



Environmental Audit Committee

Oral evidence: Climate Change Adaption,
HC 453

Wednesday 26 November 2014

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Written evidence from witnesses:

- [Environment Agency](#)
- [National Farmers Union](#)
- [Natural England](#)

Watch the meeting

Members present: Joan Walley (Chair), Peter Aldous, Zac Goldsmith, Mark Lazarowicz, Caroline Lucas, Caroline Nokes, Dr Matthew Offord, Mrs Caroline Spelman, Dr Alan Whitehead, Simon Wright.

Questions 75–137

Witnesses: **Paul Leinster**, Chief Executive, Environment Agency, **Pete Fox**, Director of Strategy and Investment, Flood and Coastal Risk Management, Environment Agency, **Tony Grayling**, Director of Environment and Business, Technical and Cross-Cutting, Environment Agency, **Dr Ceris Jones**, Climate Change Adviser, National Farmers' Union, **Dr Mike Morecroft**, Principal Specialist, Climate Change, Natural England, and **Sarah Mukherjee**, Director of Environment, Water UK gave evidence.

Q75 Chair: This is our second session on the Adaptation Sub-Committee report and we think it is timely. We want just to concentrate in this session on various aspects of agricultural land, flooding and water scarcity. As you can see, we have virtually a full turnout of our Committee, and we have a very large number of witnesses, so I think chairing this meeting this session is going to be difficult. I therefore ask everybody to speak up loudly so we can all hear. Hansard will be particularly concerned to have that happen. We will try to come in on the various issues, because we all have a great interest in this; there is a lot of interest in this whole subject. I ask you to keep your remarks brief when you answer questions and we will try to let it flow and see how that works.

To start off, just because we have so many expert opinions in front of us, the best thing I can do is ask each of you perhaps not to talk about your whole work agenda, but just to give us perhaps three challenges that you see coming out of the Adaptation Sub-Committee report

prior to their further report next year, and what you think the priorities should be for the organisations that you represent. Just for the sake of not getting muddled up in terms of who goes when, I will start with Dr Morecroft and we will work that way along the table, if that is all right.

Dr Morecroft: Thank you, and thank you for inviting us to present to you. Natural England is clearly responsible for a wide range of different environmental areas of work and it is that natural environment context that shapes our priorities around climate change adaptation.

You asked for three priorities: first, to carry on what we have been doing in terms of embedding climate change adaptation in all of the work that we do, particularly our practical adaptation delivery on the ground as part of our wider conservation work. Secondly, we are keen to go on working much more across sectors and to look for, I suppose, the win-win situations, if you like, where we can deliver for the environment and help people to benefit in terms of climate change adaptation; what is sometimes called ecosystem-based adaptation. Finally, we are an evidence-based organisation. Science is at the heart of all we do and continuing to grow the evidence base is an ongoing challenge here, particularly in terms of what works, as well as identifying the impacts of climate change, so embedding ecosystem-based adaptation and evidence, three Es, would be my priorities.

Chair: Thank you for being so exemplary in absolutely answering the questions. We will move on now to the NFU.

Dr Jones: I would just like to echo Mike's thanks for the opportunity to speak today. I will also echo some of Mike's points, namely the need for evidence, and as we set out in our response to consultation, the assessment of the risks and opportunities to agriculture from climate change is, we think, incomplete, and the Committee itself realises that. Utilising the full strength of partnership and working to meet the range of challenges ahead are also important. In the context of water, from an agricultural perspective, it is how we defend agricultural land from flooding, particularly our best and most versatile land, but also ensure that farming gets a fair share of water.

Chair: Thank you. I wonder if I should perhaps go to the Paul Leinster, if that is okay, then we will pick up with your colleagues.

Paul Leinster: Thank you very much. From the Environment Agency point of view, the national risk assessment highlights two key areas of our business as being of particular importance. One is water resources and the other is flood risk management, then the third area that I would identify is our climate-ready work, where we are seeking to help other sectors and organisations see what they can do to adapt to climate change.

Chair: Thank you. Do your colleagues wish to come in? No? Okay. Finally to Water UK.

Sarah Mukherjee: Thank you very much, Chair. Three things: as you can imagine, water is fairly central to what we do and so an awful lot of planning happens on a lot of different levels, but to take three thoughts, storage and sewerage infrastructure, so how we are going to catch the water when we can in the future in much more extreme conditions; how we build a sewerage infrastructure network that is resilient to what the weather might

throw at us in 15 or 20 years' time; making the best use of taxpayers' money, for example, aligning WFD and CAP to make sure that CAP money is being spent to support WFD objectives, and also helping customers to save water in terms of efficiency and leakage reduction, which we have a part to play in, but also to save energy and therefore to save money.

Q76 Chair: Can I just follow that up then with a question about how you see the Water Framework Directive and the aspirations there, how much that fits into this adaptation work that is going on at the same time, because you talked about collaboration and how that fits in with the European investment funding that there could be for green investments? If anybody wishes to take that on.

Paul Leinster: Shall I lead on that, Chair? The Water Framework Directive is fundamental and key to this. We are currently on the second cycle of river basin management plans, out to consultation just now. Part of the development of those plans was consulting widely, including with colleagues who are sat on the panel today, and more widely both at a national level and at the river basin plan level, and also this time going down to another level of detail at individual catchments. I think it is important to engage with the public and those who can make a difference at those three different levels. We have had that engagement. Climate change and the impact of climate are then inherent in the actions that need to be taken. One of the requirements, for example, in the Water Framework Directive is no deterioration, so once you are at a standard, that water body is not allowed to deteriorate. That takes into account the impacts that climate change might have, so if there is going to be less water, that will be a pressure on a particular catchment that needs to be taken into account. If the temperature is increasing, then you are going to get a change in ecology on rivers as well. For me, it is fundamental to taking forward that work.

Chair: Thank you. Does anyone wish to add to that?

Dr Jones: I think Paul Leinster's response might help, because we have always struggled to understand how WFD incorporates climate change, and particularly the inevitable change in the water environment that will happen as the climate changes and particularly the change in the baseline, so perhaps Mr Leinster has already answered that question.

Sarah Mukherjee: Yes, to build on that, I think there is the question about no deterioration; what are we deteriorating from? We could do with some thinking and some definition about where the baseline is, because obviously affordability—customers' bills—is very central to the work that we have done as part of the price review. We have a lot of information on what customers want. They want a cleaner environment but they do not want to pay unnecessary extra bills for supporting things that are not going to make a big environmental difference.

Q77 Chair: Can I just follow that up, because I saw in the press yesterday—although I have not verified it—that Severn Trent is in the process of making 500 people redundant. Are the cuts in the water companies likely to have a bearing on this in some way?

Sarah Mukherjee: We would never comment on individual companies. They are all our members, from the biggest to the smallest, public and private, and all companies have a set of legal obligations and targets that they have set themselves in their price review and it is up to them to decide how best to manage that.

Q78 Chair: But in the spirit of partnership that you talked about, presumably the partnership is with the water companies. Is there an issue there that needs to be further investigated, scrutinised?

Paul Leinster: Personally, I do not think so. As Sarah has said, I think the water companies individually are tasked on delivering outcomes and it is those outcomes that get captured within either the price review process in terms of what it is that they have to deliver. Part of the work that we do as part of the price review is scrutinise their plans to see whether the companies are making the proper contribution to the Water Framework Directive outcomes. If they have signed up to those outcomes, it will then be for the water companies to decide how best to deliver against those outcomes, so what we will be interested in, as will Ofwat, is making sure that the outcomes are delivered.

Q79 Chair: Is that an area you think is for consideration by the Adaptation Sub-Committee, or indeed by our own inquiry: looking at the role of the regulator in terms of those outcomes in future water reviews?

Paul Leinster: Yes. The way it works is that there will be individual directives that the companies have to meet. We make recommendations to Ministers and then the Ministers put out guidance as part of the price review process, setting out the expectations for what we call the National Environment Programme, so there is that cycle every time that you go into a price review of setting the environment programme within the expectations. The water companies then have to meet those requirements, and Ofwat scrutinises the costs associated with those activities.

Q80 Simon Wright: I have a couple of questions, mainly aimed at the Environment Agency, relating to flooding. In our first evidence session, we heard from a local resilience forum who bid for funding from the Environment Agency for flood risk reduction projects. One of the issues that they raised was the degree to which the Environment Agency micro-manages funding, how it is used locally. I wonder if you feel that that is a common complaint and how you would respond to it.

Pete Fox: Thank you very much. The process by which allocations to projects are made is set by the National Treasury Green Book, and so we use that to develop our processes for identifying and prioritising opportunities to invest. In so doing, I think we are always mindful that we are investing the public's money and therefore we need to introduce necessary checks and balances to ensure that it is invested adequately. In so doing, we work very closely with local authorities and other risk management authorities who wish to draw down that grant and make investments. We try to work with them to ensure that we have the necessary appraisal of those project proposals to ensure that we get the outcomes for the investment we make and that the money is best invested in those ways. Sometimes that may be perceived as being micro-managing. I think we always have to bear in mind that we are applying nationally consistent standards and we need to be prudent in so doing. In all cases, we try to work with our partners to make that process as easy for all of us as necessary.

Q81 Simon Wright: How often do you review those checks and balances and respond to the feedback?

Pete Fox: We undertook some review of them just last year and invited the risk management authorities, our partners, to give us advice on how we can improve the experience for them and we are continually looking at improving those.

Paul Leinster: There is something called the partnership funding approach that Government has set in place, and all FCRM schemes, it does not matter where they come from, are prioritised against a consistent set of criteria that all risk management authorities have to abide by. That sets a tariff and you get money for the number of houses protected, for the amount of farmland protected, for habitat created, but it is a transparent system that everybody sees and it is a level playing field for all authorities. What then happens is that on that tariff system, for any given scheme, there will be a certain amount of money from central Government and then there will be a certain amount that has to be raised locally. For some schemes, you will get 100% Government funding because they meet certain criteria. For others, you will need money coming from local partners as well, but it is very transparent.

Q82 Simon Wright: To what extent have staff and funding cuts at the Environment Agency affected the development of new flood risk reduction projects?

Paul Leinster: On the staff numbers, we were in a change programme and we have been going through a major change programme in the Environment Agency. Some members will know that we have moved from what was a three-tier organisation, where we had national, regional and area, and we have just introduced a two-tier organisation, which is national and area. We have delivered significant savings through that. Staff who were based at regions either went to area or national, but we also took efficiencies through that process. What we then had was additional money over the winter from Government that enabled us to maintain the same number of flood and coastal risk management staff as we had in October last year all the way through to March 2016.

We also received last year and this year additional money from Government—£120 million over the two years—to deal with some growth schemes and that money has been invested. In addition, we had £30 million last financial year to deal with the repairs from the damage caused by the storm and the significant flooding that happened. Then we received an additional £240 million over this year and some for next year to finish off the repair to the storm-damaged assets, and then also to bring up some other assets to target condition. That money will carry on next year, and part of that money also this current year and the future year is specifically assigned to revenue maintenance work—£35 million last year, £35 million next year—and we had already had an additional £5 million allocated for next year for revenue maintenance work to maintain our assets at target condition. That is in addition to the capital projects that we have ongoing. You will know that we have been given six years of funding starting from next year at about £370 million, increasing by 2021 to just over £400 million a year, and that is for capital for new schemes. That will enable us to have a longer-term programme than we have ever had before.

Q83 Caroline Lucas: It makes it sound very rosy in the garden of the Environment Agency, but can you just categorically put it on the record that you do not believe that the staff and funding cuts have undermined in any way the potential for the development of new flood risk reduction projects? You have reeled off a lot of figures, but obviously they do not mean

much unless you can compare them with what the need is, and we do not have that figure in front of us, but I would be interested to know your position.

Paul Leinster: My position is that we have been able to maintain the level of staffing from last year through this year, so from October 2013 through this year and through to March 2016.

Q84 Caroline Lucas: Is that enough, given that the risks are rising and the effects are getting more significant?

Paul Leinster: It is enough for us to be able to properly spend the money that we have been given. If the question is, “If we were to have more money, could we do more work?”, then yes, we could, but one of the things that we have is how do we deliver value for money with the money that we have been given? I was in front of the PAC this Monday—

Chair: Yes, I saw that.

Paul Leinster: —talking about this whole area around value for money. The conclusion from the NAO report was that we were delivering value for money on our maintenance work and capital programmes.

Q85 Chair: But isn’t the issue whether the money that has come in because of the extreme weather conditions last year is sufficient, insofar as it is not consolidated money, it is a kind of one-off? Isn’t that part of the issue as well?

Paul Leinster: That is why we have welcomed two aspects. One is we have had additional money for revenue maintenance this current year and next year. That is important, because that enables us to maintain the existing assets at their target condition. We have a bit of work still to do to get them back up to target condition. They were at target condition and then with the storms and with the flooding last year, that has reduced slightly, but we will bring them back up again. Our revenue funding is only certain though until 2015/16. We now have, for the first time, this six-year capital settlement that will enable us to deliver further efficiencies. In Spending Review 10, which we are just coming to the end of, we were given a target of delivering better protection for 165,000 properties and delivering a 15% efficiency in our capital programme. We will meet the 165,000 households better protected, plus we will deliver the 15% efficiency. Going forward, the conditions that have been applied to that additional money is 300,000 more households being protected, a further 10% efficiency and to bring at least 15% of the funding in from partnership funding. We believe that we will have to do more than that to meet that 300,000 household target.

Chair: That is a pretty tough challenge.

Paul Leinster: It is.

Q86 Peter Aldous: Yes, I have a funding question that should be directed towards local government, but as they are not here, I am going to direct it towards the Environment Agency. The Bellwin proposals for funding repairs, emergency repairs, which I think were instigated last year certainly as a result of the storm surge on the East Coast, do they, in your opinion, make or hinder the best spending of scarce financial resources?

Paul Leinster: I think there were two separate things. I do not feel qualified to answer on Bellwin, but I can answer on how the money was spent, because we provide grants to local authorities. A significant proportion of the damage that occurred during the storm and the flooding occurred to local authority-owned assets. They bid to us on exactly the same rules as we have and then we give the funding to them as grant, so yes, just as we delivered value for money, I believe that through the scrutiny and the working in partnership, they have delivered value for money. We have made our partnership or our framework contracts available to local authorities so that they can use the good rates that we have negotiated for their work as well.

Q87 Mrs Spelman: The Environment Agency has the important role of advising on building development applications, for example, to ensure that flood plains are avoided. We had evidence in our first session from Kent and Hull councils, who stated that the Environment Agency advice is usually followed, but we would be interested to know whether the changes to planning, putting sustainable development at the heart of the planning system, had made any difference in your view as the Environment Agency to the sustainability of building on flood plains.

Pete Fox: Thank you. That is a question that, clearly, local authorities would have a direct response to, but as I think the Adaptation Sub-Committee report states, there is no clear and comprehensive system for capturing all development, let alone development on flood plains. Our advice and guidance to local authorities for planning suggests that over the course of the last 10 or more years, where we have sustained an objection to a planning application on flooding grounds, increasingly a higher and higher proportion of those have been accepted by local planning authorities in their decisions; I think last year it was up to about 98% of the cases that we had catalogued.¹ But in terms of the total number of applications that are made to local planning authorities and therefore a comprehensive picture of how planning has changed, it is incredibly difficult for us all to see. The fact that the Government has proposed a flood reinsurance system—and houses built after 2009 are proposed to be excluded from the scheme—will also add to developers' difficulty in justifying and selling their properties once they have built them at flood risk.

Tony Grayling: I echo what Peter said. We, as an adviser in the planning system, inevitably have to take a risk-based approach and target our effort where we think we can deliver most benefit. As you may well know, we particularly target our advice to those developments that are happening in areas at greater flood risk and to larger developments. As Pete says, the evidence suggests that in the overwhelming majority of cases, our advice is taken and inappropriate developments that we advise on do not tend to go ahead in the flood plain.

Q88 Mrs Spelman: What do you do if the advice you have given is not taken? Is there any further step?

Paul Leinster: It is possible to request a call in, so if we thought it was sufficiently serious, we can ask the Secretary of State for Communities and Local Government to call in that planning application.

¹ **Note by witness:** The proportion of planning applications where we objected on flood risk grounds and the known outcome was in line with our advice was 97% for 2103/14.

Q89 Chair: Are there any examples where that has happened?

Paul Leinster: Yes.

Q90 Zac Goldsmith: I was going to ask exactly that, but I also wanted to know how many times your advice has not been taken by local authorities. How many properties have been built since 2009?

Paul Leinster: We believe that over the last year that we reported, so you have to go back to 2013/14, over 99% of houses were built in accordance with our advice, which was just over 58,000 houses.² One of the other factors that comes in is that some developments already have existing planning permissions from quite a while ago, and they can then choose to build under the existing planning conditions, which might not have had the same level of scrutiny around flood risk management.

Q91 Zac Goldsmith: Can I follow that up? If that figure applies to one year, which I think you said it does, that means that 500 new homes were built against your advice in flood-prone areas presumably annually since 2009. So you would be looking at 2,500 homes or so since 2009 being built in areas where the owners are unlikely to get insurance cover. I am just interested to know, where does that leave the homeowner? You could imagine a class action being brought by the homeowners buying homes in areas where they cannot get insurance, where the local authorities have allowed it to be built against the advice of the professionals. Is there any precedent for that?

Paul Leinster: Not that we have seen.

Zac Goldsmith: But those things chime with you?

Paul Leinster: One of the other things that can happen in this situation though—and does happen, I have seen many examples of this—is that if people do ahead and build in the flood plain, they raise the level of the floor so that the floor level sits outside the extreme flood event, or in other places they have car parking on the ground floor and then, if there is sufficient warning and you can take the cars away to a safe place, you will have inundation without damage. I think that there is this other area that needs to be considered in this, which is how do we make sure that properties become more resilient and how do communities become resilient as well?

One of the other things that happened is that any properties that are built after 1 January 2012 do not count in the partnership funding scoring process either. If you are purchasing a house, you need to be aware of all of these things and people who are lending on such properties might not lend because the house owner cannot get insurance for that property.

Chair: I think Dr Jones wanted to come in on that point.

Dr Jones: Yes. I guess one question in relation to this particular subject was whether these developments need to consider both the upstream and the downstream impact of such development, potentially the additional requirements on upstream stakeholders, but also in

² **Note by witness:** Over 99% of planning applications where we were informed of the outcomes in 2013/14 were in accordance with our advice, which was just over 58,000 houses (these homes may not have been built or occupied yet).

our manifesto we call for a reduction in downstream impacts from new developments because the downstream impacts might be on communities.

Secondly, I just wanted to quickly go back to the funding question while I have the opportunity, if that is okay.

Chair: That is fine.

Dr Jones: Clearly we think there is a need for more and better investment. Mr Leinster pointed out that they have a maintenance budget confirmed, I think, to 2016. We would like that maintenance budget to be agreed on the same length as the capital investment to enable the Environment Agency to plan longer term.

Q92 Mrs Spelman: That is an excellent point. There is some irony in me asking this question, which is about the impact of the budget cuts, for obvious reasons.

Chair: I think Caroline Spelman is about to declare an interest.

Mrs Spelman: I do want to press you on this question: because the Adaptation Sub-Committee report states that there are 40% fewer staff than in 2010, and they raise a concern about the consequent need to prioritise—which Mr Grayling touched on with the prioritisation of major projects—is there therefore a risk that the estimated 12,000 minor applications in the flood plain did not receive site-specific advice and that, if you accumulate all those individual applications, you may have a significant risk?

Pete Fox: I think the Adaptation Sub-Committee stated that their assumption was that we had reduced by 40% the number of staff commenting on planning applications. It was quite specific to that one task. I think their work has been divided among other people as well, so the reduction in the service is not as stark as the Committee report suggests. What the report does say, and it chimes with the comment I made earlier, was that nobody has a comprehensive overview of the total development across England and so there is some assumption as to what that looks and feels like. We can provide and have provided the evidence that we collect routinely and regularly.

I think the most important point is that we work quite hard with local planning authorities to help them understand the standing guidance that we give and that is there for all their applications, regardless of the size and complexity of the proposed development. I think where we add the most value is when we come in and support them on the more complicated and the larger developments, where we look at the impacts both of the development itself and within its catchment situation. That together I think provides as comprehensive a cover as we can for the development choices that local authorities then subsequently make.

Q93 Chair: Can I just come in? I know there is a danger of being anecdotal in all these things, but just on this we have received evidence from a Mr Barry Wallis from South Somerset district relating to a planning application for the development of 800 or so houses in a village called Mudford, near to the River Yeo. It seems to highlight this issue whereby DEFRA is saying that the planning decision is a matter for the local authority, but there does not seem to have been a proper full appraisal in terms of the implications for flooding and silting up over future years. I obviously cannot comment on this particular application, but there do seem to be instances whereby there is not a concerted approach from the

Environment Agency giving this kind of informed evidence base about implications for future flooding and certainly for planning applications. Where is the balance in all this?

Paul Leinster: I think we do give that advice. There is standing advice that we give. It is just interesting, and again, it is a bit of an anecdote, but on a number of occasions one of the reasons why we say we object to a planning application is because they have not submitted a flood risk assessment. They are supposed to submit. We should not have to object. That should just be the local planning authority objecting because a flood risk assessment has not been submitted. It should not be a surprise now to any local authority that they need to consider flood risk when they are considering planning applications and I do not think they should have to rely on us to do that very necessary first level of scrutiny. As Pete says, we give standing advice that, for development in certain areas, will be sufficient, with a good flood risk assessment by a competent person, to make sure that the development is appropriate. For more complicated ones, where people are relying on our technical advice and the local authority is relying on our technical advice, we still give that, but I do think in some of these situations local planning authorities should be doing their bit as well as us doing our bit.

Q94 Chair: But there is the assumption that it is down to the local authority, so where is the comeback if this has not been done in full?

Paul Leinster: We will pick that up, but it is a planning matter and we are an adviser to the planners. We are not the determinants of planning applications. That for me is truly a local democratic decision.

Q95 Chair: And if the planners have not taken the flooding risk into account?

Paul Leinster: Which they have to because there is a requirement on the local authority to take flood risk into account. When we get the planning application we will then object but I do think that they have a responsibility as well as us having a responsibility.

Chair: Okay. I think I will move on—

Tony Grayling: I just want to set out very briefly—

Chair: Sorry, yes, of course, Tony.

Tony Grayling: Of course, I don't know the individual circumstances of the case that has been cited to you but the threshold for a major development for us is more than 10 houses. I would be very surprised if a development of 800 has not received bespoke advice from us.

Q96 Zac Goldsmith: This is probably a question initially for Dr Morecroft. The Adaptation Sub-Committee put a lot of emphasis on the need to manage agricultural soil and sustainment; I am interested to hear from you to what extent soils are under threat, both from agricultural practices but also from climate change specifically.

Dr Morecroft: Thank you. The issues there where we are particularly involved are around the natural environment and natural habitats and the interface between that and the farmed environment. I am sure Ceris will want to come in on, if you like, the in-field farm operations. But in terms of our responsibilities, we entirely agree that the maintenance of

healthy soils is very important going into the future. Climate change exacerbates risks, particularly around soil erosion from heavier rainfall events, which is one scenario that is quite likely to increase. There are probably two main areas where we have some work going on and some responsibilities.

First, around upland peats or peats in general, peat soils, some of which are highly degraded, the restoration of those is something that the Adaptation Sub-Committee particularly highlighted as something where we need further work to up the pace of restoration. We agree with that and we are working at that, not just through our own agri-environment schemes and things, environmental stewardship and going forward into countryside stewardship. It is funding for things like grit blocking, the blocking of drainage ditches to try to encourage the restoration of peat in the uplands—

Q97 Zac Goldsmith: Can I just jump in quickly?

Dr Morecroft: Sure.

Zac Goldsmith: From your point of view, is that principally a wildlife issue, biodiversity issue or is it a food security resilience issue? What is the motivating factor then for Natural England?

Dr Morecroft: In terms of our responsibilities they are primarily for the natural environment, not just for its own sake but also for the benefits it provides to people. In the case of, certainly, upland peats it is about carbon storage, it is about water supply, as well as maintaining biodiversity, so that is one area in the uplands. Perhaps if I was to say a little bit within more of the agricultural environment, there is a lot of scope for using the measures under environmental stewardship—and in future the new Countryside Stewardship Scheme and Catchment Sensitive Farming, another scheme—to reduce original losses, for example, through buffer strips beside water courses, uncultivated land, tree planting as well to stabilise soils.

That is the area where we are working in terms of the interface between agriculture and the environment. In terms of how the centre of the field, if you like, is cultivated—the choice of crops and so on—that is not so much our responsibility but we want to work proactively with farmers. We have good relationships with many farmers and sharing their concerns about soil quality and sustainability of yield of land is something we would want to do what we can to support.

Zac Goldsmith: Maybe Dr Jones would like to respond on that point.

Dr Jones: Yes. As Mike said, similarly we have an inherent interest in maintaining our land in good condition. The management of the soil in that middle part of the field, which is what our members have been most interested in, is always the balance between your soil type, your crop, what the weather has been doing and so it is that balance. We have evidence to demonstrate that there are a range of soil conservation measures, different ways of managing soil appropriate to the conditions.

Q98 Zac Goldsmith: Can you give some examples? What needs to happen to mainstream farming to alleviate the pressures and prevent degradation?

Dr Jones: It depends on what you mean by degradation. As I said, farmers manage the soil in different ways, depending on what the crop type is, what the weather has been doing. Perhaps it is to manage a particular type of disease pressure, which is why it is hard to standardise a particular method. However, there has been quite a lot of interest in techniques like minimum tillage and no till, which certainly reduce erosion but that does not have the universal applicability. There is increasing interest in cover crops, not only to reduce erosion but to manage pests.

Q99 Zac Goldsmith: How big are these trends? You say there is an increased interest, what does that mean in real terms and how many farms are engaging in less tillage, for example?

Dr Jones: Again, perhaps to reinforce what the Committee said because the Committee struggled for evidence, particularly in agriculture, that we do not have any particular evidence and, of course, it changes every year. The assessment of uptake of minimum tillage, for example, is anywhere between 40% and 70% but it may vary from year to year.

Zac Goldsmith: Thank you. Sarah, you wanted to add something.

Sarah Mukherjee: Yes, thank you. As you know, water companies who have areas of upland peatlands to manage have been involved in catchment management projects—as we are calling them, the things that Mike was talking about—blocking and making sure that the peat is spongy. In fact in one part of the south-west they have a bounce test: go along and with a gentleman from South West Water, you can bounce on the bog and that is a good bog because it is nice and springy and, of course, that lovely springy bog is holding the water. As we said in a document about CAP reform recently—it is back to CAP again—if you get the water, the soil and the air quality right, a host of biodiversity benefits and benefits for water customers, for farmers, follows. You have increased water quality, decreased colour, perhaps flood alleviation. It is early days looking at the research now but there is a lot of evidence to suggest that those spongy bogs will smooth those curves that the Adaptation Sub-Committee report talked about.

Q100 Zac Goldsmith: It is fascinating. We had a session yesterday, which I missed, on natural capital but one of the examples that is always given of natural capital in practice—practices engaged in quite routinely now by some water companies like South West Water—is they report that by paying farmers not to pollute the ground they are saving 65 times more downstream, effectively, than they are paying in the first place, just with not having to clear up the water, the end product. The same is true of water companies paying farmers to manage flood plains differently, to try to slow water down, to negate the need for heavy defences further downstream. If that is so obvious financially and there are so many other spin-off benefits that you have just hinted at, why is this not completely mainstream?

Sarah Mukherjee: It is mainstream for the companies where there is a benefit. The blocks, if there are any, are: first, we need to have a robust set of evidence to show the economic regulator, Ofwat, that this is not a bad thing to do with customers' money, that customers are getting a benefit.

Q101 Chair: Is that sufficiently there in Ofwat at the moment?

Sarah Mukherjee: Ofwat have been quite challenging, and rightly so, about it because they want to make sure that the money we are spending on this has a direct customer

benefit and is not just a whole load of good things for the environment without being able to show that we can reduce customers' bills or keep them flat as a result. Because it is a relatively new project—relatively speaking, 10 or 15 years old—the science is still coming through. We have a way of showing that now but it is still fairly early.

But, certainly, we are just coming to the end of a price review process now, which the final determinations will be next month. A lot of the companies that have been doing this work are expanding because, as you say, in some areas it is so obvious that the benefits are there not just for water but for everything else. We have been working in partnership with the RSPB, the Environment Agency, Natural England, with farmers as well and everybody can see the benefits. One of our member companies has given you evidence about their Bogathon, whereby they took stakeholders up to see just how healthy those peat bogs are.

You were asking for examples: I went up to the Yorkshire moors last year and we went to see a part of land that was farmed traditionally and managed traditionally for grouse, and a part that was managed for water and all the grouse were where the water was, none of them were in the traditional bit; “grouse don't like wet conditions”. Well, they certainly did here because they can peck about and find the stuff they want to eat and you couldn't move for grouse on the boggy bit. But, of course, understandably, uplands have been managed in a particular way for generations and sometimes there is some evidence of new ways of working. There is a lot of engagement, there are a lot of conversations that are going on but it is changing.

Q102 Zac Goldsmith: If I could just ask one more question, do you think that last year's flooding disaster put the debate backwards in the sense that it suddenly became a very narrow debate between the soft stuff we are talking about now, the more long-term land management, versus the hard-core dredging and everyone was supposed to believe that dredging was the answer and that all the other stuff was a complete waste of money? That seemed to be where the debate flowed during that but I just wonder—maybe, Paul, you could answer this—do you feel that you were able to make the case for more intelligent management of flood plains?

Paul Leinster: Yes. That case was made during the discussion and the debate of last winter as well. There was talk about, how do you slow the flow? One of the issues that we are seeing is records, peak levels of flow within rivers and part of that is that the water is getting to the rivers much faster than it ever used to.

Zac Goldsmith: But surely dredging would contribute to that, would it not?

Paul Leinster: Dredging, if it is done in the right place, can have benefit. But catchment management and slowing the flow, Pickering is a good example where we are working on slowing the flow. The work that we are doing in Derbyshire looking at the Flood Risk Management Scheme going through the centre of Derby, thence the Moors for the Future work, is slowing the flow there. There is quite a bit of work on both strands of the work and slowing the flow is very important.

Q103 Zac Goldsmith: Dredging without slowing the flow is a recipe for disaster but you can do the dredging as long as you do the slowing the flow, is that what you are saying?

Paul Leinster: You need to do an assessment in all places for all things and that is the important thing, that so much of this is site specific and there is not a universal answer for any of this. One of the things that we do in a number of places—and I see a number of these schemes coming forward—is that you look for areas that you can provide upstream storage before you go into towns. There are a number of schemes like that that we design and build. The bit that is more difficult—and we are still looking, as Sarah says, at the science behind this—is, can you do this on a landscape scale and get it to work? You could certainly do it on a catchment scale and get it to work.

Dr Jones: Just to reinforce that we agree with Mr Leinster, that we don't see it is one or the other but it is rather a continuum and it is very much science specific. There is a balance of all these measures, right place at the right time and, importantly, at the right scale.

Dr Morecroft: I am going to join the party and agree with everyone else. I think that this is an important issue, where there is, potentially, a big gain to be had in managing and bringing together the landscape scale management and the management of land at large scale with catchment management, to positively identify the places that can flood. In the case of wetlands, wet meadows and so on, it is not going to do them harm, it may even do them good and you may be able to still get some kind of agricultural crop.

Q104 Zac Goldsmith: The very last point I want to make: if you bring in measures to increase the ability of the land to hold water and store water, is the flip side of that that you are better placed and more resilient in the event of drought? Does it work both ways or not?

Paul Leinster: No. It will depend on not the amount of water that you might have stored in peat bogs or other bogs; the amount of water for water resource purposes is in ground waters, which are deeper waters than those.

Q105 Chair: Does that not come back to my initial point about the Water Framework Directive and looking at the application of that to all these individual problems that are there and how then to maximise the possibility of European funding that could be coming through from the Green Investment Fund and how much there is sufficient partnership, which you mentioned at the outset, Dr Morecroft, with the local enterprise partnerships as well, who, by and large, do not seem to be giving the same amount of priority to these more innovative solutions, which would then deal with some of the problems of adaptation that we are looking at?

Paul Leinster: As you say, Chair, the Water Framework Directive is key to this because it takes an integrated approach. One of the dangers is always somebody thinking about water resources and not at the same time thinking about water quality

Chair: But why should that happen? Why is the focus not there?

Paul Leinster: Because people tend to study in those particular areas and get an interest in those particular areas. One of the things that the Water Framework Directive helps, one of the ways that we have organised ourselves internally, is to have people who take that overview. One of the things that we are doing is, at the same time as we are consulting on the river basin management plans, we are consulting on flood risk management plans to

try to bring it together so that people take flooding, water resources and water quality as a whole.

Chair: I know Mr Grayling has got this cross-cutting responsibility. Is there anything to add to that?

Tony Grayling: We work very closely with local enterprise partnerships and part of our work with them is trying to steer the European funds, the growth funds that you alluded to—

Chair: But is that being done with sufficient speed and urgency?

Tony Grayling: —towards flood risk management and environmentally beneficial projects. We have been reasonably successful in doing that. We think that that will deliver tens of millions of pounds worth of investment in projects that improve the environment and improve flood risk.

Dr Jones: I just wanted to pick up a couple of points. First, we need to get much better as a country at capturing water when there is too much for those times when there will be too little. In relation to Mike's point about identifying areas that can flood, we would want that to be a conversation with the farmer about those areas of the farm that are least productive that might be suitable for flood risk management and how farmers are recognised for that contribution.

Dr Morecroft: We would entirely agree with that. A partnership is the key here. I was going to mention that the new Countryside Stewardship Scheme is being developed in a way to try to bring together water management issues with some of the biodiversity ones. It will be good to see how that develops.

Q106 Caroline Nokes: We have started to touch on the areas that I was going to focus on and apologies if I ramble a bit. I represent a hefty chunk of the River Test. Obviously this is a part of the country where we were experiencing, in the winter, significant flooding and a raging debate, I have to say, as to whether you wanted to get all the water downstream as fast as you could or whether you needed a water management system that held it back and slowed the flow into areas—exactly as Dr Morecroft started to say—that could be flooded without causing too much of a problem. What I wanted to ask was, how well do you think we are doing in getting the balance right when it comes to agricultural productivity and the importance to protect from flooding land that is of high agricultural value and the balance between that and people's homes?

Dr Jones: For those of you who have had the opportunity to read our flooding manifesto we believe that the balance is not right, that we need a better valuation of agricultural land and rural communities and infrastructure in the rural area too, particularly for agricultural land, not only to value its role in producing food or other products but also a contribution to the UK economy and the UK supply chain.

Chair: Does anybody else want to come in on that one?

Paul Leinster: Just to say that a considerable amount of the schemes that we built also protect farmland. It is not as though farmland is not protected from flooding. Some farmland does flood, as we have clearly seen. But in the last Spending Review, Spending

Review 2010, we improved protection to over 230,000 hectares of agricultural land, so it was significant and adding to that 230,000, 160,000 was grade 1 and 2.

Q107 Peter Aldous: Dr Jones, in your submission, the NFU's submission, you expressed disappointment that the Adaptation Sub-Committee's report was rather limited on the effects of excess water on agricultural land; it was limited just to coastal erosion. Would you just like to elaborate on what other priority areas you think they should have covered?

Dr Jones: It is exactly the area that we have just been discussing. It is what I would think of in my rather uneducated head—inland flooding, river flooding. As the Committee pointed out, there was a lack of evidence in this area and it highlights that in its report. The Adaptation Sub-Committee is unsure of the level of risk of flooding to agricultural land and we are pleased to see that, in the recent consultation on a new set of indicators for its next report, it is looking at what we think are a better set of indicators that would better reflect the vulnerability of agricultural land to flooding.

Q108 Peter Aldous: Are there any particular measures that you would like to see them tackle as we move forward?

Dr Jones: Some of the indicators that they were looking at are some that we had already discussed, the particular grades of agricultural land that might be at risk from flooding.

Q109 Peter Aldous: Is the current classification of grading, do you think, in need of updating?

Dr Jones: They were restricting themselves to grade 1 and grade 2 agricultural land, whereas in our head our best and most versatile land also includes grade 3A, so we would like that extended.

Q110 Dr Offord: The adaptation report said that agriculture could benefit from rises in global climate change and temperatures. What kind of benefits do you see for agriculture?

Dr Jones: It would be unfair not to say there are some potential opportunities, but I am also going to say “but” now, but I will start with the opportunities. If you look at them on the face of it, the rising temperature and the consequent increase in growing season open the way, potentially, to new varieties, new breeds and new crops. We have already seen some of our more entrepreneurial members growing some of the things that the press love to hear about, like apricots in Kent, watermelons, olives even from Anglesey, which I am very proud of as a Welsh person, but these will always be niche crops. The other aspect to look at is not only the impacts here in the UK but the impacts relative to what might happen internationally. There is a general feeling that we might still retain a comparative advantage, particularly of growing cereals and growing grass, so that even though things might get more difficult here it will still be easier to grow some of those crops than elsewhere in the world.

Q111 Dr Offord: What steps do you think that the Government or indeed any other bodies need to take to achieve the kind of benefits that you have outlined?

Dr Jones: As we highlighted in our response, some of these things like breeding the right crops need a long lead-in time. It is making sure the research and development start thinking about these things now and, importantly, that that research makes it out on the

farm. Too often we see research for research sake, but it is important that those sorts of things are translated into practice. The other things that fall into my “but” category are some of the things that we have already talked about. Farmers can only take advantage for those increasing temperatures if they have access to water at the time that crops need it and those are some of our greater concerns.

Q112 Dr Offord: Okay. I just wanted you to expand slightly on the role of the NFU in that research programme, and particularly looking at the changing mix of crops and livestock. What do you think will be most prevalent of the two of those areas?

Dr Jones: How British agriculture might change? At least to 2050 we will still be a majority cereal-growing country. We will see crops like maize that benefit from warmer climates moving north and we are already seeing that. You could argue that is a good adaptation to climate change. There will be more what we might think of as exotic crops around the edges but our view is that those will be niche. But they bring opportunities for new markets and also diversification opportunities because diversification is a good resilience measure, not only more eggs but eggs in more baskets.

Q113 Dr Offord: Okay. You also mentioned our dependency upon water supplies for some of these changing patterns.

Dr Jones: Yes, particularly perhaps for some of the niche crops like fruit and vegetables, things that we should be both growing and eating more of in the UK. These are crops that need water at critical times in their lifecycle. It is important that farmers have access to that water, not for an average year but for those years where we might get more droughts, and also so that farmers have the confidence to invest in some of those new opportunities.

Q114 Dr Offord: Again, just touching on a point you mentioned, you said access to water not over every year but in a critical drought period.

Dr Jones: Yes.

Dr Offord: Are you saying that you do not believe that they are going to need an increasing amount of water on the whole or just in those critical years?

Dr Jones: If I could predict our rainfall I am not sure I would be sitting in this room now. Rainfall is unpredictable, and even when you look at the climate projections, those around rainfall have the most uncertainty. But our members need that buffer, they need to be certain, they need a secure water supply, not only to plant the crop to ensure that they can deliver that crop to harvest and to British consumers; they need the security of that supply, hence, the great interest in reservoirs.

Q115 Peter Aldous: I should have said previously that I am a partner in a family farm who are members of the NFU. Can I just probe on one particular thing that Dr Offord took up, on these potential new opportunities from global temperature rises? Have you taken any account of what impact these rises might have on the UK’s overall food security and food self-sufficiency? Does it provide an additional challenge that we are up to or not?

Dr Jones: I am not sure that anyone has made that assessment. There are various assumptions of current levels of UK food security somewhere around 60% to 70%. But the UK food supply clearly is both reliant on domestic and international. We have already had

hints from 2010 where Ukraine put an export ban on its wheat. It is a good question as to whether that situation might be more common in the future, it is too hard to predict.

Chair: Right, we must move on to water efficiencies and I will turn to Caroline Lucas.

Q116 Caroline Lucas: In our first evidence session, we heard from the Local Adaptation Advisory Panel that water companies need to work much more closely with local authorities to improve water efficiency and I wondered if any of you could give me your assessment as to the extent to which you thought this is already happening.

Sarah Mukherjee: As far as working with local authorities is concerned, I don't have that information to hand but would be very happy to provide that for you. We are a small policy organisation but I am sure we can ask our member companies. In terms of water efficiency generally, in a way it goes back to this point of storage and reservoirs. We would agree with the farming community that we need to think much more closely about catching water when we can, particularly if we are going to have increased and heavy winter rain and longer periods of drought. It absolutely behoves companies to do all the things that they should be, rightly, tasked to do, reducing leakage and helping customers become more efficient. But at the end of it, if the water is not there it becomes increasingly difficult to supply.

We are not talking about big concrete bunkers any more, we are talking about things like wetlands, which can support farmers and habitats, wildlife and wetland birds. Back to your point on efficiency, certainly in the customer focus work that has been done by all companies as a result of the business plan and price review process, customers are very keen to save water but part of the problem is the relative benefits you get from saving water is small compared to, say, energy. We have been having conversations with the energy sector recently about how we can work together. For example, if there is an energy company going to a particular area we can work with them to help customers save the energy. There is about one fifth of your energy bill used to heat water so if we can help customers save water we not only become more water efficient but also more energy efficient and also keep bills down, which, of course, quite understandably, is what most people are worried about at the moment.

Q117 Caroline Lucas: As you raised it, can I just push you a little more on leakages? What more can the water governance do about that? I know it drives people mad when there are droughts and so forth and yet it still seems, at least to the untrained eye, that there is an awful lot of water still being massively leaked.

Sarah Mukherjee: It is a perfectly fair reflection that customers, particularly during times of water shortage, if we are asking them to restrict their use, they are asking what we are doing to reduce leakage, and companies definitely have that message. There is a lot of work being done night and day to reduce leakage.

Q118 Caroline Lucas: Is there really, because we have been told this for years? We are always told there has been work that has been done and it still seems that—

Sarah Mukherjee: Leakage is down—and I am plucking figures off the top of my head—by about a third in the last 10 or 15 years, but I can certainly get the figures for you. Leakage is reducing but, more to the point, I think customers get very frustrated if they

ring and they say, “I have seen a leak” and nothing happens. Again, companies are doing their very best to improve that service and make sure—

Q119 Caroline Lucas: What needs to happen? Is it just a lack of resources or what? To have cut it by one third over 10 to 15 years on one level sounds reasonable. But if you are putting all this effort into saving it and at the same time it is coming out of the bucket at the other end—it just seems to be such a no-brainer.

Sarah Mukherjee: We have an incredibly large network of pipes and an awful lot of water goes through them every single day, so to be able to spot every single leak and deal with it absolutely immediately is obviously what companies would like to do but sometimes it is not possible. Often you simply cannot see the leak that is causing the biggest problem because it is underground. Obviously all companies do regular checks of their systems to make sure they can spot leaks, telemetry, and technology is helping. There are new methods of being able to monitor this electronically but there is an awful lot of pipe and an awful lot of road and land to cover to make sure that we spot the leaks. I do not think any company would say, “Well, we actually have this covered” because obviously there is still an awful lot of water coming out of the system, but they are doing their very best.

Q120 Caroline Lucas: Can I just check with the other panel members whether anyone else has any information on that local authority issue in particular? It was quite a strong piece of evidence that we were given in our last session, but if not I will move on to my next question, which is related again, I suppose, to water governance in a sense. What progress do you think is being made in getting a price on abstracted water that genuinely reflects its scarcity?

Paul Leinster: I will answer that. We are working closely with DEFRA, which have committed to reforming the current water abstraction management system and there was a consultation that finished in March 2014 on that. In addition to that bit of work, we are carrying out a strategic review of water resources. As you know, water companies undertake water resource management planning that takes a 25 year view and they will review that plan every five years, and we review those plans every five years. But the water companies are only one part of the abstraction scene. Energy companies abstract a significant amount of water, although a lot of the water that energy companies abstract they put back into the water bodies. Agriculture currently is about 1% and then there are other businesses as well that will be abstracting, so paper and pulp are big water users, food and drink also. So, we are taking a strategic overview of water resources going forward and we will be reporting on that to Government in the spring of next year.

In terms of what Government is looking at, they are looking at, and we have discussed two of these issues: how can you access water more when there is high flow? In that way, how can you incentivise storage and how can you also incentivise trading so that more of the water is then used by people trading water? Under those approaches, we will still get cost recovery for our activities because our activities are on a cost recovery basis, but the water trading should start reflecting water scarcity. So that is what DEFRA is currently looking at and we are talking to them about.

Q121 Caroline Lucas: Can I ask a question that may or may not be related because I do not know enough about how it works? On charges for water abstraction, as I understand it, it currently tends to be based on the administrative costs of issuing the licence rather than on

the volume of water that you are using. Is that something that you would advocate changing? Is that what you are saying?

Paul Leinster: Yes, so there will be two aspects to it. One is cost recovery for the work that we do to issue licences and that is quite rightly on a cost recovery basis. Then there is how do you price water properly and how do you price it at different times and in different places? Water is quite different to many from the other trading schemes that have been thought about because it is so dependent on geography and on use that you will get quite different values for the water in different places.

Q122 Caroline Lucas: Where did you say DEFRA was at, sorry, in terms of achieving something on that?

Paul Leinster: I think it will be something they are thinking about over the next six months or so.

Q123 Caroline Lucas: If I were to ask you what progress has been made that sounds like you are saying, “Not very much yet”.

Paul Leinster: It is an area that is tricky because, as I say, it is different from trading other commodities in that it depends how much water is being taken and whether people have property rights to the water that is being abstracted, but they are actively looking at this and we are actively discussing it with them just now.

Q124 Caroline Lucas: Can I just ask a further question that is dear to my heart about fracking? In terms of the amount of water that gets used for the fracking process and whether anyone—perhaps in particular farming, I do not know—might have any concerns about particular moments of water stress.

Tony Grayling: I will come in on this because I happen to lead the Environment Agency’s work on shale gas and hydraulic fracturing. It is a process, high pressure, high volume hydraulic fracturing, that undoubtedly uses very large amounts of water. A typical multi-stage hydraulic fracture might use I think between 10,000 and 30,000 cubic metres of water, which I think corresponds to between four and 12 Olympic swimming pools worth of volume. So by any human standards that is a very large amount of water. It is important to note that it is not continuous. Fracking is done once at the beginning of the life of the well and then it produces gas for some years and I think that is sometimes misunderstood. It is important also to understand that although it is a very large volume of water it is not large in comparison with public water supplies.

Q125 Caroline Lucas: But it is at specific moments, is it not? Of course, in the overall usage of water, it is not big. At a time of water shortage in a particular place at a particular time—

Tony Grayling: You are exactly right. At a strategic level it is not a significant issue in relation to total water use. In particular locations where there may be water scarcity at particular times it could be an issue. Because it is not a continuous process I suspect that will be manageable so that you potentially delay fracking during a period of drought.

Q126 Caroline Lucas: You could if there was a policy framework that enabled you so to do.

Tony Grayling: Of course, there are powers available for water restrictions to be put in place on all sorts of uses of water in those circumstances. Our framework of best available techniques encourages, in the use of the waste hierarchy, operators to use as little water as they need to and to recycle as much of it as they can.

Q127 Caroline Lucas: What about the state of it, though, in terms of trying to recycle this water, because a lot of the water that is going to come out from fracking will be pretty contaminated?

Tony Grayling: It will probably need to be treated to some extent to remove sediment and we would need to be satisfied about that process.

Q128 Caroline Lucas: It is going to be removing a serious amount of chemical contamination, surely. It is not just sediment.

Tony Grayling: We regulate the chemicals that go into fracking and we will not allow the use of chemicals that we deem to be hazardous to groundwater in hydraulic fracturing. The main components that you will find in the waste water are those that are mobilised from the shale rock itself, so they are naturally occurring minerals and materials and low levels of naturally occurring radioactive materials rather than anthropogenic additions to that. That, of course, does need proper management and if they do ultimately need to dispose of that it has to be done at properly licensed waste treatment facilities.

Q129 Caroline Lucas: Can I ask just one quick follow-up? I did want to ask Dr Jones particularly, from an agricultural perspective, about whether the NFU has any concerns around water volume use in fracking at certain times, albeit with all the caveats that we have just heard about.

Dr Jones: I am afraid I am the wrong person to answer that question, but I would be happy to provide you with that information.

Paul Leinster: The people involved in fracking will have to get the water, either from the water company from within their abstracted supply—so it would be for the water company to come to an arrangement with the people carrying out the fracking—or they will have to apply to us for a licence for this and we will then be able to put conditions within any licence. Anybody who abstracts more than 20 cubic metres of water a day needs a licence from the Environment Agency.

Chair: Do you have a question on biodiversity?

Q130 Caroline Lucas: I am sorry, I thought you were asking me to stop but if I am allowed to I will go on. About the impact of reduced water supply on wild life, is anyone able to give an assessment of it?

Dr Morecroft: It certainly is a concern with the potential for reduced rainfall in summer, which is the fairly consistent picture to come out of projections for climate change. It is something that could be a major impact on biodiversity; water shortage possibly more than the effect of one or two degrees rise in temperature in the near term. We have concerns with particular areas around certain parts of the country. For a start, with the dryer areas, the South-East and East Anglia, where water levels are already low, there is already pressure, as we have discussed, around abstraction, for example. But within that there are

particular habitat types where we have some concerns—those clearly that depend on high levels of water in the soil: wetlands, wet meadows and so on. Certainly, the effects of an extreme drought is something where we can see impacts.

Q131 Peter Aldous: Also for Dr Morecroft, in the Natural England submission you identified the biggest challenges and opportunities presented by climate change adaptation as being in linking sectors and policy priorities properly. Could you give some examples of where this link is missing?

Dr Morecroft: We have touched on some of these already and I would not say necessarily it is where things are not happening but there is scope to expand a lot more. We sometimes use this term “ecosystem-based adaptation”, which is kind of jargon but it is about using the natural environment to bring benefits for people that make us less vulnerable to climate change. Catchment management is one. We have probably gone through that in quite a lot of detail already but there are examples where that is happening. The Holnicote Estate in Somerset, for example, is holding water in the right place in the flood plain. I can elaborate if you want, but perhaps I should move on to another example.

Peter Aldous: I think we will move on.

Dr Morecroft: Yes, so that is around reducing the water risks but, of course, temperature produces its own problems. One of the areas where evidence has been steadily building up in the last few years is about how you can use the natural environment to lower temperatures locally. A good example is what happens in a park within a large urban area, particularly during the heat-wave conditions that you might get in a hot summer. The park will be a few degrees warmer than in the concrete-dominated streets just down the road, and there is good evidence now that you can measure a difference. Making sure there is good green space within a city can help to lower temperature.

There is a wider example as well, for example, providing shade by planting trees. It is relevant in cities but it is also relevant in the country; shade for livestock, shading for rivers as well. Colleagues in the Environment Agency, together with the Forestry Commission, have been leading on shading water courses to reduce water temperatures, which is beneficial for the salmonid fishes as well. Those are a few examples of what we would like to see as a more general approach, of looking to build the natural environment into the planning stage of things and to see it as a potential solution, not simply as a problem or an add-on.

Q132 Peter Aldous: Getting slightly local to where I come from, if you look along the Suffolk coast you have a number of nature reserves—I am thinking of places like Minsmere—that are freshwater habitats, with the risk of climate changing and sea rising they could become salt water habitats, so a complete different change in the environment. Is that something you are taking into account: either the need for better flood defences or you might need to find a completely new habitat to replace that?

Dr Morecroft: Yes, we are absolutely engaged in those issues and it is another one of those things where you need to be careful about generalising at a grand, national scale as a lot of the issues are site-specific. But, in principle, the coast is a dynamic system anyway. Places get eroded, and sediment and sand and so on accrete in other places and standing in the way of those natural processes can be a bit of a King Canute kind of activity. So we

work with our colleagues in the agency around managed realignment schemes, for example, to manage that process and proactively look to defend agricultural land and people at the same time as creating new intertidal habitats.

You are right about the freshwater habitats that lie just behind the intertidal ones and protecting them. That is probably one of the most difficult areas and, again, you would need to look at particular cases. We have been doing some work—Blakeney Freshes is the name that springs to mind—with the agency to lower flood defences so that there is more chance of a minor incursion of salt water but less chance of a catastrophic failure and a complete wiping out of areas. So, there are solutions but you have to work with a dynamic coastline.

Paul Leinster: Just taking the Suffolk example, because I also know the coast there well, we are providing compensatory habitat in some of the places. We have already started establishing other freshwater reed beds in case the existing ones become saline.

Chair: Did you wish to come in very quickly?

Dr Jones: It was just a general observation on land resource because we have a finite amount of land here in the UK, and Mike is right that sometimes it feels a bit like King Canute. It always feels like we are giving up land. Sometimes we look to Holland for more innovative forms of managing such risks, perhaps putting sand bars further out and whether we can create habitat behind those. Perhaps it is not always about giving up land.

Q133 Mark Lazarowicz: The Environment Agency has a Climate Ready Support Service. Could you outline its work to us briefly?

Tony Grayling: Our Climate Ready Support Service is an advice and support service for businesses, for other public sector organisations and non-government organisations. It is founded on our experience of translating climate science into impacts for our own work and therefore our understanding about how to do that and how to take business decisions on the base of that. We deliver the service in partnership with others, notably Climate UK and, through Climate UK, the local climate partnerships that have a presence around England. We second a member of staff to the Local Government Association and we have a scientific partnership through it with the Meteorological Office and indeed some of our partners around this table because on particular projects we work with the National Farmers Union or Natural England and others to deliver outcomes. What we do is we develop tools and guidance that is tailored to particular sectors of business or organisations, enable them to understand the risks they may face as a result of changing climate and to take the necessary actions to manage those risks.

If I were to give you some examples, we worked alongside Ofgem to make sure that the resilience of electricity network infrastructure took account of impacts of climate change in the latest price control round. We have worked with Ofqual to develop some courses that enable small business people to gain accreditation for understanding climate risks. We have worked with the food and drink sector to develop supply chain guidance—how they can work with their supply chains to build resilience into their systems. That guidance is being piloted by Asda. With Natural England and the Forestry Commission and others we have developed a manual—Natural England is the lead on that project—of tools that enable you to assess impacts on ecology and to take actions to mitigate those.

Q134 Mark Lazarowicz: That is helpful. It has only been going for two years, I understand. I know this is the kind of work that you cannot easily measure, but insofar as you can measure the impact of what you have been doing, can you give us some indication of how successful or otherwise it is?

Tony Grayling: First of all you are right, it is difficult to measure because to some extent you are trying to measure the dog that does not bark in terms of risk avoidance—and indeed it is the dog that does not bark in 10, 20, or 30 years' time, not just now.

Q135 Mark Lazarowicz: Do you have figures on how many businesses you have reached or that kind of impact?

Tony Grayling: We do have some data on that. For example, the course that we have developed for small businesses has been undertaken by about 300 or more businesses. Our web-based tools have reached many thousands of organisations. We do have to target our efforts because it is not a huge amount of resource that we have to devote to this so we often work through intermediary organisations—professional associations and trade associations—to try to reach as many people as possible through targeted effort. We are also working with the Adaptation Sub-Committee to develop better outcome measures for the work that we and others undertake on climate change adaptation, but it is quite difficult.

Q136 Mark Lazarowicz: On that particular point, we are told the Adaptation Sub-Committee recommended that your service is extended to sectors that are reliant on products sourced from countries at comparatively high risk from climate change, such as clothing and manufacturing. How practical would it be for you to extend your service in that way?

Tony Grayling: I think over time it would be possible. I have given you an example with the food and drink sector where we have helped them to develop supply chain guidance, which is very much about supply chains that may be overseas as well as domestic, to build resilience, and I think we can extend that approach to other sectors.

Sarah Mukherjee: Very briefly, I have been lucky enough to attend some of the Climate Ready events, and you often find in some organisations people who sit next to each other will not talk to each other about stuff in common, and all the more so when you are across sectors. There was one discussion we had that was extremely interesting with the food sector that Tony mentioned. Just to talk about how they see water availability and water resilience and storage, and as a result we are going to be having an event, hopefully with some of the food sector people, just to talk about how you share best practice. They are obviously thinking about water in terms of their supply chains in agriculture. We are thinking about how to supply farmers and is there anything that we can do together, so it gives you a meeting space that you might not otherwise have to talk about that.

Q137 Mark Lazarowicz: In the 30 seconds we have left I was wondering if Dr Jones would give an assessment of how your members have made use of that service.

Dr Jones: I can tell you better on Friday because I am attending one of a series of workshops that we have been supporting Climate Ready and the Farmer Advice Service on but feedback on the first couple of workshops is really positive on the impact of extreme weather on farming.

Chair: We will be very pleased to receive any written information on that point. We have covered—I was going to say a lot of ground but probably a lot of water. Can I thank all the witnesses and the Committee as well? Thank you very much indeed. It has been a very helpful evidence session.