Environmental & Resource Economics
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Lecture 52
Economic Valuation of Environmental Goods and Services - Different Valuation Approaches Part - 12

Welcome to our discussion on Economic Valuation of Environment once again. In our last class we were discussing about the revealed preference approach of economic valuation of the environment and under revealed preference approach yesterday we discussed about hedonic pricing. Now, today we will discuss one more approach of hedonic pricing which is one more approach of revealed preference approach apart from hedonic pricing, which is travel cost method.

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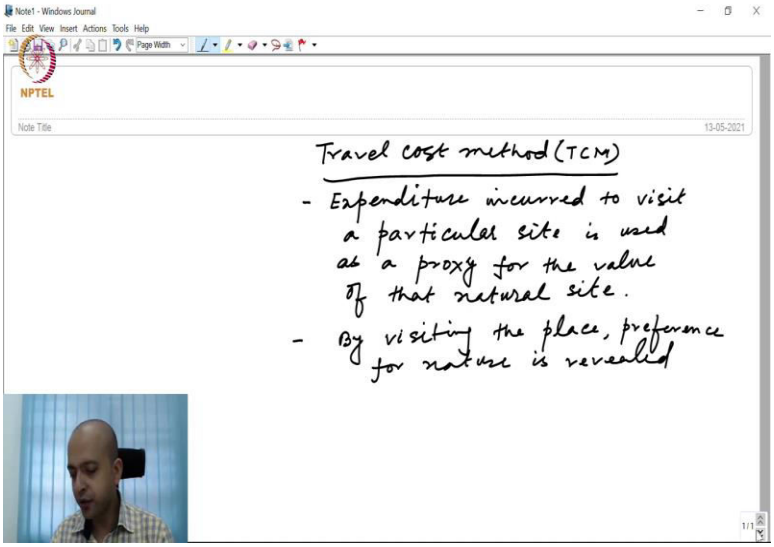

So, this is Travel Cost Method that we are going to discuss today. Travel cost method or in short TCM. This TCM or Travel Cost Method is one of the oldest method of valuing environment originally it was designed first to estimate the economic value of some kind of recreational park like a natural park.

But this technique can be applied to any particular natural sites wherein the visitors they go and spend some amount of their time So, that means, the visitors preference individuals preference for the environment is also revealed here just because I am visiting the place just because the visitors visiting a naturally recreational place that means the visitors preference for the

environment is revealed through that process and we will try to estimate the economic value of that particular natural site by the amount of expenditure that the traveller or the visitor incur in visiting that place. So, here expenditure incurred to visit a particular site is used as a proxy for the value of that natural site. So, that means by visiting the place preference for nature is revealed.

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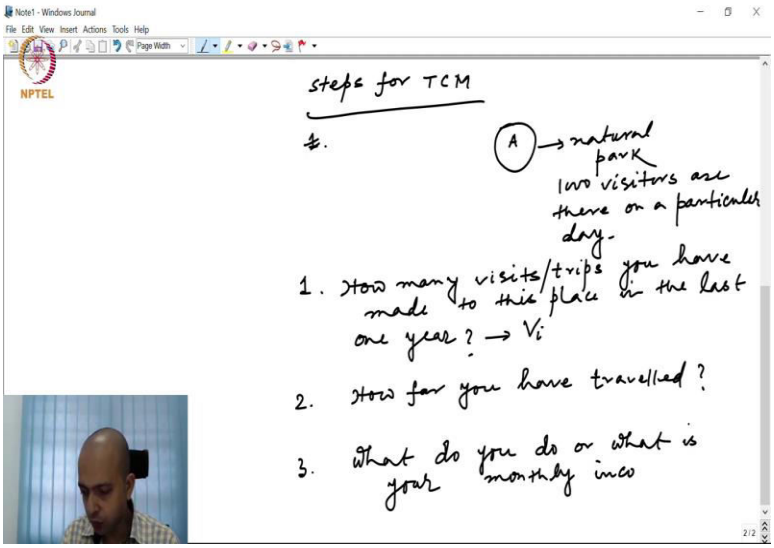

Now, we will discuss different steps of this travel cost method. How does it go empirically how do we estimate? So, steps for TCM method or Travel Cost Methods. Firstly, when several visitors go to the place let us say there is a place A this is a naturally recreational park, let us say this is a natural park and let us say 1000 visitors are there on a particular day and we will be collecting information from all these 1000 visitors from that single day, what type of question we will ask? we will ask different type of question.

Firstly, we will ask how many visits? How many visits or trips you have made to this place in the last 1 year? For example, we will go to the ith visitor and we will ask, you have come to visit this place, can you please tell me in the last one year, how many more visits you have made? Let us, say the individual i is saying Vi, Vi is the number of trips or number of visits that the visitors the particular visitors made in the last 12 months. Then, how far you have travelled? What do you do or what is your monthly income?

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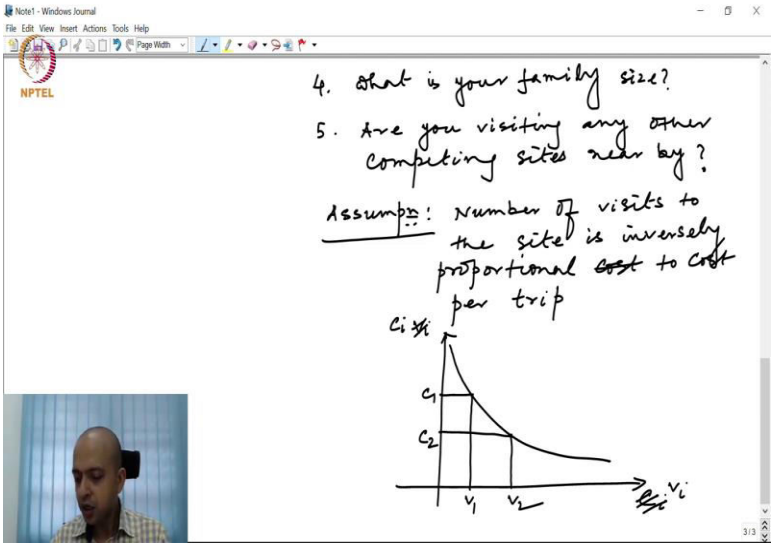

Then what is your family size? And then while visiting the place A are you planning to visit any other competing sites nearby? That is also another important question that we have to ask the individual. Because many times the visitors when the visited place, they try to visit other surrounding places as well. So, that means the cost what I incur to visit that particular place is not for visiting only that place and other this if I incurred that cost, I can visit several other places as well. So, that means there will be some common cost and there will be some site-specific cost.

So, to know about this, we need to ask this very very important question. Are you visiting any other competing sites nearby? And then what do we assume here that when the individual is visiting a site, individual is basically demanding the environment. Now, when you demand something you have to pay a price for that what is the price the visitor here is making the cost that they incur.

So, and what are the component of the cost here we assume so, the assumption is that number of visits to the site is inversely proportional to the cost per trip sorry proportional to cost per trip. So, just like any other standard demand function if we measure cost in the y axis sorry x axis and number of trips in the y axis so, sorry here what we will do C here and Vi here. So, we will see that this type of function. For example, we may consider only two visitors let us say for visitor 1, the cost is C1 and the visitor is making V1 the number of trips to that particular site in the last 12

months. For the visitor 2 the cost is actually lower obviously, number of trips per year will also increase.

So, as the cost per trip decreases number of trip increases just like any other demand curve. So, the visitors are demanding the environment and that demand is a function of cost per trip apart from this cost we may include any other socio-economic variables as well. For example, age of the individual, gender of the individual, education level of the individual and family size so on and so forth.

For example, we may assume that younger people might be interested more to visit a particular site while older people might be interested to visit another type of place which are religiously popular so on and so forth. So, keeping those other socio economic and demographic factors aside for simplicity sake, we assume that demand for the environment demand for that particular site is a function of only cost per trip which is denoted by Ci.

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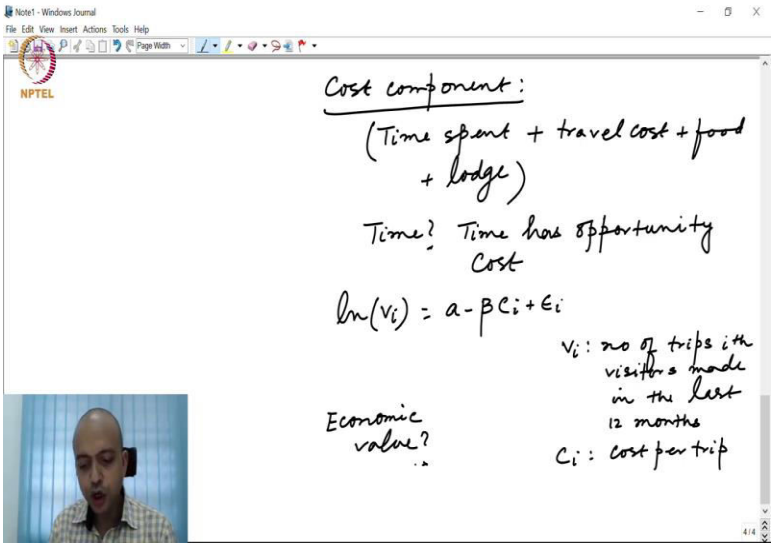

So, now, what is this cost? So, cost component, how do you calculate the cost? Cost is basically what is the time spent, how much time do you need to travel to that place and then plus travel costs. If we go to that place by train, bus or even if your own vehicle then there is some fuel cost if you go by flight or train then there is a ticket fare for that then plus food and lodging.

So, these are the other costs involved. So, this includes the total cost. Now, what is trivial here? Why do we include time? So, why time? Because in economics we believe, that time has some

kind of opportunity cost, if you are working in a place then if you spend some amount of your working time to visit that place, that means you are sacrificing some amount of income that is why the amount of time what you require to visit that place is also included in the total cost component because time has an opportunity costs.

So, then what we do here in travel cost method, we will collect this type of information from 1000s of such visitors and we will try to estimate a function like this by simple regression technique, let us say that log of Vi is a function of a minus beta Ci plus epsilon i this is the function, Vi is the number of trips that the ith individual made in the last one year, Ci is the cost incurred. So, that means, we can say that beta is basically responsiveness of demand for the environment with respect to the cost which we treat as a price. So, price for the environment is basically the cost incurred.

Then, if we estimate this. So, here we assume that Vi is basically number of trips ith individual or ith visitors made in the last 12 months and Ci is cost per trip. So, we can easily estimate this function if we collect information from 1000 of such visitors. Now, the question is after estimating this function, what is the value of the park then our intention is to estimate the economic value of the park. So, what is the economic value?

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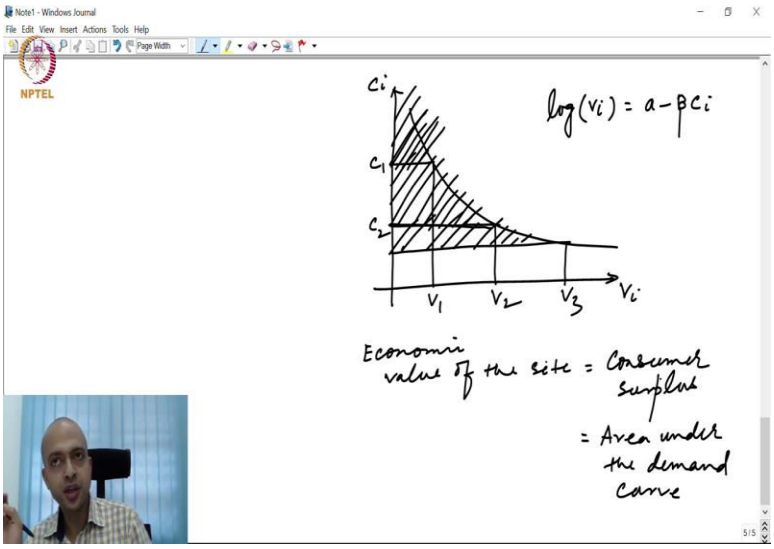

To understand this, we will draw the simple diagram once again. So, when the cost is C1 this is V1 and our function is log of vi equals to a minus b into ci sorry beta. Now, what is the value

here? The value is basically the consumer surplus. So, economic value of the park or the site equals to consumer surplus.

How do you calculate consumer surplus? We will explain simply with this diagram. See for visitor 1, visitor 1 is visiting the place when the cost is C1 visitor 1 is making V1 number of trips. But visitors maximum willingness to pay to visit the place is much higher then only the visitor will pay. This is at the core of any economic transaction.

Whenever we make a transaction the quoted price should be lower than our maximum willingness to pay. Otherwise, even if we have money, we will not purchase that product. For example, when we go to a shop, suppose I have 1000 rupees in my pocket, I see a shirt but the shirt cost only 500 rupees does that mean we will always buy that, no. What will calculate in our mind does this shirt owed 500 rupees that means, if we derive a value from the shirt which is more than 500 rupees, then only we will buy the shirt this is the economic calculation we make knowingly or unknowingly. So, our willingness to pay should be more than the quoted price for a transaction to happen.

Otherwise, we will never purchase that product we will never make a trip to that particular site. When I am saying the visitor is making V1 number of trip at a cost C1 that means definitely for the visitor, the maximum willingness to spend is a higher than C1 but the visitor is paying only C1 amount. So, that area is the surplus for visitor 1.

Similarly, for visitor 2 visitor 2 is paying c2 but visitor 2 must be having a willingness to spend which is more than C2. Similarly, if you have another visitor V3, then this is the surplus. So, if we add all this surplus for all 1000 individual then we will get that total surplus for all the 1000 individuals and then that is the total economic value of that site.

Now, we need not calculate this using geometric because we can calculate mathematically this equation area under the demand curve. So, consumer surplus is nothing but area under the demand curve. So, this is basically the value of this site. If we add up surplus for consumer surplus for all these 1000 individuals and add it up that is the total economic value of the natural site or the park or whatever might be you are thinking this is the simplest way. So, we need to collect information from 1000 individual about the number of trips and what is the cost incurred.