Introduction to Environmental Economics

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Lecture – 13
Environmental Goods and Ecosystem Services-II

Dear, students in the preceding lecture I explained you the main characteristics of Environmental Goods. Environmental goods are non rival and non excludable in nature in most of the cases and I also discuss what is ecosystem and what are the Ecosystem Services. So, ecosystem services can be classified into 4 categories; provisioning services, supporting services, regulating services and cultural services and I have explained in detail all these 4 types of ecosystem services. And, ecosystem services are also complimentary in nature as well as competitive in natures and ecosystem services can be intermediary and finally in natures.

So, I already discuss the intermediary services and final services that are provided by the environment and I also explained you the main services, which are provided by the environment. In this lecture you will study about the complementarity as well as substitutability among these various kinds of ecosystem services. And you will also study about value, how these ecosystem services are valued or measured and also you will study about the key issues related to environmental ecosystem services and what kind of measures we can initiate to sustain the ecosystem services.

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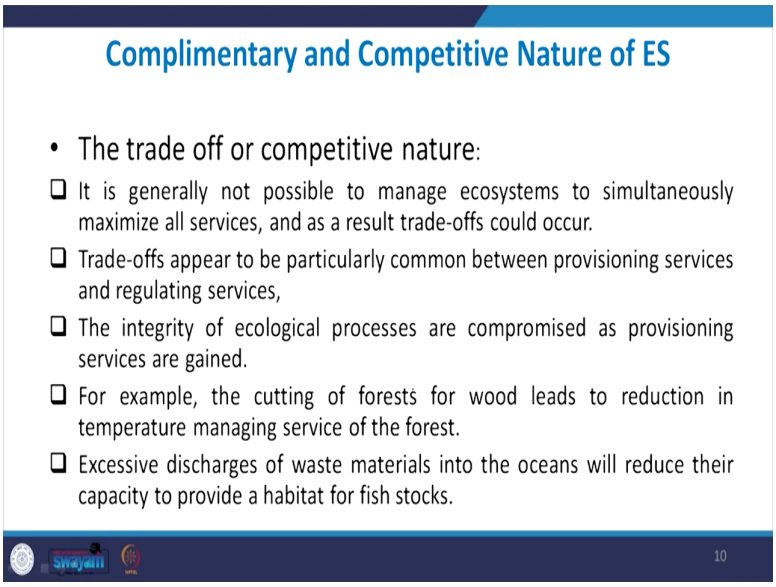

These services are complimentary and competitive in nature. So, therefore, there is some sort of trade off between one form of ecosystem services and the other form of ecosystem services. Mostly the trade off can be established between provisioning services and other services. So, if we are extracting more natural resources to satisfy our needs of industries, needs of the consumers then less resources will be available for providing the other kinds of services like; regulating services, cultural services, etcetera.

So, you can say that these kind of services are competitive in nature. But, these services are also complimentary in nature and if we are focusing on regeneration of forest resources and if forest resources are providing certain kind of carbon sequestration and other resources, then they also provide some complimentary services like cultural services. So, not only the

ecosystem provides certain kind of regulating and supporting services, but at the same time these regulating and supporting services are also closely associated with cultural services.

And, they have some com complementarity and if we are focusing more on a generating the more supporting services regulating services; more maybe the cultural services. Like for example, excessive discharge of waste, material into the ocean may reduce the capacity to provide habitat for fish stock, so that is competitive in nature. So, if we are providing more waste in to the atmosphere, then our aquatic life maybe badly affected.

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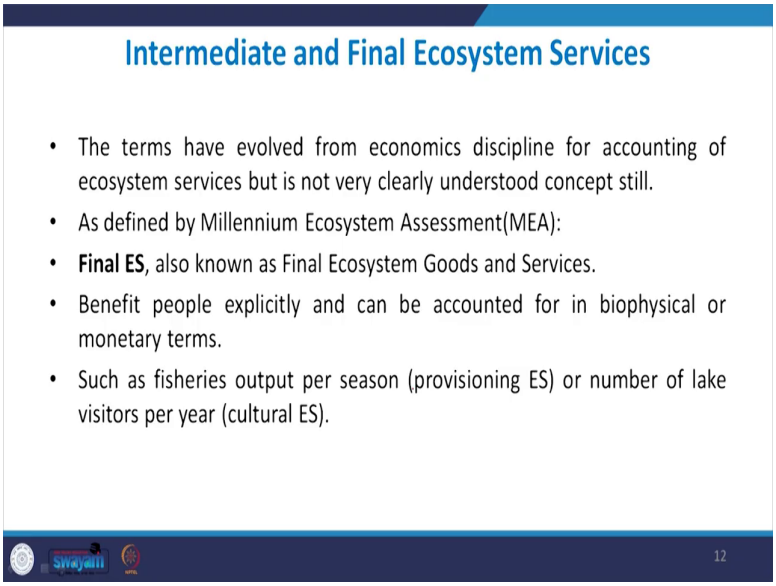

Then these services can also be classified into two categories intermediate services and final services. Let me tell you, what do we mean by intermediate services. In economics, when we estimate the value of final products certain kinds of intermediaries, goods, inputs are deducted

and only the value addition in terms of final goods are considered in the production of GDP or GNP, etcetera.

So, semi finished products, inputs they are not considered the total in the total production, because they are used as input in the final product. In the same manner, when we want to estimate the value of ecosystem services as we have already discussed, that ecosystem provide different kinds of services, but some services may not be directly consumed by the end users.

The services or goods which are directly consumed by the end users, in terms of either direct values or indirect values, etcetera they are considered as final goods or services. While some services, which are used in the process to produce the final services they are called intermediate services and they are not generally considered, while estimating the total value of environmental services which the society receives.

So, therefore, the term terms evolved from the economics discipline for accounting of ecosystem services, but it is very difficult to estimate how much is the intermediate services and how much is the final services, but as a concept, we can understand it and explain the difference between intermediary products or services and final products and services. This millennium ecosystem assessment defined ecosystem services like the services which are in the form of final goods or services consumed by the end user.

So, benefits people exactly and received from the environment, in terms of monetary value for direct or final consumption are termed as final ecosystem services. Such as fishery output. So, when we catch fish from the river, the fish value is the final product because that fish is directly consumed by the consumers.

Similarly, when we get irrigation, water that is also final product, but water may also provide certain kind of processes or other kind of services which are not directly consumed. So, they are termed as intermediary. Similarly, so, you can say all provisioning services which we get like; honey, timber or water all these can be known as final goods or services.

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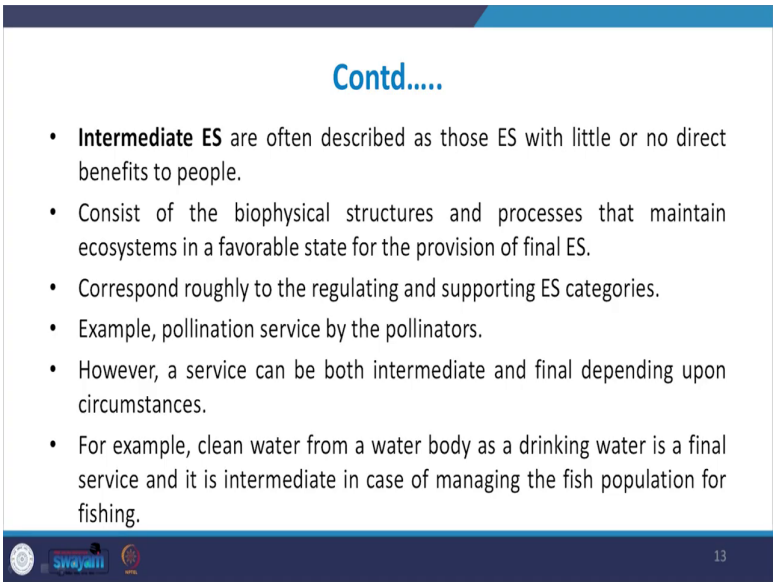

Intermediary services are often described as those ecosystem services with little or no direct benefit to the people as I already discuss. They may consist of biophysical structure and processes that maintain the ecosystem in a favorably state for provision of final goods. Like regulating services, supporting services. So, all are a kind of intermediary services which help us to generate the final goods and services, which are consumed by the society or human beings. Like pollination services is a intermediary services;

However, a service can be both intermediate and final depending upon the circumstances, like water; water if you are directly consuming it is a final product, but water can also be used for other processes, like water also help to produce various aquatic animals, which can be used for our direct consumption.

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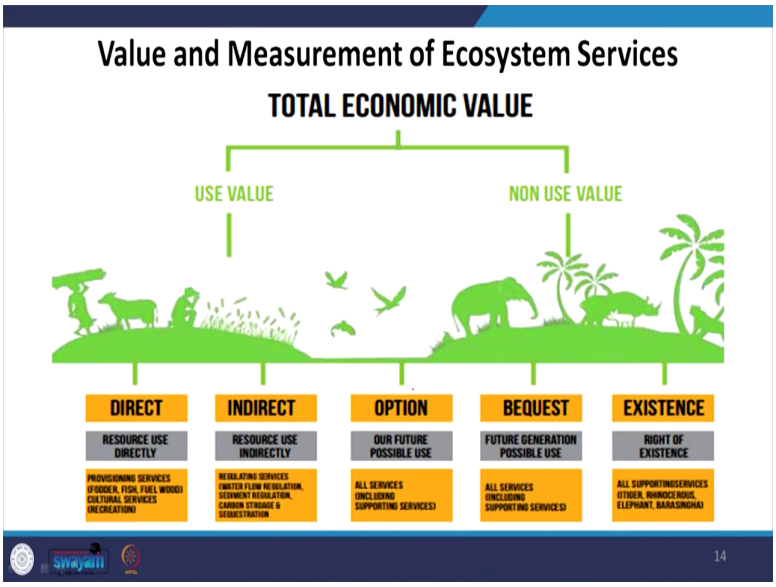

This graph, tell us about the different kinds of values that these goods and services provide to the society. And, these values provided by the environment can be classified into two categories; use values and non use values. Further we can also divide use values into two categories; direct use values and indirect use values.

In direct use values means, mostly all the provisioning services or like a food, powder, fuel all are the direct values. Water consumed by airs, water use for irrigations purposes, power generated from the water; all these are the direct use values, but we also get indirect use values. And basic difference here is that when we are getting the indirect use values then the salaries we are consuming, but these are mostly the intangible kind of things, when we see the beauty of the nature, cultural services acts educate. When we draw inspiration from the environment, they are indirect values.

So, but here the difference is that when we use the direct product then quantity of product is reduced when we consume, but in case of indirect values, the quantity remain intact or sometimes quantity cannot be determined. How much is the quantity of natural beauty? It is very difficult to determine.

So, in that case we consume these kind of commodity indirectly and they provide utility to the society, but we do not extract their quantities. Then non use values, this is also a interesting things, that sometimes the society also get value without consuming a product.

So, here it is a very important issue, can we draw utility without consuming a product? In economics we had studied that when we consume a product, we extract the utility. So, extracting utility means consuming a product, but when we put utility into the matter we get production.

So, production means; putting utility into the matter and consumption, means extracting utility from the matter. But question here is can we draw utility without consuming a product? If yes, then you can say it is non use value, because value is generated without consuming a product. And, actually in case of non use value ultimately what do we mean by utility? That is happiness of course.

So, if you can get pleasure when we see the natural beauty, we get pleasure that comes under the cultural services. So, can you get pleasure without seeing the product without consuming the product; if answer is yes, then you can say you are getting value from this without consuming the product. So, in that sense we can have three kinds of non use values; one is option value.

Option value means today, I am not interesting to use a particular service of the environment, but I may think to use it in future. So, that is called option values; like I may be not interesting to have a holly bath in river Ganga today, but I think that after 5 years or in future, I may think to go to have a bath in the holly river Ganga.

So, in that case it is a option value and I will be happy, if the river Ganga is flowing uninterrupted and unpolluted. So, I will draw satisfaction that river Ganga or for that matter any other river are flowing without obstruction and unpolluted. So, because I may think to have oh a holly dip in the Ganga in future. So, that is known as option value. Then another is bequest value some days we feel happy, we get pleasure that we may not use a particular service, but our future generation may use it and for that matter we would like to preserve our environment for the future generation. So, I am I may be willing to pay something for the cause of protecting our environment, protecting our river system, because our future generation may have access to these goods and services. So, that is called bequest value.

Then another is existence value; sometimes we get pleasure we feel happiness that a particular ecosystem is healthy or a particular river system is flowing on interrupted. So, we get pleasure mere existence and if someone would like to harm, that ecosystem we will feel bad and we will be willing to pay something to protect or preserve the environment. So, that is called existence value. I can simply give you an example, there are many world wonders so, if someone attack on any of the world wonders, then you will feel have bad, you will feel sad and you will try to do something for protecting that world heritage.

So, there are certain cultural heritage, natural heritage and if someone is destroying this natural heritage then you will feel sad and you feel happy for mere existence of such kind of natural heritage; so that is called existence value. So, non use value can be classified into option value means; we may use it in future, date, bequest value we feel happy that a particular resource exists environmental resource exists, because our future generation may have access to this and sometimes we feel happy for the mere existence of a resource or an environment.

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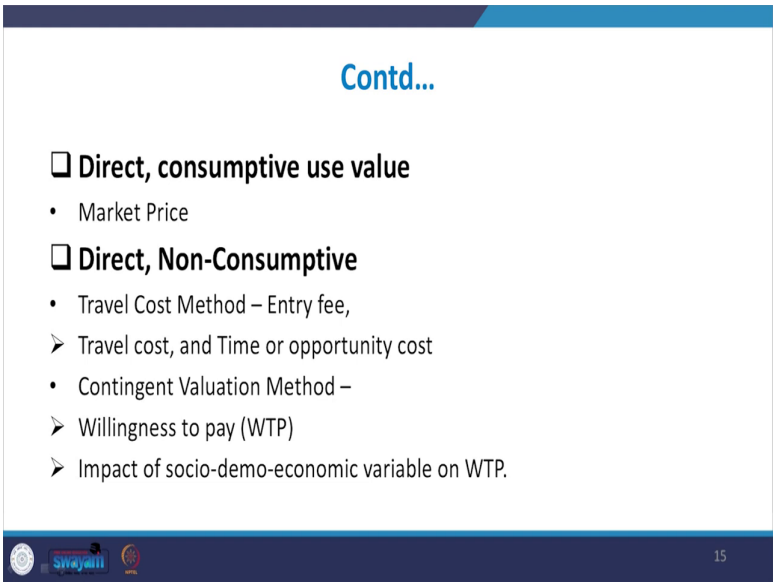

Now, as far as direct value is concerned it is easy to determine the price of direct value. So, when we cut tree said it as timber in the market we know, how much is the market price. So, mostly the contingent use of various kind of product or extracted use of various kind of product they are subjected to the market condition. So, market can work in case of such kind of environmental product, which are directly consumed by us, direct value.

But, in case of indirect it is very difficult to determine the market so, therefore, their values are determined by some various methods; like travel cost method is used how much you are spending on travel to visit natural heritage for example, if you are going to Shimla to see the natural beauty, how much you are spending on travel. So, then it is estimated in terms of how much value you are attaching to a particular service; environmental service.

So, travel cost method is used time or opportunity cost is also considered these are mostly for a direct or indirect use of values. Contingent valuation method is a very useful method which is used especially for measuring the value of environment, which are outside the market ambit. Because certain kinds of goods and services cannot be traded in the market, because of the fact that these services are either non rival or non excludable in nature or there is no existence of market for such kind of product, etcetera.

So, in that case we use contingent valuation method and here we conduct the survey to know, how much we are willing to pay for a particular service and based on these values these services can be created. So, impact of socio demographic economic variables can be examined on how much you are willing to pay, etcetera and, we will make a detailed discussion on these methods of environmental valuation in detail, ok.

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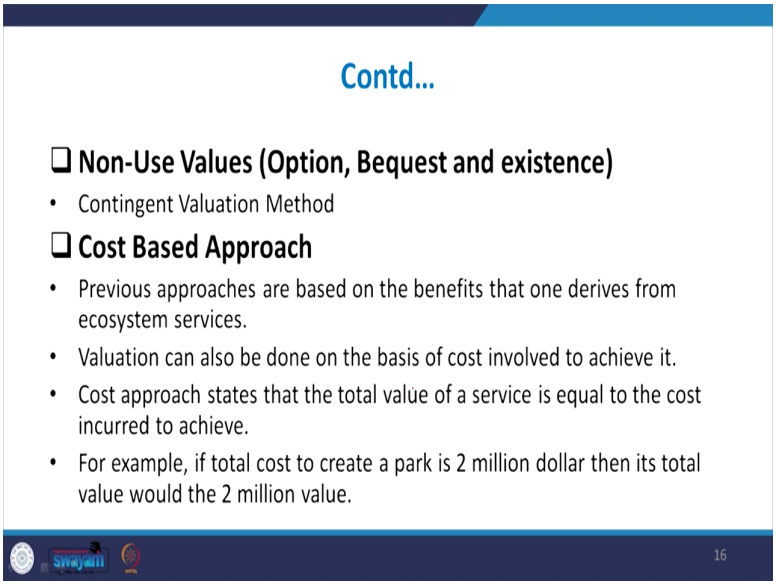

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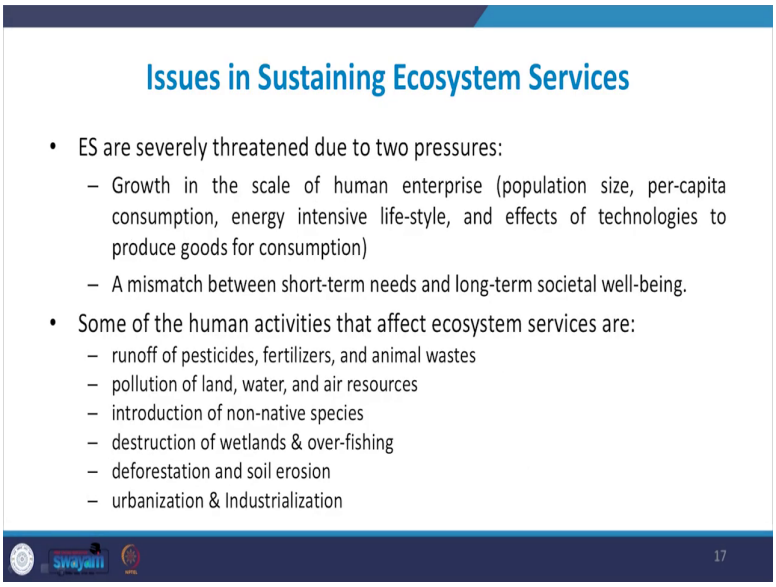

So, now, let me raise certain issues which needs some discussions for sustaining ecosystem services. Ecosystem services are threatened mainly due to two pressures. First is growth of scale of human enterprises; like population growth, urbanization, industrialization, increate increase in per capita consumption of various goods and services, energy intensive life style and effects of technologies to produce goods for human consumption.

So, these are some of the important issues which are directly related to environment. For instance a rapid growth of industrialization across the globe has increased, air pollution, water pollution and since air and water pollutions have increased they are putting pressure on certain kind of ecosystem services. So, when we are releasing more waste into the water bodies, then river water ecosystem is badly affected, fish may die consumption of fish may declined, livelihood of the people may be badly affected.

So, this is one important issue. How to deal with these kinds of industrialization, urbanization and whether market based approach would be more effective or command and control approach would be more effective to preserve our natural resources.

Second is a mismatch between short term needs and long term societal wellbeing. So, we have to see, what are our long term goal for sustaining our livelihood and what are our short term. So, we can see a mismatch between our short term needs and long term wellbeing and that is also an important aspect for discussion.

Some of the human activities that directly affect the ecosystem services are first run of pesticide, fertilizers and animal waste. So, pesticide, fertilizers and animal waste they are not only affecting our soil; soil health is badly affected water is polluted, but it also created the known point source of pollution for our water bodies. So, this is one issue second is pollution of land water and air resources due to industrialization, urbanization or excessive use of chemicals in agriculture, etcetera.

Introduction of non native species; so, sometimes there is a intrusion of non native species and that is affecting our ecology and bio diversities. You can see in some forest areas, non native plants growth is increasing and then the original plants in the forest are badly affected and that is also creating viscosity of water in certain forest ecosystems, etcetera. Then distraction of waste land and over fishing is also a major threat to our ecosystem services, deforestation and soil erosion is another issue and finally, you can also talk about urbanization and industrialization.

We have you can observe that most of the industries are set up at of the bank of rivers, you can see anywhere. So, cities and industries mostly set up at the bank of rivers and they are a releasing the waste getting water from the up stream, releasing the waste at the down stream and creating pollution in the river and that is affecting the assimilative or sinking function of river.

Finally, let me now, I discuss how to augment or how to sustain the ecosystem services. There may be various methods and in detail we will make a discussion later on, but one is payment of ecosystem services. To give incentives to the various stakeholders, in the congregation and management of ecosystem.

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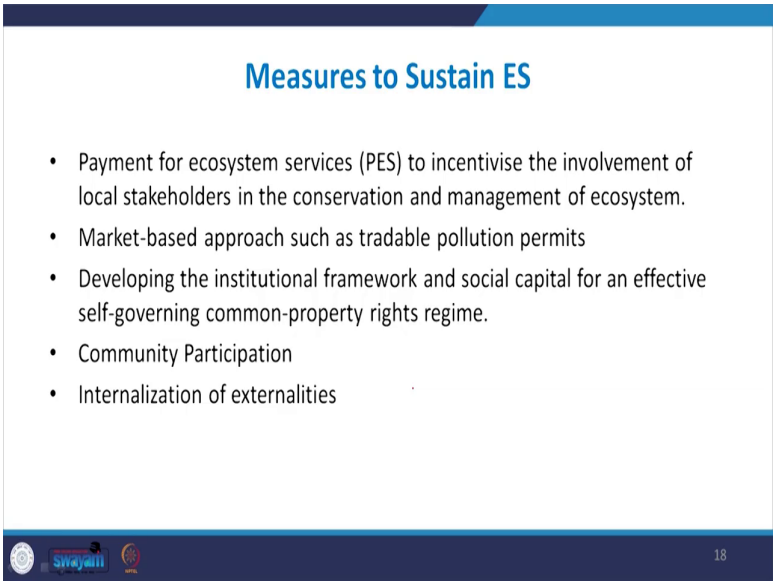

So, local stakeholders like Gram Panchayath, NGOs, local peoples, local livelihood that related to the ecosystem services, but if you want to preserve these ecosystems and generate a constant flow of ecosystem services to the society, then some institutional mechanism is required to be set up for payment of ecosystem services.

Like just an example, Uttharakand; Uttharakand is a hilly state, providing lot of ecosystem services to the entire nation, but what are the local people are getting in live of these kind of ecosystem services. So, can we think of providing some payments to the local people so, that

their livelihood maybe protected. So, payment of ecosystem service is one suggestion. Second is market based approach such as trade tradable pollution permits. Across the globe now, environmentalists are propagating that market based approach can be used to solve the environmental problem.

So, by providing effective property rights and allowing the trades in the pollutions can also help to improve the efficiency in the production and consumption. So, the tradable pollution permits can be promoted. Then developing the institutional framework and social capital; for an effective self governing common property rights regime. So, tragedy of common is major issues.

So, how to develop a better institutional framework and generate the social capital? So, that these common property or common pool resources can be effectively protected. And then community participation in preserving and sustaining the ecosystem services and last internalization of externalities.

Externality as I already discussed is unintentional harm or benefit received by a person not directly involved in the activities. Although positive externality maybe desirable, but rather externality is positive or negative both destroy the market and the prices of the various kinds of goods are not reflected the true cost of this product due to presence of externality. So, interlization of externalities either through polluter is way principle or some other mechanism is also necessary to preserve to protect to conserve our ecosystem so, that our ecosystem can provide constant flow of goods and services to the society.

Let me now take a couple of minutes to summarize what I had discussed in this topic. First I had discussed what do we mean by goods, what do we mean by environmental goods. Environmental goods mostly are non rival, non excludable therefore, it becomes very difficult to create market for these kind of goods.

We also discuss the different kinds of services which are broadly classified into four categories; provisioning services, supporting services, regulating services and cultural services.

These goods and services also provide us different kinds of values and these values can be classified into use value and non use values.

Use values can further be classified into two categories; direct use values and indirect use values. And, non use values can be classified into three categories; one is option value, second is bequest value and third is existence value. Then I also briefly discuss what are the different kinds of methods that can be used to estimate the arm environmental values.

Actually, broadly you can classify these methods into two groups is stated preference method and reveal preference method and like; travel cost method, household production functions, contingent valuation method these are the important methods to use to be used to estimate the value of environment and detailed discussion will be held later on in a separate unit on environmental valuation.

And, in the last I discuss what are the key issues related to sustaining the ecosystem services and how to improve the ecosystem services through certain kind of interventions, have also been discussed.

Thank you very much.