Water, Society and Sustainability
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Lecture - 13
Colonial Hydrology

Lecture 13; so, lecture 13 is all about Colonial Hydrology. So, I will explain what colonial hydrology is, I will explain the debate surrounding colonial hydrology, whether colonial hydrology can be you know considered as an appropriate scientific term or whether we can also you know counter or critically interrogate this particular terminology called colonial hydrology; so, all these questions should be there should be evoked in your mind once you know go through that various slides in this presentation and as it is a subjective thing.

So, you know this the discussion or the opinion is it can be open. So, it is not that you I will try to impose a fixed mindset or a fixed opinion on you, but rather what I will expect from you is that, I will give you some facts and figures by covering the various works by the several environmental and more specific water historians, and then you should think and we think that whether colonial hydrology is a proper scientific appropriate terminology or not. So, this is what we are going to do in this presentation.

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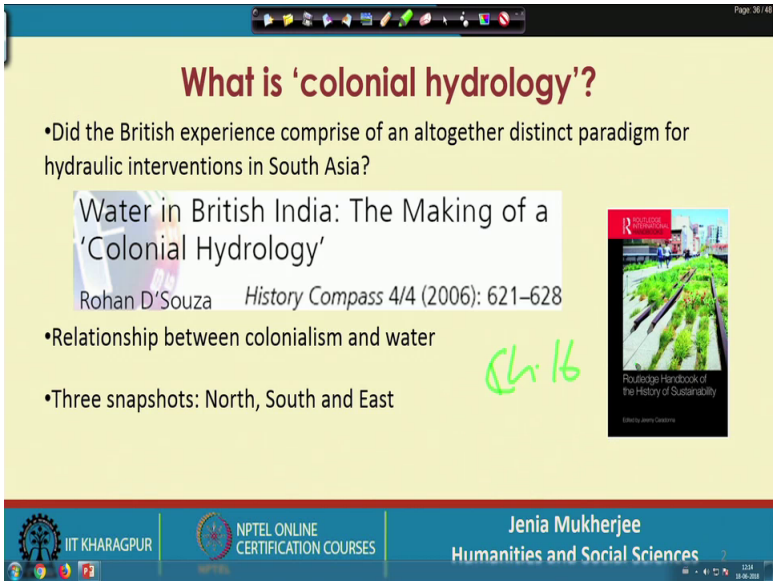

Now, to begin with what is colonial hydrology all above? What is colonial hydrology, how do we conceptualize and how do we define colonial hydrology? So, this is the question that we should raise at the very beginning that is, did the British experience comprise of an altogether distinct paradigm. Now, this is very important distinct paradigm for hydraulic intervention in South Asia.

So, we know that you know if we go through the history of civilization, we will find that there was always a relationship between water and society. So, many a times the society people they had actually a try to use water, abstract water, extract water and implemented several you know technologies to hardness water for peoples used for the basic use, for some amenities, for industrial purpose, for domestic consumption, for agriculture purpose and all that.

But now the question is so far as South Asia is concerned, did the British experience that is from the time when South Asia came under the rule of the British came under the colonial rule. So, did the British introduced technologies or did the British introduced interventions technological interventions that can be considered as very much different or something unique from the preceding years.

So, this is what is the question all about; that did it comprise of an altogether distinct a landmark watershed paradigm for hydraulic interventions in South Asia. So, this is the question that I have raised at the very beginning and this is the question which we would try to answer by some of the empirical facts that will be provided in this particular presentation yes. So, we must talk about Rohan Dsouza and his article published in History Compass journal in 2006, because Rohan he came up with this term he you know the conceptualized colonial hydrology in this particular article called water in British India the making of colonial hydrology. So, he asks us two you know to think or to understand colonial hydrology as a theoretical attraction, to the entire hydraulic experience of South Asia during the rule of the British.

Yeah. So, we need to understand the relationship between water and colonialism; so, water and society during the colonial rule. So, yes as I mention that I would give you some facts and figures and this facts and figures, I will be able to provide you from the works of the water historians who had written extensively on water scenario mainly rural

contexts of course, in South Asia and mainly we will be covering North South glimpses from North South and Eastern India.

So, I will not be able to cover all the works, but I will be able to cover most of the significant works on North South in East India. So, why west is not there because I mean west is I mean so far is west is concerned, there are not much works by environmental historians there are one or two works by scholars like Peter Molinga and all who had focused on Maharashtra.

But I mean the baring that we do not have much works on a Western India, but we have ample works on a southern northern and Eastern India on which I will be focusing on yeah. So, to mention about this book and one particular article I have called from hydrology to hydro social history of waters in India. So, this will be another very important assignment for you. So, I will ask you to please go through chapter 16 of this particular book, from where we will find details of you know details about the historiography of waters in India. So, please go through chapter 16 from the recently published book called Routledge handbook of the history of sustainability edited by Jeremy l Caradonna you just need to go through chapter 16.

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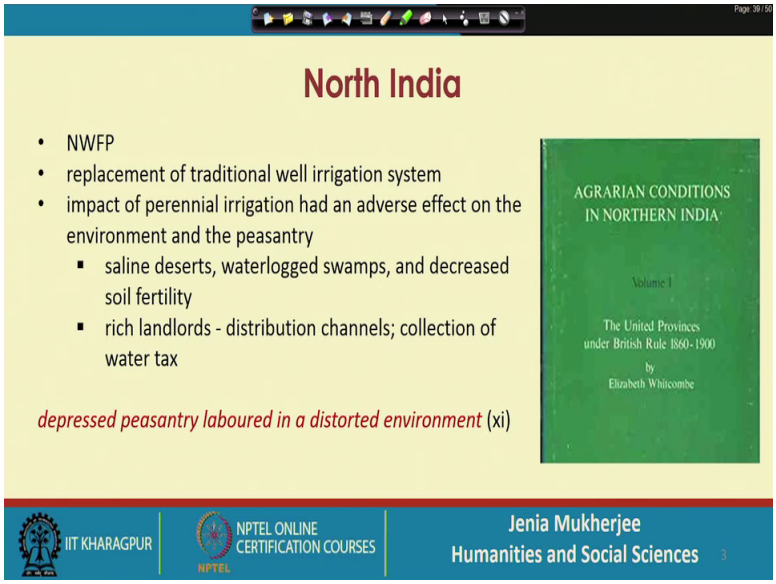

So, coming to the context of North India, in 1972 Elizabeth Whitcombe, she wrote a fascinating a comprehensive a Pathbreaking book called Agrarian Conditions in Northern India and Elizabeth Whitcombe she you know accessed ample sources. So, I mean

different administrative sources including revenue reports including lot of you know data on finance on land revenue, on I mean on what not. So, she consulted the reach archival records and evidences.

So, far as North West frontier province concerned, during that (Refer Time: 07:01) called it was not west frontier province consisting parts of Sindh and UP, and she tried to study the colonial water hydrolic interventions in this particular districts of UP and Sindh. And then she found out from these archival sources from these detailed you know reports administrative reports revenue reports and all that from this public reports, that the interventions in the form of intervention rather in the form of the perennial irrigation system that was introduced in North West frontier province it actually.

It actually did harm to the traditional well irrigation system, where the water society metabolism was much more prominent during the preceding times or the preceding years before the coming of the British. So, she showed that how a perennial irrigation actually had an adverse effect on the environment and the peasantry both. So, it had both environmental and social repercussions. So, she used to says that how these you know lengthy canals, it ultimately laid to you know saline deserts waterlogged swamps and decreased soil fertility. So, on the one hand it affected the production, which affected the well being of the peasants.

On the other hand there are as I mention some social aspects also to it because what happened is that now, with this colonial perennial irrigation system the rich landlords, they were given lot of ownership so, far as the control of the distribution channels were concern and.

So, and there were other local officers who were involved in the collection of tax. So, on the one hand already there was this problem of water logging and soil fertility, which was affecting the you know production and on the other hand the peasants were also exploited by this rich landlords and the tax collectors. So, what happened ultimately was that depressed peasantry laboured in a distorted environment. So, this is the path breaking argument that a Whitcombe made during the 70s and this can be considered as one of the major you know volumes as one of the major book or major contribution so, far as water history in colonial in North India is concerned.

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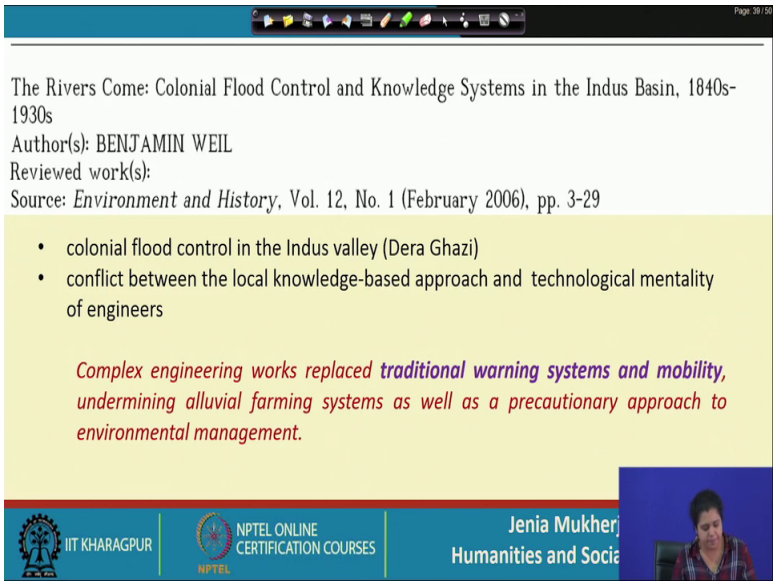

So, then I would like to site another work shedding light on another aspect which is the flood control aspect and not only flood control, but more specifically warning systems. So, warning systems prevalent during the pre colonial period and the warning system prevalent during the colonial period, but more importantly you know he says that how they used to maintain what he calls a social technology of communication this is fascinating. Social technology of communication which was cost effective which was totally based on you know relationship and kinship and very interesting kind of social communications, that were prevalent between the upstream and the downstream people.

So, in that way through those informal you know arrangements through those informal network how these people before the coming of the British, they used to maintain a very useful and effective traditional warning system. But unfortunately how when the British came how this system was totally replaced and how flood become a fiasco in North India especially in the Indus valley and especially Benjamin Weil focuses on a particular town called Dera Ghazi. And he talks about flood that occurred in Dera Ghazi and ultimately what happened that entire town have to be relocated. So, this was the history. So, it was flooded in such a I mean in an such a disastrous way that ultimately the people and ultimately the entire town have to be relocated.

So, he gives examples from the massive floods that are occurred in 1841 1843 and all them. So,. So, he makes a comparison and also he talks about the conflict between the

local knowledge based approach and technological mentality of the engineers. So, the. So, we will also see when we will discuss about Eastern India that how flood was seen as a curse.

So, the in the pre colonial period people used to visualize you know people used to understand perceive floods not as threat or as a curse, but as a blessing as boon because floods were very important because floods gave a silt or alluvium alluvial soil as. So, so the alluvial quantity or the alluvium deposits in the soil very important for the soil fertility or production. So, they understood that yes once the flood waters would reside reseed sorry then the field would be left with ceiled that would be very important for the production process.

But unfortunately the colonizers with lot of technological you know superiority the technological chauvinism this engineers, they wanted to come up with big embankments on the in thus river so that flood can be control that can be you know totally regulated at the very beginning. So, complex engineering works it replace the traditional warning system and mobility, undermining alluvial farming systems as well as a precautionary approach to environmental management.

So, as I was trying to explain that a Benjamin Weils article is very unique in a sense, that he not only talks about that you know how flood was perceived as a curse during the colonial period and how the colonial engineers totally concentrated on flood management rather than you know post flood harvesting of production, agricultural production mechanisms. But he also talks about that how a very I mean what to say colloquial a very traditional kind of a cost effective kind of a warning system was totally replace, you know when this British came and then when they came up with this loadable hydraulic interventionist mechanisms.

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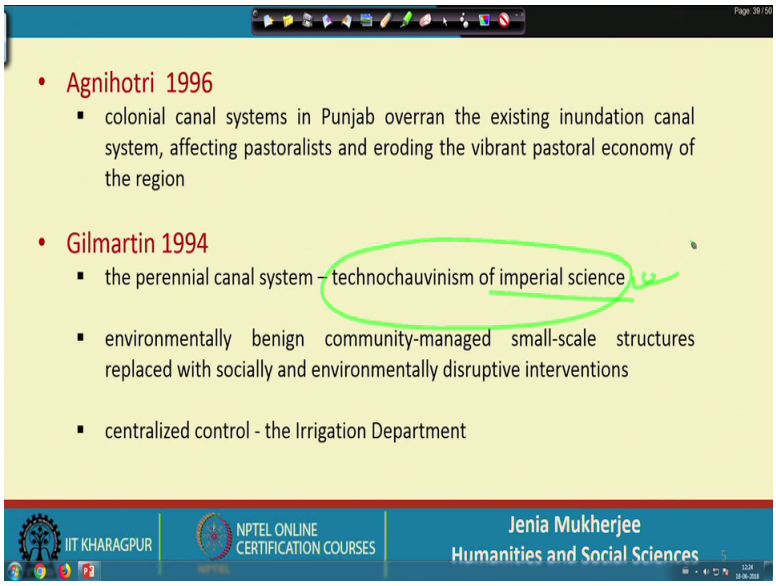

So, for as on the North India is concern there are other writings as well as. So, I am writing Indu Agnihotris work on the canal colonies of Punjab and David Gilmartins work on theoretical framework mainly, which you calls imperial science and tries to map the or trace the effects of imperial science on the hydrological or the hydraulic configurations of South Asia especially you know India North India again.

So, Indu Agnihotri work it shows that how the colonial canal system in Punjab, it overran the existing inundation canal system. The same story everywhere we will see the same thing when will be discussing eastern India and also overflow irrigation in East India. So, what happened is that the pastoral the local pastoral economy the local pastoralist way of way of a tilling the soil and their way of you know agricultural production, it was totally hampered when this perennial colon you know colonial irrigation mechanism it was implemented and it was transplanted over the traditional inundation canal system, that was already existing in Punjab.

David Gilmartin comes up with the conceptual or a theoretical frame work which you calls imperial science imperial science and. So, technochauvinism of imperial science

Is a very important argument that he makes and she he says that you know this interventions where also thickly loaded with the you know with the kind of technological superiority that this engineers were possessing. So, the Eurocentric notion of a you know the Eurocentric notion of we are the best and the Eurocentric notion of our techniques

and our technologies I can do anything in the world. It can take the rivers, it can manage floods, it can you know I mean it can tap tame do whatever it wants to do so far as ecological resources are concerned whether it is forest, whether it is water bodies, whether it is wetland these kind of a chauvinistic attitude was very much there in the technologies, that the colonizes implemented during the British rule in colonial India.

So, this is what Gilmartin emphasizes and talks about in his 1994 article on imperial science. And what was the result of course, the result was like socially and environmentally I mean social and environmental disruptions. So, this interventions that of course, as we have seen in the earlier cases as well. So, these where socially and environmentally disruptive and there is no doubt about this, and he also talks about the centralized control that was implemented under the EGs of the irrigation department. So, previously the entire water system or water management business to a great extent it was decentralized. So, it is mainly owned managed by the communities.

But supervisor monitor of course, by kings and rulers and all, but then with the establishment of the irrigation department everything became centralized and under the EGS and under the control of the irrigation department. So, maybe I am making some linear comments and arguments here, I will give a question or I will generate a question in the next part of this presentation. So, do not think that I am trying to you know you know create the binary between the golden precolonial edge and the disruptive you know colonial edge, I am not doing this kind of. So, this kind of un sophistication I am not trying to talk about or bringing in the lecture, but I am the just now right now I am a I am just introducing you with the arguments made by this water historians or environmental historians in their article.

So, we have ample scope and ample time later to think and we think and counter and criticize their arguments. So, that that will be an entirely different exercise, but this the presentation the objective purpose of the presentation is to evoke all these questions in your mind yeah. So, coming to South India I will not site much work, but I one the recent work by Eswara Rao very interesting title taming a liquid gold and dam technology. So, he has mainly focused on the Godavari Anicut in South India. So, this is a chapter in Deepak Kumar, Vinita Damodaran and Rohan Dsouzas edited book called Environmental Encounters in South Asia. So, here Rao he (sheds light on the history of

the construction of the Godavari Anicut during the 50s and he shows that just during the preceding years that is roughly between 1815 and 1840.

So, he consulted the archival reports and records to find out that there was a kind of a colonial anxiety and apprehension, that the production was actually fally. So, there was the agriculture there were lot of horizon anxieties relating to agricultural production and so, Montgomery he was asked through you know survey the entire condition, and come up with some recommendations and solutions.

So, what happened is that Montgomery finally, could publish a report he came up with the report in 1843 44 which is known as a famous Montgomery report and Arthur cotton he was trained in civil engineering of course,. So, he was brought in to the picture and he was involved in this entire project of coming up with a Anicut on the Godavari river, and the main purpose was to facilitate inland navigation and also to increase agricultural production and all that.

So, what happen is that an Arthur cotton we all know Arthur cotton was again to use little bit of I mean I mean if you follow the of if you follow David Gilmartins conceptual framework. Then Arthur cotton was no less than an you know imperial a scientist and to a great extent a techno chauvinist because Arthur cottons famous argument is that all deltas are delta all over the world. So,. So, he says that there is there are no specific distinctions you know between a delta in South Asia or a delta somewhere else. So, it as all deltas are deltas across you know all over the world. So, if all deltas are deltas all over the world, then we have the mechanism to do whatever we want to do to the delta for our own benefits and for reaping profits and for not only reaping, but also maximizing profits by generating lot of revenue and lot of earnings, on the expenditure or the investments met or concurred.

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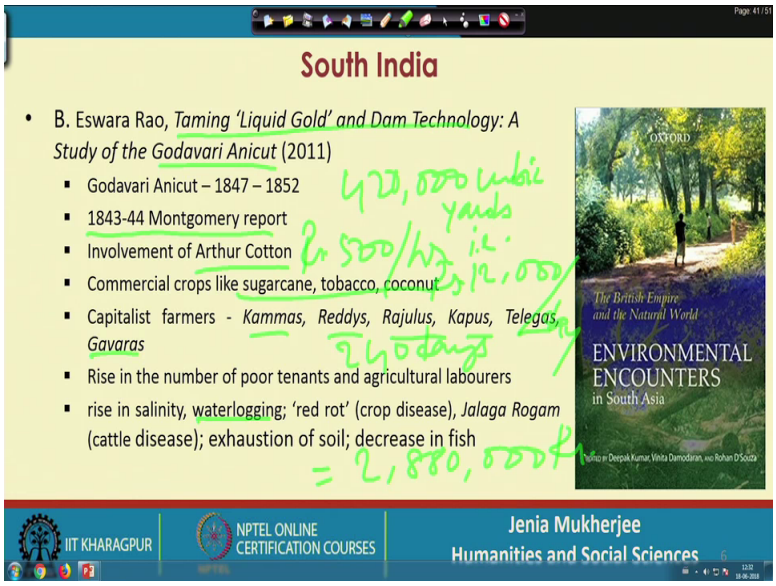

So, Arthur cotton was involved in a project and finally, we see that there were some improvements. So, commercial crops like sugarcane tobacco coconut is things were raised and it also gave raise to. So, as I mentioned that these hydraulic intervention it not only had the environmental repercussion or also social repercussion. So, we see the rise of rich capital is farmers as like these communities like Kammas, Reddys, Rajulus, Kapus telegas Gavaras. So, EswaraRrao talks about all of them and so, of course, on one hand there was the rise of capitalist farmers an on one hand the misery of the poor tenants and the agricultural labourers it went on increasing. So, and the ecological effect was that after few years the salinity rose there was water logging and also crop disease started Jalaga Rogam crop disease cattle disease soil was exhausted and also there was decrease in fish production.

And one important thing I should mention here is that as I see the name of his waterhouse chapter book chapter taming liquid gold. So, Arthur cotton was someone who even you know represented try to represented the river in terms of [FL], in terms of capital. So, if there is a. So, he mentions. So, if you go through cottons report, you will find that cotton says that you know the Godavari it generates if I remember it rightly. So, it generates roughly 420000 cubic yards. So, 420000 cubic yards of water go to the sea per day which is that is. So, he converted it and said that the rate is rupees 500.

So, 420000 cubic yards of water going to the sea at the rate of rupees 500 per hour sorry at the rate of rupees 500 per hour, that is rupees 12000 per day across 240 days which finally, gives a figure of 2880000 rupees. So, can you imagine; so, the entire Godavari calculated in terms of money. So, this is what I did. So, he represented the entire flow of the Godavari in terms of money and he measure that. So, to him Godavari was liquid gold. So, this was the kind of the mentality the colonizers had so far as our you know rivers are concern.

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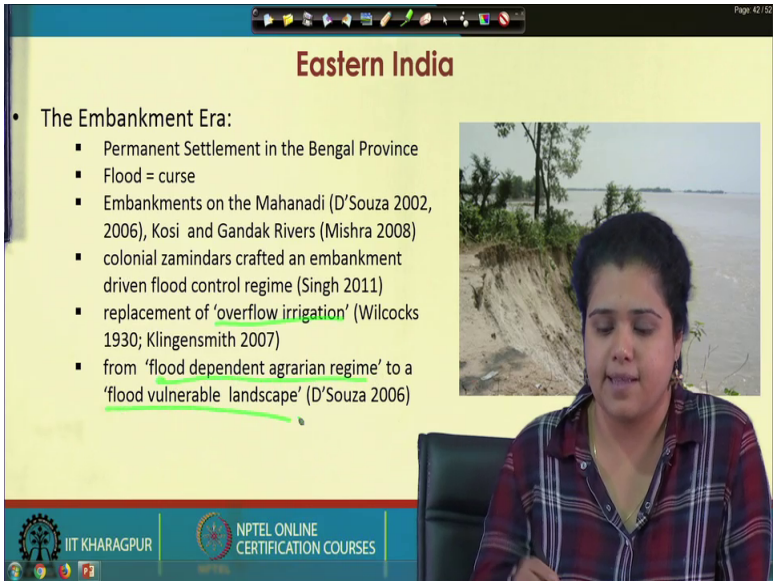

So, now coming to eastern India eastern India one major development during the colonial times was the permanent settlement in the Bengal province that is consisting of Bengal Bihar and Orissa. So, I think I had mentioned it earlier as well in some of my slides or lectures that is previously I mean the basic difference between the pre colonial and colonial rule was that you know in during the pre colonial period, flood was never perceived as a curse or you know flood was never perceived there is a negative thing.

So, flood was always perceived as a blessing as a boon, because it was a totally there in the mind of the people yes that you know floods were extremely important because when this flood water would resist then the soil would be left with very rich silt or alluvium deposit.

But unfortunately, you know the colonizers their understanding of floods was absolutely different or totally different from the pre colonial understanding of flood; because they

fix the revenue in eastern India especially if you see permanent settlements. So, permanent settlement was something where they try to fix the entire revenue.

So, what happened was that previous taxation system it was not a fixed taxation system, it totally dependent on the what to say the opportunity and the opportunities available I mean seasonal opportunities available and the droughts and floods during those times taxes were not collected, rather during those time loans were provided by the state or by the rulers and even the local I mean local rulers to the peasants. But the colonizers were not comfortable in that kind of an arrangement and what they wanted to do was they wanted to continuously extract revenue from the soil.

So, as they were. So, as this become continues. So, from irregular or discontinues system of taxation to continuous or fixed system of taxation. So, it was mandatory for them to you know to regulate floods to control floods because otherwise during those months, I mean the there would be some kind of curse which were involved on land. So, that is why they initially they you know they implemented the idea of constructing embankments on the rivers to control and regulate flood water.

So, if you see eastern India I will find that big embankments were constructed on all the rivers of eastern India including Kosi Gandak Damodar Ganges all the rivers. And what happened is that the overflow irrigation that is the traditional irrigation system was totally replaced by or totally replaced by the era of embankment or the era of embankment construction.

And we see very interestingly there is a work by Daniel Klingensmith will talk about it where Klingensmith had shown that how actually even some of the colonial officials they pointed out that overflow irrigation was extremely productive for the peasants and for the soil, which the British unfortunately did not try to understand. So, Rohan Dsouza mainly focusing on the on Orissa on colonial Orissa, he shows that how the construction of embankment actually did not do any benefit to the river or the people for that matter, but rather it totally you know disrupted environmental and social equations. So, he shows how the landscape of Orissa it actually transformed from flood dependent agrarian regime to flood vulnerable landscape.

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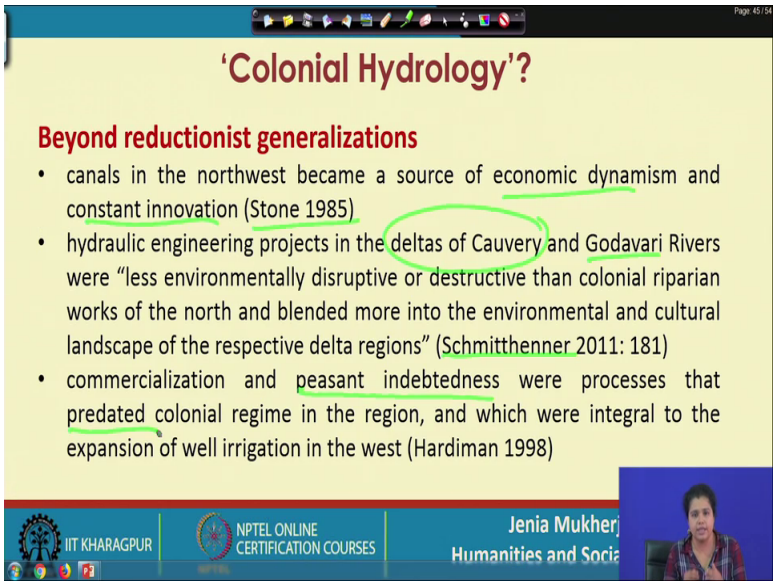

Yes. So, now, as I told you in the beginning of the lecture that we will you know little bit play with this term colonial hydrology, I am not going to impose this term on you, but rather you are suppose to think that whether the colonial hydrologies an appropriate terminology or not. Because till now I have only talked about the negative aspects of a colonial hydraulic interventions, but there are few works which also which also do not talk about this binary distinction between pre colonial and colonial water regime, rather they say that few words argue that you know there is a kind of a continuity between the pre colonial and colonial period so far as water management concern. There are other work for example, iron stone ironstone had counter Elizabeth Whitcombe.

So, ironstone writing during the nineteen writing during the 1985 she he had counter Elizabeth Whitcombe and he has shown that actually canals in the northwest was a source of economic dynamism and constant innovation.

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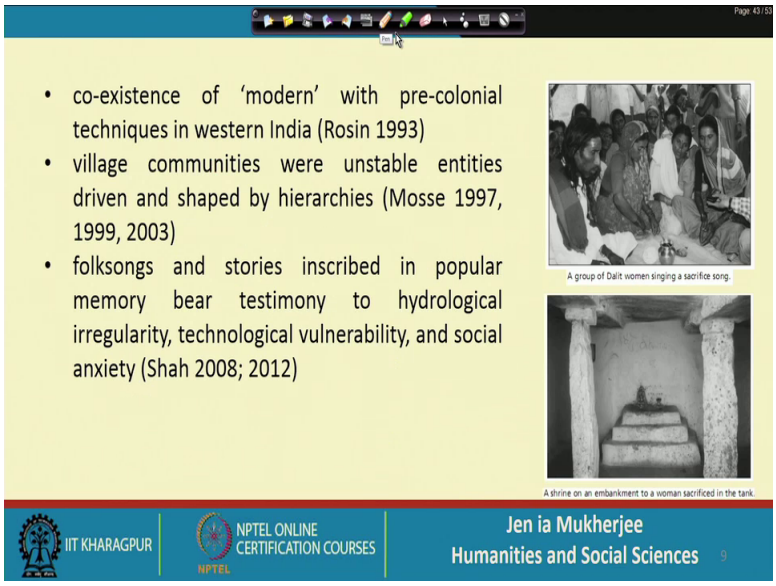

So, whitcombe said that they depressed peasant tree they walked in a distorted environment, but stone says that you know with the same similar kind of a different kind of archival records and reports, he says that canals were source of economic dynamism and constant innovation. So, we need to think about this. So, this is one then there are works on South India for example, Eswara Rao we have seen how he was shown that Arthur cotton, he has actually you know to a great extent criticize Arthur cotton and criticize the colonial hydraulic interventions on river Godavari.

But on the other hand, Peter Schmitthenner I do not know the appropriate pronunciation, but the same another person in the same edited volume of Deepak kumar Vinita Damodaran and Rohan Dsouza where Eswara Rao also had contributed an article he has actually say that you know maybe the Godavari. So, far as Godavari was concerned the project was extremely disruptive.

But if you consider other project for example, mainly deltas of Cauvery, but also he includes Godavari and says that these were less environmentally disruptive. So, they are I mean these are not closed and we cannot come up with closed an arguments, but rather these are open ended you know perspectives, which we need to think and rethink counter and encounter and also we need to go through fresh set of sources sometime may be and fresh sets of frame works to continuously keep on thinking and interpreting that what is the truth or what is the reality or may be also these kind of an understanding that whether

there are multiple realities or not. Hardiman also talks about the same thing I mean not same thing, Hardiman says that peasant indebtedness was already there during the precolonial (Refer Time: 31:01) predated the colonial regime.

So, it is not that it only started with the colonial period. So, I mean this kind of understanding or framework of pre colonial equilibrium versus colonial hydrology actually does not whole ground. So, again works by David Mosse and works by Isha shah. So, Isha shah has she has done a detailed oral history and you know ethnographic study in South India and she has mainly Karnataka and she has shown that how. So, so she has consulted the folk loads and the traditional some other traditional cultural practices. So, where she has shown that how you know the water management techniques were very disruptive so, far as the social equations were concerned.

So, for example, if there was a long prolong drought in the villages of Karnataka, then there was a ritual practice that the that are tribal women or a dalith women from a very vulnerable or marginalized section of that village, was supposed to you know drown herself in a well. And this was there was a cultural belief and I mean of course, superstition associated with the whole thing that if her life was sacrifice, then it would ensure rains in that particular (Refer Time: 32:20).

So, these were the kind of systems or practices or rituals that were there even in pre colonial India. So, how can we say that the pre-colonial India was a golden period so far as water management is concerned or was concerned?

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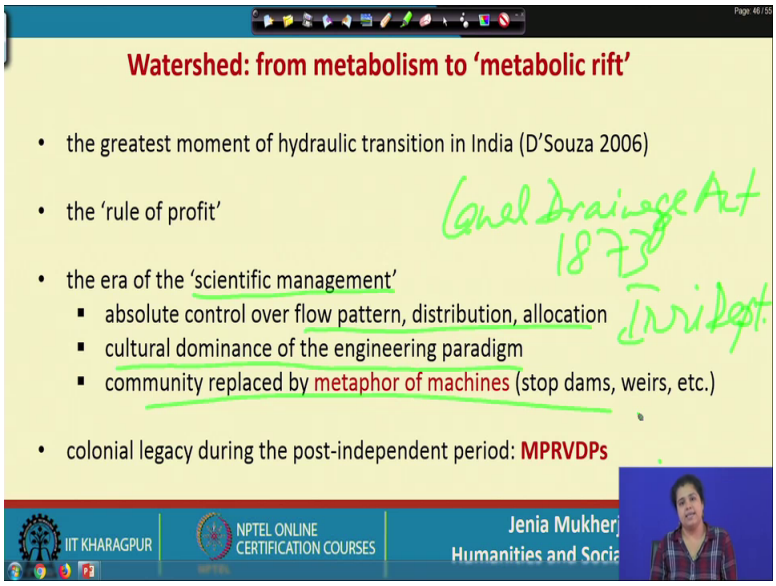

So, finally, I will end this presentation again by what to say by narrating my observations, because I am in a position to tell you what I believe in, then you are free to think you know in your own way. So, the idea of this presentation or here I do not want to impose my ideas on you, but of course, I will share my opinions.

And my observation and then you can you can go through those reference materials you can go through the articles, you can go through the book chapters and then you can have your own thinking and thoughts related to whether colonial hydrology is a scientific term or not. So, I will say that definitely though I have talked about the different other works by Isha shah or ironstone or David Mosse and pointed out that these kind of a colonial versus pre colonial or pre colonial versus colonial actually does not hold ground in that sense, but again in spite of that I will also argue and to a great extent you know I very much agree with Rohan Dsouza that the greatest momentum that colonial period it was I mean it forged in the greatest momentum of hydraulic transition in India and we cannot really denied this because even.

If we look into some of the legal procedure, some of the institutional element, some of the acts that were passed during the colonial time we will see that how it entirely altered the ecological and social equations, so far as water manures was concerned, for because the British were doing everything to generate a pecuniary well. So, the rule of profit was the main colonial logic behind all this intervention and there is no doubt you know I

mean we cannot be really doubtful about this affair. And it was of course, the era of scientific management and as I was mentioning about the acts, if we see the canal drainage act of 1873 or if we look into the establishment of the irrigation department in the second half of the 19th century.

Then you will see that the previously everything was to a great extent owned by the community but, now the canal drainage act and the irrigation department they employ through the canal drainage act and through the establishment of irrigation department they employed so called trained engineers and so called trend technocrats, who where controlling over who were who set up an absolute control over the flow pattern distribution and allocation of water resource. S

o, these things are very important see flow pattern distribution and allocation we had discussed political ecology, right we had discussed urban political ecology or we will discuss or elaborate more on it in our next some of our next presentations. So, there where we will say that it is not only pipes, I mean it is not only water which flows through pipes, but it is also power equations.

So, here it is absolutely clear that during the colonial period itself the flow pattern; where this pipes would be laid, who would get access to water who would be able to pay taxes and there were so, many other you know complexities caste, kinship, gender, so, many other things. So, many other social aspects that are very much there in so, far as the access to water was concerned.

So, it was not only quantity and quality of water, but who were actually controlling the flow of water, the flow pattern of rivers the distribution of channels and the allocation to water resources. So, this is there and then of course, as I had mentioned talked about Gilmartins paradigm of imperial science. So, there was this cultural dominance of engineering paradigms. So, where it was asserted time and again that the colonial hydraulic interventions were more sophisticated they were heavy they were big, they were more effective than the traditional systems.

And so, community was replaced by metaphor of machines including stop dams, weirs and (Refer Time: 37:05) and an entire era of you know centralized control began. And of course, we had discussed little bit of the ecological repercussions or the ecological effects of this weak hydraulic interventions. So, the embankment regime it is clearly it

has been clearly shown if we go through the works of Dsouza Dinesh Mishra as so, many other social scientist and scholars as well it comes out clearly that the embankment regime. It actually could not regulate flood or control flood rather it aggravated floods in India more specifically in North India and eastern India.

So, what happened is that. So, when this embankment regime could not actually regulate flood and could actually aggravate flood,then this techno chauvinist they actually came up with more fears and so, called what they considered to be scientific and effective interventions that replace the embankment regime so, then the perennial irrigation system was introduced. And finally, these particular I mean these water management mechanisms laid way to what is known as the era of multipurpose river valley development projects that is the era of dam construction.

So, technological interventions have to be contextualize within the broader political economic a picture, within the we have to know we have to understand the broader you know historical processes that are at work political, economic imperatives that are at play that determine technological choices of a particular period.

So, what I will like to say you is that today we are you know we are we are encountering severe challenges relating to you know dam construction, relating to the effects of big dams on people on ecology, but we have to keep in mind that it is it was it was it was not a sudden or an abrupt or a new phenomena in post independent India, but rather it drew it is a legacy from the colonial period. Which started with the embankment regime followed by perennial regime irrigation canal regime and that finally, laid way to the multipurpose river valley development projects, which would be the topic for our next lecture.

Thank you.