Environmental & Resource Economics
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Introduction to Environmental Economics and Environmental Kuznets Curve Hypothesis
Part- 5

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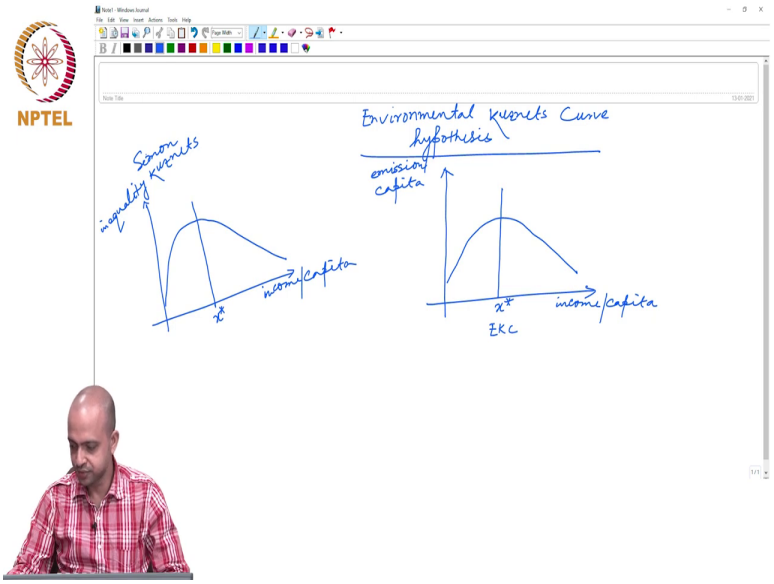

So, welcome to our discussion on Environmental and Resource Economics. What we were discussing yesterday was the course outline and today we are going to discuss about the module wherein we have the topic called impact of economic growth on environmental quality. And if you recall, we said there are two schools of thought that means, two approaches to discuss this issue of economic growth and environmental quality.

The first school is guided by the EKC School and the second one in sustainability school. Today we are going to discuss in detail about Environmental Kuznets Curve hypothesis. So, this is called Environmental Kuznets Curve hypothesis. First of all, what is Environmental Kuznets Curve hypothesis? So, diagrammatically if you plot income per capita in the x-axis, we are measuring income per capita in the x-axis and let us say emission per capita in the y-axis.

Then this Environmental Kuznets Curve hypothesis postulates that there is some kind of inverted use of relationship between these two that means at the initial phases of growth, emission per

capita will increase and once the economic achieves a certain per capita level of income, which is let us say x star, then pollution per capita, it automatically comes down that means, environmental quality starts improving.

So, this is basically the EKC relationship. This Environmental Kuznets Curve the name, why it is called Environmental Kuznets Curve, because this type of relationship was first hypothesised by Simon Kuznets but in a different context. So, Simon Kuznets, what he hypothesised was a relationship between income per capita and inequality. So, Simon Kuznets hypothesized some kind of inverted use of relationship between inequality and income per capita.

That means, as economy starts growing at the initial phases of growth, inequality also increases and then it starts declining. Why does it happen? Because as you know; wealth has a natural tendency to be accumulated in the hands of a few. So, when the economy just started growing, the fruits of that growth will be enjoyed only by very few people as a result of which you will get huge amount of inequality in the economy to persist.

And once the economy achieved certain per capita level of income, then the growth becomes more inclusive, fruits of growth or economic, fruit of economic growth or income; then it is enjoyed by most of the people in the economy as a result of which inequality comes down. So, this was the original Kuznets Curve hypothesised by Simon Kuznets.

And later on, the idea was borrowed by the environmental economists and they applied the same concept in the context of income and emission domain and that is why the name is called Environmental Kuznets Curve while this was the original Kuznets Curve, which hypothesised the relationship between inequality and income per capita.

This is called, this is what Environmental Kuznets Curve is hypothesised by Simon Kuznets first and then borrowed by environmental economists later on. Now, what do we need to understand first why does it happen? That means, what is the, what are the explanations for environmental Kuznets curve to persist.

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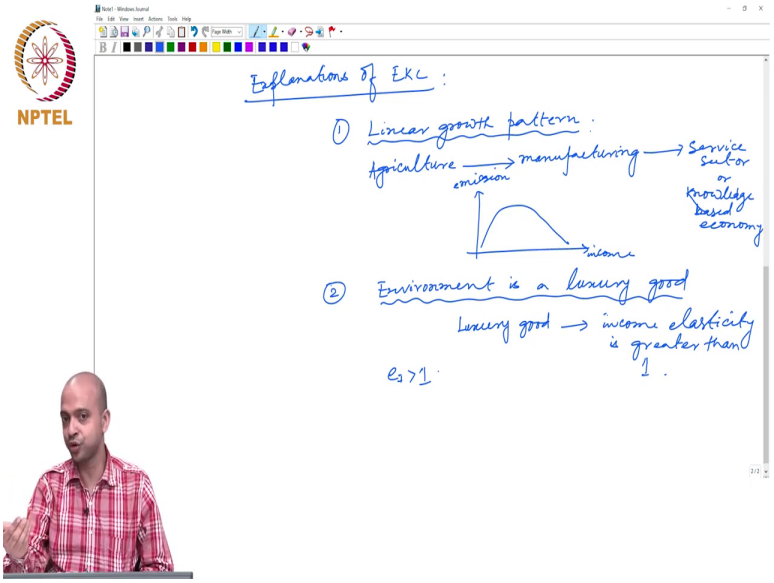

So, now we will discuss about explanations of EKC. There are several examples, several explanations for this type of inverted use of relationship between income and income per capita and environmental quality; we will discuss those one by one. Firstly, the first reason is linear growth, linear growth path or linear growth pattern.

What does it say? It says that if we look at the history of economic growth for the global economies, for all the economies, if you, if we start analysing their growth path historically, then what we observe every economy starts growing with the dominant agricultural sector that means, to start with most part of the income is generated by agriculture, agricultural sector.

So, almost all the economy will start growing with agriculture. Then from agriculture the economy will move on to the second stage of growth wherein most part of the income is generated by manufacturing and then at the last stage, most part of the income in the economy is generated by service sector, service sector or you can say that knowledge based economy.

Now, if this is kind of linear growth pattern that is observed for most of the economies. Now, when the economy is highly dependent on agriculture agricultural sector is a sector where pollution per unit of output is very low, agriculture is one of the less polluting sector. So,

pollution is very low, once the economy moves from agriculture to manufacturing, manufacturing sector is the most energy intensive and pollution intensive sector.

So, what will happen then when you are agricultural based then your pollution is low when the economy is based on manufacturing pollution would be high and when the economy at the last stages of growth is dependent on service sector, then obviously pollution per capita will come down. So, as a result of which we will get this type of inverted use of relationship, if the growth part is linear in nature.

So, this linear growth pattern agriculture, manufacturing and service, this explains why we observe inverted usage relationship between economic growth and emission, is this clear? So, the first explanation is linear growth pattern which is observed for most of the economy's growth process. Then second one, environment is called a luxury good. So, environment is a luxury good. Now, what is a luxury good, do you recall?

All of you have studied in your principles of economics about the luxury good, what is a luxury good actually, what is a luxury good? Now, luxury good is defined where income elasticity is greater than 1, it is income elasticity is actually greater than 1, that is called luxury goods. Now, if environment is a luxury good then for the environment also income elasticity is greater than 1, eI greater than 1.

Now, what is the implication of eI being, sorry, this greater than 1? That means, as income increases, people start spending more than proportionate on environmental goods and services that is the implication. Then how does it explain EKC - Environmental Kuznets Curve because when the economy at the initial stages of growth when the income per capita is low, people cannot afford of bothering so much for the environment.

They cannot afford for buying environment friendly goods and services. They cannot afford to adopt, firms cannot adopt to clean technologies and government cannot adopt for better environmental regulation at the initial stages of growth. When the economy achieves certain per

capita level of income at a higher level of income, what happens, individuals start caring about the environment, they demand for clean environment.

They demand for environment friendly goods and services. Firms also can afford now, as a result of which when there is a need or demand for clean environment, demand for cleaner products, goods and services, firms also start producing those goods and services which are less pollution intensive. And government also brings in stricter environmental regulation.

That is the reason at a higher level of income when people start caring about the environment when the economic agents, all of us, we as the individual, firms and government, all of us start caring about the environment at a higher level of income, then pollution per capita comes down. So, because of this nature we observe this type of inverted use of relationship between income per capita and emission.

So, environment is basically a luxury good, at lower level of income we have less demand for cleaner product and services, we care less about environment. At higher level of income we care more and more about the cleanliness of the environment and that explains this inverted use of relationship. This is the second explanation.

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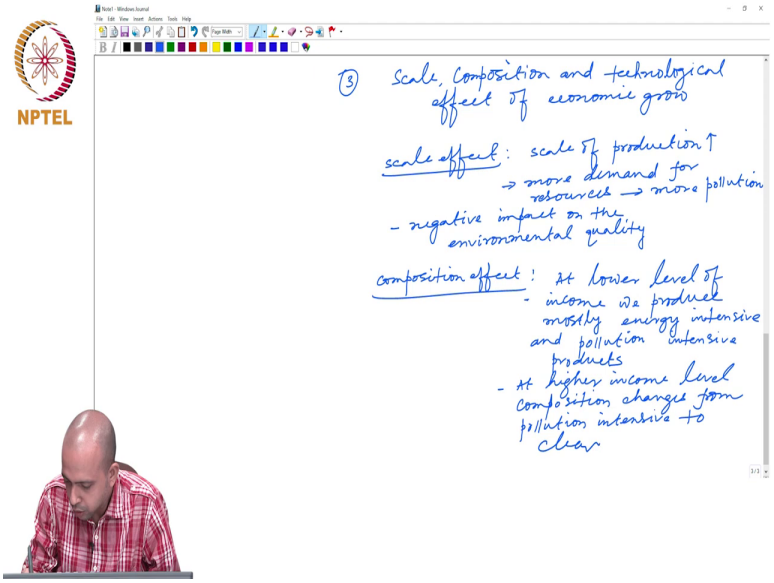

Then the third explanation what we give for EKC curve is basically skill, composition and technological effect of economic growth. Now, what is the scale effect? Scale effect basically says when the economic growth scale of production increases, so scale of production increases, when scale of production increases that leads to more demand for resources and that again leads to more pollution also.

We will extract more resources from the environment, we will generate more pollution as well. So, that means, scale effect we can say that scale effect of growth is actually negative. So, scale effect is it is negative impact, it gives negative impact on the environmental quality. Scale effect is negative as the economy start growing scale of production increases. So, there would be more demand for resources, more resource extraction from the environment, more pollution.

This is negative. What is composition effect? Composition effect says that at lower level of income we mostly produce pollution intensive goods, at lower level of income we produce mostly energy intensive and pollution intensive products at a lower level of income. Then as income increases the composition of goods and services changed from at a higher level of income, what happens, at higher income level composition changes from energy, pollution intensive to cleaner products.

So, at a lower level of income economy mostly produces energy intensive and pollution intensive goods and services. At higher level of income this composition of the goods and services changes from more pollution intensive, more energy intensive to the cleaner products, less energy intensive products from manufacturing to service. So this composition effect is then positive for environmental quality. So, this is scale effect and this is composition effect.

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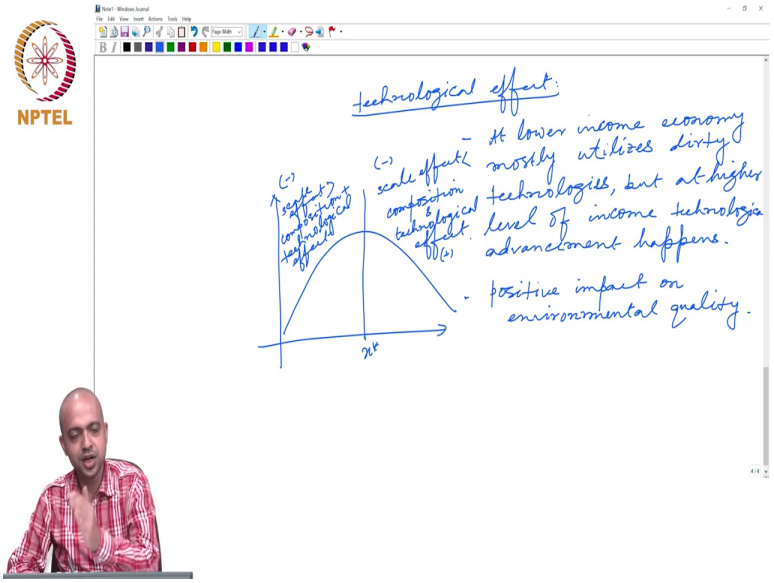

And then what is technological effect? At the lower income economy mostly utilises dirty technologies and as income increases these dirty technologies becomes obsolete and technological advancement happens, but at a higher level of income, higher level of income technology, technological advancement happens. So, there happens a technological advancement.

And these technological advancement is less pollution intensive that means, it also gives a positive impact on so environmental quality, positive impact on environmental quality. So, that means, while the scale effect gives a negative impact on the environment composition and technological effect gives, they give positive impact on the environmental quality.

So, ultimately the net impact then depends on the relative strength of these three impacts. Now, what is assumed that when the economy starts growing at the initial phases, then scale effect is more powerful than the competition and technological effect. So, that means negative impact of the scale effect out ways the positive impact of technological and composition effect.

At higher level of income, positive impact of composition and technological effect out ways the negative impact of the scale effect therefore, pollution per capita starts growing at a faster rate

than income at the initial level and at a higher level of income pollution start growing at a lower rate compared to income per capita and we observe an inverted usage relationship.

So, I will explain once again, what happens, at the initial stages, let us say up to this, scale effect is actually greater than, negative scale effect is greater than composition plus technological effect and in the declining portion, when economic achieves a certain per capita level of income, then what happens, scale effect, negative scale effect is actually lower than composition and technological effect.

So, when the negative impact is lowered, positive impact is more, then we will get the declining part of EKC that means environmental quality starts improving. So, this is how, through scale, composition and technological effect of economic growth, we can explain the EKC type of relationship between income per capita and emission per capita.