**Basic Course in Ornithology**
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**University of Florida**

**Lecture 33**
**Avian Conservation Case study 2**

Hi! My name is Priyanka and I am a PhD student at the University of Florida. Today, I am going to be talking to you about the effect of rainforest restoration on bird communities in the Western Ghats.

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I carried out this work in the Valparai plateau of the south-western ghat in Tamil Nadu in this plateau over 51% of the area is covered by tea plantations and there is some coffee in cardamom as well. but within these plantations there are about 40 degraded rainforest fragments ranging anywhere from 1 to 300 hectares in size. And from the year 2000 onwards, the nature conservation foundation (an NGO) has been ecologically restoring these sites.

And surrounding all of this is the Anamalai Tiger Reserve, a protected area of mid-elevation tropical wet evergreen forests. So, that is just to give you a context of where this work was carried out.

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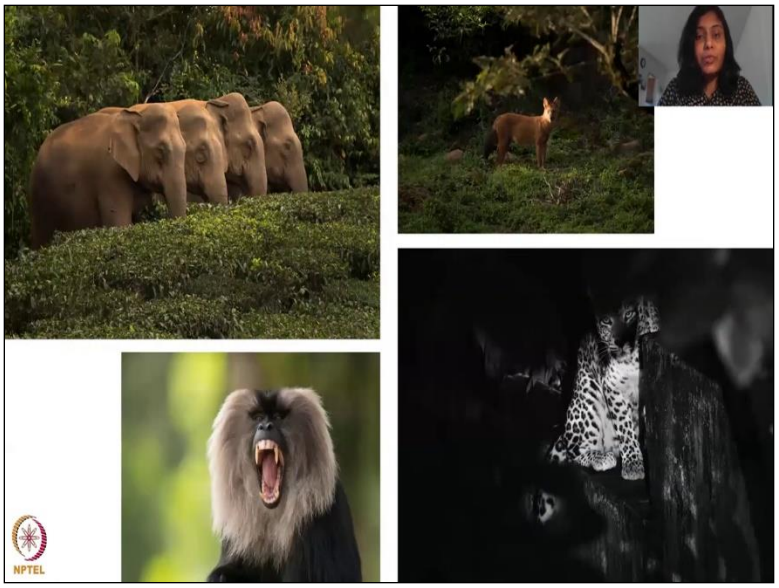

The Valparai plateau is also home just like the rest of the western ghats to an astounding amount of wildlife including elephants, wolfs, leopards and Lion-tailed Macaques. It is an amazing place to work in.

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And this is the rainforest nursery of the nature conservation foundation. So, they have about 80 species of plants here and they collect seeds from roadsides and from places where they would not germinate otherwise and they bring them back here and they raise them for anywhere between two to four years because rainforest plants grow very, very slowly. It is very intensive work and all of this work they carry out with the indigenous *Kadar* people who are amazing in the forest.

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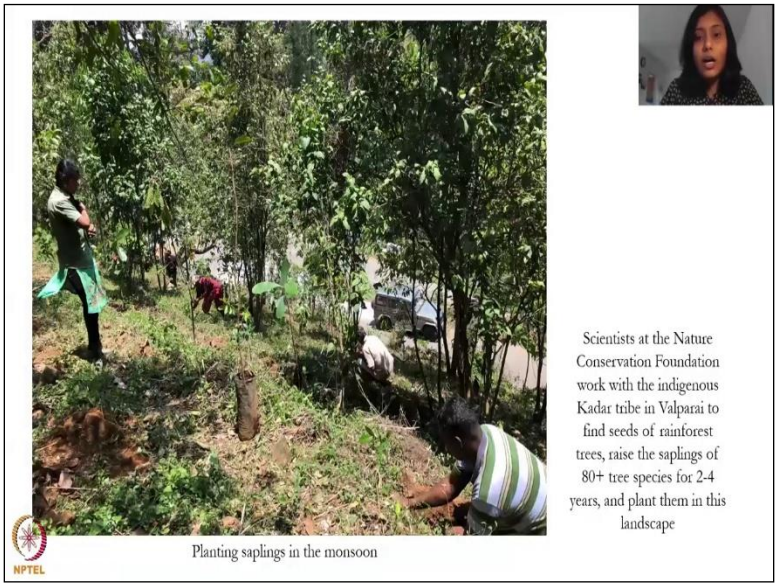


And here you can see a picture of the planting happening in the monsoon usually it happens in when it is raining heavily because these plants will not survive without constant rainfall.

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And this is what they are aiming to recreate. We do not know whether it will be possible yet, but this is a picture of the canopy in the Anamalai Tiger Reserve. You can see a closed canopy and there is very little light even reaching the forest floor, it is full of different tree species and even when we plant rainforest saplings, we make sure to plant a good variety of native trees that are collected from these forests.

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So, has the restoration been a success I would think yes because here is a picture of a degraded fragment in 2007. You can see a road winding through it and you can see what looks like a very open you know degraded sort of forest fragment and here is the same picture in 2020 after restoration was carried out. So, in this kind of restoration, we refer to this as active restoration where you know there is been some weed removal.

There is been a lot of planting of native tree species and all of that and we know that compared to forests that have been just allowed to regenerate naturally, such active restoration it is in it is resulted in an increased potential for carbon sequestration and for a structure recovery. So, we know that active restoration is better than natural regeneration for these things.

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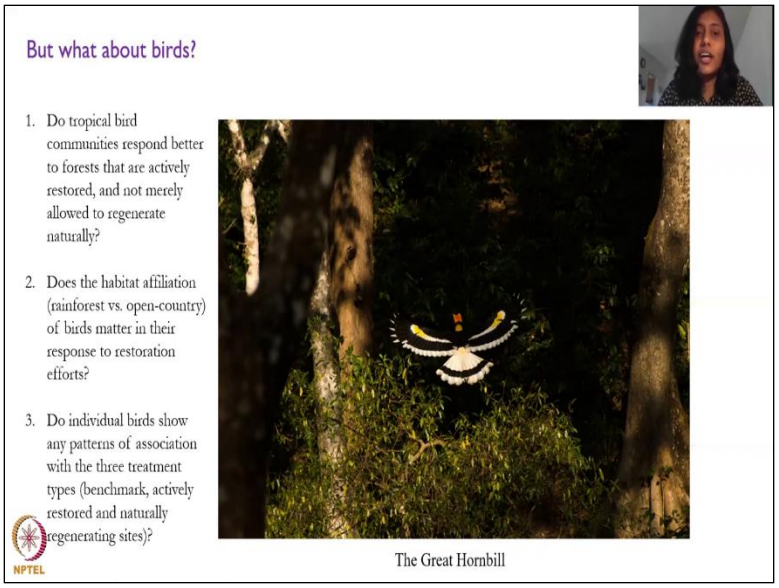


But what about birds? Is active restoration better for birds as well? So, you see here a picture of the Great hornbill which you see quite often in the Valparai plateau. So, what about birds like this? You know? Are they coming back to the forest fragments that have been restored? That is what I set up to study. And I asked three questions to try and figure out if active restoration was actually benefiting birds. So, I asked if tropical bird communities they respond better to forests that are actively restored compared to forests that are naturally regenerating.

I asked, if the habitat affiliation of birds matters in their response to the restoration efforts. So, here, I considered bird rainforest or open country species. And I finally, I asked if individual birds they show any patterns of associations with the three treatment types. And when I say treatment types, I mean actively restored sites, naturally regenerating forest and the Anamalai Tiger Reserve which served as the benchmark.

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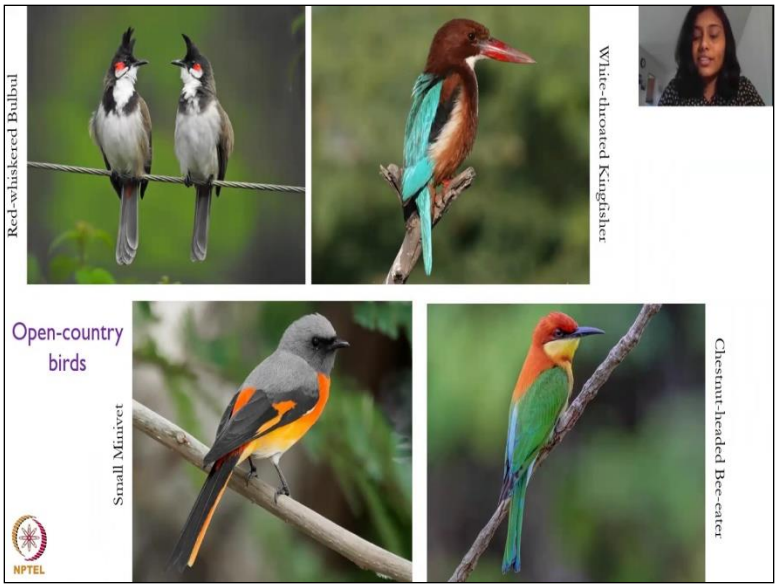


So, what do I mean when I say open country species? I mean species that you are likely to see in any major city even in India like the Red Whiskered Bulbul or the White Throated Kingfisher and you see here pictures of small Minivets, Chestnut headed Bee-eaters anything that you would you are likely to see in open landscapes.

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And when I say rainforest birds, I mean birds that are endemic to the Western Ghats like the Malabar Hornbill and the Black-naped Monarch which is a an important part of make species flocks in this region and the Greater Racket-tailed Drongo which is an excellent mimic and the Malabar Trogon which you are likely to see only in undisturbed good forest.

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So, how did we carry out this research? I from November 2019 up till March 2020, till the pandemic you know made us stop all our field work. We carried out bird point counts in 69 sites. And the 69 sites were divided up into 23 actively restored sites 23 naturally regenerating sites and 23 benchmark sites in the Anamalai Tiger Reserve.

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And so, basically, I would go to these places and I would I would stand there for 15 minutes each and I would note down all the birds I saw and heard. And in the case of rain forest because every the canopy is so, thick and there are trees everywhere you most often you hear birds rather than

see them. So, I identified a lot of the species with calls. And this amounted to a total of 460 point counts. And as I said earlier, we classified birds as if the rainforest species or open country species.

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And finally, we also measured the habitat in all these sites. We took measures of tree height, canopy cover, tree density, leaf litter depth things like that.

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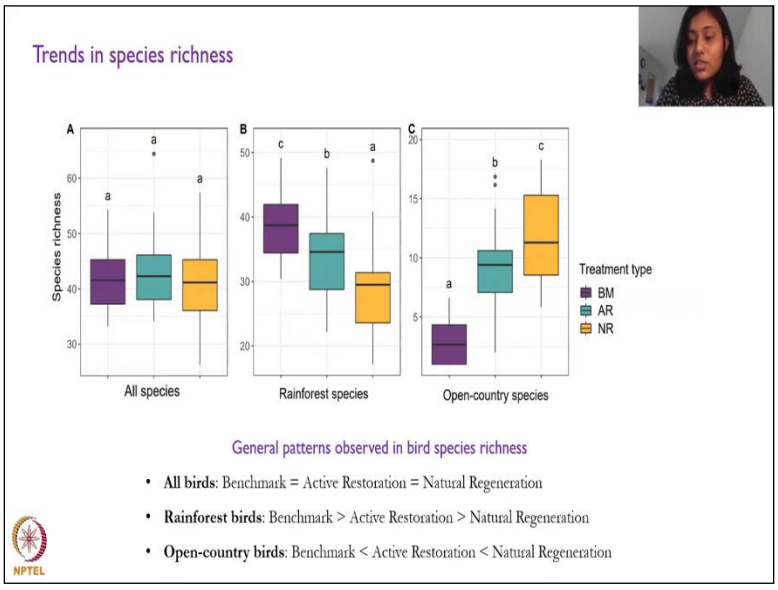


So, what did we find? We find, when we look at species richness we find that when all species are considered. We found about 92 species in the study and when you consider all of them together the species richness in benchmark which is in purple here actively restored which is in green here

and naturally regenerating sites which is in yellow here. You see that the species richness is pretty much the same it is across the board it is pretty much the same.

But then when you look at it a little more closely when you separate the birds out as a rainforest or open country species, you see that there is a stark difference. You see that in with regard to rainforest species so many more species are found in benchmark sites and very few are found in naturally regenerating sites look at graph B for this. And in graph C you see that the trend is exactly the opposite with open country species very few in benchmark sites and quite a few in the naturally regenerating sites and in both cases actively restaurant sites are fall in the middle. So, this is some these are some general patterns that we observed in this in the study.

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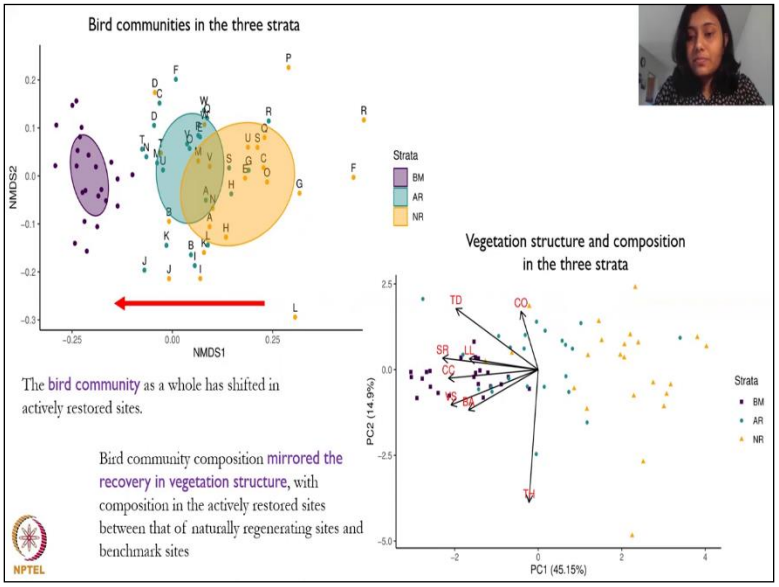


And with regard to the bird community composition, we used abundance data from all of our point counts and we plotted them to visualize them like this. So, here on the left, you see all of the benchmark sites clustering together in that they are similar in composition and bird abundance. And then you see on the on the right side, you see that the naturally regenerating sites cluster together in yellow there and again actively restored sites are in the middle.

So, you see that the community is shifting from that of naturally regenerating sites to that of benchmark sites with actively restored sites again in the middle. And but the question is, if is this pattern is it does it follow the same pattern of forest recovery. So, we plotted the forest, we looked

at the vegetation data and we plotted it similarly to see whether the bird recovery was following that of planned recovery.

And you see the and you see that it is because again you see the clustering of purple sites on the left and you see the clustering of yellow sides on the right with the actively restored sites in green in the middle. So, we know for a fact that bird community recovery is following that of vegetation structure and composition recovery.

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So, what do rainforest birds want? We found out from the study that they prefer sites that have increased canopy cover, canopy overlap, leaf litter depth, tree density things like that all of which you are likely to see in benchmark sites or in actively restored sites that are recovering well. And with open country species they want the opposite. They want reduced tree species richness and tree density and all of this you are likely to see in degraded sites.

Sites that are very open and when we looked at species separately, we found that the greater Greater Racket-tailed Drongo and the Malabar Trogon which are rainforest birds they are associated with benchmark sites. And on the other end of the spectrum, you have the White-throatedkingfisher and the Blyth's Reed Warbler which are associated with naturally regenerating forest which are very open.

And in the middle, you have a mixture of both rain forest birds and open country species in a gradient. So, we know that with this data, we can say that the broader patterns that we are seeing with bird species richness and composition is also reflected within individual species and what they want in this habitat.

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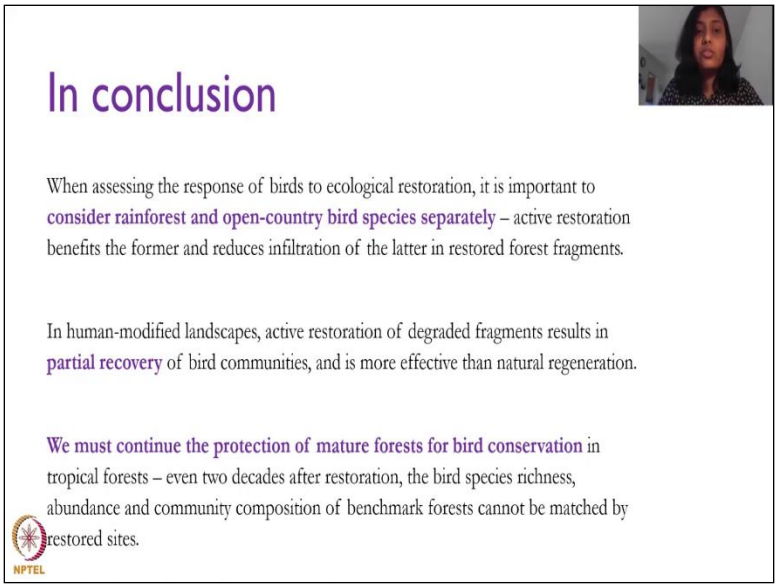


So, I want to conclude by recapping what we found in what we found in the study. So, we found that when we assess the response of birds to something as complex as ecological restoration, it is not enough to just consider all species in the response together. Instead, we should be looking at the response of rainforest species separately and that of open country species separately because they respond to restoration in different ways.

And we show that in human modified landscapes like the Valparai plateau, active restoration of degraded fragments it results in only partial recovery of bird communities but it is more effective than natural regeneration. And finally, it this study underscores the importance of the need to continue to protect maturing forests because we show that even 20 years after restoration has been carried out in this landscape it is still not enough.

We are still not able to match the composition and species richness that is found in benchmark sites that are relatively undisturbed. So, it is so, important that even though it is important that we

carry out restoration in these degraded fragments. But it is also important to continue to protect our mature rainfalls.

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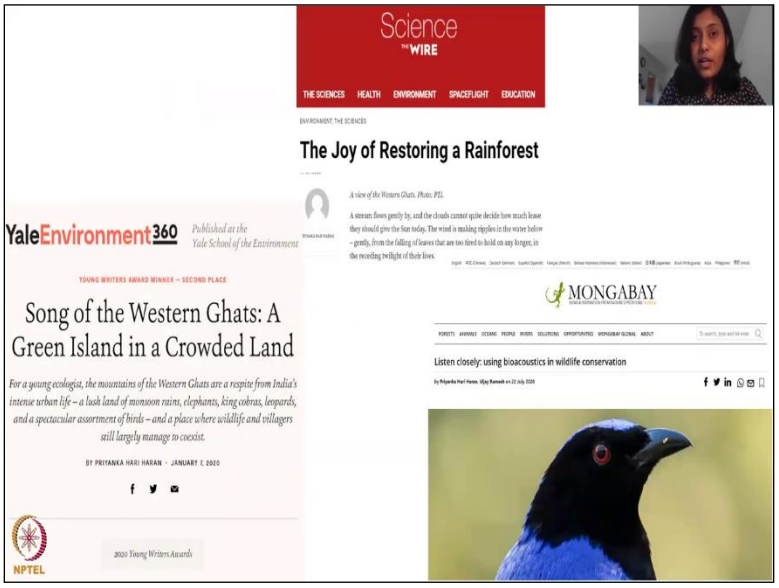


I am a scientist, but I also think it is very important that scientists continue to talk about their work to an audience that that is that is very diverse. So, for my part, I try to I write in different outlets, I write about how it feels to work in a forest, what I found and it I would strongly suggest that all of you try to either do podcasts or videos or writing or anything like that I think it really helps to bring science to a wider audience.

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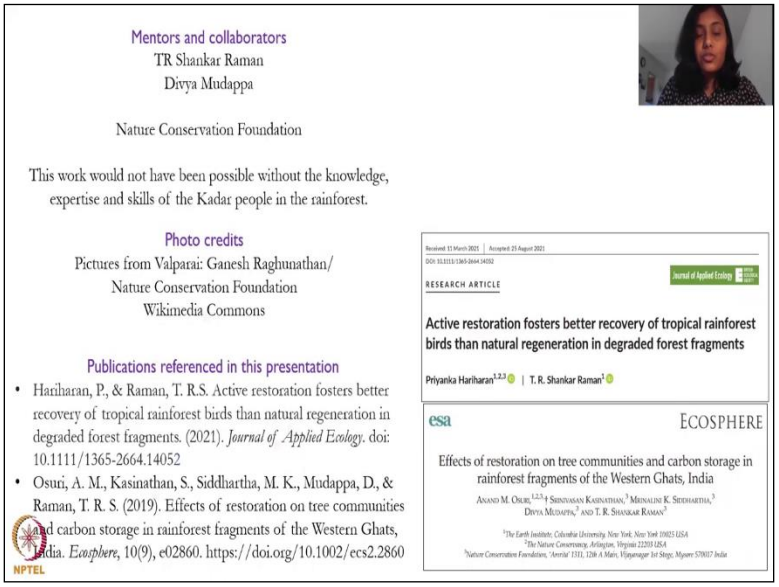

And I just want to thank all of my mentors and collaborators and colleagues at the Nature Conservation Foundation. And here you can see links to the articles that I have referenced throughout this presentation, thank you.