begin with this particular field of urban environmental history, it is a very I mean not vary, but at least it is it can be regarded as a recent or an ongoing field of research. Because, if you look into the previous works of social scientists or for that matter even natural scientist, they will find that in the previous works or in previous urban literature and also environmental literature, the relationship between city and nature was considered to be absolutely antithetical.

So, it was so, what happened is that the urban historians or urban scholars who used to study the city, they never talked about the environment. And vice versa, that is environmental scholars who actually studied, you know ecological flows or that for that matter different other areas of environmental social sciences, they never considered urban within the ambit of the environment.

So, there was a strict antithesis between you know city and nature. And it was perceived that city and nature, they are you know they diverged pathways. So, they do not converge, because urban is absolutely different from environment. And environment means environment means, pristine environment. So, only you know environment should consist of topics related to farmlands, agricultural scapes, water bodies, and so on and so forth.

So, we find a strict binary between urban and environment, if we go through the entire you know spectrum or the entire array of a social science literature for that matter. Now, what happened is that in the 1990s, there was a very interesting debate between Donald Worster, a very significant and renowned environmental historian; and Martin Melosi who started working on cities or who started working on the urban for that matter.

Now, Donald Worster, he wrote a piece in the 1990, and the name of the piece is transformations in the earth, towards an agro ecological perspective in history. So, you can understand from this name, agro ecological perspective. So, he said that environmental history should only focus on as I mentioned only the environmental components or for that matter the ecosystem resource including farmlands, agricultural landscapes, forest, water bodies, etcetera. So, according to Donald Worster urban should never be a part of the environment, because urban is always manufactured, it is artificial for that matter.

But, these particular idea which Donald Worster talked about in his 1990; a piece was countered and critically interrogate interrogated by Martin Melosi who pointed out that cities, they are also part and parcel of the bigger environment. So, one should consider city, within while one should consider changes or transformations within the larger environment as a whole, so that is why Martin Melosi pointed out that urban is embedded within the bigger environmental ambit. So, urban if one wants to know or understand the urban predicament, one has to see the larger processes that are going on even within the periphery of the urban.

So, there is a whole lot of relationship between the urban and its environment. And Martin Melosi pointed out in few of his writings, which he started publishing in the early 1990s, one very interesting piece is called the City and the Environment. And there Melosi, I think in 1993, so we will circulate this reference materials to you. So, in that case piece, Melosi pointed out he try to define, and he tried to conceptualize what urban environmental history is all about. So, he said that urban environmental history it combines the history of the city building process, and the history of the relationship between city and nature, and the combined relationship between the two. So, this is what urban environmental history as Melosi pointed out.

So, yes, so Melosi talked about that urban environmental history, it actually combines the study of natural history of the city, and the history of the city building process, and the possible intersections between the two. This is a very important composite definition, where Melosi says that one when one focuses on the history of the city, one cannot ignore the natural history of the city that that is the equation between the city, and its wider environment in the making of the city.

So, later in political ecology, we will learn that you know how city actually shares its relationship with its larger environment, and how that determines to a great extent the making, unmaking, and remaking of the urban context for that matter. So, it is the study of the natural history of the city, and also the history of the city building process, and the possible intersections between the two. So, this is what all about urban environmental history. A brilliant reconceptualization and a composite you know understanding of urban environmental history, which we got during the 1990s, when Melosi started focusing on you know what can be how urban environmental history can actually evolved.

And Melosi was joined by number of other social scientists, and historians including Joel Tarr. And there was already you know Cronon William Cronon, who had focused on the history of Chicago. So, how Chicago had developed from its larger you know environmental infrastructures. So, these things so, number of environmental historians, they started focusing on the city; and they started looking into the intersections between the natural history of the city, and the history of city building process and came up with very interesting history of evolution of cities, and you know the functioning of cities by considering into the larger ecological equations that the cities are embedded with.

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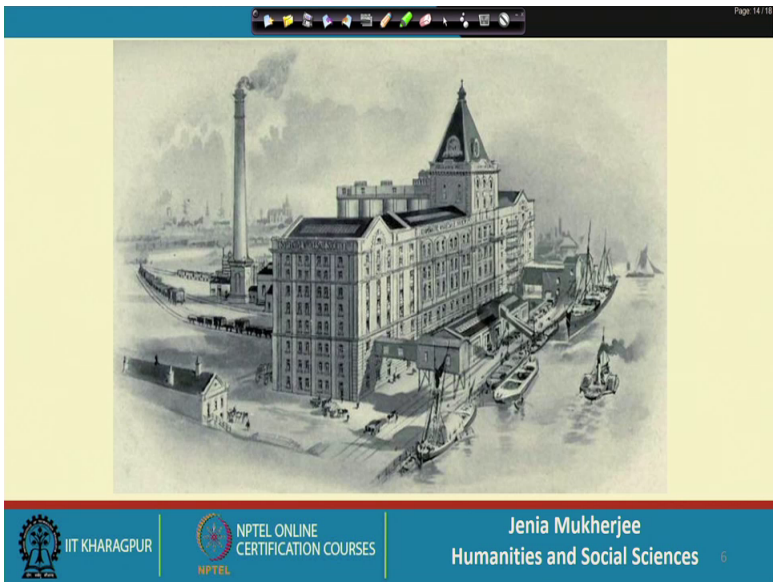

So, this is a picture; I do not know of which city, I have no idea about the time frame, but I found this picture very interesting. And so, the question that I am going to throw in front of you is that by looking into the picture, whether you feel that you know Martin Melosi's argument are could be validated or not. So, this is an exercise that you can think about.

So, there is I have no clue, no idea about the time frame; no idea about the geographical space, but the only idea that it is a very interesting, you know picture that give us bits and pieces of information about many things. So, there are so, I will not elaborate, because this is an exercise for you. So, the exercise is by looking into the picture, you have to you know you have to just reflect on, whether you are able to validate a Melosi's argument or not that is it.

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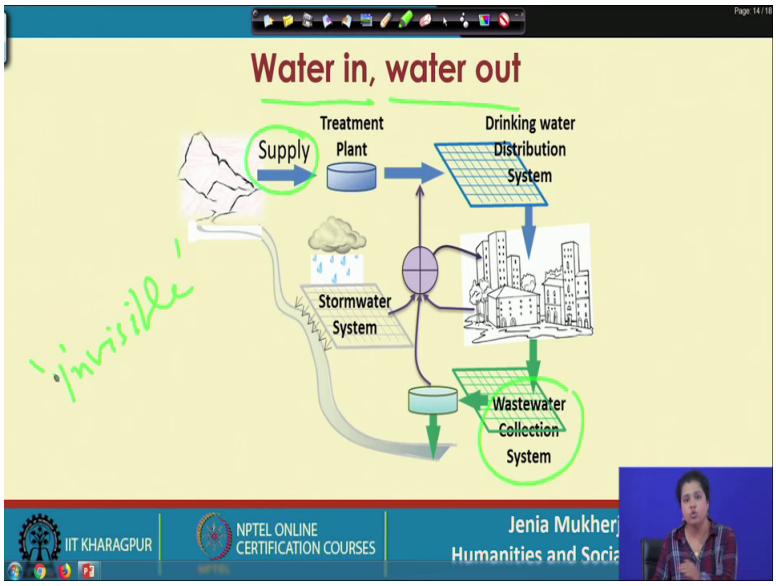

So now coming to the more technical part of it; so, when we are saying that cities to a great extent depend on environment, or for that matter environment to a great extent shape the urban technicalities. So, what do we actually specifically be, so we are specifically talking about two very crucial thing on which the survival of a city is depended. So, what are these crucial things, in technical terms it is called water in and water out.

In very simple term, so from where the city derives it water, and where it disposes its wastewater. So, these two things are very important and vital. Because, today as we had also talked about Neil Grigg's write up, so he has also mentioned that these particular thing of water in and water out mechanism is crucial for the vitality, and sustainability, and also longevity of the city.

So, this we need to understand that from where the city actually receives water supply, and how it actually has come up with the wastewater disposal or collection system. So, this entire mechanism of water in and water out, Martin Melosi and more importantly Joel Tarr, they try to conceptualize it in terms of what they call the invisible city.

Now, why they call this the invisible city? Because there are series of wires and networks and you know so many other technical things. So, an entire cohort of technical design that we sometimes and not able see within the surface of the city, but that sometimes remains in the subsurface of the city. So, this is an entire invisible network sometimes as

I mentioned I mean it is a complex system consisting of wires, and so many other technical things that are vital for the sustenance of the city. But, when you will encounter a city, sometimes you will not be able to see this system, because often it remains underground.

So, environmental historians or one of the significant contribution of environment history is that the environmental historians, they drew our attention to these a part of a city to these invisible component of a city on which the functioning of city to a great extent remains.

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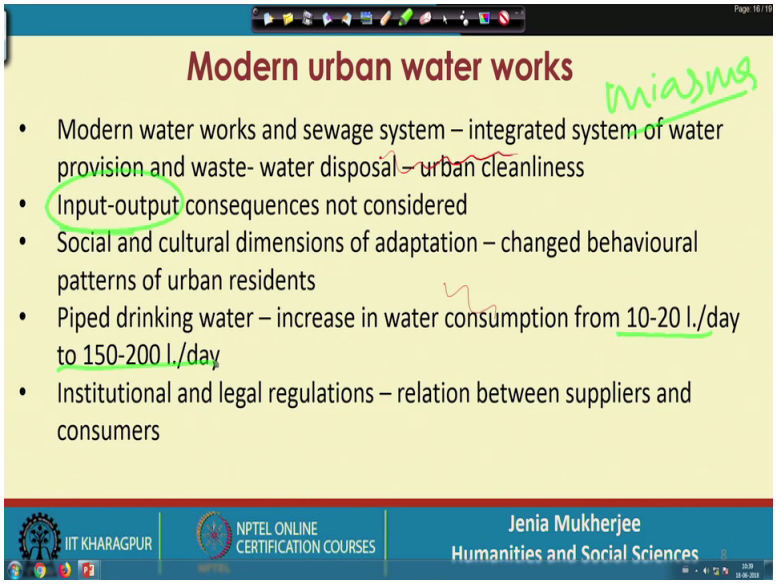

Yes. So, coming back to if you keep in mind this water in, water out. There are very other interesting nuances that this water in or water out of the invisible city actually consists of. Now, I will try to explain it one by one, because I think this is crucial, and these are the fundamental contribution of environmental historians. Because, one I mean students from the scientific background, from engineering background, they will come up with the understanding that see we know water in water out. So, what is so historical about it, why a historian has to explain what is water in water out? Because we design this system, a civil engineer designs this system, an ecological expert or engineer designs this systems.

Now, how a historian or how a social scientist can actually contribute in this you know invisible component of the city, which is conceptualize in terms of water in and water

out. So, these are the bullet points. These are the fundamental bullet points through which I am going to make or going to assert the contribution of urban environmental historians, you know in making us understand the how this complex water in water out system actually work.

So, let us take the first point, modern water works and sewage system, integrated system of water provision and waste-water disposal relating to urban cleanliness. We definitely have to go back to history to understand this. Now, in which part of the world actually first this so called modern water works and sewage system developed. It developed in the European capitals, and when roughly during the 19th century. And you will see that during the 19th century what happened is that the public you know the public health sector or the public health you know aspects, were very much determined by a particular theory that was invoked during that time, which is known as the Miasma theory.

So, what is this Miasma theory? So, Miasma theory is that during that time the Europeans became extremely anxious, because they thought that you know the cities have to be kept clean. Because, many people were dying due to many reasons, different diseases were actually taking place, and the mortality rate in these European cities were quite high.

And so, the Europeans they apprehended that in order to survive, in order to you know in order to increase their longevity, they have to keep their cities clean. So, they focused on two things, they thought that the there should be a system through which the entire city can be cleaned, this is one and secondly there should be you know the water system water supply should not be totally based on surface water.

So, they understood that you know something needs to be done or some kind of piped install piped drinking water system is very much required through which they will be actually able to get a supply of fresh quality portable water. So, these two became priority that is cleaning the city everyday or for that matter frequently and also getting accessed to piped drinking water.

So, water will flow through the pipes. So, it should not be accessed directly from the surface water. So, these two things become priorities for the Europeans. And this is where actually they started designing what is known as modern water works. So, these

piped water system and sewage disposal system, these were integrated as a whole; and these gave birth to what is known as modern water provision.

Now, the interesting part is that this miasma thing and 19th century does let to the birth of this modern water works. But, during that time, the input and output consequences to a great extent were not weighed, were not considered that is so, I again explain that. So, for example, now when you are shifting, so piped drinking water means what, piped drinking water means you are getting household connection. So, you are getting household connection and this women more importantly, because women they are actually the water providers for family. This has been established in feminist ethnography as well.

So, what happened, you do not need to travel or you do not need to move from one distance to the other, to fetch buckets of water. So, now, you are getting public or now you are getting household connection, now you are getting a connection privately. So, you have this modern bathroom amenities, you have flush toilets, and also there was lot of other scientific innovations which were made. For example, so far as this electronic appliances are concerned like if you remember 1920th century Europe during this time, we find not only flush toilet and modern bathroom amenities, but also dish washer, washing machine.

So, what happened is that I mean within a very small span of time, the domestic consumption of household domestic water consumption of household, it rows manifold. So, it rows almost 10 fold in Europe, and also in the United States. So, previously while the water consumption was only 10 to 20 liters per person per day; so now it became 150 to 200 liters per person per day. So, you can see how technological you know different technological choices, shifting technological choices actually laid to or actually affected the abstraction of water that is the input side which was unfortunately not considered, when these modern water provision was being designed.

So, these are the cultural things; these are the social aspects of the you know technical design, which were unfortunately not considered during that period of time. Not only that, there are other things like for example, institutional, and legal regulations, we have to keep in mind that these system this modern water provision. It is a large system with

fixed you know with fixed high fixed cost very high fixed cost, because it requires huge amount of investment of capital money.

So, these systems is a large infrastructures which had high fixed cost, but low variable cost. So, what happened is that consumption to a great extent was stimulated by degressive (Refer Time: 26:07), what does that mean, it means the more you consume the less you pay. So, the more amount of units you consume, the less you pay. So, what happens is that, so that is an incentive to the to the people. So, the people start and started consuming more, because then they have to pay less. So, this is the whole theory of the degressive (Refer Time: 26:28).

Now, what was happening was that, that was definitely affecting the ecological footprint that was definitely affecting the resource. So, these are the multiple dimension, the social cultural dimensions, the institutional legal regulations and all this input, output aspects and consequences that became embedded with the modern water works, which were not very much considered during that time, because during that time only the technicalities, but not the you know a social political institution and legal aspects were actually considered.

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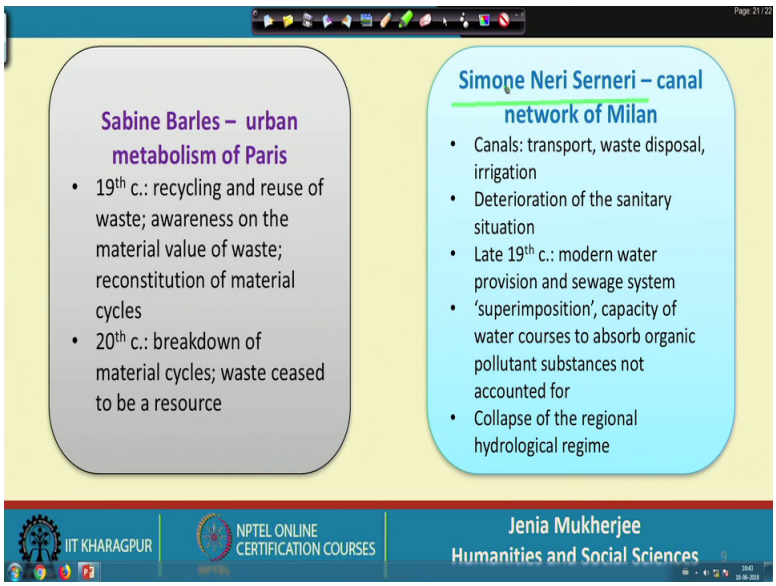

Yes. So, I just want to discuss two works here, a very prominent very interesting works of urban environmental history. One is by Sabine Barles and you should keep in mind the Sabine Barles. So, Sabine Barles Barles's a civil engineer by training, but Barles studied

the urban metabolism of Paris and not only urban metabolism of Paris, but the history of urban metabolism.

So, he focused on the archival sources, and he started studying urban metabolism of Paris by focusing on the 19th century. So, being an expert in the civil engineering I mean by having expertised in civil engineering. Barles and his team entire research team, they actually quantified water flows of 19th century Paris. And they found out that the natural scientists and the economist of that period of the 19th century, they were extremely aware about the, you know reuse and recycling value of waste.

So, to a great extent they actually concentrated on material cycles of waste, which was so very important. But, unfortunately Barles shows by you know tracing the entire historical contexture that these scene of 19th century, it actually transformed and shifted during the 20th century, when this there was this breakdown of material cycles and Barles and his team laminated that you know since the 20th century west cease to be a resource.

So, this is one and the second one is a very fascinating work by Simone Neri Serneri. So, Serneri has worked on the canal network of the city of Milan, Italy. And Neri Serneri has shown that how previously the cities canal system; which were maintained since the traditional period of time, which were maintained since the ancient times. How this canal system was an extremely vibrant resource, which played a very crucial part in trade and transportation and also waste disposal, and also the canals played an important part in irrigating the nearby agricultural fields.

Then Neri Serneri argues that after a particular point of time there was a rise in urban population, so there was a demographic change in demographic profile, and change in the demography of Milan. And so, the sanitary situation actually deteriorated. And so, this traditional canal system was replaced by modern provision and sewage system.

But, unfortunately the scientist, they did not consider or the planers they actually did not considered that this super imposition was not to a great extent able to absorb organic pollutant substances. So, what was the result? The result was the entire collapse of these traditional regional hydrological region, and the agricultural fields also to a great extent became polluted.

So, the why I am discussing these two works, because these two works to a great extent help us understand that how a long term view or how a if we trace the or if you understand a city or if you try to understand how this modern water provision, and how waste water treatment or waste-water disposal mechanisms evolved in a particular city. And how these are affected the functioning of the city, then we will be able to understand or we will be able to identify the specific challenges and potentials that are city offers, which is vital for understanding you know the parameters of a sustainable city.

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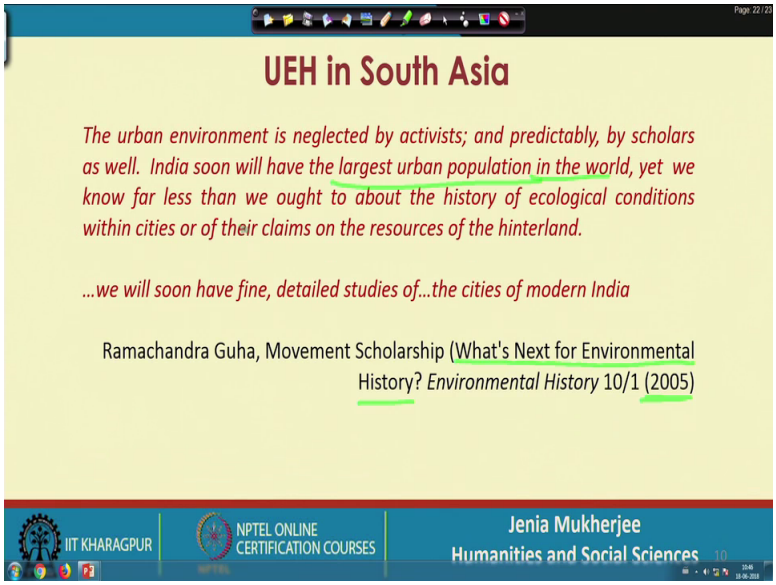

So, this is an interesting argument by Ramachandra Guha, a long back in 2005. So, the title of this particular you know peace is also very remarkable, it is called what is next for environmental history? So, in 2005, he was thinking what is next for urban environmental history. And he brilliantly captured that urban has to be included within environmental history, because keeping in mind the contemporary conjecture of urbanization. So, he says urban environment is neglected by activists. So, as we know that you know as I mentioned that city and nature, they shared antithetical kind of a relationship.

So, in South Asian or in more specifically Indian environmental history also urban was neglected to a great extent, because South Asian environment history also consisted of the history of you know forest and water bodies and all that, but not urban for that matter. So, what he says is that you know the urban environment is neglected by activists by

scholars as well. So, India soon will have the largest urban population in the world, and this is already the case. So, yet we know far less than we ought to about the history of ecological conditions the history of ecological condition within cities or of their claims on the resources of the hinterland.

So, he also brings in the question of the hinterland that is the relationship between the urban and its wider ecological infrastructure. So, then he is hopeful, because he says we will soon have fine detailed studies of the cities of modern India from the environment perspective. And this is what we are trying to do. So, one of my lectures on the blue infrastructures of Kolkata, on the canals and wetlands system of Kolkata from a temporal historical perspective; we will to an extent I think accomplish this particular dream of Ramachandra Guha that we will soon have fine detailed studies. And yes, we are having fine detailed and sophisticated studies of you know water bodies or you know environment within urban context.

So, this is I am sorry a little long lecture, and I will like to devote some more time in it, because I want to concentrate on a political ecology as well. So, once you are clear with urban environmental history, and the you know the several important aspects that urban environmental history had brought to the table. Now, we will focus on little bit on urban political ecology maybe for the next 10 minutes, and then we will finally wrap up.

So, again last slide on urban environmental history, two or three works, because in the last slide I talked about this Ramachandra Guha's dream about we will soon have. So, we are having because I cited my case study on Kolkata's canal, I also want to cite few other case studies one or two are only there.

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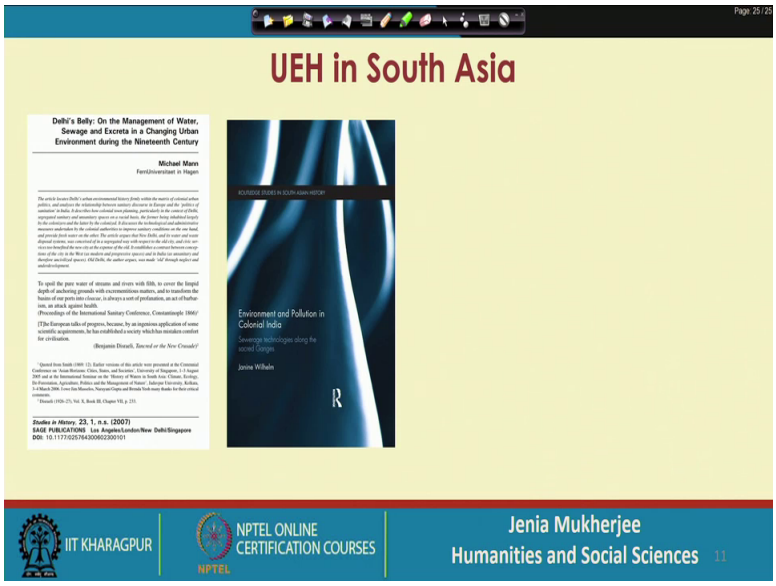

So, one is by Michael Mann. So, Michael Mann focused on what we calls Delhi's Belly. So, if you remember water in water out invisible cities of Belly. Belly you know the meaning of bell, so Delhi's Belly. So, he shades light on the sanitary situation or sanitary condition of Delhi. And he brings in a very interesting unexplored aspect by saying that you know during the colonial times, when this modern sanitation system was developed. Then there was a certain racial component to it as well that is he clearly shows that how these Britishes they actually differentiated between old Delhi, and New Delhi.

And New Delhi they came up with you know very composite or comprehensive kind of a modern sanitary system or sanitation system, but old Delhi lacked from the facilities of modern sanitation. So, this is his core argument; and followed by followed by a book very recent book by Janny Jonine William sorry. So, and the book is called environmental pollution environment pollution in colonial India. (Refer Time: 35:49) and she focuses on the Ganges, and more importantly the sewage technologies of Ganges. These are fascinating publication, because if we look into the reason that why rivers are being polluted.

If you just also focus on Ganga, then the mainstream argument is that the Ganga started getting polluted, after the post independent period, since the post independent period. Because, there was heavy economic development and you know and there were heavy industries that were coming up on the banks of the Ganges and so all these river cities.

So, the cities on the bank of the Ganges to a great extend, where polluting the Ganges. So, there was both there were both point and non-point source pollution that is pollution from agriculture, and pollution from industry, especially since the post independent period.

Now, William counters this argument, and says that no the pollution actually started during the colonial period as well. Because, her argument is that the as the colonizers, they were very much you know to a great extent they were bound by this colonial ideology of fiscal restriction. So, they introduced cheapest you know sanitation technologies, severage technologies on these various river cities on the banks of the Ganges, which to a great extent lead to massive pollution. So, you can see by looking into history that how river pollution in the Ganges actually started, since the colonial period only, and to a great extent shaped by and determined by political economic imperatives or the colonial.

So, it is not only a post independent phenomena, but it is also a colonial phenomena, a particular kind of a view that only an environmental historian can actually give you and as I had mentioned my study on canals and wetlands of Kolkata, which I will elaborate in one of my lectures. So, no need to elaborate on this right now.

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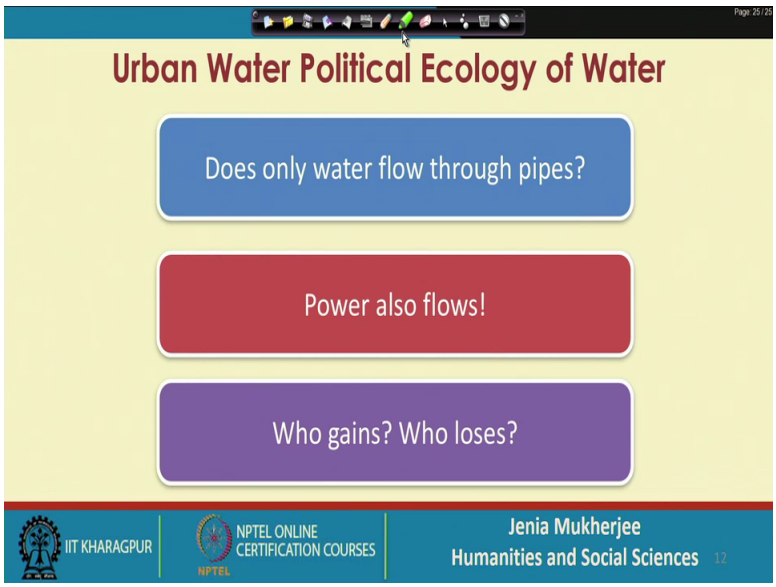

So very quickly coming to urban water political ecology of water so, what is this, this is actually these are the two or three you know basic ideas, basic things that we need to

keep in mind or the first is a question an interrogation, does only water flow through pipes. This is a question that we need to ask ourselves, this is a deeper question which will help us observe lot of things, which we are unable to observe otherwise. So, does only water flows through pipe or there are other things that also flow including, of course power.

So, it is not only water that flow through pipes, but it is also power that actually flows over, so I will explain. And political ecology of water is that framework, which enable us to understand that it is not only you know this H 2 O that flow through the pipes. But, it is also you know the power or the way this water pipes are distributed in different parts of the city that way the water pipes are laid out in various part of the cities through which the cities actually access pipe drinking water. This is to a great extent loaded with political equations powered nexus.

And who gains and who loses, this is another thing which we need to ask that who gains by these kind a you know distribution system or by the kind of you know access that the city the city achieves, so which segment of population actually can be termed as gainers, and which segment of population actually be termed as losers. So, these are the things that we need to concentrate on.

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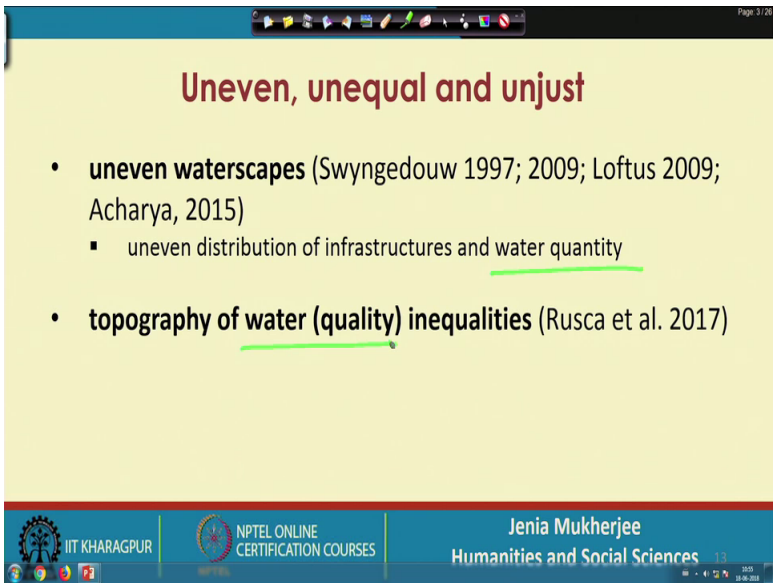

So, political ecology of water is all about a uneven, unequal, and unjust, three vary key terms; it is all about uneven, unequal, and unjust distribution of water infrastructures, and

of course water for that matter. So, yes, it is about uneven waterscapes and in political ecology lecture, we had talked about Swyngedouw so, the here again reference by Swyngedouw. So, Swyngedouw and his team to a great extent, they are focused on a portable water, and they focused on water quantity. Now, interesting so uneven distribution of infrastructures and water quantity, so quantity is the key term here. But, now political ecology of water had also advanced and moved beyond quantity to take into account, to take into consideration, also water quality.

So, we had I think discussed about Rusca's works of 2017, when he talked about political ecology that how Rusca says that how or Rusca actually establishes the link between power equations, politics, physicochemical and microbiological contamination in one of the African cities.

Yes. So, coming quickly actually this is a big jump which ideally should not have been done, but then I have no option, so it is important for us to understand urban water political ecology as a framework. And how in India the few social scientist and scholars, they are actually applying the lens of or applying the framework of urban political ecology and studying urban waters.

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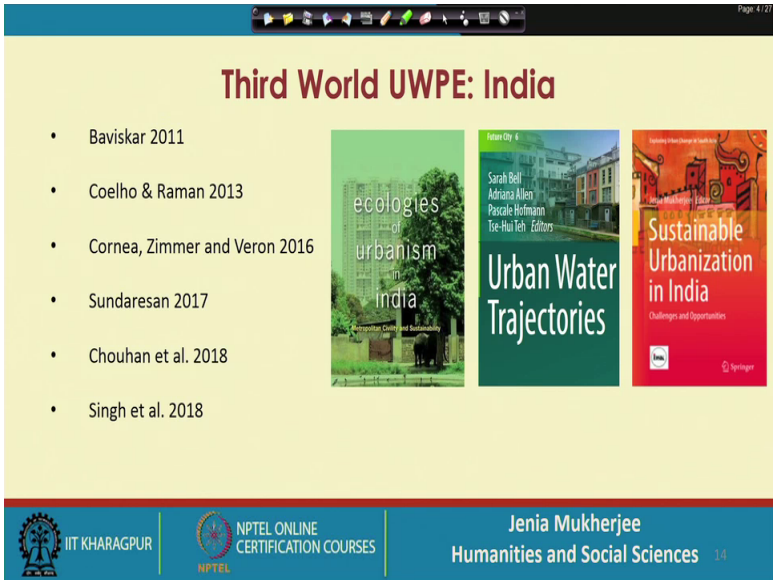

So, these are few works by Amita Baviskar 2011. And Baviskar had studied that how the bed of the Yamuna had actually transformed from urban commons to what she calls priced real estate commodity. So, she has studies this capture this entire politics across

the bed of the Yamuna river. So, it is all about the Yamuna river and its bed and its transformations from commons to commodity, from urban commons to a real price or priced real estate commodity.

This so, there is a chapter in this particular book called ecologies of urbanism in India, I think 2013 publication by edited by K. Sivaramakrishnan and (Refer Time: 42:06). And there is a very interesting chapter by Coelho and Raman. And Coelho and Raman, they have focused on the waterscapes of Chennai.

And they have shown that how you know how the political, economic imperatives of state craft had actually to a great extent you know impacted and affected the urban waterscapes of Chennai, so that shown that how water bodies had been filled up, for making space to housing or real estate development by the states. So, these are mainly state sponsors project, where you know a transnational capital and private stakeholders are also you know came in. So, what happened is that this urban water bodies had been filled up, and this had made space to real estate speculation, and housing, and all that.

So, this is one, so where water bodies had been actually converted field up and become land this is one. Secondly, the people who had been displaced from the nearby areas, so who had to face the brunt of displacement. So, they had been relocated, where to some of the you know flood prone marshlands. So, how those marshlands now had been used as resettlement site. So, you can understand. So, one thing Chennai has done is that it had filled up its water bodies, and made way to housing projects. Second thing on the other hand, flood prone marshlands has been used as you know dirty filled it to an extent not so I mean to an extent inhospitable areas, where these people had to resettle and get relocated.

And thirdly another thing has been done, few lakes or a few water bodies actually had been de silted, dredged, and beautified to you know make the city to an extent look clean and beautiful and all that. So, all these I mean ideas of elite environmentalism or so, bhujwa environmentalism or middle class environmentalism etcetera. So, Raman and Coelho to a great extent should have shown that how water bodies had been filled up and making with housing projects, water bodies had been used as dirty, filthy, resettlement sites, and water bodies had been dredged and silted, for the purpose of beautification. So, these are the complex equations that one need to understand.

So, another work by Natash Cornea, Anne Zimmer and Renne Veron 2016, on the pond scapes of (Refer Time: 44:35). This is also another interesting I mean piece, which talks about how muscle power, how the you know neighborhood dadas, and how the palas, and how the (Refer Time: 44:46) also to a great extent contribute in the access to ponds and pond water. So, Sundaresan (Refer Time: 45:01) Sundaresans work of again recent work 2017, which has been published in this particular book edited by Adriana and Pascale and all called Urban Water Trajectories. And Sundaresan has worked on the you know transforming trajectories of lakes of Bangalore.

So, mainly she has used the urban political ecologic perspective, but she has also to an extent consider the temporal trajectory as well. So, to an extent we can say that this has converge and combined environmental history and political ecology. And finally, this is another book called Sustainable Urbanization in India, challenges and opportunities which has been edited by me, and which has come up this year 2018.

And there we have very interesting works two works by very young scholars doing their research at IIT, Bombay, Hemant Chauhan and Neha Singh. So, Hemant Chauhan has focused on the coastal. What he call coastal urbanism in Mumbai, and he shows that how the coastal CRZ you know Coastal Regulation Zone rules has been violated by the Mumbai metropolitan region, and what had been the effects of that violation on the fisher (Refer Time: 46:16) or the fishing community in Mumbai.

Followed by another chapter, which is the last chapter in this edited volume on the urban waterscapes of Udaipur. Again a very fascinating study applying both environmental history and political ecologic perspective on a so called to a great extent unexplored city called Udaipur. So, Udaipur is a very important destination today, because it is a varying destination, and lot of other things are going on. But Neha Singh draws our attention to a different area that from where these urban so called varying destination is trying to manage its water.

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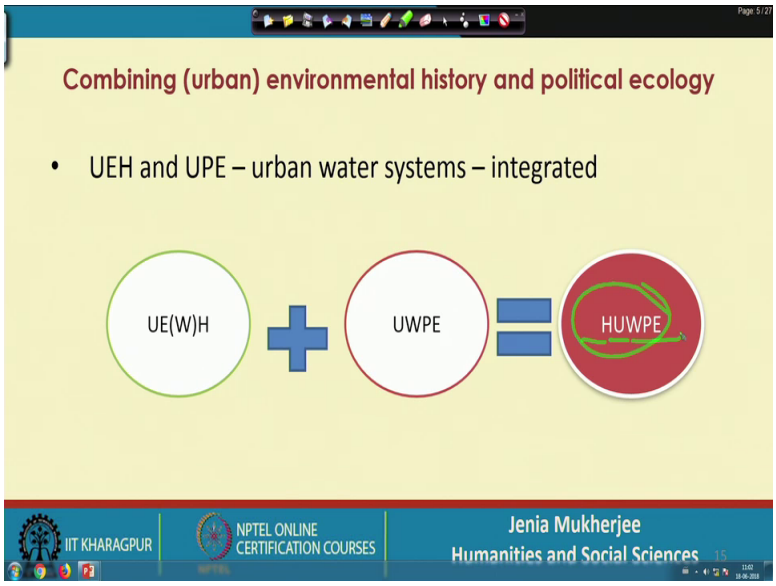

So, finally, here I will end this presentation with the argument that yes, now we know, now we are aware of the contribution of urban environmental history in studying urban water, now we are aware of the you know significance or the importance of political ecology to capture the complex realities of urban water. So, what is needed at this moment is we also need to convert this two perspectives, because if we integrate urban environment history and urban political ecology, then we will able to grab a comprehensive composite picture of what is going on within the sector of urban environment during the recent days, and what had happened since the past.

So, yes a combining urban environmental history and urban water political ecology, we can come up with something, which is known as historical urban water political ecology. So, this is the framework that I am offering you. So, a scientist also you can definitely take up this framework. And study urban water study you know piped drinking water facilities, study modern waste disposal system, study the drainage system, flooding system, all these systems that come under the water services in a particular city, and understand the nuances and nitty gritties involved in it.

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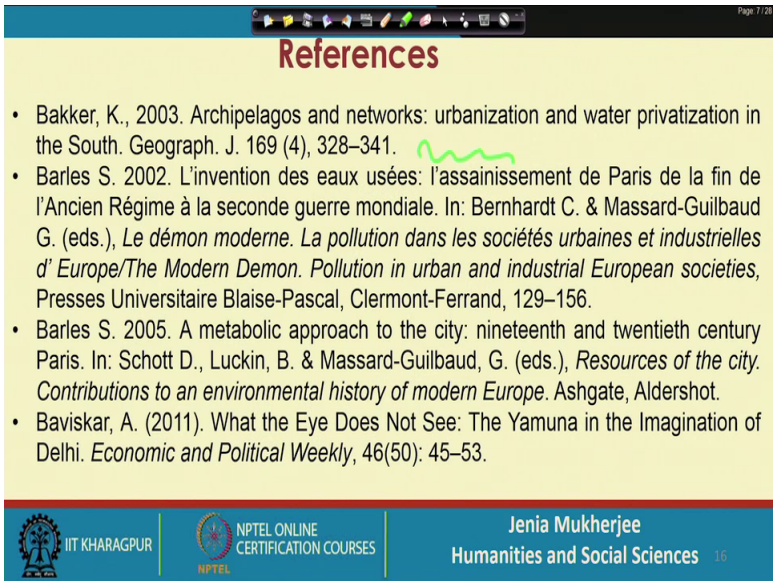

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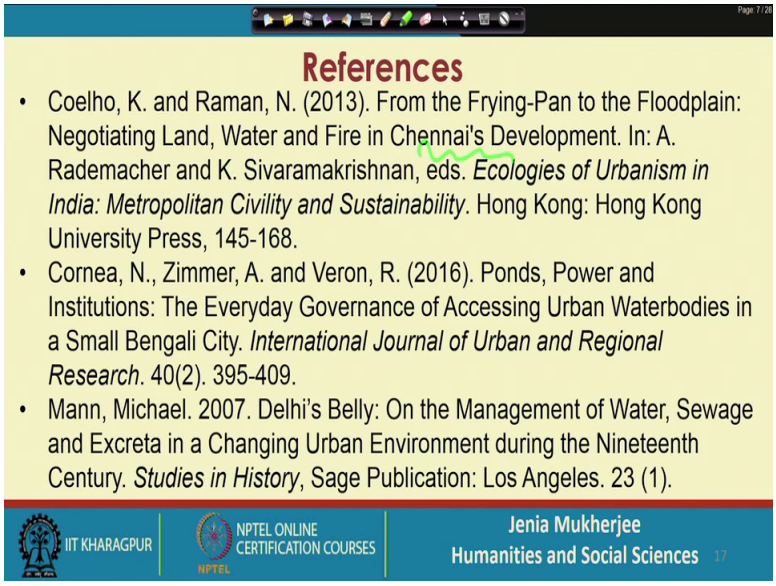

So, these are the references. And so, I think in one of my lectures in one my last lectures, I will elaborate on how I am trying to you know apply or use historical urban water political ecology by focusing on a particular case study on Kolkata; Kolkata's urban water systems, which I have connoted as blue infrastructure. But, for now you go through some of these important references, and try to understand the importance of social sciences framework in understanding urban waters in the contemporary period, and how it had evolved since the past.

Thank you.