Urbanization and Environment
Prof. Jenia Mukherjee
Department of Humanities and Social Sciences
Indian Institute of Technology, Kharagpur

Module - 04
Urban environmental social sciences frameworks
Lecture - 26
Urban Environmental History: South Asia (SAUEH)
Part II : Trends and Trajectories

Alright. So, we now enter into the most exciting field you know in this Urban environmental social sciences frameworks. So, we would now discuss South Asian Urban Environmental History which is an emerging domain, a very exciting domain and I have actually kind of divided this lecture into two parts.

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I would be basically you know take you again through a historiographical ride on the several works, several recent works, you know since the last one and half decade on this urban environmental history; especially, focusing on the Indian subcontinent. And we will discuss the various research trends and directions so far as this particular domain is concerned and then, we will also discuss very quickly how this field is also overlapping with other fields integrating and borrowing methods and methodologies from other very prominent fields like urban political ecology.

So, in this particular lecture, I would basically be focusing on three major works, the earlier works by John Broich and Michael Mann and Pratik Chakrabarti.

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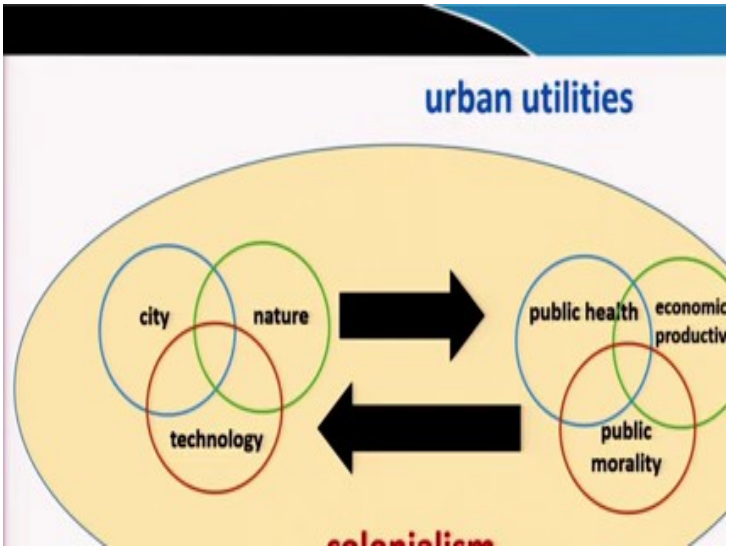

Now, urban utilities, again has been a key theme for any urban environmental history whether like you know we consider urban environmental history of the US, we have seen this now; whether we consider urban environmental history as it developed in the European continent. So, urban utilities or network infrastructure, we have seen how this has been a key theme you know, so far as this urban environmental history domain is concerned.

Now, this actually the whole story; so, I mean like other like its north global, north counterpart, here also urban environmental history, it comprise of the entanglements and you know the interactions between city, nature, technology on one hand and how you know this interactions among city, nature, technology was determined and dictated by different debates of relating to you know public health, economic productivity and public morality and this end machine becomes even more you know how do I say exciting within this particular context of colonialism.

So, yes, South Asia also started becoming modern through the deployment of modern infrastructures, modern urban utilities; but what this modernity is all about? So, can would we be in a any position to kind of compare you know the modernity that Europe or the Western part of the world North America and Europe face and the kind of

modernity that the Indian cities were actually exposed to. So, definitely, we have to keep in mind that this was modernity; but of course, modernity within the colonial context. So, you know colonial modernity.

So, what happened? How city, nature, technology intermingled and entangled remain entangled or you know they this entire interaction among city, nature, technology started getting dictated by public health, issues of public health, economic productivity and public morality as this is the case for any other you know urban context.

But then, what happens in this particular subcontinent, you know the cities, the metropolitan cities later which emerges metropolitan cities like Calcutta, Bombay, Madras, when you know these interactions actually take place within the colonial context.

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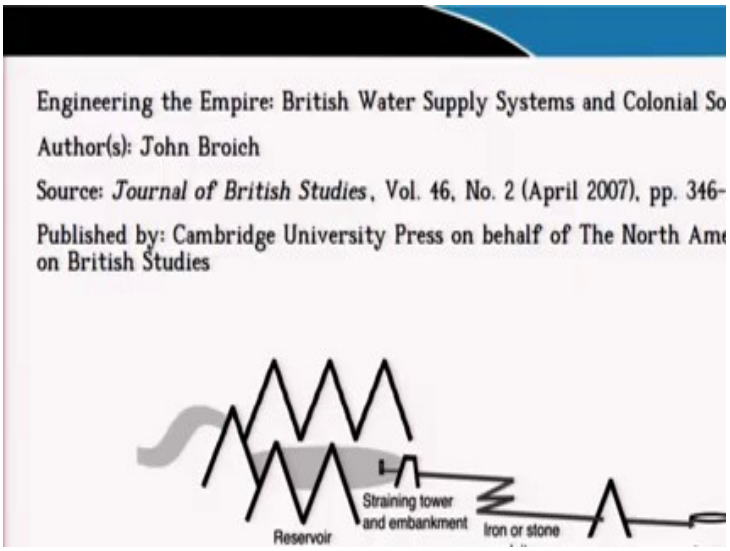

So, coming to the first work that I would like to discuss, this is not a work which typically focuses on Indian cities; but it focuses on colonial cities. And I find this particular article by Broich to be very very significant, it is written in very simple lucid language and the focus is linear. But then, this article is very important because it actually talks about several colonial cities like Singapore, Hong Kong, Colombo and Bombay.

And, we find striking similarities right, in the process in which you know these urban utilities actually emerge, the processes in which the city started getting networked you know through piped drinking water projects and also like other sanitation projects. And how all these projects also to a great extent you know were kind of implemented because they were tied up with the larger or the wider debates of sanitation or sanitary practices, health, public health and hygiene which was going on you know, in the world during that particular point of time and how all these ideas were actually transplanted.

So, not only ideas, ideas discourses, paradigms and practices were transplanted in these colonial cities and what kind of you know experiences, these cities had to you know this kind of colonial transfer and transplantation of technologies. So, did these cities again respond in the same way or even though, we find a kind of a striking similarity, but can we also come up with more nuanced place based narratives?

So, these are the various things you know that I think this article kind of unpacks. So, Broich, he basically discusses one particular scheme which is this gravitation scheme and this gravitation scheme, you know it was actually kind of considered as the apogee of the modern Watson system and why was it apogee?

Because you know it was a major intervention through which rivers were dammed, lakes were created, valleys flooded and you know piped water could actually be brought to the cities from their far distant hinterlands. So, in that sense, this was a kind of technological breakthrough right.

So, Broich actually discusses the implement, the impact, the implication of the implementation of this gravitational skill and you know related technological fixes in the several colonial cities like Hong Kong, Colombo, Bombay and Singapore.

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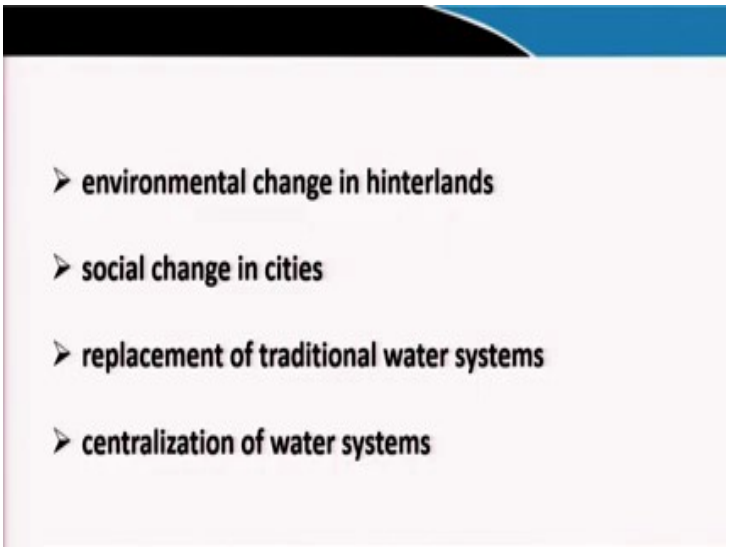

So, in Broich article, again, these are the very significant components that come out very sharp, that come out prominently. So, he talks about the environmental change you know that, the this kind of technological fix in cities caused in their larger or wider environments. So, the kind of environmental change that happened, that occurred in the hinterlands and of course, you know definitely social and ecological.

So, socio-ecological regime, this is something which is connected. We very much know now that why and how social and environmental, nature and society are actually connected. So, of course, you know when these ecological changes were forged, it had its rippling implications in the social sector at large. So, it altered the entire socio-ecological regimes of cities and also, the hinterlands, its peripheries.

And what happened is that the traditional water system of course were replaced to a great extent and which again had its own socio-ecological implications and finally, water systems also started becoming centralized with the deployment of the gravitational scheme.

And Broich shows that how official water sources proliferated along with official instructions to use them. So, the an entire office, an entire you know a bureaucracy kind of it emerged to run the system.

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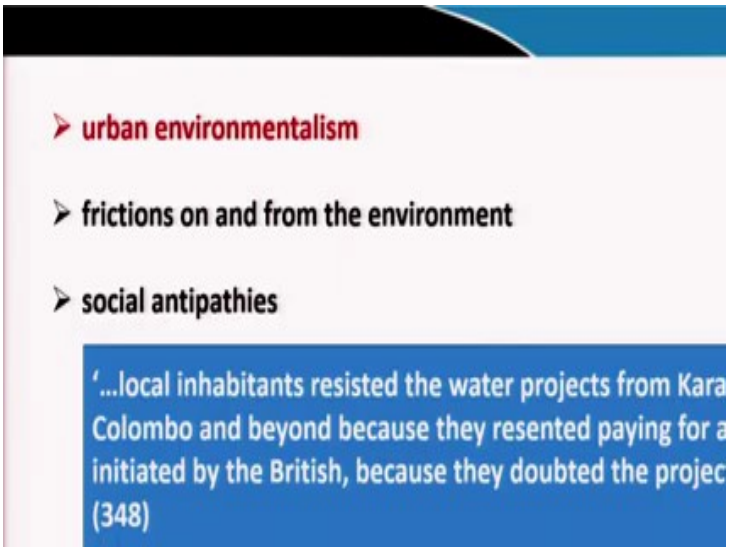

So, again, this article I find very significant because it touches the fundamental one of the key components you know within urban environmental history, that is urban environmentalism or environmental activism right. So, for example, you know if you remember, we discussed in our last lecture that how Ramachandra Guha actually lamented in 2005, when he was; when he was actually writing the article, when he wrote the article called 'What's next for environmental history'.

And Guha said, you know Guha lamented that you know, Guha said that as, he said that the activist, they are not actively engaging with urban problems. So, there are no resistances, there I mean the amount of resistances remain very low and they have not been documented by historians.

So, I think Broich's article to a great extent, I mean it addresses this question that Guha raised and I think he actually discusses in great detail that how environment resisted and also, how people, several social groups actually resisted against the deployment of the gravitational scheme which the colonizers actually could not kind of anticipate beforehand.

So, there had been unanticipated response from the environment. So, friction, so Broich article traces the frictions on and from the environment right. So, because environment you know, now we again know now that you know environment also has an agency, landscapes. They themselves have agencies.

So, environment definitely was not a kind of a blank canvas which was waiting for these alterations which were actually, which was kind of waiting for when the environment responded in its own way and these responses again had been quite different across different cities with their own geophysical and climatic you know specificities alright.

So, what happened is that you know this was a shock because the great confidence of the colonizers of the British and when they kind of transplanted this scheme and Broich writes in an unmodified manner. So, when this transplantation was done and there was no modification, there was no I mean there was no concern to the special attributes of specific geographies then of course, environment across different cities and the hinterlands also responded in their own ways.

So, this scheme was quite unsuccessful you know for the soil of Singapore and then, the earthquake prone areas or the cities like Yokohama and hot and humid, Mumbai or Bombay. Another very interesting point that Broich raises is how in Bombay when the reservoir was created. Within the reservoir, so the water became warm. Because of course, you know due to the tropical weather, the tropical environment of the city and also, the hot-humid climate and temperature.

So, the due to the tropical sun, Broich writes that how inside reservoirs, there was the growth of algae which the British could never predict right. Because when they implemented this scheme or built reservoirs in their own countries for example, in cities like Glasgow or Bradford or Manchester then these problem never arose, these problems never emerged.

But here, in Bombay, inside reservoirs algae growth actually took place and really the British as they were unprepared, they had no mechanism to deal with the crisis and there was no mechanism to actually clean these reservoirs at frequent intervals because this was a very lofty process otherwise. So, though this algae growth actually did not impaired the entire system; but of course, there were a whole lot of complaints about the quality of water.

And I know this article was published in 2007, when more than human entanglements or interspecies intersectionality or the agency you know of non human world were not very much discussed upon and I just when I read this article few days back, I was thinking that you know today, this particular point of algal growth, unpredicted algae growth is

such an important; is such an important piece or source of information for scholars working on you know this multi-species entanglement from the environmental humanities perspectives, anyway.

So, yes unanticipated frictions on not unanticipated, but anticipated frictions on environment leading to unanticipated frictions from the environment right and social antipathies of course because this is again another important point that Broich raises. So, like when this was this scheme led to the led to like a whole lot of changes in the hinterlands, so in spaces which were distant from the urban territory. So, it kind of dislodged pharma. So, for example, he like he give some instances.

So, in 1890s, I think specifically in 1892, there was riot in Nagpur, when the when like farmers were displaced, when you know a particular land area was selected, chosen as the site for the construction of reservoirs.

So, this displace and dislodge farmers they of course and swineherds they protested against this so called you know watershed-cum-wilderness catchment areas of the reservoirs which displace them from their homes and livelihoods.

So, of course, there were social antipathies you know against this kind of technologies. And yes, so this is from Broich's, he talks about how local inhabitants resisted the water projects from Karachi to Colombo and beyond because they resented paying for a project. So, and also there were other reasons. For example, they were not ready. So, because to them these projects were not necessary right.

So, they could not really, they were not motivated enough to understand or even they were they could not see the necessity of such projects. So, and the British were also quite afraid that you know this would actually, this would actually I mean the people would actually protest against a payment of taxes, which this kind of systems would require.

Later, we will see that how the British also adjusted to the system by you know kind of shifting to you know cheaper technologies, which again had its inherent problems and contradictions which the Indian cities and their hinterlands again had to face with. But in this article, Broich talks about the resistances against you know the payment of taxes for these kind of projects, which did not seem to be necessary for the Indians and for the other colonial cities.

So, and another very very significant point which Broich actually has touched upon; but he has not elaborated in detail, but we at least he touched upon this particular point is religion. So, he says that you know when the traditional systems of you know well irrigation or when the use of wells were kind of displaced with this new modern water infrastructures, then and what happened is that the officers, they started sealing cisterns and wells.

Then, the Hindu religious community, the Hindu community, were actually quite dissatisfied because wells in I mean they performed certain ritualized activities and wells were also these sites for performing I mean performing rituals and for even like performing crematorium activities, etcetera.

Again, he also talks about the Zoroastrian community which also kind of understood wells or rather were quite convinced about the healing and supernatural powers of well and unfortunately, the British colonizer or the officials and engineers were in no mood and they also did not have the training to kind of appreciate and at least realize and understand these kind of values.

So, resistance was also lot of resistance also happened, small scale local resistances happen against this interference with traditional worship practices.

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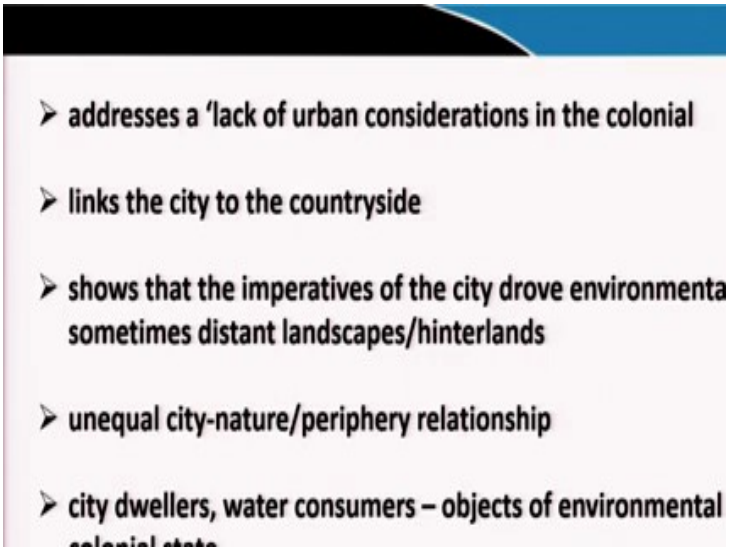

In Broich's article, Broich also talked about, he addresses like the lack of urban considerations in colonial environmental literature and he links the city to countryside shows that imperatives of the city drove environmental change in sometimes distant landscape which we have discussed and of course, unequal city nature periphery relationship like how from distant land like a whole lot of water for example was kind of extracted.

And not only that, even within cities like city dwellers, the water consumers they became passive objects of environmental projects of the colonial state. So, it is also you know whole lot of power game and this ideology of the stagecraft is also involved in this that this is also involved in the end of venture is something which Broich familiarizes us with.

And this is another important point, I will engage yeah I will try to engage you with a debate bringing to the fore my own arguments and interpretations on this. So, what happens is that you know to Broich, he says that the Bombay and Manchester were colonized in the same way.

So, he says that of course the you know the colonial cities and the mother country, the context are different. But then, the strategies which were used and even the people, who were involved you know in this kind of deployment of technologies, they were the same and the consequences also remained the same.

So, he ask us to see how you know the reconfiguration of the environment actually led to the reforming or the reformation or the reordering of the society because everything was finally, done from the sanitary perspective. So, in that way, Bombay and Manchester were colonized in the same way and you know the citizens, they were actually kind of subjugated and he also draws an interesting comparison between you know these colonial cities and Europe for that matter or England in particular.

Because like you know this gravitational scheme specifically in the official report, the British mentioned that this gravitation scheme was actually implemented to kind of as a response to the demoralizing grim. So, they say that you know the plan was to the plan was to change or replace the drinking habit, drinking alcohol, alcoholic habit of the working class to the drinking fresh water, drinking a pure portable water habit.

When household connection, private household connection would have been, I mean could have been possible through the gravitation scheme. So, same, here not alcoholic behavior, etcetera, but at least you know that the along with physical cleansing, the moral cleansing imperative was also very much there.

So, in that sense, Broich said that though the you know the economic and political context remain different, but the strategies of implementation and the outcomes you know faced by the cities remain same. So, we will see you know whether this argument is absolutely acceptable or not, when we discuss the other case studies or the other works by environmental, urban environmental historians.

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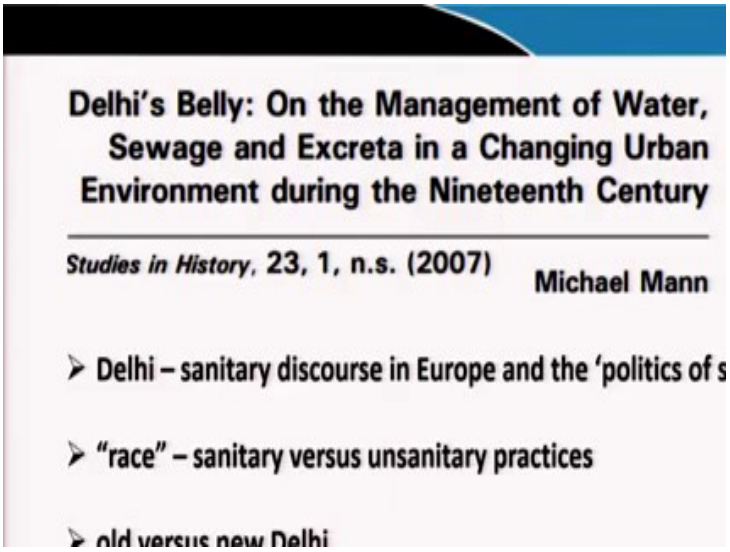

So, yes, so with this, we move on to the next major scholarship by Michael Mann. So, this article also came out in the journal called Studies in History in 2007 and this is on Delhi of course. So, Broich discussed about religion, Michael Mann brings to the fore the, or adds another layer to the story to make it complicated even more. So, the element of race.

So, how race also played an important role in kind of you know, in the emergence of the sanitary versus unsanitary cities; sanitary versus unsanitary urban spaces. So, how you know this water sanitation projects to a great extent were imbricated and dotted with the racial ideology and practice.

So, always and I mean there had been a difference between old versus new Delhi and Mann shows that how old Delhi was actually made old through neglect and under development. Because all these large scale infrastructural projects mainly drinking water supply, etcetera; but actually, geared to you know to the needs of the British colonizers.

And another important thing is that you know as is the politics of sanitation. One needs to really understand the politics of sanitation in India and which is different from the sanitary discourse in Europe.

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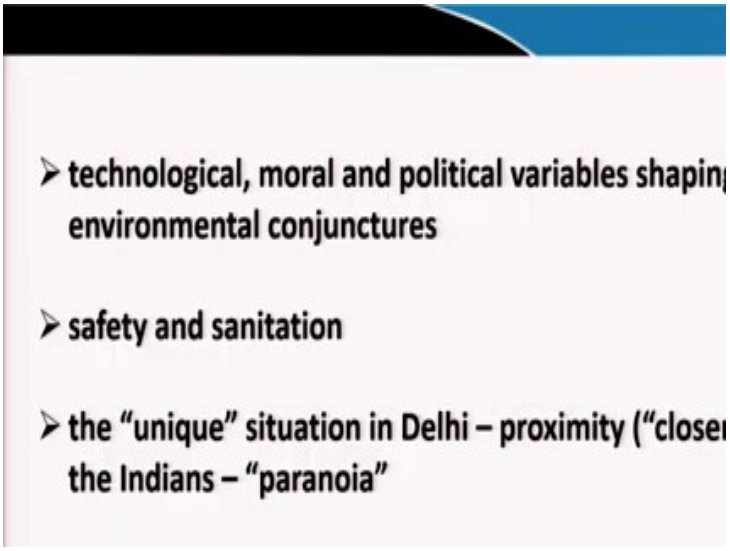

Similar to an extent, but also very much different, and why different? Because here again, though technological model and political variables shaping urban environmental conjunctures of the colonial cities to a great extent remains same as Broich shows and argues. But there are other factor, there were other factors which also dictated you know these projects that implementation of this projects.

So, for example, Delhi, it was considered to be a dangerous city. Why dangerous? Because you know during the mutiny, the great rebellion, the great mutiny of 1857, Delhi played a very prominent role. So, and British, they were quite you know they were quite shaken; they were I mean quite shaken by this mutiny.

And so, the question along with the question of sanitation, the question was of safety was always also there. So, and Delhi was somewhat different from other cities like Mumbai

or Calcutta because Mumbai, Calcutta, Madras these were apparently these were like European towns. But the Delhi was the only city, where this, the British, they actually had to stay in proximity, in closeness to the native inhabitants.

So, there was a kind of a paranoia and you know this paranoia also influenced you know the shaping of Delhi, the shaping and reshaping of her urban environment, again based on the lines of racial segregation.

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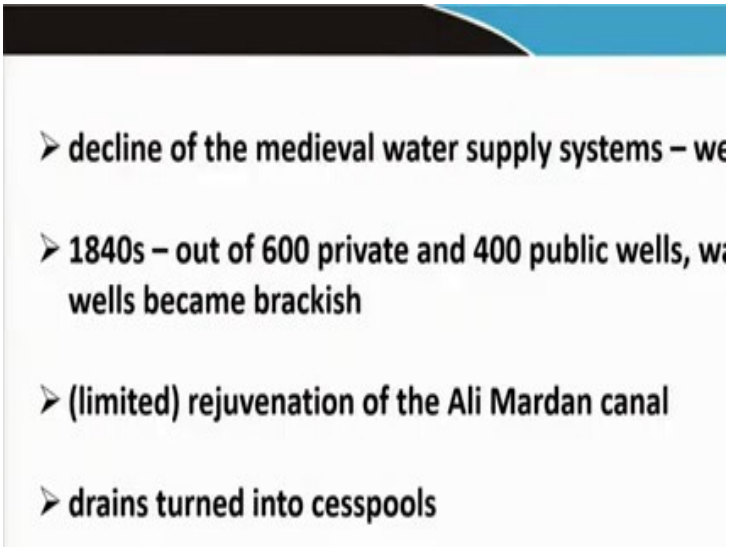

Delhi was actually you know it was quite, I mean if we see the medieval history because now there are works on medieval water supply systems in Delhi. For example, Shahjahanabad, part of it was known as Shahjahanabad because it was built during the time of Shah Jahan. And during that time, Ali Mardan canal was like one of the major canals which was connected to other inlets which provided water to the wells and from where, people access drinking water.

But what happened is that after a particular point of time, there was the demise of this system and by 1840s as per different reports, we find that out of 600 private and 400 public wells, water of 555 wells become brackish. So, there is a plan like for example, one colonial official called (Refer Time: 25:48), he wanted to rejuvenate the Ali Mardan canal; but he actually you know though he could rejuvenate the canal, but the inlet canals could not be rejuvenated.

So, you know there were limits to this (Refer Time: 26:00) scheme. And so, finally, what happened is that only the, like wells which were located close to the canal could get fresh water supply, good quality water supply. But then, the other wells became defunct. And on the other hand, the population was increasing.

So, finally, what happened is that drained turned into cesspools when the city did not or could not actually have an adequate water and sanitation system, even during the second half of the 19th century. Yamuna was also we have started to be used as a disposal channel.

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And you know today, we are discussing so much; we discussed so much about protests relating to the beautification schemes of cities urban preservation restoration projects and beautification schemes that actually cater to the needs of the elite the middle class. Amita Baviskar has really formulated this grand idea of bourgeois environmentalism.

So, we will discuss this in detail, when we discuss urban political ecology. But you know very interestingly the Michael Mann, he consulted pages from the Urdu Akbar, where he shows that how there were protests by the rise by the elite class actually against this for example, many projects most importantly, the Rosemary gardens project which was designed and developed by (Refer Time: 27:32).

So, (Refer Time: 27:34) like the protest against this was that you know the idea was that the garden could actually have been rejuvenated through the rejuvenation of the already like existing canals. So, the opening up and the cleaning of these canals, but this was not done.

On the other hand, a series of like series of new canals with bridges and culverts, etcetera were constructed and the colonial argument was that you know this rejuvenation scheme actually was necessary because it provided ventilation and it led to environmental improvement of the neighborhood areas, also like I mean which were located near this garden. But you know the Delhihites hey were not really convinced to buy this kind of an idea and they said that you know this English landscape gardener, he wasted and I am quoting he wasted Indian public money.

So, the English landscape gardener wasted Indian public money to accomplish British pleasurable persuits. And also, you know Michael Mann talks about how this subjugation on the basis of racial lines also you know kind of is a strong metaphor of subjugation of the Indian people, the Indian native and why and how Delhi can be actually understood or perceived as Europe's "oriental other".

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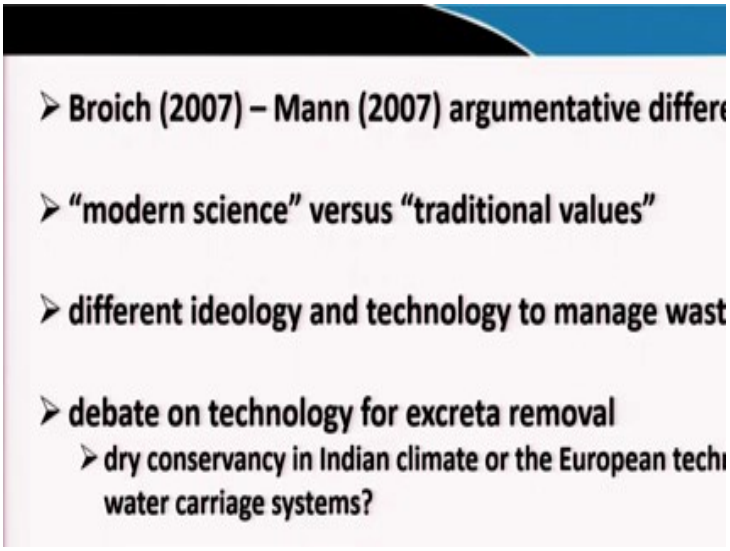

And there is finally, I would discuss about this you know the argument in reference I which I could actually traced, when I went through Broich and Mann and little bit of kind of did an, did a comparative analysis. So, for Broich, we already have discussed that

how he says that you know though the context were different, but the strategies and consequences of technological transplantation were the same. But Michael Mann says, no, this is not the case, I mean he his article does not engage with Broich argument.

But the kind of the way he has portrayed it, he talks about how the British themselves, they actually talked about the difference in you know in the colonial cities for example, Delhi in this particular case that why the geo-climatic and physical variations you know this justified prompted them to come up with a similar yet different sets of technologies.

So, there were like huge debate on this and that the argument was that British rivers or English rivers were mere streams and the like the here in India, the big rivers like Ganga, Godavari, Yamuna, they you know they were like large rivers, they were like Leviathans. And so, I mean affordable or cheaper technologies, cheaper sewerage technologies you know, they could actually tolerate and they could also tolerate the disposal or channelization of sewage in the rivers because these rivers actually had natural quote unquote purification attributes or purification tendencies.

But you know so whole lot of debate, we find in the public proceedings on this kind of; on this kind of an argument about you know the tropical versus temperate environment etcetera and also, there was major debate you know on technology for removal of excreta. So, the dry conservancy system or you know the combined sewer system or water carriage technology and then, because water carriage technology seemed to be fruitful; but it really needed adequate water and in some areas, in Madras for example, the limits became visible as soon as you know the system was implemented.

On the other hand, the benefits of for example, the dry conservancy excreta removal system which means that you know, the that the traditional way through which the waste was actually transported and carried by carts and then finally, disposed into the river. But then, this also became an issue of concern, worry for this for the British officials, who were not being able to bear the stench anymore.

But then, another group of the, I mean there was another group among the British colonialists, who were saying that you know that you know the river definitely had more purification tendencies, inherent self purification tendencies which were actually absent for English. So, the whole picture is very very clumsy and messy which makes you know

this urban environmental history of Indian cities not only complicated, but quite fascinating, more fascinating than its western counterpart because it is so thickly layered.

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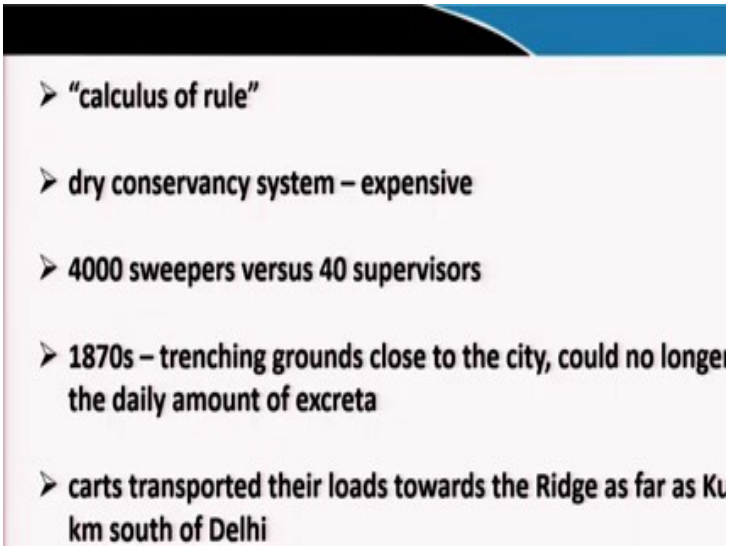

So, yes. So, these are some of the details. I would encourage you to go through Michael Mann's article actually 'Delhi's Belly; which is there in this list of reference and so, we will get all the empirical details which I think I have already covered.

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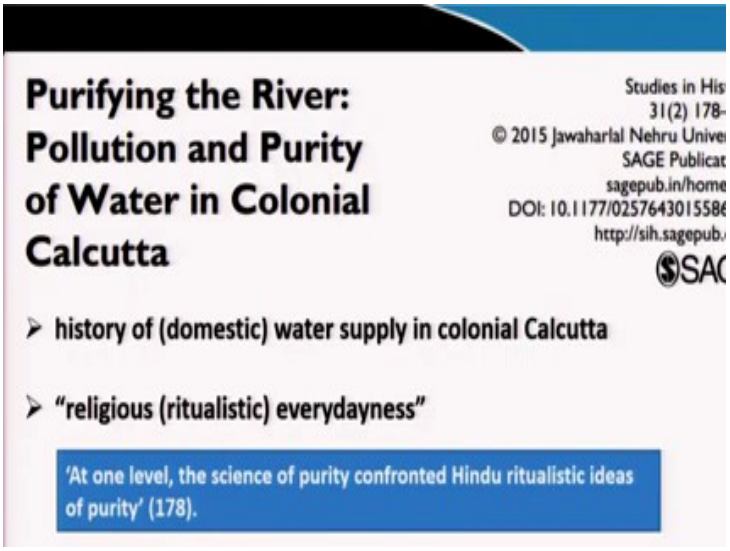

The final work that I would like to discuss yeah you know in this particular lecture is by its a more recent work, 2015 work by Pratik Chakrabarti and just see the title of the

article and you will understand that how and why this is quite you know, quite an exciting article on you know on discourses and practices, debates relating to purity, purification, relating to colonial portable drinking water project; colonial portable water project in colonial Calcutta.

So, this is a history of domestic water supply in colonial Calcutta and various notions of how he unfolds, how various notions of purity were at play within both western science and Hindu scriptural. I will come to this and he exposes us to the multiple semantic and spatial tropes you know, so far as the discourses on purity, purification and pollution you know were concerned in colonial Calcutta.

So, this is a very interesting article on the various discourses, paradigms, practices, meanings, multilayered meanings of purity, pollution and purification relating to portable water project in colonial Calcutta.

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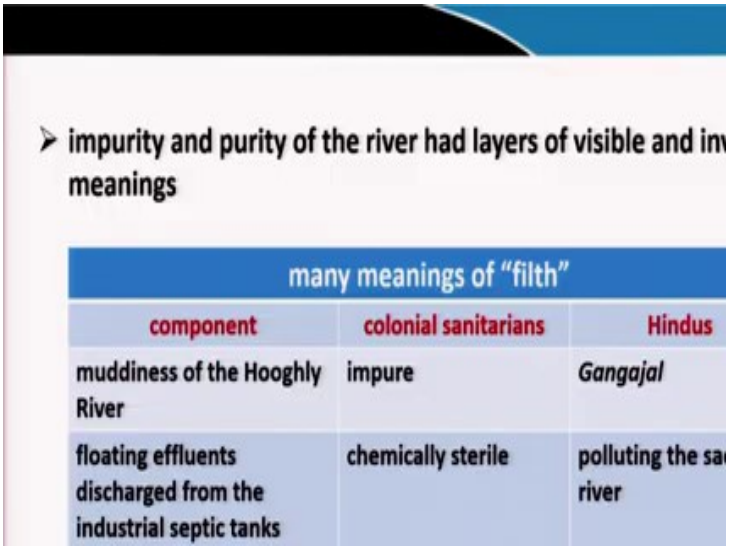

Impurity, purity of the river had layers of visible invisible meanings you know. So, many meanings of filth, many meanings of filth which we really need to engage with if we want to understand this colonial urban environmental context. So, for example, muddiness of the Hooghly River, it was considered to be impure by a colonial sanitarians, but it was Gangajal, 'pavitra' Gangajal for the Hindus.

Floating effluents discharged from the industrial septic tanks were considered to be chemically sterile, but it was polluting, it was considered obnoxious you know, absolutely impure 'apavitra' by the Hindus right. So, we can see that you know the clashes between or among the many meanings of filth within the colonial context. So, the very idea of purity itself, it seems was on trial. So, Chakrabarti reflects.

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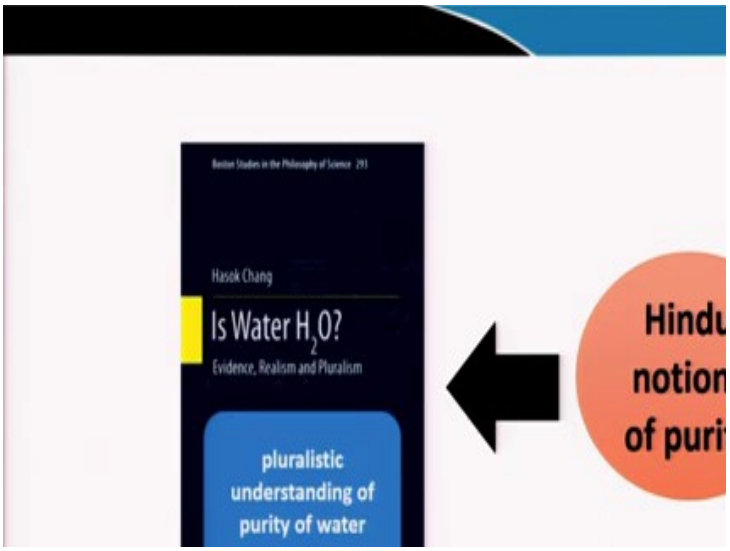

Very interesting book 'Is Water H 2 O?', I think this debate is now on for quite some time and I think this debate like for the first time, it was raised by Jamie Linton, when he wrote Modern Water, book called 'Modern Water', where he also raised the same question that, is water only H 2 O.

And Hasok Chang's, for example, he talks about Evidence, Realism and Pluralism and he says that you know the scientific debate on what is water, is it has political, philosophical, moral, economic overtones and you know this become again more complicated within colonial Kolkata or colonial Calcutta.

If you want to understand the pluralistic meanings of what water is or what is pure water, then, you know it becomes further complicated with the Hindu notions of purity getting added into this particular question of what is water or what is pure water. So, how can we engage with pluralistic understanding of pure water or purity of water? So, the clashes and convergences along these various doctrines, discourse sense and practices surrounding purity, purification and pollution.

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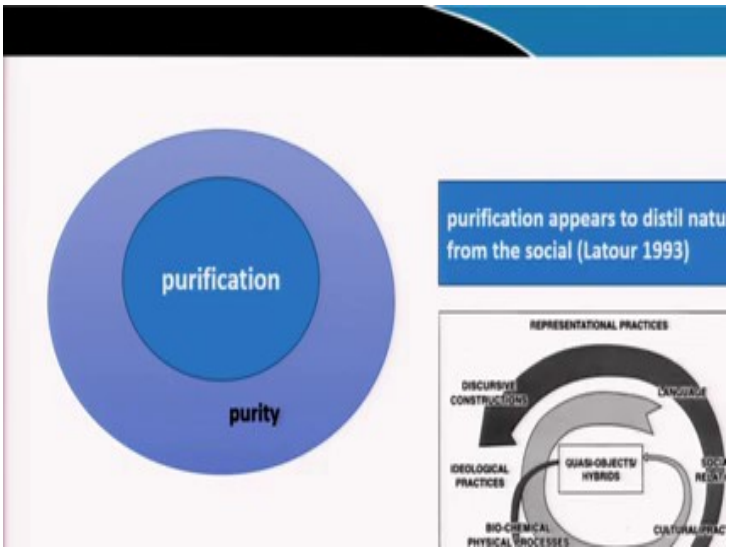

Purity; did it converge or did it clash with a colonial idea of purification? So, Bruno Latour for example, he talks about how you know the this purification projects actually kind of created a separation between nature and culture. And so, purification he says Bruno Latour distils, appears to distil nature from the social and now, we know you know how Erik Swyngedouw and other political ecologists, they have tried to explain water is hybrid or at least a quasi hybrid object.

So, how hybridity of water, we already know this now and this hybridity of water or this you know the connotations surrounding water make this whole debate even more complex and discursive within the context of colonial Calcutta.

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So, very quickly, you know coming to the story and finishing it off, wrapping it up. So, the moral ethic was of course there. Because again, Cholera and how we know from our previous presentations that how Cholera you know played I mean Cholera was a major factor, Cholera trigger you know the sanitary reforms. So, just remember those sanitary reforms by Edwin Chadwick and John Snow which we are discussed earlier, when we discuss modern European cities and its relation with environment.

So, Cholera started spreading in different parts of the world and Kolkata was home; Kolkata was called quote unquote home of the cholera disease and so, of course, the enemy was filth and filth had to be attacked and you know managed, tackled in the best way possible.

So, the immediate idea was to purify the water of the Hooghly River and of course, purification, then kind of could purification incorporate the cultural and social, native practices you know that kind of shaped river Hooghly since ages. So, to the colonizers the river Hooghly was not only the physical river, but it was also the embodiment of urban native habits.

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Now, and how to how did they tackle with this? So, the when they thought of like coming up with a water, drinking water treatment plant in 1847 F. W. Simms, he considered this Pulta Ghat to be the best you know best place because here the water was it was just above the, it was above the line of the saline water, it was above the line of saline water. So, it was not polluted. It was quite quote unquote pure and so, the era of modern water started in Kolkata; but you know what is this era of modern water?

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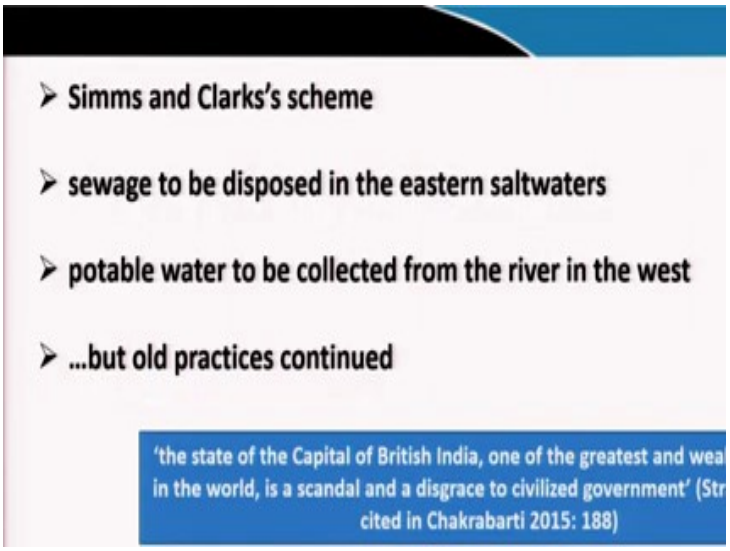

And another important development which was taking place parallelly is also the combined scheme which was proposed by William Clark that why and he established a rationale that why and how you know rain water and sewage water can sewage can actually get disposed to the salt lakes to the eastern part of the city.

So, the colonizers were quite happy, the bureaucratic circle was quite happy with you know this kind of a plan because then, the water for drinking purpose the British you know could use water from the west, the Hooghly water from flowing through the west for drinking water purpose and the east eastern part of Kolkata could be used for you know sewage disposal.

But what happened is that the old practices continued. So, the old practices of this dry conservancy systems, this collection of the night soil by you know by carts and getting disposed to river water which very much clashed with the colonial ideology, ideals, rationale.

And this is a remark by John Strachey in 1864 which is again cited in Chakrabarti, where John Strachey was extremely frustrated with this continuation of the old habit and he says that the state of the capital of British, India one of the greatest and wealthiest cities in the world is a scandal and a disgrace to civilize government. And Schalch in the same words, in the same year, he also described you know this Hooghly as the 'mass of cesspools'.

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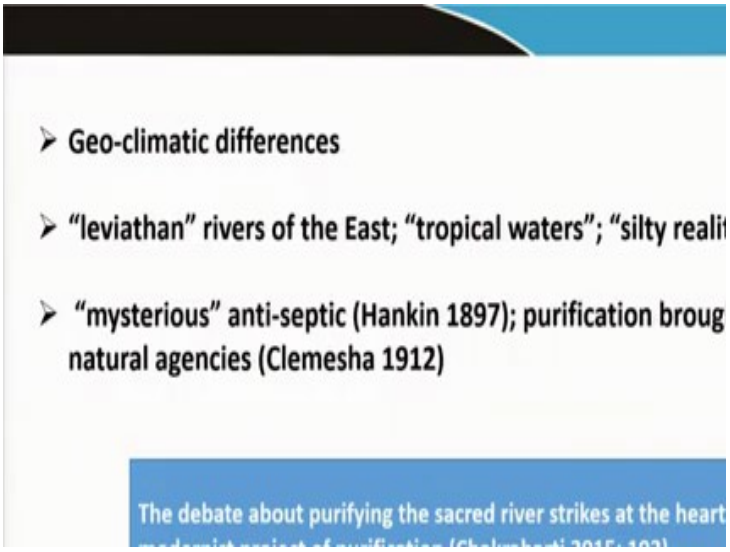

So, finally, you know the same very interestingly, you know the same geo-climatic difference debate that we discussed while we discussed Mann's paper, Mann's article. So, the same logic during this time was also getting quite prominent from another group of medical practitioners and people, who were researching on the natural purification mechanisms of the tropical rivers.

So, people like Hankin for example, who did research on the natural purification system and he says that you know due to tropical sun and also, I mean this the river has had certain if the tropical rivers at certain you know kind of volatile, acidic substances which were quite distinct and which European rivers or English rivers actually did not have.

So, and English rivers were mere streams and on the other hand, they were like leviathans and the disposing like I mean kind of coming out of the mountains, gushing, flowing and you know kind of draining and channelizing bulk of water. So, their capacities were quite they are I mean that they are, it was quite difficult for them to get polluted so easily.

So, because purification is brought by natural agencies and this was I mean this was kind of getting confirmed by back to back researchers by people like Hankin, Clemesha and others. So, the debate about purifying the sacred river strikes at the heart of the modernist project of purification. So, and it is very important to incorporate these debates when we discuss you know this portable drinking water project plans for colonial Calcutta.

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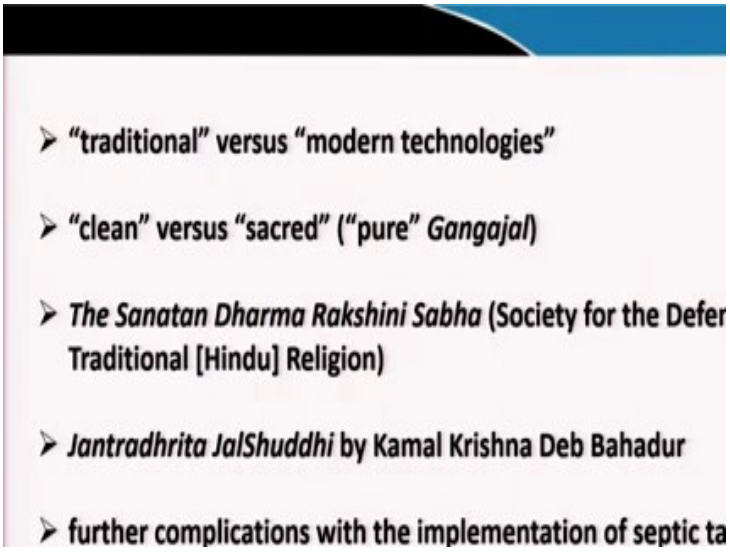

So, finally, the final part of this lecture, it is about you know how this clean versus sacred, it clashed, but also converged and how like for example, after a particular point of time, there was also whole lot of accommodation and acceptance of the modern quote-unquote modern ideas and the Hindus also started coming up with their own strategies to accommodate and embrace change.

So, for example, the Sanatan Dharma Rakshini Sabha, the Society for the Defence of Traditional Hindu Religion, it made a distinction between sacred water. So, it said that you know when you, the households needed to engage with ritual activities they should use Gangajal which is unfiltered water, but so far as drinking and bathing other important perform, important functions were concerned, the machine based water I mean, was healthy.

So, Kamal Krishna Deb Bahadur for example who was the president of the Sabha, he wrote this Jantradhrita Jalshuddhi and where, he said that you kind of you know, he attacked the Hindu orthodox people, who were not ready to you know kind of drink this machine based water.

And he said that you know that there is no point to deny that this water was actually healthy and he is when he attacked, there was a kind of a satirical tone in his head when he said that this Hindu orthodox community, they are being able to protest with their you know voracious voice and their assertive tones because they have not fallen ill by drinking the water from the machines, from I mean pure water from the purification machines.

So, then several other stories as well which I will not be covering right now in great detail; but definitely, I will encourage you to go through Chakrabarti's article because you know this problem again became more complicated, when the septic tanks were constructed on the bank of the Hooghly river when Jute Mill industry emerge and the working class, the people who were staying there; so, how their excreta would be managed.

So, septic tanks were constructed and the waste went to the river directly and that again, you know there were there was a flurry of discussion in debate on this particular issue.

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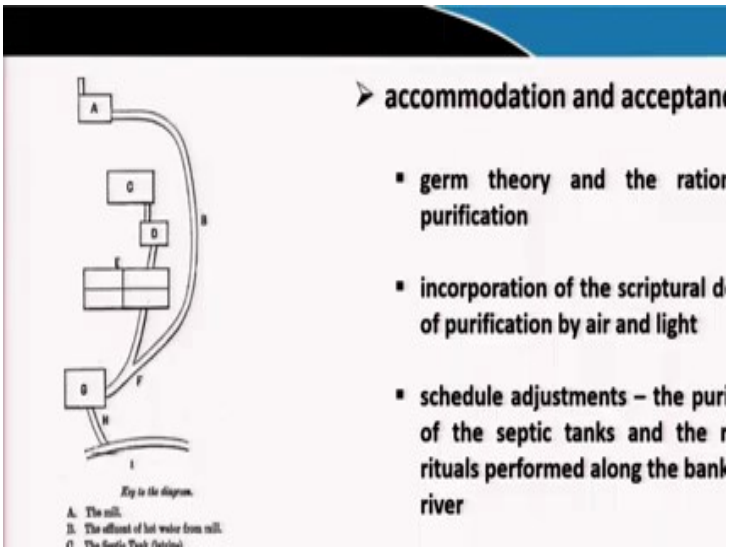

Final slide, so, finally, Chakrabarti brilliantly argues and this particular diagram is or illustration is so very significant. You will if just see it, you will think that you know this has been actually designed by this has been designed by any sanitary reformer actually or engineer in Britain. But this has been actually done by Shastri you know, and another Hindu leader who finally, I mean his scheme shows and in the report also explain that he was convinced with the germ theory and the rationale of purification.

But he also was sensitive to the scriptural doctrines of purification by air and light in the tropical environment so far as the Hooghly river was also concerned and the scheme his report the scheme, that he laid out you know he says that there can be schedule adjustments. So, the purification of the septic tanks and the religious rituals performed along the banks of the river between these two processes, schedule adjustments can actually be made.

So, when the ritual will be performed, then you know the waste will not be actually disposed during those times. So, timing, the schedule adjustments also was something which he proposed in a very innovative way.

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And yes, so multi-layered understanding meanings of pollution, purification and purity in Calcutta.

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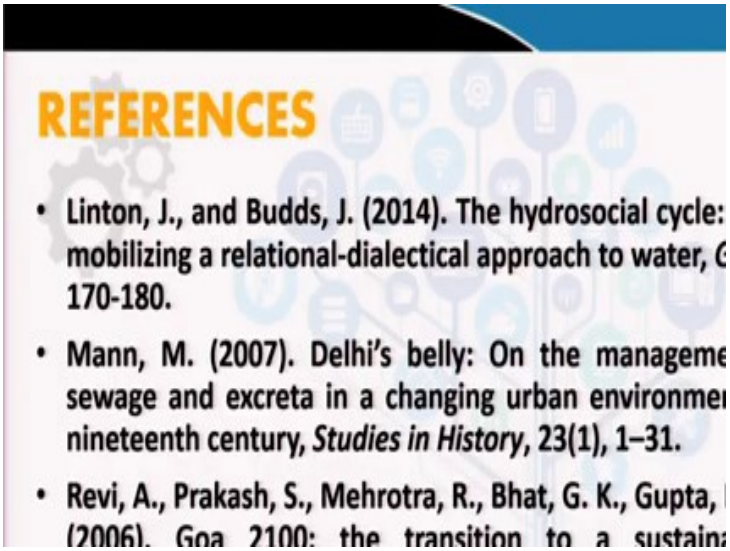

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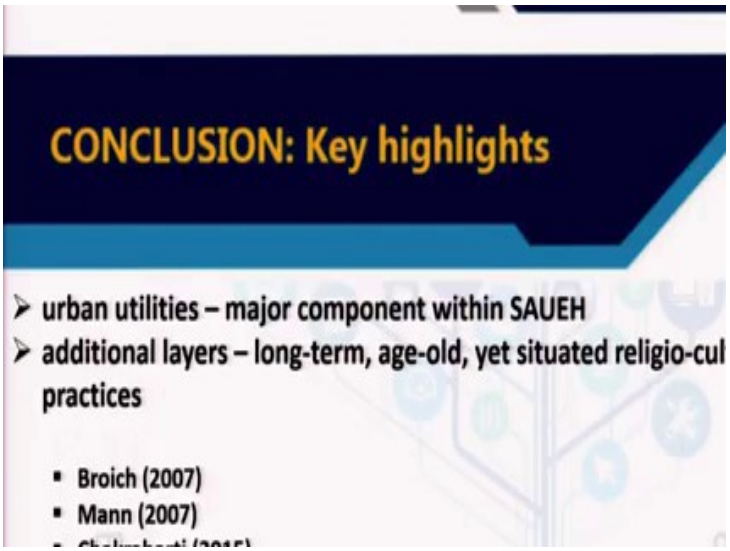

So, go through some of these references. And yes, I have discussed three major works here. We have seen how urban utilities or infrastructures have been a major component within South Asian urban environmental history. Why additional layers like religion, caste, race are important to understand you know the path dependent trajectories of this urban infrastructures.

The long-term, age-old, yet situated religio-cultural practices and then, sustainable flows between cities and wider environment surfaces in the scholarship, in the writings, the relation with city and hinterland and we will see that how you know this we will get these debates or these you know frames of analysis.

We will get further consolidated in the more or the most recent scholarships which we will discuss in the second part of this particular lecture.

Thank you.