Earth in crisis: environmental policy in an international context
The Impact of Science

AUDIO MONTAGE:
Headlines on climate change science and policy

Andrew Blowers
The problem of climate change is both scientific and social. It brings together scientists and policy makers in identifying its causes and developing solutions. We might say the role of science is to identify problems, explain their causes and suggest what might be done about them. By contrast, policy makers operate in a world where values influence actions and choices must often be made between alternatives. But it's not quite as simple as that. Very often the roles of scientist and policy makers overlap. Scientists become involved in the policy process and policy makers must be able to interpret scientific knowledge as a basis for action. Together, scientists and politicians must consider what is possible and what is desirable, what can be done as well as what should be done. I'm Andrew Blowers, Professor of Social Sciences at the Open University and a member of the Course Team and I'm going to discuss some of these issues with both scientists and those concerned with policy making.
Let's start, then, with the nature of scientific knowledge and its relationship to policy making. Professor Andrew Watkinson is a scientist and Director of the UK's Living With Environmental Change partnership.

Andrew Watkinson
The basis for scientific knowledge is based on observation and theory and it's the interplay between those two. In terms of knowledge, I suppose a lot of people would say that we work using hypotheses based on the best evidence that we have and then testing those hypotheses, those ideas with experiment and with observation. How often science actually works like that I'm not sure. I think I tend to fall into the paradigm group where essentially there's a body of knowledge. We explore that body of knowledge and that essentially allows us to develop a world view and we change that world view, we have a paradigm shift when the evidence becomes so compelling that we need to change our view.

Andrew Blowers
There is basically then, from what you're saying, a fairly well defined scientific method?

Andrew Watkinson
I think there is a well defined scientific method. How often people are actually trained in it is another matter. My experience is that people are trained very little in the actual scientific method. Mostly people just get on with the, the job of doing experiments, testing hypotheses but without realising the philosophical background.

Brian Wynne
One of the key elements about scientific knowledge is of course that it's controlled knowledge...

Andrew Blowers
Brian Wynne, Professor of Science Studies at Lancaster University.

Brian Wynne
You've got to construct artificial circumstances, whether it's experiment, whether it's a computer model, whatever it is, you've got to construct artificial circumstances to do that kind of controlled testing. And in that kind of case you're always actually raising questions about the relationship between your artificial context of knowledge production and the real world in all of its greater complexity. And the global climate, we know very well that there are certain things which are excluded from climate models, like various feedbacks. Clathrates in the

tundra for example which, when warming occurs, will release more methane into the atmosphere with more warming, a positive feedback on climate change, which isn't included in the models because it's too difficult to include. So you've got uncertainties of that kind which are about having to produce knowledge in a controlled way and to be able to test it in some way.

Andrew Blowers
Right, well that's in a sense a kind of internal set of pressures among science. Another thing they have to do though is to speak a language which can be interpreted or understood, which is accessible to others. Is that a further limitation, do you think, on what science is actually professing in terms of its knowledge?

Brian Wynne
Well I think there are a whole variety of things. That's one of them. But there are several others. I mean one of the other more important ones which you could say is an internal thing within science, but it's also partly a public and a policy thing, is that when you address any, you know, many environmental issues, even ones which are far, far less extensive and complex as climate change, you've nearly always got to synthesise different bodies of scientific research. Acid rain's a good example. You've got atmospheric chemistry, you've got atmospheric physics, you've got physiology of vegetation, like trees, because it was about tree damage. You've got a whole range of different scientific disciplines have to be synthesised. And when that's done, it's inevitable in a way that various uncertainties and indeed contingencies, in each of those scientific disciplines get left behind. And it's the policy need that's generating the need for synthesis. So the science as synthesised in that way to address a public issue like an environmental problem, is always bound to be understating the uncertainties that are involved in the combination of those knowledges.

Andrew Watkinson
Uncertainty is something that we have to grapple with and accept in the scientific process and also in the policy making process. Uncertainty will always be there. As we look to the future, there is inevitably uncertainty about the level of greenhouse gas emissions; about the level of population; about a whole range of things. There may also be uncertainties in our understanding. And so we can never be absolutely certain. There may be some feedback process that means that climate change doesn't happen as quickly as we were anticipating, or there could be a feedback process that makes it more rapid than we expect. So yes, we have to deal with this issue of uncertainty. It is part of science. We can never be certain about anything.

Andrew Blowers
It's a very good example then, climate change, of what one might rather glibly call scientific discovery. I mean some scientists makes some observations, those observations add up to a set of circumstances, ultimately a major problem is discovered. I mean at what point does that discovery, as it were, become of more than purely scientific significance? I mean could you tell us about that in terms of this climate change issue?

Andrew Watkinson
When does it become of more than scientific interest? I think it became of scientific interest back in the '80s and '90s, 'cos you've got to remember, if you go back to the '70s we were thinking then we might be heading towards the next Ice Age. But at the end of the '80s, beginning of the '90s when the IPCC process, the Inter-government Panel on Climate Change process started, it was then that we realised that the carbon dioxide concentrations were reaching a level where we were certainly going to be getting significant increases in temperature. And with that, I think that then engages society. Society has then to choose what to do about this scientific knowledge.

Andrew Blowers
So there comes a point in a sense when you've stopped exploring, you've stopped identifying things and you're accumulating knowledge. That a consensus of some kind, one could say, exists among scientists. There seems to be an important point here, because they will always be those who are not shaped by that consensus, who will continue to take a different view

and very often it you look at other issues, that minority might actually in the end prove to be more right than the majority. I mean how do you see that in terms of what now seems to be an overwhelming scientific consensus? Do necessarily have to just accept that now?

Andrew Watkinson
I think what the IPCC process has shown it's become more and more confident as we've gone from the first assessment to the fourth assessment: that climate change is occurring. That's the first statement that they would make. The second: that it is driven by human emissions of carbon dioxide. And the vast majority of scientists, the high 90 percent, believe that that is the case. Yes, there are sceptics who don't accept that for a variety of reasons, and it's quite right that they should continue to challenge. And I think if science I going to advance, you always need these people, the sceptics, to challenge the consensus view at the time. I think in the climate change arena, the scientists can provide the evidence upon which the policy makers have got to act. We need to sort of demonstrate the urgency of the issue; we need to demonstrate the uncertainty surrounding the issue. But ultimately, we are providing evidence upon which the policy makers have to act. Yes, we can be advocates. In some areas we'd be having that advocacy role more strong than in others, but certainly we provide the evidence and the advocacy, but it's the policy makers that obviously at the end of the day draw up the policy.

Andrew Blowers
So you recognise a problem for the policy makers in trying to deal with the science or the scientific predictions?

Andrew Watkinson
Yes, they have a number of trade offs to make, because essentially the climate change one is obviously a very difficult one because one's dealing with something that's gonna happen in the future. And that means one's got to look at the values -- do we deal with the problems now and to what extent do we deal with values that relate to life in the future? And that's a very tough call on politicians.

Brian Wynne
There's a really important distinction which is often overlooked and confused between science as we think about it as research front science and scientists involved in advising on various policy issues. They're often doing a lot more than advising. They're actually advocating and committed to particular views of the world. They then become, partly at least, promoters at particular points of view, which aren't necessarily that consistent with what you might call the research front understanding of the issue in hand. Like I said, it doesn't mean the scientist has just made it up and are stating what they wish to be true. They're actually doing it in disciplined ways and nature and the evidence is playing a role, an important role in shaping what they're saying. But it doesn't mean to say that it isn't a selective perspective on the greater complexity of the issues that are there.

Andrew Blowers
That brings in the question of, I suppose I'd call it objectivity, you might want to give it a different name, but science on the whole we expect to be reasonably objective, but when you start to talk about the way it's framed, then it is not perhaps quite so objective, it's selective, certain things are identified. Is that the scientists that are doing that? Or the impression I get is it's the pressures under which they operate?

Brian Wynne
Well take the way in which the IPCC's models of climate change and the human impact upon it were originally formulated in the early '90s. The only ways in which they could scientifically model and do long term predictions of the global climate was to operate with one greenhouse gas. What that allowed the scientists to do, perfectly normal science, was to then do the modelling. If they had tried to have about 20 or more different greenhouse gases in the models, they couldn't have done it. But the consequence of that, which nobody designed, was that each emission of greenhouse gas into the atmosphere was then defined as equivalent - you know, 20 grams of carbon dioxide with one gram of methane, which would be equivalent in terms of their greenhouse warming potential. But then on that basis, if you're thinking

globally about policy, you're then talking as if a certain volume of methane generated from a rice farm, which might be keeping people alive as the only subsistence way of producing food in Asia, is equivalent of the same amount of methane being generated by landfills in affluent countries like North America or Britain. Now should those be being equated? Well the scientists didn't decide that we should treat subsistence living and degeneration methane as if it's no more important than some kind of vast over-consumption on our part of the affluent West, but that was a consequence of the way that they'd done the science. And it's partly then about the lack of awareness that gets built into the relationship between the science and the policy. Because some of those kind of assumptions which are built into the scientific modelling, they're not explicit, they're not evident to the policy makers.

Then there is the issue obviously of having to communicate complicated things where you've then got to make judgements, on the hoof very often, about what's the most important thing to get across in this particular occasion and what can be left aside. And, very often, at that point it's the uncertainties that get left aside and it's the key basic message, if you like, that there is human induced climate change, whatever that might be, that gets to be important.

Andrew Blowers
Andrew, just coming back then to the question of the relationship between science and policy, how significant would you say science is now in terms of being within government and influential and having access to policy making?

Andrew Watkinson
I think science has become more important in policy over the last 10 years. I think we are seeing a change in the way that science is, is dealt with. And I think one of the signs of that is the number of scientific advisors within Government. Most people will be aware of the fact that there's a chief scientific advisor to the Government but rather few will be aware now that nearly every government department has a chief scientist. And that chief scientist has access to the policy makers at the highest level and will be questioning the evidence base for their policies throughout. So I think that's one of the factors which indicates that science is having a much greater role within policy than it used to.

Andrew Blowers
So they have this influence, they're inside now, but for a long time one could look at other elements of society, notably business, and say that had privileged access to government policy makers. I mean there may not be a conflict between the two, but I mean how do you think science lines up in terms of those what I would call power relationships?

Andrew Watkinson
I don't know the answer to that question. It's a very good question. So what is the relative influence of say business or science or the public on policy makers? Clearly politicians have to take account of all those different pressure groups on them. I think the scientist now has a more distinct voice than they used to. There aren't many scientists in a lot of the government departments, so I think to have chief scientists, to have research budgets, as many of the departments do so that they can commission their own research, does now allow a more effective delivery of the evidence base that's undoubtedly required for policy making. And I don't think I can sort of stress the importance enough. Essentially the scientists are delivering the evidence base upon which policy makers can then make decisions and essentially draw up their policies.

Andrew Blowers
It seems to me there probably has been a moment now when there is... can I put it this way, more confidence among scientists. Do you perceive that scientists perhaps have become more confident of their role, vis-à-vis policy, and maybe at the same time there has been more trust placed in them by politicians and the public that they represent. So that there actual position is considerably stronger now?

Andrew Watkinson
I think perhaps policy makers are more trustful of scientists. They recognise the value of their input into the policy process. But I think also it's scientists like myself that have also become

much more confident about engaging with policy makers. I think if you go back 10, 20 years, many of us would have found it very difficult engaging with policy makers. I've found it, certainly in my own career as I've moved from straight biological sciences through into environmental sciences, that I've found that in that environmental area there are a huge range of issues that the policy makers want to interact with the scientists on. And I've gained the confidence to interact with those policy makers. I enjoy it and I'm really keen to do more.