

Slide 1

So hi everyone, this is the third lecture in my series, and in the previous one, we talked about some of the causes of biodiversity loss, so some of the threats that different species face around the world. And in this lecture we're going to talk about some of the motivations behind doing conservation, so how we try and get people to stop carrying out those activities that are harming the natural world and what their motivations for doing so might be. And also how we prioritize the diversity, the species or anything else that we want to direct our actions towards so which bits of the natural world are people trying to protect and why.

Slide 2

We can split up the motivations for conserving the natural world into intrinsic and extrinsic motivations. So an intrinsic motivation is, as it says here is doing something for its own sake, because it is inherently rewarding. So you aren't necessarily getting a reward for doing this, you aren't being punished for not doing it. But you do something for yourself, because you find it rewarding so it could be in your day to day life, it could be something like going for a walk or cooking a meal, something that you're not being paid for that no one is giving you money to do it and always giving you a reward to but you just go into it, because you find it rewarding and you find it of value to you.

So if we transfer this to conservation and the natural world many people think that species are inherently valuable. It's not just species here, many people think that the natural world or natural spaces are value for their own sake. So you'll have seen a few times now, the diagram of the millennium ecosystems assessment where it shows how different aspects of nature have value to humans, whether that's spiritual or aesthetic or it's things like fishing and food sources that are kind of directly economically valuable to humans or they give us a direct resource and then the aesthetic and spiritual sides are a bit less tangible. They're not concrete but they still definitely have value to humans and intrinsic motivation is a bit different to this. Because of the inherent value of the natural world is different to this, because it sits apart from what is valuable to humans, and even if humans didn't exist these species would still have value so that is an inherent value. Intrinsic motivations can also be because people would like to protect the natural world for those values that are not linked to human value of the natural world.

Extrinsic motivation is doing something to earn reward or avoid punishment, and so this is where legislation and laws come in and also economic schemes to try and encourage people to protect nature. So we don't just rely on intrinsic motivation for people to conserve nature, we don't just rely on people doing it because they think they should and because it's inherently rewarding. Rather we give people incentives or we bring in laws to try and get them to behave in ways that do not damage the natural world or actively restore and protect it.

Slide 3

So some people are more connected to nature than others so will be more motivated to protect it. Lots of people do lots of things to protect the natural world because they believe in the value of that natural world as separate to the value that humans give to it. And so, this is just a picture of her my fieldwork, so I do the work that I do, because I believe that rhinos and other aspects of the natural world are valuable and themselves, and I would like to see them exist into the future.

But you know people have different values and they believe in the value of different things, and some people aren't as connected to the natural world so don't feel that they should protect it for its own sake. And so that's so one of the ways of getting around that is to offer those extrinsic

motivations that we just talked about. Another is to try and come up with schemes to connect more people to nature. And these often focus on young people. So the theory is that if we can get people out into the natural world, at an early age, if we can get them to have important experiences in nature, at an early age, then, for the rest of their lives, they will feel connected to the natural world. And therefore we want to protect it, so this is why there are lots of schemes to try and get young people out into nature to try and get them to connect to it. It can work for adults as well, but one of the ways to try and increase the intrinsic motivation of people to carry out conservation is to educate them about it, to get them to experience it to get them out into nature and enjoy themselves so that in the future we don't have to rely on extrinsic motivations instead we can we can try and get more people to believe in the inherent value of nature itself.

Slide 4

So some of the research that's been done into this again all the references will be in the document that has the exercise and the discussion questions for you if you want to do a bit more reading about this. So intrinsic motivations can be encouraged through education programs as I said, but they can also be encouraged in other ways. This research found that they are enhanced when these three needs are met. So autonomy, which is the ability to make your own decisions and the ability to control your own actions. Competence, so the skills required to carry out a certain activity. And relatedness which is feeling connected both to other humans and to non humans, so other species in the natural world. So in this research, it was found that in this reserve in Ecuador the goals and methods of forest management were decided by stakeholder meetings. And so the stakeholder meetings, there is fills the competence and relatedness aspects. Stakeholders were given the competence to make those decisions for how the forest will be managed, they increased the relatedness between the stakeholders and between them and the reserve. And also their autonomy which comes in, when they will offer different opportunities for diverse livelihood. So they weren't told you know you have to set up a tourism lodge they weren't told you have to do this activity or this other activity, they were given the decision to there were given the autonomy to make their own decisions and that fits within a conservation framework about which livelihoods, they would like to pursue into the future. So intrinsic motivations, whilst it's quite a personal thing so it's how much value of person places on nature, they can be encouraged through the education programs, so we can increase people's connectedness to nature and they can also be encouraged, or this kind of scheme allows people to decide how they would like to manage an area.

Slide 5

So extrinsic motivations are different, and they can split into, be they can be split into two different things as well. The first is to avoid punishment, so this is when there are laws in place the band particular activities. So an example here is the Convention on the international trade in endangered species and this international agreements places endangered species into different categories and controls their trade. So the Appendix 1 species it's called are the rarest and most threatened with extinction. And the trade in those species is almost is completely banned and you can't move those species between countries except on a very specific circumstances which is usually to do with research or conservation activities. So the black rhino is a an Appendix one species so you're not allowed to move black rhinos or any part of them between countries internationally without fulfilling those very specific exemptions. And if you do and you're caught doing that, then you can be prosecuted and fined or go to prison.

And the second type of extrinsic motivation is to earn a reward and this can come from different ways, so the first one is a governmental subsidies. So the in the European Union, we have, well not

we we anymore, because we're not in the European Union, but the European Union has a policy, called the Common Agricultural Policy. And as part of this, they give farmers money to carry out certain conservation activities, whether or not that's encouraging bird populations or leaving certain parts of their farm uncultivated to try and restore some nature. So the EU pays farmers to try and encourage nature back onto their farms. And the other one is not really to do with government it's more to do with the private sector, so this can be eco labels. And so you can buy specific products that have a label on them that certifies that they've been produced in an environmentally friendly or an environmentally sustainable way. And the other one which i'm going to talk about a bit more about now is the payments for ecosystem services schemes.

Slide 6

And just before I get on to the those payment that uses for services schemes going to talk a bit about why lots of industries and businesses are so damaging to the environment, so why do lots of economic activities damage the environment. And we can explain this or we can theorize about it using this concept from economics, which is an externality or externalities. So in economics, a transaction is an exchange between two parties, a producer who creates the good who produces the thing that is being traded and a consumer who receives the good. So say this is some bananas, the producer will be a farmer and then through lots of links and lots of shops, the consumer buys the bananas and then he then he eats them. Then the money is going from the consumer to the producer. So that's the transaction there's money one way and goods, the other. However, in lots of cases, the costs incurred in this transaction are not just incurred on the. Consumer so it's not just a consumer who pays some sort of cost for this. Often there is a cost or a benefit that is imposed on a third party who did not agree to incur it. So this means that someone else who is not the producer or the consumer received a benefits or has to pay a cos. T it might be direct money, it might be different benefits and costs and but they didn't atually take part in the transaction it's a unintended consequence of that action. So one of the most obvious externalities in our in modern life, oare greenhouse gas emissions. So oil companies say produce fuel and a consumer buys the fuel and that runs their car so there's a transaction there between a producer and a consumer. And everyone else on the planet is this third party, because that car as it runs produces greenhouse gas emissions that contributes to global warming and that contributes to climate change. And then lots of other people on the planet, then incur costs about climate change, whether or not that's increased flooding increased weather events, all the other effects of climate change. That person's greenhouse gas emissions from their carcontribute to that global warming and incur costs on other people. Those other people did not agree to those costs when that fuel was bought and what happens here, then is that that third person has no control over whether or not that transaction takes place. And so in conservation lots of these externalities cause problems, whether or not it's greenhouse gas emissions are whether or not it's land use change that we talked about in the previous lecture or pollution runoff from farms. So farmers use fertilizers, to increase the yield but that can cause and biodiversity declines of fish and other things in fresh or systems. So the third parties that did not agree to incur those costs are not just humans, it can also be non humans, so those fish that are affected by the fertilizers, that run off into their habitat they didn't agree to incur costs.

So taxes and equal labels are a way of internalizing that externality so this means that in that oil example that we were just talking about so when the consumer buys the fuel for their car they pay an extra tax on top of that, on top of the cost of the fuel. That tax then goes towards trying to prevent climate change or tries to mitigate against its effects, so therefore the cost that's being imposed on other people is internalized into the transaction. So that consumer has to pay to be able to put that cost of global warming on to everyone else it doesn't have to be the consumer the

producer can also pay the tax. And that's just a way of trying to get the two people that are involved in that transaction to pay the cost, rather than someone that wasn't involved in the transaction. So payments ecosystem services are a way of internalizing these externalities.

Slide 7

So in this scheme, the users of an ecosystem service pay for it to be supplied by a landowner or another person who can provide that ecosystem service. Ecosystem services are the things that I talked about in the millennium economic Ecosystem Assessment, which we've talked about a few times now. So it can be provision of food, it can be climate regulation, it can be those spiritual and aesthetic values that are a bit harder to define. These are all ecosystem services so it's the benefits that you and get the humans get from natural ecosystems. So this diagram is an example of this in a watershed so the users here of the ecosystem service are the people that live down in the valley, so they get benefits from this upland forests through water purification flood mitigation and other things like that. So there's an opportunity cost of having that forest which we talked about the last lecture, the opportunity cost is that we can't farm it to keep that forest, or we can't farm it in particular ways. So the person that owns that is paying that opportunity costs because they can't convert the forest to a farm which may give them higher profit. So, to try and prevent them doing that the users of this ecosystem service, which would lose that service if the forest was cut down, pay the landowner to keep that forest, so therefore the landowner has an incentive to keep that forest to not cut it down. Then we can continue to have this producer and consumer relationship of those ecosystem services.

Slide 8

There are five key principles of this this kind of system so of the ways that is usually done so participation is voluntary, so people aren't generally told they have to do this is something they go into naturally.

So additionality means that the payments go to prevent an action happening. So in that previous example, it means that the farmer or the landowner would have cut down those trees, unless they receive that payment. So it shouldn't be that it's beneficial for the landowner to have that forest anyway, so they won't cut it down it's that they will cut it down unless they get that payment.

Conditionality means that the payment is conditional on the destruction not taking place, so it means that, once the landowner sees that payment they don't cut down the forest. This just ensures that the payment has the desired effect.

Ensuring permanence means that it is as much as possible, a permanent relationship so it shouldn't be that we just pay the landowner to not cut the forest down for one year, it should go on into the future.

And avoiding leakage means that we don't just displace the destruction to a different area, so we don't cut down the forest on the hill next to our town. But that landowner has land at other places as well and they take the money that we that we gave them to not cut down the forest near us they take it and they cut down a forest on land somewhere else so we're not just displacing the problem. This leakage doesn't just happen on a local scale like that it can also happen on a global scale. So if a particular country has a very effective payments ecosystem services scheme which we'll talk about Costa Rica in a second, and it doesn't just shift the deforestation problem to a different country.

They're not usually provided by the private sector due to the free rider problem, and this means that that people cannot be excluded from benefiting from the ecosystem service, even if they haven't paid for it. So if you imagine that town on that previous slide so if some people pay the landowners upstream to not cut down their forest, but some people who don't pay still get the benefit. And therefore, they can free ride on those benefits, and this in economics terms, is an example of a market failure and it leads to people deciding not to continue to pay because they aren't the only ones getting the benefit so they're paying more than the benefits they get. Therefore it's not really in their rational economic interests to continue to pay, so the those kind of schemes won't happen in the private sector because it's not profitable for people to pursue them. Therefore, it tends to be governments that have the most effective forms of these payment for ecosystem services schemes, because the government represents all of the people in a country so they're providing the benefits for all of the people.

Slide 9

So the most famous example is the national scheme in Costa Rica in Central America. Service included in this carbon sequestration so growing trees or other things to sequester carbon and help prevent climate change. Biodiversity protection, water regulation and landscape beauty so they've even managed to try and get some of those values that are quite difficult to define into this scheme as well. So under the scheme landowners get direct cash transfers under five year contracts for different activities that protect the forests and Costa Rica has some of the lowest deforestation rates in the in the tropics all around the world.

Slide 10

So now we've talked about different motivations for doing conservation we're going to talk about how we prioritize conservation. And so what which aspects of the natural world are we seeking to protect or restore so in an ideal world we'd want to protect everything as conservationists. However, we have, or we almost always have limited resources, so therefore and there's also trade offs with human activities as well, so we can't get rid of all human damage to the natural world overnight and lots of the industries that we rely on to support ourselves and damage or alter the natural world in some way.

Slide 11

So what aspects of the natural world do we prioritize for conservation and these are the aspects that i'm going to talk about in the rest of the lecture.

Slide 12

So the first thing we're going to think about is just the amount of diversity. So should we prioritize the sheer number of species or the sheer amount of biodiversity. So, again it's brings us back to this, the pattern of diversity around the world, so this just shows the different items and different biofilms will have different amounts of biodiversity. And as i've mentioned several times you tend you tend to get the highest concentration of diversity in the tropics in the tropical forests, in subtropical forests and in those grasslands around the around the equator.

Slide 13

So if we're going to just protect the largest number of species that we can the greatest amount of diversity. And we have to think about this latitude and or gradient of species richness so there's

some very famous work that's been done identifying areas that have the highest number of species, the greatest concentration of diversity. And one of the ways that one of the methods of doing this came up with these hot spots here which tend to fall in tropical forests, especially Southeast Asia that where my Myanmar is and in South America. But also, in what are known as the Mediterranean climates or the Mediterranean biomes which occur around the Mediterranean Sea, but also in California and in South Africa. And so, this work identified that these areas have the greatest amount of diversity in them per unit of area, so if we're just seeking to protect most amount of biodiversity, should we just protect these areas that have high amounts of diversity.

We can do this, however one of the problems is that you're missing very large areas completely. So if you look into Europe here you're probably missing, almost all of the temperate broadleaf forest, which is the light green area here you're probably not going to protect any of that. And then, if you look at Russia and Canada so right at the north you're missing all of the tiger forests, all of the tundra all of those kind of polar biomes. So the species that are adapted to those biomes won't be protected if we are just trying to conserve the greatest number of species per unit area. So, whilst we can focus on hotspots like this you're going to miss large parts of the world.

Also, when we're thinking about this and do we just look at species diversity, or do we think about different types of diversity, as well, so I defined species and that first lecture. But as i'm sure you've learned in Cathy's lectures and there's a lot of diversity below the level of the species. So there's different genetic variation there's ecological variation and there's behavioral variation as well. So an example of this behavioral variation is animal cultures, so this is when different groups of the same species behave differently, because they've learned that behavior from their parents or from other members of the group that they that they socialize with that they see. This means that different groups of the same species can behave in very different ways. So we're very famous example of this is termite fishing in chimpanzees. Different groups of chimpanzees will fish for termites so use a tool, such as a stick to get termites out of the ground to eat, but not all chimps groups do this, some haven't learned to do it and also different groups have different methods of doing it. So they use different tools and have different ways of doing it, so they have different cultures, so if we just protect one group of this of chimps because we are just protecting them as a species we're missing a lot of that variation within the species.

Slide 15

So here there's just a diagram to show how there's different levels of diversity, and so the width of that triangle represents the number of individuals. That occur within that level of diversity, so the very top, we have ecosystems and then within ecosystems, we have communities of species those communities and made up of species. And then below the level of species, we have evolutionary significant units and then below that we have management units which i'll talk about now.

Slide 16

So an ESU or evolutionary significant unit is a genetically differentiated population that have a high priority for separate management and conservation. This means that two populations within a species have diverged in evolutionary time and so they've started to diverge genetically and we can detect that genetic divergence, with some of the methods that Cathy has taught you about in her lectures. And so two different groups of species have been either separated geographically or it can happen in the same when they're not separated geographically as well, so we have allopatric and sympatric differentiation.

But say they have been differentiated, they have been separated geographically they're starting to diverge genetically and so they're not different species, yet, but it is the start of that process, so they could still theoretically breed together, but there is some genetic differentiation, that we can observe.

A management unit is slightly different. So, it means that there is a significant divergence in allele frequency, so there is a genetic difference, but it's not necessarily that they're they're diverging along phylogenetic lines so they're not diverging evolutionarily. Because allele frequencies respond to population isolation more rapidly than phylogenetic patterns. And so, this means that there's some adaptive variation between two groups. And that adaptive variation appears in the different allele frequencies between those two groups. But it doesn't necessarily mean that those different frequencies are being inherited from from different genetic pathways and a very useful way of identifying this is mitochondrial DNA as i'm sure that you've spoken about with Cathy in her lectures.

So the difference between these two units is that ESUs are historically isolated at and independently evolving sets of populations, so that can be sort of thought of as an early stage in speciation. And sometimes there can be thought about similar to subspecies and so they're so these two groups, these two yes us are evolving separately. Whereas a management unit and the definition of that is slightly less distinction between the two between two groups and it just represents demographically independent populations. So there's not as much distinction there's not as much genetic distinction between the two. But they're breeding separately they're not really exchanging gene flow, but they haven't yet reached the stage where they're as genetically distinct as ESUs, but you will be able to just tap some divergence in annual frequencies usually using that mitochondrial DNA.

Slide 17

And so, as well as just the amount of species or the amount of diversity, another way another candidate for prioritization in conservation is evolutionary distinctiveness. So this means that a particular species or a particular group of species is very unlike anything else any very it's not closely related to other types other species. So these are often also called endemic species so it's a species that only occurs in a particular place. So lots of islands issues are endemic which is unfortunate, as well that they tend to be very vulnerable to extinction and through invasive species and other things. These evolutionarily distinct species often take place on islands as well or places that have been isolated from a big landmass from a continent for a long time. So lots of the species in Australia and New Zealand are very much like this, and so on in New Zealand, there is a reptile type of lizard called tuatara that's not this, by the way, i'll talk about that photo in a second. And, which is the only representative of a huge group of reptiles, all the other types of which are extinct. So snakes and lizards and all the reptiles we see are one branch of reptilian evolution and they used to be another huge branch, which is now only represented by one species or the ones that gone extinct, and the that one species that the tuatara is the only remaining example of that what used to be a huge branch a reptilian evolution so that's really, really evolutionarily distinct.

So if we're going to try and conserve things, according to this metric that would definitely be a candidate for conservation and there are some programs that use this. So there's the EDGE, the evolutionarily distinct and globally endangered program from ZSL in London, so they target animals like this lizard here. Which are aren't closely to other species, so they represent quite a large aspect of evolutionary history. So if we're trying to preserve the the diversity that evolution has given us and that species or a few species represent large aspects of that and we'd like to protect them Another example is the ginkgo tree, which is the only representative from a large branch of plant

evolution and there's only that one species left. And so, this graph here just looks at how evolutionary distinctiveness is distributed around the world.

Slide 18

So this map shows the amount of unique and endemic species international vertebrates, and so it doesn't really matter too much about the what the scale. But basically, the redder the cell be more endemic and evolutionarily unique species feature. So as you can see the similarity to the overall graph of diversity around the world, we do get tend to get more endemic species and more evolution evolutionarily unique species in the tropics and on oceanic islands, so this fits in quite well with the hotspots mode of prioritization that we talked about before. So if we're going to be focusing on the areas with the highest diversity we're also going to catch quite a lot of these evolutionarily distinct species as well.

Slide 19

The next form of prioritization is not necessarily looking at particular species themselves, but their function within ecosystems. So in conservation, there are two big kind of schools of thoughts about how we should think about concepts about the natural world and about ecology. So the first one is a is compositionism. So compositionists look at the world into at the species level and kind of how we split up into those groups of evolutionarily distinct organisms and so yeah they're looking at it through the lens of evolutionary ecology. So they're thinking about what are ecosystems are composed of, which species exist in each ecosystem. So they want to protect diversity and so compositionism. All the schemes of thought we've talked about up until now they're all compositionist schools of thought they're all focusing on diversity they're all focusing on particular species. And that begins with organisms aggregated into populations so they're thinking about that species level that evolutionary significant unit level that management unit level.

However, functionalists are less interested in what ecosystems are composed of and they're more interested in the function of those ecosystems. So it's more about how energy and matter is transferred through those systems, how ecological function and processes continue to take place. So in the case of elephants it's not the fact that the elephant is a species and that it is however evolutionarily unique instead it's the function of that elephant it plays within that ecosystem. So, in the case of mega herbivores it's often functions like nutrient transfer to the eat in one area, and then they poo in another. And by doing that they're taking nutrients from where they eat to where they poop and it's also seed dispersal so they can eat seeds again they proven other area those seeds can germinate and plants grow. And the other thing is grazing so one of the things that elephants are very good at doing is knocking down trees, so they tend to take a forest area with quite a uniform tree cover and they knock down some of those trees and then it becomes a different mosaic of habitat. So you get some open areas some closed areas. So functionalists are more interested in those processes that the elephant does rather than the identity of the elephant itself as a species.

Slide 20

So one example of this are keystone species. So a keystone species is a species that plays a particularly important role for the functioning of that ecosystem disproportionate to their biomass so disproportionate to the amount of living matter that they make up in the ecosystem. So yeah these are animals that play a particularly important role in maintaining the processes of the ecosystems that they live in, so an example of this is sea otters and kelp forests. So this also goes back to the previous lecture when we talked about traffic cascades so the effects that removing a

particular species has on an ecosystem, due to the food webs and what different species are consuming. During the 18th and 19th centuries and sea otters were hunted overhunted for over a century. Sorry the 19th and 20th century sea otters were overhunted for over a century and their population went down massively. However, they were protected during the 20th century and populations rebounded This gave people the opportunity to study the effect that they have on an ecosystem and what they do is that they eat a lot of these sea urchins that in turn eat kelp. So kelp is a very important organism in near shore marine habitats and it provides a habitat for lots and lots of different species. So, as we can see here we're looking at the density of these different organisms and so these measurements will take slightly different times but it gives you an idea of how the ecosystem changes. So, in the 1970s, there was at the bottom here, there was very, very high densities of kelp and there was very low grazing intensities by the sea urchins on the kelp and low amounts association biomass, because the sea otters we're eating a lot of those sea urchins so it's keeping their numbers down and it meant the kelp could thrive.

So, even though the sea otters were protected at this point in time, in the late 20th century. There was still a lot of fishing and for the offshore, this is thought to disturb the behavior of killer whales or orcas which came closer to the shore they started to eat a lot of the sea otters so the amount of sea otters, as you can see, on the top graph here went down very, very quickly, so the biomass or the number of sea otters went down very fast. And down to quite a low level in 1997 This meant that there were fewer sea otters eating the sea urchins so the grazing intensity of the sea urchins went up.

And the amount of or the density of kelp went down by a lot, so in this system, the sea otters are a very important keystone species, so if we think about ecosystem functionally they play a very important function in that ecosystem.

Slide 21

Another important concept in functional ecology are ecological engineers. So these are similar to keystone species because they do play a role that is very important to the functioning of an ecosystem that's out of proportion with their biomass so they're more important than their biomass would suggest. However, it's slightly different because they create or significantly modify maintain or destroy habitat. So they're playing a role in kind of the structure of a particular habitat so as we talked about before elephants are ecological engineers and other large browsers because they tend to maintain a mosaic in wooded habitat, they tend to knock down trees maintain some areas open some eyes closed. Another important ecological engineer is the beaver so these create dams, which you can see here which then floods an area and creates a pond. They do this because they live in lodges as part of the dam, but they also stop the flow of water, because it allows them to swim around in relative safety away from terrestrial predators allows them to swim around and get to the trees which are the source of their food without having to walk across land and you threatened by predators. And in doing this, they create these quite large areas of still water which are fantastic habitats for a whole range of other species, so they are engineering this habitat.

Slide 22

Another important class of species to think about in functional ecology is apex predators. So this these graphs are referring to the same system that we talked about in the last lecture which was wolves in yellowstone National Park, so they were driven to extinction in yellowstone and then reintroduced in the 1990s. And this allowed people to study what happened after they were

introduced. So this is the same example it's just that now, you can see some numbers about what happened to different classes of species after wolves were introduced. So you can see they were introduced in 1994 and the numbers of wolves have gone up since then. And then this has led to a trophic cascade, which is the time we're using quite a lot and it had impacts on a whole range of other species. So the number of elk went down because the wolves were eating those elk it also changed the browsing patterns of those elk, so the browsing pressure really went down on a lot of the tree species, so the outcome was them eating much less trees. As you can see here and the browsing graph so see the browsing pressure on different trees went down this had an impact on different tree species. So the height of Aspen trees went up the number of cottonwood trees went up and the size of willow trees went up as well. So by eating fewer trees this has a positive impact on the beaver and the bison. So the beavers eat trees and so it's good for them, it also meant that there were more trees around the rivers which not only gave the beavers more food but also allowed them to have more habitat because they need wooded areas around rivers, so there, there was more space. And it also increase the number of bison because they had better habitat and more food.

By bringing back wolves were not just affecting the number of wolves in the habitat, because the apex predators that having a disproportionately large impact on the function of that ecosystem, which changes and makes it better for many other species.

Slide 23

One of the other aspects of proposition, we can think about is inherently anthropocentric so the value that humans give to particular species. So up until now all of the different types of prioritization we've talked about are generally thinking from a biocentric point of view, so what is best for the species that we're trying to conserve. So instead of the ecosystem services it's so the benefits that any system has for humans it's what's best for the organisms we're trying to preserve. Charisma, on the other hand, is an anthropocentric value, so what animals do we think are most charismatic what animals would we prefer to conserve. And this study looked at some of the most charismatic animals in the world and tried to find out what it is that makes them so charismatic. So there's things here that you'll definitely recognize so tigers lions elephants chimpanzees which we've all talked about. They ask people why they thought these animals were particularly charismatic. And they split up into these characteristics at the top, whether or not they're beautiful impressive endangered cute dangerous and rare and these are the six aspects that are generally considered to make up the charisma particular animal, why humans are attracted to that particular species, why they want to protect it and, as you can see different species have different aspects of charisma. And so the Koala is particularly charismatic because it is endangered, but also because it is considered to be cute so it's a small furry thing with big eyes, which is something that humans generally think is quite cute Giraffe are considered to be beautiful so people like them aesthetically. And then other animals, such as lions Tigers and crocodiles are charismatic because they're dangerous because people think that danger makes them charismatic people like to watch nature, documentaries of tigers and lions hunting things, and that makes those species charismatic. So it's not just what is best for the animals and the things we are trying to conserve that's not just the own that's not the only reason why people choose to conserve certain things. They also choose to conserve certain things because of their value to humans, and not just their value in terms of economic value and the ecosystem services but also just what we think are the most charismatic species. So this isn't necessarily the best way to conserve species because it's not thinking what's best for the species what's best for the ecology what's best for the landscape is instead thinking what's best for us which isn't necessarily wrong. But it may lead to conservation that isn't optimal, isn't the best thing we can do for the

natural world, but I will talk a little bit in upcoming lectures about how we can use these kind of charismatic animals for why the benefits in conservation.

Slide 24

So, finally, the last thing I'm going to talk about is wilderness so wilderness is something that's quite hard to define but generally it's considered to be places that have little human influence and little human presence. And lots of people think that areas of wilderness are valuable to be conserved. And this isn't just because of their value to non-human entities. So it's, not just because of their value of biodiversity and that is one of the reasons people protect them. So if we think that humans are the root cause of all the biodiversity declines, we see then, surely, by protecting areas that are free from human influence we almost by default protect biodiversity. If we remove the human influence we're removing the threats we were protecting biodiversity. But also people value wilderness from their own point of view as well, they think that having wilderness is a positive thing, having places where there isn't human influence is inherently valuable. And they like to just know that it exists that there are parts of the world where humans don't go or don't live. Finally, people like to conserve wilderness for its recreational value so people like to go to places where there aren't other people they like to go hiking or camping or other activities where they don't come into contact with other humans so wilderness is also valued for that recreational value.

And when we think about wilderness wilderness we start to come into questions of whether or not humans are part of nature or separate from it. And in future lectures I'll talk about different ways of protecting nature do we try and protect nature in concert with human activities with human activities, or do we try and just fence humans out of an area and protect it without humans there. If we believe that humans are separate from nature and fencing them out and protect it and leaving areas of wilderness is probably best. However, if we think humans are part of nature and conservation can be about humans living well with the natural world so it's not that an area isn't natural if there are people in it rather it's about trying to ensure that their actions don't decrease or degrade the biodiversity by too much.

The other aspect to consider is whether by fencing off areas of nature and having areas of wilderness and thinking that nature only exists there, we're disconnecting ourselves from nature. So, as I talked about with the intrinsic motivations, these are people's desire to protect nature for its own sake and is encouraged by allowing people to experience nature and allowing them to have positive experiences in it. And so, if we're fencing off and being disconnected from it, do we, in the future, become disconnected from nature, to the extent that we no longer want to protect it.

Slide 25

So there's been a lot of work done about mapping wilderness around the world, so these green areas are places where wilderness is considered to still exist, so wilderness here being areas free from human implements so as you can see these line up quite well with the land use change maps that I talked about in the previous lecture. So these are places that has been very difficult for humans to alter because they're not valuable for farming or other economic activities, so we have the polar regions at top there, we have the Sahara desert the deep Amazon and central Australia. And whilst a lot of these places are still wildernesses and quite small areas of them are actually protected by protected areas, so if we do decide that we want to continue to protect wilderness, we need to design our protected areas and our other activities to try and protect them into the future.

Slide 26

And just finally this ties into a bit about what I was talking about whether or not we want to protect nature with humans in it, whether or not we want to separate humans from it. So there are two schools of thought here which are represented by these two books so here Wilson, is a very, very, very, very famous biologist and conservationist. And his dream or his plan for how he would like conservation to continue into the future is that we protect half of the earth so % of the earth without human influence for nature. And this is obviously a very difficult task. But he would like to separate human nature, so that we have half the earth and nature has half the earth, obviously, this may be very difficult, because you would have to move humans a lot around the world to do this, but his idea is that humans are separate from nature and nature will be better off if we separate to the two. The other school thought is this idea of a rambunctious garden where rambunctious kind of means unruly and a bit wild but not wild in the sense that there's no humans around . So Emma Marris who wrote this would like to see humans exists with nature, so we protect nature by creating areas that humans existence and humans manage, a bit like a garden. But we do it in a way that's best for both humans and nature, so we manage areas to maintain that diversity. But we don't completely fence them off step back and say this area would be better off without us. And so, these are the two main schools of thought, where we think about whether or not wilderness, is something we should be protecting or whether or not humans should be coexisting more with nature.

END

So, thank you very much for listening to this lecture. There's a discussion task that will go up in the folder with this lecture.

And a paper to read as well, so the paper is sets out the difference between composition list and functionalist school of schools of thought in conservation. I'd like you to read that and then have a think about the questions that are on there, which is about the how those two things are different and how. It might be quite difficult to tie functionalist approaches in with things like payment for ecosystem services So how do we measure an ecosystem function and then, how do we put a monetary value on that to get people to conserve places. And then have a think about which of the schemes of prioritization do you think the most important which ones would you if you were going to be given the power to protect an area within Myanmar or different place in the world, what would you prioritize if you only had limited funds? And then yeah finally how do you think these kind of prioritization things would work in your country in mind and how would they tie in with conservation priorities there.

So, thank you very much, and again I hope that we can speak again soon directly over zoom or and that we can have more interactive experience and talk about some of these ideas.