Wildlife Conservation
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Lecture – 01
Preliminaries

[FL] and welcome to this MOOC course on Wildlife Conservation. I am Dr. Ankur Awadhiya; I am an officer in the Indian Forest Service, serving the Madhya Pradesh corridor. We will have eight different modules in this course; the first module will be introduction, importance, and threats. In this module, we are going to have four lectures; preliminaries, a closer look at biodiversity, economic valuation of biodiversity, and threats to biodiversity. So, let us begin with the preliminaries.

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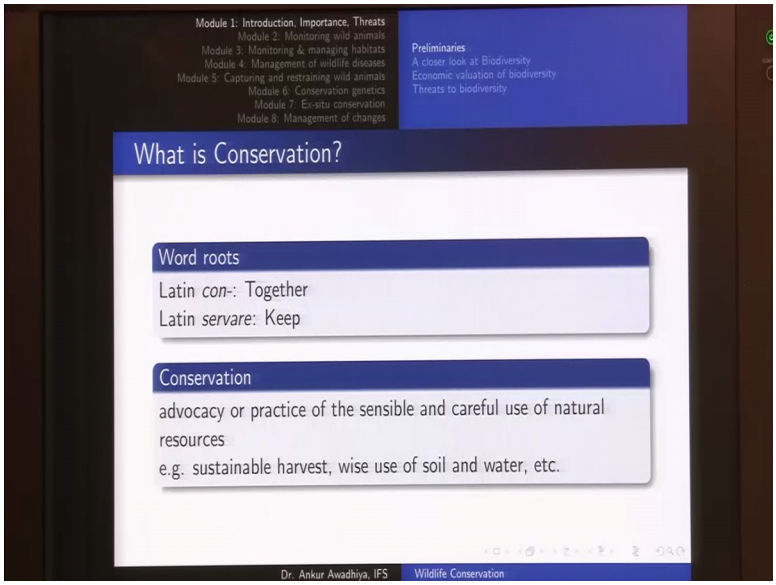

So, when we talk about wildlife conservation, what is the word conservation mean. So, we will start with the word roots of conservation. It comes from the Latin roots con meaning Together, and Servare meaning to Keep. So, it is if you join both of these words, it will mean Keep Together.

So, it is the advocacy or practice of the sensible and careful use of natural resources. So, it is advocacy. So, people talk about it, people try to advocate it, people try to profess about it, and it is also the practice. So, you do not do, just say about it, you also practice it. You put it into action of the sensible and careful use of natural resources; so it this

sensible and careful use. So, you are taking care that you are not exhausting your resources at a very fast rate, you are doing it carefully.

Examples include, sustainable harvest, wise use of soil and water etcetera. Now, sustainability means that whenever you are using a resource, you should use it at a pace, and use it using technologies, such that even people in the future will be able to make use of this resource. So, you do not over exploit this resource, you do not completely exhaust this resource, so that is the sustainable use of a resource. Now, conservation is normally confused with a number of other terms, but then there are differences.

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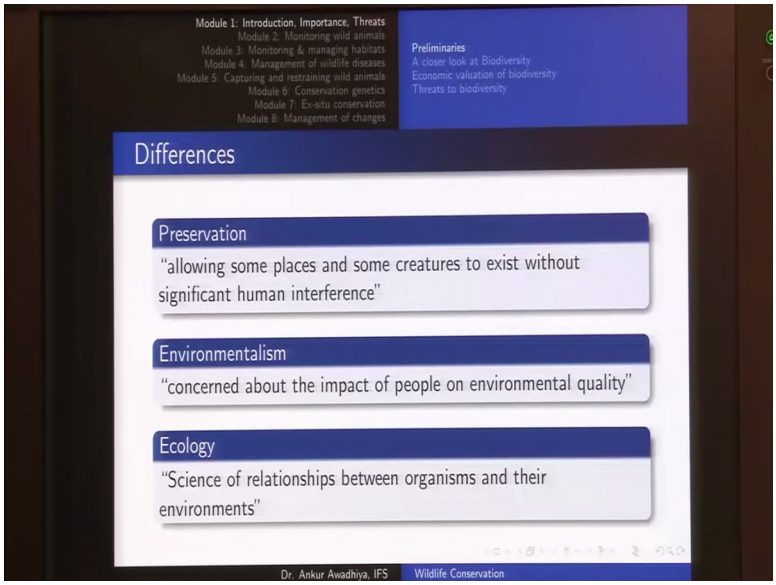

So, when we see a wildlife conservation, and if we see a wildlife preservation, when they be one and the same things or else conservation the same as environmentalism or ecology, so the answer is no. Preservation is allowing some places and some creatures to exist without significant human interference. So, essentially when we are talking about wildlife conservation, we are making the sustainable use of wildlife. So, we are allowing people to go inside, do some amount of tourism, may be even harvest some of the resource that are found in those areas. So, for instance in the case of India, we will have some core area, then will have some buffer areas for wildlife conservation.

In the case of buffer areas, will even allow people to get inside and say remove some amount of non-timber forest produce, such as straw or may be some medicinal plants. So, it is a sustainable use you are using the resource. In the case of wildlife preservation,

we would designate those areas as no go areas, there will not be any human interference, and will allow nature to do whatever she wants to do.

So, it allows some places and some creatures to exist without significant human interference or in most cases with no human interference. So, examples could include some areas in our Himalayas, which are no go areas for human beings. Next is environmentalism. Environmentalism is concerned about the impact of people on environmental quality. So, in this case, we are only concern with the environmental quality. So things like pollution, air pollution, water pollution and so on, we will come under the embed of environmentalism.

Ecology on the other hand is the science of relationship between organisms and their environments. So, this is a theoretical concept. Ecology means, the science of relationships between the organisms. In our case, when we talk about wildlife ecology, it would mean the science of relationship between wildlife and their environment.

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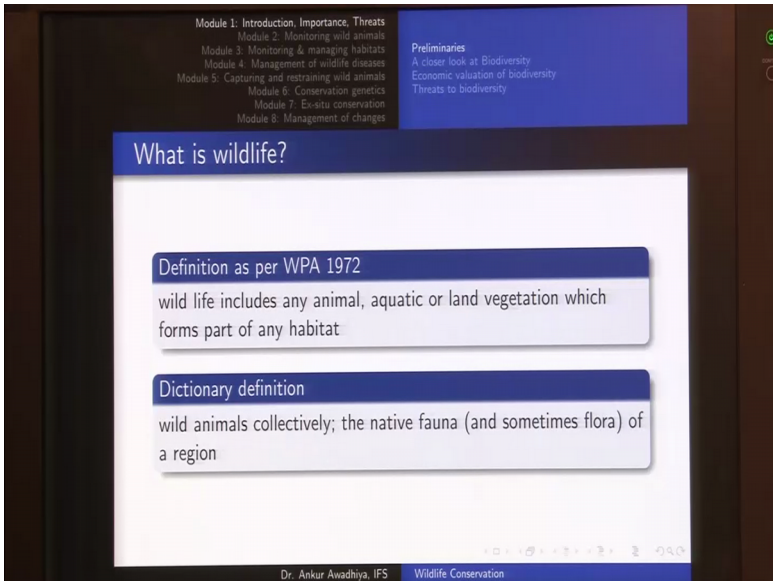

Now, coming back to the term wild life conservation; what is wildlife? So, when we say wild life, we normally say that a tiger in a forest is a wild life. But, what about a tiger that is come out, a tiger that is there in the agricultural fields is that still a wild life or for instance is the grass inside the forest area wildlife. How do we define wildlife? So, we make use of this definition as per the wild life protection act 1972, it states that wild life includes any animal aquatic or land vegetation, which forms part of any habitat.

So, this includes animals as well as plants, which forms a part of any habitat. Even (Refer Time: 04:59) part tiger comes out of the forest areas. Then because it is naturally a part of a forest habitat, it still will comprise a wild life. Now, dictionary definition would mean wild animals collectively, the native fauna and sometimes flora of a region.

So, even if we go by the dictionary definition, it also includes the animals as well as the plants that form the native species of any area. But, in our case, in the case of the wild life protection act, we have gotten rid of this term native, because there could be a number of species you that have come from outside. And have now become naturalized into our country.

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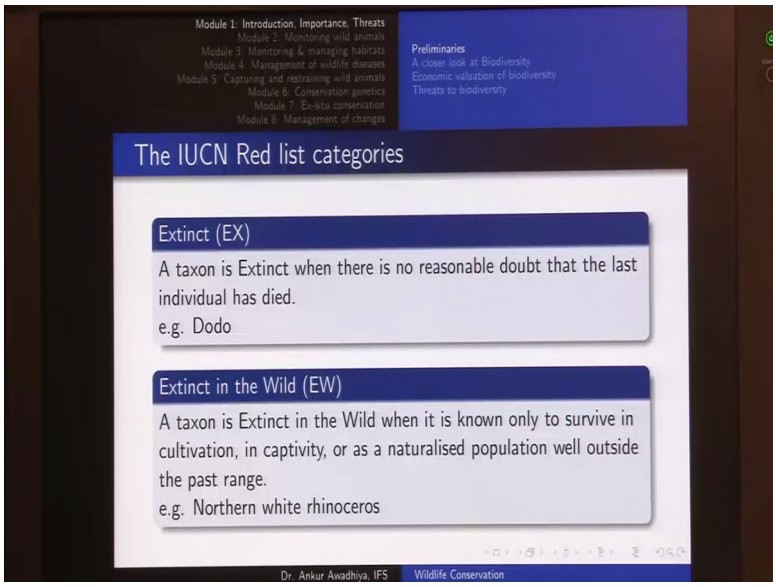

Now, when we talk about wild life conservation, do we conserve anything and do we conserve everything. So, to prioritize, what we need to conserve, the International Union for the Conservation of Nature and Natural resources has come up with the red list category of different organisms. So, it goes from extent to least concern: two things, which have not been studied so far, and are known as data deficient or even not evaluated.

So, we will look at all of these red list categories, an extinct organism is a taxon. So, a taxon means, that it could a species, it could be a genus, so it could be any category of organisms, is extinct when there is no reasonable doubt that the last individual has died.

So, for example, dodo; so we know that this species of bird, and we are completely sure that that not a single organism of this species, now exist on the on the planet. So, it is there is no reasonable doubt that the last individual is died. So, if there is a species that is extinct, there is hardly anything that we can do about it, though these days with technology; we are trying to de extinct some of these species.

Now, in the case of de extinction, what we do is that we could start from any preserved sample of that organism; so say a stuffed bird can be used. And if we could figure out some of its sales that have the genetic information intact, we could try cloning that bird. Or maybe if any species or any taxon has become extinct, and we have stored its sperms or eggs or zygotes somewhere or embryos somewhere out in a frozen facility. So, we could try and used those resources to create this organism again, so that is the a process known as de extinction. But, for the purpose of this course, this will not be of much use.

So, extinct is something, that is already gone; extinct in the wild, so it means that it is unknown only to survive in cultivation, in captivity, or as a naturalized population well outside its past range; for example, the Northern white rhinoceros. Now, Northern white rhinoceros is a sub species of white rhinoceros that is found in the continent of Africa. And from all the natural regions, this animal is now extinct, and only a few specimen extinct in a few number of zoos. So, this taxon will be known as extinct in the wild.

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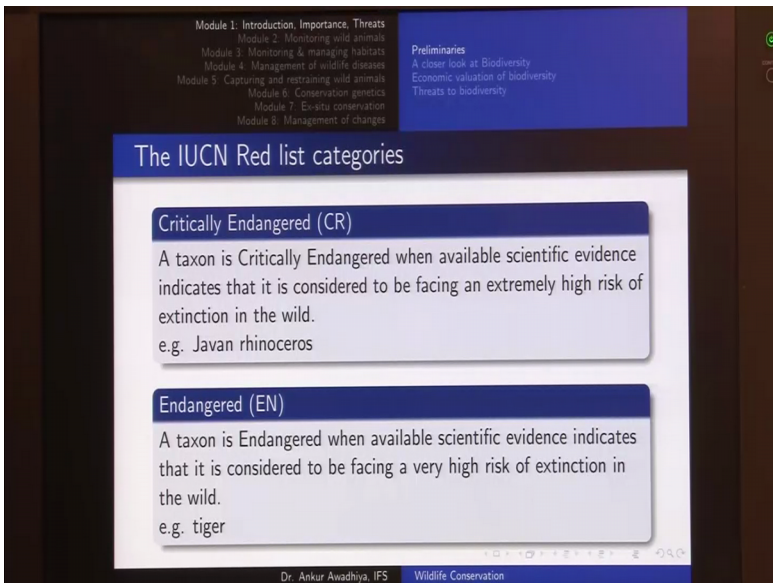

Next, we have critically endangered. So, at taxon is critically endangered, when available scientific evidence indicates that there is that it is considered to be facing an extremely highly risk of extinction in the wild. So, there is an extremely high risk of extinction, the example includes the Javan rhinoceros.

So, now in the case of the Javan rhinoceros, we have closed to around hundred individuals that are there in nature or that are there found anywhere. So, now this taxon has become critically endangered. And if it is not looked after in any intensive manner, it would very fast it will go into the extinct in the wild or in the extinct categories.

Next, you have endangered. A taxon is endangered, when available scientific evidence indicates that it is considered to be facing a very high risk of extinction in the wild. So, here we were saying extremely high risk of extinction. Now we are talking about a very high risk of extinction.

Now, you may argue that that these are semantic words. But then, for this course, we are only looking into their definitions, but all of these have been more clearly defined. So, there are categories that would show that if the number of individuals left is so and so. If in the past n number of years the population has gone down by this percentage, then it would be put into such and such category. So, those numbers have well defined, but for this course, we are only going to look into the definitions. So, a tiger would an would be a species that is endangered.

Now, one difference you can very easily make out is that in the case of Javan rhinoceros, we have around 100 individuals left. In the case of tiger, we have say around more than 2000 individuals present in India alone, and it is also found in a number of other countries. So, you can see that it is endangered, it is not critically endangered, because the situation is not that bad yet.

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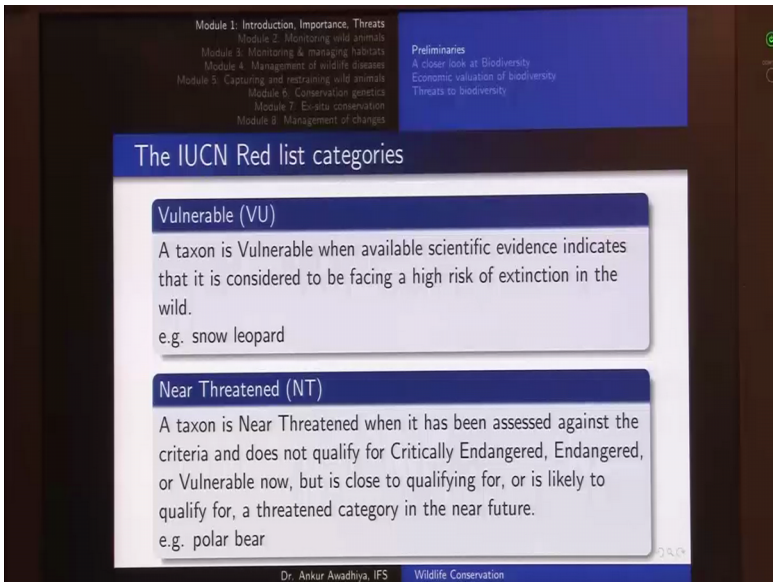

Next, we have vulnerable. A taxon is vulnerable, when available scientific evidence indicates that it is considered to be facing a high a high risk of extinction in the wild. So, in case of very high risk, now it is a high risk. Now, the examples includes snow leopard. Now, snow leopard also has lesson number of individuals that are left in the wild, but it is vulnerable, because the population is steady or is arising at a small pace. And at the same time, the habitat that is used by the by the snow leopard, does not face a very high level of threat from the human beings, because at less very high in the mountains in very cold areas, and we do not have quite a number of human being that live in those areas.

Whereas, in the case of tigers, they are found in tropical and subtropical areas, we have a very high population density, and there is a very high demand on the forest resources. So, people want to clear up those lands and convert them into say agricultural fields or into pasture land. So, it is in a threat category that is above this snow leopard.

Next, we have near threatened. A taxon is near threatened, when it has been assessed against the criteria, and does not qualify for critically endangered, endangered, and vulnerable now, but is close to qualifying for or is likely to qualify for, a threatened category near future. Say example includes polar bear.

So, even though we have quite number of polar bears left as of now, but because of climate changes and because of some amounts of hunting that is going on for the (Refer

Time: 11:48) this animal. So, it is a near threatened animal and very soon if nothing is done, if things go as usual, then it might become vulnerable.

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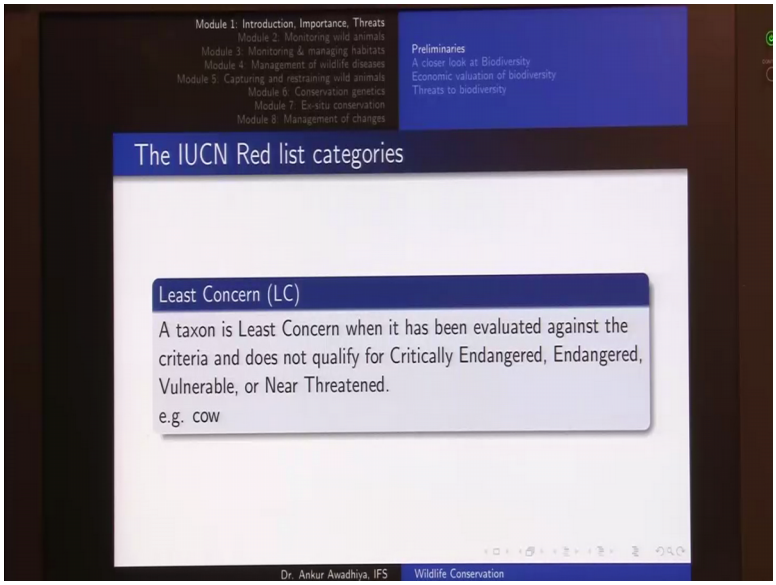

Next, we have species that are called as least concern. A taxon is least concern, when it has been evaluated against the criteria and does not qualify for critically endangered, endangered, vulnerable, or near threatened; example is cow. We could also include the domestic dog or the domestic cat as organisms that are least concerned organisms, because they are already present in very large numbers. And the threat that is facing those taxon is very less.

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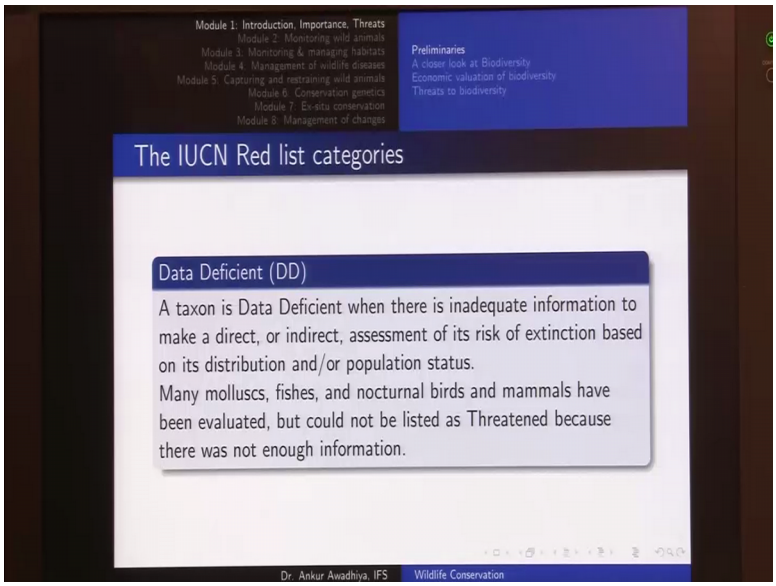

Next, we have data deficient. So, a taxon is data deficient, when there is inadequate information to make a direct or indirect assessment of its risk of extinction based on its distribution and or population status so many molluscs, fishes, and nocturnal birds and mammals have been evaluated, and could not be listed as threatened, because there was not enough information.

So, you would observe that a number of these organism or taxon are such that we are not able to gather data for them, because they are living in those habitats that are less accessible for most of us; so for example, nocturnal birds. So, they come out in the night, and in the night it is very difficult to detect these birds; or in the case of a number of molluscs, so they are out there in the large oceans. And in those cases, that is very difficult to go there and count all of to make an assessment, whether it is coming into any of these categories.

So, people have tried to evaluate these, but then the amount of data that we have for these taxon is very less, so which is why we have put them in the category of data deficient.

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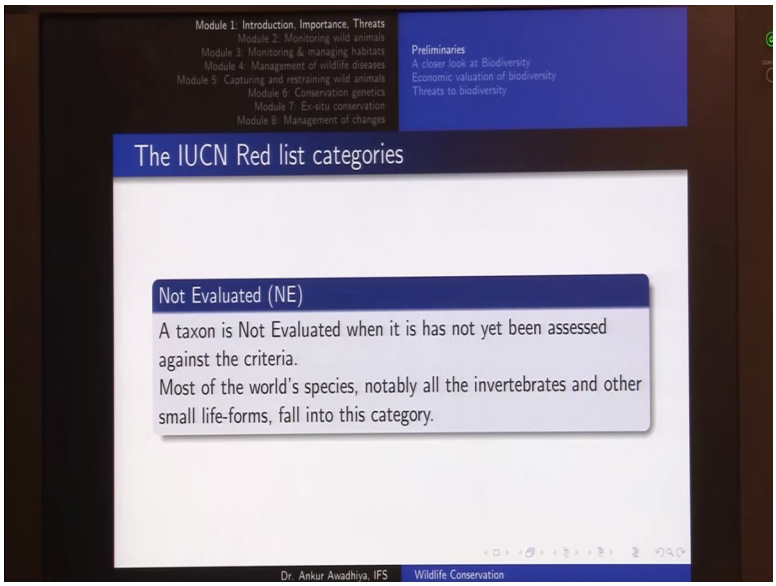

Next, we have the category of not evaluated. A taxon is not evaluated, when it has not yet been assessed against the criteria. So, we have not started to evaluate this in this taxon. Now, most of the world's species, notably all the invertebrates and others life small life-forms, fall into this category. Why, because if we talk about the invertebrates, and if we talk about say our tropical rain forest.

So, tropical rain forests are full of biodiversity, they have so many species that we do not yet know how many species are there. We have not yet gone there and classified each and every species, we (Refer Time: 14:13) have not yet identified each and every of those species.

So, for a species, that has not yet been identified, it has not been evaluated, so it comes under the category of not evaluated. And it is a estimated, that the largest number of taxon at the largest number of organisms are put into this category of not evaluated, because we have not yet taken a cognizance of those species and taxon.

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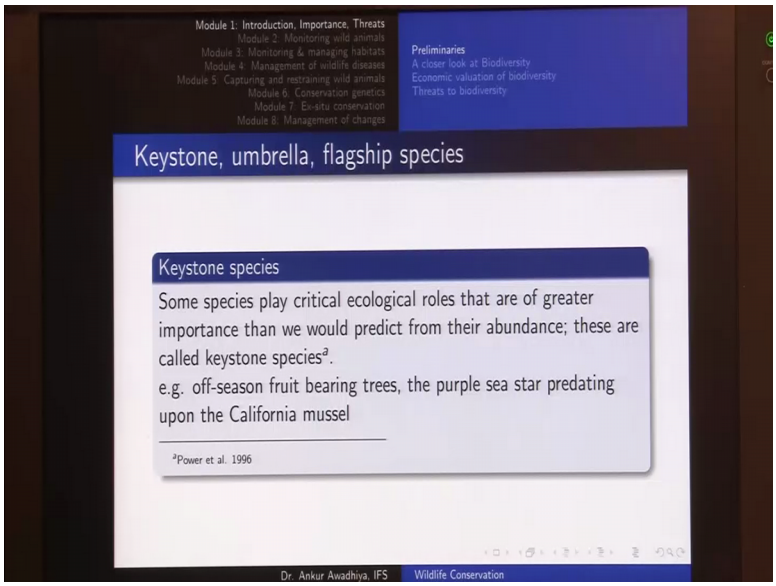

Now, the next concept that comes up is that of keystone, umbrella and flagship species. Now, if we have resources, so suppose we have x amount of funds, we have t amount of time, and we have n number of people. Now if we have to conserve a species, then we need to prioritize those species. Now, one sort of prioritization is what we just saw, the IOC and red list category. But then, even if you talk about species that are say extinct in the wild or that are critically endangered, so if you look at those species, we will find a long list of those species that has that are classified as critically endangered.

Now, given that we have limited amount of resources, we cannot conserve each and every of those critically endangered species, so then how do we prioritize. Now, for that prioritization, if you go out into the field; and suppose I like mammals, so I come from Madhya Pradesh, so I am very fond of tigers. I would say no, we should be conserving tigers.

There could be some other person, who is avidly fond of watching birds, and that person might say no, tiger has been talked about so much, let us conserve vultures. Or then, there could be a third person, who is very interested in frogs, and that person would say, oh this is one species of frog for which we have only 10 individuals left in the world. So, why not conserve these 10 individuals, we should put all our effort into 10 individuals, because we have like 3000 tigers, and we have only 10 frogs.

So, as administrators and as conservationist, how do we take this call, how do we decide, which species. So, as conservationist or as administrators, how do we take this call, should we should divert our resources to the conservation of tigers of a vultures of for these frogs, because the problem here is that we have limited resources, and we have unlimited demands. We have unlimited number of individuals that need to be protected.

Now, if we divert all of our resources from say conservation of tigers and from protection of our forest into these 10 frogs, we develop a state of the art facility, so that we can put all of these frogs there and we request them to breed as much as possible, so that we increase the size of this species. But, in that time, it is quite possible that while we are saving one species, we have already loss say a 1000 other species in our forest, that could have very easily been protected. So, such a strategy would be called as penny wise and pound foolish.

So, we come down to this question, how do we decide, how do we conserve those species, such that there conservation would result in the maximum amount of benefit, for the maximum number of species.

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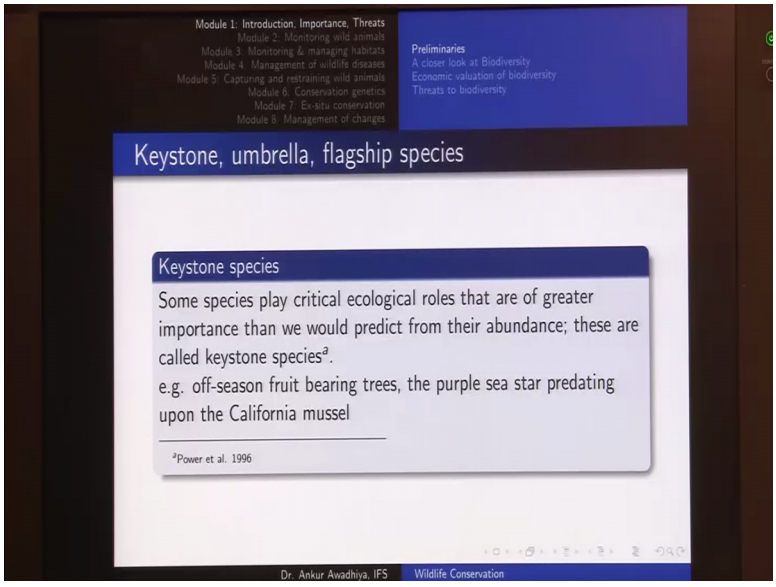

So, to answer that we come to this concept of keystone, umbrella and flagship species; now, key stone species: some species play critical ecological roles that are of greater importance than we would predict from their abundance, and these are called keystones

species. Now, examples include an off-season fruit bearing trees, the purple sea star that is predating upon the Californian mussel; or say species such as tigers.

Now what happens is that if you consider this off-season fruit bearing trees, so example could be say a say trees of the ficus species. Now, ficus species includes trees, such as the banyan tree, the people tree, the Gular tree, and so on. Now, for these species of trees, they support quite a number of organisms. And especially in the off-seasons, because their fruits are edible, their flowers are edible, in some cases their leaves are also edible, so they support quite a number of organisms.

Now, if there is a single banyan tree out there in the forest, it would be supporting say more than 1000 or say around 2000 organisms, including a number of species of birds, a number of species of rodents, such as squirrel, a number of other small mammals. So, when we talk about such species, they are doing a role that is much greater than their numerical abundance. So, if we protect such species, then the ecology as a whole will be supported to a very large extent.

Another example of keystone species would be say a species like tiger. Now, a tiger is a top carnivore, it feeds on a number of other herbivores, such as a number of deer species or the Indian God. Now, if we remove tiger from an ecosystem, then it is quite possible. That all of these herbivores, because they are not being predated upon, so they will increase in their numbers. Now, if we have a number of herbivores out there in the forest, they would be eating away all of the grass, they would be eating away all of the plants that are coming up, all of the seedlings that are coming out from all these (Refer Time: 19:36).

So, what would happen is that in a very short while we will be having a forest in which there is no regeneration, so a tiger just by predating upon so many of the herbivores is playing a very key role in the eco system because of which it is called a keystone species. So, whenever we have a keystone species in an ecosystem, we need to conserve and protect that species, so that the ecosystem as a whole functions in a proper manner.

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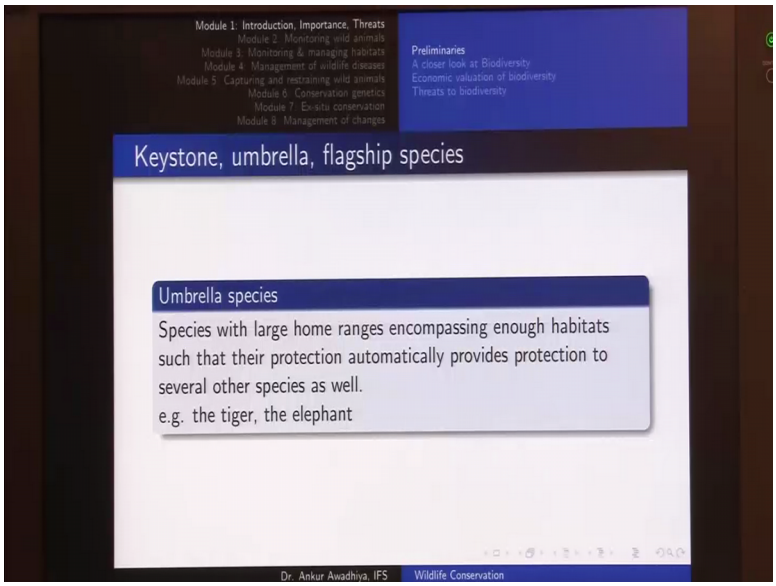

The next species is called as the umbrella species. Species with large home ranges encompassing enough habitats such that their protection automatically provides protection to several other species as well; example the tiger, and the elephant. Now, in the case of the tiger, a tiger requires an area of close to around 100 square kilometers for instance, now this value would be even greater. So, for instance, in the case of Siberian tigers, they require as much as 800 square kilometers of area.

Now, if we develop a policy that we are going to conserve tigers, we will have to protect all of this large area. So, just by taking the name of one species will be conserving an area of say around 100 square kilometers in India or say 800 square kilometers in Russia. Now, in this huge expanse of 800 square kilometers, there would be a number of other species that will automatically get protected, because we are not allowing any human interference any amount of coaching into (Refer Time: 21:08) these area, so the others species also get protection. So, umbrella species are those species that have very large areal requirements.

Other example is the elephant. So, elephants are large sized animals, they require huge amounts of food, and they are known as mega herbivores, they are destructive feeders. So, essentially, if you see an elephant feeding in a forest, it would go say break one free eat some of its leaves, then leave that that tree, there go to the next tree, take out some portion of the bark, topple that tree, and then move further.

Now, elephants also are umbrella's species, because all because of this habit of being destructive feeders, and also because of their large dietary requirements, they require a large size forest. So, you would typically observe that elephants do not stay in one place, because if they stayed in one place, all of these trees would be eaten. So, they keep on moving from one place to another place.

So, for any herd of animal of elephants, you would require a very large size of forest that needs to be protected, and just by protecting that large size of forest, for one species, such as the elephant. We are also given protection to a number of other species that that have smaller home ranges that are in encompassed in that large size forest.

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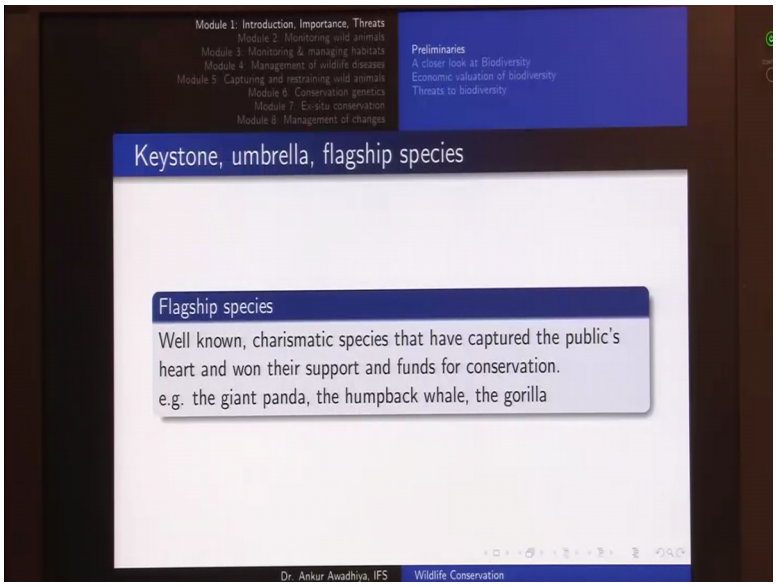

The third category is that of flagship species. Now, these are well known, charismatic species that have captured the public's heart, and won their support and funds for conservation. Examples include the giant panda, the humpback whale, the gorilla, the dolphin, and so on.

Now, why is this important, because for any amount of conservation, we require resources, we require funds. And where do we get these funds from, we get it from the public. If there is a public opinion that is diverted towards conservation, then the government will automatically give us more funds for conservation. At the same time, for a number of resources, such as say fur that is used for coat; if there is a reduced demand for fur, then automatically poaching will get abided.

Now, how do we reduce the demand for fur by having more and more people into the cause of conservation? And how do we bring more and more people into the conservation fold by showing them some animals that are chubby looking or some animals that are extremely majestic or they are very colorful, so that people are able to connect to those animals. So, for instance, when we talk about the giant panda, the giant panda is also there on the logo of the WWF, the World Wide Fund for nature.

Now, consider a species such as the panda, it is black and white bear or say a polar bear, and consider some other species such as a snake. Now, a number of people would be able to connect to these chubby looking or beautiful looking animals such as the polar bear, and very less number of people would be able to connect to a snake, even though a snake might be having a very important role in the eco system nonetheless; similarly, when we talk about species such as dolphins.

So people generally have a soft heart towards dolphin. So, when you talk about dolphin, everybody wants to hear about those. But then, in case of dolphins, if see you are a talking about an ant, then would be a very less number of people that would interested in knowing about the ant or would be able to provide their time, and money, and other resources, for the conservation of ants.

So, when we talk about protection of the flagship species, it is critically important to conserve these species, because people like them people, want them to exist, and so it makes much more sense to conserve these species. But then, we have all of these three definitions together, what about those species, that are keystone species, that are umbrella species, and that are also flagship species. So that would be the best of all the worlds.

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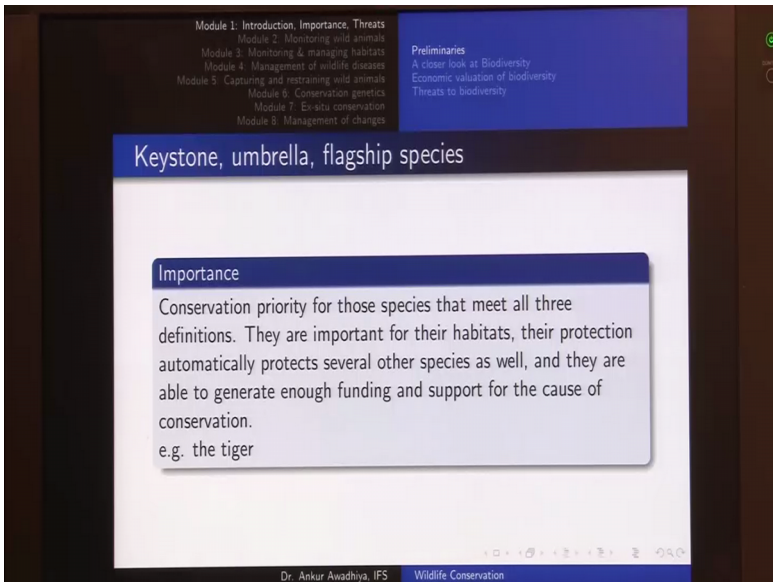

So, conservation priority is given for those species that meet all the three definitions. So, they are important for their habitats, their protection automatically protects several other species as well. And they are able to generate enough funding and support for the cause of conservation; for example, the tiger.

Now, in the case of the tiger, it is a keystone species, because it is playing a very important role in its habitat. If you remove the tiger, the whole of the ecosystem will be collapse down, also it is an umbrella species, it has a very large areal requirement. And if you protect the tiger, then its protection will automatically protects several other species that are there in the same forest.

So, when you conserve the tiger, you are automatically conserving a number of deer species, the hair, you are conserving quite a number of monkeys, you are considering quite a number of different species of trees and plants, because you are not allowing people to go there and poach indiscriminately. So, you are also preventing those people from having a large amount of grazing into those areas. So, just by protecting the tiger, you are also protecting so many other species.

And at the same time, people want to see a tiger, people go to a tiger reserve, spend 1000 of rupees just to have a glimpse of the tiger. Why, because it is a very majestic species, it has a very golden orange color, it has black colored strive, it looks good. So, if you go to any of the tiger reserves, and if you observe any tourist, that has seen a tiger end is avidly

taking pictures of a tiger, you would you would get a sense of the of the amount of excitement that the person is having, just by seeing this tiger.

So, when we talk about the conservation of tiger, people are able to connect to this species also, because it is connected to our religious believes. So because of all these reasons, then this tiger is able to generate enough funding and support for the cause of conservation. So, conserving a tiger makes a huge amount of sense, as it is say conserving an elephant. An elephant is also a keystone species, because it is a destructive feeder, it provides quite a huge amount of nutrition available to other animals that live on the ground.

So, for instance, if you if you see a large sized tree, and in the summer season, when there is hardly any grass available. And we have a number of deer species in the forest, a deer species cannot climb up on a tree and eat the leaves. But then, if there is an elephant in that area, the elephant will topple this tree down, and make all these leaves available to be eaten by the deer species. So, it is a keystone species. Again, it is an umbrella species as we saw; it requires quite a huge amount of area for itself.

So, if you if you protect an elephant, you are also protecting a number of other species. And also it is a flagship species, not only because we have elephant reserves and people want to go there and observe these animals. But, at the same time, there also flagship because of our religious beliefs, because they consider Lord Ganesha to be an incarnation that is quite connected with the Indian elephant.

So, if you are conserving the elephant you are you are conserving a species that has a keystone species, and umbrella species and a flagship species. So, it makes a huge sense just by a by conserving the species, you will get enough resources. And you will also protect a number of other animals, and you will also ensure that the ecology works fine.

Now, to move up with basically that is all information that we wanted to say for today. So, now let us have a look at what we are going to do in this course.

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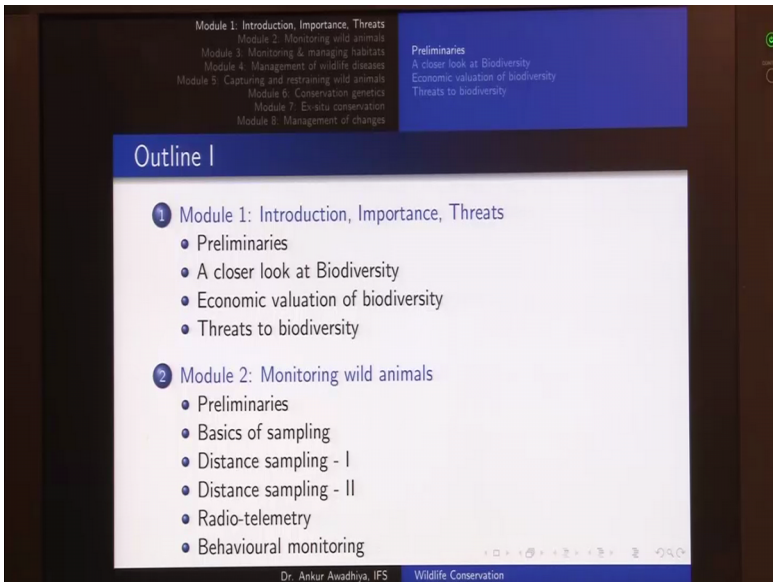

So, this course will have eight modules. So, the 1st module is what we are going through; then next module will be on monitoring of wild animals; so basically will talk about basics of sampling. So, how do you know how many animals are there in your area, because, if you want to perform any activity in your area, if you are trying to do any amount of conservation, so for instance you are conserving tigers. How do we know (Refer Time: 29:09) bearing fruit or not, will only get to know about that. When we see that are number of tigers last year was say 2000, now it has grown up to 2500.

So, we would say, our population of tigers is increasing, so conservation is going fine; or at least its population is stable. But then, if its population goes in into a decline, then we would say that there is something else that needs to be done, there are still some lacuna left. So, monitoring is extremely crucial.

So, we will look at basics of sampling, distance sampling, which is a process that is used for the sampling of animals in the forest, radio telemetry in which we use a tracking device on an animal to be able to go to that animal whenever we need, and they monitor that animal. And also behavioral monitoring, which tells us what sorts of behaviors these animals are showing.

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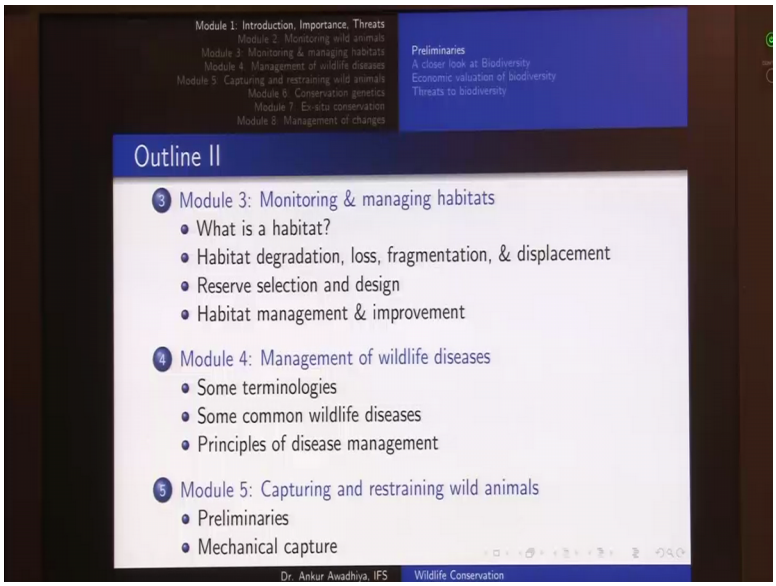

The 3rd module will be on monitoring and managing of habitats. So, we will start with an introduction of what a habitat is, then habitat degradation, loss, fragmentation and displacement are essentially why are habitats under threat. Then we will look at how do we select and design a reserve. So, if you have an option of designing a tiger reserve, what should be its area, what should be its size, what should be its shape and things like that. And also we will have a look at habitat management and improvement options.

In the 4th module, we will look at the management of wildlife diseases. So, we will look at some terminologies that are used, whenever we are describing a disease. Then we will look at some common wildlife diseases. So we will take four case studies one bacterial, one fungal, one parasitic, and one viral disease, to look at how these, the diseases progress in their nature. And also we look at the principles of disease management.

Now, in the 5th module, we will be having capturing and restraining of wild animals. So, what is capturing, what is restraining, what are different kinds of capturing. When we talk about mechanical capturing, what (Refer Time: 31:12) kinds of traps can be used.

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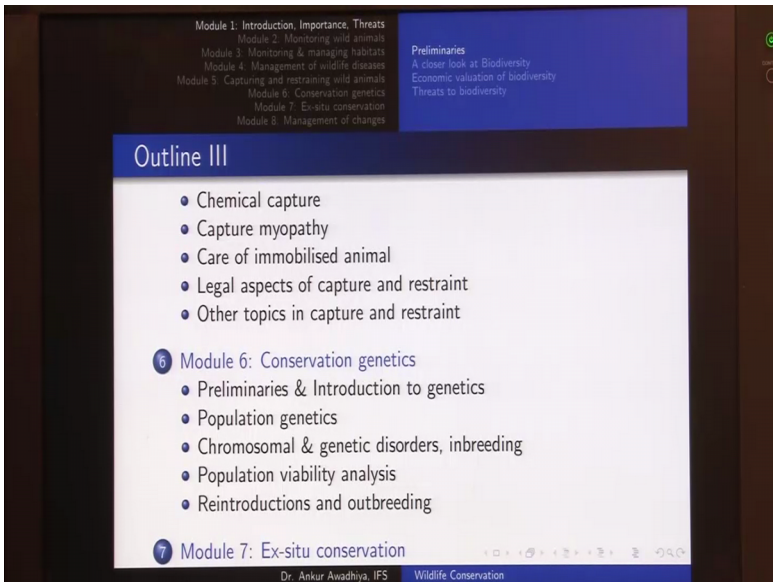

When we talk about darting an animal with a drug that tranquilizes or immobilizes that, then it is known as capture it is known as chemical capture. And we look at what are sorts of drugs are used what (Refer Time: 31:26) sorts of equipment are used. Then also things like capture myopathy, which is a disease that is found when we are capturing an animal. Then we will also look at care of a mobilised animal. And also most importantly the legal aspects of capture and restraint, and also some other topics like human safety.

Now, in the 6th module, we will be having conservation genetics. So, we will look at introduction to genetics, population genetics, genetic disorders, population viability analysis. So, this is a technique in through which we get to know whether our population will be able to survive for say the next 100 years or for the next 500 years.

Next, we will be having a look at reintroductions and outbreeding. So, if your population has gone down, how do you bring more tigers from outside? If and when you are bringing these tigers, where should you bring those from, what is outbreeding. So, we look at in breeding and out breeding; so in breeding here and out breeding in this lecture.

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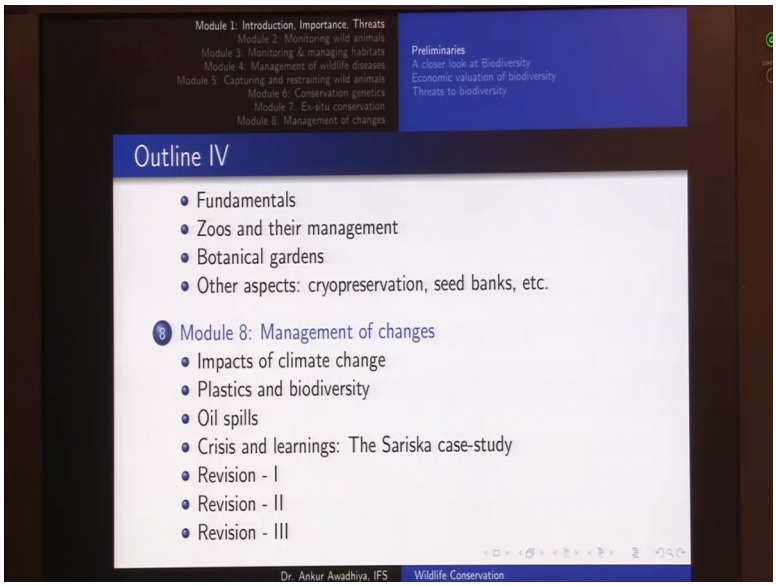

Now, in the 7th module, we will look at ex-situ conservation; ex-situ means of the site. So, the fundamentals of ex-situ conservation, then zoos and their management, botanical gardens and their management, and some other aspects such as cryopreservation preservation and seed banks in which we are we are conserving or preserving certain a gametes or say embryos in a very cold stage. In the last module, we will be looking at the management of changes. So, for instance, these days there (Refer Time: 32:53) quite a lot of talk about climate change, the impacts of climate change. So, how does climate change impact our wildlife, what can we do to prevent climate change, and also what kind of adaptation measures can we put in to our reserves, so that our animals are able to survive this climate change.

Then plastics in biodiversity, so just being a year of plastics, so we will also have a look at what sorts of impacts is this having on our wild life, and how can we counter those. Then oil spills, and also crisis and learnings The Sariska case-study. So, the Sariska tiger reserve is one tiger reserve that had lost all of its tigers, so it became a very serious crisis situation. So, how did we get to that stage, how are we able to come out of that stage and things like that will be discussed in this case-study. Then will be having three sessions for revision. And also for of a problem solving, and also for discussing the examination pattern, so that is all that we are going to do in this course.

Thank you for your attention. [FL].