

Chapter 25

Climate Change: Responding to a Major Challenge for Sustainable Development

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Abstract Climate change is emerging as one of the major challenges facing scientific and policy communities. The inherent complexity will ultimately require a much more integrated response scientifically to better understand multiple causes and impacts as well as at the scientific–policy interface where new forms of engagement between scientists, policymakers and wider stakeholder communities can make a valuable contribution to more informed climate policy and practice. The content of this chapter is considered particularly timely as scientific research and policy debate are shifting from one of problem-framing to new agendas that are much more concerned with implementation, the improvement of assessment methodologies from a multidisciplinary perspective and the reframing of current scientific understanding as regards mitigation, adaptation and vulnerability. A critical element of responding to the climate change challenge will be to ensure the translation of these new scientific insights into innovative policy and practice ‘on the ground’.

Keywords Climate change • Adaptation • Mitigation • Policy

Based on: Martens P, McEvoy D, Chang C (2009). The climate change challenge: linking vulnerability, adaptation, and mitigation. *Curr Opin Environ Sustain* 1: 14–18

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1 Introduction

The consequences of rapid and substantial human-induced global climate change could be far-reaching, even leading senior commentators such as Sir David King to label it as one of the greatest threats facing future societies.¹ Until very recently, scientific and policy emphasis has focused on mitigation efforts, i.e. the reduction of anthropogenic greenhouse gas emissions. However, the success of global mitigation initiatives to date is questionable, and the impact of ever more stringent emission control programs could potentially have enormous social consequences. The efficiency of such action is also highly debatable. Whilst the characteristic of prompt costs and delayed benefits has resulted in early research which has concentrated for the most part on ‘top-down’ analyses of the cost-effectiveness of various greenhouse gas abatement strategies, little effort has been expended on the exploration of the interactions among the various elements of the climate problem, on a systematic evaluation of climate stabilisation benefits or on the costs of adapting to a changed climate, let alone an integration of different approaches. Crucially, these studies also do not assist decision-makers with the identification of climate change policy objectives; they only address the costs of meeting various abatement targets and the efficacy of different strategies.

2 Response Strategies

More mature climate strategies will require the integration of a wider range of mitigation, adaptation and vulnerability considerations, as well as responses more closely aligned with the objectives of other non-climate policy realms (McEvoy et al. 2006; Wilbanks and Sathaye 2007). In this regard, there is increasing recognition that, as policy evolves, new windows of opportunity may also emerge which allow for the articulation of integrated options for long-term policy on climate change mitigation and adaptation, as well as the building of local adaptive capacity and resilience in order to reduce vulnerability to climate change and variability (Neufeldt et al. 2012). Ultimately, a coherent response will require consideration of all the facets of this issue (Fig. 25.1 shows a schematic representation of the climate change agenda).

Indeed, emerging international agendas are now reflective of a more holistic approach to responding to climate change. These are represented by funding agendas such as climate compatible development (development coupled with adaptation), green growth (development coupled with mitigation) and low carbon resilient development (an equal emphasis on the three agendas) (Fisher 2013).

The climate change issue has risen rapidly to the top of both research and policy agendas and is now the subject of widespread media coverage and increasing public

¹ <http://news.bbc.co.uk/2/hi/science/nature/3381425.stm>

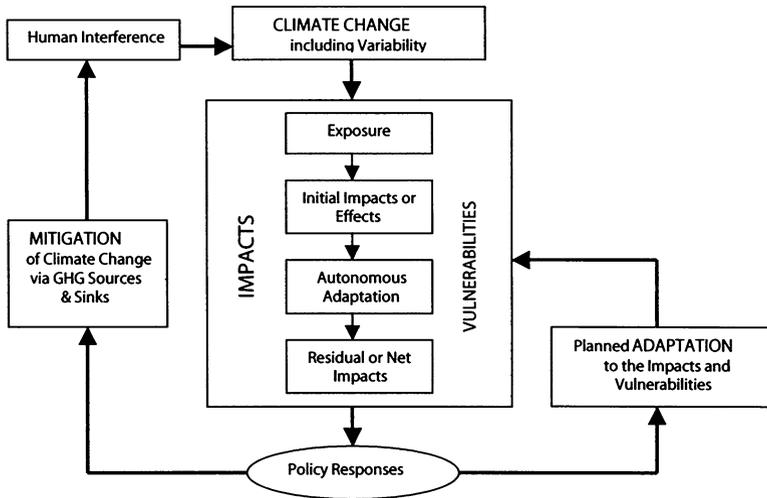


Fig. 25.1 The climate change agenda (Derived from Smit et al. 1999)

concern. To some extent, this is a consequence of important scientific advances in recent times. Several key developments are:

- *Increasing scientific consensus:* Concern about global warming, and the influence of human activity, can be traced back to the 1980s and is reflected in the creation of the Intergovernmental Panel on Climate Change (IPCC), an international attempt to consolidate the scientific community. Their most recent reports, published in 2007 and updated in AR5 in 2013, represent international state-of-the-art knowledge on climate change and its likely impacts. Through this forum, the collaborative efforts of scientists have concluded that climate change is happening and importantly that human activity is making a discernible contribution to this change.
- *From impacts to risk management:* Early scientific efforts concentrated on generating knowledge of the potential impacts of a changing climate and how to reduce anthropogenic greenhouse gas emissions. However, since the IPCC's Third Assessment Report in 2001, increasing emphasis has been placed on adaptation and the promotion of a risk management approach. This means going beyond mere consideration of climate-related hazards to more explicit consideration of issues surrounding the vulnerability and exposure of different elements at risk, as well as addressing conditions of uncertainty. This risk-based approach is embodied in state-of-the-art climate change strategies such as that recently adopted by London (Greater London Authority 2008). An important caveat also needs to be highlighted here. Whilst risk management has gained traction in the EU context, in many other regions of the world – particularly developing countries – other approaches continue to be valued, e.g. vulnerability

assessments which focus on current day adaptation deficits (Satterthwaite and Dodman 2013).

- *Consideration of non-climate stressors*: When looking to the future, it also needs to be recognised that climate-related events will impact on societies that are likely to be very different than today's; hence, an integrated assessment of both climate and non-climate scenarios will ultimately be necessary to gain a better understanding of future risks (McEvoy et al. 2008).
- *Recognition of the need for greater interdisciplinary working*: Whilst mitigation has dominated policy and research agendas in recent years, there is an increasing recognition that actors also need to be preparing for change that is unavoidable. This has resulted in a greater consideration of vulnerability, adaptation and in many parts of the world already experiencing extreme events, disaster risk reduction. Drawing these different research domains closer together, with improved linkages between natural and social scientists, will be critical for effectively addressing the complexities of climate change.² New ways of working between scientists, policymakers and the wider stakeholder community will also be vital.

These advances have also filtered through to the public realm, as reflected in mainstream acceptance of human-induced climate change and the need for society to respond. Findings from actor-based research carried out for the EU-funded project ADAM (Adaptation and Mitigation: in support of European policy) suggest that, on the whole, the climate change issue is no longer questioned as it was in the past. Across all sectors, there is a common acknowledgement that climate change is happening and that we need to prepare for future change. Indeed, in the words of one interviewee, 'the world is changing fast and I no longer have to deal with sceptics as I have done in the past', whilst others have noted how 'rapidly the climate change issue has risen in profile over the past couple of years' and that there has been a 'rapid sea change in attitude following recent climate related events, such as the heat wave in 2003' (McEvoy et al. 2008). This shift in public perception has also been accompanied by a greater institutional impetus for change. Over the past couple of years, there has been an increasing recognition that climate change is not merely an environmental issue but one with important social and economic dimensions as well. This argument received much attention as a result of the Stern report in 2006 (Stern 2006). Although not the first economic report on this issue, it has become the most widely known document of its kind. In it, the author provides stark warning that climate change could result in a 'market failure on the greatest scale the world has seen'.

It is also important to recognise that these changes have taken place in a rapidly evolving policy context. Of the two mainstream agendas, mitigation is relatively 'mature' in comparison to adaptation, though new instruments continue to be developed and introduced. Perhaps the most high profile of these is carbon trading, a

²The Dutch NWO-funded VAM programme (Vulnerability, Adaptation, Mitigation and Adaptation-Mitigation) is a contemporary example of an attempt to encourage interdisciplinary working. See http://www.nwo.nl/nwohome.nsf/pages/NWOP_5XDGSK_Eng?OpenDocument

market-based mechanism given momentum by the signing of the Kyoto Treaty in 2005. Adaptation, on the other hand, can be considered an agenda still very much in its infancy. Politically, it is also recognised that there is a need for greater cohesion between climate change and sustainable development objectives. To date, climate change and sustainable development have tended to be treated as two distinct agendas; however, there is considerable added benefit to be gained by ensuring a more coherent approach. Not only will climate change have an adverse impact on progress towards a sustainable future, sustainable development activity can reinforce our response to climate change by both enhancing adaptive capacity and increasing resilience. As noted by the IPCC, however, few plans for promoting sustainability have explicitly included either adapting to climate change impacts or enhancing adaptive capacity.

3 Approaches to Climate Change Risks: The Way Forward

Moves towards considering both types of response as part of a more coherent policy programme represent an explicit acknowledgement by decision-makers that both mitigation and adaptation are important in reducing the risks associated with climate change, i.e. limiting the adverse effects of change and adapting to what is unavoidable. However, even though the preceding text has highlighted clear evidence of a desire to respond to the climate change issue, debate continues as to how best to approach this. Although linked in many ways, mitigation and adaptation have different problem structures with important implications for how political responses are framed (Klein et al. 2007). Therefore, whilst there is obvious interdependence between the two (they are both deliberate human responses aimed at reducing the risks associated with climate change), it is important to better understand some of the key synergies and conflicts between these two agendas. From McEvoy et al. (2006), some of these are:

- A common link between the two approaches is the capacity of a system to respond. For example, adaptive capacity can be simply defined as the ability of a system to adjust to climate change; this is thought to be determined by a range of factors, including technological options, economic resources, human and social capital and governance. Mitigation has similar determinants – in particular, the availability and penetration of new technology (although technological solutions have a role to play in both mitigation and adaptation, it should be recognised that ‘soft engineering’ has a particularly important role in adapting to climate change). The willingness and capacity of society to change is also critical (information and awareness-raising can be useful tools for stimulating individual and collective climate action);
- An integrated response is challenging as ‘mitigation and adaptation are very different in what they mean and how they work’. Firstly, there is an obvious mismatch in terms of scale, both spatially and temporally. Mitigation efforts are

typically driven by national initiatives operating within the context of international obligations, whereas adaptation to climate change and variability tends to be much more local in nature, often in the realm of local/regional economies and land managers. As well as the spatial element, there are also differences in the timing of effects. As greenhouse gases have long residence periods in the atmosphere, the results of mitigation action will only be seen in the longer term. Adaptation, on the other hand, has a stronger element of immediacy.

- Disconnection in space and time can make it difficult for people to link the consequences of their activity with long-term environmental consequences. It also raises the question of environmental equity, i.e. who are the likely beneficiaries of the different types of response. Mitigation, being an action targeted at the longer term, attaches value to the interests of future generations and to some extent can be considered an altruistic response by society. Conversely, the impacts of climate change are felt more immediately by society, and adaptation is typically viewed as everyday 'self-interest'. As such, risk perception by individuals and organisations will be a critical influence on the acceptability and ultimate effectiveness of different responses.
- This inevitably leads to a consideration of trade-offs and distributional effects, in particular, who pays and who benefits, and whether there is a willingness to invest if the benefits of climate change response are perceived to be private. It is also important to note discrepancies in that those responsible for the majority of emissions (i.e. developed countries) also have the highest adaptive capacity, whilst the poorest countries, producing the lowest emissions, are most vulnerable to the impacts of a changing climate, and this has an influence on the urgency that is attached to any mitigation response. This also holds true within national territories, with uninsured, unaware and relatively immobile populations living in poorer quality accommodation often being hardest hit. In reality, those most vulnerable to climate change are those already at a socio-economic disadvantage in society.
- Another important difference between the approaches relates to those involved. Not only are decisions taken in different policy domains, but different stakeholder communities are also involved. Mitigation policy is primarily focused on decarbonisation and involves interaction with the large 'emitting' sectors such as energy, transport, etc., or else targets efficiency improvements according to specific end users – commercial, residential, etc. The limited number of key personnel and their experience of dealing with long-term investment decisions mean that the mitigation agenda can be considered more sharply defined. In contrast, multi-actors involved in the adaptation agenda come from a wide variety of sectors that are sensitive to the impacts of climate change. They also operate at a range of spatial scales. As a result, the implementation of adaptation measures is likely to encounter greater institutional complexity.
- It also needs to be recognised that adaptation agendas differ across regions of the world. In the European context, cities are well established with relatively stable populations, and therefore, responses to climate change are likely to focus on the medium to long term and involve retrofitting measures. In parts of the world already exposed to extreme events, adaptation inevitably overlaps with disaster

risk reduction, and in the developing world, adaptation not only needs to consider extreme events but also current-day deficits in infrastructure and adaptive capacity, as well as the pressure from rapidly growing populations.

Accounting for this complexity, combining the analyses of different dimensions of climate change, and highlighting the implications for policy and practice, will ultimately require a holistic and integrated approach (Van Zeijl-Rozema et al. 2008). The authors suggest that the science of integrated assessment (IA), with its combined application of modelling, scenario and participatory approaches, has considerable potential for both analysing the multiple causes and impacts of such a complex problem and informing the development of effective policy responses (Martens 2006). However, the generation of scientific knowledge alone will not suffice; information will also need to be translated into action ‘on the ground’. Hence, as the policy debate moves from one of problem-framing to one more concerned with implementation, detailed political, ethical, social and normative analysis becomes increasingly important. A highly organised, multidisciplinary programme of research intended to add value to efforts to improve assessment methodologies, to contribute to the reframing of current scientific understanding and ultimately to provide new insights into innovative policy options will be required (McEvoy et al. 2013). Significant scientific and policy challenges remain ahead (Kemp and Martens 2007).

Questions:

1. Please identify interlinks among vulnerability, adaptation and mitigation in the context of climate change.
2. Give examples to describe the substitutability and complementarity between adaptation and mitigation measures.
3. Why is the framing of adaptation important?
4. All the agendas discussed have risk reduction and reducing vulnerabilities in common. What are the major differences between them?
5. Why does the adaptation agenda differ across different regions of the world?
6. Are climate scenarios necessary for adaptation planning? Why are they or why are they not?
7. Is it desirable to have a holistic climate action plan or should adaptation and mitigation be treated separately?

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