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#316: Natural value: Pricing ecosystems, and its implications for conservation policy

VOICEOVER

This is Up Close, the research talk show from the University of Melbourne, Australia.

DYANI LEWIS

Hi, I'm Dyani Lewis. Thanks for joining us. You don't have to look far to find stories of species or ecosystems under threat. Whether it's the critically endangered black rhinoceros in Africa or the local wetlands under threat from urban sprawl our collective failure to protect the world's natural heritage can seem exasperating. But in a world where resources to put toward protection are limited, making decisions about where to direct our efforts or how to prioritise our donations can be equally as frustrating and it's not just individuals who struggle with these choices. Governments too are often faced with difficult decisions. So how do we go about placing a value on our natural heritage? Should we even try to weigh the relative merits of saving one species or one ecosystem over another and how can government policies help to guide us through the murky waters of environmental decision making? To help us answer these questions I'm joined on Up Close today by Associate Professor Brendan Wintle, a Conservation Ecologist who has been working with economists and policy makers to improve environmental decision making. Brendan is based at the School of Botany here at the University of Melbourne and he is also Deputy Director of the National Environmental Research Program Environmental Decisions Hub. Welcome to Up Close, Brendan.

BRENDAN WINTLE

Thanks Dyani.

DYANI LEWIS

Brendan, one of the main ways that we have for protecting endangered species or ecosystems is to create protected areas like national parks or reserves. How have these traditionally been formed?

BRENDAN WINTLE

Protected areas have traditionally arisen by chance really, mostly areas that were not

particularly useful or suitable for agriculture or any industrial uses early on. In Australia for example we often find that our protected areas are characteristically in steep or rocky locations, places that are not very fertile that maybe have low rainfall, difficult places to do agriculture. That's partly the history of Australian agricultural development, areas were chosen that were best for agriculture and the rest were sort of left. Most of our conservation reserves have ended up on rocky, steep, dry, difficult places, which is good in some ways because often those places are less threatened by other more modern land uses, not always but sometimes but it also leads to a strange representation of environments in our national reserve system.

Very many species are not well represented in our reserve system simply because they don't exist in those types of environments. What we try and do nowadays is identify where the gaps are in our reserve system that need to be filled to make sure that we're preserving all of the species that require conservation and all of the ecosystem types and environments that people might like to see in nature reserves.

DYANI LEWIS

So when you talk about looking at what gaps you have, how do you go about I guess evaluating or comparing one patch of land to another to determine its relative merits for being a protected area?

BRENDAN WINTLE

There's some obvious things and some less obvious things associated with that decision or identifying new conservation reserves. The obvious things are wanting to choose places that have a high richness, that is a lot of different species that we're interested in conserving. You might see commonly rainforests identified as good places to put into conservation reserves because they have very high species richness and they are often rare in the broader landscape especially in continents like Australia that are hot and dry. You might then look at which types of environments are not well represented in the existing reserve system and they are in Australia, for example, fertile river flats for example are an ecosystem that tends to be supporting a lot of agriculture and there are very few good conservation reserve areas in those sorts of environments. So it's the combination of environments defined by the soil and the vegetation that occupies those environments but also the species, the animals and individual plant species that occupy those environments.

We want to make sure that we're putting some environments into conservation reserves to ensure that all of the species are accommodated in our reserve system.

DYANI LEWIS

Is this shift away from agriculturally less valuable land to representative ecosystems, is that happening in other places in the world as well?

BRENDAN WINTLE

It's the sort of thing that happens when you're in a society that can afford the luxury I guess of conserving areas, making sure that we don't lose species. Yes it is happening in lots of other countries either through political mechanisms, through legislation and the actions of governments or through private conservations organisations like the Nature Conservancy for example that operates throughout the

world. They will identify areas of important conservation value and try and purchase those areas or try and put some kind of agreement in place with the owners of those lands to try and achieve conservation. But you can see that already when you're dealing with philanthropic organisations or organisations like the Nature Conservancy that relies on donations you're spending large sums of money to conserve particular places that might be highly contested so you have to make difficult decisions about where you're going to spend that money. This is one of the less obvious things about identifying new conservation areas is that you need to be finding places that are the last of the last if you like but that you can afford within your conservation budget and all conservation organisations whether they're government or private organisations are faced with these economic constraints.

DYANI LEWIS

In a wealthy country like Australia why would you not just argue that the government should I guess pay to protect all sites that have some biodiversity value?

BRENDAN WINTLE

We could spend our equivalent of our GTP multiple times over trying to conserve all of the things that are currently threatened or that contain endangered species. There are a huge number of endangered species on our threatened species legislation lists for example, hundreds of plants and hundreds of animals that have been identified as very close to or at high risk of extinction in the next 10 to 50 years. If you wanted to ensure that you were going to conserve all of those species you'd have to buy a lot of land. You would also have to buy land in places where those species are most threatened and they tend to be the most expensive places to do conservation. For example, some of our most threatened ecosystems here in Melbourne in south-east Australia are the grassland ecosystems, the basalt plains grassland of which we have less than one per cent left compared to when Europeans first arrived in Australia. Those grassland ecosystems are critically endangered but they're in the most valuable urban development areas in the country where the pressure to build new houses, to make housing more affordable is very, very high. This is a common theme. Species that exist in coastal heath lands, species that exist in fertile areas, they're places that people want to do other things, agriculture, build houses, those sorts of things. If you were going to conserve those areas there's a high financial cost. There's also a high opportunity cost and so governments and private conservation organisations have to strike that balance between cost and conservation value.

DYANI LEWIS

If the grassland for instance is government owned then when they put a value on how much it would cost to set aside they're looking at those things like opportunity costs. How does biodiversity get valued in that equation?

BRENDAN WINTLE

There's been a lot of research of that especially in economics about how to value biodiversity. There's a line of economics called contingent valuation where you essentially ask people how much they would be prepared to pay in order to conserve

a species or conserve an area that has a species in it. These methods have been criticised for being a bit unrealistic. People are often not inclined to give you very sensible answers about how much they're prepared to pay until you're actually asking them to pay. There's problems with those sorts of methods. We avoid trying to value biodiversity in a financial sense in our research because we feel that that's very problematic, it's very subjective. How much you value a species depends on all sorts of things including other pressures you're under in your life to feed your family or to spend your time doing other things than conserving species so we're not very enthusiastic about putting a monetary value on biodiversity. We're more interested in finding the most efficient ways to conserve biodiversity from within a conservation budget for example that has been determined by a political means. Of course politicians respond to public pressure and if there's very high public pressure to conserve particular areas or just to conserve species in general then the amount of money they'll allocate to conservation organisations or to their conservation programs will be something they balance between the other ways they can spend their money, on health, education and other things. So most of the work that's been done in conservation is using those limited amounts of money in an efficient way to try and conserve as much as you can.

DYANI LEWIS

But it does sound like in comparing different patches of land, in comparing a grassland to a rainforest area for instance, the rainforest is almost always going to win out.

BRENDAN WINTLE

Yes, that brings us to another one of the critical questions when you're trying to figure out which bit of land to purchase next to put in your conservation reserve system. There's a thing we call representativeness. The idea is that we want to represent all of the habitats and ecosystems in our reserve system to ensure that they persist in the long term. If you could buy one more hectare of land, you already had 100 hectares of rainforest conserved and you had no hectares of grasslands reserved and you could afford to buy a patch of grassland then you probably would buy the grassland so to ensure that it's represented in the reserve system. A key principle in conservation reserve design is the principle of complementarity which means that the next bit of land that you buy should best complement the existing reserve system, that is by adding things that you don't already have. So this principle of complementarity comes into play alongside cost and also alongside threat. Obviously if a parcel of land is sitting there and it's already in good condition, the species that are there aren't likely to go extinct for any other reason in the near future, it's not threatened with development, it might be owned by someone who's sympathetic to conservation, it's not really threatened you probably wouldn't buy it because by buying it you're not changing the future of that land. You're just putting a different tenure title on it which might be reserve. Obviously you want to get the best marginal benefit from every extra dollar you spend on conservation so you have to consider the benefit of securing that land and that means usually trying to secure areas that are quite threatened. A good example of a very threatened area would be a grassland on the edge of an urban development that is very likely to be developed

in the next 10 years or a coastal heath or a bit of prime beachside real estate.

DYANI LEWIS

This is Up Close. I'm Dyani Lewis and in this episode we're talking about the complexities of environmental decision making with ecologist Brendan Wintle.

Brendan, are there other considerations that you need to take into account rather than just an extra hectare of X type of land? Are there other things that help that decision rather than that it's just the next representative complementary piece of land that you're going to buy?

BRENDAN WINTLE

Yes, one of the big threats that we hear a lot about is climate change. The implications of climate change for our conservation reserves is that for some of the species that currently exist in those places they're unlikely to be able to exist there in the future because the rainfall might change and so there's no longer enough rainfall for the individuals to survive or it gets too hot and there's a lot of concern about species having to move essentially towards the pole, away from the equator to stay cool and this is a big issue in conservation. What it means is that our current reserve system is not going to be guaranteed to maintain all of the species that currently exist in the reserve system so we need to think about whereabouts we might put our next conservation reserve purchase to maximise the value of that purchase for conserving species now and in the future under a changed climate. What this amounts to is often looking for areas that are currently not reserved but might be suitable habitat for something we think is going to have to move. There's some interesting examples at the moment of threatened marsupials like *Burramys possum* and *Lemuroid ringtail possums* in the tropics. It's getting a bit hot for these animals where they currently exist and so they're probably going to have to move to some extent to maintain the right thermal environment. *Burramys possum* is problematic because it's on the tops of mountains already and it's not going to be able to move much higher but there are other species that could potentially move latitudinally so that they can find cool enough places to persist. We can plan for conservation reserve systems in a way that you're going to enable them to migrate over time to cooler places that are currently reserved or where there's habitat. One of the problems is that there's not always suitable habitat in intervening places. You can get big gaps in the reserve system across which species can't move so we have to look at trying to identify places to restore habitats potentially to enable us to have habitats in the future that are useful not just as habitats in their own right but sort of as stepping stones towards suitable environments.

DYANI LEWIS

Yes, I was going to ask you about restoration. Where does restoration come into the mix? Are there other instances where restoring land is actually preferable to protecting untouched land?

BRENDAN WINTLE

Restoration is a very important conservation topic and it's going to become more and more important as we inevitably lose areas of already highly depleted or highly

threatened environments simply because we can't compromise away to the conservation some of those environments. The trouble is you can imagine trying to recreate a really complex thing like an ecosystem in an area that's highly degraded. How do you restore a natural functioning ecosystem in a place like that? It's incredibly challenging and it's very expensive. At the moment restoration suffers from a lack of knowledge about exactly how to restore places to a natural state if you like and also a lack of money. There are people around who can create a natural Australian grasslands to some extent. We're not sure exactly how well they're functioning natural ecosystems but they look good and they seem to have the basic species complement but it costs a lot of money, tens of thousands of dollars per hectare or hundreds of thousands of dollars per hectare in some instances. So we're going to have to do a lot of restoration, do it more efficiently. We're going to have to figure out how to do it more cheaply and we're going to have to learn about what it means to restore a symptoms, not just the plants and the obvious animals that are there but the fungi and the mycorrhizae that connect the plants' roots to the nutrient sources. There's all sorts of dependencies that we don't understand very well so restoration's a very complex business but it's going to be crucial for the long term conservation of many species and ecosystems.

DYANI LEWIS

Brendan, we've spoken about setting aside large areas of land as protected areas but often especially say in urban fringe areas you're talking about an individual project going ahead one bit at a time, gradually eating away at more and more and more land that perhaps hasn't been set aside. How do you go about I guess planning for those small patches of land at a time? Is that the best way of doing it?

BRENDAN WINTLE

Yes, it's a big issue with the way we do environmental regulation in this country in Australia and also in other countries where individual projects are assessed for their impact on let's say endangered species or endangered ecosystems. Oftentimes an individual project itself won't put a whole species at risk. How you assess individual projects doesn't often allow us to accommodate the fact that someone is also putting in a proposal to build a development just next door to where you're doing yours and then in two years' time someone's going to do one just down the street and ultimately those developments can accumulate into a very large net impact. We've started developing as a conservation community and also policy makers, we've started developing approaches that are supposedly more strategic in that we identify for a large area, let's say the greater suburban area around a city which might be in a radius of 80 or 100 kilometres around a city, we try and identify what are the likely future impacts in those areas and map them to our best ability. They could be housing development, they could be mining, they could be big roads that need to go in, new industries that are going to develop. To the extent possible we try and identify those out over a horizon of 30, 50, maybe even in some instances 100 years, think about what those impacts might be and look at the cumulative impact of all of those different activities and then try and identify within that geographic area which places must we conserve to ensure that we're going to maintain this endangered species or that ecosystem type, that we're going to maintain sufficient ecosystem

connectivity between conserved patches to ensure that species can persist in the long term when they need to migrate and recolonise areas. One of the important reasons to have connections between patches of suitable habitat or ecosystems is that chance things can happen. You can have a fire or you can have a disease that can knock out a population of an endangered species, a frog species for example in the urban fringe. If there's no other populations of that species within 10 kilometres of that patch that patch will never recover those animals or those plants or whatever. So you need these sorts of connections in an environment to ensure the long term value of biodiversity. We try and envisage a future landscape that has those connections, that has sufficient amounts of habitat to ensure the long term persistence of species and then fashion our plan for where we'll develop, where we'll put in new infrastructure, where we will allow new industries to pop up that's not going to basically drive the remaining environmental values to extinction. This is a challenging thing of course. You can imagine all of the different groups that you're dealing with, the urban development groups, the planners, people who do big infrastructure projects so you go across multiple levels of government to maybe big projects or responsibilities for road and rail for example. It's quite a complex planning environment and of course the ecological questions are themselves very complex as well. Coming up with strategies for envisaging a future environment that will maintain species is very challenging and requires quite sophisticated ecology and in many instances, ecological modelling, mathematical modelling to try and understand with the uncertainties.

DYANI LEWIS

Brendan, I wanted to come back to this idea of an ecosystem's value and one term that crops up a lot recently is the idea of ecosystem services. What does this refer to?

BRENDAN WINTLE

An ecosystem service is a service that is provided to humans by nature basically. There are a range of different types of services. People have come up with the idea of provisioning services. Nature provides us with resources like clean water, clean air. There are other sorts of services like the spiritual and aesthetic value that you get from being in nature. Ecosystem service is an interesting concept that became fairly popular about 10 or 15 years ago in conservation as a way of communicating the value of nature to everybody. It's not just about conserving charismatic species. It's also about conserving the systems that sustain us and so ecosystem services tries to fill that communication and education role I guess. It hasn't been regarded as a very successful way by some people to communicate the value of conserving species. There's an argument now that is nature is the most marketable commodity that we have, the wonder of nature never mind its economic value of what it provides us with but just the wonder of nature and the opportunity to see nature as the most important selling point for conservationists wanting to conserve nature. I think we need to strike a balance between how much we describe nature as providing us with services, utilities and how much it should be preserved for its own right and because it's just a wonderful thing.

DYANI LEWIS

In putting some sort of monetary value on an ecosystem do you run the risk of effectively giving licence to destroy it because business or development or mining interests have a greater monetary value?

BRENDAN WINTLE

Yes, I think you run that risk. By giving it a monetary value and then trying to use that value to negotiate its conservation you run the risk of ignoring the most important value often of nature which is the sort of motivational value, the spiritual value, call it what you will. You can't value that monetarily of course. It's like trying to value someone's life. Well that is done in some areas of health economics but it's very difficult to maintain the economic value argument and put it side by side with other economic values like employment. It's problematic from that perspective. Also the argument often ignores that you can't really recover something once it's gone. If you lose that particular place, that particular environment which might be unique in some way either because of the species that it contains or because of the importance to local communities or local indigenous groups for example, that can't be recovered. We need another way to think about that trade-off between environment and other economic opportunities and I don't think putting a monetary value on the environment is quite working for us at the moment as a way to just strike that balance.

DYANI LEWIS

Are governments keen though to adapt this monetary mechanism where they can directly compare health costs to environmental costs to other portfolios that they might have?

BRENDAN WINTLE

Yes, it can be a very convenient way to make decisions appear transparent and accountable by accounting but I don't think it's a very satisfying way. But I want to draw a distinction here between valuing environments and trying to do things as efficiently as you possibly can. People often put those two things in the same basket but they're not the same. If you're trying to put a monetary value on the existence of a species I think you're trying to do something that's impossible. If you're trying to find a way to conserve that species as efficiently as possible then that's a very sensible thing to do. It's like shopping. You find the cheapest way to get the thing you want and so being sort of economically efficient with your conservation is something we definitely have to do for all of the reasons we talked about a bit earlier.

DYANI LEWIS

I'm Dyani Lewis and my guest today is conservation ecologist Brendan Wintle.

We're talking about conservation policy and environmental decision making here on Up Close. Brendan, the idea of ensuring that conservation dollars go as far as possible seems very sensible but should we assume that our conservation budget is actually finite? Why not simply argue for greater resources to tackle more environmental problems simultaneously?

BRENDAN WINTLE

We would be living in a dream world to think that we can just get more and more money to do conservation. The world doesn't work like that unfortunately as much as I wish it did. How do you argue for more money? Well for me I think the most effective way to do that is to be very clear about what you're getting for your current investment. We need to be able to demonstrate very transparently that for our current conservation budget we're able to save this species, this species and this species but we're not able to save these others because we currently don't have enough money. If we had an extra \$100,000 a year, if we had an extra \$100 million a year these are the other things we could save and this is how we would do it most effectively. It's very important to speak that language of economic efficiency if you're going to make a plausible case, a credible case for increasing funding to conservation rather than just rail against the fact that it's not enough and that we need more. We need to be very strategic about identifying the projects we would do next, what they will cost and what they will bring us in terms of conservation benefit.

I think then you can start to make very motivating arguments, if we had this extra money we could save this species and look at how cute it is and it's not going to exist anymore in 30 years if we don't spend that money. Yes we can make claims that we don't have enough money and we've just got to spend more and more, that is definitely true but the way we make those claims is very important I think.

DYANI LEWIS

Is there any onus currently on protected areas, national parks for instance to prove that they are doing a good job in conserving whatever species are within that reserve?

BRENDAN WINTLE

There's more and more emphasis, I'll speak about the Australian context to start with because I think we've moved quite a long way in trying to come up with systems for accounting for what we got for our money. Organisations like the park managers in Australia and even the Australian Government are now setting up strategies to monitor changes in the environment and trying to understand how the environment's changing in places that we're investing money versus how it's changing in places we're not and the idea being of course that if we hadn't invested that money this is perhaps what would have happened. This is a form of accountability that has really only become really prominent I think in environmental management in the last five or 10 years. We also need to get better at predicting what we might get if we invested more money and that's partly about drawing on the evidence of what we've measured about previous investments but also developing sophisticated methods for predicting what we might get that are drawing on mathematical and biological models of environmental change or of species persistence.

DYANI LEWIS

Are there other mechanisms that governments and city planners can use to protect important pieces of land from development?

BRENDAN WINTLE

There's a lot of mechanisms for trying to achieve conservation that are economic and legal, that rely on private landholders to commit to some form of conservation.

Usually that's just because they want to so conservation covenants are a very important instrument for trying to achieve conservation on private land for example where the government has relatively limited ability to manage what happens on those lands. There are other mechanisms commonly employed called offsets. We have a program now of environmental offsets in all states of Australia and it's growing in other parts of the world, especially in the United States. In offsets the idea is that a developer or somebody who's going to do some sort of environmental damage has to offset that damage by finding a place somewhere else to secure it against existing threats or to restore it back to a condition that's something akin to what was lost. This is a very difficult thing to do well because of the things we discussed before about the uncertainties associated with restoration and how expensive it is. It's also very hard to know that you're getting something that's somehow equivalent to what you lost. You need quite sophisticated ways of measuring what you had and what you lost and what you're gaining from an offset.

For example, in Australia if a developer wants to develop some native vegetation, an area that is currently covered in native vegetation and habitat for the brown bandicoot for example, they might need to try and find some other habitat for the brown bandicoot that's currently threatened with development and purchase that for a conservation offset or they might need to restore some brown bandicoot habitat elsewhere. That's a mechanism that's commonly used that in theory could reduce the burden on governments to spend on conservation. It's very controversial. We're not really sure that it works. We don't really have any good demonstrations that offsetting is actually working and achieving a net conservation benefit or a net conservation gain and there's a lot of people who suspect the opposite.

Conservation covenants are definitely a very important mechanism. The problem is what you can achieve with conservation covenants, that is legal arrangements between a private landholder and the government or a conservation organisation to conserve what's on their land, it's a very small portion of the landscape over which those covenants can be made. You've got to have the right kind of landholders with the right kind of will. That's not a very common combination. The big problems that we have are not going to be solved by conservation covenants. They're requiring much bigger investments across the whole continent or across the whole globe.

DYANI LEWIS

How then do we know which of these different policies and mechanisms are the best to achieve the outcomes that we want into the future?

BRENDAN WINTLE

Well we can try and measure what we've got from existing programs so we should be measuring how well the environment's doing in places where we have offset programs or what we're getting for conservation covenants. We also should be measuring what we're getting from public investment in conservation so when the government spends money to try and fix the river systems in Australia, create conservation reserves we should measure what we're getting from that. We then need to compare that to what we need to do to solve the big environment and

conservation problems and figure out which of those strategies is most likely to get us there. My belief is that it's going to have to continue to be primarily public investment because the scale of the problem, the scale of the investment required is just not really going to be solved by private mechanisms. That said, philanthropy is a big contributor to conservation and organisations like the Nature Conservancy that's run out of the United States that also operates here in Australia has very big budgets and has very big conservation programs worldwide. If you're in a society like especially America where philanthropy is a big part of your opportunity to do public good then maybe that's a mechanism but by and large I think it has to be done by government expenditure and government regulations on what you can and can't do in the environment. That's the reality for this country anyway. In Australia that's the reality I think for the medium to long term. In other countries it's probably going to be a bit different.

DYANI LEWIS

Brendan, thanks for being our guest today on Up Close.

BRENDAN WINTLE

My pleasure. Thanks very much, Dyani.

DYANI LEWIS

Associate Professor Brendan Wintle is a Conservation Ecologist at the School of Botany here at the University of Melbourne. He is also Deputy Director of the National Environmental Research Program Environmental Decisions Hub. If you'd like more information or a transcript of this episode head to the Up Close website.

Up Close is a production of the University of Melbourne Australia created by Eric van Bommel and Kelvin Param. This episode was recorded on 19 August 2014.

Producers were Kelvin Param, Eric van Bommel and me, Dr Dyani Lewis. Audio engineering by Gavin Nebauer. Until next time, good bye.

VOICEOVER

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