

Environmental Audit Committee

Oral evidence: [Planetary Health](#), HC 1803

Tuesday 15 January 2019

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[Watch the meeting](#)

Members present: Mary Creagh (Chair); Geraint Davies; Mr Philip Dunne; Zac Goldsmith; Mr Robert Goodwill; Caroline Lucas; Kerry McCarthy; Anna McMorrin; John Mc Nally; Dr Matthew Offord; Alex Sobel.

Questions 1 - 49

Witnesses

I: Professor Sir Andy Haines, Professor of Environmental Change and Public Health, London School of Hygiene and Tropical Medicine, Professor Howard Frumkin, Head of Our Planet, Our Health, Wellcome Trust, and Professor Lora E Fleming, Chair, European Centre for Environment and Human Health, University of Exeter Medical School.

Written evidence from witnesses:

- [London School of Hygiene & Tropical Medicine](#)
- [Wellcome Trust](#)

Examination of witnesses

Witnesses: Professor Sir Andy Haines, Professor Howard Frumkin, and Professor Lora E Fleming.

Q1 **Chair:** I welcome our distinguished guests here with us this morning. I feel like we are examining you for your viva voce; if only. For the purpose of the record, could I ask you to introduce yourselves, starting from my left?

Professor Frumkin: I am Howard Frumkin. I am Head of Our Planet, Our Health, a programme at the Wellcome Trust here in London.

Professor Fleming: I am Lora Fleming. I am the Director of the European Centre for Environment and Human Health at the University of Exeter Medical School in Truro, Cornwall.

Professor Sir Andy Haines: I am Andrew Haines. I am from the London School of Hygiene and Tropical Medicine, Professor of Environmental Change and Public Health.

Q2 **Chair:** Thank you all very much indeed for being with us here this morning. We know that planetary health is a new and emerging discipline and that the UK, along with the US, is the locus for this to happen. We are holding this inquiry to educate ourselves and the public about the planetary boundaries and the things that you are doing.

I will just start with a very general question: what is planetary health and why does it matter?

Professor Sir Andy Haines: I will start by just saying that in the Rockefeller Foundation-Lancet Commission, which I had the honour to chair, we defined it very simply as the health of human civilisation and the state of natural systems on which our civilisation is built. That really encapsulates the complex interlinkages between human health and the global and local environmental trends.

We showed in this report how the world is undergoing dramatic changes. Many people have called it the Anthropocene epoch because humankind is transforming the global landscape and, in doing so, of course, it has caused great improvements. Human progress has been underpinned by the exploitation of natural systems.

We have reached the point now where that exploitation is potentially very damaging. We have overexploited our land and our seas. We are dramatically changing the climate, of course, as you well know. Biodiversity is declining at over 100-fold greater than prehuman times, the oceans are becoming acidified and many other changes are occurring.

In this report we try to document those changes and their implications for human health and also began to lay out what might be done to address some of these burgeoning problems.



Q3 Chair: What are the main links between the health of the population and the health of the environment then?

Professor Sir Andy Haines: First, of course, is our climate. As we know, according to the UN Environment Programme, at the moment we are heading towards about 3 degrees warming by the end of the century compared with preindustrial, and that will affect the risk of many conditions. At the simplest, it will cause an increase in the direct effects, increase in heat exposure. That has implications for death rates, particularly among the elderly because we know elderly people are more likely to die during heat extremes, but as we are also beginning to understand, it has a whole range of other effects, declining labour productivity, for example. If it is extremely hot, you cannot work to the same level as you can when it is cooler. It is going to affect poverty levels around the world.

There are also the effects on infectious diseases through natural systems; for example, vector-borne diseases like malaria and dengue. The distribution of those is changing as a result of climate and other environmental changes. Water-related diseases, of course, increase risks of diarrhoeal and other diseases related to water. Cholera as well can be influenced by climatic factors.

Then, finally, these indirect effects, which are very difficult to quantify but are possibly the most important of all, things like increasing poverty. As people can't work and other crop yields decline, then you could get increasing poverty. There has been a lot of debate about migration and conflict as well, which we could go into if you want to know more details.

Q4 Chair: Thank you. Do others have anything to add?

Professor Frumkin: I might just add to that that even if there were no climate change we would still need to be talking about planetary health this morning, and that is because other global changes also threaten human health. For example, the loss of biodiversity and the alterations of phosphorous and nitrogen cycles all can have impacts on health via their impacts on nutrition. The dissemination of persistent chemicals in the environment has impacts that are not fully understood but probably include endocrine disruption, neurodevelopmental abnormalities and others. There is a very big complex of changes, of which climate change is the poster child but by far not the only change we need to be concerned about.

Q5 Chair: Where do you think the endocrine-disrupting chemicals are coming from? Are they the PCBs?

Professor Frumkin: PCBs are an example, dioxins are an example, in the former case manufactured intentionally for various uses, in the latter case generally produced unintentionally as a by-product of combustion.

Q6 Chair: Sorry, what was the latter one?



Professor Frumkin: Dioxins. Many of the chlorinated pesticides have been produced for use in agriculture but then become persistent in the environment. There is a very wide range of these chemicals.

Q7 **Chair:** Thank you. We might be looking at that later on this year. Professor Fleming?

Professor Fleming: I just want to add two pieces to it. One would be the whole issue of mental health, both positively and negatively. Both climate and other environmental changes that my colleagues have been talking about have been shown to directly impact on mental health potentially negatively, things like wars, poverty, extreme weather and so on.

The other possibility is that our interactions with the natural environment can be very good for our health. In the UK, we have data that shows that the more you interact with natural environments, particularly coastal and blue environments, the better for your physical and mental health. If we don't start taking care of those natural areas, it decreases our opportunities to interact positively with these areas.

Q8 **Chair:** Can I press you on the health side of things? In our briefing this morning, we heard that the *Aedes albopictus* mosquito, which is a carrier of dengue and chikungunya—I am not sure if I have pronounced that right, but it sounds horrible and I think it has some pretty nasty brain influences—is now present in the Netherlands and Spain. It is very easy for the mosquito to travel on lorries and head over here. Are we ready for dengue fever?

Professor Sir Andy Haines: We have very strong communicable disease control systems in this country so we need to be prepared for changes in vector distribution, including the vectors of dengue, which is the commonest vector-borne disease around the world and, as you say, can cause very serious outcomes. I would be reasonably confident that the UK could address them, but we cannot be complacent because even high-income countries like Singapore, for example, which is very well developed, have a very serious dengue problem. I would say that we need to be vigilant about the changes in vector distribution and if it happens that *albopictus* comes here, we will need to look very carefully at how we can best control those vectors.

Q9 **Chair:** How do we measure the impact of environmental change on human health, then? What measurements do you have? You tried in *The Lancet* to look and said access to green space doesn't have any physiological changes, but clearly Professor Fleming is saying there are mental health changes. How are we measuring those things?

Professor Sir Andy Haines: There are a number of ways in which we can measure them. At the high level, of course, are sustainable development goals. While they are not perfect, they do provide in some ways an overarching summary of human progress. They are not perfect because they have some gaps within them and there are some issues



like, for example, inequalities within populations that are not very well addressed by the sustainable development goals, but they do provide an overarching metric that can help to guide us towards planetary health.

In terms of measurement of the impacts of environmental change on human health, there are a number of issues here. One is looking at the links between the drivers of environmental change and health. Air pollution is an example. Many of the emissions of air pollution are associated with emissions of fossil fuels; also in the case of ammonia, of course, related to agricultural practices. We can look at exposures. Where we are very confident about the link between exposure and human health outcome, we can use exposure as a surrogate, if you like, for the human health outcome.

However, where we are not so confident, where the links are more complex, then we have to look at the health outcomes themselves. One of the challenges there is that the areas that we would most like to know about—for example, many low-income countries—have the poorest surveillance systems, the poorest measurement of human health. We do need to invest, and the UK needs to think about investing more through DfID, for example, in the monitoring and surveillance of health in these low-income countries where many of the effects of climate change are going to be most forcefully felt, at least in the near term. We are all affected in the longer term.

Professor Fleming: There is also a whole piece on the fact that there are huge amounts of environmental data out there—things like the Met Office, world famous, fabulous data—but how do you link that up with human health data and how do you train people to be able to work with these huge datasets linking up variables that traditionally are not analysed as such? There is almost a research and training gap there to prepare people to really be able to look at things on a planetary scale from an analysis point of view.

Professor Frumkin: I was going in the same direction. You will hear from us again and again during this morning's session about the dangers of siloing. If you have health over here and environment over here and if the two don't interact, then we fail to understand fully those connections. It is a problem for governance, it is a problem for science, and it is a problem for data. If the two kinds of databases do not interact with each other, we cannot fully enquire of them whether there is a link between environmental change and human health.

As a governance issue, what that may mean is directing or incentivising the owners of different databases to get those databases to be interoperable and then to perform the analytics that are needed.

Q10 Chair: That is certainly an issue that has been of great concern to this Committee because we go across Government and have always criticised things being treated in silos. We are also very alert to the sustainable development goals. I am interested in what you said, Professor Haines,



about the gaps. Where do you see the gaps in the SDGs?

Professor Sir Andy Haines: One of the issues with the sustainable development goals is that if you want to answer the question, “Is country X improving its health in an unsustainable way? Is its overall environmental footprint sustainable?” it is not that easy to get that data from the sustainable development goals because you need to know per capita greenhouse gas emissions, whether its fresh water supplies are sustainable, and whether it is using fertiliser, for example, in a sustainable way. You cannot just get that data from the sustainable development goals.

The other problem is that they are very wide ranging. In planetary health we understand one does have to think very broadly and in a very transdisciplinary way. One of the issues is where we prioritise among the 17 goals and among the 169 different targets and more than that in terms of indicators. Some kind of prioritisation is probably valuable as well as looking critically at where the gaps are so that at the country level those gaps might be addressed, and certainly when we come to the next generation of whatever will follow the sustainable development goals we can make them even more effective than they are at present.

Professor Fleming: I also think that there is a huge piece to be done—which is happening, I will say, at least in the communities that we operate in—around trying to link them all up because they are inherently siloed. How does health and wellbeing and equality go through all of them, not just the health and wellbeing one and the equality one? I also think that there will be a piece looking at what things have been measured that give us the information that we want. There is the potential for an overload of things being measured with the SDGs.

Q11 **Chair:** When you are talking about the data needing to be matched up, who owns the data? Is this Government data; is this uni data; is this private sector data?

Professor Fleming: Yes.

Professor Sir Andy Haines: It is a range of different sources and that is one of the problems. Even in this country, ONS is co-ordinating and monitoring the SDGs for the UK. The most recent data is they have good data on about two-thirds of them or something of that order. Other countries would probably have less data. We do need to invest more in data collection and analysis, as we have heard. We also need to look at synergies between the different SDGs, and if there are any potential conflicts between some of the indicators or targets, then we need to be aware of those as well.

There are areas where there are big synergies and one of them would be in climate change mitigation—for example, the provision of clean energy. The provision of clean energy can also help to alleviate poverty, if it is affordable energy. It can also reduce air pollution exposure. It has big



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health benefits and that obviously contributes to SDG 3, which is around health. We also know that climate change mitigation can reduce malnutrition or undernutrition, so that contributes to SDG 2. We need to seek synergies between these different SDGs to understand what the key policies are that we can put in place to make rapid progress towards the SDGs.

Professor Frumkin: Just one more comment on data, if I could. There is a whole set of very interesting, innovative, emerging data sources that we are just becoming aware of how to use. One of the best ways to track data on migration in response to disasters is cell phone locational data. One of the best ways to track people's curiosity about their symptoms and the emergence of symptoms is through Google search data analysis. One of the best ways to track information about people's consuming patterns, which is key to sustainability, is through their supermarket customer preference card data. These are private sector owners of large amounts of data that are some of the most important sources we have, if those private sources can be made somewhat available and accountable.

Q12 **Chair:** You have not asked Tesco Clubcard for access to their data yet, then?

Professor Fleming: Everyone is trying to. Increasingly, they are talking about—and there has been some big work on the UN level for this—the second data divide, and it is that increasingly data are becoming privatised. All of the ones that Howard just talked about, as you point out, are private data and the other issues that are raised with that are the ethics of it. Do people realise what is being done with their data? Then, finally, the point has been made by the UN around this that increasingly poor people and people in developing countries are the ones who have least access to those data, for a variety of reasons.

Chair: That is very interesting. We are a bit more aware of it now after the Cambridge Analytica scandal. People began to understand in a completely different way. Thank you very much indeed for that introduction. I am going to ask Kerry to ask some questions on food.

Q13 **Kerry McCarthy:** I am just trying to think where to start. The food system illustrates what you were just saying about things being in siloes. In this country, although, as I always used to try to say, the F in DEFRA stands for food, it is seen as being about farming and producing food. When you get into food production, what happens in the supply chain and how the supermarkets operate, that is the BEIS Department. Then you get into the health consequences; that is obviously the Department of Health. If you are looking at global food poverty, that is DfID. There is that real disconnect; there is not a joined-up food strategy. I know that Michael Gove is going to be producing a food strategy later this year, which hopefully will get us somewhere.

To what extent do you think the food system is fit for purpose? Where are the key flaws? What needs to change in terms of tackling some of



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these planetary health issues?

Professor Frumkin: There are challenges all the way through the process, from production to consumption to waste creation and waste minimisation. We need to think about land use stewardship, water stewardship and production techniques, the use of chemical inputs and others so that land and water can be used sustainably and made available for future generations.

We need to think about the content of the diets that people eat. These nutritional issues have traditionally been quite far from agricultural production issues, but they really need to be considered together. Finally, all the way through to questions of packaging, distribution of food from farm to market to people's tables, and the 30% food waste figure that bedevils food systems worldwide.

Tomorrow the EAT-Lancet Commission will release its report. It may not be a perfect report, but it will be a landmark report that calls for the consideration both of the environmental impacts of food systems and of the health consequences of food that we eat. It calls for considering those together.

Q14 **Kerry McCarthy:** If I could just interrupt, the UN had its "Livestock's Long Shadow" report, which I think is now 11 years old, something like that. You have had Chatham House do reports. It seems to me at least that every few months there is a flurry of headlines, particularly about the environmental impact of food. While tomorrow's report sounds exciting, when you come to the COP talks or whatever, it is not being discussed, is it?

Professor Frumkin: Not as much as it ought to be.

Kerry McCarthy: Yes. Sorry, I interrupted you on the original question.

Professor Fleming: For me, I love to use the example of aquaculture because it is a whole food production system. We are probably going to have to increase it here in the UK, and what kind of impact is that going to have in terms of environmental degradation? As Howard has pointed out, whatever you are doing in aquaculture reflects what you are doing on the land because it gets into the water, either coastal or fresh water systems, but we are also increasingly importing aquaculture-raised food from other countries. I have one colleague who says that basically we are eating the water of the developing world, and to a certain extent that is true with aquaculture. There is that whole piece there that makes it very clear how it is not just the food, it is the health, it is the land, it is the environment.

Q15 **Kerry McCarthy:** There was an interesting article a few years ago about how overfishing was leading to piracy in the Horn of Africa by Somali pirates. It is because their livelihood has been taken away from them because of overfishing. We do not make those sorts of connections either.



Professor Fleming: Exactly.

- Q16 **Kerry McCarthy:** In your biography, Professor Fleming, the two projects you are involved in, SOPHIE and BlueHealth, sound absolutely fascinating.

Professor Fleming: Thank you. They are funded by the EU to look at the health and wellbeing interactions with the oceans and health. We also have one that is funded by the Global Challenges Research Fund here in NERC. It is working with communities in south-east Asia who live in UNESCO biospheres, very, very poor communities, and how their health, their food and marine management could form a better circle if they were involved in the planning to maybe try to prevent the piracy issues, for example.

- Q17 **Kerry McCarthy:** In terms of the overarching look at global food systems, you have the UN and people like Olivier De Schutter and people like that who are doing very good work. Is there really an overarching look at this or does it tend to be that we look at what our food needs are, and we might look at food poverty in another country as a separate issue, almost like a famine relief type approach? Where are the mechanisms? Obviously, you have the WTO and organisations like that looking at how we trade food, but in terms of the global—

Professor Sir Andy Haines: There is, as you say, the UN Food and Agriculture Organisation. That is an organisation that does good work, but it has limited resources. There is also a need to link, as we have already said, agriculture with health and nutrition much more closely. Historically, these sectors have worked very independently and have not worked in a co-ordinated fashion.

We know, for example, in the case of fruit and vegetables—which is often a rather neglected area but is very, very important for human health because it helps to prevent a range of non-communicable diseases—that most people in the world are not consuming enough of those. The poor are particularly priced out of fruit and vegetable consumption, and we also know that environmental change threatens fruit and vegetable production. For example, it is not just about climate change but other changes as well, air pollution and other factors.

That is a good example of how we need some kind of global mechanism for optimising the production of fruit and vegetables and making them more accessible to poor people. At the moment I think it is fair to say that there are not good linkages between, on the one hand, agriculture, on the other hand trade, and, on the other hand, health. That seems to me to be an area where there is a real need for some much greater coherence.

The private sector has a very important role, of course, because they are driving a lot of the innovation in the food sector. We also need to look at emerging technologies that are coming through because obviously land



and conventional fisheries are going to continue to provide an important contribution to human health, but there are a whole range of new technologies, many of which are being driven by the private sector. We need to understand much better the environmental implications of those and the implications for human health.

The sorts of things I am thinking about are things like insects, which are increasingly being used to feed to animals or, in some cultures, people directly consume them, and they have a much lower environmental footprint than many animal products. We have heard about aquaculture. There are also things like mycoproteins, quorn being one example. There is synthetic meat, cellular agriculture, which is being advanced in some sectors as a way of addressing some of these questions. However, there are still major questions as to whether, or to what extent, they are environmentally sustainable. In cellular agriculture, for example, some of the early evidence there suggests that it could involve quite high energy consumption.

We need to understand much more of how these emerging technologies can make a real and lasting contribution to health and sustainability. That is something that your inquiry might wish to point to in future and how we need to get better evidence of that particular potential contribution.

Q18 Kerry McCarthy: In terms of the projected trends that we have heard about with climate change and environmental damage, what impact would that have on the UK's food system, the ability to feed itself?

Professor Sir Andy Haines: There are concerns because obviously we are a food-importing nation and we need to look carefully at the nations that we are importing from. There are six nations that are the major food exporters around the world, and the concern is that if for some reason they should reduce their exports, either to replace domestic demand or because of climate emergencies or declining fresh water supplies, then that could leave countries, including the UK, vulnerable.

For example, in the 2008 heatwave we saw the Russians and the Ukrainians stop their grain exports. That did not affect us directly much at that time, but it did affect many countries around the Middle East where it probably resulted in some of the political disturbances that occurred around that time because of increasing bread prices.

We need to understand much more the interlinkages between imports, exports, trade, and the vulnerability of those linkages to a country like the UK. I don't think that we have sufficiently invested in understanding our vulnerabilities and what we can do to reduce those vulnerabilities. Again, this might be something that your inquiry would wish to focus on: the need to strengthen our evidence base and to have some mechanism at the national level for addressing issues around food security for our nation and providing sustainable, healthy diets for the whole population.



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Professor Frumkin: Let me just add to that. One scenario that is very immediate rather than far off in the distance would be if there are shortages of particular products—if there is a drought in Spain and courgettes are more expensive and scarce on the market. What we know is that people who are food insecure and who have a hard time purchasing food when under financial pressure shift their purchasing to calorie-dense, nutrient-poor foods. If you shift the price signals to come through the food system because of even temporary or short-term shortages, then that can shift the purchasing and eating patterns of people who are right at the edge of being able to put food on their table. If they shift to those kinds of foods, that contributes to the obesity epidemic and to all of the non-communicable diseases that flow from that. That is not a hypothetical, that is a very immediate kind of scenario that we can see play out even now.

Chair: We did a report last week on the sustainable development goals, looking at hunger in the UK and looking at exactly that phenomenon. We are also obviously with Brexit looking at shortages of tomatoes and cucumbers in a no-deal scenario. I think that has woken people up to the amount and the nature of the foods that we import. We will move on to Zac.

Q19 **Zac Goldsmith:** I have one question on the back of the food discussion you have just been having. We have heard in previous inquiries about the scale of soil erosion as a consequence of large-scale industrial monoculture. I do not think that is disputed, but are there any signs anywhere in the world that this is a problem that is being taken seriously in terms of changing agriculture, changing patterns?

Professor Sir Andy Haines: None of us are experts in agriculture, but I am aware that there has been a recent report from the UN on the state of the world's soil. The problem is dealing with that in a coherent and co-ordinated way.

I would also say that the links between human health and soil degradation have not been very effectively made. There is some work, including some done by my colleagues at the London School, looking at potential strategies for improving the quality of soil, improving micronutrients from soil in field trials, but I think they are still at a fairly early stage. This is an area that you have pinpointed that interacts with global environmental change and could compound some of the adverse effects of global environmental change and certainly deserves greater attention.

Q20 **Zac Goldsmith:** Thank you. I am going to move on. I want to talk about urbanisation. First of all, what has been the impact of urbanisation generally in terms of planetary health? Obviously, it is happening, it is inevitable, it is going to continue but, broadly speaking, does it lead to a disproportionate increase in resource use or is urbanisation potentially part of the solution?



Professor Frumkin: As you know, urbanisation is proceeding rapidly in the world. At some time in the last decade we got to the point where more than half the world's population is urban. We are probably heading towards about 70% or 75% by mid to late century. It is very difficult to generalise because the patterns of urbanisation are so different from place to place.

Potentially, urban living can be a positive for human wellbeing and for the environment—that is to say, individual carbon footprints and resource use patterns can be minimised through the efficiencies of scale, the smaller living spaces, the smaller travel distances, the ease of delivering services, and so on. On the other hand, if cities grow in a rapid, uncontrolled way, as is so typical in the global south, conditions can be horrific with poor air quality, an astronomical risk of motor vehicle fatalities, noise, crowding, and so on. The goal in the global health context needs to be to develop strategies for urban growth that are both healthy and sustainable.

In one particular response to your question, the rapid growth of cities, especially in low and middle-income countries, will probably consume an additional 1%, 2% or maybe 3% of the world's land area over the next century, and that is not just any land. That is land where people traditionally settle; that is why cities are there in the first place. It typically is relatively rich, high-yield land that moves from agricultural use or forest or grassland into urban use. It is not a very big number, but at a time when we are right at the edge of soil depletion and land scarcity it is an important contributor, underlining the importance of compact urban development as well as healthy urban development.

Q21 **Zac Goldsmith:** When you began your answer, you said it varies considerably depending on where you are looking at. Are there any examples you can think of, both in the north and the global south, of cities where living standards are par but where the ecological footprint is proportionate? What would be the best examples you can think of, both in terms of north and south?

Professor Frumkin: One theme for an answer would be, "Where is transportation planning proceeding in an ecologically sensitive way?" Copenhagen and Amsterdam, with their good bicycle infrastructure; Curitiba, Brazil; Bogota, Colombia—

Zac Goldsmith: Sorry, where in Brazil?

Professor Frumkin: Curitiba, Brazil.

Professor Fleming: Medellín.

Professor Frumkin: Bogota and Medellín in Colombia. There has been visionary urban leadership there. They have prioritised transit and pedestrian infrastructure and cycling, reducing travel by internal combustion engine-driven vehicles, reducing congestion and air pollution as well.



Q22 **Zac Goldsmith:** They would be your top examples?

Professor Frumkin: Yes.

Q23 **Zac Goldsmith:** I was going to ask you how urban transport should be developed in existing cities to improve planetary health, but I guess you have, by implication, answered that by pointing to the best examples. Do you want to add anything?

Professor Frumkin: One does not want to silo transport planning because it is very much linked with land use planning and with building design. However, density, mixed use so that trip distances are reduced, good pedestrian, cycling and transit infrastructure, vibrant activity centres to reduce travel demand again, the provision of green space to reduce the drive to expand the cities and build more suburbs; all of those as a package are the core principles of healthy, sustainable urban development.

Professor Fleming: I would just say the obvious piece, which is that increasingly as everyone does go towards the cities, particularly younger people, how do we deal with the rural areas, which have very variable types of health and resources, yet are where we grow most of our food currently? How do you keep those people healthy and engaged?

Q24 **Zac Goldsmith:** As a consequence of the depletion of people from those areas?

Professor Fleming: Exactly, yes. I live in Cornwall and it is becoming one of the oldest counties in Europe. Part of that is because people are leaving the cities to retire there, but there goes a lot of the agricultural land as well.

Q25 **Zac Goldsmith:** As we see the creation of new cities and the retrofitting of existing cities, what should urban planners particularly be focusing on in relation to climate change and environmental impacts on health?

Professor Sir Andy Haines: There are a number of things they can be doing. We have heard about the transport system. There the emphasis has to be on the public transport system and also obviously on what we call active travel, walking and cycling, because that is beneficial for health both through reducing air pollution but also increasing physical activity. Building codes and building regulation can be very helpful, creating more efficient homes and other buildings that use much less energy.

We have also found through our research and others' research that you cannot just seal up houses in an attempt to reduce energy use because if you do so that can increase indoor air pollution exposure. You need to have a holistic approach that both reduces the energy use within houses by better insulation and seals them but also looks at very energy-efficient ventilation systems that can keep the indoor air pollution much lower. In fact, you can even keep it lower than the surrounding environment with



filters and so on. There are technical solutions, but they are not being used sufficiently.

The other thing we need to do is to look at adaptation to environmental change. For example, about 30% of the world's major cities depend on fresh water sourced from fairly local watersheds. Protecting those natural watersheds is a very important part of the sustainability strategy. There is also reducing the urban heat island effect. Cities magnify heat stress and that is because the heat is trapped by the built environment and then it is radiated at night, for example. Strategies to reduce the urban heat island effect through more green space and through water, for example, maybe from reflective roofs and so on—there are a range of different technologies—could be an important part of the overall strategy.

Q26 Zac Goldsmith: On the heat issue, are there any existing cities that you can think of that have taken that issue seriously and have adapted accordingly?

Professor Sir Andy Haines: I do not think there is a single city, as far as I know, that is doing that seriously. Obviously, what we do know is that a lot of the activity around climate change mitigation is occurring at the national level. You have the Covenant of Mayors—I think 7,000 cities that have pledged to reduce their greenhouse gas emissions. You have the Rockefeller Foundation 100 Resilient Cities. Those resilient cities are looking at greening infrastructure to reduce the urban heat island effect but also to prevent or reduce the impact of extreme events like floods and so on. There is a lot of activity. I do not think any one city has it right, but there are cities that are taking active steps.

There is one city I am aware of in Finland called Jyväskylä, if I am pronouncing it correctly, which now has a very ambitious programme to reinvent itself as a circular economy over the coming decade. It is aiming to be a city that essentially uses 100% renewable energy, local green space, recycling, remanufacturing and reusing as much as possible, and that model I believe is being taken up by a whole range of other Finnish cities. It would be worth looking in more detail at the experience of some of these cities, where a lot of activity is occurring on the land.

What we do find from some of the work we have been doing with cities is that there is often a gap between their aspirations, which are to go towards 100% sustainability, and what they are actually putting in place. Many of the policies depend not just on what is in the control of the mayor or the city leader but also national policies for, say, decarbonisation of energy systems. You cannot see cities in isolation. They have to be seen in the context of national policies.

Q27 Zac Goldsmith: This is the last one on cities. In our discussion before the public panel began, we were hearing a bit about China. China is obviously rapidly developing entirely new cities and they certainly see themselves as pioneers, at least in terms of sustainability. Is that a view that you share? What particularly are they getting right and potentially



what are they getting wrong?

Professor Frumkin: It is probably best for us to come back to you with that. There is a huge literature on Chinese urban development. The extent to which it is generalisable to places with less command-control economies is a question.

If I could just add one more point on cities to Andy's very good points, one of the other considerations is disaster resilience because we know that more disasters will be coming. If you have back-up generators in your hospital and you are in a flood-prone city, you had better put those generators on the top floor and not in the basement, as has been typical.

Another theme that runs through planetary health that is very relevant here is the notion of long-term planning. We have to be thinking about 50 to 100 years from now, not just next week. If you are an urban forester looking to put in more tree canopy as a protection against the urban heat island effect, you had better plant trees that will be adaptable to the climate that will come in 50 years and not the trees that have been good for the last 50 years. If you are a planner planning housing, you had better anticipate that there may be large movements of people who have to flee from some areas and land in other areas. Cities may have to adapt to large increases in population relatively suddenly. That sort of long-term planning, which typically has not been a part of urban planning, probably needs to be.

Q28 **Zac Goldsmith:** Sorry, just one last question. On that issue, for years the UN has not recognised environmental refugees as a category. I think they might have changed that now but certainly they had not until a couple of years ago. Who globally is making the best attempt at predicting what is going to happen in terms of environmental refugees? If you look at the maps relating to temperature increases, rainfall patterns, desertification and so on, it is inevitable that there will be an escalation in the number of people fleeing those conditions around the world. Has anyone properly mapped out, to the best of our scientific ability, who is going to be moving from where and to where? I am certain there is not a plan but is there any kind of central body of information that can provide us with an indicator of what is likely to happen and when?

Professor Frumkin: I am aware of individual studies from academic centres and from think tanks but there has not been the kind of overview that you are discussing either within national boundaries or globally. Even within a country, even within the UK, one can anticipate that some coastal areas may need to decant their populations and one can predict where people might go based on standard principles such as that people prefer not to migrate any further than they have to. They like to stay near where they are from. I do not know of any co-ordinated synthetic effort, globally or nationally, to forecast that.

Professor Sir Andy Haines: I think that the IOM in Geneva has been looking at this but, of course, it is very difficult to quantify these things



because there are many factors involved, not just climate change. There has been one recent paper—I think it was in *Science* about a year ago—looking at environmental refugees to the EU in relation to climate change, and they suggested that by the end of the century, under a high greenhouse gas emission scenario, you could have well over 600,000 people applying for refugee status linked to climate change. They linked it to changes in crop yield in the source countries. There are about 100 source countries where people come to the EU from. They looked at changes in crop yield in relation to temperature and then they quantified the number of potential refugees or people applying for asylum that could be increased under climate change. There is that data but, as we have said, I do not think there is any concerted effort to put everything together. Indeed, there would be substantial uncertainties in doing so. That is not to say it is not a very important issue.

Can I just quickly respond to the Chinese question because it is a very important one? Of course, the Chinese Government have made a firm commitment to pursuing the path of eco-civilisation. What that actually means in operational terms is still unclear, but it is a very important political statement they have made, and they are making progress in areas like air pollution, for example. We are seeing a plateauing and perhaps a reduction in air pollution levels in some Chinese cities, so there are changes occurring. Of course, they are not dramatic enough and they are not sufficient to take us to a more sustainable economy, but there is a lot of room for countries like the UK to work much more closely with colleagues in China to develop this concept of eco-civilisation or eco-economy in much more detail in a partnership mode.

Q29 Geraint Davies: I just want to follow up on indoor air pollution. My understanding is basically that because we live in hermetically sealed environments with triple glazing and all the rest of it, there is a problem with chemicals inside that we use to spray on ourselves, clean things, light candles or whatever, and that when you open the door there can be a cocktail from outdoor air pollution that inflames respiratory problems and others. I was wondering what you thought should be done about this. You did begin to touch on building standards, but it is also whether there should be more constraints on some of these chemicals being promoted or sold, warnings or taxes or whatever. Again, I think that Professor Frumkin mentioned that we just talk about climate change, to a certain extent, but there are all these other chemical risks occurring. I just wondered whether you wanted to comment.

Professor Sir Andy Haines: It is a very important issue. Of course, in high-income countries like the UK the contributions to household air pollution are multiple. They include volatile organic compounds from domestic sprays and suchlike; they include formaldehyde, which comes out of furniture and so on; they include oxides of nitrogen from gas burning in those households where there is gas; and, of course, we are also seeing, as you well know, people burning wood, which is quite a



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major contribution to outdoor air pollution as well as household air pollution. All of these sources need to be addressed.

Some of that may be through better regulation. Some of that may be through better public knowledge. It may also be through decarbonising the energy system so that people are using electricity generated from renewable sources rather than gas, in the longer term. Certainly, we need to push back on the increasing use of wood, particularly when wet wood is being burnt, which releases a lot of particulates and can contribute quite seriously to air pollution hazards.

There is a need also to invest in very high-efficiency ventilation systems, particularly if we want to create houses that are going to have very low energy use because in those cases you do need to have very effective insulation but, as I said before, you need to combine that with effective and efficient ventilation systems with filters fitted to remove outdoor air pollutants.

Professor Fleming: Andy mentioned earlier the idea that, with the best will in the world, we have asked people to make their buildings more efficient and that can increase some of these issues. For me what it sets up is this whole scenario that whenever you do any kind of intervention you need to have ongoing monitoring. Even with wonderful intentions and great data on the ground, it is going to change, and things are going to turn out not so good. Part of it also is that whatever interventions you do, you have to follow them, monitor them and see what is happening to the people who live in those places over time.

Professor Frumkin: I would just add that there is, in the green building movement, a lot of concern with this notion of reducing indoor exposure to chemicals. One of the big organisations in that movement has issued a red list of about 300 chemicals that should be excluded from building construction materials and furnishings. Buildings have begun to be built in compliance with the red list and it turns out that chemical exposure levels are measurably substantially lower in those buildings. If the Committee wants to pursue this issue, then your namesake Mike Davies at UCL is a world authority on this set of issues and might be a good source for you.

Q30 **Chair:** Before we move on from cities, can I just ask about cities as a food source? There have been a lot of good initiatives. I am thinking of Lambeth's "edible bus stops" getting the community into growing. I am not saying we are going to grow our major crops on our bus stops, but I remember that in the DEFRA figures about five years ago, about 10% of all beans grown in the UK were grown by people in their gardens. What scope is there for people to learn more and grow more of their own food, or do you think that is just a middle-class fantasy?

Professor Fleming: Well, Detroit? It is done in lots of poor communities. For me, it is not necessarily that that would become the sole source of food production but rather the other benefits about people learning what



is good to eat and what is not, introducing them to foods they might not have eaten, increasing community interaction and greening neighbourhoods. I do not personally know if that could ever be the entire source of food for an urban area, but I see there are lots of other benefits from this type of movement.

Professor Frumkin: It is a fascinating set of trade-offs. We need more density in cities for all the obvious environmental reasons, but if you dedicate more urban space to residential property then you have less green space for growing food. There is the concern about toxic materials in the soil of cities. Most cities have accumulated toxic materials and one wants to be very careful about the soil that is used.

I think Lora is right and it exemplifies the notion in planetary health that we like to do full benefit accounting and full cost accounting. Thinking about urban agriculture not only as a source of food but as a source of social capital, as a strategy to combat loneliness and as a strategy to improve nutrition, it is a multifaceted, interesting, complex problem.

Professor Fleming: Going back to what Andy was talking about in terms of synergy, the terminology that you have used in the past is “co-benefits”. Particularly in cities, maybe there is the potential for the health sector to work with education or transport—whatever agriculture is in cities—so that you could look for things that check multiple boxes. Then again, you need to follow up on them, too.

Q31 **Chair:** I have a housing estate with a row of cherry trees, and nobody ever eats them. You have nice blossom but then people look up and say, “Are those cherries?” People do not want to be going up ladders and picking them and they are not sure if they are safe to eat. Obviously, whoever designed that estate put those cherry trees in, in a post-war environment, as an important fruit crop for the children of that estate, and it is not being used. There are a lot of movements around food, the Incredible Edible movement—

Professor Fleming: But also, did they even talk to the people who were going to live there about what they wanted planted? There is that whole piece, trying to involve people and engaging them. That is one of the things I worry about with the Chinese cities. I do not necessarily hear about a lot of engagement.

Professor Sir Andy Haines: Just two quick points. Growing food in schools is a very useful way of introducing children to the whole idea of how natural systems provide our food. Even though the actual contribution to the amount of food we eat is going to be tiny, it can make a big impact on the way children think about food.

The second is the role of the National Health Service. There are some very good examples and case studies of how hospitals have been sourcing food from local sources. I think there is one in Nottingham, for example, which won an award for doing so. That can also help to raise



the profile of the importance of local food and reducing the environmental impact of food through the health community. Through the activities of the NHS sustainable development unit it has become a potentially important force for reducing greenhouse gas emissions and also moving towards this concept of planetary health. It is one that we could probably use a lot more in this country. The recent NHS plan, for example, does not capitalise sufficiently, in my view, on the potential for the NHS to be involved in thinking about these broader issues around how we sustain and promote health. I would like to see that given a much higher priority in future plans.

Q32 John Mc Nally: Following on nicely from that, I would like us to move on to understanding the changes that are needed in human behaviour and how we make people more aware and get that out into the public domain.

But before I go on to that, Chair, on the conversation we have had about trees and woods, I was listening to Melvyn Bragg the other day and he was talking about a university. I think it might have been Oxford or Cambridge. When they built the university with the oak beams they planted trees at the same time to renew them. When the beetles got into the beams, they went back and brought in these other oaks. That was what I would call the best of long-term planning. In fact, I think what he said was that when they went back to get the trees they said, "Glad to see you, we have been waiting quite some time". That type of planning might be something that we should all be able to look forward to and learn from. I like the idea of "the long now". I think that it is the way to look at most things that we do because the here and now comes around every other week and you suffer the consequences of that.

However, to go back to the point about individual behaviour, Professor Frumkin, in one of your statements that I read earlier you mentioned chemical contamination of pesticides, making the public more aware of that and getting this into the public domain. Sometimes the mere ask can help that, that we need to bring that into public awareness, and I do believe, as has been mentioned before at these meetings, that we are now in a privileged moment in time, when we have the like of a man called David Attenborough, who is raising the awareness of the whole planet. I wonder if we have any plans to replace him.

Professor Sir Andy Haines: He is irreplaceable.

John Mc Nally: He is an oak of a man, without a doubt, but we need to. I cannot see anybody sitting around here. Maybe Kerry is pretty good at speaking—

Chair: What about you, John? You audition.

John Mc Nally: However, I wonder what could be done by legislators, planners, manufacturers or others. We have heard examples. I am the chair of the APPG on the Hair Industry, where we discuss a lot of problems on the water, the waste water and the chemicals that are used



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in the industry. It is a huge business. It is amazing what it has revealed to us. How could we nudge people to make more environmentally sound choices? Who are the choice architects guiding human behaviour and how can they be influenced to promote environmental stewardship?

Professor Frumkin: That is a fascinating set of questions.

Professor Fleming: It is one for PhDs.

Professor Frumkin: There is a whole range of strategies, as you know. One of the nudging strategies, for example, has been environmental labels on foods and other products, and it turns out there is quite a mixed record when the impact of environmental labelling is studied. People profess in interviews and in surveys that they care about environmental purchasing, but the labelling does not make much of a difference. We need to learn more about how to make labelling effective. On the other hand, price signals do have a big impact, celebrity endorsements matter a lot in our popular culture-oriented world and powerful media presentations like Sir David Attenborough's films make a big difference.

There is a huge set of strategies aiming at behaviour change and environmental behaviour and we have a lot to learn about which ones work and which ones do not, but that does not mean to throw up our hands and be hopeless. It means that there is a research agenda here that we should deliberately be pursuing, asking these questions, testing interventions and then implementing the ones that work.

Professor Sir Andy Haines: I would also like to briefly respond to your point about pricing because one of the things that we found in this commission report was that, in effect, we are subsidising fossil fuels in quite a lot of the economic activities in our society because we are not paying the full economic cost. If we drive a diesel car, for example, we do not pay the full economic cost of the carbon dioxide or of the air pollution it produces. Of course, there is a big literature on things like carbon pricing. In the UK I think it is generally accepted that probably our carbon price level is too low to really have the desired effect and, of course, with carbon taxes—as we know from the recent experience in France, in trying to increase fuel duty—you have to be very careful about how you introduce them, and you have to also take the public along with you.

Your inquiry might wish to look at successful models of implementing carbon pricing. We do have examples like Sweden, where they have a high carbon price. It has not been accompanied by any social disruption that I am aware of. Indeed, I think that their economy is doing rather well. It depends on how you introduce it, whether it is a regressive tax, whether it hits the poor worse or whether it is used as a way of generating income that can then be transferred to poorer people, which is a much more productive way forward in my view. The whole question of pricing, not just carbon but other resources where we are causing adverse effects, is something that needs to be addressed much more effectively.



The second issue is regulation. One does not want, of course, unnecessary regulation, we want lean and frugal regulation as far as is possible, but we do need to regulate standards more effectively—energy standards, for example, or building standards—to ensure that we attain the highest level of health and development at the lowest level of environmental impact. Looking at how we can do that with the least amount of disruption is a really important task, maybe for your inquiry, but certainly someone needs to do that.

Professor Fleming: One other area that I am particularly interested in, and the group I work with, is around interactions with natural environments and how that can be good for your health and wellbeing, as I mentioned earlier. There is some information that if you do that, for example, with children, or the more people do that in their own lives, the more they are interested in pro-environmental behaviours that can then spill over into other things, not just trying to protect the natural environment but buying into plastic pollution prevention. It does not fall out as well with rich people—the more pro-environmental you are in the UK in terms of your behaviour, in the higher classes, the more likely you are to fly to different places—but if you look at it in the general population, this is a way you can increase the protection of the environment and these kinds of behaviours, which would also play in with pricing.

Q33 **John Mc Nally:** I am going to come back a bit to what we were talking about, the carbon emissions and the data. It sounds like we are all trying to make some sense out of the science here and how we get it to the individual and affect their behaviour. You will probably be aware of it, but when I was doing some research I found that a climate change accountability project called the Carbon Majors project reported that over 70% of the world's greenhouse gas emissions can be attributed to just 100 companies. That would point to a relatively small set of decision makers having a huge influence over the whole global emissions. Are you aware of that and are you at liberty to comment on what you thought about that report?

Professor Sir Andy Haines: In general terms, yes, we are aware that many of the greenhouse gas emissions are controlled by a relatively small number of companies, many of them with very strong fossil fuel interests, of course. I do not know the details, but I think it is fair to say that some of those companies have different approaches. Some of them are seriously investing in renewables and going down the route of a low-carbon economy. Others are much more resistant to that.

I do think that we need to consider how best we can incentivise the kind of behaviour that we want to see among companies and, as I say, I think the way to do that in the case of climate change is some kind of carbon pricing. It could be a cap and trade system, although we know it has not been very well operationalised in the EU, or it could be a carbon tax. It seems to me that that is what needs to be done. Of course, some of



those companies will oppose that—you see that particularly in the US, for example, where there is a lot of lobbying to oppose those kinds of interventions—but I think that is the way forward and we need to engage those companies to try to understand how we can alter their business models.

- Q34 **John Mc Nally:** Can I just respond to that, please? As an individual trying to make changes, you get to the stage where you think, “What is the point in me doing something when every other influence is prohibiting me from behaving in the way I want?” These are the people who influence your behavioural change. You were talking about labelling earlier on. I quite like the idea of naming and shaming and I think that people quite like to hear that. Would you be in favour of that, public naming and shaming? It probably is being done quite a lot now, but I do not think it is in the public domain and it certainly needs to be, and I think most people who sit on this Committee think the same.

Professor Fleming: You could also flip it and praise, not just name and shame. A lot of behavioural data would say—as much as I, on some level, would love to name and shame—it probably is not as effective in the long run. Behavioural change research would say that thinking about ways of praising people and using them as exemplars is more efficacious.

- Q35 **Geraint Davies:** How is planetary health governed at a global level at the moment, do you think, how effective is it and how should it change? We are aware, unfortunately, certainly in my view, that we have moved away from a more collective approach through the United Nations and WTO to a more atomised, self-interested perspective, particularly in America with Donald Trump. Now we see this in Brexit as well, of course, and elsewhere, whether it is “America first” or “China first”. How do we bring together the global interest in planetary health in a governance structure?

Professor Sir Andy Haines: That is a very important question. In our report we did flag up that current governance systems are not fit for purpose. We do not have a global governance system for the health of our planet and the health of the human population. We have parts of it in the UN but, as you say, the UN is relatively under-resourced and does not have the power it could have in order to tackle these interrelated issues of planetary health.

There is no simple answer to what you are saying but there are multiple possibilities. One is to strengthen the role of the UN itself. There is an opportunity, I think, with the Secretary-General’s Climate Summit coming up. The UK ought to play a major role in that by emphasising the important links between climate change, environmental change more generally and human health, and that opportunities exist for addressing climate change and improving human health at the same time. The UK could play a very important role in that.



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It could also play an important role in other international treaties like, for example, the Convention on Biological Diversity, which has some interest in human health but that could be emphasised more. It could also play a major role and perhaps a higher profile role in the sustainable development goals because, although we have the SDGs, I would say that the UK is not prioritising their achievement. They are certainly not very dominant in the political debate in the UK. Raising the national profile of the sustainable development goals and ensuring that the UK is advocating for them in a global forum I think would be extremely important.

We also need to consider fora that engage the private sector. For example, we have the Davos meeting that occurs every year. Raising the profile of planetary health at Davos could be an important part. I think, Howard, you are going to be in Davos shortly so you may want to say something about that.

Also, supporting some of the subnational initiatives that are taking place, particularly some of the city mayors, for example. We know that there is a lot of aspiration and a lot of goodwill. They need support in order to transform some of those aspirations and goodwill into practical policy. Ensuring that UK cities are very active participants in those city networks would also be extremely important.

Finally, the UK is a major player in research. We need to ensure that our research activities, whether they be Government or Wellcome Trust and other charitable funders of research, are much more focused on the interrelated issues around planetary health.

There are a lot of ways in which the UK can raise its game, if you like, in the field of planetary health, and there is a lot that can be done. Maybe my colleagues wish to add to that.

Professor Frumkin: It is hard to add to that, but I have a couple of thoughts. One is that in the realm of development assistance, if that is carried out through the lens of planetary health it would lead us to favour particular levers that we know are important and productive. For example, helping poor countries leapfrog past fossil fuel power sources directly to renewable power sources would be an important theme in development assistance. The second is educating girls and empowering women because that is the most reliable set of strategies for reducing population growth, for achieving prosperity and for reducing some of the drivers for deforestation and other resource losses. Third, steps to reduce deforestation in areas that are rapidly deforesting in Brazil, Indonesia and elsewhere. That is an important global resource. We could think about policy instruments in the context of development assistance that would help achieve that goal. It is not hard to identify some of the main levers that we know would advance both health and wellbeing and environmental sustainability as parts of development assistance.



The only other comment is to pile on to the last thing Andy said, which is that as we consider global governance either at the level of multilaterals or national Governments, is that it is easy to forget that some of the best initiatives are happening at the level of cities now, at the subnational level. Municipal administrations are in many cases more pragmatic, more effective and quicker at making change than are national Governments or multilateral organisations. I think some of the most exciting initiatives are with the C40, the Compact of Mayors and organisations like that, which are leading the way in many places.

Professor Fleming: I see the whole idea of planetary health as a framework that allows people to think differently. It is also relatively new, although you could argue there are other movements like that. To leap immediately to international governance may be asking too much of it.

When I work internationally, for example in southeast Asia, they get that health and environment are intertwined because it is right there in front of them. I think with our lifestyle, the wealthier we are in developed nations the more it allows us to not see that connection. I agree with you on expanding through things like the Global Challenges Research Fund. Also, how do we bring private industry into that to have a planetary health point of view when interacting with developing countries? What is happening there is going to come back to haunt us. We cannot pretend that what is happening in Mexico right now is not going to input on our health here.

Q36 **Geraint Davies:** On that, in terms of the relationship between a more joined-up approach for global governance to combat climate change and promote global health, do you think there is a vested interest in the private sector in having a more atomised world so that the big oil giants do not have to face collective action beyond carbon pricing, carbon trade and so on? How should we approach it in the UK to get to that global position where we tackle these problems? As far as you are aware, what is the way through? Is there an accountability as a Department? Should we change our structures as well? I am sorry, there are a few questions there.

Professor Sir Andy Haines: I think that in the UK we need to think about what the best governance structure would be to enhance our contribution to planetary health. One might argue for some sort of cross-Cabinet structure that would ensure these principles are embedded across the whole of Government because it is inter-sectoral and individual Ministers have a limited control over the whole agenda. Somewhere co-ordinating those activities would be important.

One might think about pieces of legislation. You will know very well, for example, in Wales, the Future Generations Act. It is an interesting piece of legislation that essentially, as I understand it, means that when you enact a piece of legislation in the Welsh context you need to think about the implications of the legislation for future generations. That is a very interesting approach because the pressure, I guess, on you as politicians



is to respond to near-term priorities. This piece of legislation enables and supports policies that will think about the longer term as well. Maybe your inquiry could think about items of legislation that can support that kind of longer-term thinking, look critically at the experience in Wales, for example, and how that is being implemented, and see whether that might be relevant for other parts of the UK.

On a global scale, the private sector is not a single, monolithic interest structure. There are very different interests within the private sector. There are those companies that see their future through the lens of the sustainable development goals. Quite a large number of companies are using the SDGs in order to frame their medium to long-term strategy. There are others who are completely and resolutely opposed to that kind of thinking and are thinking only in terms of short-term profits and exploitation, who, as you say, may have a vested interest in atomising the system of global governance. We should not think of the private sector as a single, unitary, monolithic sector. It has very diverse interests. The challenge is to work with those parts of the private sector that see their business model as being something different. In fact, some of them are seeing it in a way very consistent with a planetary health lens. We need to reinforce their way of thinking over and above the old way of exploitative, short-term and damaging approaches.

Professor Fleming: Because we are in a more global world due to all the things that we have talked about, as well as the negative things like migration, I think that it is getting harder and harder for companies to do bad in a particular place and not have it come back to haunt them. Again, can we stress examples where international players have done good with local communities? Also, the consequences. For example, if I destroy an island in south-east Asia those people may end up turning up in the UK asking for asylum. Those connections are being made and planetary health allows you to have a framework to say, if not obviously, "This is the kind of thing we have to look out for, that we need to hold people accountable for and we need to monitor".

Professor Sir Andy Haines: The only other thing to add, perhaps, is the whole issue of investment because many institutions have large investments in businesses that may be more or less sustainable. There is quite a movement at the moment to try to influence universities and other institutions to make sure that their assets are invested as far as possible into industries and private sector interests that support more sustainable policies. That is potentially quite an important movement. One can debate whether it is best to divest completely or to keep some investment in order to have some kind of channel of communication and influence through the shareholders, for example. That is a very active debate, it is a very healthy debate to have and I think it should be encouraged. Hopefully, it will have impact in the future.

Professor Fleming: I was at a meeting on the oceans in Portugal two years ago and one of the things they were talking about there was the



whole issue of bonds. China apparently has said that if it has a choice between a bond that will have a green, sustainable result versus not, it will pick the green one. I see that as a very powerful way to start changing the finance, along with the investment that you were talking about, but I am not an expert in economics.

Q37 **Chair:** We had a green finance inquiry last year looking at both mobilisation of capital—

Professor Fleming: Maybe that could be partly how you—

Chair: Yes, and we are about to look at export finance as well.

Q38 **Geraint Davies:** Finally, what would a planetary health approach to addressing climate change mean in practice? Obviously, we do talk about climate change from Kyoto onwards, but should this change the complexion and provide more buy-in? One of the big concerns, of course, is that as these global changes occur some countries 'benefit' in sea oil production and others lose. How do we get a joined-up approach from a planetary health point of view of climate change challenges?

Professor Sir Andy Haines: Some countries will be impacted on more seriously and more immediately than others, but at the same time in the end we all lose because it is not in our interest to have, for example, populations in Africa or Asia destabilised. That will increase migration and it will also mean that our trading partners are less able to trade with us. In the end we all have a vested interest in trying to sustain the global population but at a much lower level of environmental impact than we have at present.

There are two aspects to planetary health. One is being more resilient to the change that we cannot prevent, because some change has already occurred. We need to adapt to that and be more resilient, and we need to help neighbouring countries and other less well-resourced countries to do that as well. We also need to maintain and sustain our level of human development but at vastly lower levels of environmental impact. In the case of climate change, we need to decarbonise our economy as quickly as we possibly can. The UK aims to do that, but we need to accelerate that level of ambition as quickly as we can. Doing so might cost us a little but at the same time we will reap the health and other benefits of doing that, and we will also reap the longer-term economic benefits. The people who develop sustainable technology and sustainable business models will be much better equipped to succeed in this Anthropocene epoch, the epoch in which we are currently living. We need to have the confidence to make those investments and changes in the knowledge that it will enhance our capacity to succeed in the future.

Professor Frumkin: I would just add to that a couple of additional elements. The planetary health approach to dealing with climate change would feature changes in communication. Human health and wellbeing would become the central vehicle for communicating the impacts of climate change, both threats, which are motivating to people, but also



the opportunities. Tackling climate change can be a tremendous opportunity or set of opportunities for health and wellbeing. The public will understand that issue and be moved by that issue in many cases far more than if it is framed as an environmental, an economic or a security challenge.

Secondly, the research enterprise needs to change so that it is tackling important, pressing questions. What will happen to the nutrient content of some foods with increasing levels of CO₂? What will happen to the fisheries of this country with warmer and more acid oceans? How do we compensate? How do we develop new sources of food? Those are research questions that typically are not fully explored, especially including the health consequences, and to the extent that policy can drive the allocation of resource priorities that would be an important way for the planetary health approach to affect our approach to climate change.

The third is governance. Tackling climate change will mean co-ordinated action on the part of energy, transportation, agriculture and many sectors. I am not in a position to make a comment on this Government but typically Governments are relatively siloed and that co-ordinated action across sectors is difficult. Working very hard in the direction of co-ordinated cross-sector action is the only way to solve these complex problems.

Q39 Kerry McCarthy: Quickly, going back to what you said about big companies taking more responsibility or perhaps being shamed a bit more for some of their activities when it comes to depletion of natural resources, environmental damage and so on, 10 years or so ago I had this really interesting discussion with people from Ecuador. They were trying to raise well over \$3 billion for a fund so that they did not have to exploit their oil resources in National Park, which is one of the most biodiverse places, almost on par with the Galapagos Islands in terms of biodiversity. I have just looked it up and they ended up shelving it because they needed, I think, \$3.6 billion and they got \$200 million from the global community. That was basically saying, "If you think it is so important for us to protect our natural resources and biodiversity, we are a poor country, we have this oil and you have to compensate us for that", and the global community did not respond. To me it seemed like a brilliant idea. Is there any sign that some sort of global mechanism could be put in place? It is one thing blaming it on the multinational companies that go in and make money, but in poor countries, to lift themselves out of poverty they sometimes do not have any alternative. Is there any hope or is that just a bit of a pipe dream?

Professor Sir Andy Haines: Of course, there is the Green Climate Fund and there are other climate-related or environmental funds. Originally, under the Paris Agreement it was projected that there would be \$100 billion annually going into those funds by 2020. That is not going to happen, unfortunately. It is not going to be that much. There is still a fairly substantial sum—



Q40 **Kerry McCarthy:** Is that more for mitigation? Is that more for adaptation, sorry?

Professor Sir Andy Haines: No, it is a combination of adaptation and mitigation. In fact, I think more of the funds have gone into mitigation than adaptation, if I remember correctly. We need to rebuild the momentum for those funds. They sound like a lot of money but in international terms they are a tiny proportion of the global economy, which is a multi-trillion-dollar economy. We need to build the public argument as to why that kind of fund is important and why it is in our self-interest to support this kind of funding, because it will enable poor countries to reduce the level of environmental damage, reduce population movements and improve the potential to trade with poor countries in a sustainable fashion. We need to be much better at communicating those kinds of arguments to the public.

Professor Frumkin: If we aggressively move toward sustainable renewable energy technologies and price carbon, then Ecuador's oil, Poland's coal or Canada's natural gas loses value on the market. It becomes cheaper to use renewable energy than to use fossil fuels and then they can be left in the ground.

Q41 **Kerry McCarthy:** That has already happened with the tar sands, hasn't it, in Canada? It is no longer economically viable to go down that path.

Professor Sir Andy Haines: Yes.

Chair: I am conscious of time and the busy day ahead for colleagues in one way or another, so we are going to move on to our final question.

Q42 **Mr Dunne:** I was going to refer to data and research, which we have covered quite well. You started the session by talking about the UK and the US being ahead of other nations in this field of research. Is that view shared by the panel?

Chair: No false modesty.

Professor Sir Andy Haines: It depends what you define as "planetary health" because the term is a relatively recent one, but there have been initiatives around environment and health for many decades. It is fair to say that the US has probably the largest concentration of environmental researchers, but it has—Howard will know better than I—a relatively small proportion of people concerned with these broader links between global environmental change, planetary health and human health. In the UK we do have a small number of us working in this area, but it is a very tiny number.

When you look around the world and compare the amount of money being spent on biomedical research—which, of course, is important and we are not denying that—and the amount of money spent on the kind of research that links human health and environmental change, we do not have a precise estimate, but it must be thousands to one, I would think. There is a lack of balance there in terms of our research funding,



between the investment in biomedical research, which is important, and the investment in this kind of global environmental change and health research. Some of us would like to see that balance addressed in future funding decisions.

In terms of excellence, China is coming up very quickly. We are seeing a dramatic increase in publications from China and they will be increasingly dominant in the future, but we need to ensure that this capacity is there in every country, not just in China, the UK and the US. It is very important to build that capacity in Africa and other parts of Asia as well in order to sustain human development in coming years.

Professor Frumkin: I can offer a data point. We at the Wellcome Trust support this programme that I head called Our Planet, Our Health. It is one of the major research funders in the world at the interface of planetary change and human health. A few months ago we issued a research call inviting applications to do research at the interface of climate change and health. We had enough money to make about 15 awards. We expected about 100 letters of interest, which would lead to applications. We got 450 letters of interest from all over the world, and these were not just investigators wanting to do what they were interested in to feather their own nest; these were tackling very important questions.

The conclusion we drew was that there is a huge amount of pent-up demand in the research community and there is a huge number of unanswered questions that researchers stand ready to try to answer, but there simply is not enough funding to support them to do that. To echo what Sir Andy said, shifting research funding priorities through the research funders, both public and private, needs to be at the top of our priority list.

Professor Fleming: I think that there is a huge training piece to it, too. Most medical schools do not talk about climate change. Most nursing schools do not talk about climate change. They do not learn that. It is not what is sexy to them. What is sexy is genomics or hospital-based medicine. Prevention is very low on agendas on both sides of the Atlantic and in other countries. Until you change that, it is going to be difficult to do this. Funding for research will drive some of that but we also need to change curricula.

The other thing would be: how do we work with private industry in terms of training? How can you do this in the universities and in high schools to support the idea that somebody should be ethically involved and interested in planetary health as a corporate head? That has to start very early. It cannot just happen later on.

Q43 **Mr Dunne:** We talked a bit about decision making and policy making being siloed in this country and in most countries apart from the command economy countries, which we have touched on. Which Department gives you the best hearing in terms of helping to develop



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policy in this area domestically in the UK?

Professor Sir Andy Haines: It is difficult to say because so many are important. Obviously, DEFRA is very important, and it is beginning to be open to some of these linkages, but obviously energy, transport and housing are all crucial to this planetary health agenda. I suppose what we are saying is the need for some kind of mechanism across Government that can co-ordinate some of these cross-sectoral policies that are needed to work coherently in concert.

Q44 **Mr Dunne:** I asked you that question in the hope that you might say DfID was one of them. Part of DfID's budget is allocated to mitigating climate change impact in developing nations. Are they doing anything in this area to help fund research into the planetary health aspects?

Professor Sir Andy Haines: I do not have any quantified data on that. The Global Challenges Research Fund, which of course is not under the direct control of DfID, is trying to tackle some of these issues. In terms of DfID funding, that would be a very interesting question perhaps for your inquiry to ask. To my knowledge they have not been a major funder of climate change adaptation. I think that they have funded some work around low-carbon development, but again I am not sure that it has measured the health impacts and the health co-benefits of moving towards a low-carbon economy, which is an essential part, we think, of quantifying the benefits.

Professor Fleming: There is also how much DfID is joining up with the Global Challenges Research Fund, which a lot of the research community is getting on board with. It is about capacity building with developing countries, it is not just, "We are going to do our research and take what we get". It is building a network and a cohort of people for the future. I think personally that the Global Challenges Research Fund could learn a lot from how DfID has done things successfully in the past and it does not seem to be that joined up.

Q45 **Mr Dunne:** They fund things like girls' education projects, as one of you mentioned. They have several projects around that around the world.

Professor Sir Andy Haines: They do fund a lot of them.

Q46 **Mr Dunne:** They also have a high level of interest in disaster relief around the world. There is a logic to it, and I think it is something we should be looking to recommend.

Professor Fleming: It is one of those things that you could check multiple boxes with, if you thought about it.

Q47 **Chair:** Who would you say is the main research funder? Is it NRC, is it EPSRC, is it ESRC or is it all of them or none of them?

Professor Fleming: I am on the NRC science board and they have really tried to go outside their comfort zone. They have a very strong environmental community that is uncomfortable with funding in the



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health arena because they feel some of their pounds are being diverted to an area where there is a lot of research funding, as Andy said, but now with the whole coalescence of UKRI I think there will be more crossing over that. I personally have been very impressed by NRC.

Q48 Chair: Is the problem that this is a public health issue and there is no monetising public health and prevention?

Professor Fleming: The Department of Health seems to spend a lot of time and money on curative medicine rather than preventative, as has already been said.

Q49 Chair: Yes. Look at the charts for hospital doctors and GPs over the last 20 years. One is flat. One has massively increased.

Professor Sir Andy Haines: Yes, and the prevention that is there is often based on one-to-one prevention—

Professor Fleming: Yes, or vaccines.

Professor Sir Andy Haines: Which is important but only part of the agenda.

Chair: Not one to many.

Professor Fleming: Exactly.

Chair: Very interesting. That has been absolutely fascinating. Thank you very much for feeding our minds with such a fascinating topic and we hope we will be able to do you proud. Some of it sounds familiar; some of it is definitely unfamiliar to us. We are very grateful to you all for sharing your expertise. Thank you.

Professor Fleming: It is inspiring that you are doing this. Thank you.