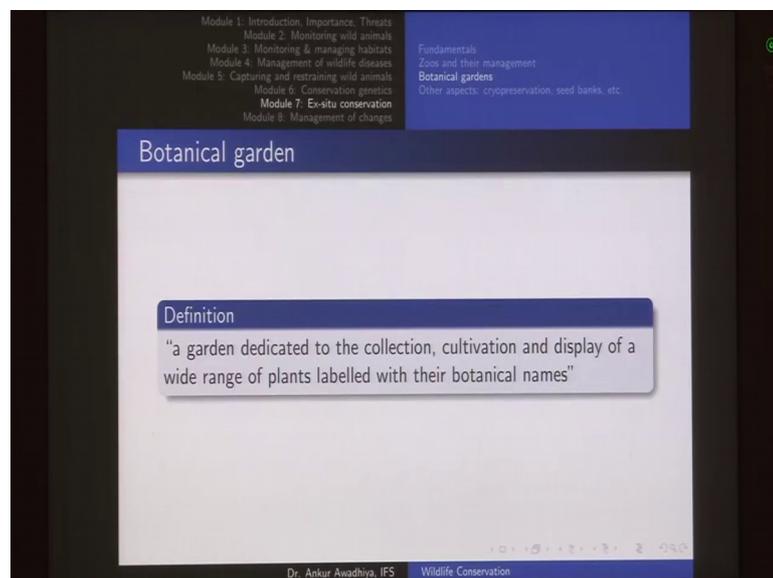


**Wildlife Conservation**  
**Dr. Ankur Awadhiya**  
**Indian Forest Service**  
**Indian Institute of Technology, Kanpur**

**Lecture – 32**  
**Botanical Gardens**

[FL] Moving forward in our module of ex-situ conservation let us today have a look at botanical gardens.

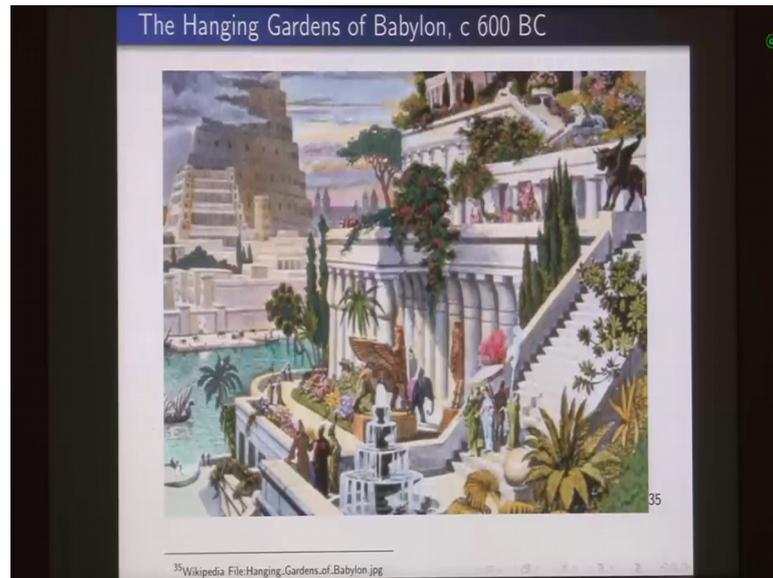
(Refer Slide Time: 00:22)



So, let us begin with definition of botanical gardens. A garden dedicated to the collection cultivation and display of a wide range of plants labelled with the botanical names. So, essentially this is a garden, but this garden is different from other normal gardens, because it is dedicated to the collection, cultivation and display of a wide range of plants. So, essentially you are collecting these plants not just from your own areas, but also from some other areas.

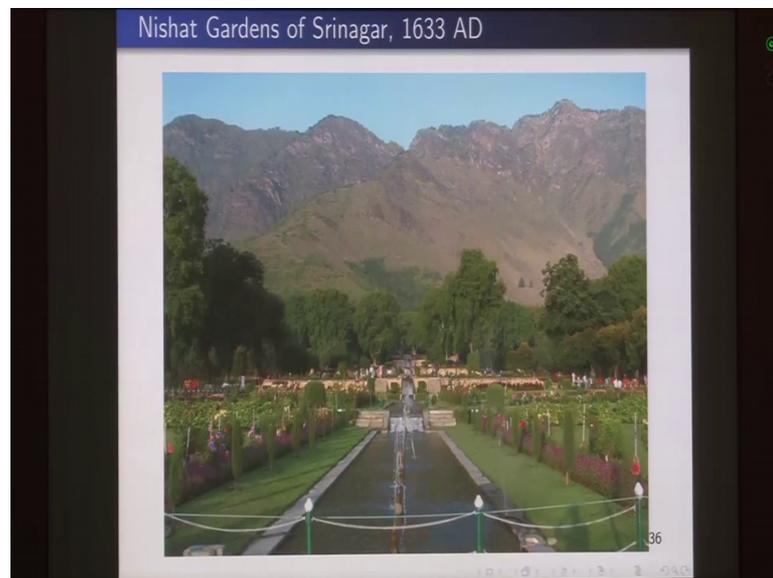
Then you are cultivating them in this garden and we are displaying them for people to see. And you are displaying a very wide range of plants, and all of these plants are labelled with the botanical names because the purpose of the botanical garden is more of a scientific purpose than mere pleasure. So, botanical gardens have come out from a normal gardens, but they have given it about scientific bent.

(Refer Slide Time: 01:18)



So, the history of gardens is very old. The hanging gardens of Babylon around 600 BC were one of the old Seven Wonders of the World.

(Refer Slide Time: 01:28)



In India also we have had a very long tradition of having gardens. So, for instance this is the Nishat Garden of Srinagar. This was created in 1633 AD. But if you look around if you see these gardens the amount of plant diversity is not very huge. So, the mostly the plants that are shown here are the ornamental plants or grasses. And besides they do not have a very high scientific bents, so essentially all of these species will not be labelled.

So, essentially it is a difference of purpose, do you want a garden for playing or do you want a garden for scientific analysis discrimination and also for conservation of biodiversity. If you are doing the second thing, then it becomes botanical garden.

(Refer Slide Time: 02:06)

Module 1: Introduction, Importance, Threats  
Module 2: Monitoring wild animals  
Module 3: Monitoring & managing habitats  
Module 4: Management of wildlife diseases  
Module 5: Capturing and rearing wild animals  
Module 6: Conservation genetics  
Module 7: Ex-situ conservation  
Module 8: Management of changes

Fundamentals  
Zoo and other management  
Botanical gardens  
Other aspects: in-situ conservation, seed banks, etc.

### Roles of botanical gardens

- 1 Conservation awareness
- 2 Interest in gardening
- 3 Information network for propagation of scientific information
- 4 Access to seeds and plant transfer sites
- 5 Repository of biodiversity
- 6 Educational sites, esp. for relation between plant and ecology
- 7 Source of botanochemicals
- 8 Availability of plants for scientific research
- 9 Study of plant diversity and identification
- 10 Protection of rare species

37

<sup>37</sup>1. Ballantyne Tourism Management Volume 29, Issue 3 2008. 2. Brockway American Ethnologist, 6(3), pp.449-465 1979. 3. Hill Annals of the Missouri Botanical Garden, 2(1/2), pp.185-240 1915.

Dr. Ankur Awadhya, IFS Wildlife Conservation

So, botanical gardens have a multitude of roles. So, they are a repository of biodiversity. They are an ex-situ conservation methods, but at the same time they also perform a number of other roles. So, it is conservation awareness. So, for instance, when we talk about biodiversity and we as students of conservation we know what biodiversity is, how many kinds of species are there or that we are losing as many as 27,000 species per year just from our tropical forest as we have calculated. But then for our general public how do we told them that there is such a huge diversity of plants and animal life, so which is why zoos and botanical gardens becomes very important. So, they are very important for conservation awareness.

So, people who are having an interest in gardening, they can use these resources to say get some seeds or may be just to go there and watch how people are cultivating these botanical gardens, because these botanical gardens are maintained in a very scientific manner. So, a number of gardening inputs can be had from these.

Then these are information network for propagation of scientific information. So, these are not just areas where people go and see things, but these are also areas where quite a lot of scientific research is going on. And then because all the botanical gardens form a

network. So, it also becomes a network for the propagation of information then it provides access to seeds and plant transfer sites. So, these become important. So, for instance if there is a botanical garden in India and this garden wants to have some plants that are not found in India. So, one way is that you can go to the other place say South America and get the seeds from there, or else if there is any botanical garden nearby or may be in nearby country that has these plants. So, you can access this seeds and plants from that botanical garden. So, it also becomes a very good medium for transfer of seeds.

Then it is a repository of biodiversity, it is also a very important educational site especially for relationship between plant and ecology. So, for instance a botanical garden in India, if it is showing plants of South America or plants of Europe or plants of Australia, all of these would be requiring different habitats. And when you want to grow these plants in your country, you would have to recreate that habitat. So, it becomes very important site for studying the relationship between plants and ecologies. So, if there is a student who wants to understand why ecology is important or why habitat is important and why only certain species go grow in certain areas, then these would be very good educational sites.

Then these are also source of botanical chemicals or phyto chemicals. So, these are the chemicals that are harvested from plants; and specially for say some amount of scientific research or some amount of medicinal research you can have access to some seeds or some flowers or some leaves from these botanical gardens. So, they also become a source of botanical chemicals for pharm ecological studies as well.

Then they make available the plant force scientific research. So, you do not have to go to their original (Refer Time: 05:14) the original place where they were going, but you can have access to the samples from the botanical gardens. Then they become very important such as for the study of plant diversity and identification. So, if there is a student of botany and in the case if botany people want to know the various forms of leaves that are there or the various forms of fruits that are there. So, they can always go to a nearby botanical gardens and witness with their own eyes what all different kinds of variety are available. Then these also become very important for identification purposes. So, for instance, if you want to know what are the characteristics of the cucurbits family. So, you can go to a botanical garden and look at a number of species from this family, so that your identification becomes much better.

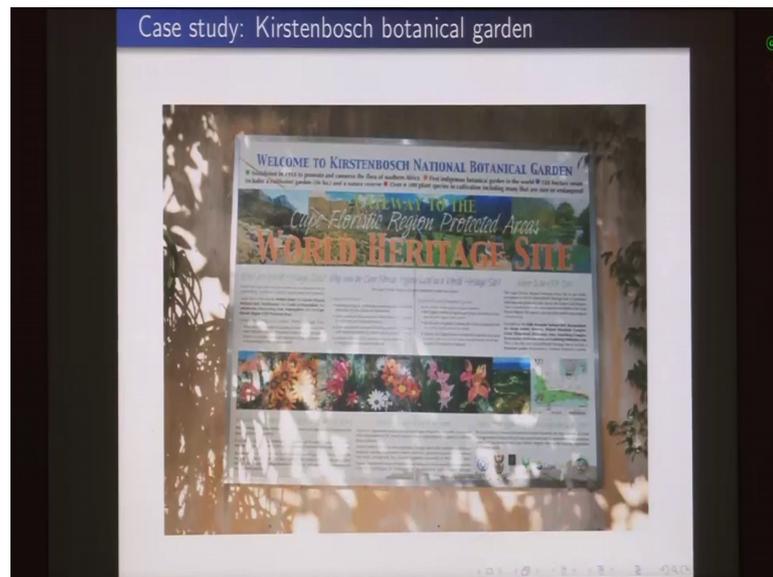
And then they also play a very important role for the protection of rare species. So, for instance there are a number of species that as we saw earlier are extinct in the wild, but then they can still be there in the botanical gardens. So, they are protecting those rare species.

(Refer Slide Time: 06:18)



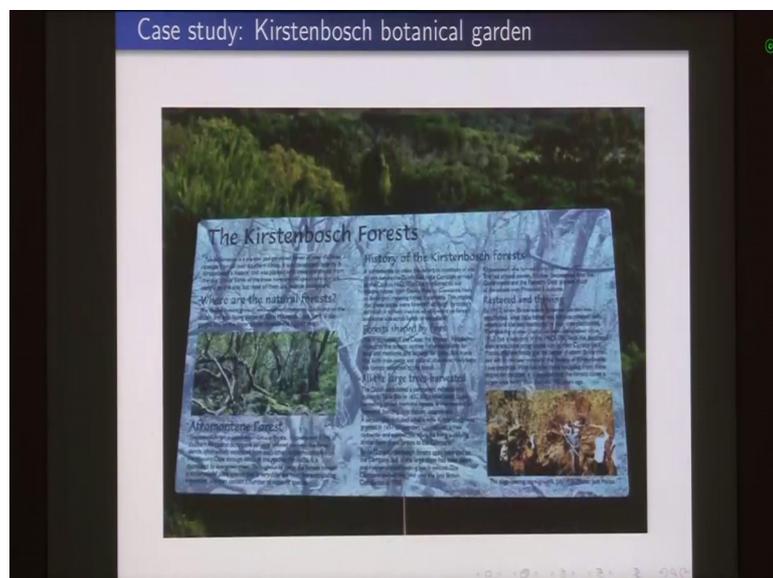
So, there are a number of roles of botanical gardens and we will look at the Kirstenbosch Botanical Garden in Cape Town as a case study. So, what all things happen in a botanical garden and how do they act as places where the message of conservation is disseminated to the general public.

(Refer Slide Time: 06:31)



So, Kirstenbosch Botanical Gardens are a part of this cape floristic region wild heritage site. So, they are of international importance.

(Refer Slide Time: 06:40)

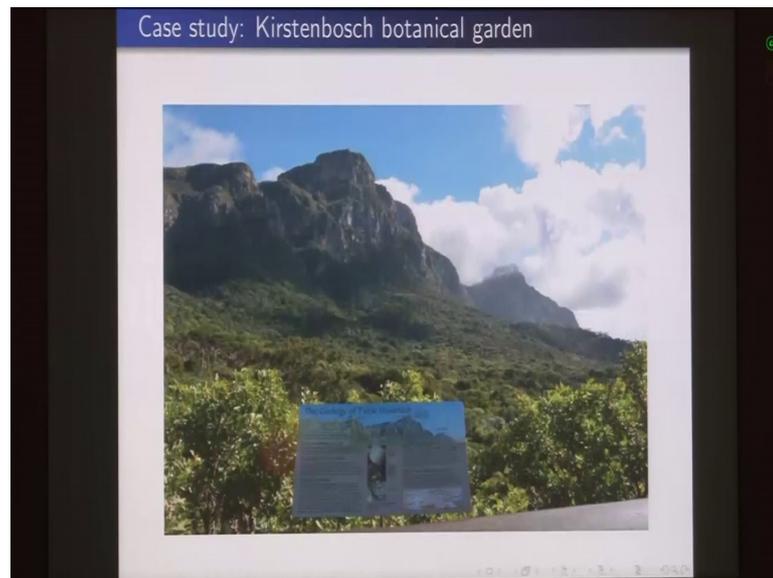


And these gardens have been set up in the Kirstenbosch forest. So, these are the forest in Cape Town, but then these forest the specialty of these forests is that fire is a very important role in the formation of these forests. So, for instance in our country if we go to a very deciduous region, so for instance Madhya Pradesh, so there are a number of species that are dependent on fire for their propagations. So, only when there is the fire

will the fruits open and release the seeds or may be the only when there is a fire will the seeds germinate. Now, these are the forest of that category.

Now, in our recent past most of the trees from these areas, especially the large size trees were cut down for timber. So, when these trees are cut down then later on some conservation is believed that at this area could become very important for conservation purposes. And so our big part of this forest was converted into the botanical gardens.

(Refer Slide Time: 07:34)



And in this botanical garden we have a range of habitats that are labelled because these have these mountains here. So, you have the mountains, you have the Tallu's and you have the flat areas, and other habitats have been created artificially.

(Refer Slide Time: 07:50)



And just like any other botanical gardens we have very nice pathways. So, you can go just go for a morning walk or evening walk, but at the same time, you can go there and have a look at different species and most of these trees are labelled. So, we will come to this in a short while.

(Refer Slide Time: 08:07)



So, people go there to have a look at flowers to understand different varieties.

(Refer Slide Time: 08:10)



To look at insects and their relationships with flowers.

(Refer Slide Time: 08:13)



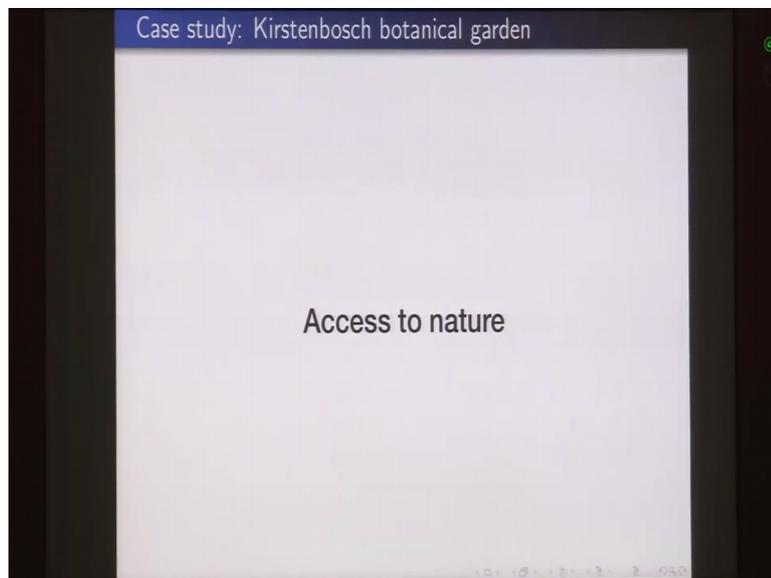
You look at birds. So, for instance this is a bee humming bird. And so if you want to understand the relationship between this beak and these flowers, so you can very clearly see that this bird is having this beak which is very slender and very long because it is feeding on the nectars of these flowers which have a tubular structure. So, only such kind of a beak will be able to get inside and take the nectars out. So, if you want to teach such things to our students, then have to visit these gardens become very informative.

(Refer Slide Time: 08:45)



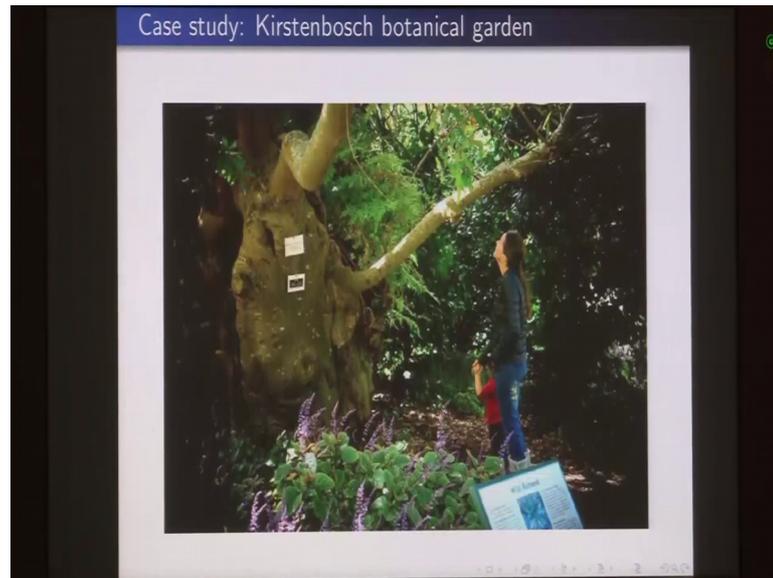
At the same time there are a number of snakes and so there is quite a lot of herpetological research that is also going on in the Kristenbosch gardens.

(Refer Slide Time: 08:52)



So, it provides an access to nature.

(Refer Slide Time: 08:55)



And when we talk about conservation, in these areas you would normally find that there are parents who were teaching their kids things about their forest or things about the trees or things about the ecosystem. So, for instance, if there is child who is growing who is growing in urban areas and does not understand how many kinds of birds are there, how many kinds of trees are there or why are these trees important. So, just to visit to this to these gardens, and if you visit an area which does not have shade and then you move towards an area that has the canopy, you can very clearly tell that these areas are much cooler, they are much more humid and things like that.

So, parents spend quite a lot of time teaching their kids about different plants. These also become important because for instance for most of us are earlier our classes started with things like name 5 fruits or name 5 flowers or name ten insects or name five birds and so on. Now, if you have a visit to such a place when you do not have to remember all of those name, but just because you have seen these things with your own eyes. So, you just remember them directly without putting it for a rote learning.

(Refer Slide Time: 10:04)



So, we saw that so we can normally see that there are number of kids that are playing here and so it creates a connect with the nature, because these kids will be growing up with all these trees and flowers around them. So, it creates a connects with the nature with their nature, and it also creates people who are bent towards the cause of conservation.

(Refer Slide Time: 10:22)



Then these days most of our botanical gardens are multi used areas. So, for instance even in these gardens, there would be areas their families can spend their time together. So,

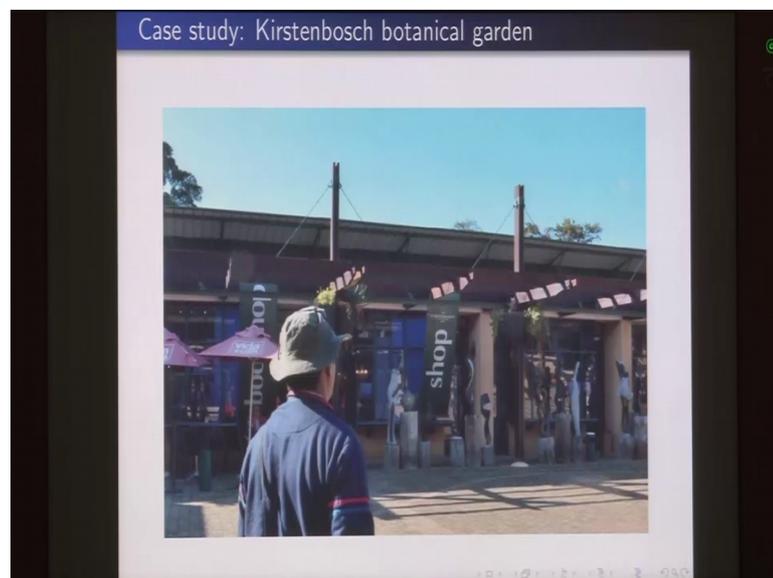
this is also important because if you have such a facility when people are spending their time with nature, then they also become bent towards the conservation cost.

(Refer Slide Time: 10:41)



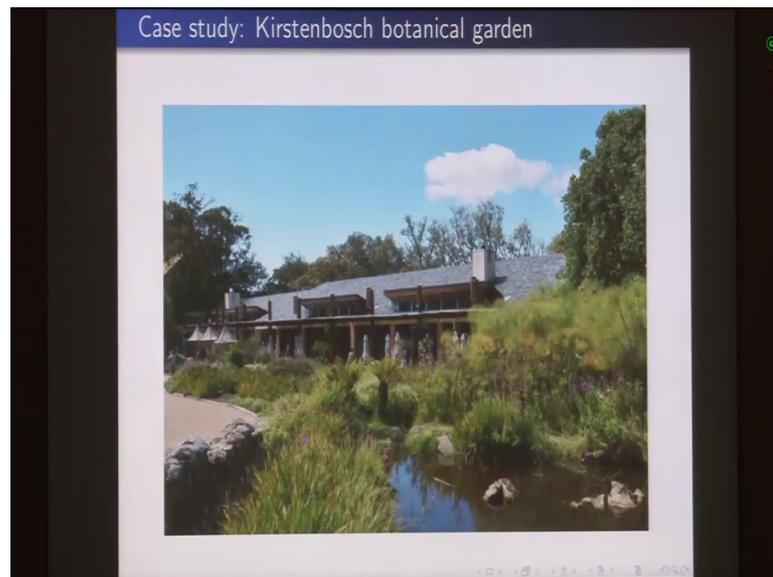
So, in these gardens you can look at birds and other stuff.

(Refer Slide Time: 10:45)



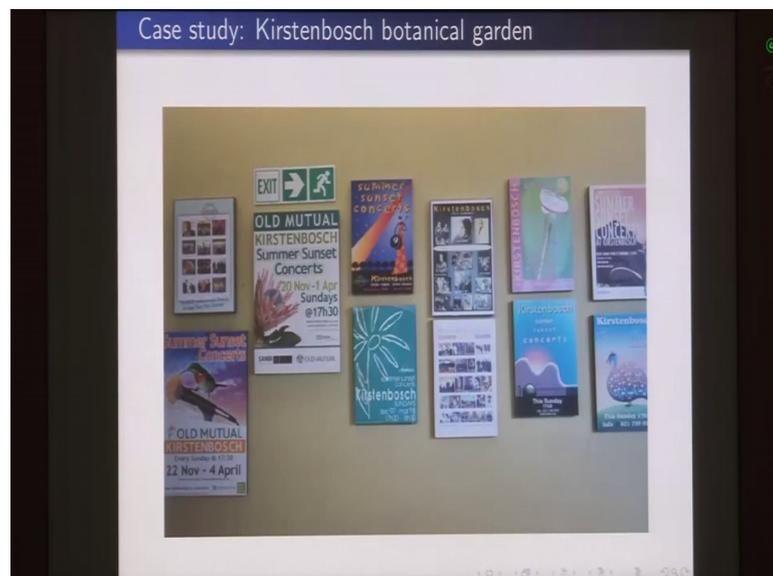
And then just to ensure that people spend their time here these gardens, these botanical gardens also have a number of other amenities such as shops or restaurants.

(Refer Slide Time: 10:56)



Or places where you have a small lake.

(Refer Slide Time: 10:59)



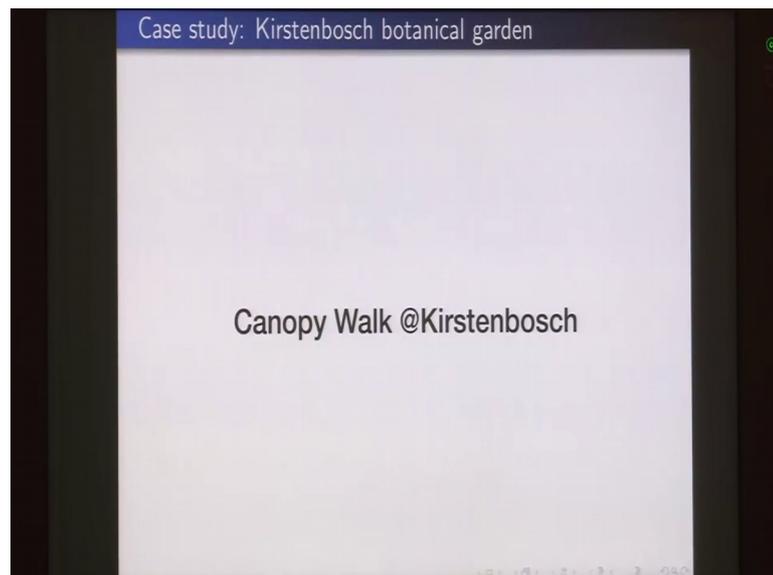
And then coming back to our multi use areas, these gardens are also used for the such as concerts. So, regularly a number of concerts are held there.

(Refer Slide Time: 11:07)



So, things like this. So, in this way the aim of the botanical garden is to have more and more people coming to these areas, because when you have more and more people coming to your botanical gardens and spending time with nature, only then they will understand what biodiversity is, why is it important. And later on if there is a scope of a new law being passed or a new act being formed for pro conservation or anti conservation, so these people will act as messengers to further cause of conservation.

(Refer Slide Time: 11:43)

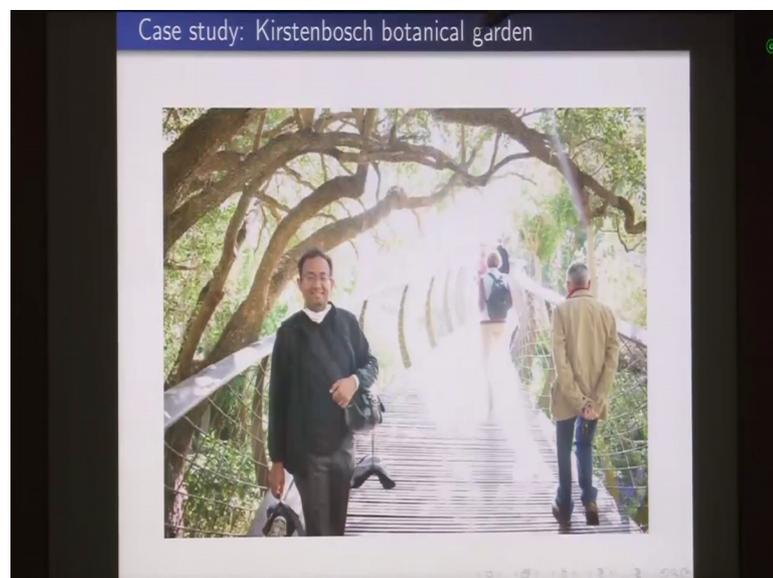


Now, there are some other things here which are quite unique. So, one of these things is the canopy walk, which is also goes by the name of Boomslang

(Refer Slide Time: 11:46)



(Refer Slide Time: 11:52)



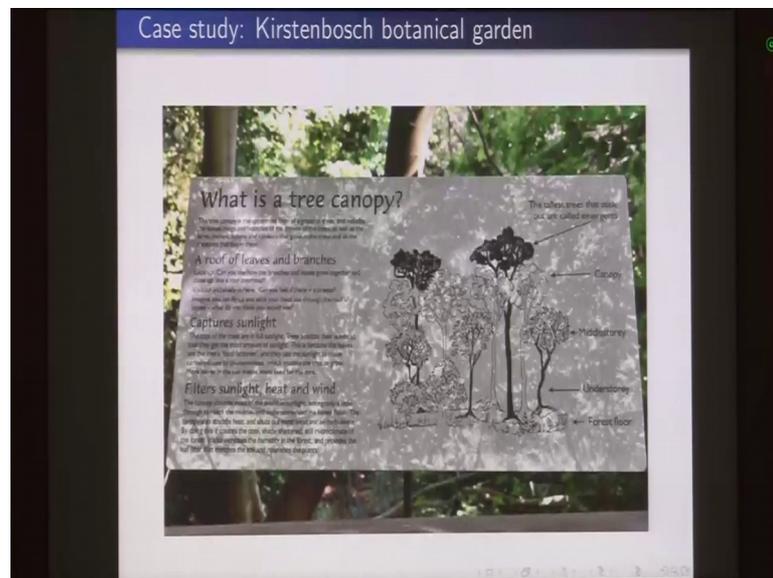
Now, what this canopy walk is that you have trees and on the top of these trees are nearly at the top of these trees you have this walk way, on which you can walk.

(Refer Slide Time: 12:02)



Now, why and a number of areas trees are growing through these walk ways now why our such things important, and what is their role in conservation?

(Refer Slide Time: 12:09)

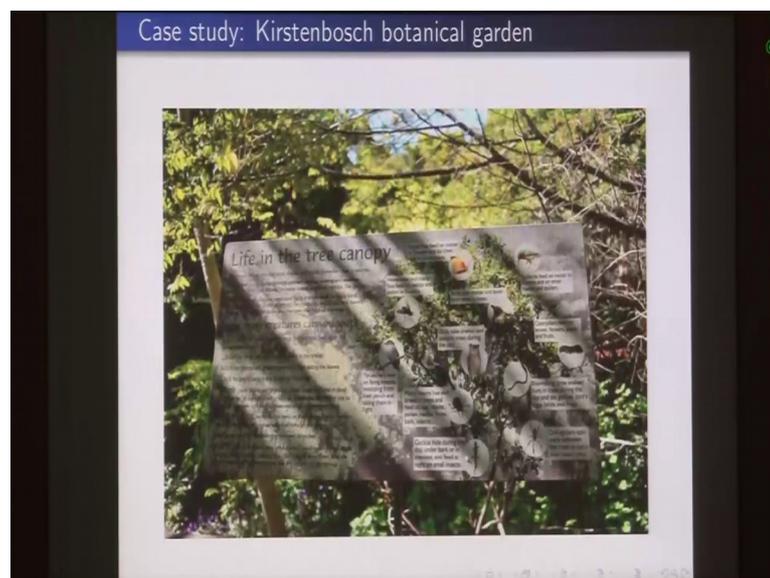


So, for instance, you will see a number of lakes there and which will tell us what is a tree canopy. Now, most of us who have not visited such areas or who were not lived in areas which are close to forest or have not observed trees very closely would have remembered the definition of canopy by route in our biology textbooks. But then when you go there, and then on the top of this walk way, you are saying all these trees around you and then

you get this board which tells you what is canopy. So, it says things like a roof of trees and of leaves and branches, it captures sunlight, it filters sunlight heat and wind, and then you have these different stories.

So, you have these tallest trees which are the emergence, when we have this canopy. So, this canopy is all this top portion that forms an umbrella, then you have a middle story then you an understory and then you have the forest floor. Now, when we learn about ecology, we read such things in a textbook, but then when you go on top of this canopy what you have this textbook with chip and then you can also see it by your own eyes which one is the emerging, which one is the top canopy, which is the middle story and so on.

(Refer Slide Time: 13:21)



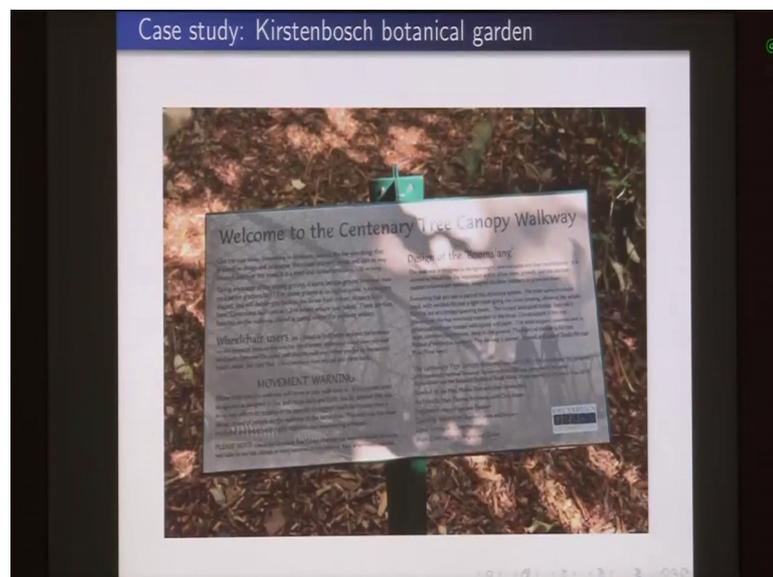
Then it also provides information about life in the tree canopy. So, for instance, this board tells you different kinds of life forms that live in a canopy. So, it talks about things like birds, butterflies, insects, smaller insects, spiders, then snakes, then you have reptiles and so on. And then it also tells you what is their role in this in a maintenance of this ecosystem or in the maintenance of this habitat. So, essentially the canopy provides shelter for all of these life forms; and all of these life forms in effect are also supporting the canopy. So, when you are there and when you observe all of these life forms together, and then you are given this information. So, it remains in your brain for a very long period.

(Refer Slide Time: 14:11)



Then you also have some fun activities such as these are the kinds of birds that are there and having a spotted of these and the canopy. So, just a look at such a board and when you see all these birds around, you will get to know that yeah there is quite a lot of biodiversity that exists in this forest.

(Refer Slide Time: 14:27)

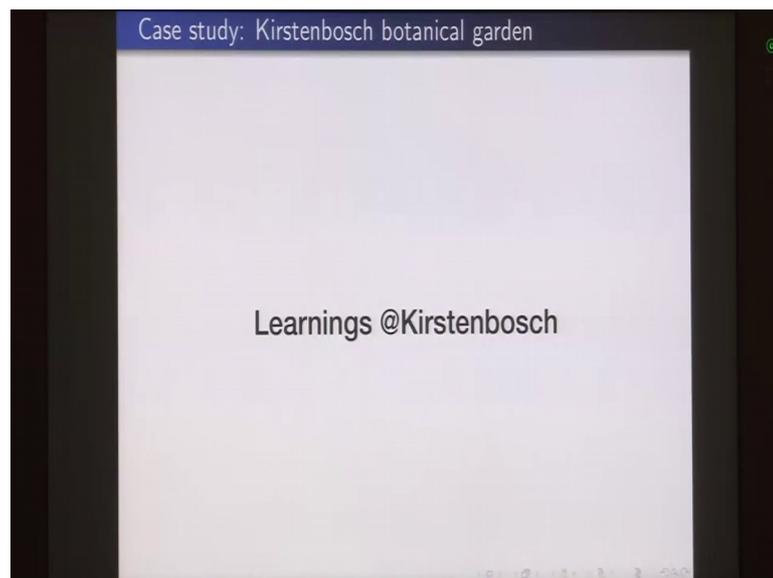


Then these canopy walks also tell you things about the engineering backgrounds. So, how does this canopy walk work, what are the mechanisms or what are the mechanical aspects of it so things such as these provide quite a lot of input, quite a lot of experiences

and these are direct experiences, because you are not reading these things, you are observing them with your own eyes. So, you are observing all these kinds of biodiversity, you are observing a bird eating an insect. So, when you when you read about a food change later on, so these areas are extremely important specially for small kids.

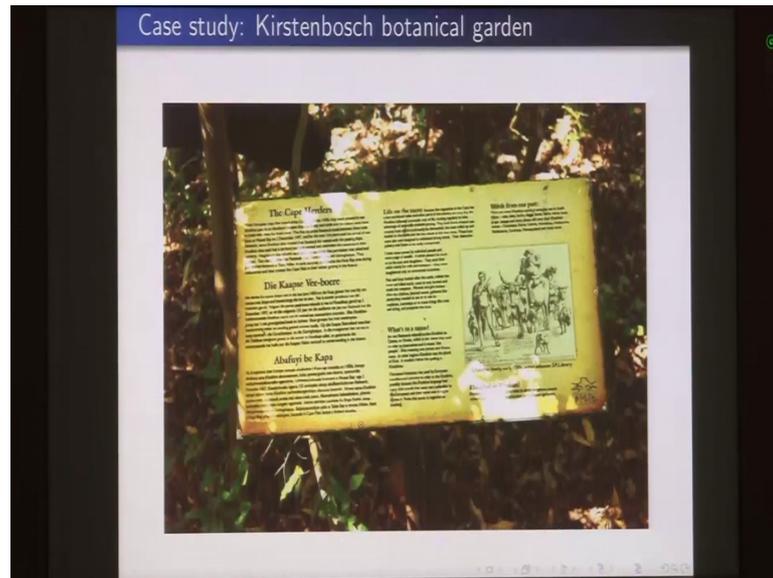
So, as small kids when people go into these areas and they have seen that there is an there is a bee that is sitting on a flower, and there is a grasshopper that is eating grass and then they also observe that there is a frog that is eater of one of these insects or say a grass hopper. And then they have they observe that there is a bird that comes and eats up this frog. So, things such as food chains and food (Refer Time: 15:28) become extremely intuitive, things such as biodiversity becomes very intuitive. So, these become extremely important educational grounds.

(Refer Slide Time: 15:40)



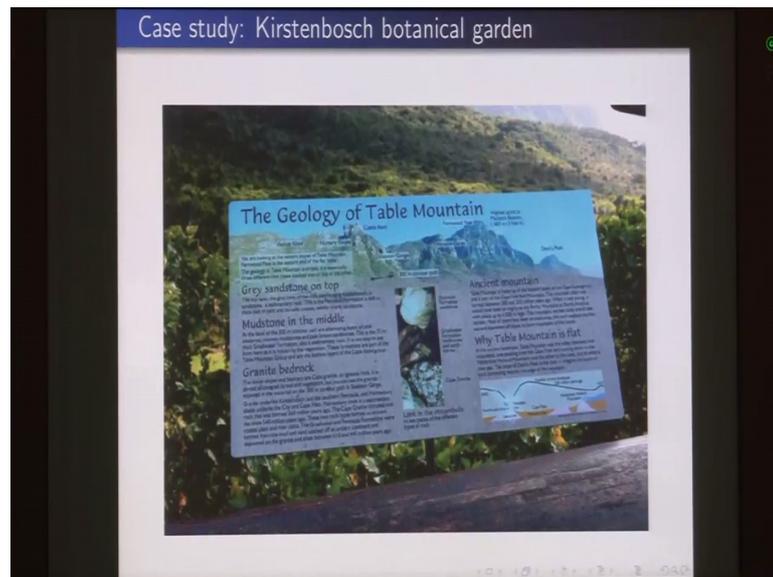
And then apart from these experiential learnings, we also have a number of learnings through ways of these boards.

(Refer Slide Time: 15:44)



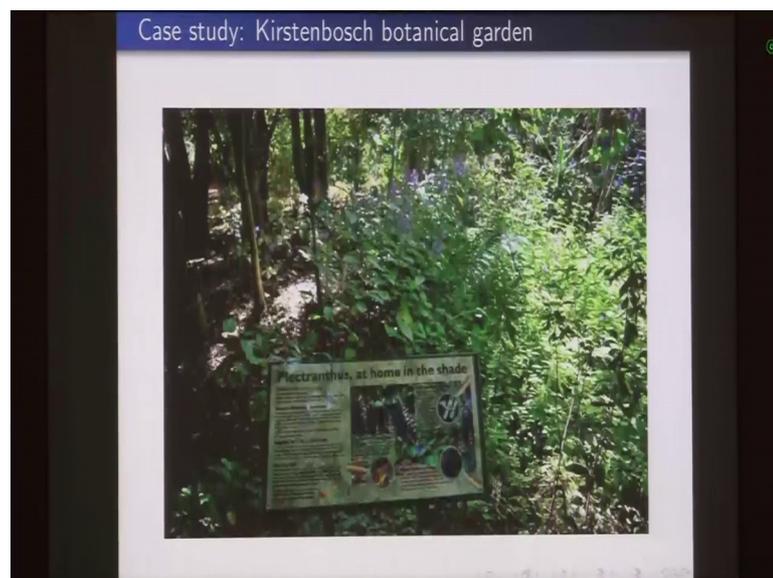
So, for instance, this is one board that tells us the history of this area. Now, if there is a person who lives in a city, so for instance if there is a person who lives in the city of Delhi, how would that person get to know about the history of this area? When we if someone is extremely interested is to go back say look at Wikipedia or look at some textbook to understand the history of New Delhi. But then this thing requires effort. Whereas, if there is a person who is going in to a garden to spend some time with the family and there itself you have a number of such information boards. So, this information comes very intuitively. So, for instance, this board tells us about the cape wood who was one of the first people to come to this area.

(Refer Slide Time: 16:29)



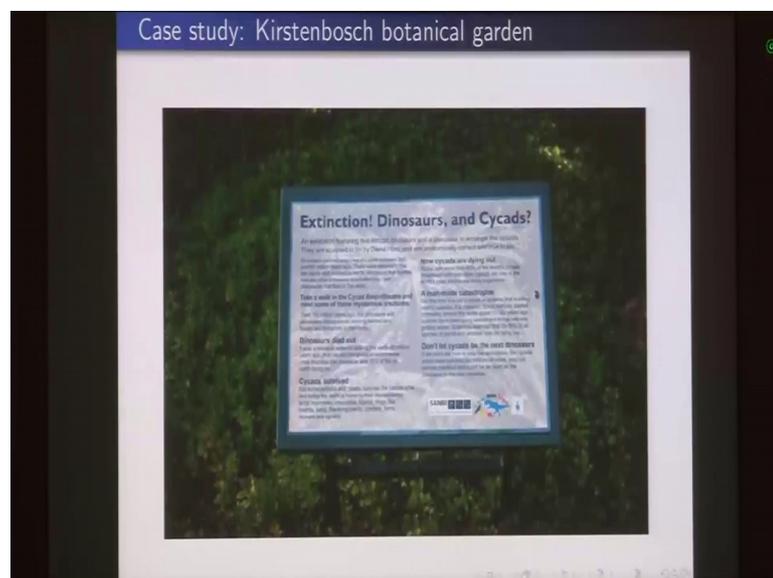
Then we saw that these areas have held some these areas have that tallus and these areas have the flat planes. So, when you are there on the canopy walk, you are seeing the hills on the background and then you get this information, there is geology of table mountain. So, then it talks about different kinds of rocks that are found here. And then you are seeing all these rocks with your own eyes. So, this is not only providing you information about biodiversity and information about your conservation, but you are also getting information about other aspects history, geography, geology and so on.

(Refer Slide Time: 17:01)



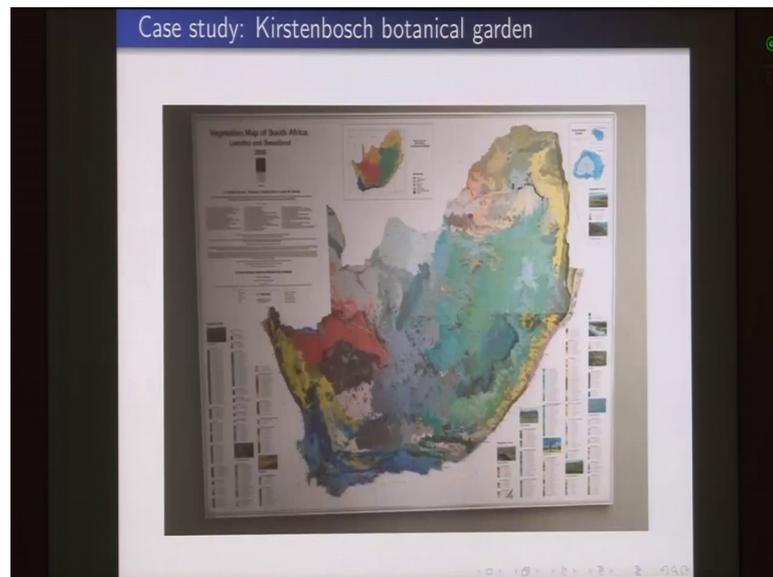
Next when we see these areas, so this board is telling us that plectranthus, at home in the shade. So, here we have this particular species and this particular species is flourishing under a tree shade. So, now in one of our earlier lectures, we had a look at why species are where they are. So, what are the push factors, what are the pull factors and why all the species have a very range of tolerance for a number of factors. And here when you go to this area, you would observe that yes these plants are growing here, and there is not much of a light inside, this area is very cool and this area is very humid. So, you will make a direct correlation between the habitat and the species that are found in different habitats.

(Refer Slide Time: 17:47)



Next when we talk about conservation, so there are boards that will tell you about extinction dinosaurs and cycads. And then these areas these boards will tell us that extinction of dinosaurs are already happened, but then the cycads are rapidly suffering from huge amount of threat because of a number of manmade activities. And so what can you do to prevent these activities. So, how can you prevent the extinction of cycads? So, things like these will gradually turn all the visitors towards a cause of conservation.

(Refer Slide Time: 18:23)



Then we also have information about the various kinds of vegetation that are found in different parts of the country. So, here you have information about different areas, what is their classification, what all kinds of species are found in different areas and then when most of these species are shown together in this botanical garden, then people will have a much more clearer understanding of how system is working in nature.

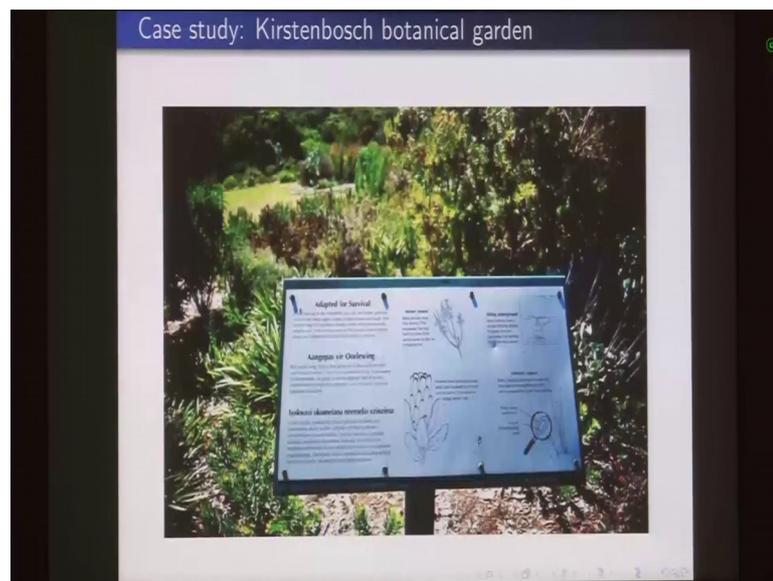
(Refer Slide Time: 18:50)



Next, you would have things such as these. So, these are the native vegetation that are found there. So, they go by the name of fling boss. And in these cases this board is telling

people that these particular species are indigenous ground covers and what are their role in conserving this area. So, for instance you can very clearly see that these ground covers are preventing soil erosion, because there would be a strange nearby and people would be able to see it by themselves.

(Refer Slide Time: 19:22)



Or different kinds of adaptations that are there in the plants. So, from instance this one is telling you adapted for survival. So, here you have the plants and with these plants they have this board and this board is telling you what kinds of flowers are there, what kinds of leaves are there and how are they helping this plant to survive in this area. So, we can observe that in the case of botanical gardens not only do you have a large collection of plants from different areas.

So, you have a very good site for the conservation of this biodiversity in ex-situ fashion because these are away from their native habitats. So, these are not only just very good collections of biodiversity, but they also play a very important role for science and also for conservation, because people get quite a lot of information from these areas, people have all these trees that are labeled. People have these trees and these labels which also tell them why this species is important is this a native species, is this an exotic species, what kinds of adaptations does it have, why is it very important for the ecology of this area and things like that.

Besides intuitively it also gets people of a very good opportunity to connect with the nature, because you can see various kinds of plants you can feel the cool breeze that is going there you can observe, how these trees are changing the habitats the micro climates in these areas. And at the same time, these areas also become very important for giving other kinds of information such as the historical perspective or the geographical perspective or the geological perspective or the ecological prospective. And together with the information about why these species are under threat and what people can do to conserve these species. So, in a sense botanical gardens play a very important role not only for ex situ conservation, but also for science research and education of the people, so that is all for today.

Thank you for your attention [FL].