Introduction to Environmental Economics
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Lecture - 22
Environmental Sustainability- II

Hello everyone. So, today we will be continuing from our last lecture that is Environmental Sustainability. So, here today we will be discussing what is economic sustainability? What is social sustainability and we will be differentiating what is a weak sustainability and what is strong sustainability? Then we will be discussing what are the criteria for environmental sustainability and is there a measure for environmental sustainability; whether there are certain indicators or indices are available right now for measuring the environmental sustainability.

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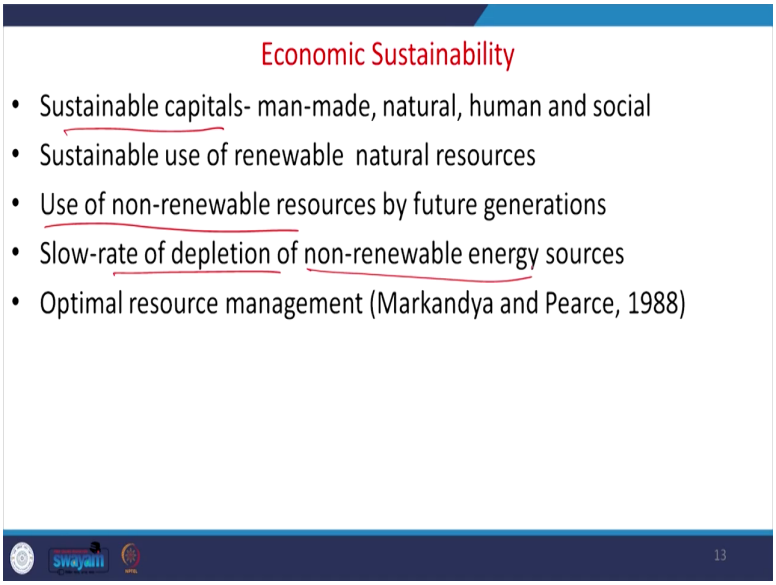

Now, let us talk about the second pillar of sustainability that is economic sustainability. So, what is the meaning of this economic sustainability? It may must be interpreted, it must be understood in terms of the economic terminologies. So, they are the sustainable capitals; economic sustainability is expressed in terms of sustainable capitals like man-made capital, natural capital, human capital and social capital. So, how all these forms of capital can be sustained, can be maintained throughout the time?

So, here we can say that sustainable use of renewable natural resources can be produced if economic sustainability is maintained. And moreover, we need to think about the use of non renewable resources by the future generations and the rate of depletion of the non renewable energy sources that must be taken into account in order to understand this economic sustainability. And finally, economic sustainability means how to optimally use and manage the resources.

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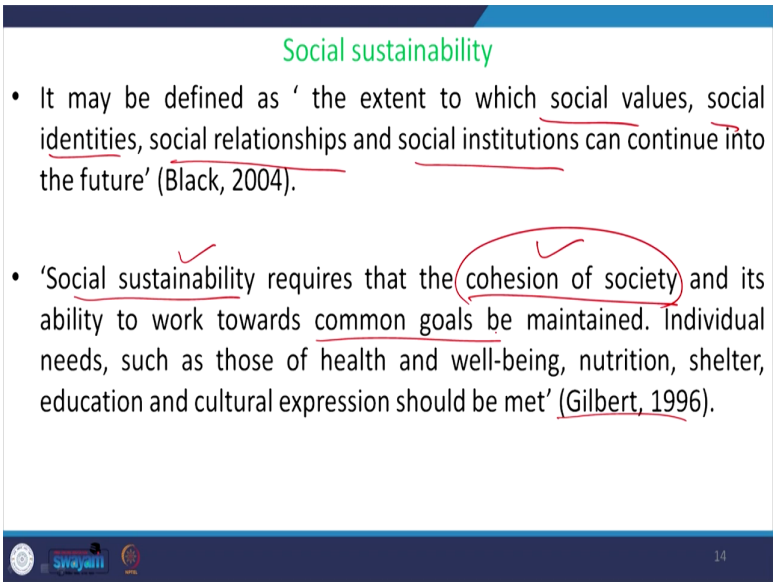

And again we need to talk about the social sustainability; this is the third pillar of sustainability itself. So, how we are understanding the social sustainability? Here the societal values, the societal identities, the societal relationship or the institutions that are adjusting in the society; they must continue for the future as well. And this is happening in the society in terms of preserving and continuing the societal values; the societal understanding, the societal identities, the societal relationship and institutions then it is known as the societal sustainability or social sustainability.

So, this social sustainability it requires the cohesion of the society, its ability to work towards the common goals so that the individual needs like health, well being, education, nutrition, shelter and the cultural expressions; they can be met. So, here basically Gilbert in 96; he defined that social sustainability can happen or it can be possible if there is a cohesion of the

society is experienced so that this cohesion of the society in terms of all these values, they will be working together for achieving the common goals.

And as a result, the individual needs in terms of health, in terms of education, in terms of nutrition, in terms of shelter they can easily be fulfilled or it can be met.

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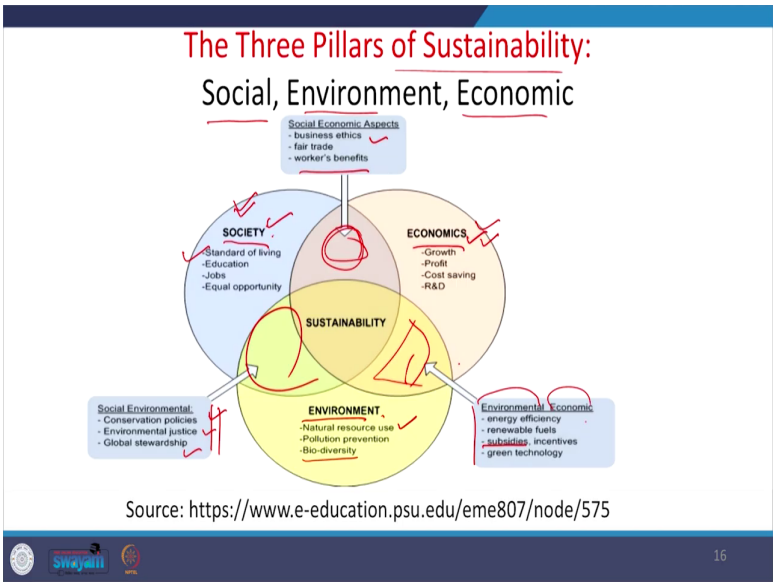

So, now in this by taking this three a schools of thought, by taking into account three pillars of sustainability; we can have an integrated hope of the sustainability concept, taking into account the societal context, the environmental aspect and the economic aspects itself.

So, in societal aspects; in order to maintain the sustainability, we can take into account the standard of living, the education system, equal opportunities system, health system etcetera that we can we need to take into account for having the societal sustainability. And in

environmental sustainability we can take for example, we can take into account the why we are using the natural resources as raw materials for expansion our production, how we are making our policies; how we are framing our public policies in order to prevent the pollutions, how the by; bio diversity is preserved; so these are the examples of the environmental sustainability.

And in economic sustainability, we are expressing in terms of that growths needs to be sustained, profit needs to be continued for longer time. We need to focus on resource and development for increasing the quality of the products itself. So, this is if this; if these are these the dimensions gets fulfilled then we will be having an integrated whole of the sustainability; what we call is the three pillars of sustainability.

And the intersection point let us say points like the societal sustainability and environmental sustainability; this point. So, what we are talking about? So, here we are talking about the policies that we frame so that the societal sustainability and environmental sustainability can be possible like the conservation policies. So, how the conservation policies can be met or what would be the structure of the conservation policies so that the societal sustainability can happens in terms of mutual cohesions; understanding the common goals, collective actions goals how they can be achieved.

And simultaneously how the nature's resources can be protected through these conservation policies or we can talk about the environmental justice or we can actually talk about the global stewardship. So, these are the examples which are in intersection points of the societal sustainability and environmental sustainability.

So, likewise when we are talking about the economic sustainability and environmental sustainability; this intersection points, it talks about the environmental and economic sustainability. How the energy will be efficiently used or how should be the renewable fuels are used, what is the alternatives, the policies that promote for subsidizing a particular resource, giving incentives different kinds of incentives how to stop pollution or how to use

less of this natural resources, how to promote green technology so that the resource efficiency can happen.

So, all these examples are dealing with the environmental, as well as economic sustainability. And the last intersection point between societal sustainability and economic sustainability is reflected here only. So, for example, we can take about talk about the business ethics or how the workers they can be benefited taking to account the societal welfare and the economic sustainability.

For example, if workers benefits are taken into account; that means, workers are paid after paid (Refer Time: 09:35), then the societal well being is encouraged and also the economic sustainability in terms of growth or in terms of profit can be maintained. So, that is why for this the whole pillars of the sustainability or for the integrated sustainability, we can think about all these three pillars and their intersection points; how they are, how they need to be look after.

And we need to also understand the typology of this the sustainability; so which can broadly be divided into this two parts. The first one is the weak sustainability and the second one is strong sustainability. So, what is this weak sustainability and what is the strong sustainability, what is the basis of this sustainability?

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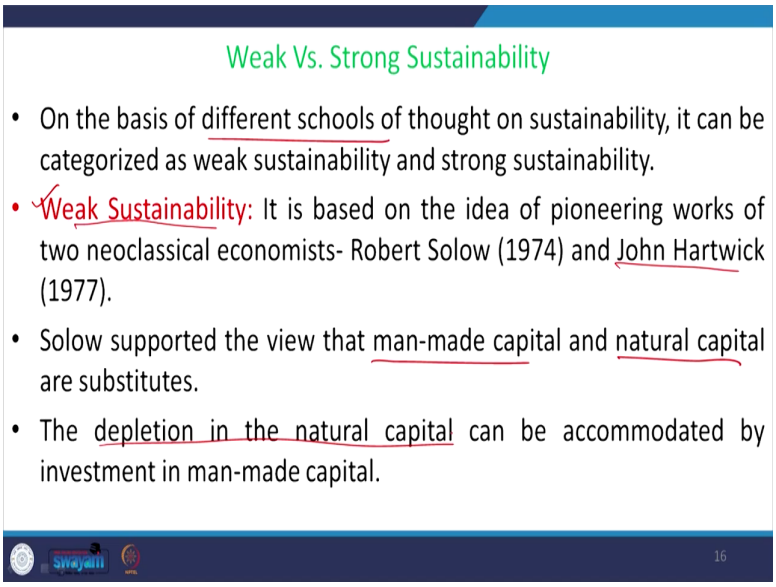

Again the basis of this categorization of sustainability, it depends on it is based on different schools of thought on the concept of sustainability itself. So, what is the first category of sustainability that is weak sustainability? So, this idea of weak sustainability can be found from the pioneering work of Robert Solow in 1974 and we have understand that he is; this economist is a neoclassical economist. And this the same weak sustainability; idea of weak sustainability we can also find from the works of John Hartwick, in 1977 and both of these fellows are the are the Nobel Laureates.

So, what is their viewpoint of this weak sustainability or what is the meaning of weak sustainability? So, the very idea of weak sustainability is that the man-made capital and the natural capital they are substitutes; that means, if the amount of natural capital is decreasing,

then you can increase the man-made capital in order to substitute it, in order to fill the gap of natural capital and this is possible.

So, in this context if we are believing the weak sustainability; that means, there exist or there is a substitute existing for the natural capital and or we are saying the man-made capital and the natural capital; they are substitutes of each other, then we can say that the depletion in the natural capital like your natural resources; they can be easily accommodated by investment in the man-made capital.

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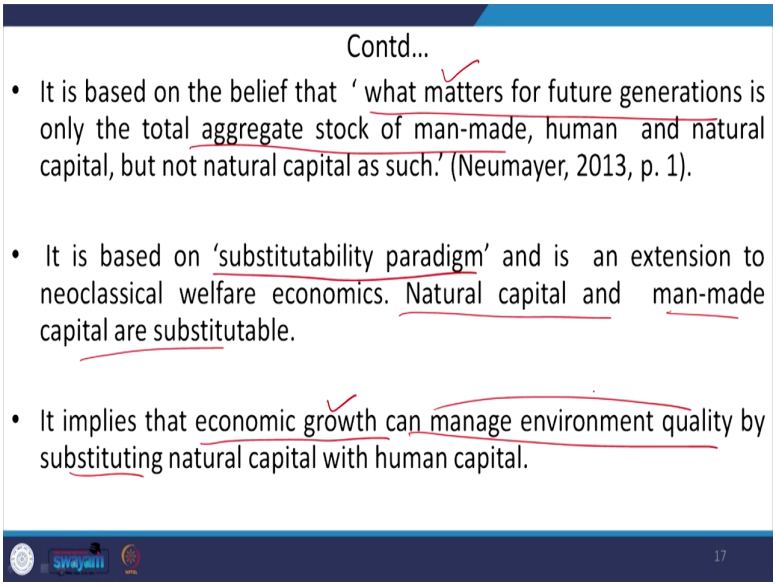

So, this is the view point of the weak sustainability that substitutes there is the substitutes are existing or the relationship of substitute substitutability are existing between the natural capital and the man-made capital. So, we can say that this weak sustainability is based on this idea

that what matters for future generations is only the total aggregate of stocks of man-made capital and human capital and natural capital.

It is not the natural capital is taken as such; so that means, here we need to highlight that it is a matter of concern if the future generations are not getting the aggregate stock of capitals; maybe the man-made capital is high and the natural capital is less; it is not a matter of concern, but they should be getting the total aggregate stock of capitals.

So, if it is so; that means, it is based on this paradigm of substitutability and obviously, this is the idea, this is the belief that is propounded by the new classical welfare economics and as per their view that natural capital and man-made capital are substitutable. So, we should not be having so much concern if the natural capital is depleted and the man-made capital is encouraging to substitute the or fill up the place of the natural capital.

If this is the belief, then we are saying this is the weak sustainability. So, it may imply that this economic growth can manage environmental quality by substituting this natural cap capital with human capital. So, if you are believing this substitutability or sorry weak sustainability; then we can say that this economic growth can be substituted for this or it can be compromised for the environmental quality or the environmental quality can be compromised for the economic growth.

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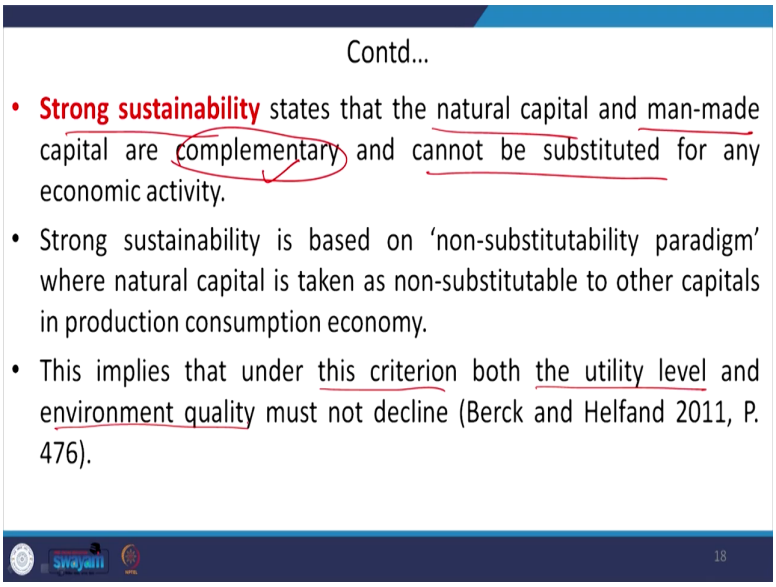

Because we are believing that both of these are substituted and so far this strong sustainability is concerned; here we assume that natural capital and man-made capital they are complementary not substitutes of each other. And as they are complementary, they cannot be substituted for any economic activity. We cannot say that the amount of the natural capital can be decreased and the amount of man-made capital is increased for carrying forward a particular economic activity; we cannot say.

So, because this forms of capital are complementary as for this strong sustainability idea and that is why they cannot be substituted. So, this implies that this criteria of this strong sustainability; the utility level and the environmental quality, they must not decline because we are saying that they are complementary that is what.

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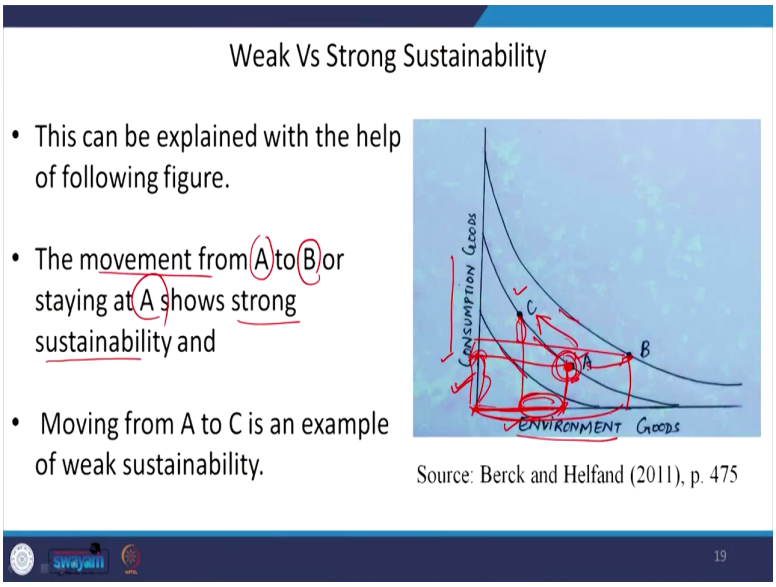

So, in order to understand this weak sustainability and strong sustainability; we can take into account the preference curves which we are saying it is the indifference curves. So, let us suppose say that we do have preference for environmental goods, as well as the any of the consumption goods; they are market marketable goods you can say. And these lines are indifference curve; all these lines are indifference curve showing the preference of individuals for both of this goods.

So, suppose say a person is in place here at point A so; that means, the person is preferring for this amount of environmental goods and this amount of the marketable goods right. And any two points on the same indifference curve they are giving the same level of satisfaction; that means, if the person is here and when the person is here; he is getting the equal level of

satisfaction or equal level of welfare. So, that is why the person is indifferent between A and C.

Based on this common this principles are very principles of indifference curves; now we can say that if the person is moving from point A to point B or staying at A; it shows the idea of or this case of strong sustainability; why strong sustainability? Because if the consumer or the individual is moving from this point; A point to B point, then the consumer is actually either maintaining the same level of environmental consumption, environmental goods or increasing the level of environmental consumption; environmental goods consumption.

While maintaining the same level of marketable goods here or this is here; either maintaining or increasing. That is why when the consumer is moving from A to B; then it is a case of strong sustainability. And even if the consumer is maintaining its position by staying at A, he is not moving to anywhere like C, then also it; it is understood the case of strong sustainability because he is maintaining the same level of by staying at A point, he is maintaining the same level of consumptions of the environmental goods, as well as the other marketable goods.

But if this person is moving from A; this point to C point on the same indifference curve and as you understand that the same indifference curves means thus the consumer is getting the same level of satisfactions by moving from A to C right. However, although the consumers level of satisfaction is concerned, if he is moving from A to C; however, he is sacrificing this level of environmental goods and he is getting this amount of; this amount this more amount of the consumption goods.

So; that means, what you understood? That this is substituted with this and it is not matter of concern to the individual because by substituting itself; by forgiving environmental goods and by getting some more of the consumption goods, he is also having the same level of satisfaction be because he is placed on the same indifference curve.

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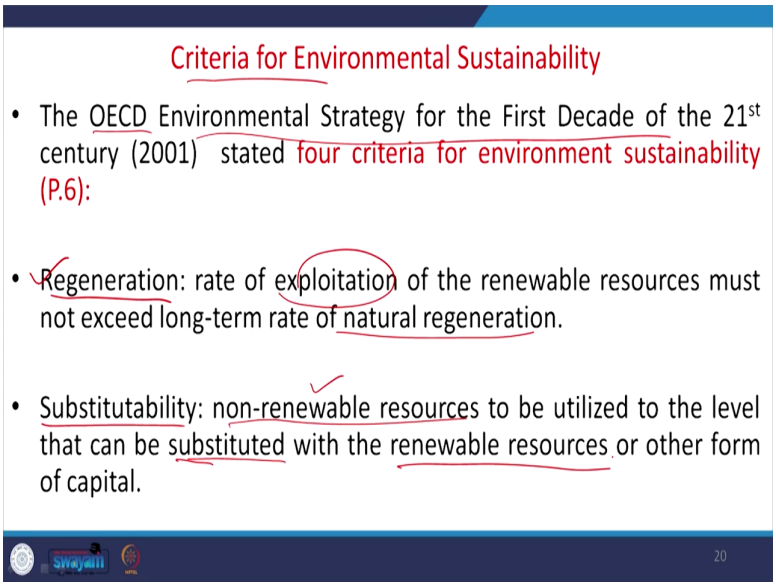

So, this is the understanding behind the idea of strong sustainability and weak sustainability. So, now let us discuss about the criteria for environmental sustainability; how the environmental sustainability may be possible? So, we can take the case the strategies by OECD. So, this is the environmental strategies for the first decade of 21st century; it was OECD publication in 2001 and this document states about four criteria for environmental sustainability; what are these four criteria? So, that this environmental sustainability may happen; the first one is the regeneration.

So, what is regeneration? That is the rate of exploitation of a natural resources or renewable resources; must not exceed the natural regeneration. So, if exploitation is not greater than the natural regeneration, then this state is giving the condition of sustainability or environmental sustainability. So, the first criteria is that exploitation of the natural resources should not be

exceeding the rate of natural regeneration of those resources and the second criteria is its substitutability.

So, here it highlights that this non renewable resources that we are utilizing for our economic expansion or production; they can be substituted with the renewable resources or other form of capital. So, that means here we are saying this is the case of weak sustainability that this non renewable resources can be substituted with the renewable resources or other forms of man-made capitals or other forms of capital (Refer Time: 24:21); if it is so, then this environmental sustainability may happen or this is the second criteria.

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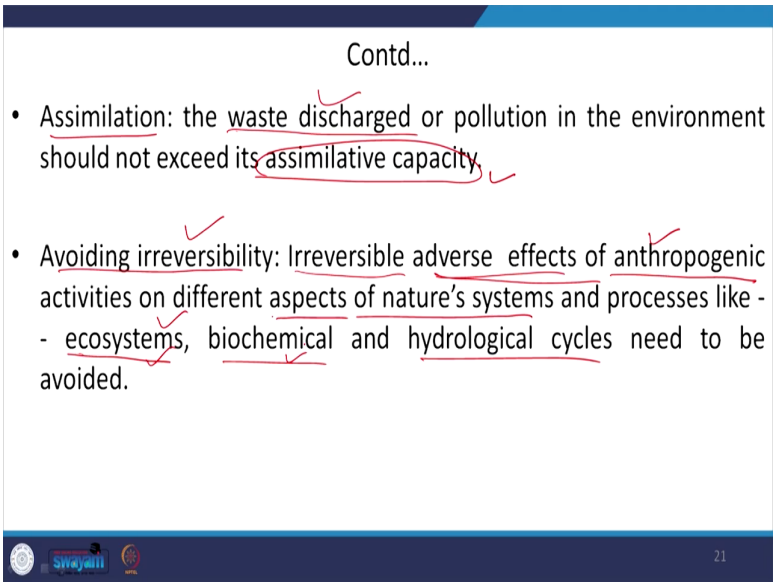

So, the third one; the third criteria for this for achieving this environmental sustainability is assimilation; that means, we need to think about the assimilative capacity of the nature and the amount of waste or the amount of pollutions, we are generating from our economic activity. If

this total amount of waste is not exceeding the assimilative capacity of the nature; then this, this environmental sustainability may happen and the last in this regard is avoiding irreversibility.

So, here how to if you can avoid this irreversibility; that means, we can avoid this irreversible adverse effects that we are observing out of these anthropogenic activities or human activities in terms of the production systems. And if these effects; adverse effects are not impacting different aspects of natural systems and processes; that means, the anthropogenic activities are not affecting; adversely affecting the ecosystems and the natures processes like your biochemical processes or hydrological cycles; then we can say that this environmental sustainable may happen.

So, if the anthropogenic activities; they are adversely impacting this systems or these processes on cycles; however, they can be reverse back, it can be actually turned into the original state; then even although this activities are impacting, but still this change on this system can be revived back or can be attained to its original state. If this is so, then we can easily avoid the irreversibility conditions, out of the impacts of the anthropogenic activities and then only we can say this environmental sustainability may be achieved.

And another question in environmental sustainability is how to measure this environmental sustainability? We need to measure the sustainability itself how to measure?

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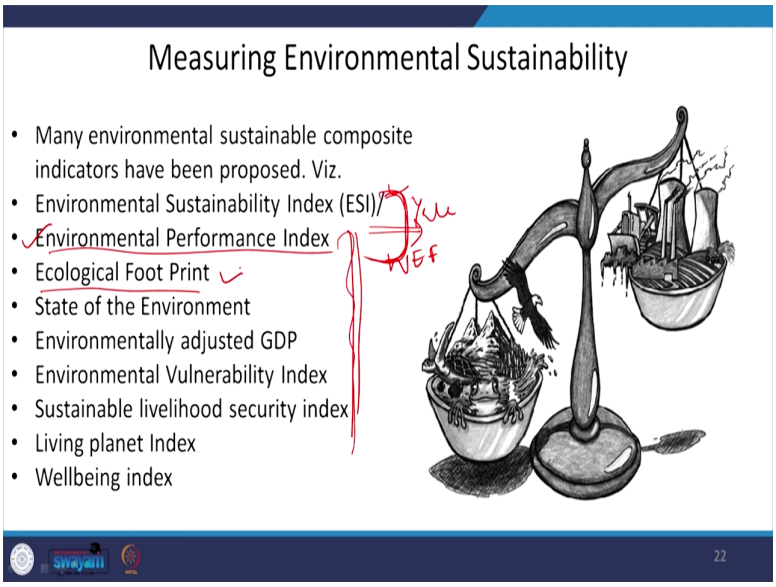

Is there any criteria or is there any indicators that we can use and we can say that yes we now yeah; we are now in a condition to measure the very sustainability very environmental sustainability itself. If it is so, so what are the different indicators that we need to take into account?

So, the existing literature proposes some of the; indicators or indices to measure this environmental sustainability. So, these are the environmental sustainability index or the environmental performance index. So, both of these indices they are; there they are the; these are the composite indicators. So, this composite indicators are very much practiced or it is founded; it can be found out these this environmental sustainability index and environmental performance index; it can be found by a the Yale University, along with the World Economic Forum.

So, between these two; we will be discussing the second one environmental performance index as one of the indicators for the environmental sustainability; we will be discussing in detail in the next class. And another criteria or another measuring rod for environmental sustainability can be that we are finding from a literature is ecological footprint, state of environment environmental adjusted GDP, environmentally or environmental vulnerability index, sustainable livelihood security index, living planet index and wellbeing index

So, these are some of the index; indices that are there already in the literature in order to capture or in order to measure the environmental sustainability. So, among all these indicators or indices; so we will be highlighting these two, the first one is environmental performance index and ecological footprint index in detail in order to measure the environmental sustainability. So, this two will be we will be discussing in the next class.

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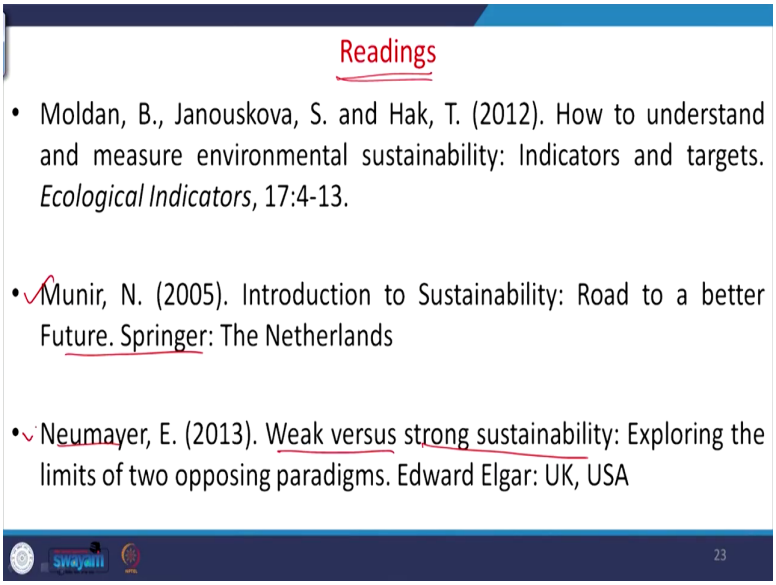

So, for environmental sustainability; these are the basic readings that we need to go through. So, this is the how to understand and measure the environmental sustainability, introduction to sustainability this is complete book. Then again this is a complete book; in order to understand this weak sustainability and the strong sustainability because they are the two opposite paradigms that we have already discussed how this weak sustainability is different from strong sustainability.

For today, this is all about the environmental sustainability itself and in the next class we will be discussing the indicators of the environmental sustainability in terms of environmental performance index and the second one is ecological footprint. So, now we are done with the sustainability on environmental sustainability; we need to look into this readings.

These are the basic readings for sustainability understanding and environmental sustainability as well and these are; so this second and third reference are this two books. So, the first will be giving the detail of this sustainability concept and the second will be helpful in understanding the typologies of sustainability or the; the two paradigms of sustainability weak and strong sustainability.

And in the next lecture we will be discussing how to measure the different indicators for; for environmental sustainability. The first we will be discussing the environmental performance index and the second we will be discussing the ecological foot footprint as indicators of environmental sustainability.

Thank you.