Introduction: Facing up to climate change

David Sugden[1] and Paul Bishop[2]

[1]School of Geosciences, University of Edinburgh, Drummond Street, Edinburgh EH8 9XP

[2]School of Geographical & Earth Sciences, University of Glasgow, Glasgow G12 8QQ

Climate change poses challenging questions for humankind. It is also a challenge for earth and environmental scientists and the way they interact with other disciplines.

Progress since the Industrial Revolution has brought prosperity to a growing proportion of the world's population at a time of rapid population increase. Progress has been based on the scientific and technical exploitation of the energy derived from fossil fuels. It is the very achievements of society that are now threatening future advances by raising CO_2 concentrations in the atmosphere and introducing risks of damaging climate change. The central question for the world in the 21st Century is whether we have the ability to engender a different industrial revolution, a sustainable one which no longer relies on fossil fuels. There is an encouraging convergence of different agendas, all pointing towards the same goal. The independent arguments in favour of using renewable energy, maintaining biodiversity, building prosperity in the developing world, wasting fewer resources, distributing food and water more equally, and providing greater security, are all part of such a sustainable future.

This Special Issue is a response to such a future and arises out of an Inquiry, *Facing up to Climate Change*, carried out by the Royal Society of Edinburgh and published in March 2011. Over 100 organisations and many people gave evidence to the Inquiry Committee. The global scale of the challenge and the complexity of the issues it raises are so large that it is helpful to study them through regional studies. Here we examine a small player in the wider world – Scotland. Scotland was a leader in the coal- and petroleum-based Industrial Revolution and has been a major *per capita* contributor to the rise of atmospheric CO_2 in the atmosphere. Are there lessons to be learned from the way a small global player is struggling to develop a sustainable way forward? The principal finding of the Inquiry was that it is proving extremely difficult to achieve coherence between different activities at different scales, especially in a liberal democracy where progress depends on wider acceptance of the urgency and need for change.

One important example of the lack of coherence comes from the separation between academic disciplines. During the Inquiry, it became clear just how many disciplines were involved in the challenge presented by climate change – economists and social scientists, land use specialists and natural scientists – and that the findings, perspective and full relevance of each are not always appreciated by the others. Moreover, there is often a gulf of understanding, urgency and timescale between academia and policy makers. This Special Issue addresses these issues by bringing together papers led by members of the Inquiry in the above disciplines and those involved in policy.

Our aim is that this Special Issue will contribute in three main ways. First, it brings together the case for change from the perspectives of different disciplines. Thus we see the problem of changing the behaviour of individuals from the perspective of economics and sociologists. The uncertainties of climate science are seen from the point of view of natural scientists and also from social scientists, who see how natural scientists respond cautiously to doubters and, at least during part of the Inquiry, a hostile media and puzzled public. Land use is an integral part of the solution and is covered both in a specialist paper and in the economics paper.

Secondly, the Special Issue aims for integration between the different approaches by identifying the problems and possible solutions at different scales. Thus there is a paper making a global and ethical case for change, and a paper that highlights the responsibilities and possible solutions at national, Scottish, regional and local levels. The policy implications of the various disciplines are brought together in the final paper, which identifies the barriers on the ground as perceived by different stakeholders.

Thirdly, this Special Issue represents the state of play in a particular place at a particular time. This characteristic will be invaluable when historians document the early stages of the new renewable industrial revolution or, more pessimistically, what went wrong. For example, there is the contrast between the enthusiasm of youngsters at school pushing to save waste and cut carbon and the scepticism about the reality of climate change amongst the public in the wake of the leaked emails about the data of climate scientists at the University of East Anglia (data which are now accepted as reliable). Also, there is the contrast between the perspectives and evolution of ideas in the different disciplines at a particular time, as well as the way policy is discussed and implemented by different groups within society. It is also interesting to note the nature of the conflict between the wishes of the government to cut carbon usage and the resistance to change amongst the public. There is a lack of coherence between the environmental, social and faith groups, each favouring a low-carbon future, but sometimes finding themselves on the opposite side of policy implementation. Future generations may well wonder at the energy of local communities in opposing wind farms rather than building their own.

We also note that this Special Issue further highlights the move of the *Earth and Environmental Science Transactions of the Royal Society of Edinburgh* to a wider remit. The journal will remain focused on the earth and environmental sciences, in the empirical 'natural sciences' sense, but the RSE's Inquiry into *Facing up to Climate Change* has provided the Editorial Board with the opportunity to feature an issue of intense interest to Society.

This Special Issue stresses the academic underpinnings of the Report of the RSE Inquiry and also reflects on changes in the six months since publication. Thus it builds on the Report. Those readers seeking details of the evidence collected by the Inquiry and the ten primary and 30 supplementary recommendations addressed to specific activities are referred to: *Facing up to Climate Change: Breaking the Barriers to a Low-carbon Scotland* (RSE, 2011), or to the websites where the report, short film and all the evidence collected are available at www.achangingclimate.co.uk , or www.royalsoced.org.uk

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