**Forests and Their Management**
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**Module - 01**
**Introduction**
**Lecture - 01**
**What is a Forest?**

Namaste and, welcome to this MOOC course on “Forest and their Management”. I am Doctor Ankur Awadhiya. I am an IFS officer of the Madhya Pradesh cadre and your instruct for this course.

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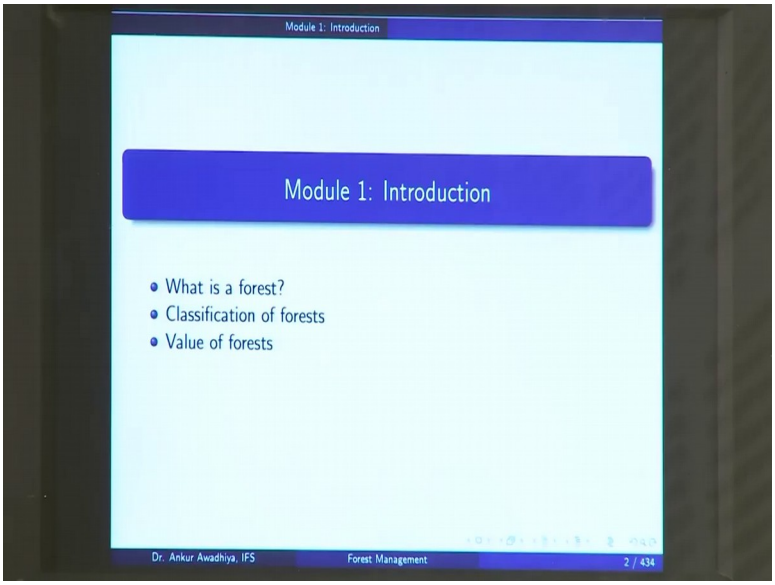


Now, let us begin with the first module. This module is called introduction, and we will be having 3 lectures- 1. What is a forest? 2. Classification of forests and 3. Value of the forest?. So, “What is a Forest?” We all have some idea about what a forest is! Most of us have visited some national park or sanctuary or at least have gone through a forest, while traversing through road or rail. So, we have a general perception, a general idea about, what we should expect when we going to a forest.

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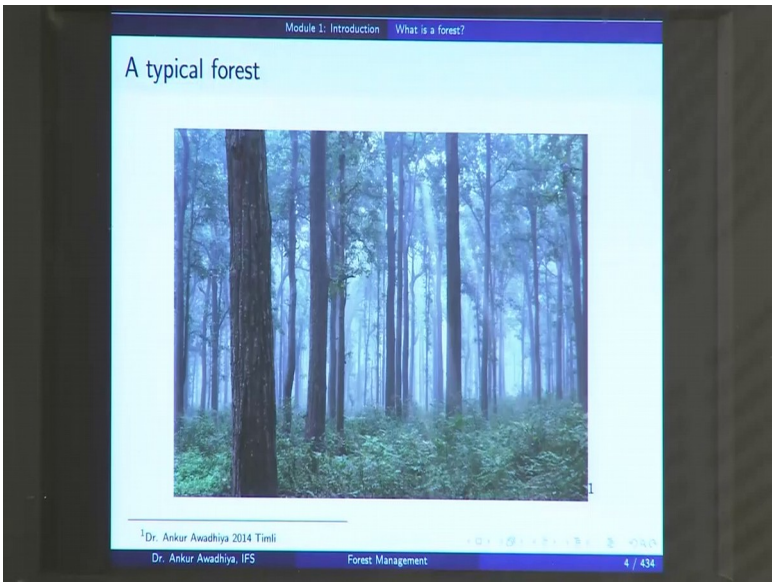


Mostly will expect to see trees, a large number of trees, probably also with some undergrowth.

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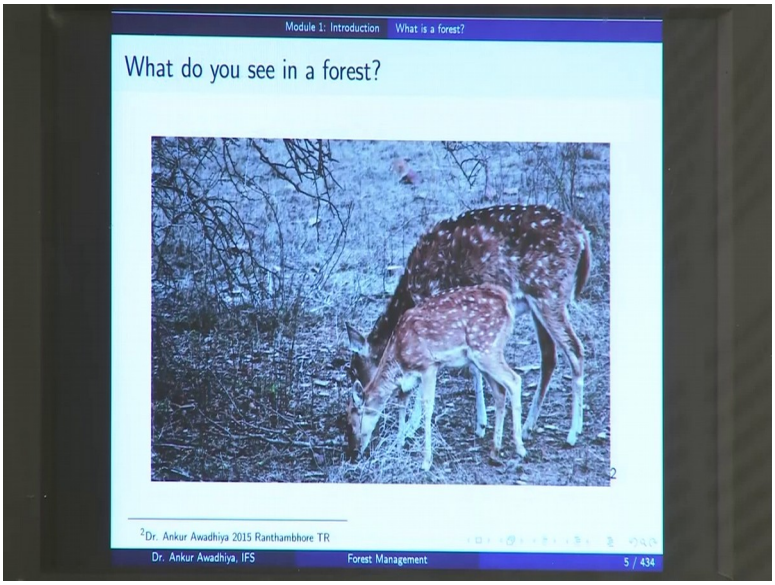


We might even expect to see a few animals. So, like this chital (Indian Deer). So, chital is a very common species that is found nearly everywhere in India or we might see communities of animals, such as these chitals that are interacting with these langurs.

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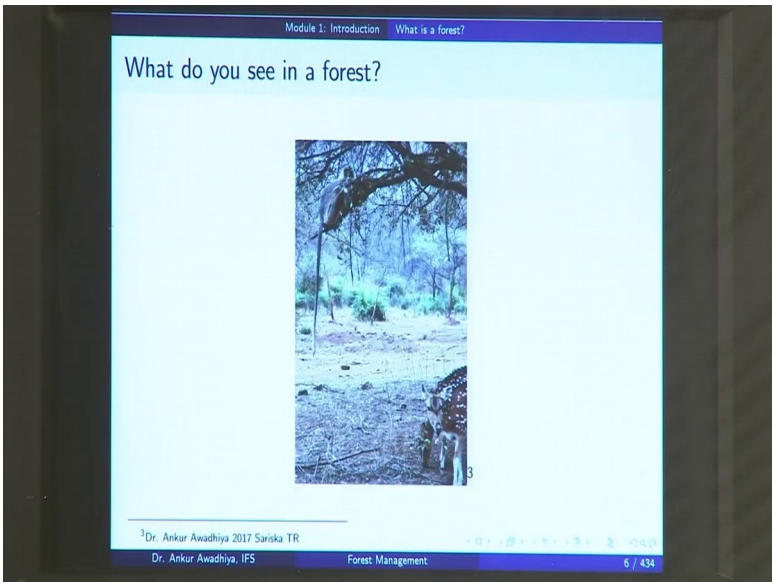


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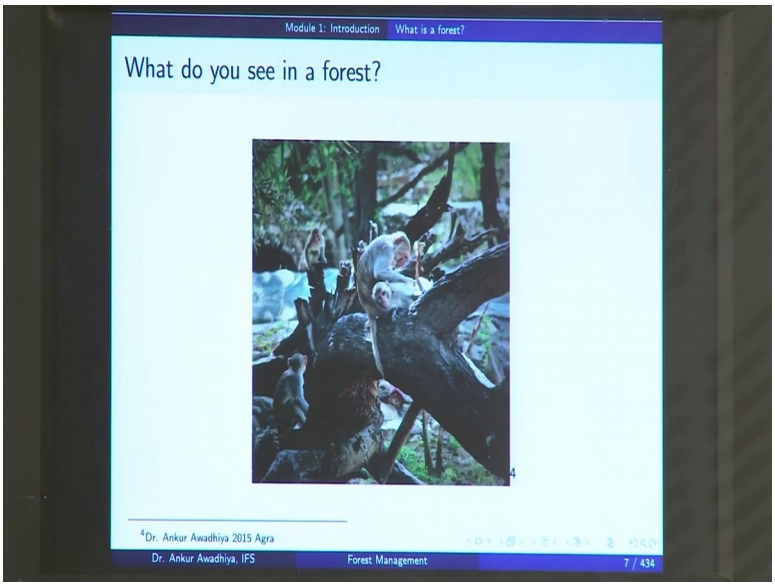


Or we might see some animals that are doing some activities, like these monkeys that are engaging in a social activity.

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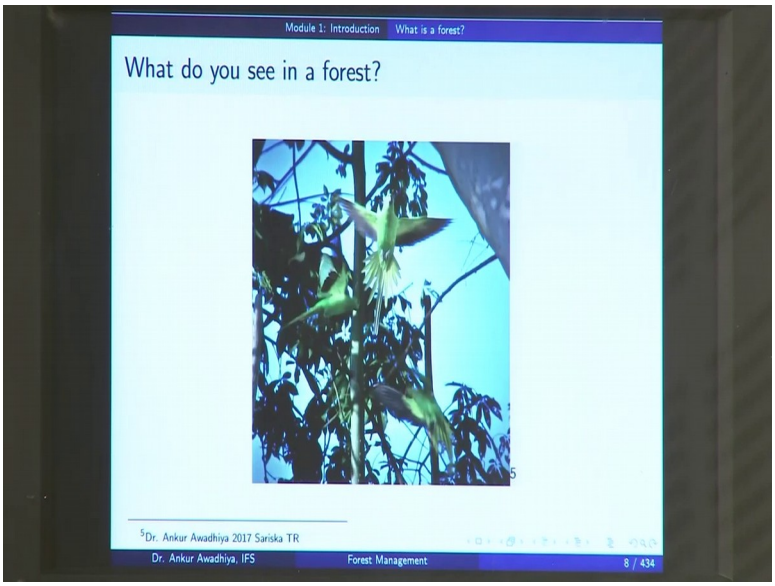


For those of us that like to view birds, we might even expect to see certain birds.

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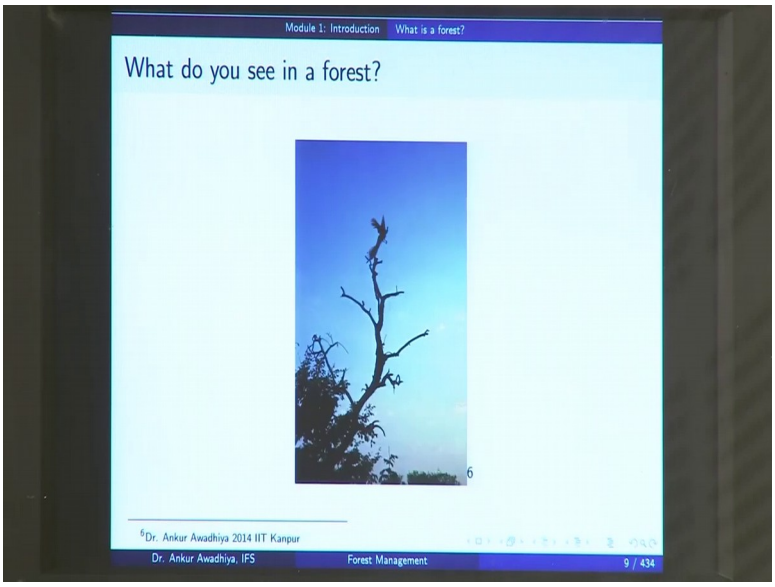


Like parakeets or peacocks.

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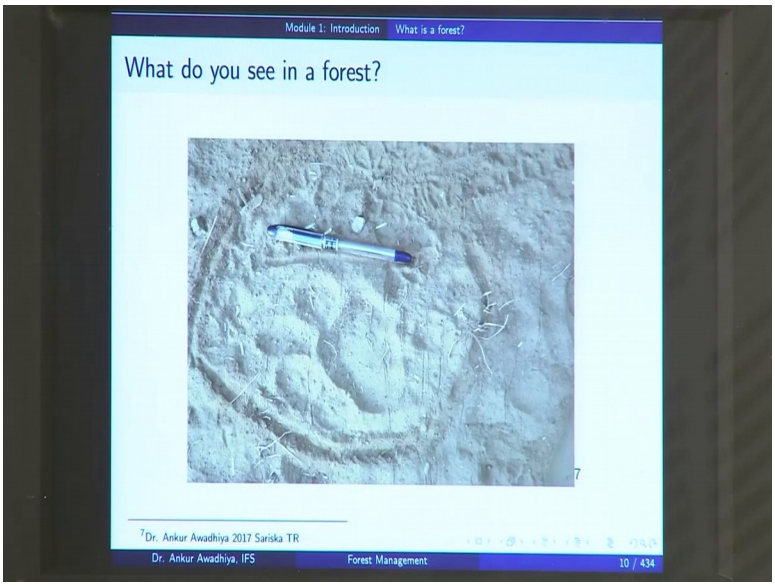


And, if you do not see any animals, we will at least expect to see certain signs of the animals. Such as if you are walking through a forest and if you see a pugmark, then probably you will have an idea that yes, there is a tiger nearby or it has pass through this area, in the recent times.

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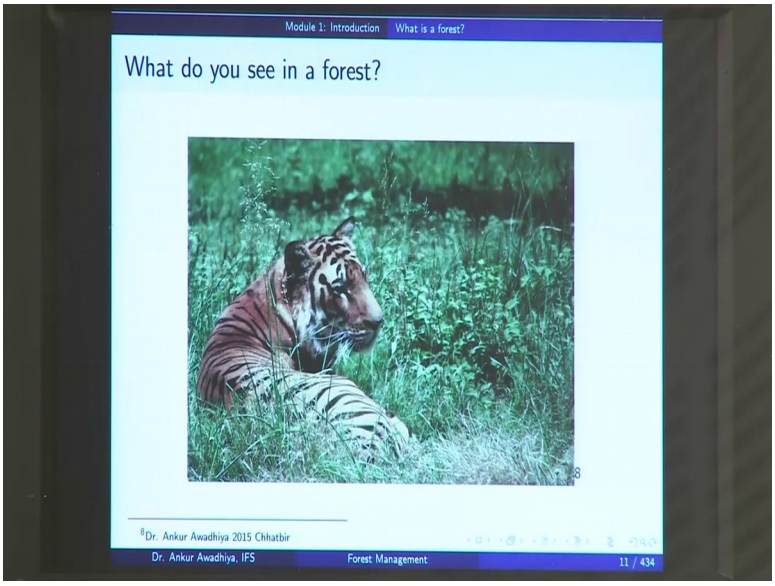


Or in certain cases, we might even see a tiger. Especially, if you go to a tiger reserve, there is a very good possibility that you will observe a tiger.

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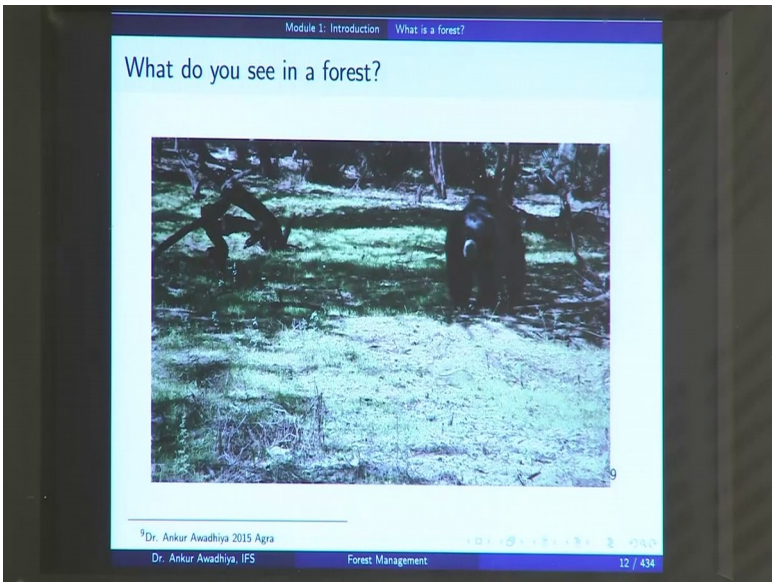


Or, some other large mammals, such as bears.

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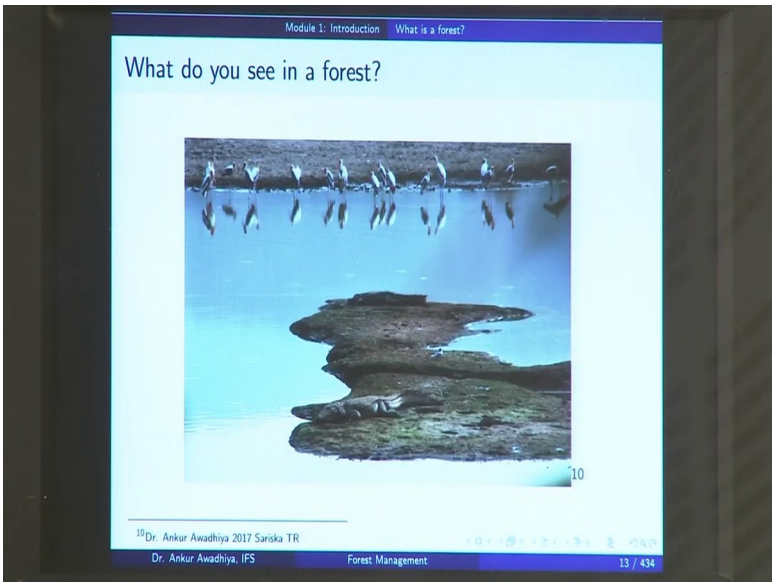


Or, things like crocodiles.

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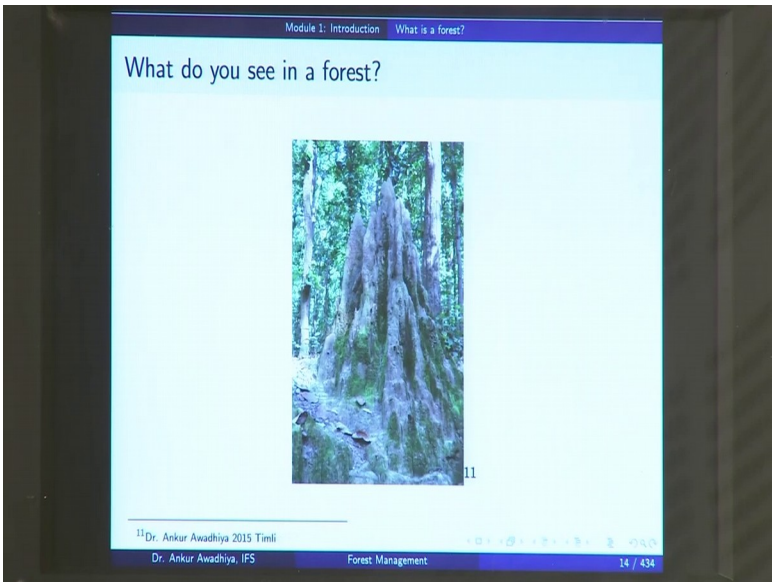


We will also a see a number of small animals, such as termites, And, also other forms of biodiversity, such as Fungi.

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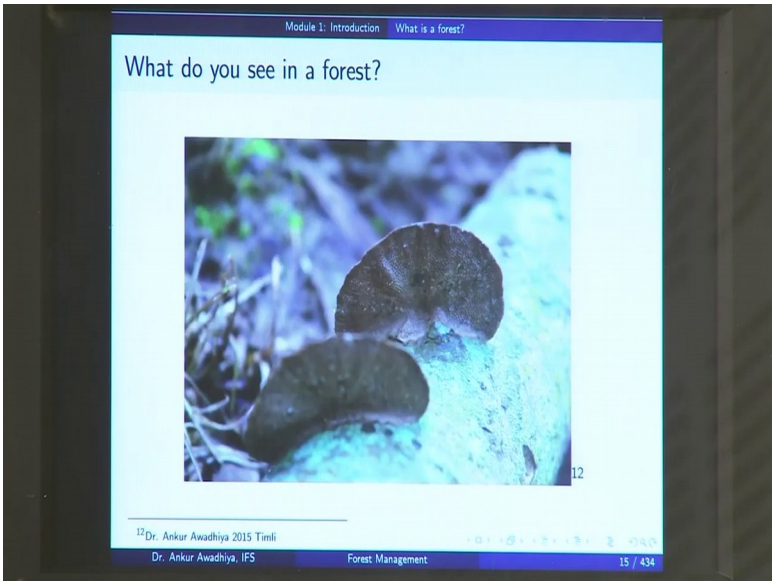


So, we will see all of these different things in a forest, but then "what is a forest?" If, there is an area, where you do not see a tiger, is that a forest or not? If, you go to an area and you do not find any trees, will you call that area a forest or not?

So, when we are doing the management of forest, when we are looking at the scientific management of forest, the first thing, the most essential thing is to 'define a forest'.

Because, as we will see in later lectures, there is a huge variety of forest that we find in our country, and in the world. So, for instance, if you go to say a scrub forest, if you go to Rajasthan, we will find huge areas in which you have a very few scattered trees, and probably, a lot of scrubs. Now, is that a forest or not? And, when you are managing that forest, should you aim to convert that whole area into a wood land?

Now, when I was sitting for the several service examinations, the UPSE asked me that in front of the Dholpur house, where the UPSE office is situated, we are seeing a few trees on both sides of the roads, there are trees; is that a forest? Or, let us consider your college compass, you have a few trees in your college compass; is your college a forest? Because, you are finding trees, you are finding some animals, you are finding some birds, you are finding things like fungi or termites or ants. So, you are seeing everything that you expect to see in a forest, but is that a forest? So, how do we define a forest? WHAT IS A FOREST?

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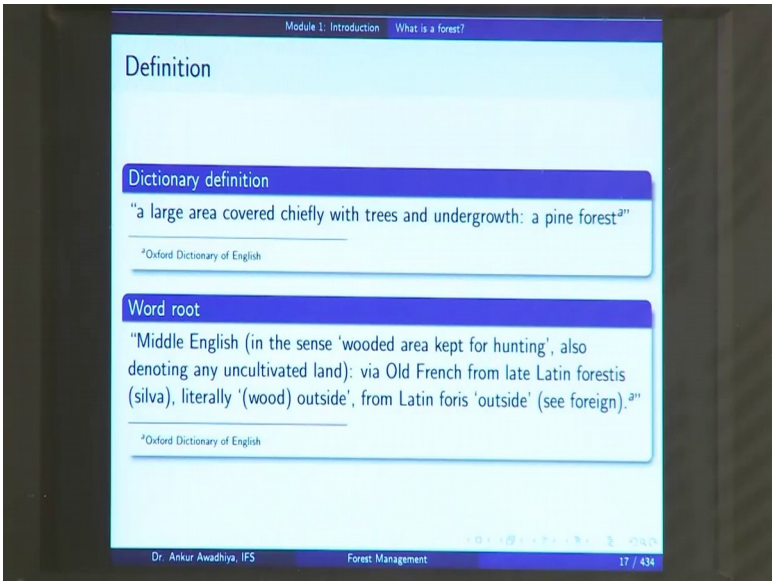


So, we have different definitions of forest. The first is a dictionary definition. If, you look at a dictionary what does it say, "what is a forest?"- So, a large area that is covered chiefly with trees and undergrowth: example, a pine forest".

So, this definition has a few new answers, it says that it should be a large area; How large in area? So, is what hectare large area? Or, is 10 hectares a large area?. So, what is the minimum size, where you will call that this area is a forest. Then, it says it is covered

chiefly with trees and undergrowth, but then you have this word “chiefly”. So, it is not essential criteria for it to be a forest.

So, you might be having a forest that is not chiefly covered with trees and undergrowth. Probably, it is chiefly covered with say sand, or say water, and you are having a few trees, is that a forest? Now, if you look at the word root, where do we get this word ‘FOREST’ from? So, it comes from Middle English, in the sense of ‘wooded area that is kept for hunting.’ So, even in our country, the chief or one chief use a forest apart from getting timber, was to act as Shikaargaahs (hunting ground). So, they were kings that wanted to perform shikars or go for hunting, and so, they reserve certain areas and they said this area is my Shikaargaah, I will go and I will hunt for animals there. And, similarly in other parts of the world as well, they were forest that were kept for hunting.

So, it comes from Middle English, in the sense of a ‘wooded area that is kept for hunting.’ It also denotes any uncultivated land, and this Middle English word comes from Old French, which in turn, comes from late Latin, where the term is, ‘forestis.’ And, forestis, you also have another word, which is ‘silva.’ So, you have this word forestis - silva. So, you have Silva, which is wood, and forestis, which means ‘outside,’ in Latin. So, you are talking about a wood that is outside. Outside of what? Outside of your city limits; outside of your village limits.

So, now the Latin phrase is emphasizing that you have certain woods that are outside. And, this in turn comes from the Latin word, ‘foris’, which means ‘outside’. So, for instance, if you talk about the word “foreign”. The foreign also comes from the same word root, ‘foris.’ So, foreign is something that is outside of our area; outside the country.

Now, in this case, in the case of forest, we are talking about a wood that is outside of the city limits. And, this was typically true, because in those days we did not have city forest, we were not talking about form forestry, and any area that was cleared of the woods, and was converted into the cities or the villages, or was the place where people used to live. And, anything that is outside, that is left uncultivated, that is only having tress that was a forest.

So, this is the word root and so, you have a large area that is covered chiefly with trees and undergrowth; typically it is outside of your residential limits. So, this is the

dictionary definition, but then this definition does not serve all of our purposes. So, we have certain other definitions as well.

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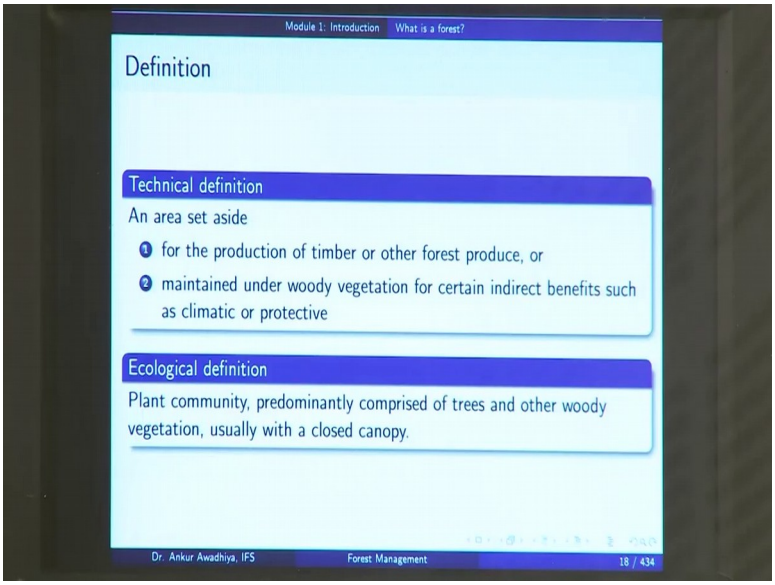


So, one definition is a technical definition. Now, in this technical definition, we say that an area that is set aside for the production of timber or other forest produce. Now, in this case, we are now looking at a utilitarian concept, we are looking at the utility of the forest. So, this definition is not emphasizing where the forest is, but is emphasizing the use of a forest. So, now, this definition says that in “area that is set aside for the production of timber or other forest produce.” Now, it may be a set aside even within a within a city limit. It may even be set aside within a village limit.

So, you can be having a, say, a grow of mango trees, and that and that grow of mango trees is surrounding, is surrounded by fields. So, probably you are having it inside a village, but then you are setting this area aside for the production of either timber or other forest produce. And, typically these other forest produce includes fruits, water or fire wood and so on. Or, this area may be a set aside to be maintained under woody vegetation for certain indirect benefits, such as climate or protective.

Then, what it says is, at times you are not looking at just the direct benefits, such as timber or non-timber forest produce, you might be even be looking at some indirective benefits, such as maintenance of a local climate, a local micro-climate, or for some other protective purposes, such as you might be having trees, that are surrounding, that are on

both the banks of a river, so that the soil is not getting eroded. So, that could be another use of a forest or it could be there for some other ecological benefits. So, you have in this technical definition that you have an area that is set aside, either for direct benefits or for indirect benefits. So, this is a utilitarian, a technical definition of a forest.

Now, as you saw before, in a forest you have trees. You have animals. So, there are a number of species that are living together, as populations. These populations are interacting with each other. So, you are having biological communities. So, forests are not just meant for your utilitarian purposes, they are also having a very important ecological role. And, so, we have an ecological definition of forest. Now, the ecological definitions says that a plant community, predominantly comprised of trees and other woody vegetation, usually with a closed canopy, is a forest.

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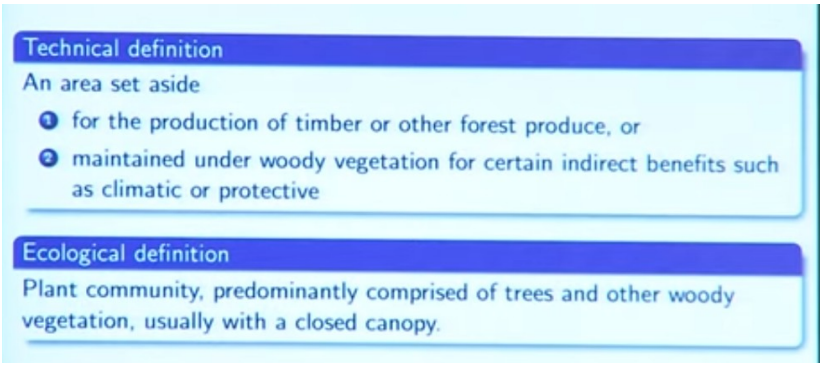


Now, when we say that it is a plant community, we are emphasizing that we have plants of different species. Otherwise, you would have called it a plant population. So, you have a plant community that is comprising of several different species, and this community is predominantly comprised of trees and other woody vegetation.

So, the ecological definition is saying that if you have an area that is supposed to a full of grasses and does not have much trees. So, in that case you will not call it a forest, we will call it, “a grass land”. So, a plant community that is predominantly comprised of trees and other woody vegetation, will and, that is usually with a closed canopy. Now, what do we mean by closed canopy?

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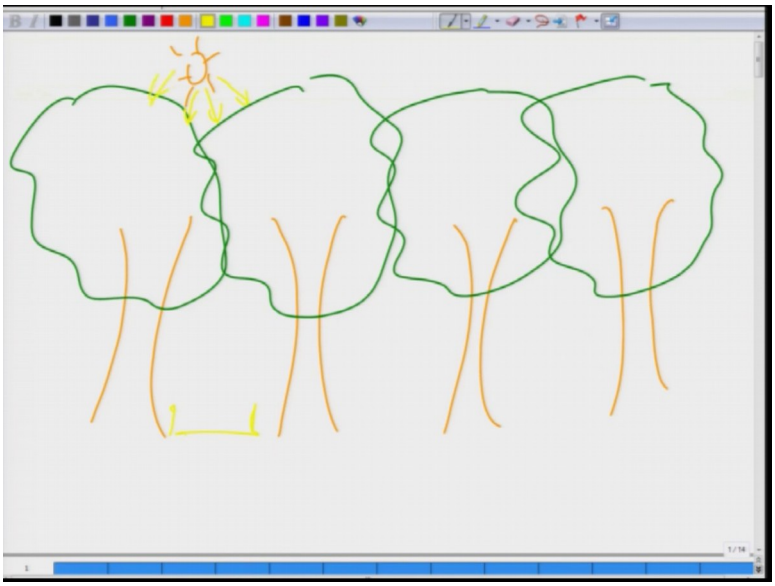

The term canopy refers to the umbrella that is formed, because of the leaves of a of different trees. So, suppose this is your forest, these are different trees with their canopies, and when we say that it is a closed canopy, what we are saying is that if you look at the sun, then at the bottom of your forest, you are not having enough of bound of a sunlight, because the sunlight is getting blocked by this canopy.

So, the ecological definition is emphasizing that you have different plants. So, we are not talking about animals in this definition. We are talking about plants, different species of plants, and in those different species, the predominant community, the predominant species comprises of trees or other woody vegetation. And, it has a closed canopy, and then you called it a forest. Now, each of these definitions has certain nuances.

So, for instance when you talk about an ecological definition, and you go to Rajasthan and you are you are having a number of trees that are scrub trees. So, they are thorny trees, and they are not having, they are not making a closed canopy. So, as per the ecological definition we would call it a scrub land, but we will call it a forest. So, each and every of these different definitions are defining forests in different ways and so, we are including certain areas, as forest, and we are living out certain other areas, that could be called a forest, in certain other definition.

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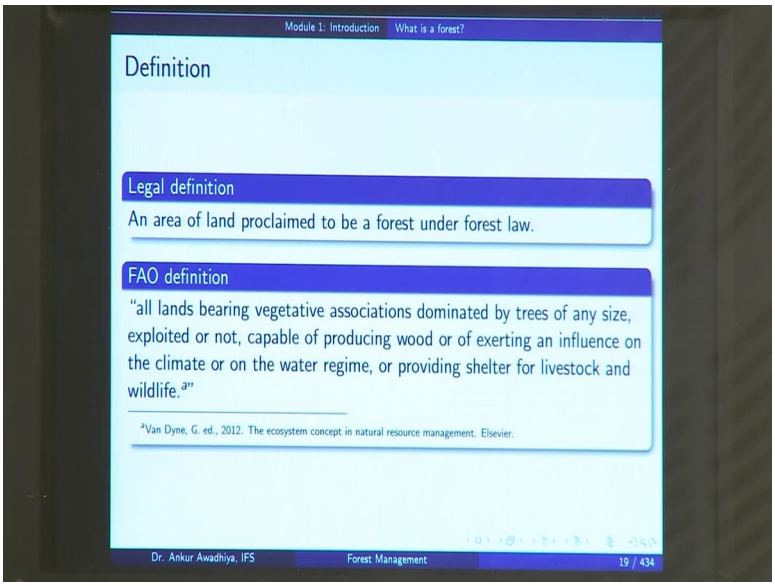


Now, another definition is a legal definition of a forest. Now, legal definition is very important when you are say, protecting a forest. So, somebody has entered into an area and you are saying that this person has done a trespassing of a forest area. Now, trespass in a forest area, in certain laws, is prohibited. So, you cannot just enter into any forest. And, this is especially true, if we are talking about a protected forest, such as a national park or a wildlife sanctuary.

Now, if somebody comes into an area and you have called this person and you are producing this person in front of a court. So, the court is going to ask you can you prove that this person is actually trespassed or entered into your protected forest, that the court is not concerned in this particular case about whether there were trees in the forest, or whether there were animals in the forest, how was the canopy. No, they are not concerned about that! They are only concerned about the legal definition of forest in this case, and the legal definition of a forest is an area of land that is proclaimed to be a forest under a forest law.

So, you might even be having a land that is not having a single tree, not talking about the canopies, it probably does not have any animals in that land, but this land was proclaimed to be a forest, under a forest law. So, for instance in India, we have the Indian Forest Act 1927, and under this Indian Forest Act the government came out with a notification and said that this area is a protected forest or this area is a reserved forest.

Now when they came up with a notification, probably at in those days, there were a large number of trees on that piece of land, but over time there was a large scale deforestation and today we do not have any tree on that particular piece of land. But still because they have been proclaimed to be a forest, even though there are no trees that are remaining now, but because they have been proclaimed by the government under a forest law, the court will continue to consider those areas as forest.

So, when we talk about a legal definition, we are not talking about trees, we are not talking about animals, we are only concerned about whether this land has been proclaimed to be a forest under a forest law. Then, you have this FAO definition of the food and agriculture organization- "all lands bearing vegetative associations dominated by trees of any size, exploited or not, capable of producing wood or of exerting an influence on the climate or on the water regime, or providing shelter for livestock and wildlife."

Now, this definition is sort of an umbrella definition that is concerned about several different utilities of the forest. So, what it says is – "all lands bearing vegetative associations." So, this definition is looking at a forest in terms of vegetative associations or in terms of the plant communities. So, if you talk about the FAO definition it and if you have a land that was proclaimed to be a forest under a forest law, but today does not have any trees or does not have any vegetation, then you will say that this area is not a forest, according to the FAO definition. So, you can have one land that is a forest under one definition and not a forest under any other definition.

So, this definition says "all lands that have bearing vegetative associations and these associations are dominated by trees of any size." So, the predominant trees in this case, the predominant vegetation in this case, is trees, in these trees can be of any size. So, we are not saying that these trees have to be very tall trees or they have to be scrubs, but these can be trees of any size and whether they are exploited or not. So, when we say exploited or not, what we are emphasizing is that, even if this area of vegetative communities - dominated by trees, is being used for the production of timber or is being used for say wildlife purposes, or is being used for say ecotourism, or other or other recreational purposes, whether it is being used or not, we are not concerned about that.

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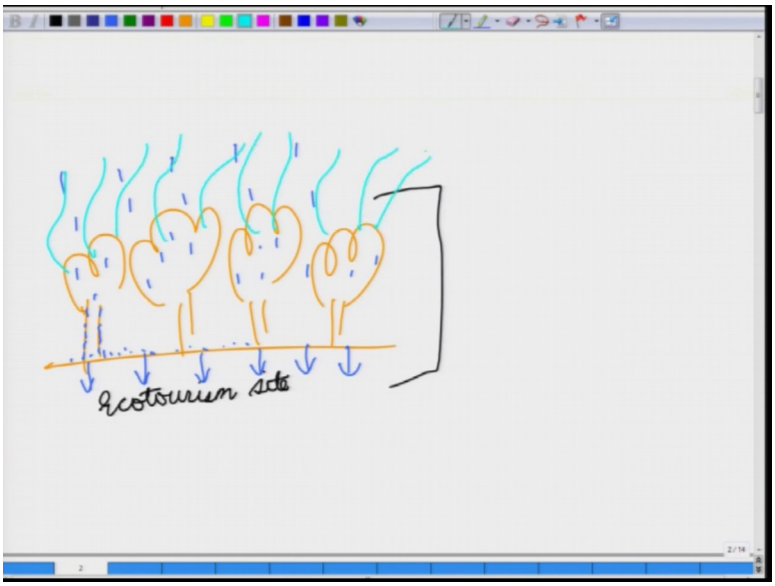


So, even if you have an area and this area has trees, and you have defined that this area is an ecotourism site. So, you have not defined this area as a forest, you have defined it as in ecotourism site and you are using it only for ecotourism, but still even if you have not defined it as a forest, the FAO definition will consider this to be a forest, because you are having a piece of land that is dominated by a vegetation, by a vegetative association that is dominated by trees.

Now, this forest should be capable of producing wood. So, this is one utility of the forest that you can have in area that is capable of producing wood, or of exerting an influence on the climate. So, you can have this region, because this area is a forest, because it is exerting in influence on the climate. So, this is another utility of a forest or on the water regime. Why on the water regime? Because in the case of a trees, there will be greater recharge of the ground water, because whenever the water falls on this land, it does not move in a deluge. So, when you have rain fall in this area.

So, the one thing is that, the rain drops are not falling at a very high speed, because they get entrapped in the canopy. So, this speed has reduced. And, then with this reduces speed, they are falling to the ground, they are even moving through the stem, which is known as stem flow. And then, because this speed is very less, so, it is residing in this area for a greater period of time, and because of that it is getting inside the ground. At

the same time, these trees are also leading to transpiration where the water is getting lost, because of evaporation.

So, there is in influence on the water regime of this area. So, you have a land that has a vegetative community dominated by trees and this is having some influence on the water regime. So, this is the forest, even if you are even if you have an area that is not capable of producing wood. But, if it is exerting an influence on the climate, you will say ok, it is a forest, because you have the word or not, and or on the water regime or providing shelter for livestock and wildlife. So, you have an area and you say that it is not having any major influence on the climate regime or on the water regime, but it is able to provide shelter for wildlife, even in that case, we will call it a forest.

So, the FAO definition is a mixture of the ecological definition, where we are talking about community of plants that is dominated by woody vegetation plus it is also including in it is purview the technical definition, where we were talking about the utility of a forest. So, which is why we say that the FAO definition is a much broader definition, it has the ecological definition inside it and it also has the technical definition inside it.

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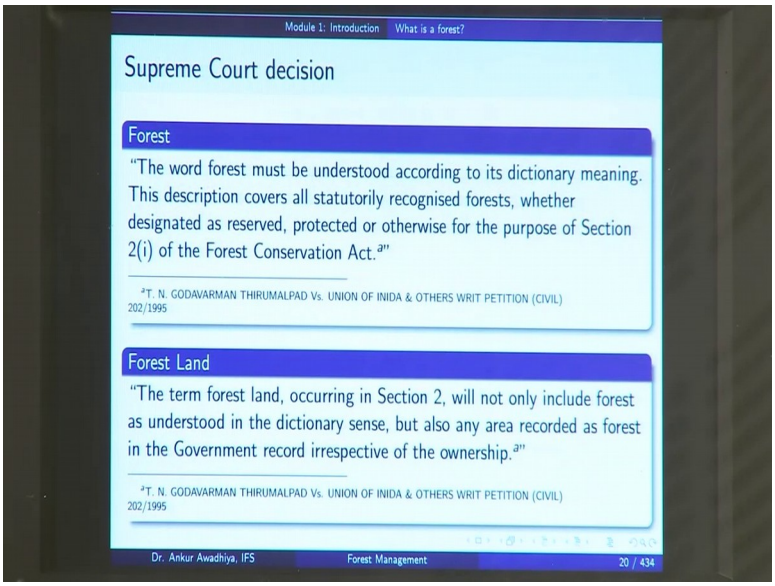


Now, in our country, the forests have been defined as per the Supreme Court's decision in a case that is known as the Godavarman case. Now, in this case, the Supreme Court said in it is decision that the word forest must be understood according to it is dictionary

meaning. So, what is a forest? A forest is an area that comes under the dictionary definition of a forest. And, what is the dictionary definition of forest, is something that we just saw before, “a large area that is covered chiefly with trees and undergrowth.” Example: a pine forest.

So, the supreme court is now saying that whether an area is a forest or not, we are only going to look at the dictionary definition, we are not going to see whether it has been defined as a forest under any forest law or not. If, it is any area that is having trees eveb if it is a sufficiently large area and it is having trees and undergrowth, will say that it is a forest, will consider it to be a forest. Then, the Supreme Court further elaborates by saying that this description covers all statutorily recognized forests.

So, the Supreme Court is saying that this dictionary meaning is covering all the statutorily recognized forest, whether they are designated as reserved forest or protected forest or otherwise for the purpose of section 2(1) of the Forest Conservation Act. So, now, with this judgment, after this judgment, if you ask whether any area is a forest or not, the Supreme Court would say does it come under the dictionary definition of a forest.

So, for instance, if you are talking about the trees that are on both the sides of the road, they are not a forest, because this is not a sufficiently large area, that is covered with trees and undergrowth. This is just a straight line. So, in this case, it will not come under the dictionary - under the Supreme Courts definition of a forest. But then the Supreme Court further elaborated and said that there is a difference between forest and a forest land.

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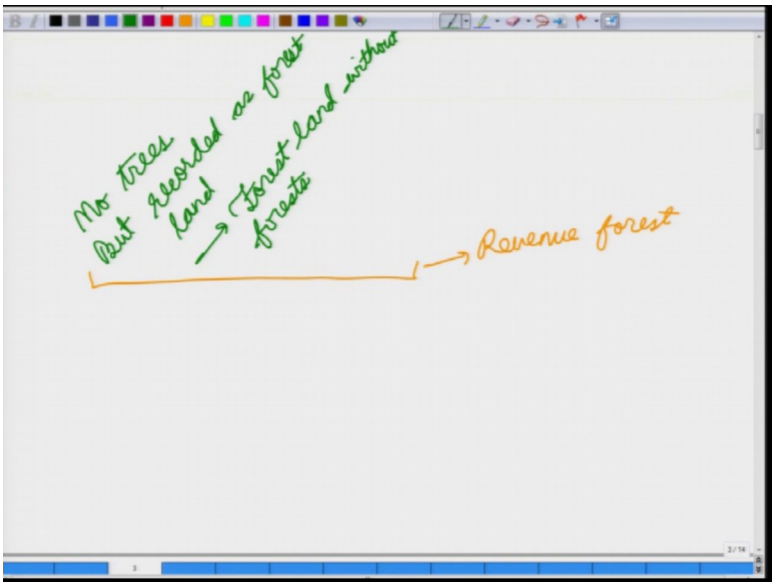


So, for instance in this case the supreme court is saying, that you have a piece of land and a in your records, this land is a revenue forest, but if you now go to this area, you are not seeing any trees or undergrowth, this area is now completely bare. So, is this area a forest the Supreme Court would say, NO, THIS AREA IS NOT A FOREST, because this is not coming under the under the dictionary definition of forest, but then is this area a forest land is this land a forest land? So, the Supreme Court says, "the term forest land, occurring in section 2 of the Forest Conservation Act, will not only include forest as understood in the dictionary sense, but also any area recorded as forest in the government record, irrespective of the ownership".

So, the supreme court is saying here that there is a different between forest and a forest land. A forest is an area that is a large area that is covered with trees and undergrowth. But if you talk about a forest land, it would incorporate, not only those lands that have forest, but also the other lands that have been designated as forest under a forest law. So, here now the Supreme Court is moving into the legal definition of a forest, that is any area that is proclaimed to be a forest under a forest law.

So, this area of land will also be called a forest land as per the Supreme Court's decision. So, what the Supreme Court is saying now, is that if you come back to this piece of land. So, this land does not have any trees, but it is it is ah recorded as forest land, and so, this is a forest land. This is a forest land without forest. Now, if you look at this definition -

any area recorded as forest in the government record. Now, what can be these government records?

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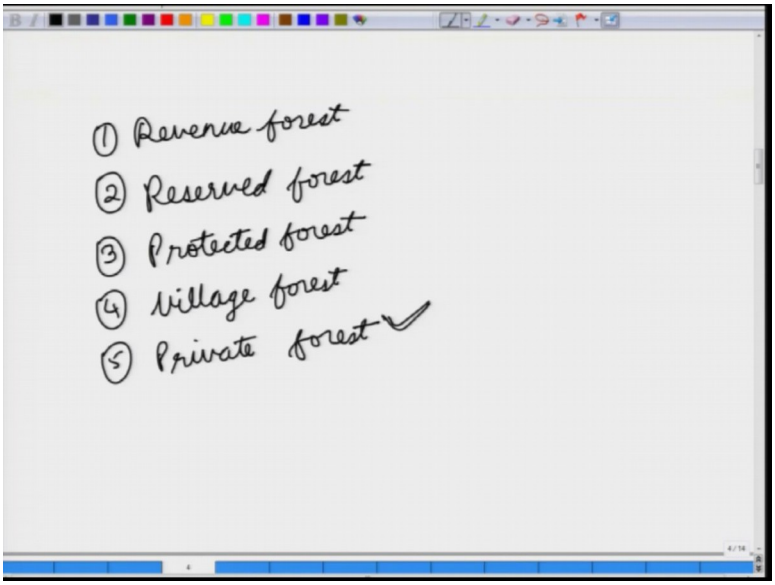


In the government record you can have an area that is recorded as, say a revenue forest. So, this area does not come under the forest department, it comes under the revenue department, but it is recorded as a revenue forest because yours probably having some trees in that forest on that piece of land.

Or it can be a reserved forest. Now, reserved forest is a forest that comes under the forest department, and it has been declared or notified as a reserved forest, under the Indian Forest Act 1927.

Or this area could be a protected forest. Now, a protected forest again comes under the forest department, and it is notified as a protected forest under the Indian Forest Act 1927.

Or this area could be a village forest, or in certain states there can even be things like a private forest. Now, a private forest is a forest that is notified as a private forest. So, it is having certain trees and it has a private ownership. Now, this definition of a of a private forest is not there in all these states, it is only there in certain states. So, the supreme court is saying that when we talk about a forest land it includes all the areas that are covered with trees and undergrowth, plus it also includes those areas that are recorded as

for as in the government record, irrespective of the ownership. So, whether this land belongs to the forest department, or whether this land belongs to the revenue department, or whether this land belongs to a private person, it is immaterial. If it is recorded as a forest under any forest records, under any government records, then it is a forest land.

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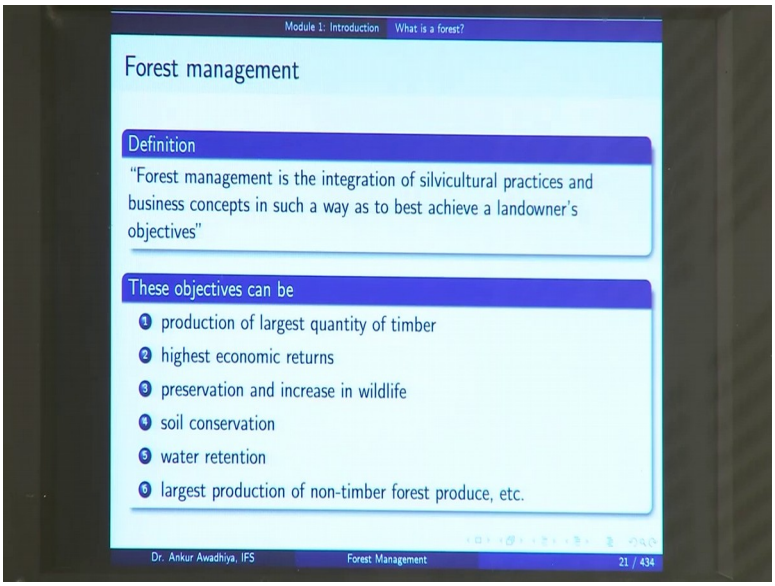


So, now we move to the definition of Forest Management. Now, this course is FOREST AND FOREST MANAGEMENT. So, we saw what is a forest? A forest can be defined as different categories of lands, whether they have trees or not, under different definitions. And, then forest management is the integration of silvicultural practices and business concepts in such a way as to best achieve a landowner's objectives. So, when we are talking about forest management, we have a forest and we are managing it in such a way that we are able to achieve certain objectives. So, we are talking about management by objectives. It is an integration of silvicultural practices.

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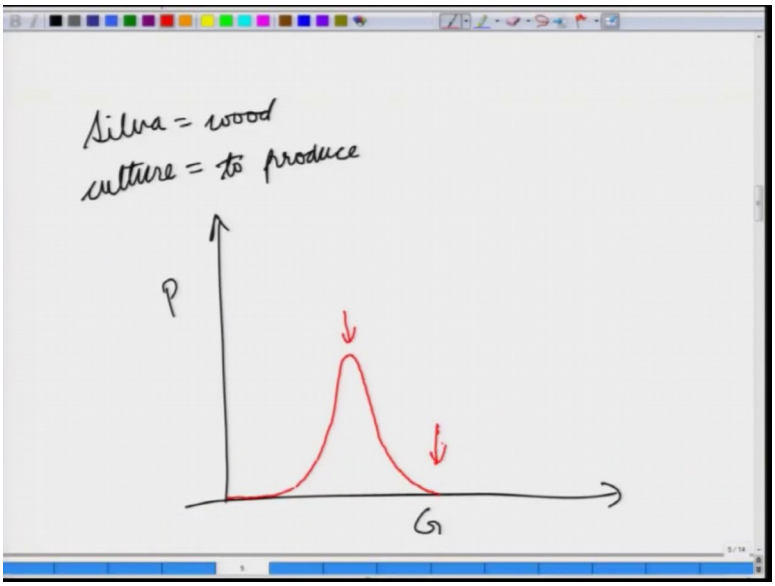


Now, what is silvicultural practices? As we saw just before, silva is wood; culture is to produce. So, when we say silviculture, it is the art and science of producing wood or of producing these forest produce.

So, it is the term forest management, it is an integration of silvicultural practices. So, we are using the best silvicultural practices together with business concepts. Now, these business concepts will tell us how to manage this area, whether you want to manage it, for say maximum amount of revenue or maximum amount of profit. So, you have to look at different business concepts. When should you for instance cut this forest? What should be the area of maturity? How much amount do you have to pay to your laborers? What is the amount of technology that you need? How are you going to pay for it? How are you going to pay for the transportation, and such other things?

So, you are including all these businesses concepts, economic concepts and you are also looking at the best silvicultural practices, because suppose you only look at a business concepts, so you can say that I am going to have teak trees in my land and I am going to cut them when they are 5 years of age. But then if you look at the silviculture of teak, and then it will probability 80 to 90 years to reach maturity.

So, you have to balance both of these. You have to look at the silvicultural practices and you also have to look at the business concepts. And, when you combine both of these you are getting the field of forest management. It is an integration of silvicultural

practices and business concepts in such a way as to best achieve a landowner's objectives. And these objectives can be different things, you could have an objective of production of the largest quantity of timber.

So, you are looking at the maximum volume of timber that can be harvested from your forest. Or you could be looking at highest economic returns. Now, both of these are not the same. So, for instance, in areas that are having a plywood industry. You have trees that are cut into logs and then those logs are then converted into very thin sheets just like a sharpener works. So, you are putting it through a blade and you are converting it into a flat sheet. And, then these flat sheets are then stacked together, put along with glue and then compress it higher temperature to get plywood.

Now, if you want to use your forest for the production of plywood, you will require not very huge size logs, but typically this much thickness of the logs, so, that you can put it inside a machine. Now, when you look at the prices that you will get for different sizes of the timber, in this particular case, your prices will go something like this. (Refer Slide 33:34). So, the price versus the girth. So, if you have a very small girth you have a very thin log, the prices will be very less, then the prices will increase, then they will reach a maximum and then they will decrease and then after a while there is hardly any utility of this log for this particular purpose.

So, you can have a silvicultural objective of getting the maximum amount of wood, the maximum volume of wood or you can have a very different objective of getting the maximum income. If, you want to go for the maximum income, you should target this size, if you want to go for maximum volume, you should target this size. So, your objectives can be - production of largest quantity of timber, highest economic returns preservation and increase of wildlife.

Now, if you want to go for preservation and increase of wildlife, probably you should just live forest as such, you should not go in to your forest and cut the trees. Because in the case of wildlife, even, if you have a tree that has reach the area of maturity and then it has become old - this tree is going to die and when this trees dies, the biomass that is there in the form of timber, in the form of the wood that is there in this tree, will be eaten up by certain other organisms.

So, for instance you have a dead tree in a forest. So, you will see that you have an attack of termites; termites eat up that wood and in turn these termites are eaten up by birds. And, so, when you are talking about preservation of wildlife, you need to have that deadwood in the system whereas, if you talk about economic returns, probably you should remove that wood in sell it off. So, depending on your objectives your forest management will be very different. Another objective could be soil conservation.

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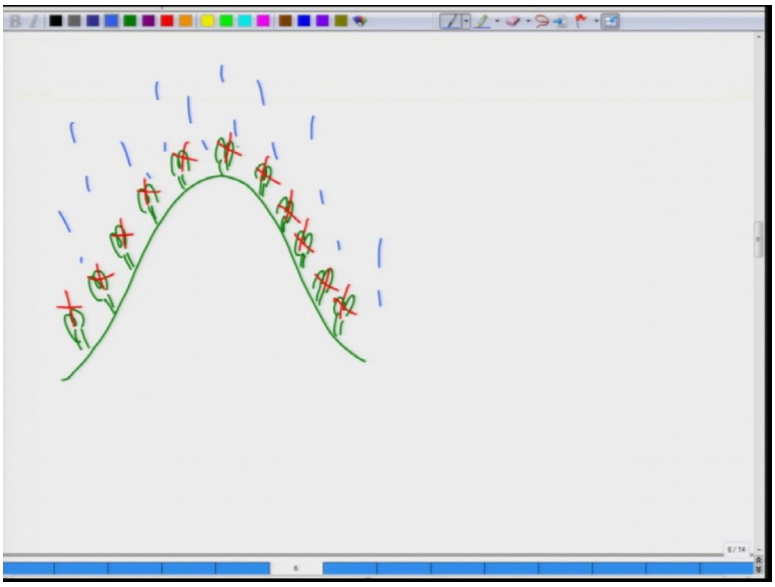

So, especially in the hilly states, what we find is that if you have hill and this hill is full of forest. If, you manage these forests for say timber or for maximum profit, what you will do is you will remove these trees. But when you cut these trees and this is a hilly region, you will find huge amounts of soil erosion. Because, whenever there is any rain, now there is no there are no trees to reduce the speed of these rains to permit water to percolate inside.

So, all these rains will form small streams, and then these streams will now go on eroding these hills. And, in a very short period of time, through the through this process of degradation you will have that that the soil is removed from these trees and it goes into the rivers. So, you can have an objective of conserving the soil, in which case you will say that my forest management is to either not harvest any trees, or to harvest trees in such a small proportion that, the that the remaining trees are able to bind the soil together. So, that the soil is conserved.

Another objective could be water retention. So, in the case of water retention, again you will want to have, have a removal of timber in such a way that there are sufficient number of trees on the ground. So, that the water is retained and the ground water is recharged. Another objective could be the largest production of non-timber forest produce. Now, non-timber forest produce as we will see in later because all that forest produce that is apart from timber.

So, you could be looking at production of largest number of fruits. Suppose, you have a forest that is full of amla trees, and in this forest, you want to manage it in such a way that you are getting the largest amount of production of amla. So, this could be one management objective. Or you get have another forest, in which you are having medicinal plants and you want to collect the largest number of leaves or the largest quantity of leaves that could be another management objective. So, the forest management is looking to fulfill or to best achieve the landowner's objectives, which can be any of these or any other objective for that matter.

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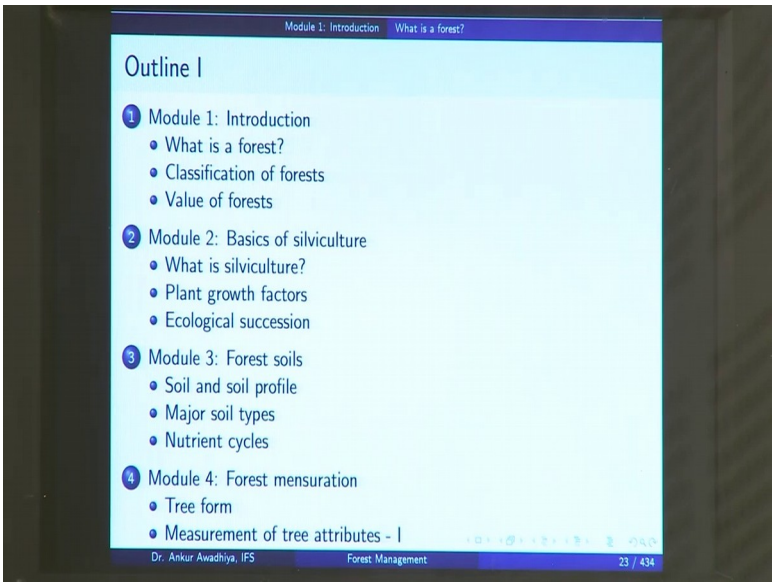


So, this is forest and forest management. And, if you look at an outline of the course, this course has 12 modules and each module will have 3 lectures. So, will so, every week we will be covering 1 module, the first module - introduction has 3 lectures, the first one is a WHAT IS A FOREST? that we looked at today.

In the next lecture, we will look at classification of forest. So, in India as well as in the world, you have different kinds of forest. A forest that is there in a very cold area, a mountainous terrain is very different from a forest that you will find in an equatorial region or an evergreen forest. So, how do we differentiate these forests? How do we classify these forests? Why do we need to classify these forest is something that we will look at in the next lecture, after that we will have look at the value of forest.

So, when we say that forest need to be managed, a forest need to be conserved, the question is why do you want to conserve these forest? So, we want to conserve forest, because they gave us certain benefits. And, these benefits could be direct benefits or indirect benefits something that we are getting directly or something that we are getting indirectly, you can have some certain conceptive utility of the forest, consumptive benefits such as timber.

So, a consumptive benefit is something that if I am taking timber out of the forest, it is not available for you. So, somebody is using this timber so, another person will not be able to use this timber. They can be certain non-conceptive values of forest such as tourism, if I see a tiger, if you see a tiger, both of us are getting happy because of seeing this tiger. So, because I have seen this tiger does it does not reduce the value of the tiger. So, I am not consuming this tiger. This is a non- consumptive value. So, in this lecture we will look at different values of forest and also how do we value these forest in quantitative terms.

The second module is basics of silviculture. So, as we saw just now, silviculture is the art and science of growing forest crops. Now, this module will cover - What is silviculture? Different kinds of silviculture. The plant growth factors. So, if you want to raise a forest crop, you need to provide certain nutrients. What are those nutrients? And, we will also have a look at Ecological Succession, which tells us how a certain piece of land or a bare rock moves from being a bare rock to a forest. So, this is an ecological succession.

Now, the third module will be forest soils. So, the first lecture will be soil and soil profile. What is a soil? And, what are soil horizons? What are the characteristics of soil? And, how are the soil horizons arranged in the form of a soil profile is something that we will cover in that lecture. Next, we will have major soil types of India as well as the world. So, you have black soil, you have a red soil, you have laterite soil and so on.

So, how do we classify these soils? Why do we need to classify these soils? What are characteristics of different soils? Both in terms of the classical classifications as well as the USDA classification. Next, will have a look at nutrient cycles, now nutrient cycles is a cycle through which different nutrients moved from the biotic component of the biosphere to the abiotic component and vice versa. So, for instance there is carbon dioxide in the atmosphere, the plants are using that carbon dioxide, they are fixing that carbon dioxide in the form of biomass. So, they are producing fruits. Now, we are eating those fruits, and we are converting this biomass back into carbon dioxide. So, this is a nutrient cycle. So, it is your carbon dioxide or carbon is moving from the atmosphere through the plants to the animals and then back. So, we will look at different nutrient cycles in this lecture.

Next the force module will be forest mensuration.

Mensuration is to measure. So, in this module we will look at how do you measure a forest? The first lecture will be the TREE FORM. How do you describe a tree? What is the shape of a tree - is it a cylinder, is it a cone, is it having some other shape, is something that we are going to discuss in this lecture. How do you describe a tree? Then, once you have you have described tree, next we will look at measurement of the tree attributes.

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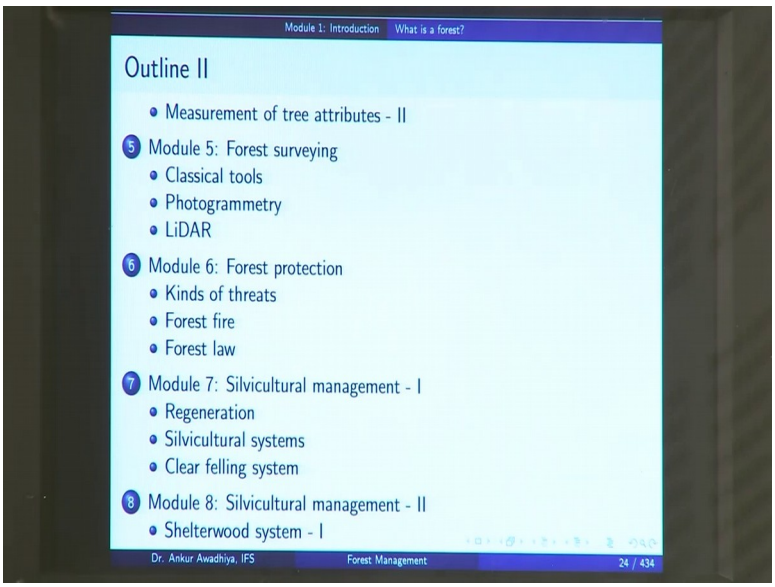

So, what are different tree attributes - what is the diameter of tree? what is the height of a tree? how do you measure a diameter? how do you measure the height? And, how do you measure different derived attributes - how do you measure the basal area? what is the stand basal area? - are different things that we are going to look into in these lectures.

The fifth module is forest surveying. So, what is a forest survey? how do you do a forest survey? So, there are certain classical tools of doing a forest survey, such as a chain survey, or a compass survey, and there are also some modern tools, such as photogrammetry and Lidar. So, we will look at how we are using satellites, how we are using drones to survey a forest. How are we using lidar which is light detection in ranging, to understand the height distribution of different trees or the volume or the biomass of a forest.

Then, in the sixth module we will have forest protection- how do you protect a forest? what are the kinds of threats that you need to protect against? So, you need to protect your forest against fires. You need to protect your forest against deforestation, against grazing, against insect attacks. So, there are different kinds of threats that your forests are facing. So, how do you protect against those? And, the most important one we look at forest fire - how do you protect your forest against fire and then we will also look have look at Forest Law. So, under the Indian Forest Act 1927, or the Wildlife Protection Act 1972, or the Forest Conservation Act 1980 - what are the provisions that are available to protect the forest - is something that will cover in this lecture.

Now, the 7th and the 8th module are about silvicultural management. So, when you have a forest you have a certain management or silvicultural objective, suppose your objective is to have the maximum quantity of timber. Now, the question is how do you go about having the maximum quantity of timber? Should you cut all your trees in one go, should your cut your trees in different sections, should you divide your forest and to say 10 or 15 different sections and then cut each section every year? How many sections do you want? And also what are the different silvicultural systems that we have for different species for different silvicultural objectives. So, you could be having certain plants species that require a huge amount of light in their early stages. So, in that case if you want your seed to germinate to establish then probably you would want to give a clear canopy, you will remove all the trees from that area, so that your next generation is able to come up. On the other hand, in certain species, you might be having a situation, where

if you give a large amount of sunlight to the young plants they will die off. So, in that case you would want to provide certain shelter to the young crop.

So, these are different silvicultural systems. So, we will have a look at what is regeneration? How do you get to the next generation of young crops after you have harvested a particular forest? And, we will look at silvicultural systems. And, and certain silvicultural systems in greater detail - a clear felling system. What is a shelterwood system? What is a group shelterwood system? What is a selection system? What is an irregular shelterwood system?

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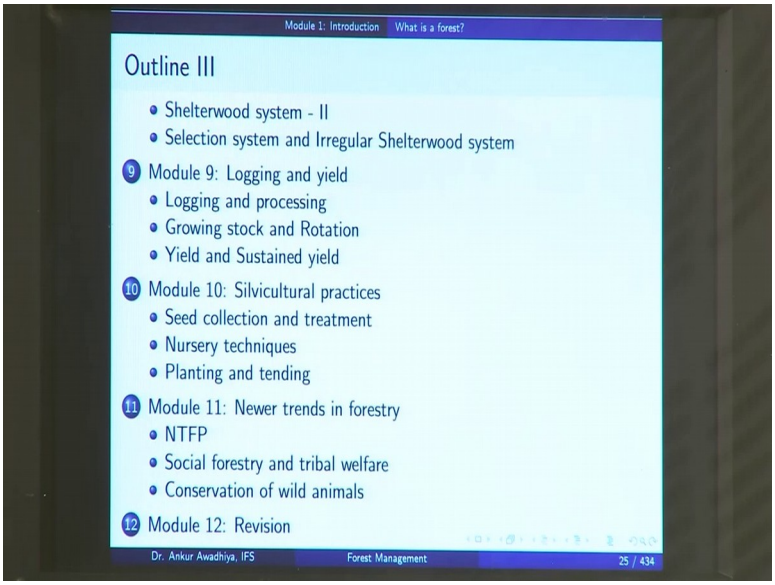


So, we will look at all these different ways or modes of managing your forest and and in this module. Then in the ninth module will have a look at logging and yield. So, you your harvesting timber out of your forest. So, this process is known as logging. So, how do you log your forest in a way that you are getting the maximum output out of it? So, we will look at logging and processing. We will look at growing stock and rotation and we will also look at yield and sustained yield.

So, you want to have a sustained yield which means that every year and year after year till perpetuity, you should be able to gain the maximum amount of harvest from the forest. So, how do you ensure that? - is something that we will look at in this module?

Now, the tenth module will be about silvicultural practices. Now, silvicultural we looked at silvicultural management, silvicultural systems and then we have silvicultural practices.

So, what is a silvicultural practice? What are the good practices? how do you collect seeds from trees? how do you raise them in a nursery? how do you germinate these seeds? how do you care for these tree for the seeds? what kind of treatments do you give to the seeds? how do you raise them in the nursery? how do you do the planting operations? what is the size of the pit that you should be digging? what are the kinds of additives to the soil that you should be adding? how do you care for the plants, which is tending? So, we will look at all these different silvicultural practices in the 10th module.

Now, the 11th module will cover newer trends in forestry. So, earlier we were managing a forest for trees for the for the timber and these days we are having a much greater emphasis on the non-timber forest produce. So, what is a non-timber forest produce? what are the kinds of non-timber forest produce? And, what are the kinds of operations that we are doing or the kinds of management we are doing to have these non-forest timber produce.

Next, we will have a look at social forestry and tribal welfare.

Now, why are we managing a forest? we are managing a forest for the citizens of the country. And, so, this a management of the forest should incorporate the needs of the citizens and it should also solicit the aid of the of the citizens in protection - in forest operations. So, we have shifted from a regular - from an authoritative regime of forestry towards social forestry.

So, in social forestry we have joint forest management. How do you ensure the welfare of tribals that are living in the forest? And, how do you conserve wild animals? So, we will look at all of these in the 11th module and the 12th module will be a revision of the whole course.

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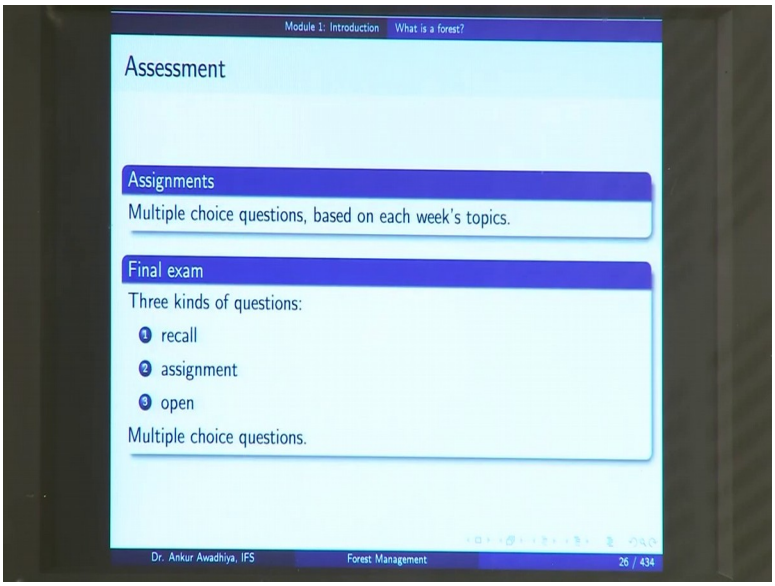


Now, if you look at assessment, this course will comprise of several assignments one for each module, where you will be having multiple choice questions that are based on each week's topics.

And, the final exam will comprise of multiple choice questions, this will be a computerized exam and you will be having 3 sections, there will be a recall section - you will have questions from directly from the lectures, you will have questions from the assignments and there will also be certain open questions that you will have to think about.

So, I am sure you will find this course interesting and probably very useful. So, that is all for today.

Thank you for attention [FL].