Water, Society And Sustainability
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Lecture - 01
Setting the Context

So, the course is all about Water, Society And Sustainability which will talk about the relationship between water and society towards efficient and sustainable future. So, here the first lecture would be I mean it is entitled Setting the Context; where, I would like to establish the relevance that why this particular course is important? Why do we need to know about the embedded relationship between water and a society towards and you know efficient and sustainable future?

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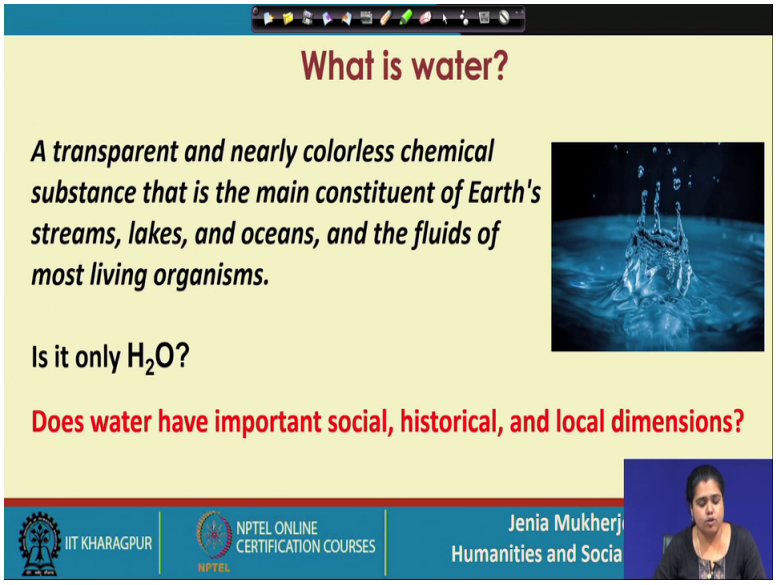

And so, first I would like to begin with the very fundamental question that; what water is all about? Now, is it only H 2 O? Because if anybody ask what is water; then, generally people would argue that now it combines or it comprises of compounds of hydrogen and oxygen.

But then, this particular idea that water is only H 2 O to a great extend abstracts water from the social, political, regional, local and ecological processes of dimensions with which water is extremely loaded with. Now, if we ask what is water? To an anthropologist, he is answered would be very different from a particular another social

scientists may be an historian who would actually define water or pursue water in a very different way.

Similarly, how water can be pursued or understood by experts, technocrats or engineers may be people who are specializing in technical fields or physical sciences like geomorphology or hydrology would be very different from people who are actually dealing with social sciences. But a unfortunate part is that like in our conventional text books, these kind of conventional definition is available that what is water? It is a kind of a transparent and nearly colorless chemical substance that is the main constituent Earth's streams, lakes and oceans, and the fluids of most living organisms.

So, in this particular lecture what I would try to do is I would critically interrogate this very meaning or dimension of water by arguing that water is not only a physical substance comprising of hydrogen and oxygen compounds, but there are other additional meanings, there are other you know significant understandings or perceptions surrounding water.

So, yes; so, this is a very fundamental question that I would like to raise that; does water have important social, historical, and local dimension which unfortunately are missed in this particular idea that water is nothing but H 2 O?

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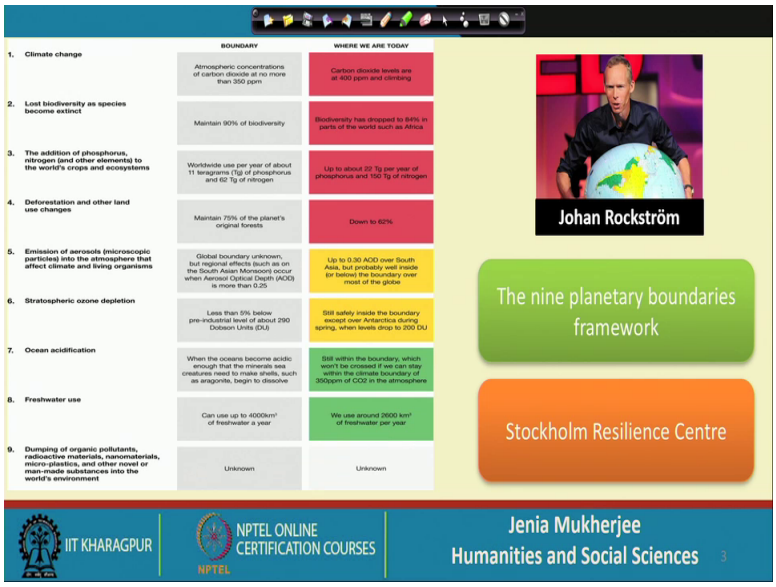

This is the nine planetary boundaries framework; a very important framework which Johan Rockstrom and his colleagues working at the Stockholm Resilience Centre came up with.

So, they publish paper in 2009 in one of the journals called Environment and Society; where, they proposed this particular framework called; the nine planetary boundaries. And this is one of the most relevant frameworks though it also it has been criticized by different social scientist and natural scientist as well, but we would not go into criticism, but we would discuss that why this framework is very important for understanding anthropocene. Anthropocene that is the current or the contemporary geological era that we are encountering.

So, anthropocene is that particular geological era where it is believed that human activities or anthropogenic activities have played a very important role in altoning the major out system processes like the geological processes, hydrological processes, atmospheric processes and even the biospheric processes.

So, we are encountering anthropocene today and the very important question that really we need to raise today is that what are those non negotiable planetary conditions that we need to respect in order to avoid the risk of deleterious or even catastrophic environmental change within the you know a continental or even at global scales?

So, Johan Rockstrom and his colleagues they argued in this particular paper published in Environment Society that these framework; the nine planetary boundaries framework is actually not a doom stay message, but rather it is a framework that help us understand the safe operating space for us like I mean what should be done; how we can really come up with innovative, alternative solutions to which we can avert a crisis?.

Now, if we look into these nine boundaries, we find that now there are this Climate change, Lost biodiversity as species become extinct. Then, there is there are changes in transformation in the phosphorous and nitrogen cycles; Deforestation and land use changes; Emission of aerosols; Stratospheric ozone depletion; Ocean acidification; Freshwater use and organic pollution or pollution as a whole.

Now the whole question is that like they updated the findings publish in 2009. Again, in 2015 because again a detail report came out in science, but they showed that how you know the first four boundaries had already been transgressed.

So, we see that here fresh water use is still within the safe operating limit. The boundary for fresh water use as not been transgressed yet, but it is you know it is I mean we should not be released out of this because we have to understand, we have to realise that there are strong you know and deep interactions or overlaps across these different boundaries.

So, I will give some examples to illustrate how you know the these all these boundaries are interrelated to each other. So, for example, if we take an example at the regional scale will find that deforestation in Amazon of course, it will have it will influence water resource availability in Asia. So, similarly like you know if there are changes in vegetation in the Amazon and it is predicted that by the end of the 21st century the Amazonian vegetation might get replaced by Sawana type vegetation.

So, that will have an effect on even surface temperature in Tibet. Now, Tibet with its changing climate, it will definitely affect again water resource availability in Asia. So, like there are around 15000 glaciers in the Himalayan Hindu Coast region which stores around 12000 cubic kilometres of water, a fresh water which is supplied to the to around more than 500 million people in that particular region plus 250 million people in China.

So, this glaciers melting definitely will have its short term impact in increase run off, but there would be also long term impact. For example, there would be changes or variability in seasonal precipitation and it would also affect the entire water supply system in that area with definitely lot of implication at global scales.

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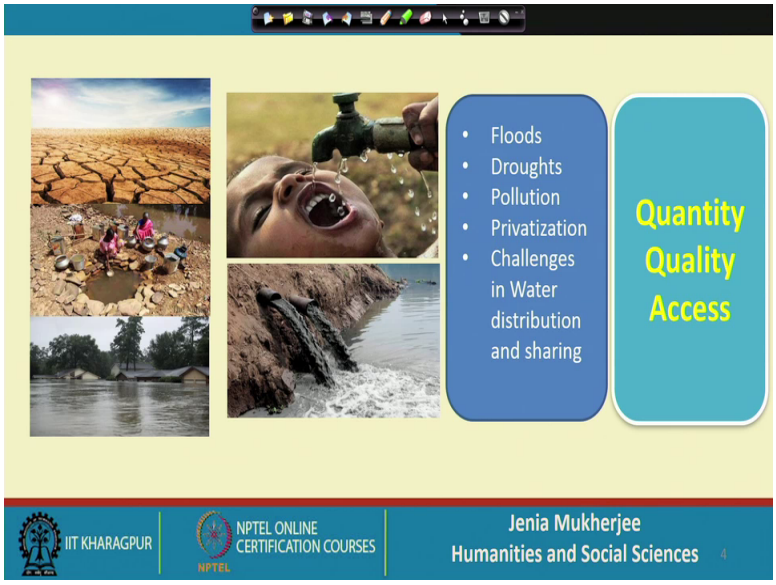

So, this is a scenario today and coming specifically to the context of water we find that you know what this what a sector. It is manifested with manifold challenges. For example, due to climate change, due to anthropogenic activities what is happening is that the severity and the intensity of water related disasters are increasing. For example, Floods.

For example, droughts and there so many other problems as well related to the quality of water and there are many other changes are taking place because like we are on structure of you know multiple new things like for example, what is happening today in the 21st century is that you know this is also the era of rapid urbanization. Rapid urban sprawl is going on at a increase space; I will describe it later in one of my slides. But, what is happening is that this is also creating a whole lot of pressure on water resource.

So, with a change in demographic pattern, there is also direct change in water consumption. So, we can see that you know this three important components like the quantity, quality and access to water is very important.

So, we really need to think about the quantity of water that is water flowing from one system to the other which can be measured; definitely using certain units and the quality of water and also the another important parameter, another important very important one of the fundamental important variables is also accessed to water. How water is being distributed to people? So, who are the people who are getting more water who are the people who are receiving less water; less water than the daily requirement need.

So, all these dimension help us understand that water is not you know it is not simply H 2 O, but there are definitely other multi layered complex dimensions that are very much imprecated within the concept of water.

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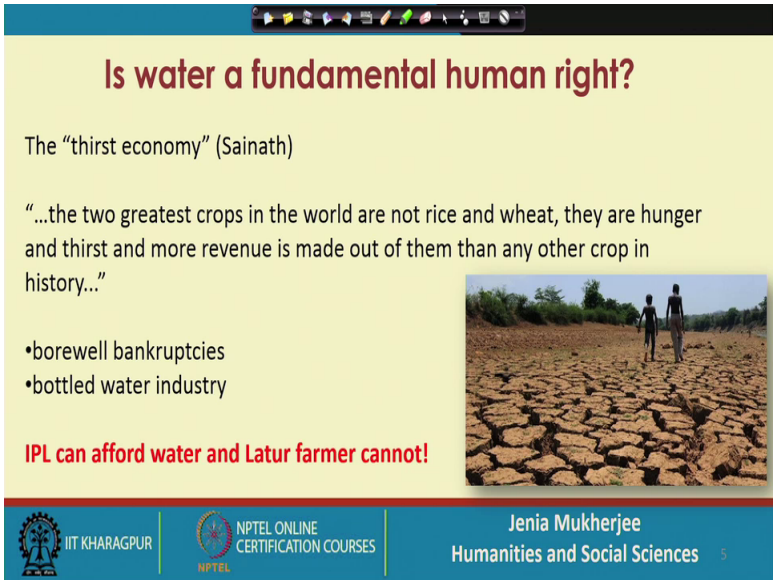

So, P Sainath, the famous renowned journalist, he wrote something called Is water a fundamental human right? and he wrote this particular piece in context of the droughts prolonged and protected drought that was going on in the western part of India, in the Maharashtra region and. So, the P Sainath said that you know that the India is undergoing mega water crisis and this a outcome of growing inequality and also lopsided environmental policies and projects that are sweeping the Indians since in the last 20- 25 five years.

So, if you take a look I mean very briefly today, 27 percent of the Indian villages and 46 percent of the Indian urban areas, lack access to drinking water. The irrigation sector is also undergoing major crises. On the other hand, ground water resource is also it is also declining, reducing, getting reduce at a massive scale. So, what is happening is that you know P Sainath again; who is also the author of the best seller called Everybody loves a good drought.

So, he points out that we are facing this water challenges due to numerous factors including the global corporate capitalist projects that are undergoing which again include the construction of multiplexes and the construction of malls on eco sensitive bells and

diversions to cash crops and other things like for example, concretisation of pilgrim towns and also the coming up of the housing very big- big housing complexes with large swimming pools on roof top.

So, what is happening is that you know we find that there is absolute misuse, an abuse of water resource and he also talks about bore wel006C bankruptcies and bottled water industries. I would like to little bit elaborate on this because we really need to understand water in a need to understand water not only from a perspective of the you know physical dimensions; we really need to know about the other dimensions including you know the pitfalls or the challenges that a very much there relating to water distribution system.

So, for example, in the 1989's this Million bore well scheme initiative was carried on by the Government in Western India; mainly a areas like Maharashtra and Rajasthan where, the areas the edible areas the farmers were encouraged to dig bore wells. Now of course, one can understand that the rich farmers who could afford to pay the loans, they started digging bore well across this edible lands.

Now, what happened is that immediately after few years those zones, those regions where declared as successful zones because the agriculture productivity it increased like anything, but after few years after 2 decades, these zones where only categorised and declared as black and gray zones because nobody could again dig another bore well in that region. Because a aquifer was already finished.

So, this is what happened with the million I mean with the so called very glorious quote unquote A million bore well scheme initiative. Now again, if we focus into the privatization of water resources if we focus specifically into these bottled water industry; then, we will find that you know industry like Coca Cola or Pepsi cola they are the continuously digging and dealing different parts of rural India.

Again especially, Western India Rajasthan, Maharashtra etcetera and what is happening is that these areas are undergoing tremendous water crises. So, the ground water is being extracted like anything. So, in 2003 in Thane before the massive protest which were laid by Kisan Savas. So, Sainath found out as he was again reporter a journalist. So, he found out that like the Maharashtra government was selling water to these bottled water industry at. So, 1 litre water, they were selling at 5 paisa.

So, this is the situation and this particular thing I mean if we just focus [vocalized noise] into this particular statement that IPL can afford water and Latur former cannot! I think this very statement itself is indicative of what is going on in the water sector so far as the national context, the Indian context is concerned.

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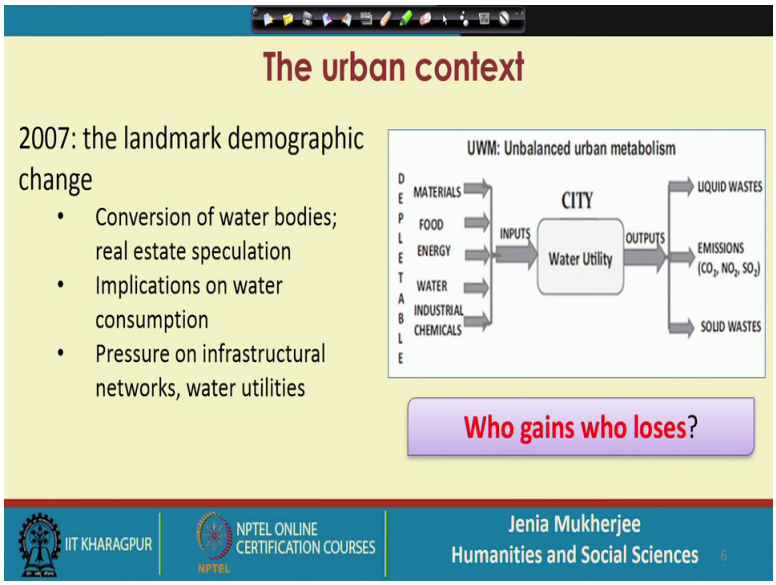

So, coming to the urban context like 2007, it is the I mean it is the land mark here because I mean there was a massive change or there was a massive demography transformation because for the first time in 2007, the urban population of the world its (Refer Time: 15:50) the rural population. Of course, and there were lot of implications of these transformation now what happened is that like with this rapid urbanization or urban sprawl, water bodies were converted into realistic.

So, today we find massive realistic speculation going on and of course, it has its implications on water consumption and there is a whole lot of pressure on the infrastructural networks, water utilities and water sanitation facilities. So, this is the picture of our unbalanced urban metabolism. So, you can find out what is happening. So, you can see the inputs and the outputs and this is again the burning question that who gains and who loses. So, I will give you one example.

So, one of the case studies which I would shared in due course is that we carried on a study, we conducted a study on what we call water injustice in the peri-urban areas of the

global south. So, we mainly focus on Cochabamba in Bolivia and Kolkata, India and Darussalam, Tanzania. So, we mainly focus on peri-urban area.

So, peri-urban again it is a recent connotation because peri-urban means areas which were rural yesterday, but which will become urban tomorrow. So, these areas though they are urbanizing at a fasters space, but at the same time they are not infrastructure in the well connected. So, we do not actually I mean the municipality do not I mean the municipality has not provided water pipes or pipe lines and adequate sanitation facilities in those areas. So, these areas are urbanizing without any infrastructural support.

So, the famous renowned water expert who is an advisor on water to very many like international organisation and governments professor A K Bishwas; Ashith Kumar Bishwas. So, he do our attention to you know what a consumption inequity in one of the metropolitan city in India, Kolkata for example, where he mentioned that a person living in slum for example, consumes 50 litres of water per day. On the other hand, like in the CBD that is the Central Business District of Kolkata people consume around 200 litres. So, what is happening is that a poor person is subsidizing a rich person by almost like 150 litres.

So, and he is using that for example, he is using treated water for washing his car or for you know watering his garden and all that on the other hand, peri-urban poor or the slum dweller or a person residing in the quarter, he is not being able to access drinking water or he is not been able to access water even for drinking purpose and even for performing some of the basic amenities or some of the basic requirements of the daily life of daily needs.

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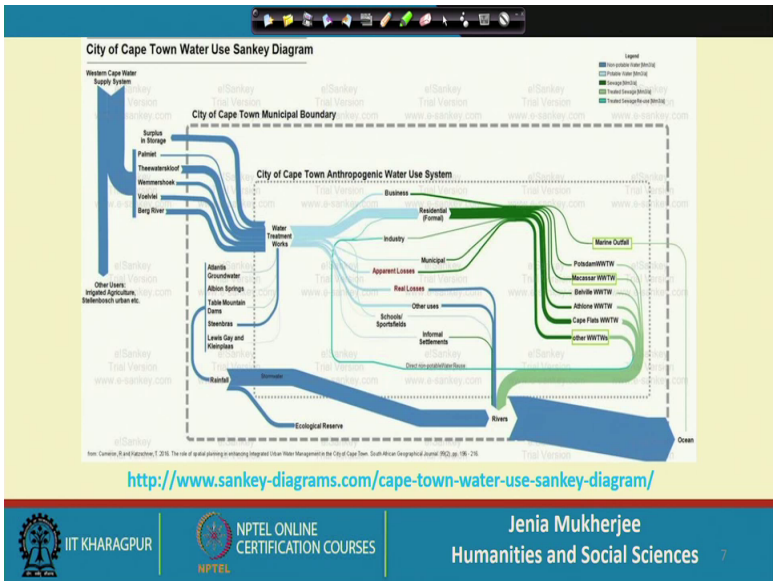

So, finally, like this is a Sankey Diagram which tries to explain like how Cape Town can really you know move on to a more efficient and water secured and water sustainable future because we all are aware about happening in Cape Town. So, in January, there was much hue and cry relating to water crisis in Cape Town and. So, the so, government declared that by April Cape Town has to observe this Zero day. So, what would be these Zero day? The Zero day is that would be that day when the citizen have to consume water less than 25 litres.

So, generally an average American citizen consumes roughly 300 litres per day. So, one can imagine like this particular amount 25 litres is a very is extremely inadequate to meet his or her daily needs. So,. So, there was also a hot bit of controversy relating to a like why this thing happened and like what could be the possible solutions you know to move towards water secure future and all that.

Now, if you live in look into the history, will find out that like why this water crisis actually happened in Cape Town. We will find like if we take a note or if we take a look into the demographic patterns of growth into the demographic growth, we will find that in 1995, the population of the Cape Town was like 2.4 and that increase to 4.8 in 2018.

So, it was or it is a 79 percent increase in population growth. On the other hand now, if we look into the water availability, if we look into the dam storage capacity; then, will

find that the dam storage capacity or the water availability so that is the main source of drinking water for Cape Town that only increased by 15 percent.

So, 79 percent increase in demographic growth or 79 percent increase in population with 15 percent increase in water availability or dam storage capacity. So, that maniface that shows the mismatch or between the demand and supply curve. So, and beyond that in addition there was the again the problem of protracted drought. So, the drought started I mean getting severed since 2015 and scientist argue that it was also the outcome or the effect of the El Nino.

So, again you know changing weather conditions that if affecting Cape Town and many other regions in the world today. So, on one hand, I mean the increase in population; on the other hand, crowd due to El Nino effect. So, all that where great extend put lot of pressure on the water resources on the water availability. And another thing is also there like if we look into the water distribution mechanism of this particular city, will find that there is also a deep I mean there are we definitely find inequity.

We definitely find unequal patterns relating to water distribution mechanism because like for example, 64.5 percent water is supplied to the multiplexes, to the malls, to the houses, to the flats in the central business, in the central I mean in the posh lucrative luxurious areas; on the other hand only 3.5 percent of water is supplied to the informal settlement. So, the growing inequity is also very much there in the Cape Town water supply system.

So, this is a very interesting diagram which Rebecca Cameron came up with which she you know designed and conceptualised and this diagram which is called Sankey Diagram. It was first published in one of her papers roughly entitled The role of special planning in integrated a urban water management in a Cape Town which was published in 2016 in the South African geographical journal and there Rebecca Cameron through this picture, she tried to argue that one needs to have a detailed idea about water system and its multiple aspects.

So, it is very important to capture the multiple aspects underlying water system of a particular region or a particular city whatever. Now she says that like there are so many elements, there are so many components which are otherwise fragmented, but they operate they operate in connection to each other. For example, water use, water supply,

waste water treatment, storm water etcetera. And on the other hand, one has to also take into account the quantity and quality of water at the same time.

So, here you know the arrows for example, the size of the arrows like proportionally indicate the flow of water that is how water flows from one process to the other; on the other hand, the colour of the arrows the actually indicate the quality of water including different waters like portable water, treated water, treated water after use and all that.

So, what we find is that she tries to come up with this idea that if one really wants to intervene with or one in really wants to intervene with the urban water cycle or the urban water system; then, one has to have a detailed understanding of the functioning of different parts as a composite whole.

So, yes; so, this is I think interesting diagram within today's context that gives an idea that if one city has really has to make an efforts to you know to go for smooth transaction from water scarcity to an efficient you know water secure future, then to a great extinct an integrated approach is the need of the day, the need of the hour.

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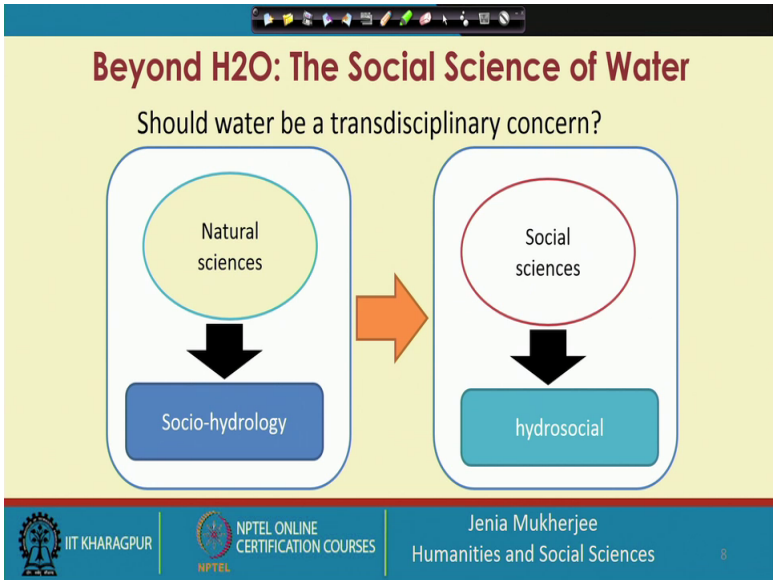

So, this is the final slide for the first lecture yeah. So, where I actually say that why we really need to go beyond H 2 O? Why water is not only H 2 O. As may be you know the technocrats or the you know engineers had understood till recently, but we need to have

this very idea that water comprises of both bio physical and social components and aspects.

So, the another question that we really need to raise provocative question is that should water be a transdisciplinary concern? That is why and how natural sciences or the natural scientist and social scientist should really come together and they should start exchanging among themselves and how different method mythologies, insights, inputs, tools etcetera could be exchanged and could be combined to come up with the integrated transdisciplinary prospective on water.

So, today there are very interesting, some interesting creativity innovative framework or emerging. For example, we have social hydrology in natural sciences; we have hydro social in social sciences what can we really learn from them.

So, these are some other things, these are some other ideas that will be discussed in this course so that we can really you know address the very important question that what water is all about. Because if you really want to know at least understand the problems, if not now come out with solution that is the next a big step, but at least if you really want to be aware with the problems, with a challenges, then we have to have comprehensive and composite understanding of water.

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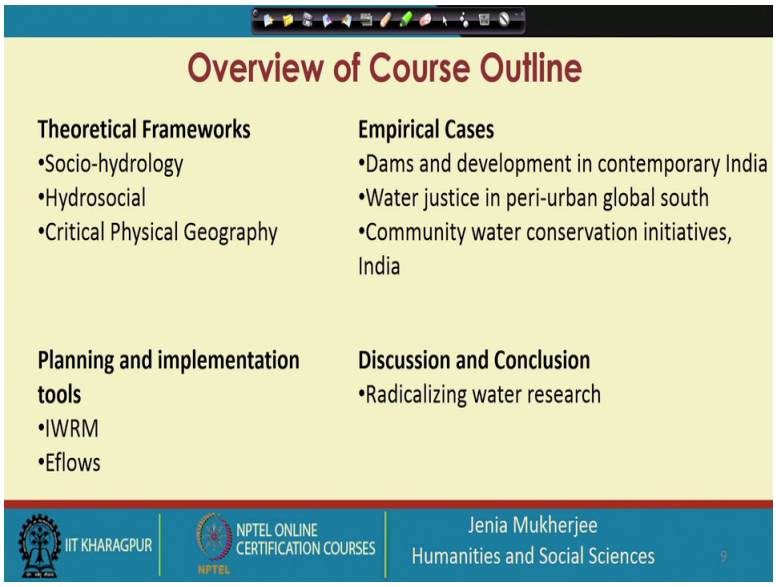

So, (Refer Time: 27:23) like I have designed the course, I mean following this particular schema. So, this slide provides an overview of the course outlines. So, in this course I would like to cover the emerging theoretical frameworks that I had mentioned.

So, theoretical frameworks across both natural and social sciences like social hydrology, hydro social and also critical physical geography as again one of the most radical emerging frameworks of the contemporary times. And I would also be delighted to discuss some of the planning and management tools and implementation strategies including Integrated Water Resources Management, Eflows etcetera.

And of course, all these theoretical frameworks retarded with so many other interesting cases, case narrative, case studies, empirical findings I would like to introduce the you know the students with the empirical narratives, the empirical findings across in a various examples mainly from the Indian context, but also outside India.

But mainly of course, also restricted winning the global south and then, this would be important because this empirical cases would also informed the theoretical framework frameworks in its own way.

And finally, I would like to conclude the course with you know with the discussion and conclusion or concluding section which itself you know I am really passionate to really go for it. So, I have named it has Radicalizing water research.

So, like how we can really radicalize river research how we can really radicalize water research by combining by integrating the multiple prospective and the multiple insides and inputs that are coming up these days. So, this is roughly the tentative overview of the course outline.

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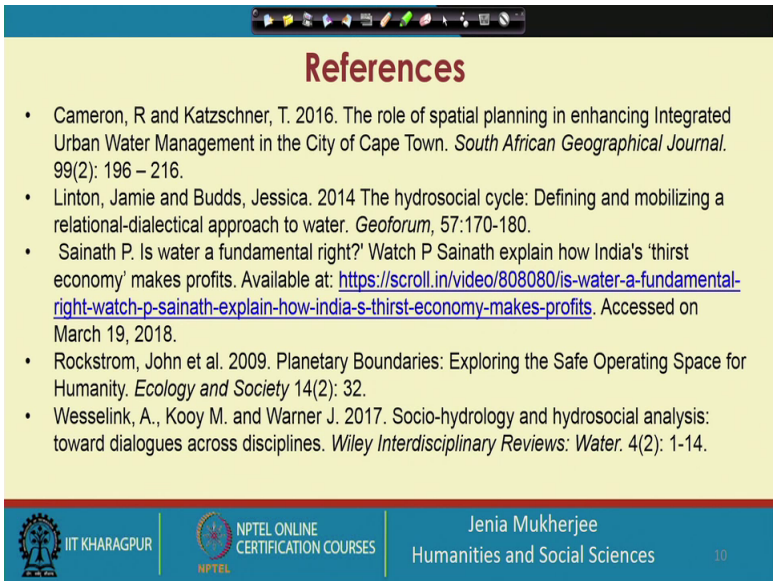

These are some of the references which would be shared with all of you and I mean you have to go through some of these references for having detailed ideas about some other components that had been discussed in the overview lecture.

Thank you.