

**University of Cambridge, Department of Land Economy
MPhil in Environmental Policy**

EP07: Climate Change Mitigation and Adaptation: towards a more Sustainable Development, Lent term 2008

**Lecture 1 only (21 January): St Catherine's College, Ramsden Room
All other lectures: Pitt Building, Darwin Room**

Course description

The evidence suggests that climate change with potentially disastrous consequences is occurring and that human-induced activity is responsible for most of this change. Furthermore, without substantial global-scale mitigation and adaptation measures, anthropogenic induced climate change will severely jeopardise worldwide development, and reverse local, national and international efforts towards reducing poverty and creating more sustainable livelihoods in developing countries. This course of eight lectures and discussions will introduce students to key issues in the subject of climate change mitigation and adaptation. It will cover the overall framing of the problem and potential solutions, the drivers of global warming, the impacts, and the opportunities and challenges of mitigation and adaptation, with a focus on developing countries and sustainable development. Those giving the course are members of the Cambridge Centre for Climate Change Mitigation Research (4CMR) in DLE. They are involved in research and writing on the topics covered by the course.

Course outline

Lecture 1 (Week 2, Monday 21st January, 3-5pm): Introduction to the course and the integrated assessment of climate change, adaptation and mitigation

Terry Barker

Key concepts (greenhouse effect, co-benefits of mitigation, cost-benefit versus cost-effectiveness) will be introduced. The inter-relationships between climate change, adaptation and mitigation will be explained. Externalities, social choice, uncertainty, long-term effects, and international cooperation, all inherent features of topic will be discussed.

Readings and references:*

Houghton, John (2004), *Global Warming: The Complete Briefing*, third edition, CUP, 2004.

*Barker, Terry (2003). "Representing global climate change, adaptation and mitigation", *Global Environmental Change-Human and Policy Dimensions*, 13(1), 1-6.

* Stern, N. (2007) *The Economics of Climate Change*, CUP. Executive Summary
Schellnhuber, Hans Joachim, Wolfgang Cramer, Nebojsa Nakicenovic, Tom Wigley and Gary Yohe (eds.) (2006) *Avoiding Dangerous Climate Change*, Cambridge University Press.

*Barker, T and others (2007) "Climate Change 2007: Mitigation of Climate Change", Summary for Policymakers, IPCC Working Group III, IPCC Fourth Assessment Report, Intergovernmental Panel on Climate Change
(<http://www.ipcc.ch/SPM040507.pdf>)

Lecture 2 (Week 3, Monday 28th January, 3-5pm): The science and drivers of climate change

Rachel Warren

This lecture is structured into two main components: the science of climate change, and the socio-economic drivers of climate change. Past, present and future predictions of climate change will be presented, showing how climate-science models are used to explain past changes and the role of anthropogenic greenhouse gas emissions; and how they are used to predict future change using a scenario approach. The socio-economic forces determining the

amount of man-made GHG emissions released into the atmosphere are also discussed. Underlying causes, such as population growth, technological development and increased world industrial activity, globalisation, greater trade and transportation, material and energy consumption growth, changes in land use and deforestation are presented. The role of institutions in shaping climate change is also investigated.

Readings and references:*

- Baumert, K., Herzog, T., and Pershing, J. (2005) "Navigating the Numbers: Greenhouse Gas Data and International Climate Policy", World Resources Institute
- *Houghton, John (2004), *Global Warming: The Complete Briefing*, third edition, CUP, 2004.
- * McKibbin, W. and A. Stegman (2005) "Convergence and per capita carbon emissions", Working Paper in International Economics no.4.05, May, Sydney: Lowy Institute for International Policy
(focus on section 4 on the determinants of key energy and emission variables across countries and over time) http://www.brook.edu/views/papers/200505_bdpie167.pdf
- * Stern, N. (2007) *The Economics of Climate Change. The Stern Review*, Cambridge University Press; part I – section 2.2 (pp: 24-28); and part III - chapter 7 (pp: 168-192)
http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/sternreview_index.cfm
(Good summary available as well in: Stern, N., 2006 "What is the economics of climate change?", *World Economics*, vol.7 (2): 1-10)

Lecture 3 (Week 4, Monday 4th February, 3-5pm): An overview of climate-change damages

Rachel Warren

Climate change is already impacting upon both human and natural systems and will continue to do so via both the gradual changes in climate projected for the twenty-first century and beyond, and through the effects of extreme weather events which are predicted to increase in frequency and magnitude as climate changes. The lecture includes summaries of observed and projected impacts upon natural ecosystems, agricultural systems, coastal systems and human health, together with explanations of the methods used to predict the changes. The metrics used to express the size of the impacts are also important and the extent to which these may be used in a multi-criteria analysis approach is also discussed.

Readings and references:*

- *UK HM Treasury (2006) *Report of The Stern Review on the Economics of Climate Change*, chapter 3
- Schellnhuber, HJ, Cramer, W, Nakicenovich, N, Wigley, T, and Yohe, G (eds.) (2006) *Avoiding Dangerous Climate Change*, Cambridge University Press: Cambridge, UK
- Root, TL, Price, JT, Hall, HR, Schneider, SH, Rosenzweig, C, and Pounds, JA (2003) "Fingerprints of global warming on wild animals and plants", *Nature*, 421, 57-60
- *IPCC (2007) "Climate change 2007: Impacts, adaptation and vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel of Climate Change", IPCC (eds Parry ML, Canziani OF, Palutikof JP, van der Linden PJ, Hanson CE), Cambridge University Press: Cambridge, UK.

Lecture 4 (Week 5, Monday 11th February, 3-5pm): Mitigation potentials and costs: the IPCC Fourth Assessment Report

Terry Barker

The Mitigation Report from the IPCC (CUP, November, 2007) introduces new definitions of the economic potential for mitigation policies and presents estimates of these potentials at different costs. The lecture will explain the concepts and provide a guide to the Report and the global, regional and sectoral estimates, both from top-down and bottom-up modelling and analyses. Key concepts covered in the lecture will be: technical, economic and market

potentials; top-down and bottom-up modelling of mitigation costs; no-regrets options; the carbon price; global temperature, concentration and GHG reduction targets; and costs of climate stabilization.

Readings and references:*

- *Barker, T and others (2007) "Climate Change 2007: Mitigation of Climate Change", Summary for Policymakers, IPCC Working Group III, IPCC Fourth Assessment Report, Intergovernmental Panel on Climate Change (<http://www.ipcc.ch/SPM040507.pdf>)
IPCC WG3 Climate Change 2007: Mitigation, CUP.

Lecture 5 (Week 6, Monday 18th February, 3-5pm): Economic policies and climate change mitigation

Terry Barker

This lecture will cover economic policies and their effects on the costs and benefits of mitigation, including ancillary environmental benefits. Concepts covered will include the double dividend, competitiveness issues, carbon leakage and co-benefits. The focus will be on mitigation strategies and cooperation at the global level, with particular reference to the role of developing economies. The discussion will include the Kyoto Protocol and its effects, the EU Emissions Trading Scheme, impacts of world oil prices on mitigation, and a quantitative analysis of the modelling of costs, including the role of different modelling approaches and induced technological change.

Readings and references:*

- *Barker, T., and P. Ekins, 2004: The Costs of Kyoto for the US Economy. *The Energy Journal*, 25(3), pp. 53.
Barker, T., M. S. Qureshi and J. Köhler, 2006: The Costs of Greenhouse Gas Mitigation with Induced Technological Change: A Meta-Analysis of Estimates in the Literature. UK Tyndall Centre Working Paper 89.
*Köhler, J., M. Grubb, D. Popp, and O. Edenhofer (2006). "The Transition to Endogenous Technical Change in Climate-Economy Models: a Technical overview to the Innovation Modeling Comparison Project." *The Energy Journal Special Issue, Endogenous Technological Change and the Economics of Atmospheric Stabilization*, 17-55.
Stern, N. (2007) *The Economics of Climate Change*, CUP.

Lecture 6 (Week 7, Monday 25th February, 3-5pm): Climate change mitigation and sustainable development

Serban Scriciu

The literature has mostly focused, until recently, on the economic and environmental dimensions of climate change mitigation. This lecture gives a greater attention to the social side of development. It aims to identify key issues related to potential synergies and trade-offs between mitigation strategies and the three (social, environmental and economic) pillars of sustainable development. The North-South divide regarding climate change mitigation efforts and responsibilities and potential interconnections between mitigation policies and poverty alleviation are discussed.

Readings and references:*

- *Huq, S., Reid, H., and L. Murray (2006) "Climate Change and Development Links", IIED Gatekeeper series 123, International Institute for Environment and Development, London (<http://www.iied.org/pubs/pdf/full/14516IIED.pdf>)
*Munasinghe, M. and R. Swart (editors) (2005) *Primer on Climate Change and Sustainable Development*, Cambridge University Press (chapters 1, 3, 4, 8 and 11)
*Prum, R. (2007) "Climate change and North-South divide: between and within", *Forum of International Development Studies* 34 (March): 223-244

Richards, M. (2003) "Poverty Reduction, Equity and Climate Change: Global Governance Synergies or Contradictions?", ODI Policy Briefing Paper, Globalisation and Poverty Programme, Overseas Development Institute, London
(www.odi.org.uk/iedg/publications/climate_change_web.pdf)

Lecture 7 (Week 8, Monday 3rd March, 3-5pm): Climate change impacts on sustainable development and the role of adaptation

Serban Scriciu

This lecture will address the impacts of climate change on the economic, social and environmental dimensions of sustainable development. It will introduce concepts such as vulnerability, exposure, sensitivity and adaptive capacity. The focus is on developing economies and poor communities that will bear the brunt of climate change. Adaptation measures and policies and their fit within broader development strategies are also discussed.

Reading and reference*

- *Adger, W. N., Huq, S., Brown, K., Conway, D. and M. Hulme (2003) "Adaptation to climate change in the developing world", *Progress in Development Studies* 3: 179-195;
- *Adger, N. et al (2007) "Climate Change 2007: Impacts, Adaptation and Vulnerability", Summary for Policymakers, IPCC Working Group II, IPCC Fourth Assessment Report, Intergovernmental Panel on Climate Change (<http://www.ipcc.ch/SPM13apr07.pdf>)
- Huq, S., Reid, H., and L. Murray (2006) "Climate Change and Development Links", IIED Gatekeeper series 123, International Institute for Environment and Development, London (<http://www.iied.org/pubs/pdf/full/14516IIED.pdf>)
- Möhner, A. and R.J.T. Klein (2007) "Global Environment Facility: Funding for Adaptation or Adapting to Funds?", Climate and Energy Working Paper (June), Stockholm Environment Institute
(http://www.sei.se/editable/pages/sections/climate/publications/climate_energy_working_moehner_klein.pdf)
- *Munasinghe, M. and R. Swart (editors) (2005) *Primer on Climate Change and Sustainable Development*, Cambridge University Press (chapters 1, 5, 6, 7 and 11)
- *Stern, N. (2007) *The Economics of Climate Change*, CUP.

Lecture 8 (Week 9, Thursday 13th March, 9-11am): The politics and regulatory frameworks of climate change

Anna Korppoo

This lecture will describe the politics underlying climate change agreements or policies at the national and international level. Regulatory issues surrounding the climate change debate are also brought into discussion. The main themes to be covered include the architecture of the Kyoto Protocol, the Kyoto mechanisms, the main country groups in international negotiations and their views during the Kyoto process, and the current state and challenges of post-Kyoto negotiations.

Readings and references:*

Yamin, F. and J. Depledge (2004). *The International Climate Change Regime. A Guide to Rules, Institutions and Procedures*. Cambridge University Press.
(*Analysis on the outcome of the Bali negotiations round to be provided prior to the lecture*)

*References marked with asterisk represent core readings of the course.

Course assessment

The course will involve one *essay assessment* on a topic of choice, the details of which will be later disclosed.