FMP Conference Day 2 Session 2 10.30 – 11.20

Emma: Hi welcome back everybody. I realise I meant to say thank you very much to the 3 speakers in the 1st session. That was a really fascinating series of presentations. We are going to move on now. This is Markus Lange from the Jena Institute in Germany who wasn't able to join us today but he sent us a recorded presentation. So we'll start off with that.

Markus Lange-Plant diversity positively affects short-term soil carbon storage in experimental grasslands

Markus: Good morning everyone. Unfortunately I cannot be with you today that's why I recorded my presentation. What is my presentation about? I will talk about soil carbon storage and how it is impacted by plant diversity. The results I'm going to present come from the Jena experiment named this because it's located in the city of Vienna, which you can see in the back and it's located in a floodplain. Here you can see the Saale River, so here this valley is the Saale River valley and directly by the Saale river this experiment was set up. In my talk I will shortly introduce the design and the research questions of this experiment and then I will present some of our results regarding soil carbon storage in the experiment. At the end I will also talk very briefly about some extreme events so flooding in this case.

So the overall question of this biodiversity ecosystem functioning experiment is what happens to ecosystem functions like biomass production or soil carbon storage when species get lost. So in the history or in the early days of this biodiversity experiment, we and a lot of other researchers could show that with higher diversity there is a positive relation to ecosystem function. So with higher diversity we will see more biomass production and we will also see for instance more soil carbon storage. The more recent question in this experiment is, what are the underlying mechanisms for these positive relations. So we specifically investigated what are the underlying mechanisms that drive the increased soil carbon storage and how do we do this? The Jena experiment, as I said, is located in a flat plain area and here many different plant communities were established and all of these communities have natural occurring or native plants. These belong to the Arrhenatherion communities so it's central European mesophilic grassland and we established plant communities that were specific to the plant species, gradients ranging from monocultures up to 60 species. The plants could be grouped into different functional groups like legumes, grasses, small herbs and tall herbs and this is the normal situation here in these floodplains. You also have these soil texture gradients. Close to the river the soil contains really huge amounts of sand while further away from the river, sand or silt and clay minerals dominate the soil. So that's why all the plots that you can see in this schematic here, against the river all these plots have been plotted. So here is plot 1, then we have plot 2 and so on. This accounts for the soil texture gradient and makes further statistical analysis also much more easy.

So just a bit of the history. The Jena experiment was established in 2002 and this is very important, it was established on former arable land. The original plot size was quite huge around 400m², now it's much smaller because the management is really labour intensive. So to maintain the plant species gradients several times a year, a lot of students have to weed the plant communities and also the plant communities are treated like semi-natural meadows here in our region. So it means no fertilisation but twice a year the above ground biomass is removed like on hay meadows in our region.

So how the soil organic carbon content looked along the soil profile before this experiment was established, you see here a very homogeneous distribution of the organic soil carbon. This is due to the ploughing of the now arable land use and almost 20 years later we see that the soil carbon is differently distributed over the soil profile. In the top 10cms we gain carbon, so there is carbon storage and below 15cms we lose some carbon. But this is quite normal so this profile reflects the root distribution along the soil profile. So we have a lot of roots in the topsoil and only very minor roots in the depths. But there is surprisingly for me when I saw this, we are still far away from meadows which have not been disturbed yet. So these control plots, we have 2 control plots, they are very close to the Jena experiment. So that's why we assumed before the area of the Jena experiment in the 50s the soil profile concerning the organic carbon looked a bit like this. But this is an average of all plots and we reported in the very early days of the experiment already a positive short term effect of soil carbon storage depending on the plant diversity, and this positive effect of plant diversity is confirmed also in the longer term. So what you can see here on the x axis are the plants species levels and here the changes of the organic carbon per depth segments. The colours indicate different depth segments. Cream is the topsoil 0 to 5cms and 5 to 10cms and we see that with higher plant diversity, much higher carbon storage. But as I said, in the deeper soil segments, we see some losses but very importantly these losses are less strong with higher diversity. So the plant diversity also diminishes its losses in the deeper soil. Clay mineralogy is often assumed in the very long term to determine the soil carbon stocks and what we see here is that depending on the soil carbon stocks before the field was established, they have no impact on changes in organic carbon. So the soil carbon stocks in 2002 do not determine the changes we see later and also the plot which somehow reflects the soil texture is independent of these changes. We found this very important to say because globally clay content is correlated with organic carbon, but on the smaller plots you don't see this relationship on a local scale.

But our question was – The plant diversity, how can we explain it? What are the underlying drivers? We tested using this structural equation modelling and a lot of different hypotheses. For instance, if the carbon inputs drive the carbon storage, if the microbial activity is driving this carbon storage, what we found was very surprising. Plant diversity increases the carbon inputs to the soil which is itself not surprising, but these carbon inputs do not directly impact the carbon storage we see.

So instead these carbon inputs fuel the microbial community, microorganisms are more active but also plant species richness increases the activity to more stable conditions along with higher plant diversity, the microclimatic conditions are more stable for instance, and that with this higher microbial activity we see a positive relation to the carbon storage. So the higher activity is not responsible for higher decomposition of organic carbon, instead the higher microbial activity transfers the carbon inputs of plants via roots in to soil organic matter. How is this done? This is nicely depicted by a graphic I was drawing for another publication. So the microbes feed on root exudates, on root residuals and then they die and these microbes finally contribute major contents to the soil organic matter.

As a last point I would like to talk about flood events very briefly. Since the Jena experiment was established in 2002 we have experienced 3 floods and the summer flood in 2013 was the most severe one, but we do not see big effects on the soil carbon stocks. So statistically we didn't see any impact of such a flood event. But of course, as described in this very nice paper, we see in the experiment effects of these floods on the plant productivity. This depends on the severity of the floods, here these plots the flood intensity was not very severe. So here we saw an increase of biomass plant production compared to the years before, mainly probably because there was no limit in water and nutrients at the start, but here the plots were flooded for more than 10 weeks. Of course the plant communities have such a big stress that the productivity decreased compared to the years before.

Finally I would like to sum up. So the carbon stocks of the floodplain meadows are variable due to tremendous change as we have seen and if one aims to restore the soil carbon stocks this is a long term task I would say. But of course, soils are probably depending on the plant diversity, on the plant productivity, and carbon sinks. So this restoration might also diminish the increasing carbon dioxide concentrations in the atmosphere. As I said, more diverse plant communities can promote a faster transition of soil carbon stocks towards natural floodplain meadows and we find as a mechanism that the storage of carbon is rather a function of the microbial community than simply the carbon inputs of plants. But what he did not see was an effect of flooding events on the carbon stocks in our research here.

So I would like to thank you a lot for your attention and a lot of people particularly. If you have any question in general about the experiment or more specifically about our research here is my email, you can shoot me an email if you would like to, and I'm happy to answer. I wish you a fruitful and happy meeting. Goodbye.

Emma: Thank you Markus in your absence and as he said please ask him questions directly or if you want to put them in the chat, saying for Markus, we can send him an email with a list of questions, I'm sure that he will respond. He’s been very interested to be involved. We are going to move straight on to our next speaker, who is Steve Beal, Nature Conservation Advisor for the Southwest, working for the National Trust.

Steve supports National Trust properties in the Southwest to deliver nature conservation work including large scale habitat restoration and creation projects. He has a keen interest in botany and vegetation, and especially floodplain meadows and is currently training as an ambassador for the Floodplain Meadows Partnership. He's prepared this talk with the help of 2 other colleagues from the National Trust, Stewart Clark, a national freshwater specialist and Simon Barker, a nature conservation advisor for the Midlands.

Steve Beal: Floodplain meadow restoration across National Trust owned land

Steve: Thank you for inviting the National Trust to present at the conference today. You've given me an introduction so that saves me doing the first bit of the slide, and also credited Stewart and Simon as well. So what I'm going to do today is I'm going to talk about the work that we're doing around floodplain meadow restoration for the National Trust and providing an overview and the perspectives of what it's like for a major landowner. So it's a slight change of pace from the academic stuff, but hopefully it will still be satisfying and interesting for everybody. So the structure today, I'm just going to initially talk about what we're doing internally and what the work the National Trust for nature recovery looks like. Also some of the tensions and push and pulls we find particularly around works and floodplains. Then I want to just quickly talk about how we're identifying the best sites for floodplain meadow restoration and what that process looks like. Then give you some case studies and examples at the end of some of the work that we've been doing over the last 10 years and on into the future.

So setting the context internally. In 2015 the National Trust launched its most recent 10 year strategy which was asking the question - What does the nation need from the Trust in the 21st century? For nature this crystallised itself into what we call our Land Outdoors and Nature Programme which has 3 key elements which are underpinned by laws and principles. So the 1st of those is improving the condition of our triple SIs or Areas of Scientific Interest if you're in Northern Ireland, and our priority habitats. So in other words, the better part of the Lawton principles. There's the creating and restoring 25,000 hectares of new priority habitat which we're planning to do by 2025 or have 25,000 hectares underway by 2025 and that is the bigger and more parts Lawton principles. Then finally there's nature-friendly farming, or as we call it internally high nature status farming. So it's essentially trying to get 50% of our land into high nature status or nature-friendly farming by 2025. So this is the joint part of the Lawton principles so the priority habitats are the core areas and these are the areas in between where nature can just move through to find the core areas of habitat.

But today this conference is all about restoring habitats so that's what I'm going to focus on today. So it's what are we doing to restore floodplain meadows of the National Trust? I think anyone who works in conservation and ecology these days

will attest to the fact that this is exciting. This is what we're here to do. This is what we love doing and that’s exactly the same for me and it's definitely what gets a lot of us out of bed in the morning. So the National Trust owns some very significant areas of floodplains and floodplain habitats. But typically of the wider countryside most of this is improved farmland, so a lot of it is drained, reseeded, depressingly some of it is still under arable. But all of this means that there's a lot of opportunity for restoring habitats on our floodplains.

Now as you can possibly imagine in a large organisation there's lots of internal conversations and discussions about what we could do with floodplains and very often they're seen as marginal land. So there's some different competing interests and ideas of what we could do with this so called marginal land. In terms of nature, which is generally what we're always talking about, there's a range of habitats we could deliver. So obviously, a really key one for me and many of my colleagues, is the species-rich grasslands, the floodplain meadows, MG4, MG8. But there's also new priority habitat, floodplain wetland mosaic, which particularly is suitable for some of our larger areas of floodplain where it brings together a mosaic of lots of different habitat types to work together. Wet woodland, everyone's talking about tree planting these days. So of course, wet woodland is always going to be in the mix. I've got more on that in a moment and, of course, beavers. The National Trust, every other conservation organisation, every other landowner in the country is starting to release more and more beavers and we're going to see more and more into the future. They create again these very dynamic mosaics of habitats of which floodplain meadows can sometimes be a part of. We also do stage zero restoration where it is suitable and appropriate and we've got the ability to actually reconnect to the river and its floodplain in a meaningful way. So from a Trust perspective we're generally looking across our floodplains and thinking we could do all of this stuff, we've got enough land, we could actually do this. But what it's about for us really is about choosing the right habitat for the right place. Inevitably there can be some tensions between these different types of habitats that you could deliver.

So to build on that the National Trust is a very broad conservation church. Our raison d'etre is nature conservation, but it's not only nature conservation. So we also have to consider history, beauty, access etc, or in other words, multiple public benefits. We are aware that most of our floodplains are definitely not operating in the way they could do, 90% is this figure that is quite often cited and actually we could be delivering more on all of these counts. That's what we're certainly looking to do, to try and hit as many of those multiple benefits as possible.

In connection to that as well, some of you may have heard recently about a recent partnership that was launched between ourselves, the Beaver Trust, the Rivers Trust and the Woodlands Trust called Riverscapes. This is really about developing thriving networks of nature-rich habitats in our river catchments. Inevitably there's a focus on trees because some of the partners involved and particularly as some of the initial

trails have all been about planting woodlands to link to the woodland creation offer. But the key thing is actually about mosaics of habitats and floodplain meadows are really in the mix. I just wanted to use that as an illustration because I think sometimes particularly it can be easy to forget that actually what we're talking about are quite complex systems and we're trying to find ways and means to fit in all of the habitats that are suitable.

So with all of this in mind, myself and Stewart Clark and Simon Barker, who internally will have a very particular interest in floodplain meadows, started asking ourselves the question - How can we do more for floodplain meadow restoration? How can we make sure that with all of this noise, all this competing interest inside the Trust, we can make sure that we actually deliver the maximum amount of floodplain restoration that we possibly can? So to achieve this and to support our colleagues to achieve this as well, we've set ourselves a series of tasks. All of this is to ensure that we do maximise the amount of floodplain meadows that we restore. So the first thing we did, or we're starting to do now, really calls back to the previous slides on competing interests. So it's about a decision-making process and supporting our teams to make the right decisions locally. So again, it's this idea about right habitat, right place. The reality is there's no magic bullet. It’s all based on good judgment and a good understanding of each site.

But for ourselves in the Trust a really key question is how is the land managed, because most National Trust land is not actually within our direct control. It sits within farm tenancy. So these could be long term, multi-generational Agricultural Holdings Act tenancies or shorter term farm business tenancies which could be 5, 10, 15, 20 years. But either way the tenant farmers are a fundamental key part of the decision-making process and they're involved in it, and it has to be built in collaboration with them. So quite often when we had these conversations with tenant farmers and we ask them what they want to deliver on the land. What would work for them. Very often floodplain meadows unsurprisingly are an attractive option for them because it stays in agriculture, it's productive agriculture, you're getting a hay crop, you're getting grazing from it, it's also delivering these multiple benefits. So obviously restoring nature, locking in carbon, as we've been hearing about today, in the soils, access, floodplain meadows you have beautiful access, it is fantastic, people love them. So very often it's an attractive option for farmers compared to some of these other options you may have on a wetland or on a riparian system which may mean taking land out of agriculture. So alongside asking that question about what is possible with the tenancies and the tenant farmers a really important thing for us is always inevitably to understand what's happening on the site, to have good knowledge of it. So the potential for a site whether it's a floodplain meadow for us or anything else, really depends on understanding the hydrology of the site, its history, did it used to be a floodplain meadow in the past? Its local context, what other habitats are surrounding it? Also the planned management in the future. So as we know some habitats have very specific requirements, for example, floodplain

meadows, MG4, MG8 they have very narrow hydrological requirements. It's the same for some of these other habitats. But there are other habitats, woodlands, for example, which are a little less fussy and you could potentially plant woodlands in lots of other places. So it's all about understanding which sites can support the narrow requirements of floodplain meadows and targeting these and fitting in the other habitats around them.

So just to build on that, the next piece of work we've been doing is identifying sites for floodplain meadow restoration. So we've been working with our regional colleagues to undertake a desk-based review of existing and potential floodplain meadow sites. So this is a screen grab of our floodplain meadows database. So it captures some very general information. I'm not going to go into all of it now. But I think the key thing that we are looking at is to do with the next steps. So this is the key thing that we found is really tricky for us, or really important to understand, is what are the barriers to progressing restoration? It could be many different things. It could be we need to have a baseline survey. Some of these sites have not necessarily been visited for a number of years so do we need to go back and actually have a look at them and see whether they are floodplain meadows or what have we got there at the moment. Some of them it's about understanding what restoration advice is needed, or perhaps doing a feasibility study to understand whether we've got the correct hydrology and soils to deliver a really good MG4 or MG8 site. Sometimes we've got all of this stuff in place. We know what we want to do. We know we can do it, but we need money. So it's about finding the funding to deliver that work. That actually leads us back quite nicely to our 3rd task that we've been looking at which is about developing a pipeline of projects. So we know that some are ready to go. We've got money, we've got funding, we are about to deliver them, some are delivered, but actually doing this exercise, talking to our colleagues on the ground and a consultancy in National Trust, we realised that actually a lot of the time what we need is some more feasibility work to understand are these sites viable for floodplain meadows. So to do that feasibility work we've been doing a couple of steps in the process. So desk-based which goes back to our initial point about understanding the site in the decision-making process, what's possible with the tenant farmers etc and then undertaking site visits, which is the typical type of work which the Floodplain Meadows Partnership and its staff does, alongside the ambassadors and going out visiting a site, meeting the local Ranger Team, meeting the local farmer, understanding what's happening with the soils there, the hydrology, the nutrients, essentially the ecohydrology and understanding is it possible to restore a floodplain meadow to these sites? If it's not, why not? Is it just a case of the hydrology in which case is that something that we can play around with quite easily? Is that feasible? Or is it not? So it's a really important step just to understand the site and really understand what's possible there. Then once we've done all of that a key step after that is to actually get a costed restoration plan up and running because as I'm sure many people are finding out pots of money pop up all of the time at the moment, constantly there's some new water environment grant coming up, or green

recovery challenge or something like that. But you've got to be ready, you've got to be on the front foot. So we're not on the front foot if we haven't decided what we can do, know it's viable, and actually put together a costed restoration plan that allows us to actually apply for the funding and have some confidence that we'll deliver what we say we're going to deliver.

So it's not all about just identifying opportunities and weighing up decisions versus other habitats. It's also about restoring. This is just an illustration of some of the opportunities that we're looking to deliver on National Trust land in the Midlands. Now what is really exciting here for me is looking at the totals of figures we've got down here. So essentially in the Midlands alone we're looking to restore 170 hectares of floodplain meadow which is quite a significant number, particularly when you take into account that there are less than 3000 hectares of floodplain meadows in the UK. So once you scale that up and you say this is for the Midlands, we could do this for the Southwest, London, Southeast, the North etc, I think we're fairly confident that we can add significantly to the area and extent of floodplain meadow habitats in the UK.

Just to finish off, just to give you some nice examples of the work that we have been doing, some of which are successful, some of which are still underway. This is a floodplain meadow up on the River Severn which is 10 years old. You can see it's doing quite well. Sanguisorba is flourishing. It was green hay, it was started off with green hay from a triple SI. It had some issues to do with docks and weed burdens initially, which might be familiar to a number of people and there was a lot of pressure to actually spray it off and start again but Simon Barker who worked on it and was the advisor and the countryside manager are very experienced and very confident in the process and they said No, we'll just take our time, this will happen and look it's happened and that for me was a key thing that came out from a lot of those videos that we saw last night as well was to be patient. I think now they're actually taking green hay off this site and using it to kickstart meadow restoration on some other sites on that estate. On the subject also of being patient this is Places Meadow on the Warwickshire Avon floodplain at Charlecote Park, a very familiar sight to a lot of people I think. It was a long established but improved ryegrass grassland, and here they've tried a number of different techniques. We've done some plug planting, overseeding, green hay etc and it is getting better. You can just about make out some sanguisorba in there as well. But it is slow. So again, it's about being patient and communicating with other people who may be not experts in these things that actually it does take time sometimes.

Finally this is a planned project. So this is Severn Meadows up at Dudmaston Estate. It's a ryegrass ley at the moment, a temporary grassland and next year we're going to start restoring this to a floodplain meadow. We've just secured some funding for it as well via Highways England. So if you return here in 10 years' time hopefully you'll see a very interesting floodplain meadow and there'll be lots of fantastic species to

see. So that just illustrates the different life cycles that we're going through at the moment and this is replicated all over the country at National Trust properties. So that concludes my presentation. So thank you for the time, it was a rapid tour. If you have any questions, I'm in a Q&A Simon and Stewart are too, but also feel free to drop me an email. Thank you.

Emma: That's great. Thanks, Steve very much. That's a really nice overview of what the National Trust are doing at the moment and hopefully Steve will be able to answer some of the questions that are going on in the chat as well. There's been quite a lot coming in Steve. But for now we'll move straight on carrying on this double act of National Trust speakers on floodplain meadows and soil and we're going to hear now from Felicity Roos who is the National Consultant for Soils for the National Trust. She also works with farmers and land managers in Australia, Ghana and the UK on the adoption of sustainable agricultural practices and climate change adaptation and resiliency. She's going to talk today on the National Trust's ambition for soils. So thank you very much Felicity and welcome.

Felicity Roos: Soil carbon and the National Trust

Felicity: So I'm Felicity, I'm the National Soil Specialist for the National Trust and I'm just going to talk briefly about what is our ambition for soil. What are we trying to do? What's does the Trust want to do?

Just very briefly, why is soil so important? So as loads of people have touched on already this morning, we rely on our soils to deliver so many ecosystem services that we rely on and if you think of the National Trust goal to be here forever for everyone, if we want to protect the historic landscapes and cultural landscapes, like Stonehenge and all the amazing natural habitat we look after, we need to look after our soils. So that's why we want to fix them. So Stephen very kindly set the scene for what are our ambitions around our land and/or nature objectives, around 25,000 hectares of priority habitat and protect our triple SIs. So to try and put that into context this is a brief overview of the National Trust's estate. So we've got around 251,000 hectares of land and that includes all the parks and gardens and all the farmland and moors and countryside that we own. So we have about 200,000 hectares of farmland with around 1700 farm tenants and graziers, about 50,000 hectares of that is common land. Within all of that we've got nearly 140,000 hectares of triple SIs and/or priority habitat. So we have a lot of land to look after and I guess the scale of it is quite big when we're talking about what we're trying to achieve in the different areas.

So our soil ambition is quite simple, if slightly high, we want all our soils to be healthy and well managed so they can deliver the wide range of public goods we rely on. But if you think back to that previous slide the scale at which we are trying to do that at is large. We know that some of our soil is not in particularly good condition. We know

that parts of it are in very good condition. I guess in terms of delivering ambition, were promoting, I'm talking internally as much as externally, the 5 principles of soil health that these are considered in every decision that people make when doing something that involves soil, whether that's in the garden, in the parklands, on one of our big upland estates, or on the floodplain meadows The 5 principles are limit disturbance, so mechanical and chemical, to protect that really essential structure and biology that everyone's been talking about this morning. Keep the soil covered, so protect it from erosion, which is pretty important if you've got floodplains, diversity, so that lovely presentation just now on the benefit of having 60 different species and that variety of roots and the role of livestock animals, maintaining that.

So how are we trying to do this? So we split our land into 2 broad groups, what we call our in hand land so the land we directly manage ourselves. Then we've got our tenanted land so that which is tenanted out largely to farm tenants and graziers. So we want to be able to manage our soil, we need to be able to monitor it or measure it so we're doing that. So a combination of quantitative and qualitative data. So we're using things like VESS, the Visual Valuation of Soil Structure and earthworm counts as a proxy indicator for soil biology. Then also looking at chemistry, some of the basics around particularly soil organic matter, because it's such a good indicator, but also where relevant the main nutrients. For the scale we're doing it at VESS and earthworms are relatively easy because they're free to do, it just takes the time to go out and dig a hole. But some of that chemistry data you want, particularly if you start looking at things like soil carbon, unfortunately still requires a lab test and so we're trying to work out what's the best way to do this at scale. We've got the countryside survey, soil carbon data, and datasets like that and we're trying to build up our own internal dataset so that we can compare how do we perform to the national average for different land users. We've been really lucky in this recently in that through the Green Recovery Challenge Fund we've secured funding to create a soil baseline at 5 of our large estates stretching from Wallington in the Northeast to Killerton in the Southwest. So we're going to get really good soil carbon baselines at 5 quite different estates across England which will be really interesting.

Soil carbon, we don't have a specific policy on soil carbon. We absolutely recognise its value and importance and the multiple ecosystem services you get from improving soil carbon and soil organic matter content in soils beyond just the carbon benefits. So we are definitely managing our soils as part of our land management and everything to increase that. But we don't actively have a goal that we want to increase our soil carbon by x% or anything like that. We are looking at something like the "4 per 1000" Initiative that was launched in France a couple of years ago. So this idea of trying to increase our soil carbon content by 0.4% a year, but it's not officially adopted. In terms of soil carbon and carbon trading, and I think Jenny Phelps is going to talk on this later, there is still a lot of uncertainty in the market and how its measured. So it's something we're looking at, and maybe in the future we might get involved in, particularly in terms of reaching our Net Zero targets, but at the moment

we're not. We're also working just internally to improve our understanding of soil health and how to manage soil well and particularly in relation to big restoration projects like floodplain meadows or arable reversion projects, what's the role of soil? Then on our tenanted land we're grappling with the same issues that many of the large other land estates like the Duchy of Cornwall and the Clinton Devon Estate are dealing with which is when you've got a really large estate, how do you baseline all of your tenancies? We are starting slowly with some new tenancies as they come up. So as we get a vacant tenancy and it goes out to be advertised, we are starting to create baselines for those. But then thinking of all the 1500 other existing tenancies we've got, how do we get baselines of those? What are the best ways to work with the tenants? Do we write something in the tenancy agreements when they come up for renewal? Do we look at the new Sustainable Farming Initiative policy and its soil initiatives in there and do we try and work with our tenants? What are the best ways to engage? So this is something we are talking to the landowners about, we are talking to some tenants about like what's the best way to address this.

So what's the challenge? Managing soil health and looking after soils, where does this fit into our wider objectives of delivering for people, nature and carbon. Particularly after COVID the recognition that people need access to green space, and one of our founding principles was to provide space and a bit of quiet for people. We're encouraging public access and the picture shows the walk to the peak in Wales, but you can see the massive erosional scar there from all the foot traffic. So we've got challenges like that. When people organise park runs which are incredibly important, and they often happen through the winter and when you have wet soil, it's much more prone to compaction. So if we're getting a couple of 100 people running through our parkland at the weekend what's the soil impact there? How do we manage that and things like that? To link this back to floodplains, some of the challenges when we're restoring floodplain meadows, if you're doing work that involves groundworks so creating scrapes or digging ponds or stuff, how do you deal with all the spoil that's spread? What about the compaction that comes and are the groundwork necessary in reconnecting that floodplain to the river and stuff like that and how do you manage it? I had a conversation with the Riverlands project on the Bure catchment. They had 30cm depth of spoil they wanted to spread on the surrounding field and that potentially, because you're putting a completely unstructured mixed up mess of soil on an existing soil structure, you're creating a cap as such and how do we manage issues like that? So there's things like that we need to consider in our working around. Also questions like if we are putting something in and there is going to be some compaction, do we need to consider going back in 2 or 3 years and maybe doing some mediation work? Or how do we manage those issues we might create long-term? I think Stephen was talking about the meadow that originally started off with loads of docks and thistles and weeds. Well docks and thistles can be a sign of compaction so there's all these things to consider and how we manage our soils and how we actually balance our other objectives with having a healthy soil.

I'm just going to briefly touch on peat because its vaguely soil-related. Just to say that we look after around 40 triple SI peatland sites and like many peats across upland, but we also have upland and lowland peat and lots of bogs and fens and mires and like a lot of peatlands in the UK we need to do paths management and different government policies and things, it has been damaged, over grazing, burning, drainage and so we're working really hard with different partners, people like Exmoor and Dartmoor National Parks, the Peak District, Moors for the Future and the Yorkshire Water to restore our peat bogs. The picture you can see is Holcombe Moor where they've created loads of halfmoon dams to encourage rewetting of the area. So that was just what I had to say on peat.

Again, my last slide, if you've got any questions that's my email.

Emma: Thank you very much, Felicity, thank you very much for coping in technologically challenged circumstances. We've got time for a couple of questions, if we could put Steve back on as well as Felicity because we only have questions for the National Trust.

Session 2 Questions

Ann: It's a question really to Steve about your tenants. How much consultation have you done with them? Have you presented any of this thinking that you've got to them? If you haven't, what do you think their take on all of this might be, restoring all of the land and the work that you're aspiring to achieve?

Steve: Generally there's figures out there about what we've been doing, they've been available for a number of years. I think it's taken a number of years to work out what the plans are at each individual National Trust property. Then there's a process with a local team to engage with the local tenants to work out what's possible, because a lot of our aspiration, we've been realistic, is around areas where we know there's actually a real opportunity to actually make some change. Some bits of land which are either in hand where we know we can definitely make a change, or where we already have a very good relationship with the tenant and they've expressed an interest in doing something. So we have a fairly high degree of confidence that we can deliver those areas. Then after there we then go and have a conversation with the other tenants and ask what's possible, what's viable and what fits in with their business. What we're finding as most people are around the country is that everything is changing with agricultural subsidies. So tenant farmers are sometimes coming to us or are very interested in what we've got to say about what our ideas are and understand that it's a route into finances which maybe are being taken away with the end of BPS. So it's generally quite a positive situation.

Caroline: So my question is about the example that Steve talked about for Charlecote where several things have been tried over the years and you're gradually seeing things changing. When you talk about patience how are you deciding how patient you can be and what are the indicators for you to decide to intervene a bit more to try or try and accelerate? Have you got anything to say about that please?

Steve: Well with Charlecote specifically No, because that's not a site I'm involved in. If Simon Barker's here he might be able to say something, but his internet connection is not always fantastic. So if he's available then perhaps we could put him on but otherwise generally, Yes, we have monitoring set up and we monitor all of our restoration projects. We've got our own methodology which is very much based on common standards monitoring which identifies how indicator species are coming in and how abundant they're becoming. Quite often we use that as a yardstick to measure it and if we start to see things are not necessarily happening, then we ask the question why not? Was it something to do with the environmental conditions that year we did the reseeding, was there a flood? Was there a drought? In which case go back and do some more reseeding or potentially we did something and we didn't necessarily have all of the underlying data about the hydrology so it could be collecting something more along those lines, but I think it's always a case by case basis. There's never an easy answer to it in my experience. If Simon could come in if we have time, I don't know.

Emma: I appreciate there's lots more questions but I'd quite like to wrap up now so we have a decent 10 minute break in between now and the next session. But hopefully Steve and Felicity will be about on the chat and they can keep an eye on that and answer any more questions. Brilliant, thank you very much both of you for sticking with it and giving us such a great overview of what the National Trust is doing and we will be continuing to work with Steve and Felicity and Stewart and Simon and all the other people from the National Trust that we are doing in order to be that vision out. Great. We'll see you all again just after 11.30, that gives us 10 minutes.