

Addressing the challenges of climate change

Thomas Stocker discusses with David Bresch how the scientific community is contributing to the current debate on climate change. Climate change is an irreversible reality that is already upon us. Those countries, businesses and individuals that embrace the scientific evidence will be in a better position both to mitigate their climate impact and to adapt to their changing circumstances.

Climate change has been a major subject of public debate for some years now. Could you frame the scale of the problem from a scientific perspective?

The scientific understanding of climate and the effect of human activity on it was actually postulated in the late nineteenth century. The greater availability of data, both of weather and rising atmospheric carbon dioxide (CO₂) concentrations, has made the theory increasingly robust since the 1960s. Subsequently, climate change has become an undeniable phenomenon, not only within the scientific community, but within mainstream public opinion. The global atmospheric concentration of carbon dioxide has increased from a pre-industrial value of about 280 parts per million (ppm) to over 386 ppm in 2009. The atmospheric concentration of carbon dioxide in 2009 exceeds by more than 29% the natural range over the last 800,000 years as determined from ice cores from Antarctica. This concentration is causing average global temperatures to increase, snow cover to retreat and sea levels to rise. All these data are extremely well documented and corroborated through many studies.¹

Do you worry that such figures can seem a little abstract for many people?

That might currently be the case – but it has changed as climate change now becomes visible on regional scales. Many are already affected by climate change, such as those living in areas of declining permafrost, or on the low lying lands of Bangladesh. Climate change will become increasingly tangible for all of us in coming years. Let us take, for example, the key element of water management. That not only applies to areas traditionally vulnerable to drought; it will be a key factor in, for example, the Spanish agricultural sector, or here in Switzerland in some of the mountain valleys as the glaciers retreat. Other areas will become wetter. Many major cities – such as London, Shanghai, the Eastern US seaboard – are vulnerable to rises in sea levels. And many of us will likely be exposed to more extreme weather events.

How successful do you think the Intergovernmental Panel on Climate Change (IPCC) has been in highlighting the issue of climate change?

Within our mandate I think we have made great progress. Our mandate is to provide information on the status of knowledge on climate change in a comprehensive way based on peer-reviewed literature to governments. The IPCC does this in regular assessments which have been published every 5–6 years since 1990. We are not a campaigning group. We aim to be neutral, thorough and transparent, and based on scientific objectivity. Success, on our terms, is to be credible in the eyes of policy makers. It has been a long and occasionally tough process, but this we have largely achieved. We have had four assessment cycles in which reports have been produced by the scientific community. These reports have been subject to a three-stage review, one stage of which is undertaken by governments.

¹ For further information on the effects of climate change, see: Fourth Assessment Report, Working Group 1, Intergovernmental Panel on Climate Change (www.ipcc.unibe.ch/publications/wg1-ar4/wg1-ar4.html)

Has the IPCC been a learning curve for the scientific community?

It certainly has. We have to boil down the expertise of hundreds of scientists currently active in this field to understandable and yet precise language. Climate projections are based on a handful of policy options and expected consequences are estimated based on model simulations. This is new territory for many scientists and certainly not an area in which they are always comfortable. However, policymakers themselves rarely have a scientific background. Even if they have, they have numerous other policy considerations landing on their desk day after day. We are in competition for their attention with many other groups.

Is there a danger that messages for politicians are over-simplified? Or that the message of the IPCC is diluted through numerous review cycles?

Often individual scientists would prefer to use stronger language in these reports and summaries. However, we provide an assessment in which we present robust findings based on multiple lines of evidence rather than a risk-based approach which would be supported only by little evidence or uncertain extrapolation. Therefore, these assessments may rather be too conservative, although some media have claimed the contrary. We present a number of scenarios and use scientific methodology to attribute probabilities to certain climate outcomes. Moreover, we also present research results that are more uncertain and less robust. That includes research that suggests climate change is more prevalent than previously thought.

With how much certainty can the IPCC look to the future?

No one can say anything with absolute certainty about the future. There are two independent sources of uncertainty. One concerns natural science. More research will hopefully reduce this type of uncertainty. However, such a reduction of uncertainty may be temporarily reversed as new processes may be discovered to be relevant for climate change. The factor that actually weighs more heavily concerns the choice of emission scenario. There are no scientific laws governing what decisions humans might take. Our own species is the largest variable in our future looking models.

Have you encountered resistance by governments or other groups to the scientific findings of the IPCC?

At the end of the Third Assessment we had intensive discussions at a high level with a number of oil-exporting countries which had expressed their reservations to our report. With the publication of the Fourth Assessment Report most of these parties had come on board to endorse the IPCC and its findings which are based on multiple lines of scientific evidence. Our largest problem currently is lobby groups of special interests which actively oppose the potential policy reactions to the findings of the IPCC. They have changed their tactics. The sceptics used to deny climate change head-on. However, they can no longer credibly do that. What they do instead is question particular aspects of climate change literature with an aim to cast doubt over the whole body of research. Incidentally, a very similar tactic was used in the smoking debate 20–30 years ago.

How can these sort of tactics be countered by the IPCC?

Not easily. We have had four exhausting assessment rounds to inform, to the best of our abilities, the world's governments. I still do not have the feeling that climate change is enough of an issue in domestic politics. Perhaps this is also connected with a growing illiteracy of scientific and technical knowledge in the wider public. The teaching of natural science needs to be enhanced in school. This will improve scientific and environmental understanding. Too much science has fallen by the wayside in recent years, to be replaced by business and economics. To reach a wider public, we need to be clear in our communications and be ready to use the most accessible channels. Here the scientific community has made progress; but there is more that we can do.

Is the global concern of climate change causing a new multidisciplinary science to emerge?

It is certainly bringing together scientific topics as never before. We see this here at the University of Bern with the National Centre of Competence in Research on Climate Change.² Twenty years ago oceanographers would not have mixed a great deal with climate change modellers or those studying the carbon cycle. Now they do. We are collaborating, to the extent that every individual maintains their own specialism, and we are engaged in an exchange of expertise. Climate change embraces so many different fields of research, we are creating a truly multidisciplinary approach to the biggest challenge facing this and coming generations.

Do you think the Stern Report³ helped those concerned with climate change, attaching as it did monetary values to potential climate change scenarios?

This has been extensively debated by my colleagues in Working Group 2 and 3 of the IPCC. Anticipating the cost of a rise in global temperatures involves a huge array of actors and, as New Orleans showed, there are always unexpected factors in natural disasters. Deriving financial indicators from climate change data should really be understood approximate with a large margin of uncertainty, in both directions. Placing a monetary value on climate change and its consequences helps further focus attention. It also builds bridges between science and economics, which I believe will be increasingly important in the future.

Do you believe that business is sufficiently aware of the risks posed by climate change?

The problem in the relationship between business and science, certainly the science of climate change, is that we have different time horizons. We are looking into the upcoming century; businesses, with some exceptions, rarely focus beyond 5–10 years. Our societies are organised into economies that are too focused on short term reporting, quarterly reports and the like. I would like companies to say “what will our business look like in 30 years?” This is a key question for the really successful entrepreneurs, the Bill Gates and the Warren Buffets of the world.

² www.nccr-climate.unibe.ch/summary/index_en.html

³ www.hm-treasury.gov.uk/stern_review_report.htm

How would you advise businesses to position themselves vis-à-vis climate change?

Climate change poses many risks for businesses, not least in a field such as insurance. If there is an increase in frequency and severity of extreme weather events, if there is major coastal flooding or failed harvests, then insurers will have to cover the insured losses. Just as the science of climate change has become multidisciplinary, so business needs to embrace a holistic approach to their risk management. From mitigating the effects of extreme weather to changing regulation from energy use, to securing supply chains, climate change will affect many areas of business. These must be integrated into a single guiding risk management strategy.

How much of a role should governments have in adapting to the risks of climate change?

Climate change is upon us, like it or not. If we shut down all our CO₂ emissions tomorrow, the volume of CO₂ currently in the atmosphere will still have significant effects on our environment for centuries. If the global community recognizes Article 2 of the United Nations Framework Convention on Climate Change (UNFCCC), climate change must be limited. Therefore, the first step is to define a binding climate change target, for example limit the global-mean warming to 2°C. Second, this target directly translates into a schedule for global emissions reductions, with a clear lead by the industrialised countries, which are responsible for the current climate change. Very soon, however, all countries will need to reduce CO₂ emissions. Those who move sooner rather than later will be those most capable of mitigating and successfully adapting to climate change. Countries that provide the right mix of incentives to encourage greater energy efficiency will have a societal and technological edge over others. Also here, first movers take a decisive advantage. This is a principle preached by many, but when it comes to climate change mitigation, magically forgotten. The same is true of business. Climate change is not only a multifaceted risk for businesses, climate change mitigation and adaptation can be an opportunity.

Do you think governments are prepared for such a challenge?

In the recent economic crisis, billions of dollars were mobilised to support the banks. It was a coordinated approach by countries across the world in recognition of the financial gravity of the situation. In some ways, it makes me optimistic and angry at the same time. The potential for global action is there if attention is suitably focused. However, the release of such unimaginable amounts of public money should have been tied to conditions. For example, why help an ailing car industry when all they manage to do after their resurrection is to produce the same old technology? Why bail out banks if they continue to act as they did before? I only hope we do not wait for similar scale environmental disasters before we acknowledge the increasing urgency of action on climate change and certain climate targets have become unachievable. The IPCC will continue to provide the scientific information to the policymakers and the public. We will offer, according to the best research, model-based scenarios of future climate outcomes from the global to the regional and local scale. At that point the job of the scientists is done. It is up to policymakers and the public to act.

Thomas Stocker is the Professor of Climate and Environmental Physics, Physics Institute, University of Bern, Switzerland. He is also Co-Chair Working Group I, Intergovernmental Panel on Climate Change. He was in conversation with David Bresch, Head of Sustainability and Emerging Risk Management, Swiss Re.