Climate Change, Engineered Systems, & Society Bibliography

Author(s)

Kelly Laas
Simil Raghavan

Year

2011

Description

This bibliography includes a balance of the effects of climate change on engineered systems and more philosophical articles looking at wider issues of climate change and justice and communicating about climate change to different stakeholders. There are also sections on education, other resources, and state climate offices.

Body

Books and Articles

Adger, W. Neil. 2006. *Fairness in Adaptation to Climate Change*. Cambridge, MIT Press.
A collection of essays discussing the social justice issues inherent in how the world adapts to climate change. The book outlines the philosophical underpinnings of different types of justice in relation to climate changes, presents inequities and future burdens and it applies these to real world examples of climate change

adaptation in Bangladesh, Tanzania, Botswana, Namibia, and Hungary. The authors argue that the key to adapting to climate change lies in recognizing the equity and justice issues inherent in its causes and in human response to it.

Beard, Lisa M. et al. 2010. Key Technical Challenges for the Electric Power Industry and Climate Change. *IEEE Transactions on Energy Conversion.* 25(2): 465-473.

This paper, prepared by the Climate Change Technology Subcommittee, a subcommittee of the Power and Energy Society Energy Development and Power Generation Committee, identifies key technical issues facing the electric power industry, related to global climate change . The authors examine these issues in detail and look at possible lessons that can be drawn from other industries.

Black, William R. 2010. *Sustainable Transportation: Problems and solutions.* New York: Guilford Press.

This book looks at some of the major problems faced by today's transportation systems, including climate change, air pollution, diminishing petroleum reserves, and congestion, and explores a range of applications for addressing these problems, including pricing, planning, policy, education and technology.

Brown, Hilary. 2011. Eco-logical Principles for Next-Generation Infrastructure. *The Bridge* 41(1): 19-26.

Today's global complex of networked infrastructure is indispensible to economic and social development. However, it is unclear if our current infrastructure can support the growth of an urbanizing carbon-conscious world facing a destabilizing climate. The author discusses how there must be a large shift in the goals for civil infrastructure of this kind so they can support the challenges of a changing climate, and the need for major investment in public works based on new paradigms for reconstructing and managing waterworks, bridges, power grids, sewers, landfills, rail systems, ports and dams.

Braun, Ricardo. 2010. Social Participation and Climate Change. *Environment, Development, and Sustainability.* 12(5): 777-806.

This study investigates if climate change mitigation strategies have been integrated into the social participation process, and describes positive examples of climate change mitigation actions in different parts of the world that have successfully involved local people in "carbon neutral" or "social-carbon" projects and proposed

the creation of a carbon-neutral committee that would be responsible for coordinating climate change mitigation measures within development proposals such as the ones analyzed in this study.

Dixon, M. 2009. Climate Change, Politics, and the Civil Engineering Profession. *Proceedings of the Institution of Civil Engineers- Municipal Engineer.* 162(4): 207-210.
In order for the world to adapt to the current challenges presented by climate change, governments worldwide must make use of the special knowledge held by civil engineers to provide technical expertise and help politicians produce effective policies.

Corner, Adam and Nick Pidgeon. 2010. Geoengineering the climate: The social and ethical implications*.* *Environment*. 52(1): 24-37.
This article discusses the social and ethical implications of geoengineering the climate. The authors argue that despite the increasing attention of mitigating dangerous climate change by reducing the amount of greenhouse gas emissions, anthrogenetic influence on the climate will become increasingly severe. An over view of the proposed approaches to geoengineering, including carbon dioxide removal techniques and solar radiation management techniques, and the impacts of intentional manipulation of the global climate are presented.

FitzPatrick, W.J. 2007. Climate Change and the Rights of Future Generations: Social Justice Beyond Mutual Advantage. *Environmental Ethics.* 29(4): 369-388.
The author discusses the moral responsibilities that current generations have to future generations, and how arguing for protecting the rights of future generations is an effective answer to political arguments against taking mandatory measures to curb greenhouse gas emissions when these are unpopular with a democratic populace.

Hall, Jim and Nick Pidgeon. 2010. A Systems View of Climate Change. *Civil Engineering & Environmental Systems.* 27(3): 243-253.
Engineers have an essential role in responding to climate change, along with many other disciplines in environmental science, economics, social sciences and politics. This article discusses a number of distinctive systems characteristics of climate change from an engineering perspective, and how the relate to issues of spatial and temporal scale, uncertainty and interdisciplinarity.

Hyams, Keith. 2009. A Just Response to Climate Change: Personal Carbon Allowances and the Normal-Functioning Approach. *Journal of Social Philosophy.* 40(2): 237-256.
One of the normative aspects of climate change that has received little attention from philosophers is the proposal that states reduce their green-house emissions by issuing “personal carbon allowances” (PCAs) to each of their citizens. According to this proposal, citizens would be required to surrender PCAs in order to engage in various greenhouse gas emitting activities. This article discusses a potential system of this kind, and discusses the various benefits and drawbacks of this system, as well as its wider ethical ramifications.

Imnan, Mason. 2011. Working with Water. *Nature Climate Change*. Published online 6 April 2011. Doi : 10.1038/climate.2010.28.
Nations threatened by sea level rise are looking to engineers for help. In the Netherlands and elsewhere, engineers are working with a concept called “ecological engineering” which encompasses a variety of approaches for working with nature rather than confronting nature’s forces head on.

Irwin, Ruth. 2010. *Climate Change and Philosophy: Transformative Possibilities.* London: Consortium International Publishing Group.
This collection of ten essays explores the important contribution philosophical inquiry can make to contemporary debates having to do with climate change and the global environment. The authors propose ways of beginning the important task of rethinking the relationship between humanity and the natural environment, and looks at how basic philosophical principles can help inform how we should be begin to address the environmental crisis facing us today, including climate change in the context of social justice, education, and the uses of technology to solve these pressing issues.

Jamieson, Dale. 2010. Climate Change, Responsibility, and Justice. *Science and Engineering Ethics.* 16(3): 431-445.
In order to see anthropogenic climate change as clearly involving moral wrongs and global injustices, we will have to revise some central concepts in these domains. Moreover, climate change threatens the value of “respect for nature” that cannot easily be taken up by concerns of global justice or moral responsibility.

Kirshen, Paul, Kelly Knee, Mathias Ruth. 2008. Climate Change and Coastal Flooding in Metro Boston: Impacts and adaptation Strategies. *Climatic*

Change. **90(4): 453-473.**
Sea level rise associated with climate change will increase the storm search height along the 825 km of Metra Boston. To deal with rising sea levels, the authors discuss various strategies that should be adopted to help protect both highly populated, developed areas, and less developed areas of the coastline.

Means, III, Edward G., Maryline C. Langier, Jennifer A. Daw and Douglas M. Owen. 2010. Impacts of Climate Change on Infrastructure Planning and Design: Past Practices and Future Needs. ***Journal/American Water Works Association.*** **102(6): 56-65.**
Discusses how climate change is likely to affect the planning, design and operations of the water utility infrastructure. As the impact of climate change is likely to increase uncertainties about water resources, the authors describe a framework to devaluating the effects of climate change and what options are available to reduce identified risks.

Morton, Thomas A., Pamela Bretschneider, David Coley and Tristan Kershaw. 2011. Building a Better Future: An exploration of beliefs about climate change and perceived need for adaptation within the building industry. ***Building and Environment*** **46(5): 1151-1158.**
This article reports the results of a survey within a larger engineering firm about the adequacy of current climate-related actions within the industry and the perceived need for new practices. The researchers found that participants in the survey perceived climate change to be an important issue, current practices to be inadequate, and thought that new ways of addressing change was needed. The article talks about the survey results in detail, and the implications of these patterns for innovation around climate change within the building industry.

National Research Council, Board on Atmospheric Science and Climate Division on Earth and Life Studies. 2010. ***Informing an Effective Response to Climate Change.*** **Washington D.C.: National Academies Press.**
This volume from the America's Climate Choices series describes and assesses different activities, products, strategies and tools for informing decision makers about climate change and helping them plan and execute effective, integrated responses.

Ockwell, David, Lorraine Whitmarsh and Saffron O'Neill. 2009. Reorienting Climate Change Communication for Effective Mitigation: Forcing People to

be Green or Fostering Grass-Roots Engagement? *Science Communication* 30(3): 305-327.
The article analyzes how communications about climate change could possibly be effective in getting people to accept regulation that forces green behavior, and also to stimulate grass-roots action through affective and rational engagement with climate change.

Pidgeon, Nick and Baruch Fischoff. 2011. The Role of Social and Decision Sciences in Communicating Uncertain Climate Risks. *Nature Climate Change.* 1: 35-41.
A major role of climate scientists and engineers is explaining to non-specialists the risks and uncertainties surrounding potential climate changes over the coming years, decades and centuries. This article identifies the communications science that is needed to meet this challenge and the ambitious interdisciplinary initiative that its effective application to climate science requires.

Pielke, Roger. 2014. The Rightful Place of Science: Disasters and Climate Change. *Consortium for Science, Policy & Outcomes*.
In recent years the media, politicians, and activists have popularized the notion that climate change has made disasters worse. But what does the science actually say? Roger Pielke, Jr. takes a close look at the work of the Intergovernmental Panel on Climate Change, the underlying scientific research, and the data to give you the latest science on disasters and climate change. What he finds may surprise you and raise questions about the role of science in political debates.

Ralston, Shane. 2009. Engineering an Artful and Ethical Solution to the Problem of Global Warming. *Review of Policy Research.* 6:821-837.
This article reviews various proposed projects in the field of geoengineering as a way to reverse the global warming trend, and argues that geoengineering should not be so easily dismissed in policy debates concerning how to mitigate the antropogenic emissions of greenhouse gasses. The author investigates the desirability of the geoengineering options to address global climate change in terms of its capacity to overcome collective action issues, to accommodate ethical norms, and to provide a creative solution to the problem. After exploring six ethical quandaries that are raised in global climate changed debates and how they ameliorate or resolve the problem, he then concludes that a fundamental shift in perspective must occur if we are to take intentional climate change as a possible, if second best, tool in the environmentalist’s tool kit.

Savard, Jean-Piere and Alain Bourque. 2010. Adapting Coastal Zones to Climate Change: From consultation to action. *European Journal of Environmental and Civil Engineering.* 14(2): 219-232.
Describes a three-year project in Quebec that focused on facilitating the adaptation process of coastal communities to climate change. The project team addressed this issue through an interdisciplinary approach and a participative method that promoted the transfer of scientific information and research of consensus. The participative process was designed to facilitate the transfer of socio economic, environmental, technical and scientific information to policy makers. The benefits of this type of approach include the inserting of the science of climate and coastal dynamics into the decision process at regional and national levels, improving communications between stakeholders, and accelerating the implementation of adaptation solutions.

Schneider, Stephen H. 2006. Climate Change: Do we know enough for policy action? *Science and Engineering Ethics.* 12(4): 607-636.
The author discusses how the climate change problem must be thought of in terms of risk, not certainty, and how it should be thought of in terms of a risk management problem. He calls upon scientists to look at possible outcomes and the probability of these outcomes coming to pass, and for policymakers to use this information to make value judgments about what is safe, what is dangerous, what is fair. He argues that the climate debate needs to be reframed away from absolute costs--or benefits--into relative delay times to achieve specific caps or to avoid crossing specific agreed "dangerous" climate change thresholds.

Schwartz, Henry G. Jr. 2010. Adaptation to the Impacts of Climate Change on Transportation. *The Bridge* 40(3): 5-13.
Discusses the impact climate change is likely to have on the world’s transport system, and how the need for adaptive response will become even more important as we begin to identify where the vulnerabilities lie in this system. Thought this article focuses on transportation, many of the concerns raised will also affect other infrastructure segments, such as power generation and transmission facilities and water and wastewater distribution and treatment systems.

Thorne, O.M. and R.A. Fenner. 2008. Modeling the Impacts of Climate Change on a Water Treatment Plant in South Australia. *Water Science And Technology: Water Supply.* 8(3): 305-312.
The authors use the simplified climate change impact assessment tool they

developed to help translate climate change projects into “real world” impacts to assess the impacts of climate change on the reservoir water quality and water treatment operations at Myponga, South Australia. The aim is to provide engineers and water plant operators with knowledge of the potential impacts and associated probabilities of occurrence related to climate change, enabling them to make informed, risk-based adaptation and planning decisions.

Steenberg, Raphael D.J.M., Chris P.W. Geurts, and Carine A. Van Bentum. 2009. Climate Change and its Impact on Structural Safety. *Heron.* 54(1): 3-36.

Extreme climatic events leads to loads on buildings and civil engineering works. Changes to climate will have an effect on the design loads. This paper presents an investigation into the relevance of climate change scenarios with respect to the loads on buildings by wind, precipitation, and temperature. Possible consequences to building codes are illustrated.

Tompkins, Emma L. et al. 2010. Observed Adaptation to Climate Change: UK evidence of transition to a well-adapting society. *Global Environmental Change.* 20(4): 627-635.

This article reports on a research project looking at whether and to what extent a wide range of actors in the UK are adapting to climate change and whether this is evidence of a social transition. The researchers found that while little was being done at the local government level, sectors requiring significant investment in large scale infrastructure have invested more heavily than those who are not dependent on large scale infrastructure in identifying potential impacts and adaptations.

Upadhyaya, J. E.K. L. Tam, and N. Biswas. 2010. Process, Resource, People and Change (PRPC) Approach to City Infrastructure and Sustainability in the Context of Climate Change. *Proceedings of the Canadian Society for Civil Engineering Annual Conference.* June 9-12 2010. Vol. 1 p. 287-296.

Provides a general understanding of the various approaches to city sustainability and weather and how the approach described in this paper is useful when dealing with climate change. The authors describe a process based approach for assessing infrastructure sustainability that in allows cities to factor resource usage reduction, climate change adaptation and peoples’ health and wellbeing in infrastructure related decision making.

Yohe, Gary. 2010. Risk Assessment and Risk Management for Infrastructure Planning and Assessment. *The Bridge* 40(3): 14-21.
This article discusses some critical definitions and fundamental insights about applying the risk-management paradigm to climate adaptation and mitigation, and gives a brief description about how Boston and New York are including climate change in their planning processes to protect both public and private infrastructure.

Zeng, Ning, Yihui Ding, Jiahua Pan, Huijun Wang, Jay Gregg. 2008. Climate Change: The Chinese Challenge. *Science Magazine. 319(5864):* 730-731.
Authors outline how China is likely to be impacted by climate change and potential ways in which the country can seek to mitigate these impacts by investing in their infrastructure, favoring long-term energy saving solutions. The authors discuss how government policies could help motivate investment in energy-saving technologies for urban and rural areas, and discusses recent activities on climate change undertaken by the Chinese government.

Back to top

Education

Burandt, Simon and Matthias Barth. 2010. Learning Settings to Face Climate Change. *Journal of Cleaner Production.* 18(7): 659-665.
To prepare students to face the challenges connected to climate change, the authors present an educational approach called the Education for Sustainable Development that seeks to help students go beyond just reacting to events, and instead helps them consider the need for intensive mitigation as well as adaption to climate change at the same time. The authors describe two learning settings that employ adapted sustainability science approaches: the syndrome approach and scenario analysis, and discuss how these approaches can help foster the acquisition of the two competencies described above.

Desha, Cheryl and Karlson Hargroves. 2010. Surveying the State of Higher Education in Energy Efficiency, in Australian Engineering Curriculum. *Journal of Cleaner Production.* 18(7): 652-658.
This paper presents the method and results of a survey of 27 Australian Engineering Schools undertaken in 2007 to ascertain the extent of energy efficiency education,

and to identify preferred methods to increase the extent to which energy efficiency is embedded in engineering curriculum.

Gordon, M., and M. Shahiedepour. A Living Laboratory: Smart grid education & workforce training at IIT. *IEEE Power & Energy Magazine.* 9(1): 18-28.
In order to help solve high energy costs and address the problem of climate change, the Illinois Institute of Technology has used federal stimulus funds to develop the IIT Smart Grid Education and Workforce Training Center which will bring university students, K-12 students, educators, and the utilities together in a collaborative initiative to train a strong workforce to meet global challenges in the smart grid, energy independence, clean environment, and sustainable energy.

Holmberg, J., M. Svanstrom, D. J. Peet, K. Mulder, D. Ferrer-Balas, and J. Segalas. 2008. Embedding sustainability in higher education through interaction with lecturers: Case studies from three European technical universities. *European Journal of Engineering Education*. 33(3): 271–282.
DOI 10.1080/03043790802088491
In this paper, three universities compare their work on the integration of sustainable development into their educational programmes. The purpose is to show examples of how this can be done and to illustrate important generalised success factors.

Jennings, Phillip. 2009. New Directions in Renewable Energy Education. *Renewable Energy: An International Journal.* 34(2): 435-439.
Discusses the growing demand for renewable energy specialists in industry, and discusses several new approaches that have arisen in the field of renewable energy education that seek to address the needs of the 21st century for sustainable energy supply systems.

Shen, Hayley and Hung Tao Shen. 2005. Teaching Climate Change Impact on Cold Regions to Multidisciplinary Graduate Students. *World Water Congress 2005: Impacts of Global Climate Change – Proceedings of the 2005 World Water and Environmental Resources Congress. May 15-19, 2005.* P. 261.
As climate change is likely to be felt most acutely in cold regions, affecting plant growth, river navigation and permafrost stability, Clarkson University is offering a multidisciplinary junior level course where students completed group projects all centered on the general theme of climate change impact in cold regions. The paper

summarizes the problems the students explored and the depth of knowledge the students took away with them about how climate change is likely to affect many engineered systems and aspects of life in societies in colder regions of the world.

Wiedenhoeft, Ronald. Ecology and Engineering: Changing Paradigms. 1999. *Journal of Engineering Education.* 88(1): 15-18.
Describes a new core course added to the engineering curriculum at the Colorado School of Mines in which the liberal arts department has joined with the engineering faculty to teach students how to question the sustainability of current patterns of production and consumption and to consider what practices need to be changed. The paper considers principles leading to courses intended to foster new ecological paradigms among engineers.

Back to top

Notes

Last updated by S. Raghavan, January, 2012.

Rights

Use of Materials on the OEC

Resource Type

Bibliography

Parent Collection

Climate Change, Engineered Systems and Society

Topics

Climate Change
Controversies
Sustainability

Discipline(s)

Engineering