

WEDNESDAY 2 DECEMBER 2009

Present

Arran, E.
Caithness, E.
Lewis of Newnham, L.
Livsey of Talgarth, L.
Palmer, L.
Sharp of Guildford, B.
Symons of Vernham Dean, B.
Ullswater, V. (Chairman)

Memorandum submitted by Natural England

Examination of Witnesses

Witnesses: **Dr Tom Tew**, Chief Scientist, **Dr Geoff Radley**, Principal Specialist, and **Ms Rosie Manise**, Principal Specialist, Natural England, gave evidence.

Q1 Chairman: First, I should explain that I am the acting Chairman for this particular meeting of Sub-Committee D, and you are very welcome and we are very grateful that you have come to give evidence to us from Natural England. This is a formal evidence-taking session. As you know, we are at the outset of our inquiry into the adaptation of agriculture and forestry to climate change. As it is a formal evidence session you will be offered a transcript to note down whether there are any particular figures or wording you may wish to alter in order that we may keep the record straight. You will note that it is being recorded and it is also being webcast - whatever that means! We have had your written evidence, of course, but perhaps I should offer you the opportunity of making an opening statement before we get on to the more detailed questions, of which I know that you have received a copy. Dr Tew?

Dr Tew: I have with me Geoff Radley, one of our specialists in agriculture, and Rosie Manise, who is one of our experts in general policy matters. I am Natural England's Chief Scientist. Thank you for inviting us, firstly, and I would like to take the opportunity of

making an opening statement. I am taken with John Beddington's perfect storm metaphor where rising populations and increasing demand for water, food, energy and land against a backdrop of climate change present an unprecedented set of challenges for society. It demands an integrated response from society and an integrated response to land use, and an integrated response to climate change, whereby adaptation and mitigation are not alternatives but rather are both essential and complementary bedfellows. We are focusing on adaptation today, and I hope it is helpful if I give you Natural England's take on adaptation. We are interested in adaptation for two specific and different reasons. Firstly, we think that the wildlife of the country is threatened by climate change and that we have a responsibility to enable wildlife to adapt for, if you like, moral reasons, and that is important to us because that is part of our statutory remit. However, we are also interested in helping a natural environment adapt to climate change because we believe that is the most effective response that society can make, and that having a healthy, natural environment provides a cheap and effective societal response to climate change. For instance, it can be as effective and cheaper to create salt marsh on the coast than to build a concrete wall. There are a number of ways that society can adapt by turning the air conditioning on, by pouring more water on to the land to irrigate crops, by building coastal concrete flood defences - they are all appropriate ways for us to adapt but they are not, in our opinion, the best way; they are not sustainable in the long-term, in our opinion. For agricultural adaptation we think the same argument applies. Food security and production is critical for this country and will remain so, and it is important that agriculture adapts to climate change to enable that to carry on. It is equally important, however, that agriculture does not adapt in a silo, and we recognise that land has to deliver a wide range of what are unfortunately called ecosystem services to society, from clean water and flood defence and carbon sequestration and so on, and I think our take-home message

today is that adaptation by the agriculture and forestry sectors is critical and must take account of that wider societal need to adapt.

Q2 Chairman: Thank you very much. You have identified almost the first question in your answer, what do you see as the main challenges in the sectors of agriculture and forestry, and you have indicated one or two of the sort of areas where solutions might be, but perhaps you would identify for us where you see the main challenges in climate change, and who needs to be dealing with these challenges. Perhaps also you could tell us how this is an important issue for the EU and how the EU itself can bring answers to it, rather than the individual Member States; whether there is benefit for the EU to act unilaterally rather than Member States individually.

Dr Tew: I will try, my Lord Chairman. Given that context there are three general challenges for agriculture. The first is for us to find a way that enables agriculture to maintain or increase production whilst at the same time not compromising that other broad range of goods and services, and there is a clear role for my organisation and Government to provide frameworks and advice and work closely with the land managers who will have to deliver. The second challenge is to make the land managers aware of the value of what they deliver, so that a farmer does not simply focus on food production but is himself aware of the wide range of other things that he is delivering for society. The third is the other side of the coin, which is to make society understand that land managers deliver a whole lot more than just food or timber, and that the water that is running through their front room is closely linked to the way that land is managed on the distant moorlands. If society can understand that, then we can have a bash at starting to put value on those goods and services, because at the moment this is market failure. Land managers are not rewarded. There are a few things that land managers are rewarded for; they deliver a wide range of things they are not rewarded for, and if society wants them to deliver that wide range of things, then society has to find a way

of paying land managers to deliver. So those are the three generic challenges, and then I have some specific urgent challenges. The first is about providing some mechanisms for land managers to be able to do this rather than just talking at them about this role, and that leads into the second, which is developing effective and integrated incentives, and there are some huge challenges for this joined-up debate. For instance, at the moment you may go up into the hills and a farmer may be receiving agri-environment payments from Natural England, woodland grants from the Forestry Commission, grants from the Regional Development Agency for forestry, he will have the water companies talking to him about water, and there is a significant societal challenge in how we join those up so that we have proper integrated land use planning. I will finish by saying we are part of a study with the Environment Agency and Defra and the Forestry Commission that has looked at the real substance behind what it is we might want land managers to do, and I am very happy to pass that on to the Committee, or I can give you the summary which covers eight specific issues that we think are important.

Q3 Chairman: Let us see if we touch on them.

Dr Radley: Can I pick up the point about the European Union and what that might add? Climate change is obviously a global issue, and if ever there was an issue where European level co-operation was important then I think this is probably it, but if we go beyond that level of broad principle one of the issues is that, as a nation if we decide to respond in a sustainable and integrated way, it would be very nice to make sure other Member States are doing the same, and that we retain some semblance of a level playing-field across Europe.

Q4 Chairman: You realise that our report will be on the EU White Paper, and therefore our concerns are very much what is coming from Brussels, which we will deal with as we go through the questions. That is our focus, rather than being a UK focus on adaptation.

Dr Radley: There are two issues. There is the issue of principle, if you like, and also the pragmatic point, which is there are major EU-level instruments which can be used for good or ill, and it is obviously in everyone's interest that we use them for good.

Q5 Earl of Arran: You have already touched upon this, but concerning adaptation to climate change facing agriculture and forestry, what actions, in your opinion, should be taken by those responsible, by Government, by statutory agencies, by regional and local authorities, firstly, and, secondly, to what extent should the suggested or required actions differ across the UK, and if you think they should differ, why?

Dr Tew: My Lord, there is a strong role for leadership in this sphere by Government but essentially - and I would say this, I am a public servant - Government should provide policy and frameworks and incentives to allow and enable land managers to adapt. We think regulation has a role but we do not think you can regulate your way to climate change adaptation; we think it needs to be incentivised and enabled. For our part, we have a role in terms of the advice we provide to Government; we are on a number of the working groups that the national framework has set up, which I will not go into as this is a European inquiry; and we also deliver the agri-environment schemes which we may come back to because they are instrumental in the delivery of those adaptation actions. To what extent should required actions differ across the UK? Dr Radley was right, mitigation is global but adaptation is local, so the responses will clearly vary across Europe. There are wide variations in the predicted effects of climate across Europe and, indeed, the UK as a producer of food becomes increasingly important as southern Europe gets hotter and hotter, but even within the UK there are big differences between predictions for a much dryer and warmer south east and a milder and wetter north west. Then, of course, there are clearly the differences in adaptive responses between horn and corn and what the different sectors would need to do, so within an EU framework there has to be flexibility for regional and even local responses.

Q6 Lord Palmer: In reality how easy is that going to be?

Ms Manise: If I may, I will come in here. Public policy, whether created at a European level or at a UK level, increasingly has to deal with a large and growing number of actors who need to be co-ordinated by themselves, perhaps through will, through incentive, or who work within some sort of coherent framework so that they understand the part they play in this bigger whole. It is never going to be an easy matter of a policy framework being developed and, lo and behold, delivery takes place appropriately and in all of the right ways in all of the different areas. The fact that climate change is global but adaptation is local means there needs to be a good deal more flexibility offered to the very local players, whether they are land managers, land owners or local authorities, as the Earl of Arran included in his question, to consider what their locality needs to do to be able to adapt sustainably, affordably and comfortably to climate change in the future. Perhaps when we get into the later questions about timetable and the level of ambition for the European White Paper, we might be able to pick that up in a bit more detail. My take-home message, however, would be that the European White Paper and the strategy for action that follows from it must merely be an enabling system and framework, not an opportunity to reproduce, duplicate or confuse the arrangements made within Member States or within local authorities in the UK.

Dr Tew: If I may, your question raises the crux of the issue, which is equity. Adaptation does have to be local, but an East Anglian farmer adapting by putting more water on his crops may not be the response that his neighbours or the rest of the country find sustainable, so there is a real challenge, in the same way that someone on the top of a cliff is unfairly bearing the brunt of a national coastal erosion policy. Climate change is raising real issues of equity both across the country and between generations in a way that is unprecedented for some of the policy instruments.

Q7 Earl of Arran: Just coming back on one general point concerning the advice that you are going to give to those who work in agriculture and forestry, are you finding this an open door from the point of view of belief in climate change, or is it an uphill struggle to convince them? What is the feeling out there amongst those who work in forestry and agriculture who till the soil?

Dr Tew: Positive. My experience is that farmers more than anyone are in touch with the environment. However, it is not their first reaction. When you say to them, “What are you doing about climate change?” or “Do you believe climate change?” their initial response is not that they are confirmed believers and advocates; but when you ask them whether they have noticed the changes in the seasons and sowing timings and patterns of rainfall and so on, they are highly attuned to that. There is an on-going debate which reflects society’s on-going debate about whether that is really caused by humans or not, or is not part of a natural cycle.

Q8 Earl of Arran: They accept that something needs to be done, do they?

Dr Tew: They are absolutely exposed to the realities of farming the land. My late father-in-law was always prepared to act and he was not interested in the cause behind it, but he was very aware of what needed doing on his farm.

Q9 Chairman: Farmers tend to react to climate change on a day-to-day basis.

Dr Tew: There is also a discussion, my Lord, about climate and weather, which is another interesting one!

Q10 Lord Lewis of Newnham: You have made a remark which I found very interesting which is that if you are dealing with farmers, presumably in Essex, who find water difficulties, they have to change. How are you going to do this and what timescale are we

discussing on this, because it seems to me you are involving yourself in a very direct approach to local farming.

Dr Tew: I will ask Geoff to expand on this because interaction of the various environment schemes is Geoff's specialist area. We are engaged very directly in designing those scheme structures, so we can have a direct and immediate effect in terms of the incentives that are offered to farmers. However, I think the discussion on how society uses water is of less immediate impact; there your Lordships would want to have discussions with the water companies and the Environment Agency. From our point of view there is a general discussion about how unsustainable use of water will have an irreversible impact on the natural environment, and that is not good for either farmers or conservationists.

Dr Radley: Tom is right, there is a much bigger issue around the priorities for water use, and we are just one of the players that have a view on that, and that will be longer term. What we are involved in at the moment is what can be done within the current paradigm of farming and the current patterns of farming, at least in the short term. We can help farmers to make significant adaptations and to some extent mitigate as well within current systems, but it is important to look for and to look at the direction of travel and where you are going in the future, and in these areas there is no choice. Parts of the Broads are already suffering from problems of salinisation, not from water extraction but because of rising sea levels, so there are real challenges we cannot avoid.

Ms Manise: It is worth pointing out that in the next few years we will start to recognise water management as being the lynchpin for adaptation, not just in respect of the natural environment, which is clearly our remit, but also in terms of adaptation of society and the wider economy, and that would include the agricultural and food processing sector. We are all familiar now, or are becoming familiar, with carbon footprints on products and services that we buy. I am not a betting woman but, if I were, I suspect we would see water footprints

in due course, because the embedded water in goods and services is a very crude but important indicator of society's adaptation to challenges of a warmer and drier climate, so I think that might be an area that your Lordships may wish to turn to in future.

Q11 Lord Lewis of Newnham: I would agree totally. If I was pushed to the wall I would say that the real problem is population and water, and that the problems we are dealing with today are going to be dependent upon those two particular factors. I think that is implicit but not explicit in what you have been saying. May I turn to the European Commission's White Paper? One of the matters they enunciate is the timetable, and they foresee two phases: Phase 1 from 2009 to 2012 for preparatory groundwork and Phase 2, from that period of time onwards, for the implementation of a comprehensive strategy. What is your view on this timetable? It seems to me to be very tight indeed and, particularly from where you have been enunciating the problem to us at the moment, that we are being pushed, or they are being pushed, into a very tight timetable. My impression from what you are saying is that the consultation, particularly within the whole of Europe, is going to be a very important part of dealing with this particular problem.

Ms Manise: I would say that in an ideal world we would be having this discussion, and the European Commission would be having its discussions, some five or ten years ago, to give the maximum amount of time in which to optimise the outcome of those conversations and to ensure that all of the players from the European level, policy-makers down to the agents of delivery, be they landowners or local authority departments, have time to embed the agenda in all of their own work. But this is not an ideal world. I do, however, think that the timetable that is presented, while it may prove challenging in some places, is perfectly do-able. My reasons are that there are a number of key policy windows which are just beginning to open and have been due to open for many years - CAP reform; discussions around the European budget; discussions around the terrestrial cohesion funds; in 2012 there will be publication of

what might become the 7th Environmental Action Programme, which will trail the legislative measures needed, and which we would argue should be predicated on the basis of healthy ecosystem services and adaptation to a changing climate, whatever the cause. There will also be plans being laid for the new rural development programme, the environmental stewardship scheme which our organisation is the key delivery agent for, and that needs to be in place by 2013. Thankfully it is not as though DG Environment, which is the progenitor of the EU White Paper on Adaptation, has to climb this mountain all on its own. If it is smart, and I am hoping it will be, and it learns from the experience to date of the UK Government, which has sought to embed all of these measures around adaptation into the legislative and financial levers that make the most sense for the issue under discussion, so we spread the burden, they will reduce any insurmountable challenges they may face and they will deliver. None of this means, of course, that we have to wait for the set European strategy on adaptation to be delivered to us before we do anything. There are, and will continue to be, a very wide range of “no regrets” actions that Member States, including the UK, can and should continue to take to restore and improve the resilience of the natural environment and to increase the resilience of our agricultural industry so that we optimise production, which will not only safeguard the natural environment and society which depends on it but also the agricultural industry in the long term. Many of those measures are happily very straightforward and are already being done, as Geoff could describe in some detail, through the existing environmental stewardship scheme. We do not need to wait for this document to arrive to start making a very positive difference, but we do need to give the document and the strategy enough time to be embedded in the levers where it will matter most.

Q12 Earl of Caithness: You have painted a very rosy picture of what the EU could do. Do you think there is the remotest chance of the EU in their review of the CAP policy turning

round to the Spanish, the Italians, the Greeks and others and saying: “We are going to take quite a lot of your land out of agriculture as part of the adaptation”?

Ms Manise: I travel in hope rather than expectation!

Q13 Earl of Caithness: But have you any indication that that is likely to be accepted on an EU-wide basis?

Ms Manise: I do not have any indication that taking large swathes of agricultural land out of production, elsewhere but in southern Europe in particular, will be welcomed with open arms, but I do believe that other European nations are themselves starting to identify the sociological effects of direct climate change, whether that is in Spain with reduced water levels and water shortages, or whether it is further south in Greece, where the rate of summer deaths and increasing rate of summer fires may be linked to the heat island effect around Athens in particular, and I have no doubt whatsoever that they are mindful of those measures. The gap that needs to be made up, which is where I think your question really goes, is the difference between the body of evidence that we know exists, the policy framework we hope the European Commission will develop, and seeing the appropriate measures delivered in each European Member State. That is, I have to say, a little bit beyond Natural England’s immediate remit, but I know that from discussions with other nature conservation agencies and with Whitehall departments other than Defra that, in their role of shaping European policy to safeguard British interests, they are taking the learning that we have developed in the UK and looking at the best ways to adapt that so it can be applied much more easily and much more widely elsewhere in Europe. I am quite sure there will be many examples of failure; that would characterise the history of pretty much all environmental policies since the year dot. I am equally sure there will be many instances and examples of environmental policy success, and our job is to maximise those, learn from those and diminish the former.

Dr Tew: You are quite right, my Lord, it does sometimes feel like you are whistling in the wind and personally I think that some dramatic climate change events will change people's thinking on this. In the meantime we need to prepare as best we can and put the framework in place to allow action to be taken when the society of this country or Europe decides it wants to act. I was on the continent in the 2003 heat wave and 35,000 people died in that heat wave. There was much more focus then on what was happening and what needed to be done. The climate protections for southern Europe are dire.

Chairman: I think we have dealt with that timetable, and thank you very much for your answers to that question. Perhaps we should deal with the individual pillars which appear in the White Paper. Lord Palmer?

Q14 Lord Palmer: Do you agree that the knowledge base about the impact of climate change on agriculture and forestry, and I must declare an interest being involved in both, across the European Union needs to be developed as the White Paper proposes? Have you been able to identify any gaps along those lines? What is your view of the proposed Clearing House Mechanism as a shared database on climate change impact, vulnerability and best practices on adaptation?

Dr Tew: As a scientist I live by the creed that our knowledge base needs developing, so my answer is yes. There is, however, a very large caveat in here which is that uncertainty is not an excuse for inaction, so running around collecting more evidence is not, to my mind, the most urgent priority at the moment. Having said that, there are significant gaps in the evidence base, and I would like to highlight four, if I may. There is no good overview of which parts of the continent or which parts of the countries or which sectors are the most vulnerable. There is a rather homogeneous view that things might get tough but there is no very good vulnerability analysis, and when you start looking at different parts of the country and different sectors some are clearly more vulnerable than others, that is a piece of work that

needs doing on a variety of levels. There is not a very good idea of what works on the ground, what you would do to deliver adaptation and in what way. Again, we can give ideas but there is very little field-testing of what actually works or not. Further, there is no good analysis of what impact those actions that you would take to allow agriculture to adapt would have on the variety of other actions that you would deliver. If I may, my Lords, I would point you to three pilot schemes we have just announced that we will be running in the next year in three different parts of the uplands, where we are trying to change the way land managers are incentivised to deliver things: where we hope to record the response of land managers in doing things differently: where we then hope to record the effect of that change in land management whether it is helping to mitigate floods or not, and, lastly, whether that has any positive effect on the environment. But I have to say, my Lords, that is quite a long haul and it will not happen overnight, as your Lordships are aware, but that is a piece of research that we are kicking off. Lastly, we think there are gaps in the monitoring. We think we should be monitoring with land managers rather than monitoring land managers. We think we should be much more engaged with land managers and in using their expertise and their knowledge to help tell us what is going on in the way we discussed earlier on, rather than monitoring what people are doing all the time. So there are some very significant gaps. The Clearing House Mechanism is a brilliant idea designed by conscientious scientists very keen on evidence base, and if it works it will be fantastic, but I would not like to think that billions of euros will be invested in constructing a Clearing House somewhere in Europe.

Q15 Lord Lewis of Newnham: You talk about climate change, and you have referred very much to the effect of temperature and to the effect this is going to have on sea level, water, and so on. What other factors of climate change do you include in your particular model? What strikes me as being very important is the wind, because climate change is effectively

introducing quite a significant change in the sort of wind patterns we get, and even the occurrence and violence of winds as a whole. What other factors am I missing?

Dr Tew: Modelling weather is extremely complicated and it is one of the uncertainties that stretches the public's credibility in the modelling, because they say to scientists, "Was this flood we have just had the result of climate change?" Of course the answer is not directly. The flood we suffered in the North West was because there was a depression which, very unusually, sat in the same place for several days and it was not a direct result of climate change because climate does not directly affect the way weather patterns occur. There is, however, a general effect that means that we are going to be warmer, wetter and windier in the west during the winter, and I cannot speak for climate scientists because I am not one but I do not think they can tell you that on that particular hillside it is going to be a bit windier. We can advise, however, that it is sensible, when you are planning where you plant woodland, to put woodland in a place that is likely to provide cover for livestock and crops, because that is an adaptive, flexible response to a changing climate. There are lots of other variables that go into these models and I cannot give you a quick and direct answer.

Ms Manise: If I may I would just add that one group of variables frequently excluded from consideration of the impact of climate change is the indirect impact of climate change, that is the effect of society's human responses to climate change which are likely to take effect much more quickly and have much more long-term effect than we could possibly quantify here and now. Just to give an exaggerated example to make the point, if in a warmer climate we all decided to buy air-conditioning systems, then taking carbon out of the electricity system and providing sufficient baseload to keep the lights on and industry with the energy it needs to function will become a much, much greater challenge. So the indirect effects that flow from societal response to climate change are ones that perhaps in future we need to pay rather more attention to.

Dr Radley: Similarly in agriculture, in that people will make adaptations that are sensible in terms of agriculture and they will have side effects that we do not know about yet.

Q16 Baroness Symons of Vernham Dean: Picking up that last point that you were just making, in answer to Lord Palmer's earlier question you said that one of the gaps was looking at what really works on the ground. Did you mean what works in the scientific sense, what works in terms of technique, or did you mean what works in terms of getting people to do what you want on the ground? Those are two very different questions.

Dr Tew: As I answered the question, I meant the former.

Q17 Baroness Symons of Vernham Dean: I thought you did.

Dr Tew: I should have been thinking of the latter as well! You are quite right. The issue of how we effect change in behaviour in the population in terms of mitigation is an extraordinarily complex one but, of course, the issue of how we effect changes in agriculture and forestry in general is also clearly important.

Ms Manise: It is worth amplifying that point. There was an excellent series of proceedings by the British Psychological Society on the psychology of climate change, and one of the messages I took away from that was from Professor Poulston of the United States, a behavioural economist, who said there are too few social scientists and too few psychology scientists engaged in the debates about climate change, both adaptation and mitigation, because certainly on the mitigation side there are huge numbers of tried and tested technologies which are plug-and-play, ready to go now, and the real conundrum is why are more people not taking advantage of that? So there is thinking to be done there.

Q18 Baroness Symons of Vernham Dean: Is Natural England mainly science-based? Are you scientists, or do you have sociologists amongst you?

Ms Manise: We do have social scientists as well, so we do have a modest but very valuable internal resource on whom we can draw for some of the advice we need so, for example, in the environmental stewardship arena, we can understand what it is that makes one group of landowners adopt particular measures versus others. Land owners, like any other community of human beings, are not homogeneous, each has motivations that are quite different, and arguably, perhaps, we need to get a little bit smarter about understanding that.

Dr Tew: We have four social scientists out of 2,500 staff.

Ms Manise: It is modest!

Q19 Lord Brooke of Alvethorpe: Do you have economists?

Ms Manise: We do.

Q20 Lord Brooke of Alvethorpe: Is that not the area in which we need to spend more time?

Ms Manise: It is certainly one of the areas in which we need to spend more time. Bearing in mind the very focused nature of Natural England's remit and the fact that Natural England is one of a range of authoritative bodies who collaborate in this area, in other words we do not seek to duplicate the work of other organisations, one of the areas that our economists are currently looking at in some detail is this question of valuing the benefits of sustainable adaptation and valuing the disbenefit of maladaptation or non-adaptation, so that in the future decision-makers can be better served by a fuller range of information when they come to decide whether to have a very big sea wall or mandatory alignments.

Q21 Lord Brooke of Alvethorpe: I was thinking particularly of sticks and carrots for the individual citizen.

Ms Manise: Our locus is not directly on individual citizens, so we do not wish to stray too much into that.

Dr Tew: If I may, my Lord, I enthusiastically agree with your analysis. We have quadrupled the number of economists working for us in the last 18 months - from two to eight! - and part of that debate is that society needs to understand that these services are valuable - literally valuable. We can either pay for good water management by increasing our insurance premiums because it has cost 3 billion pounds to mop a flood up, or we can inject 1 billion pounds into management skills that prevent a flood. It is cheaper and better to do it the first way. Society will pay one way or the other. The reason we need economists is, firstly, to find good ways of putting value on that and then, secondly, to find ways of rewarding the land managers who are providing those services.

Q22 Lord Livsey of Talgarth: Looking at the question of integrating adaptation of agriculture and forestry into the Common Agricultural Policy, the White Paper states that measures for adaptation and water management should be embedded in rural development programmes from 2007 to 2013. To what extent are you content that this is already happening across the EU and what obstacles, if any, have you identified? You did mention in your opening remarks, for example, that there were different ways of dealing with water management, that maybe the conventional methods perhaps were not the right answer, necessarily.

Dr Radley: We can mainly talk about what is happening in England, since that is where we operate, and a little bit about elsewhere in Europe. From our side of the Common Agricultural Policy, which is Axis 2 of Pillar 2, to get us in the right place, there is quite a lot already happening. We did some sums and we reckon we have spent about 90 million pounds on options that contribute to either adaptation or mitigation, so we are providing some support to farmers already, often for other reasons as well as climate change adaptation and mitigation, for example, through a combination of measures that help to conserve or increase carbon sequestration in soils by improving soil quality or by conserving peat, and also by

limiting fertilizer use in some areas. Natural England has estimated, on the basis of work done by the University of Hertfordshire, which is the best available although the methodology probably does need further refinement, which says we may have helped farmers save up to three and a half million tons of CO₂ equivalent per year as a result of the existing management options. We are working in other areas too to help with adaptation. We have a range of options within environmental stewardship that are intended to help with issues such as soil management and water quality management which will become more acute if the weather predictions we were talking about earlier come to pass, but they are existing problems that happen anyway without climate change, so we can pay farmers for buffer strips, for small woodlands to be planted on slopes and so forth to help with soil conservation, even with taking the most vulnerable land out of arable production and putting it into grass. Outside our bit of the CAP there are some schemes for things like manure storage facilities and anaerobic digestives which the Regional Development Agencies largely administer in England. Water is a key issue, and I am going to ask my colleague, Rosie, to talk about how water is dealt with under the current arrangements.

Ms Manise: I said earlier on that we will come to recognise water as very much the lynchpin of adaptation, and I repeat that. Water is not just a commodity that needs to be moved from A to B as cheaply as possible: it is a tradeable commodity in some respects, but it is also the life blood of human communities, wildlife communities and landscapes as we know them now. I think Tom has referred a couple of times to this notion of multifunctional landscapes, areas of land that produce many types of service to society and the economy other than perhaps their immediate apparent purpose, and water is one of those hidden environmental services. We need agricultural and land management policies which enable water to get quickly and safely through to the aquifers, slow its entry into river courses and other water courses, and lead us towards what I have heard described as “slow” water. Many of the floods we have

seen over the last few years have been as a direct result of fast water. Water hitting overgrazed, deforested, upland areas, exiting into river basin in a rush all in one go. The canalisation of flood defences built during the 1970s before the state of knowledge had improved produces a canal. All of the water that flows into that river therefore goes through to the next town, which has in the 1970s and 1980s built its own flood defences, producing another canal which shifts even more water further downstream, and you can see where I am going with this, to whoever ends up catching the big flood. We cannot divide water management from land management. They are not separate; they are part of this integrated whole.

Q23 Lord Lewis of Newnham: Can you amplify that? What you are saying is that, of course, immediately you now have an impact on buildings, because if you put up a house and the house is approved there is an obligation on the part of the Water Authority to provide you with water. They have no alternative but to do that; that is statutory. So really what you are saying is that in addition to all this problem we have with the agricultural aspect, we have to look at the urban aspect, and the rate at which water comes off concrete as opposed to off soil is enormous. Realistically speaking, therefore, and I think I am coming back to what you were saying at the beginning, this is not an isolated problem: it is one you have to integrate across the whole.

Ms Manise: That is absolutely true, and you cannot even divide the rural uplands. I live in South Shropshire and you cannot divide the Shropshire hills from Ludlow, Bewdley, Worcester and Tewkesbury, because the absorbency of the hills where I live has a direct effect on the amount of water that gets into the river that may flood a town, but each town along this necklace, along this chain, has to have much more and much better quality green infrastructure as part of its urban design. Permeable paving, for example, sustainable urban drainage systems, balancing ponds and green spaces increase not only the absorbency of the

landscape, but when planted with trees are aesthetically very pleasing and increase the rate of transference from the ground up through into the atmosphere. All of these things are interconnected, and I know it is a horrid truism but we do need to think outside the narrow silos of our particular respective specialisms and remember that we all live in one very crowded little island. We have to treat the interconnected systems for what they are, and make our solutions similarly interconnected.

Dr Tew: The key point is that the city dwellers understand what those trees do for them. We are not advocating planting trees because we like trees. We do like trees but we are advocating planting trees because it is a cheap and effective way for urban society to adapt to climate change, because of all that trees and green spaces do for us. They also provide reservoirs for wildlife and we are very happy about that, but it is essentially a sustainable response.

Dr Radley: Bringing that back to the CAP, that illustrates the point that we have measures already in place that can make a modest difference. We are doing a review at the moment of whether we can do more by better use of what we already have in the toolkit, if you like, and we have already heard some of the examples. Shelterbelts can be very effective at combating wind erosion in vulnerable areas; they can also help with water, and planted around farm buildings they can help reduce heat stress and so on, so there is more we could do, but this issue of the larger scale response is a limitation. We are already finding society as a whole needs to make significant changes in land use to help with wider problems. We may need to have something like a managed realignment, and that is very unfair on the farmer whose land it happens to be on, because what CAP does not provide is the lump sum or capital payment needed to facilitate that step-change in land use that may be in the wider public interest.

Q24 Lord Livsey of Talgarth: If I could comment before asking my question, it is an incredibly complex equation you are talking about, and certainly in my lifetime my

observation is that the blanket of forestation and the related vertical ploughing has caused a lot of problems and on the other side of the equation you have what the woodland is doing, but it is such a vast subject I am not going to go into that. The White Paper also indicates that the CAP's contribution to adaptation must be examined in the review of the CAP after 2013, and I am sure you will agree that land managers and farmers are rather anxious about that date, 2013, and what is going to happen. How do you see the CAP best contributing pre-2013 as regards adaptation of both agriculture and forestry, and within that context do you see any tension between food security and the protection of biodiversity? Is the issue of food security being underestimated. We only supply 60 per cent of our own food production and we heard already this morning about the inability even for southern Europe to produce sufficient food. Also, you have talked about incentivisation. The existing Pillar 1 payments to farmers, according to CAP plans, may or may not be phased out. Could that be a mechanism for incentivisation and adaptation?

Dr Radley: There is quite an important difference between pre-2013 and post-2013. In the period up to 2013 Pillar 1, which is by far the largest part of CAP, is broadly neutral because it is income support and has very little conditionality, so in terms of CAP it is largely down to Pillar 2 to bring about change during that period. Pillar 1 tends to have a stabilising effect, if any effect, whereas Pillar 2 can incentivise change. Perhaps where we can add the most value to your inquiry is by tackling this question of whether there is a tension between food security and protection of biodiversity. There is some tension between food maximisation and the protection of biodiversity and the provision of all those other services we have talked about. I do not think there needs to be a tension between the optimisation of food production and these other services. If I could borrow a phrase from the CLA, we are interested in achieving food and environmental security. Coming back to the headline message, really, we are looking at ways of integrating food production with all the other ecosystem services,

including biodiversity, which we as a society need agricultural and forestry land to produce, and we are gaining quite a lot of experience about how to do that. There are two basic approaches: there is the approach of land-sparing and the approach of land-sharing, and both have their place in different circumstances. Our experience to date is that, in most relatively intensive agricultural systems, land-sparing is probably the best approach, which is that you have single focused crop production on most of the land and you have similarly intensive conservation management on a small proportion of land, usually the land which, within that area, is the least productive anyway. So you get the best out of your productive land and the best out of the marginal land within that area for conservation, so that is why our entry level stewardship focuses on boundaries, on marginal strips, on planting wild bird seed mix crops and planned pollen and nectar mix in marginal strips. If you go to areas where, for physical or other reasons, production farming has to be extensive, such as the uplands, then a different approach is needed where you have land-sharing, and you try and get your farming system right so that it also produces alongside the crop these other environmental benefits - water management, biodiversity and so forth, and that, in European speak, is called high nature value farming. We are learning quite a lot as we go along. The Campaign for the Farm Environment, which has recently been launched, is really good at getting the industry on side in this challenge of managing for both food production and for all these other services that we need land to provide, biodiversity being one of them.

Q25 Earl of Caithness: Following up on that, just so we are all clear, there is more than one interpretation of food security. What do you mean by food security?

Dr Radley: Food security in this context, you are right, is a slight misnomer. It is about a lot more than food production. It is about the way markets work having diversified food chains and all the rest of it, but that is not to deny, as I think Tom said in his introduction, that given where we are on the climate see-saw, food production in England is going to be increasingly

important. I say that because at least in the short to medium term conditions are likely to become more vulnerable.

Dr Tew: I hesitate to sound glib over what are extremely complicated and important issues but when we throw away 30 per cent of the food we buy and have a national obesity epidemic it is hard to have a meaningful discussion about real food poverty, and the futurologists tell us that this is not simply a function of population but rather more a function of how much and what we are going to eat in the future. However, I would not wish to downplay the importance of growing our own food.

Dr Radley: If we look longer term as well, as well as having a societal need to balance food production against these other services we are also talking about the sustainability of agriculture and forestry. Agriculture is not divorced from its environment: it depends on it. There has been a lot of concern recently about the availability of pollinating insects and evidence is beginning to accrue, partly through an excellent project done by the Centre for Ecology and Hydrology and Farm Environment Company, that some of the measures that we have available to farmers through ELS do provide real benefits to maintaining the population of pollinating insects, which is a vital service for some sectors of the agricultural industry. Our pollen and nectar mixes, as one might hope, are beneficial to pollinating insects, but some of the other options we provide, our grass margins and our wild birdseed mixes, help because by providing a diversity of sources throughout the year and geographically, it helps to sustain wider populations of pollinating insects. So that is one small example of how there is feedback from the conservation of the wider environment to the maintenance of agricultural production.

Q26 Lord Livsey of Talgarth: So would it be correct to summarise in this way: that food security is going higher up the list of priorities but you are trying to devise systems which sustain biodiversity without impinging on our ability to produce food?

Dr Tew: That is the overall challenge. Indeed, not just biodiversity but that range of other services.

Dr Radley: I would go further and say, rather than just impinging on it, sustain it in the longer term as well.

Q27 Earl of Caithness: Turning to forestry, how might the forestry strategy be updated to assist the adaptation of EU forestry to climate change?

Dr Tew: We are not foresters so the Forestry Commission will know more than us, but we note that forestry is largely a devolved matter. We have taken part in and we very much welcome England's Trees, Woods and Forests Strategy, and we have signed a memorandum as a delivery partner with the Forestry Commission. Essentially there is now a growing scientific consensus on the benefits of woodland for sequestration, and in particular a report out just a couple of days ago, woodland provides cost effective sequestration of carbon, and in general we are entirely supportive of the Government's now stated intent to increase woodland cover in this country. When we were launching our uplands vision a couple of weeks ago we started off the debate about what more woodland cover in the uplands might look like, and what it does not look like is a blanket forestation of the entire uplands. We have been there and made that mistake, and it is having the right tree in the right place at the right time which is extremely valuable.

Q28 Earl of Caithness: In the memorandum to which you have signed up, has it been identified what the full implications of planting in the uplands are? For instance, we have talked about ploughing in Lord Livsey's question. If you are going to plough up peatland, which is a carbon sequestration asset already, put a Ross plough through that, to turn it out and then plant it with even-aged species, only for it to be clear-felled or windblown in 40 years' time to me is not mitigation or adaptation but stupidity.

Dr Tew: Quite so, my Lord, and so the mistakes of the Flow Country and previous policy instruments have been learnt. Again, I fear I am being glib, but the right tree in the right place at the right time means you need to choose what you plant and where, and over what rotation.

Dr Radley: You may not even have to plant it because if the sort of places where we wanted to encourage more woodland growth were in the ghylls, the valleys coming off the side of the hills, just putting a fence round for a few years can help trees get away that were there anyway.

Q29 Earl of Caithness: I seem to remember speaking about this about 40 years ago in this House and nobody thought that was a good idea.

Dr Tew: We do now, my Lord!

Q30 Earl of Caithness: Let us move on. We were talking in Lord Livsey's question about the CAP. What other EU policies do you think could involve agriculture and forestry for the adaptation?

Ms Manise: Interestingly, I think some of the territorial cohesion funds will play an increasingly important role in terms of woodland planting of forestry in the urban and urban fringe regions. Although there is not a comparable study we could draw on in the UK, the city of New York did a fabulous study published just a few months ago, that identified that for every dollar the city invested in urban tree planting, the city gained five dollars in terms of health benefits, infrastructure benefits, reduction of the heat island effect, reductions in flooding, and also, curiously, lowered levels of anti-social behaviour and low-grade crime because of the improved quality of life elements of that urban area. We do have to think laterally and quite broadly to identify a range of atypical policy instruments that would be useful in this regard. I would always focus on the cohesion funds because, historically, they have been one of the largest providers of regeneration funding in Member States, including in

the UK in years gone by. We need to make sure that those funds and the measures they advocate and support are, if I can use the awful phrase, climate change-proofed, properly adapted.

Dr Radley: If I could bring that back into the more agricultural debate, we mentioned earlier that one of the things CAP does not do is provide upfront capital funding to buy land use change where it is needed, but structural cohesion funds potentially could. For example, and this is not strictly agricultural but it gives you the idea, I notice that the Government recently announced its Coastal Change Pathfinders Scheme, which is essentially providing help for people whose properties would otherwise fall into the sea which could only be avoided by very expensive and environmentally damaging fixed coastal defences, recognising that not defending them leaves them very much bearing the cost, and that is the sort of principle that the structural and cohesion funds could pick up. There is one other area, of course, which is that the EU does provide strategic research support, and coming back to the issue of what we need to do for agriculture and forestry I think there is a growing consensus that a revival in agricultural research is an important issue. We would add that one of the benefits of supporting that with public funds is that the focus needs to be on sustainable agricultural adaptation, adaptation in ways that produce more but impact less, as a shorthand. There are some arguments for doing that at European level to avoid duplication between Member States.

Q31 Lord Livsey of Talgarth: Would you also agree that farm extension and forestry extension advisory services are absolutely crucial in boosting to improve management and the spread of technology?

Dr Radley: Very much so. It is as important to apply existing knowledge properly and widely as it is to find new knowledge.

Chairman: To avoid maladaptation.

Q32 Baroness Sharp of Guildford: One of the issues I have been pondering on as you have been talking is how far the policies that are available to us under Pillar 2 and Pillar 3 are really sufficient to provide the more holistic approach that you are talking about here, but I wonder whether you could tell us what is your view on the possible sources of financing which are mentioned in the White Paper, namely market-based mechanisms, public/private partnerships and other financial products, and the auctioning of revenue from the Emissions Trading System? We recently did a study of that and, while backing it, were a little bit sceptical as to how far it was fulfilling its functions at present. How else might the adaptation of the EU agriculture and forestry to climate change be financed?

Ms Manise: First, it is worth saying that in the very short term there may be economic gains to be made from a warming climate with longer growing seasons, so in the short term there will be some benefits to some sectors of agriculture. My second key point would be that, in the short and the long term, adaptation measures which are sustainable are likely to be lower cost over their whole life than traditional 1970s approaches to what we might now call adaptation. For example, if we were to think about one of the coastal realignment projects, Alkborough Flats, a study has been completed which demonstrated two different costs. For example, the cost for a concrete defence wall was £900,000 per kilometre, whereas the coastal realignment cost for preserving the salt marsh area was £700,000 per kilometre, which sounds like it could be a marginal difference. However, if the costs are considered over the whole life, then the salt marsh and the managed realignment becomes cheaper at 20 years simply because the concrete retaining wall requires maintenance, and as extreme weather events become more frequent - and I hope they do not but they are likely to - then the maintenance costs will go up. The salt marsh has a range of other benefits which can now be costed, and I have to say I would not be the person to cost them but I know people who do. They include, apart from the biodiversity aspects, the recreation and the wildfowling, and the

carbon locked away in the muds below the salt marsh is incredibly valuable. At the moment that value is not given sufficient recognition and it does not appear on anybody's balance sheet when they are looking at the options appraisal for particular types of projects. That, for me, would be one of the weaknesses in the system as a whole. We ought also to think back to the Stern report and what Stern said about the costs of adaptation. These were large, global, broad estimates, so not an awful lot of help if what you wanted to know was the cost:benefit analysis of competing options in East Anglia, for example; but, that said, Stern suggested that adapting now might cost 0.5 per cent of GDP, whereas adapting later in a few years' time might cost as much as 4 or 5 per cent of GDP, so crudely speaking, reverting to my audit background, it is ten times cheaper to adapt sustainably now than to wait for a few years, get forced into adapting, and have to pay a very much higher bill. All of those things said, we are entirely open to whatever additional means of producing revenue or capital funding for adaptation the policy community wish to explore, and that includes conservation credits, the funding of adaptation through carbon credits, although that would be a good deal easier and a good deal more satisfying if the carbon price was a little higher - considerably higher, in fact.

Q33 Chairman: You have attempted to give a timeframe by saying "in the short term". Could you put a number of years on that? Is that 20 years? 25? To give some benefit from a warming climate?

Ms Manise: In some places it might be over the next 10/15 years, where the growing season has extended but water shortages have not started to occur and other direct impacts have not started to take hold, so that short term might be that sort of window. In other parts of Europe the window might be very much smaller, particularly if you are talking about the Mediterranean, where the window might only be months long, because the effects are so much more severe. As Tom said, adaptation is a very local matter.

Dr Tew: I think it is very brave of my colleague to attempt to guess that. I think my comment would be that there is so much variability and there are so many unknowns in the system. For instance, you may well have a longer growing season but your bees may have declined, so it becomes very difficult to give sensible prognoses. Also, under the Climate Change Act there is this adaptation economic analysis being run by the Government alongside the national risk assessment, which I know intends to look at the cost of adaptation and, indeed, the mechanisms to fund adaptation. Broadly our comments are that we do support looking at alternatives because the current market is not working.

Dr Radley: It is important to explore all of these methods of funding and sources of funding. I would say that the current Pillar 2 of the CAP has a number of features that make it quite a good mechanism for this, for whatever purpose you choose to use it, and it comes back to something that Tom said at the beginning which is that we want Europe to provide a framework and not be too prescriptive. Pillar 2 at the moment has a system of national programmes so you have a certain amount of continuity, it runs for seven years, I think, and everybody has to play by a certain set of common rules across Europe, but the content of the programme is very much at the discretion of the national authority, so those principles are quite useful in terms of thinking about future public funding mechanisms.

Q34 Baroness Symons of Vernham Dean: You have said in the course of what you have talked about that the headline message was “integration”, and it is a word we have heard over and over again. We have had integrated land use, integrated land use planning, integrated water and land management, integrated approaches and benefits, integrated food production with biodiversity, and in your 2008 position statement you wanted the EU White Paper to provide an EU-wide framework which was integrated with other EU legislation. So does the White Paper “press your integration button”?

Ms Manise: It is starting to but not fully. I think the ambition is right; I think the White Paper provides a very good opening framework for the debate about how to embed adaptation in all of the other mechanisms and levers at the European Commission's disposal. There is still the question to be answered about the extent to which the European Commission will stand back and provide what it needs to do, which is to deal with transboundary issues, with a degree of support and co-ordination, and allows the Member States, because adaptation is local, to develop their own responses and their own mechanisms to suit their local circumstances. The UK is very ahead of the game in terms of the Government's policies and research framework around adaptation, and it would be very disappointing, to say the least, if we found that an entirely new set of policies and incentives was to emerge from the European Commission, however well-intended and meant, which then either cut across or, just as bad, duplicated the money and effort invested at the UK level.

Q35 Baroness Symons of Vernham Dean: You have made the point about being ahead of the game, and we know the UK is the only EU country to have a Climate Change Act. Is there a Natural France, a Natural Germany, a Natural Italy? Are there bodies throughout the European Union whom you identify as your sister organisations? Lord Caithness earlier said "Do you really think people are going to do all this?", and we all know French farmers are not exactly the most biddable people in the world when it comes to a bit of planning on the most straightforward issues, and I think the fear is that this is a big ask. Do you really think that there are other organisations like yours throughout Europe who have the same positioning as you have, with a base that is supported by Government, and do you respond to them, and do they think like you do, or do they think differently?

Ms Marise: Yes, there are.

Dr Tew: They have not all got as good a name as us but there are nature conservation agencies across Europe. Two years ago ENCA (European Nature Conservation Agencies)

was set up specifically for conservation organisations with a statutory remit like ours, and I occasionally go to ENCA could meetings. There are two a year. To generalise, Northern and Western Europe are in exactly the same place as we are; in Eastern Europe it is much less of an issue, they are much more concerned with economic development; and the Southern Europeans are frightened by the whole thing and simply do not like to hear the message. So the answer is there are lots of other organisations like ours across Europe and they are broadly in the same place. My concern in response to the question here is that dealing with climate change becomes ghettoised amongst the environmentalists and it sits in DG11. That is the danger. Do I think the White Paper is spliced to move beyond that? Yes, I do, and I applaud that ambition, but it is a real issue because if it becomes embedded simply in the environment sector then you will get bad adaptation and inappropriate responses. If I may refer back to my opening remark, that is the new challenge that climate change brings to society, and the White Paper goes some way to addressing that.

Q36 Earl of Arran: Are these other organisations you mentioned mostly funded by Government?

Dr Tew: Yes. These are the Government-funded organisations. There is another suite of voluntary organisations as well, but it is the Government organisations we liaise with.

Q37 Chairman: Dr Tew, thank you very much for the evidence you have given the Committee. Are there any matters you feel you should touch on, now that you have the opportunity, that we have not covered?

Dr Tew: No, my Lord. It has been a very interesting session and we are delighted to be here. Thank you for inviting us.

Chairman: Can I thank you and your colleagues for coming and giving us the benefit of your advice and opinions. We are very grateful for your contribution.