Ambition to Impact powered by Climate Impact Partners

Episode 4: Measuring 15000 trees by hand with Ed Mitchard and Rachael Nutter

Hannah Blackmore: Welcome to Ambition to Impact, a climate action podcast powered by Climate Impact Partners. In today's episode, our Global Director of Project Development, Rachael Nutter, talks to Professor Ed Mitchard, a world expert in satellite mapping of land cover change and forest properties. And he's the man who's measured 15, 000 trees by hand.

Ed is the chief scientist and co founder of Space Intelligence, a nature tech company enabling zero deforestation and mass restoration of biodiverse forests globally by providing the highest quality nature mapping data. They combine their extensive expertise in remote sensing, Data Analytics and Forest Ecology to provide highly accurate and comprehensive reporting, monitoring and verification solutions for forest carbon project developers and investors. Or, as his X bio says, he makes maps of forests and peatlands using satellite data to bring carbon finance to protect them.

Ed was Professor of Global Change Mapping at the University of Edinburgh, has published over a hundred scientific papers, advised governments on how to monitor their forests, and been deeply involved in the evolution of carbon standards. But today, we are asking Ed to come down from space and delve into his journey from ambition to impact.

Rachael Nutter: Welcome, Ed. Great to see you again. You're obviously at the center of a topic that's at the top of everybody's mind in this industry. So, whether you're a project developer or buying from projects, it's a hot topic, how we do the monitoring on these projects. Delighted to have you here because you're one of the people I think in this space who's very good at making something that's quite complicated and technical, understandable to lots of people.

Ed Mitchard: I'll see if I can live up to that. Thanks very much for inviting me on.

Rachael Nutter: So, let's get started with how you came to be founding Space Intelligence and what started prompted that journey and how's that been since you founded the company?

Ed Mitchard: To take a long step back right at school, I became very interested in tropical deforestation. I actually entered a national competition to go to the Amazon and look at deforestation and biodiversity when I was 15 and I won that competition. I was one of the six UK kids that got to spend two weeks filming for Japanese TV, bizarrely, in Brazil.

But that was a fantastic experience, and I was determined to make my career to be something to do with stopping deforestation. And I did an undergraduate in biology and then went on to do a PhD at the University of Edinburgh focusing particularly on using new and interesting satellites to look at tropical deforestation.

There was a major problem in the 2000s that we had a set of satellites up there collecting data called the Landsat satellites. There's an optical satellite, it's a bit like a camera looking straight down at forests, but they can't see through cloud. And if you've ever been to the tropics, you'll know that most of the tropics is cloudy. Most of the time, some places are particularly cloudy. For example, in central Africa, you might not get a view using Landsats for decades even, so we really didn't know what was going on. And there's a different type of satellite called a radar satellite, which can see straight through clouds and see the forest.

They weren't put up there to look at forests. They were there to look at things like earthquakes ice flows, that kind of thing. But one of my PhD supervisors thought they could see forests, and I did my research to test that. And we developed some good maps and good data across the tropics on both deforestation rates and some work on the amount of carbon stored in these forests.

Rachael Nutter: That is a brilliant story. It'd be great if we could start with a layman's definition - what is satellite technology? What can it do? And how can we then use that to help us increase confidence in carbon projects?

Ed Mitchard: Sure, I'll try and not go into lecture mode because I'm pretty sure I could talk for an hour on the various topics you entered into there. The first thing I should say is that there are now loads of satellite data collected every day. There are literally hundreds of satellites collecting data and we focus on a few of those that are what are called operational satellites. So those are organized by governments normally European Space Agency EU and NASA and the US Geological Survey.

They are funded by taxpayers and they produce a lot of open data. It used to be that they charged for that data. I remember as a PhD student writing paper applications to get hold of individual scenes that turned up on a satellite and you put into your computer. The Obama administration changed all that in 2009 and made all kinds of satellite data from NASA open and the other space agencies have largely followed suit.

So, there's now 20 or 30 terabytes of satellite data collected every single day that's free and open. Most of that kind of deluge of data is never looked at. Those scenes are never downloaded and never used, which is a challenge and part of why we set up Space Intelligence to try and address that and use that data in a useful way.

Three main types of satellite data can tell us something about forests. There's optical satellite data, which a bit like a camera, they're the easiest to understand. That's the type of data in Google Earth, for example. We see in red, green, and blue. Those cameras also go further into the infrared. So, they have bands that are parts of the electromagnetic spectrum where the atmosphere is more transparent. So, you get better data in these longer wavelengths, but essentially, they're a picture of what's on the earth's surface. That's great. It can tell you where forests are, but it only looks at the very top of the forest.

For obvious reasons, you don't get any information on anything apart from the topmost leaves. You can't tell the difference between a very healthy 50 meter tall tropical forest and a very degraded 10 meter tropical forest if they're both a hundred percent canopy cover using that optical data. So a big thing we've tried to do is use other types of satellite data as well that maybe can see through some of the forest structure.

There's a set of satellites called Synthetic Aperture Radar Satellites, normally just radar. Those send pings of microwave radiation at the surface, a very long wavelength radiation, and listen to what bounces back. They weren't really put up there to look at forests, but they are very useful.

They're seeing something about the forest structure. They penetrate past that first leaf and bounce off the trunks and branches. And they have a side benefit that they can see through clouds. Every time you get a radar satellite going over day or night, they send these pings that go straight through the clouds and get information about the forest.

The third type is LIDAR satellites. These are rarer. They send pings of laser lights straight down at the surface and listen again for the time for that laser to come back. Those are blocked by cloud and they're quite rare. There are only two satellites right now orbiting, collecting both NASA instruments.

But they're really useful because they give estimates of tree height. So, from 700 kilometers away, they can time the difference in the response from the top and the bottom of the canopy, at the speed of light. So, you can work out the distance between those two pings that come back to the satellite and say, if a forest is 50 meters tall or 10 meters tall - that's the main thing we use to map the carbon stored in the forest, as opposed to just where the forests are.

So I was an academic working for a long time on how you combine these different data sets to produce good maps. I was at the University of Edinburgh leading a big research group and doing some very exciting projects and publishing lots of papers. But meanwhile, tropical deforestation just kept on happening.

And I just felt like I was doing a better and better job at watching the world's tropical forests disappear and not actually helping with that. So, I set up Space Intelligence with one of my colleagues at the University of Edinburgh, Dr. Murray Collins in 2018. We did that on along with our university jobs for a while, as a way of serving forest projects - the kind of things that Climate Impact Partners supports - by providing really high quality maps to support projects that are trying to conserve forests.

That company started getting very busy and we ended up leaving our university jobs and working at the company full time. We're now 53 people. Producing maps all around the tropics.

Rachael Nutter: I'm very glad you are. And we've talked before a bit about resolution of what you can see. So I'm just, one of the things that brought this to life for me was understanding that, ESA NASA is, it's 30 meter type resolution down to some of the private satellites can go to 10 or 30 centimeters resolution.

I think it'd be really helpful to say to people what typically are we looking at when we see those sorts of things on the BBC website. Because I think that for me was really helpful in making this

come alive as to what resolution means. And then we'll move on to the topic of whether resolution is important.

Ed Mitchard: When we talk about resolution, we always get back to pixel sizes. These are square boxes that have the color information. If you zoom into a normal photograph you've taken, eventually you start getting these blocky bits. And the question is, what size do those represent on the earth when you're looking from a satellite?

And yes, lots of the data we use in Space Intelligence is 10 meter, 20 meter or 30 meter resolution. So they sound fairly coarse, even the 10 by 10 meter boxes. It's much bigger than a car, for example. You wouldn't be able to separate different cars at that kind of resolution, whereas, your BBC news or you zoom into a city on Google Maps or Google Earth, you'll often be seeing very high resolution satellite data at sub-meter resolution.

That's effectively a telescope sitting on the end of an optical satellite. You can't collect that kind of resolution of data over the whole planet. That would take a very long time to do that. Instead, this is targeted. They're not so good for interpreting on a computer because that kind of high resolution image is something our human eye and brain is really good at interpreting.

For the computer, it’s is almost too much detail and if you imagine what a tree looks like at that kind of resolution, let's say 30 centimeter pixels, it's going to have lots of different colored squares for the bits that are in shadow or brightly lit by the sun or the trunk. And what I'm normally interested in is looking at the forest, not the trees, and how they're changing.

For producing continuous maps of large areas that are updated regularly, we actually find 10, 20, 30 meter resolution is the right resolution for doing that. That's what a computer can deal with and where we can get nice continuous images across a wide area that are repeatable. That's why the space agencies are focused on that, what we call medium resolution.

The high resolution data is really useful for that kind of targeted intervention where you really want to know what went on yesterday with images that you can interpret with your eye. We do use them as part of our kind of ground-truthing of our automatically produced maps and to help train the algorithms.

But if I was asked to make a forest cover map for a large national park, for example, you just couldn't do it using that 30 centimeter data. Even if you could afford the hundreds of thousands of dollars for that high resolution data to be collected, it might take years for a satellite company to build up an image of that national park, lots of little kind of postage stamp, zoomed in images.

Those would be inconsistent. There'd be clouds, inevitably, over that larger capture, and it wouldn't be something that the computer would be able to deal with. So medium resolution is the right resolution for doing these up to date analyses of biomass and land cover.

Rachael Nutter: I saw the Starlink satellite going over for the first time. I'd never seen it. I was in a dark garden out in the countryside and I what on earth is that going over with little. I think it was, is it 12 points? I think I counted 12, 12 points. They're often in little lines. It was a complete line. I was looking, thinking, what on earth is that? Like an alien train! So that was really cool to see. But yes, the topic of resolution, I think that was a helpful thing for me to get my head

around. And you talked a little bit about ground truthing. I'm interested in what other data that you use aside from satellite data.

I know in your life, you've measured a lot of trees on the ground. We put a huge amount of time and effort in, with our project partners when we're implementing projects in measuring, if we do tree planting - taking lots of digital ground data about locations, et cetera. We'll be tracking mortality and maintenance and whatever else it is.

So we're building up a lot of data on the ground. We're looking at drone data to be able to take samples of bigger areas to know what we're doing. So all of those and there's lots of other data that we're gathering. Can you talk a little bit about how all of this stuff gets synthesized and how you use other data sources in your analysis?

Ed Mitchard: Yeah, I'd love to talk about that. I'm a field ecologist. I still say that I've spent a lot of my life living in tropical forests in a tent or a hammock and measuring thousands of trees during a day to build up forest inventory plots. That's particularly done to get an idea of the carbon stored in trees.

From space, you can map things that are related to carbon, for example, canopy height or canopy cover. So you have some idea of how many trees there are and how tall they are, but that doesn't actually tell you the carbon they store. To relate those parameters back to carbon, you must do forest inventory plots where you hug trees, you put a tape measure around them and estimate their diameter, and you identify their species to give you an idea of how dense the wood is.

In this case, you have a sample of trees. Balsa wood compared to ebony, you'll know those are a factor of 10 difference in terms of mass. That's a factor of 10 difference in terms of the carbon storage per volume. So you need to know whether your trees are balsa wood or ebony or somewhere in between to get the carbon storage.

So what we always do in forest carbon projects, are always anchored by field plot data. All of the methodologies require project partners to set up field plots. Setting out Space Intelligence, we have a lot of people who've got experience collecting that field plot data. I don't want to run a company in Edinburgh in the UK that involves flying people to the tropics to collect field plot data and never want to do that.

It's not a sensible thing to do from a capacity building, from a carbon point of view, or simply from being able to scale up the operation of the company. We provide training and support to local partners for collecting field plots. That field plot data is necessary to produce good maps of forest carbon.

Maps of forest carbon are only one part of the puzzle for creating a forest carbon credit. You also need to know a baseline. What would have happened without the project happening in the case of forest protection projects, REDD projects. That's normally in terms of deforestation rate before the intervention, and then monitoring to see what happens afterwards.

You don't need ground truth as much for that. It's good to know the forest ecology, but you couldn't do that from rate sensing of land cover change. But for biomass you really need that

anchoring of what's going on. And I think for forest planting, as you said, again, it's really important when the trees are baby trees, they're really hard to spot from satellites and you do need to monitor them.

The mortality of trees is highest in the first few years after you've planted them. And I think, I still think the best way of monitoring those is often people walking around and checking the trees are okay on the ground, maybe taking photos to prove it, that works well, but there could be a role for drones there as well.

That's certainly what we're doing. We spent four months trying to assess whether we could see saplings growing. But we have the cloud cover issue, where there's rain and it's good to plant, but you can't always see the trees. So that's one of the reasons we're trying to do drones and often, they might be in less accessible places but generally, yes, as we're planting, it's taking photos, we can add measurements in time and looking at creative ways to add auditable data based ways to know what's going in the ground and know whether it's growing and surviving and being maintained. And then we can flip longer term onto the satellite data side to monitor. We're very lucky as technologists implementing this type of thing in the 2020s.

And even relatively poor farmers in developing countries all have mobile phones nowadays, or almost all will have access to one. That's a fantastic tool for taking good monitoring data on things like tree planting and often. Sending payments back to the farmers on results. And if you can manage to do that fairly digitally without paper, there's much less room for corruption on the way.

And a much greater connection between that tree surviving and the money going to the person holding that phone. And this human element means we pick up other information. You've got people out and about in the sites and the communities, and you just pick up other stuff while you're doing it as well, aside from the tree data.

Rachael Nutter: One of my colleagues was showing me on her iPhone the DBH or the tree measurements that you can take just by scanning with your phone and then recreating 3D pictures of trees and things like that, it's so accessible now. And usually the communities are really happy to have new mobile phones because they can use them for other things as well. As one of our project partners was saying, I think I've become a mobile phone distributor.

That's great if that happens, right? Most of these forest conservation projects are fundamentally development projects and that's the reason I'm so keen on them - they're protecting these really at-risk forests, protecting biodiversity, and they're also helping some of the world's poorest people.

Bit of a left field question. Soil carbon? I'm always intrigued by the idea about how much information one can get about soil, carbon content of soil from satellites.

Ed Mitchard: I should share the limits of my knowledge here. I'm a tropical forest ecologist. I know quite a lot about tropical peat because I've done a lot of work at that. I know very little about soil carbon. Soil carbon is a massive carbon pool and it's one of the kind of risks related to climate change and land use changes that we start releasing a lot of soil carbon. It's particularly a problem in northern ecosystems where a lot of carbon locked up in permafrost is definitely

being released into the atmosphere. And it can be very difficult to slow that process. That's something you can monitor with satellite data. You can see whether there's normally healthy soil as vegetation sitting on top of it and soil that's releasing carbon to the atmosphere would be bare. That would apply in Scotland where you have the protective sphagnum moss released from bogs that should be submerged and haven't been because of draining and the same in the tropics where you have forests removed from peatlands. That's the soil carbon that's releasing carbon and especially where it's peaked, that carbon can be released to the atmosphere very quickly.

We've been involved in peatland projects up in Scotland and lots of covering up drainage, which is very satisfying, less photogenic than planting trees unfortunately, but I'm based in Scotland and that's by far and away the best nature based solution you can do in Scotland. We can grow trees, unsurprisingly they go quite, grow quite slowly. But we're losing loads of carbon from these peatlands that we've put drainage ditches in. You block those up, that stops that loss of carbon. It's gonna be less CO2 in the atmosphere by blocking those drainage ditches compared to growing trees somewhere. That's not the obvious solution from a climate point of view.

Rachael Nutter: We talked a little bit about reference areas and baselining. That's obviously a very hot topic and critical to get right. And there's a lot that can be done obviously with the types of analysis that, that you do.

A lot of the REDD projects that are in operation today started several years ago, in some cases, many years ago. And obviously, there have been some criticisms levelled at those in terms of how baselines were set, etc. Now, there's an element of crystal ball gazing and trying to predict the future.

So today we have the benefit of hindsight, but we also have the benefit of technology. Can you give a little bit of context on how much has the technology changed in that time? Are there things that we can do today that we couldn't have done 10 years ago, even if we'd wanted to?

Ed Mitchard: I certainly can. Just recently VERRA released its Consolidated REDD methodology, which is a new way of doing REDD projects that will be compulsory for all current and new projects from 2025 onwards, which is doing baselines, this idea of, what would have happened without the project in quite a different way.

They're doing whole countries in one go or big chunks of countries that are massive and companies like Space Intelligence are producing those baselines under contract for VERRA – and project developers are no longer involved in creating those baselines. They just get told what likely deforestation there would be in their area over the subsequent six years. And they can claim up to that number of carbon credits if looked at after the fact they've managed to reduce deforestation well below that baseline. That probably is a better way of doing it. And I'm glad they've made that shift. It has two major advantages. It stops any ability of projects to choose a methodology that's more likely to give them more credits by increasing the baseline because that decision is typically taken out of their hands. But also it reduces the startup costs for projects because that baseline work, which often would take a year or more at the start of a project long before they could sell carbon credits that's now being done by VERRA. And I hope these national scale jurisdictional baselines will integrate nicely with the similar things that countries are producing.

There’s an easier match between project level and jurisdictional level projects. But anyway we didn't know, or have the technology even to do that kind of large scale mapping 15 years ago. We didn't have all the science on counterfactuals.

I can see why a REDD project starting in 2010 would have had no ability to do something like that. And VERRA was busy creating this market. It's not like we knew what was happening then. Looking back at those projects, I think what no one argues about is the set of REDD projects we have right now, which protect a little under 1 percent of tropical forest has had very low deforestation inside those areas.

Most of them have almost no deforestation. So from that point of view, they've been successful. All the questioning and debate is about what would have happened if those areas hadn't been in REDD projects. Again, most people think deforestation in those areas would have been higher, but the question is about the amount - whether these baselines were higher than they should have been.

Probably in some cases, in retrospect, they were higher than they should have been. Some of them are probably fine. I don't think there's been a big analysis of that, but I think going forward that will be corrected by this new methodology.

I really hope we don't throw the baby out with the bathwater. Some of these long term projects started in 2010 are doing fantastic work with communities that are protecting these biodiverse forests. And I hope they continue to be able to sell carbon credits to keep those bits of forest protected. It'd be disastrous for the forest and the communities if those just stopped. And we will be using the latest satellite technology to carry on monitoring those forests over the subsequent periods to find out what's really happened and try and estimate what would have happened in the absence of the project.

Rachael Nutter: Yeah couldn't agree more with the throwing the baby out with bathwater comment. It is, as you say, when you put it in context, it's a tiny part of the world’s forest cover that is being protected in this way. We want to find ways to do more of that, not less.

Ed Mitchard: I'm pretty sure if that 1 percent on the REDD projects in the 2010s had been 30%, if we'd managed to be much more successful in growing this market in the 2010s, I'm pretty sure the deforestation rate would be lower right now. I don't think there's any doubt about that.

Rachael Nutter: Indeed, we can keep planting trees, but we need to keep the stock that we have already – that would be a very great help for us all. Thank you and thank you for the very clear update on the latest VERRA changes, because that's an important big step forward, I think, for the industry to have that clarity.

So next question, automatic remote verification, being able to press a button and have your credits issued every month. How far away are we from that Nirvana? All really accurate and we're all very happy with it.

Ed Mitchard: Okay. I'm not sure it ever should be a hundred percent automated. I think that the datasets being as automated as possible with checks to make sure that they’re high quality is a very good thing. I think having humans who understand tropical forests and understand projects

in the loop, as we say, is a good thing. We're developing a digital MRV system and another change VERRA is going through is they're intending to get rid of all these PDFs and Excel spreadsheets being used to make carbon credits. Instead, this is all going to be on digital platforms, relying on up to date remote sensing data. And that would be a great thing. So yeah, we're developing that and hoping to get to a point where you can see what's happened in the forest last month. See very clearly how that relates to a baseline and the amount of forest area that's there and that kind of live view should give buyers of carbon credits and people investing in these projects a much closer relationship to what's happening on the ground to the carbon offsets.

I hope that allows the market to grow and increases the value of the credits. And that's what we should be doing in this world of platforms and up to date satellite data in the 2020s.

Rachael Nutter: We're very much looking forward to that being implemented. But yes, I think the way we think about the idea of remote verification, as you say, there's lots of other things that you need to do as part of a process of verification. But I think it's got potential, in terms of different stages of a project life cycle. So how do we use the technology as we're designing a project and selecting land areas, et cetera through to the implementation phase and making sure that's going as you think it's going to, and then there's longer term monitoring.

And I think in the long term the technology is great for giving that leading indicator. Are we picking up adverse events, but also a leading indicator of directionally are we on track, even if the exact number comes out through a more formal verification process. It's really exciting about giving investors confidence and putting big sums of money to work.

Ed Mitchard: Exactly. All the carbon standards, they all talk about transparency. And in theory, a lot of the data that these projects spend ages collecting is open that anyone could look at. It's just buried in PDFs or out of date and difficult to access. And I think that's where a digital platform can help, it's not just the satellite data that it gives access to, it's the reports they do on biodiversity once a year, it might be the metrics from communities about things like how many girls are in education or how much money has been transferred to a community fund or something like that. People want to be able to access that data and it's frustrating because it's there, but it's just not easy to find.

There'll be much more confidence in that market. If that is made easily accessible to yes, investors or project managers, but ideally the public as well.

Rachael Nutter: We're doing lots of work on 'what's format you're collecting it in, being really clear about what's being collected, how often has it been housed? How are we displaying it and how can we share it with clients? And how can we share it with investors as well as the standards, as well as the project partners that we're working with?' So I think that's going to be a big breakthrough when we get onto those sorts of platforms.

What advice would you give to them in thinking about how they set up to monitor projects to be the most robust monitoring, best quality, put them in the best position to market their projects, raise money for their projects, get their projects validated, verified? What are the hot tips on setting up a monitoring plan?

Ed Mitchard: I guess the number one thing I'd encourage project developers to do is to get an independent group to produce the satellite based monitoring data and the monitoring plan. It's a strange thing in this market that quite often these companies have had one kind of satellite expert sitting in the corner with a computer trying their best to do a very difficult thing of making these satellite maps. And then they maybe do something else in the next three years and then try and do it again for the next validation. And they're not independent of their bosses. It's related to the success of the project, so it's quite possible that even if they are entirely independent, there's a perception of a lack of independence in terms of this critical monitoring data that then relates directly to the carbon credits.

The baseline bits for REDD projects has been taken away from project developers. Partly for that region, but I think it'd be better if all that monitoring data was done independently and having an independent monitoring partner would help, I think, raise the integrity and price of carbon credits means more money going to the project and communities, which is a good thing.

The other thing I would think of is these are very long term projects. So it's trying to think of the long term in terms of setting up. For example, forest plots, we often do simple things: we talk to project developers who are setting up forest monitoring plots and they paint numbers on the trees rather than putting in an aluminium tree tag to save a few hundred dollars.

And if you come back in five years, that paint will have disappeared from a tropical forest. You won't find the same trees as if you have an aluminium tree tag. So it's difficult because there's terrible economics to setting up a REDD project. You set it up it maybe takes you a few years to get through the initial phase and start the project. And then it might be five years before you sell a carbon credit because everything is done after you've already achieved your benefits. So it's very tempting to save money early on, but I guess if investors or anyone can help them plan for the long term, these are 35 or 40 year projects you want to set up high quality monitoring systems to start with, to, to help you down the line.

Rachael Nutter: Yeah, and it's thinking about all of these things at the time that you conceive the project design and start building that in and start building in the costs right from the word go as well. I think the other thing that we find is making sure that you've got people on the ground who are fully trained and know what to do and know what to collect and how to collect it.

That's training and you need to think about that ahead of time, but all of that, yeah, has to come together in a cohesive way. That's going to stand the test of a lot of time.

Ed Mitchard: The projects that succeed are the ones that build really robust local teams - so they maybe bring in someone, hopefully people from in country rather than from too many consultants coming in from outside. You build a robust team and do training with local people.

Yeah, if it's a 35 year project, that's someone's career that they can have in that project, doing the biodiversity monitoring, for example. It's great if that's a consistent person rather than the consultant coming in every five years.

Rachael Nutter: I like your point about, increasing specialists in the past few years. You've had people, as you say, doing their best and doing as good a job as they possibly can. But it's I think it's a little bit like surgery or something like that. At one point you'd have had a general surgeon

who did the whole body and now you've got someone who just does fingers and you've probably got someone who just does little fingers, but it's like increasing specialization and we tend to work with all sorts of different people, the different specialist things that we need to do in evaluating and designing projects, including your good selves, of course.

So finally, as we move to wrapping up the question that we'd like to ask of all of our guests, who do you know or follo w that has moved their ambition to tangible impact. And why do they inspire you?

Ed Mitchard: Okay. So I've been working quite a lot the past year with someone called Adriana Morales. She's na expert who works for Green Gold Forestry, which is a forest carbon project in Peru, which is protecting an area of forest that they were going to log. They have the rights to log there. They're not logging it. We at Space Intelligence are providing the maps to allow them to claim carbon credits. But she's done a fantastic job of getting all the project documents together, working with a company around the world that talks in quite technical language and building that into the project documents, and then going through the audit procedure involving an auditor.

It's a very robust audit procedure. You have to go through and talk to Verra and we've done a modification to the methodology there to allow for that - carbon maps from satellite data to be used to look at the growth in the forest. And I've been really inspired by her ability to work in English and grow from someone who's a technical expert, but not in the carbon markets to be able to lead that audit process and generate carbon credits. So it's been great working with someone in Peru on that.

Rachael Nutter: Yeah, that's fantastic. Now that's the sort of capability that we need to see thriving and growing in this market. So that's a lovely example. Thank you. Great. That's everything for today. Thank you so much for all the time, the super clear explanations and hopefully you, the audience have learned something. I learn something every time I talk to Ed I'm sure you have as well. So thank you very much.

Ed Mitchard: Thanks for asking me in. It's great.

Hannah Blackmore: Thank you for joining us for today's episode of Ambition to Impact. We hope you enjoyed it as much as we did and are left feeling inspired. Be sure to subscribe to our podcast on your favorite platform so you never miss an episode. And if you found today's conversation valuable, please consider leaving us a review.

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