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CLIMATE AND DEVELOPMENT RESEARCH REVIEW

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Comparing climate strategies: economic optimization versus equitable burden-sharing

Ackerman F, Bueno R, Kartha S, and Kemp-Benedict, E. 2011
Working Paper WP-US-1104.
Stockholm: Stockholm Environment Institute
http://sei-us.org/Publications_PDF/SEI-WorkingPaperUS-1104.pdf

Review

There is much agreement that climate change is a global crisis, however the impacts are disproportionately distributed, with poor developing countries being disadvantaged. The problem is aggravated by uneven capacity to deal with the problem. This problem of global externality has been the underlying reason for the stalemate in climate negotiations—most importantly on the issue of burden sharing or sharing of the costs of climate action. Questions of efficiency and equity are central to the distribution of costs. This paper points out this issue has been debated from two different perspectives. First, from the realm of international negotiations—proposals often begin with principles of equity and Common but Differentiated Responsibility (CBDR) to advocate its use to allocate costs. Second, from economic modelling, using frameworks in which the optimization criteria are focussed on economic efficiency. However, the ultimate resulting scenario for each approach is necessarily the same. This paper highlights that both approaches seek large transfers from the developed countries to the developing countries. Therefore, the paper strongly substantiates the provisions of the United Nations Framework Convention on Climate Change (UNFCCC), which asks developed countries to take the lead and provide financial resources to developing countries for climate action.

Keywords
Economic optimization, burden sharing, equitable, UNFCCC, Greenhouse Development Rights, CRED model, developing countries, financial resources

In brief

This paper describes an important issue in climate negotiations–that of sharing the global cost of climate action. The paper recognises that this question has been answered from at least two different perspectives: from the realm of international negotiations (principles of equity), and from economic modelling (optimization criteria and economic efficiency). On analyzing the two approaches using the results from the adjusted Climate and Regional Economics of Development (CRED) model, and the Greenhouse Development Rights (GDRs) framework, the paper finds that both GDRs or CRED assume equitable resource distribution leads to better climate outcomes, and that economic growth and climate stabilization are only rival objectives in the politics of high-income countries, not in the world as a whole. Largely, this result is a reflection of the fact that both approaches imply large transfers from developed countries to developing countries. While in the GDRs approach, these transfers are justified by the fact that the majority of the world's capacity and responsibility reside in the developed countries, in the CRED approach, these transfers are justified by a straightforward implementation of the notion of declining marginal utility of income. Thus, the authors conclude that it is more efficient (in the case of CRED) and more equitable (in the case of GDRs), for much of the mitigation that is needed in the developing countries to be financed by the developed countries.

Painting the world REDD: addressing

scientific barriers to monitoring emissions from tropical forests

Asner G., 2011
Environmental Research Letters, **6**(2), *p. 021002*
http://iopscience.iop.org/1748-9326/6/2/021002

Review

Climate talks in Copenhagen and Cancun made much progress in the case of the REDD+ mechanism (Reducing Emissions from Deforestation and Forest Degradation, plus sustainable management of forests, conservation of forest carbon stocks and enhancement of carbon stocks). However, one key stumbling block had been to design a system for Monitoring, Reporting, and Verifying (MRV) emission reductions for REDD+. Current barriers to measuring emissions from forest carbon stocks range from technical to scientific and from institutional to operational. The author in his article provides a review of some of the successful examples across the world, elements of which could form the basis of a future MRV system in the future REDD+ mechanism. Some of the elements include: use of carbon accounting models, availability of, and access to high quality observational data in a cost effective manner and at regular time intervals. At the institutional level the author argues that the MRV challenge could be addressed faster at the subnational level as in many developing countries, states/provinces are often responsible for implementing forest policies and programmes.

Keywords
REDD, tropical forests, emissions, monitoring, MRV, uncertainties, barriers

In brief

This paper discusses the monitoring of emissions from the REDD+ mechanism, stating that it can achieve both operational status and high accuracy only through innovation. It reviews approaches from across the world that could bring some learning to the international regime in designing the MRV mechanism for REDD+. The author looks at a few studies on national monitoring of forest carbon stocks and emissions, and identifies barriers that range from technical to scientific and from institutional to operational. In the discussion in this paper the author argues that while an innovative, but one-time or infrequent, mapping of forest cover or carbon stocks has been the most common scientific contribution to REDD+, it alone does not constitute an operational monitoring mechanism. Achieving both operational status and high accuracy requires innovation, such as a portfolio of techniques and products as in carbon accounting models developed in Australia's National Carbon Accounting System, which can meet the REDD+ challenge if the observational data is of high quality, high resolution, and synoptic in geographic scale. Important for REDD+ monitoring is the ability to use the latest satellite and aircraft technology on a cost-effective and repeated basis; for example, the Carnegie Institution's CLASlite system, routinely tracks deforestation and degradation. Data accessibility is also critically important, and a few countries, such as Brazil and the United States, are leading the way by providing satellite imagery.

Resolving the adaptation paradox: exploring the potential for deliberative adaptation policy-making in Bangladesh

Ayers J. 2011
Global Environmental Politics, **11**(1), pp.62-88
http://www.mitpressjournals.org/doi/pdf/10.1162/GLEP_a_00043

Review

The paper presents the fact, that though climate change is a global risk, processes shaping the vulnerability towards it are highly localized as a paradox for adaptation plans. More interestingly, how this paradox unfolds in an actual planning process in a Least Developed Country (LDC) like Bangladesh is captured by the paper. A comparison is made between the climate change risks and corresponding adaptation strategies cited in the National Adaptation Programme for Action (NAPA) coastal afforestation project document of Bangladesh and the risks and adaptation priorities that emerged through fieldwork revealed crucial discrepancies. This was attributed to the influence of varying issues of vulnerability and development rather than direct impacts in framings of risk among diverse groups in communities. The paper then analyzes why these varying issues are not reflected in the consultative process of NAPA due to the overarching influence of the impacts-driven framework in climate change issues and hence ending up as largely an expert-driven process. This paper evaluates the NAPA process in Bangladesh and recommends the inclusion of existing local institutions of governance into the planning process for appropriate and acceptable design of the adaptation strategies.

Keywords
NAPA, adaptation paradox, Bangladesh, climate-change, consultations, stakeholders, inclusive, adaptation planning

In brief

The paper infers that climate change adaptation planning is yet to become inclusive. It analyzes the structure and process of Bangladesh's National Adaptation Programme for Action (NAPA), and compares it with the risk perceptions and adaptation priorities on the ground. The study further reveals inconsistencies in the approach and practice of the NAPA planning process. Though, in principle it follows a bottom-up approach, in practice the planning process showed ignorance of the element of power in participation by inviting stakeholders, generally not elected to government extension offices, showed signs of instrumentalism in the design of stakeholder workshops by presenting pre-defined climate-change risks along with adaptation options, and showed signs of being expert driven by introducing a voting system for prioritization of options and inviting an excessive number of experts to the consultations. Thus, the paper identifies the mismatches between the cited risks and options in the plan and explains the reasons for these by analyzing the planning process. The author recommends the integration of existing local institutions to make the process deliberative and the plans more inclusive.

Education responses to climate change and quality: Two parts of the same agenda?

Bangay C and Blum N. 2010
International Journal of Educational Development, **30** (4), pp.359-368 http://www.sciencedirect.com/science/article/pii S0738059309001540

Review

Issues related to environmental degradation and climate change are to a great extent driven by society-driven unsustainable developmental activities. Much of the research on education and environment issues (including climate change), has centred around the impacts of these issues on the supply and demand of education services. The education sector has proved to be instrumental in generating transformational changes in child and maternal health and holds an immense potential in creating enabling environments for innovation and capacity building. However, the links between education, and responses required to address climate change are very poorly tapped. Article 6 of the UNFCCC also encourages countries to consider education, training, and public awareness as being integral to any response to climate change. Furthermore, the international donor community lays a major emphasis on capacity building, training, and transfer of knowledge in both developed and developing countries for the majority of adaptation and mitigation strategies. Additionally, the paper delineates short-term strategies that can involve climate proofing education infrastructure from long-term strategies that focus on building education systems that are targeted at the training of teachers and learners with the required skills, knowledge, and qualities to deal with environmental challenges. This paper is important as it identifies education as a critical element to be integrated into the broader quality and relevance of education debates rather than being seen as additional.

Keywords
Education, climate change, sustainable development, quality, climate-proofing, education infrastructure, knowledge

In brief

This paper draws attention to the fact that the education sector provides an opportunity to equip communities with the skills and awareness required to effectively respond to the challenges of climate change. This would require the engagement of individuals across all age-groups through formal and informal modes of education. The paper emphasizes the role of education, specifically content and quality, to create a generation of sensitized individuals, and prepare them to deal with uncertainty and potentially radical futures. Additionally, the paper cautions that considering any education related to the environment or sustainable development simply as an 'alternative' or 'separate' stream from conventional education can propagate wrong or incomplete understanding of critical issues, such as climate change. The paper argues that effective tapping of the education sector is essential to build a generation that is better equipped to contribute towards adaptation and mitigation, and prepared to deal with uncertainty and plausibly a drastically altered future. Apart from climate proofing educational infrastructure to avoid impacts of climate change, there is a need to re-orient education through strengthening knowledge on issues related to climate change and environmental problems.

Maladaptation

Barnett J and O'Neill S. 2010
Global Environmental Change, **20**(2), pp.211-213
http://www.sciencedirect.com/science/article/pii/S0959378009000995

Review

A large body of literature has emerged in recent years to define successful adaptation, which indicates that adaptation can be unsuccessful too. Additionally, adaptation being context specific, the same adaptation activity might not work or reach its end objective, in any place and situation. While some adaptation activities do not reach their target objective, there are others that might actually enhance the risk in the long run rather than decrease it. Many studies have warned against an over-simplification of the concept of maladaptation, as this can lead to the dubious classification of normal coping strategies also as being maladaptive. Using the specific example of Melbourne city, where two schemes were launched in 2007 to deal with water stress conditions in the city, this paper presents how these strategies eventually ended up being maladaptive, as gauged against five specific criteria. Hence, this paper is critical because by highlighting the five types of maladaptation, it provides guidance for setting criteria for monitoring and evaluation the effectiveness of adaptation activities and prevents potential negative spin-offs. These five criteria can be used to screen adaptation decisions for possible adverse effects. Additionally, each of these can trigger the need to review adaptation activities before committing resources. This holds true for major structural investments that are being undertaken under adaptation in any country, especially in cases where the socio-economic and environmental base is being compromised, eroded, or altered.

Keywords
Maladaptation, climate-change, Australia, water management, vulnerability, risks

In brief

This paper defines and explains five key dimensions of maladaptation, which it refers to as "the problem of increasing risks from adaptation activities". The paper highlights that as adaptation activities are complex and difficult to deploy, they might often run the risk of not achieving their intended objectives, and also result in negative spin-off effects that might instead increase vulnerability in the long run. The paper defines maladaptation as "action taken ostensibly to avoid or reduce vulnerability to climate change that impacts adversely on, or increases the vulnerability of, other systems, sectors, or social groups". This paper puts forth five different types of pathways that can result in maladaptation, that are explained with the specific case example of water management in Melbourne city, Australia. The five dimensions are: pathways that can increase the emissions of greenhouse gases, those that can increase the vulnerability of people that are at high risk already, those that have high socio-economic and environmental costs as compared to alternative options, options that reduce incentives to adapt, and practices that exhibit path dependency, thus being less flexible to change.

An energy policy approach to climate change

Bazilian M, Outhred H and Miller A. 2010
Energy for Sustainable Development, **14**(4), pp.253-255
http://www.sciencedirect.com/science/article/pii/S0973082610000384

Review

The positioning of climate change as an environmental or developmental issue and not as an integrated energy, transport, or land-use issue impedes the prospects of incentivising and delivering energy and sector-specific policies essential for addressing the problem. This paper takes a fresh look at the climate change debate and proposes a new positive approach to it by way of choosing a `low-carbon economy' pathway rather than a pure environmental one. The main value of this paper is in terms of bringing the dimensions related to low-carbon energy pathways to the forefront of the climate change debate and defining their clear contribution to the climate change mitigation roadmap. This paper has the potential to mobilize changes in the design and delivery of climate compatible development policies and practices because it puts forward the case for changing the focus of policy formulation to a low-carbon economy from a broad, climate change-centric one. The recommendations of this paper would be useful in policy agenda setting as the paper suggests a paradigm shift from the currently practiced climate change policy framework with respect to mitigation activities in the energy sector.

Keywords
Climate change, energy policy, climate negotiations, low-carbon economy

In brief

This paper analyzes the opportunities for a policy approach towards a low-carbon economy scenario arising out of the COP 15 negotiations and the significance of energy-related aspects in the Copenhagen Accord as a blue print for strengthening climate mitigation efforts. It advocates the development of integrated policy frameworks for each of the dominant sectors of the economy of a country in a bid to mobilize a movement towards a low-carbon trajectory while addressing climate change concerns in the process. In the case of the energy sector, mitigation actions could actually be initiated through an integrated energy policy dealing with the delivery of energy-related services. The paper argues that while emission reduction targets hold their merit, these aspirations can be realised only if integrated into specific sectoral policies in the energy sector. The major recommendation of the paper is that addressing energy-related issues relevant to mitigation under the aegis of energy policy frameworks can be a better and positive way towards achieving a low-carbon economy, rather than forming separate policies with the main objective of reducing emissions. Concerning the role of international institutions in the climate change discussions, it suggests a re-organization of the UN process to improve and ensure sustainability of the delivery of services related to energy-related sectors.

Strengthening clean energy cooperation under the UNFCCC: steps towards implementation

Benioff R, de Coninck H, Dhar S, Hansen U, McLaren J and Painuly J, 2010
NREL Report/TP-6A0-48596. Golden, Colorado: National Renewable Energy Laboratory
http://www.nrel.gov/docs/fy10osti/48596.pdf

Review

Given that the Copenhagen Accord did not lay out a clear message on emissions targets for any private or country action, clean energy advancement to a major extent had be based on bottom-up, national and technology specific policies. It is thus important to assess where clean energy stands with respect to research and development, national and international policies and legal frameworks, including intellectual property rights and financing strategies. The paper is useful as it focusses on practical solutions geared towards strengthening policies in three major areas influencing the development of clean energy technology by countries and international organizations in the transition towards clean energy. These are bilateral and multilateral partnerships for research and development (R&D), up scaling of technological cooperation, and financing. The avenues for cooperation presented for the transition towards clean energy include not only those within the UNFCCC framework, but also within the present national, bilateral, and multilateral frameworks. The paper provides specific options for scaling up global cooperation on clean energy technology through R&D, legal, policy, and financial frameworks. This paper can be an important tool for policy makers and practitioners to not only understand the nuances of clean energy, but also design and deliver on various dimensions related to clean technology.

Keywords
Clean energy, UNFCCC, emission targets, clean energy, enabling environment, legal frameworks

In brief

This paper offers different transition mechanisms towards clean energy within and outside the UNFCCC, under research and development (R&D), enabling environments of policy and legal frameworks, and financing strategies. The paper presents the current implementation measures for clean energy technologies under the UNFCCC, that include technology needs assessments of developing countries, spread of technology information, capacity building, and enabling environment programmes to facilitate the adoption of and investment in climate technologies and opportunities for transfer of technology. An overview of selected international clean energy technology programmes is also provided. These mechanisms are likely to be most effective if they build on national priorities, buttress developing country capacities and enabling environments, encompass a comprehensive approach spread over a longer action period, build sustainable public private partnerships, foster cross-country cooperation, promote knowledge sharing and learning and garner international support. Under R&D, the paper discusses the role of networks and road mapping, multilateral collaboration and technology demonstration partnerships, the role of national policies, international cooperation on sectoral deployment programmes and Intellectual Property Rights in an enabling environment and the role of investment matchmaking and advisory services, coordination of existing funds and investment risk mitigation under financing.

Beyond the intergovernmental regime: recent trends in global carbon governance

Biermann F., 2010
Current Opinion in Environmental Sustainability, **2** (4), 284-288
http://www.sciencedirect.com/science/article/pii/S1877343510000345

Review

The paper highlights the fact that global carbon governance is marked by high uncertainties, high degrees of functional, spatial, and temporal interdependencies, and the high stakes for the various actors. The paper argues that the uncertainties and complexities in the international climate regime have given rise to policy innovations with a stronger role for non-state actors, the emergence of new mechanisms, such as transnational regimes, public private partnerships, and market mechanisms resulting in fragmentation of the policy system with multiple spheres of authority that requires new types of interplay management. The paper also discusses the emerging trends from stalemates in intergovernmental negotiations and categorizes the new approaches in three broad clusters of innovation—the emerging role of actors beyond the nation state; the emerging governance mechanisms beyond the intergovernmental regime and the increasing fragmentation of the overall governance architecture both vertically between supranational, international, national, and subnational layers of authority (multilevel governance) and horizontally between different parallel rule-making systems. By highlighting the trends in the intergovernmental regime in global carbon governance, this paper makes an important contribution, as this understanding is important for influencing rule-making across various levels.

Keywords
Carbon governance, intergovernmental regime, negotiations, multilevel governance, institutions, post -2012

In brief

This paper highlights emerging trends within the intergovernmental regime with respect to global carbon governance. The paper defines 'carbon governance' as the set of rules, policies, mechanisms, and institutions developed to manage and mitigate climate change, and the process of the development of rules and rule-making systems to coordinate national responses to climate change. While it is difficult to conclude if the increase in multilevel and multipolar fragmentation will help advance climate negotiations, it is highly likely that the emergence of multipolar governance incorporates inclusiveness and legitimacy in rule-making. However, multilevel governance may raise the potential for both conflicts and synergies between different levels. The key to designing new institutions and modes of governance for a post-2012 climate regime, therefore, is this space for new ideas and innovations. Their relevance will only increase, given the current state of play in climate negotiations.

Framing climate vulnerability and adaptation at multiple levels: addressing climate risks or institutional barriers in Lesotho?

Bisaro A, Wolf S and Hinkel J, 2010
Climate and Development, **2**(2), pp.161-175
http://www.ingentaconnect.com/content/earthscan/cdev/2010/00000002/00000002/art00006

Review

There has been literature on how different frameworks for assessments of vulnerability have evolved with different decision-making priorities. But how different framings actually influence decision-making processes for adaptation actions is still a grey area. This paper tries to fill this gap by giving three examples of how project formulations in Lesotho draw upon two different discourses to strategize actions for resource management and adaptation. The paper gives a brief history of the framing of climate change impact, adaptation, and vulnerability studies by citing the influences of evolving concepts, development priorities, and uncertainty paradigms over the process. It then categorizes frameworks into two distinct discourses of adaptation, decision-centric and institution-centric, with the former basing its justifications for action on the basis of studies driven by climate change impact scenarios while the latter leans more towards situation analysis of a context and finding governance deficits to recommend for the enhancement of institutional capacity. Then the paper unfolds the influence of the discourses in projects related to wetland conservation and climate adaptation action plans in Lesotho. This analysis raises issues of lack of awareness in climate change issues, lack of understanding of linkages between knowledge creation and policy-making, and also the need to match analytical methods to context to take strategic actions for adaptation.

Keywords
Vulnerability, adaptation, Lesotho, climate risks, institutions, capacities, discourse, decision-making

In brief

The paper analyzes how projects in climate change adaptation are drawn from different conceptual frameworks that are influenced by international discourses. By reviewing the evolution of conceptual frameworks for analyzing vulnerability and describing the influence of development and uncertainty in the framing of such studies, the paper provides evidence from three different initiatives taken in the southern African country of Lesotho to demonstrate that projects can either be 'decision-centric' — using climate change impact assessments as the basis of strategizing adaptation action—or 'institution-centric', which use stakeholder consultations and indicator-based surveys for understanding issues of resource use and access for governance recommendations. The paper point out that lack of awareness about climate change issues in Lesotho has led to a continuation of an expert-driven planning process, rather than making it a more participatory process. It points out that a decision-centric approach may be limiting in terms of practice and hence recommends matching methods to context rather than working in a top-down approach with a rigid structure.

Financing the response to climate change

Brendenkamp H and Pattilo C. 2010
IMF Staff Position Note SPN10/06. Washington,
DC: International Monetary Fund
http://www.economicswebinstitute.org/essays/imf-greenfund.pdf

Review

Effective climate change action may require considerable resource mobilization in the short to long-term. For large-scale resource mobilization the financing needs will also be massive. Although the fast-start finance is a good start, by 2020 large-scale policy action will be required. The $100 billion fund for this was accepted in both the COPs prior to Durban. Though there is an ad-hoc committee on finance that has worked out possible solutions to bring in a financial mechanism to infuse $100 billion per annum in climate action, this position paper by the International Monetary Fund (IMF) proposes new alternative mechanisms to achieve the $100 billion target. It does talk about Special Drawing Rights (SDRs), the global capital markets, and equity finance as well, given that equity and the private sector will have the best tools to manage risk efficiently and thereby promote more efficient climate change action. This paper adds to better understanding of the nature of finance vis-à-vis climate action and the scale of policy support that may be required. The paper suggests a 'safe outcome' that will not depend on the uncertainties of international climate negotiations. A major contribution of the paper is that it brings to the fore a mechanism by which a large- scale annual fund focused towards climate change action can be mobilized.

Keywords

Green fund, $100 billion, Copenhagen Accord, Cancun agreement, International Monetary Fund, financial mechanism, global capital markets

In brief

This paper outlines a scheme for the financial mobilization of a 'Green Fund' with the capacity to raise resources on a scale proportionate with the Copenhagen Accord ($100 billion a year by 2020). This scale was again reiterated in the Cancun Agreement. The paper emphasizes that to achieve the scale required, the Green Fund may use an initial capital injection by developed countries in the form of reserve assets that can also include Special Drawing Rights (SDRs) to leverage resources from private and official investors by issuing low-cost bonds (named 'Green Bonds') in global capital markets. SDRs are an international reserve created by the IMF in 1969 to supplement the official reserves of its member countries. This paper also suggests a method of step-by-step scaling up of financing. The paper concludes by highlighting the role of political will and partnership by all participating countries for operationalization of the Green Fund. Additionally, it draws attention to the fact that the development of a Green Fund can potentially be a crucial step in facilitating consensus building for reduction of greenhouse gas emissions. Additionally, the Fund can expedite the scaling up of adaptation and mitigation action by developing countries.

Monitoring and tracking long-term finance to support climate action

Buchner B, Brown J and Corfee-Morlot J. 2011b
Paris: International Energy Agency and Organisation for Economic Co-operation and Development
http://www.oecd.org/dataoecd/57/57/48073739.pdf

Review

The Cancun Agreement called for improvements in the existing reporting requirements of climate finance, both with respect to the frequency and the coverage of reporting. A key issue to be resolved for any progress on reporting is a sound MRV system that is transparent, comparable, and comprehensive. It is important to assess countries' compliance with commitments and to facilitate the effective implementation of these commitments. Although the definitions of elements that constitute climate finance arguably do not have universal agreement, but this paper highlights the importance of defining these apparently simple terms, which have been open to interpretation in the current climate negotiations. Universal understanding on the definition of each term is further important to work out operational details of future mechanisms. The paper further discusses two 'straw man' proposals on expanded direct reporting by Parties and limited direct reporting by Parties. While the former builds on and emphasizes strengthening the existing system, the latter relies on reliable data management by existing sources outside the UNFCCC, including transnational non-state organisations. This paper highlights the relevant information that needs to be tracked in order to build a comprehensive MRV system for climate finance, proposing both improvements to current reporting and tracking systems and new reporting approaches for a more robust and inclusive MRV system.

Keywords
Long-term finance, climate action, Cancun agreement, MRV

In brief

This paper discusses critical information that needs to be monitored and regularly tracked in order to establish a broad system for Measuring, Reporting, and Verifying (MRV) climate finance. Improvements to current mechanisms of reporting and tracking as well as novel reporting approaches are suggested for a more comprehensive MRV system. This paper suggests that any comprehensive MRV system should work towards internationally acceptable definitions and approaches to quantify support, through a process of open discussion with specific intergovernmental organizations dealing with climate finance. The key recommendation of the paper is the use of information from other inter-governmental organizations in conjunction with existing reporting mechanisms under the UNFCCC in order to ensure that the MRV process is less cumbersome and does not replicate existing mechanisms. The paper suggests a multi-dimensional and dynamic framework for tracking climate finance. Lack of a standardization format for collection of data pertaining to climate finance impedes the process of defining both private and public financial flows for climate action. The paper strongly calls for an integrated framework to combine the information from a variety of information sources from the country Parties as well as reporting systems outside of the UNFCCC.

Policy misfits, climate change and cross-scale vulnerability in coastal Africa: how development projects undermine resilience

Bunce M, Brown K, and Rosendo S. 2010
Environmental Science and Policy, **13**(6), pp.485-497
http://www.sciencedirect.com/science/article/pii
S1462901110000663

Review

This study explores reasons why large-scale interventions that are intended for overall societal benefit eventually end up increasing local vulnerabilities, primarily because local vulnerabilities and longer-term climate change impacts are not integrated into their planning and implementation. This is partly an issue of scale resulting from the presence of multiple stressors and dynamics of change at different scales and the fact that national, regional, and local interests cannot be easily reconciled or integrated through existing institutions. A large body of literature has made a strong argument for adaptive governance. This paper is important because it goes deeper into the genesis and formulation of these policies and interventions in order to identify areas for change to ensure that they address complex vulnerabilities and dynamics of chance across scales. Though the concepts of adaptive governance and scale mismatch have been known for some time, this paper specifically uses examples of two regional interventions to point out that despite knowledge on climate change impacts, its proper integration into developmental policies is missing. Additionally, rigid governance mechanisms at the regional level can further undermine resilience at the local level, especially for issues of international importance, (such as trans-boundary water sharing) that face political pressures. This paper is important as it urges policy-makers to consider climate change, as being one of the many stressors affecting societies in developing and least developed countries, and thus building the case for integrated approaches. Using bottom-up methods to gauge local perceptions, this paper is able to articulate how policies and interventions at different scales interact with climatic and non-climatic stressors to generate new patterns of vulnerabilities at the community level.

Keywords
Policy, cross-scale vulnerability, bottom-up methods, adaptive governance, Mozambique, Tanzania, water management, marine protected area

In brief

The study is based on local perceptions and responses to multiple stressors at four case-study sites in coastal Tanzania and Mozambique. After identifying multiple stressors that affected these sites, cases where certain developmental policies themselves can emerge as stressors were identified. Policies that did not consider cross-scale dynamics of change did not correctly reflect local vulnerabilities and coping abilities. The same policies did not consider the existence of multiple stressors, specifically climate change and associated risks, and their impact; thus they did not fit the social ecological systems they intended to manage. The study found that poor communities in vulnerable locations already at risk from climate related stressors became more vulnerable as a result of large-scale interventions that aimed to bring benefits to society. The paper suggests fundamental shifts that should be propagated simultaneously in order to alter this error, including a move towards adaptive policy-making through processes that are flexible, integrated, inclusive, and able to work across scales; and by building adaptive capacity among the communities most vulnerable to change through investments in alternative livelihoods.

Promoting health and well-being by managing for social–ecological resilience: the potential of integrating ecohealth and water resources management approaches

Bunch MJ, Morrison KE, Parkes MW, and Venema HD, 2011
Ecology and Society, **16**(1), p.6
http://www.ecologyandsociety.org/vol16/iss1/art6/

Review

Over the years significant work has been produced to examine the cause-and-effect relationship between environmental exposures and health effects. However, critical gaps still prevail in the systemic understanding of the complex, reciprocal linkages that exist amongst ecosystems, society, and human health. The paper presents an in-depth discussion on how focussing on watersheds as a spatial setting for health promotion and sustainability can drive the view of 'health-water' linkages beyond conventional application (to drinking water and sanitation). This approach is more inclusive, focussing on linkages across livelihoods, land use, employment, food and service provision, culture, governance and equity, all of which are determinants of, or linked intrinsically to, human health and well-being. The authors present a view of watershed management as a 'double dividend' strategy, which helps to promote human health by addressing both its environmental and social dimensions. Though limitations are inherent, such approaches can help decision-makers to think and plan across disciplines and scales to address health objectives. The paper advocates adoption of a participative and multi-disciplinary management approach that can potentially prove significant while dealing with an issue as complex and multi-faceted as climate change.

Keywords
Social-ecological systems, resilience, human health, ecohealth, watershed, water resource management

In brief

The paper propagates a discussion that combines insights from the field of eco-health—which advocates human health and well-being as an important outcome of effective ecosystem management—with those from integrated watershed management—which promotes 'watersheds' as appropriate units for managing ecosystems. It presents this combination as a promising approach for understanding, exploring, and managing complex interactions between health, ecosystems, and society. The paper quotes multiple examples for elucidating three primary lessons for deriving health benefits from watershed management programmes; addressing poverty and inequality, building resilience, and using watersheds as a context for applying inter-sectoral management and policy tools. While the paper highlights the strong potential of social processes to fulfil both ecosystem management and public health promotion objectives, it acknowledges a number of associated challenges; such as jurisdiction, integration of multiple professional fields, spatial-temporal scales, and true stakeholder participation.

A new NAMA framework for dispersed energy end-use sectors

Cheng C. 2010
Energy Policy, **38**(10), pp.5614-5624
http://www.sciencedirect.com/science/article/pii/S0301421510003800

Review

The building sector and the industrial sector account for the largest share of energy consumption in developing countries. However, multiple barriers, such as the lack of technology and capacity, investments and supporting policy environment impede the translation of energy efficiency in dispersed energy end-use sectors into effective practice. The paper reaffirms that for an effective climate regime, specific country circumstances need to considered. It also points out that competitive concerns continue to overshadow the need for global cooperation. The climate negotiations have been considering new mechanisms, such as Nationally Appropriate Mitigation Actions (NAMAs), to enable mitigation in developing countries in the context of sustainable development through support in terms of finance, technology, and capacity building. The new NAMA framework described in this paper is designed to fulfil the demand for public policies and public sector investment in developing countries and thereby boost private sector investment through project-based market mechanisms, such as the Clean Development Mechanism (CDM). This framework is designed as a need-based mechanism that effectively considers the conditions of each developing country. The operational details in the paper are a timely input to the climate talks, as NAMA frameworks have the ability to facilitate a systematic uptake for greenhouse gas (GHG) emission reduction projects in developing countries.

Keywords
NAMA framework, energy end-use, emissions, developing countries, energy consumption, public and private sector investment, NAMA registry

In brief

The paper argues for a NAMA framework that can enable public policies and public sector investments in developing countries and ultimately boost private sector investments. This paper presents a new approach to utilize the huge emission reduction potential in dispersed energy end-use sectors (building and industrial sectors), in developing countries. It highlights three issues for operationalizing Nationally Appropriate Mitigation Actions (NAMAs), taking into account elements of the Bali Action Plan. This includes avoiding double counting, interfacing with Kyoto Protocol mechanisms, and leveraging sufficient private funding from public sector investment. This paper presents a new approach for a NAMA framework that can unlock the huge potential for greenhouse gas mitigation in dispersed energy end-use sectors in developing countries. The building sector is used as an example to demonstrate how NAMA measures can be registered and implemented. The described new NAMA framework has the ability to interface efficiently with Kyoto Protocol mechanisms and to facilitate a systematic uptake for GHG emission reduction investment projects. This is an essential step to achieve the global climate change mitigation targets and support sustainable development in developing countries.

MCA4climate: a practical framework for planning pro-development climate policies

Cheung WWL and Sumaila R. 2011
Nairobi: MC4 Climate Initiative,
United Nations Environment Programme
http://www.mca4climate.info/_assets/files/Marine_Ecosystems_Theme_Final_Report.pdf

Review

The paper re-states the need for different policy options in different parts of the world, the necessity for technological innovations, a detailed overview of the economic impacts, the use of models preferably at a regional scale to assess socio-economic pathways, and the need for policy to improve the health of marine ecosystems. It recognizes the various problems, proposes solutions to them and methods to assess indicators that assess the effectiveness of climate change adaptation policy. This paper also emphasizes the importance of a healthy ecosystem and therefore the need to enhance marine ecosystem resilience through measures including proper management of anthropogenic activities. The paper details the pros and cons of market-based instruments, regulatory instruments, public investment programmes, information-based instruments and international cooperation programmes, and the possible solutions for existing drawbacks.

Keywords

Climate change, pro-development, framework, technological innovation, cross-sectoral linkages, marine ecosystem resilience, adaptation, mitigation

In brief

This paper focuses on environmental pressures caused by climate change and their impact on marine ecosystem resilience. The paper also talks about anthropogenic drivers that increase the vulnerability and decrease the resilience of marine ecosystems. Overviews of both direct and indirect drivers altering the state of marine resilience are also dealt with. The paper provides a detailed overview of the existing 19 generic criteria across 12 climate change mitigation and adaptation domains considered under the MCA4climate initiative, along with indicator and assessment methods to evaluate climate adaptation policies. It suggests that adaptation options of climate change policies in marine ecosystem resilience need to be evaluated against these criteria. The effectiveness of these policies are assessed using indicators that provide an insight into how the policy may affect the drivers, pressures, status, impacts and responses of the social-economic-ecological system. Solutions to cope with uncertainties for the economic analysis of climate policies under the MCA4climate initiative are also put forth. The paper concludes by providing cross-sectoral linkages between marine ecosystem resilience and adaptation and mitigation options in sectors like agriculture and health.

Governing and implementing REDD+

Corbera E and Schroeder H. 2010
Environmental Science and Policy, 14(2), pp.89-99
http://www.sciencedirect.com/science/article/pii/S1462901110001449

Review

REDD+ is emerging as a key policy instrument to reduce forest and land-use emissions from developing countries by reducing emissions from deforestation and forest degradation, conserving and enhancing forest carbon stocks and sustainably managing forests in conjunction with co-benefits for biodiversity conservation and local livelihoods. The modalities, institutional architecture, and governance structures of REDD+ are, however, in their infancy. The paper highlights the complexities involved in the REDD+ process, the multiplicity of partners, projects, stakeholders, and potential financing instruments, the complex linkages with various sectors including agriculture and urban development, and the multiple drivers of deforestation and degradation. This article and its associated papers are valuable since it offers a range of perspectives on REDD+ from multiple actors, processes, and geographical scales and on various thematic issues such as governance, legal aspects, methodological issues and monitoring, and verification. By providing an overview of the current status of governance of REDD+, and incorporating some of the latest findings from research, policy, and practice, the paper helps raise awareness on REDD+ implementation to date and the quality and aspects of available research. This paper represents an important first step along the ladder of REDD+ policy formulation and implementation, by paving the way for detailed and informed research on several issues of key importance to this global land use regime.

Keywords
REDD+, forest emissions, land use, carbon stocks, governance, biodiversity conservation

In brief

Using the Earth System Governance Framework, this paper aims to analyze the complexities inherent in the implementation of the REDD+ (Reducing Emissions from Deforestation and Forest Degradation) initiative. The paper further illustrates gaps in current knowledge and research, and attempts to chalk out an agenda for future research. The Earth System Governance Framework comprises of five elements viz., architecture, agency, adaptability, accountability and allocation, and access. The paper assesses how the REDD+ mechanism is currently gaining shape and momentum at the national and local levels, and looks at future research and governance aspects. The role of various stakeholders in this emerging framework is explored, and the various challenges and opportunities posed by this evolving framework in terms of policy are highlighted. The paper emphasizes the absence of research on the politics governing the emergence of REDD+, particularly the influence of parties' interests in determining negotiation outcomes, or on promoting particular financial mechanisms. Potential research areas include, the interaction between proposed policies and measures, and the influence of other land-use sectoral policies and market interests. A third priority research area focusses on analyzing the environmental and socio-economic outcomes of REDD+ activities by linking them with previous experiences in forest governance.

Energy service companies (ESCOs) to optimize power in peak demand period in hybrid energy system: an impact on climate change

Das A and Balakrishnan V. 2010
In: IEEE, *Green Technologies Conference 2010*. Grapevine, Texas, United States 15-16 April 2010
http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=5453792&isnumber=5453775

Review

Whichever way one looks, renewable sources of energy are the answer to the conundrums posed by climate change, energy security, and long-term sustainable development. However, the answer itself is also perplexing, as renewable energy does not quite fit our energy systems, or the way we manage them. One piece of the puzzle is integrating renewable energy, and in the case of this paper, solar energy, with the electricity grid of the country or region. The idea of smart grids has been there for quite some time, but to some extent it is not the science that is the problem. The greater challenge is to integrate the science with the policy (or the law of the land). In this context, the paper underscores the potential of Energy Service Companies (ESCOs); but a more important yet subtle point is perhaps how this concept is embedded in policy, or how, even more so, it is embedded in the Energy Conservation Act 2001, under the Bureau of Energy Efficiency (BEE), in the Indian context for sustainable development of the rural and urban sector. The fact that a present legal Act is utilized in a country context is noteworthy, as is how this is used to address climate change objectives in particular, while also keeping energy security and efficiency in mind. It is not that research directs policy; policy can also direct research in seminal areas and not just policy evaluation.

Keywords
ESCOs, power, peak demand, hybrid energy system, climate change, supply chain, renewable energy, electricity grid, solar, energy security

In brief

This paper has illustrated how ESCOs (Energy Service Companies) and ESCOs groups and ESCOs chains or energy service companies in the Smart-Grid network can minimize the national power shortage problem in peak demand period. It is a virtual service value network, based on a supply chain network of various energy trading companies. This proposition also helps to minimize the adverse challenges of climate change by using the renewable energy resources for this service value network. This would see them integrated into a repository of conventional energy resources, thus reducing the proportion of CO2 emissions and, ultimately, enhancing a green power scenario. This paper has focussed on the integration of renewable energy, specifically solar energy resources, into conventional electric grid and the deployment of the smart architecture of hybrid energy system for the sustainable development of the rural and urban sector. A concept for next generation mobile smart-grid cities is proposed. This would enable efficient real-time collaborative use of renewable and non-renewable energy sources via a smart user-centric device for a sustainable green environment in the context of climate change. This, together with the chain of ESCOs, can reduce CO2 emission ultimately with synchronization of all entities in the virtual network of Smart-Energy scenario. The cost proposition for integrating distributed renewable (solar) energy resources to the electricity grid is analyzed in this paper.

Toward a whole-landscape approach for sustainable land use in the tropics

DeFries R and Rosenzweig C 2010
Proceedings of the National Academy of Sciences, **107**(46), pp.19627-19632
http://www.pnas.org/content/107/46/19627.short

Review

Recent policy discussions in the international arena have emphasized that deforestation and forest degradation are major sources of greenhouse gases and initiatives such as REDD are priority strategies to address issues of climate change. Simultaneously, however, food demand is projected to increase by 50% by 2050 and the conversion of forests to crop lands and pastures to enhance agricultural output and meet food security is one of the primary causes of deforestation. The paper convincingly demonstrates that in tropical countries, the main opportunities to mitigate climate change arise from these sectors, in contrast to the rest of the world where such opportunities lie largely in the energy sector. Moreover, it clearly demonstrates that large scale conversion of forests to agriculture has only led to very small increases in agricultural production. Clearly, the solution to food security lies elsewhere. This paper provides a clear message that agricultural intensification, not expansion is the way to both enhance food security and reduce greenhouse gas emissions and suggests the need for policy re-orientation at the local and the global scale on a landscape basis, while emphasizing the need to be sensitive to local level issues. The main messages of the paper can inspire change in the suggested policy directions and can facilitate policy agenda setting, formulation, decision-making, and implementation.

Keywords

Landscape approach, sustainable land-use, tropics, REDD, agricultural intensification, emissions, mitigation

In brief

This paper examines the synergies and trade-offs between increasing food production and mitigating climate change. The intricate connection between the use of land in forests and agriculture, and the need for a landscape-based approach is clearly outlined in this paper. The paper explores whether these objectives can be reconciled by increasing agricultural intensification rather than increasing the diversion of forest to agricultural land. Synergy between reduced forest diversion and enhanced agricultural production is possible through agricultural intensification; including the use of already cleared or marginal lands, enhanced livestock, and crop management techniques, and the incorporation of agro-forestry. However, the paper importantly mentions that there is no instant remedy; rather the need is for local, place-specific strategies and approaches that encompass multiple dimensions of cultural, socio-economic, biophysical, and demographic considerations. The paper concludes that in order to address the multiple uses of tropical landscapes, an integrated approach is required to link climate mitigation and adaptation objectives with food security objectives. Such an integrated approach can also contribute to the development of local, national, and global policies that are targeted towards meeting multiple objectives in tropical landscapes.

Climate adaptation wedges: a case study of premium wine in the western United States

Diffenbaugh NS, White MA, Jones G.V., and Ashraf, M. 2011
Environmental Research Letters, **6**(2), p.024024
http://iopscience.iop.org/1748-9326/6/2/024024

Review

The impacts of various adaptation activities are likely to be different, depending on the changes in socio-economic conditions, climatic conditions, uptake of mitigation action, prevalence of current climate conditions or a severe climate change scenario in the future. This paper uses a specific case study of premium wine production in the United States that requires a narrow climate window for high-value production. Quantitative assessment of future impacts of climate change can motivate the design and implementation of a suite of adaptation actions, designed for differing degrees of impacts. Additionally, this framework can be applied across a number of climate-sensitive sectors to quantify damages avoided by undertaking specific adaptation action. Furthermore, this framework can be dovetailed with detailed economic analysis for comparing the costs and benefits across a range of adaptation actions. The adaptation wedges framework is of value to both developed and developing countries, because it also focusses on the fact that there are limits to adaptation and thus the size of the wedge, signifying that the avoided losses may vary depending on the degree of climatic stress and thus further building the case for urgent mitigation action.

Keywords
Climate change, adaptation wedges, framework, premium wine production, western United States, avoided damages, impacts, vulnerability

In brief

Drawing a parallel from the stabilization wedges introduced by Pacala and Socolow for greenhouse gases, this paper presents the concept of adaptation wedges that represent the share of impacts that can be avoided by undertaking specific adaptation action. The damage avoided by virtue of undertaking a specific adaptation action creates a 'wedge', compared to the loss that would have been incurred in the absence of adaptation. A case study of premium wine grape production in the western United States is used to study the sensitivity of wine grape cultivation to different levels of thermal stress to simulate the likely impacts of warming in the near-term (till 2039). The study reveals that a large adaptation wedge can be realized through adaptation in the form of increasing the heat tolerance of the wine grape varieties. The paper concludes by highlighting that this case example can be elaborated with greater refinements in the climate modelling assessments for example, to engage multiple stress factors that can be considered within the adaptation wedge framework.

Making good use of adaptive management

Doremus H., Andreen W.L., Camacho A., Farber D.A., Glicksman R.L., Goble D., Karkkainen B.C., Rohlf D., Tarlock A.D., Zellmer S.B., Jones S., and Huang, Y., 2011
Center for Progressive Reform White paper # 1104. Washington, DC: Center for Progressive Reform. http://ssrn.com/abstract=1808106

Review

The concept of adaptive management emerged from the seminal works of C.S. Holling and Carl Walter in ecological sciences and corresponding lessons drawn for natural resource management. Though adaptive management has been in the conceptual stages and used for the management of natural resources for some time, there is still no operational framework defining its use for appropriate resource use problems. This paper attempts to fill this gap by presenting the pitfalls of flexibility associated with this management paradigm and offers guiding principles to enable resource managers to design an adaptive management programme to address specific resource problems. Effective adaptive management holds the potential to reduce uncertainty over time by systematically incorporating learning from case studies into future resource management strategies. Hence, instead of offering blueprints for solutions to all problems associated with natural resources, this paper calls upon the diagnosis of specific problem cases, to address which adaptive management can be used effectively. Understanding effective application of adaptive management is critical given the uncertainty of climate change impacts on the sustainability of natural resources, including changes in resource use patterns.

Keywords
Adaptive management, complex problems, climate change, uncertainty, natural resource management

In brief

This paper presents the prerequisites for the effective application of the principles of adaptive management by resource managers. Some of the key elements of adaptive management include identifying clear goals and measurable indicators, following an iterative approach for decision-making, systematically monitoring the process, acknowledging feedback for systemic learning, characterizing risks and uncertainties, and reducing uncertainty over time. The paper uses case studies and scientific literature to present the advantages and disadvantages of adaptive management and its applicability to specific problems related to resource management. Adaptive management, as it is cost-intensive, may increase or extend controversy and conflict, and may require trading of the best outcome in the short-term for long-term learning. The paper provides some guiding principles for designing an effective adaptive management programme, such as fitting the strategy to specific resource problems rather than a generic goal, ensuring accountability and enforceability, promoting targeted learning, and ensuring regular funding. The paper builds a case for problem-specific adaptive management design, and suggests the prerequisites for problem selection, viz.; cases where there are information gaps, opportunities for learning, and adjustment of decisions.

Institutions and policy processes: the means to the ends of adaptation

Dovers S R and Hezri AA. 2010
Wiley Interdisciplinary Reviews: Climate Change, **1**(2), pp.212-231
http://wires.wiley.com/WileyCDA/WiresArticle/wisId-WCC29.html

Review

In the historical context, the policy hubris related to 'adaptive capacity' has included mainly institutions as core elements. Similarly, institutions have been an essential part of evolving policy discourse around sustainable development. The United Nations Secretary General's report on the themes of the United Nations Conference on Sustainable Development (RIO+20) says that, "This (Institutional Framework for Sustainable Development) covers a spectrum of formal and less formal bodies, organizations, networks, and arrangements that are involved in policy-making or implementation activities". For informing policy process, the paper is relevant to agenda-setting for horizontal integration (cross-sectoral) and vertical integration (federal systems). The paper recognizes problems (gap and non-specificity) and recommends a greater focus on the practicalities of institutional change to enable climate change adaptation. Another value to the insights offered by this paper is its discussion of institutional processes and engagement of multiple institutions and actors (including Agenda 21 Major Groups). This is important because climate change adaptation would need to consider natural resource management that involve informal bodies, such as community, cooperatives and civil society at large. This paper calls for stronger understanding and commitment by decision-makers around cross-cutting and cutting edge issues in order to improve understanding of climate compatible development.

Keywords
Institutions, policy processes, sustainable development, adaptive capacity, adaptation, civil society

In brief

This paper suggests that while institutions and institutional change (which the authors characterize as the 'means') are often mentioned in policy discourses pertaining to climate change adaptation (characterized as the 'end'), nuances of institutions have not been detailed. The paper specifies concepts and themes around institutional theory that could be applicable to climate change adaptation, and discuss issues related to climate change adaptation with the varying degrees of uncertainty related to climate impacts. The authors point that while policy discussions have included sectorial portfolios such as water, spatial planning, health, and emergency management, central agencies related to finance, taxation, law, and industry are rarely mentioned. The paper also suggests that climate change research and policy have only recently connected with the idea of sustainable development. The paper suggests that a useful approach would be to think of climate adaptation policy as coordination and reform of other policy sectors. The paper also sets an agenda for the knowledge community to delve into "unfamiliar and perhaps boring territory' related to institutions.

Greening the grid: implementing climate change policy through energy efficiency, renewable portfolio standards, and strategic transmission investments

Duane T. 2010
Vermont Law Review, 34, pp.711-718
http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1614964

Review

With climate change mitigation requirements as its backdrop, the paper reviews the regulatory history of renewable energy development in the US for grid-electricity and how the lessons learnt through these experiences could be applied to evolve a more robust system of practices for multi-fold increase in renewable energy. The value of the paper lies in it being able to provide a good understanding of the US regulatory scenario over the years, the comparative merits of different approaches, and drawing from them the approach for making the grids more responsive to renewable energy resources. The analysis and recommendations brought out by this paper are based on experiences in the US and can be used as examples for policy-makers and practitioners to adopt new approaches. The findings of this paper can be useful for policy evaluation and formulation, for instance its suggestion to use a portfolio of policy/regulatory instruments to achieve radical reductions in GHG emissions is necessary to stabilize the climate.

Keywords
Climate-change policy, renewable energy, energy efficiency, grid, transmission investments, power purchase agreements

In brief

The paper recognizes that electricity generation accounts for a large GHG share and that this is one sector that needs to be decarbonized. Thus, this paper examines various issues related to greater uptake of renewable energy for grid-connected electricity generation in the US. Further, it provides an in-depth analysis of regulatory practices adopted by different states and regions to address these issues. The paper evaluates various policy options for `greening the grid' and comes out with specific recommendations. It advocates for an integrated regulatory approach to encourage significant investment in energy efficiency, renewable generation, and new transmission. The paper suggests a portfolio of tools—regulatory as well as market-based—to achieve the radical reductions in GHG emissions necessary to stabilize the climate. Issues like transmission access and Power Purchase Agreements structure are just as important to renewable technology investors as the price they would get for their power. Indeed, the paper shows that price incentives alone are not sufficient for steady development and deployment of new technologies. Suggesting a multi-attribute evaluation, it concludes that successful renewable technology deployment policy must pay attention to much more than price alone; contract structure, interconnection issues, and a variety of other considerations are also important.

Community-based adaptation: enhancing community adaptive capacity in Druadrua Island, Fiji

Dumaru P. 2010
Wiley Interdisciplinary Reviews: Climate Change, **1**(5), pp.751-763
http://onlinelibrary.wiley.com/doi/10.1002/wcc.65/abstract

Review

Compared to other adaptation strategies, Community-Based Adaptation (CBA), projects prioritize the use of local institution and community participation in the process of assessing climate risk, as well as in planning, implementing, and monitoring adaptation strategies. Though CBA has been promoted as an effective adaptation technique, there has not been much opportunity of learning as there is dearth of conceptual as well as empirical literature. This paper aims to fill this gap by drawing common principles from participatory approaches, like Community-based Natural Resources Management (CBNRM) and Community-based Disaster Risk Management (CBDRM) for application in Community-Based Adaptation projects. This paper recommends that CBA should aim to increase awareness among communities about climate-change risks, empower communities to make decisions for their own adaptation, connect communities to networks necessary for accessing the information and resources they need to implement adaptation strategies and facilitate an adaptive approach to adaptation decision -making and implementation. Thus, the paper adds value by providing lessons for the design and delivery of adaptation practices at the community level by evaluating the Fiji experience of CBA.

Keywords
Community-based adaptation, Fiji, climate change risks, participatory approaches, disaster risk management

In brief

The paper describes the process and outcomes of a pilot Community-Based Adaptation (CBA) project on Druadrua Island in Fiji. From the project's achievements, the paper infers that CBA has commonalities with other developmental projects as it enhances the capacity of local communities to adapt to change. It also points out that developing partnerships and networks with locally-based technology, information, and engineering experts and institutions should be a key function of CBA project implementers. The paper presents an empirical view of the work on Druadrua Island, where two of its most vulnerable sectors i.e., its coastal ecosystem and water supply, were targeted by the CBA project. The case study further demonstrated that planning for adaptation through CBA can be both anticipatory and reactionary, but capacity-building to face present problems remains crucial for adaptation. Moreover, efficiency and affectivity of actions depend largely on whether the facilitators are from the same culture, speak the same language, and have an understanding of local customs. One of the conclusions of the paper is that CBA projects are inherently time-consuming and build on practice and experience.

When not every response to climate change is a good one: identifying principles for sustainable adaptation

Eriksen S, Aldunce P, Bahinipati CS, Martins RD, Molefe JI, Nhemachena C, O' Brien K, Olorunfemi F, Park J, Sygna L and Ulsrud K, 2011
Climate and Development, **3**(1), pp.7-20
http://www.ingentaconnect.com/content/earthscan/cdev/2011/00000003/00000001/art00002

Review

With the growing emphasis on formulation of effective adaptation strategies, it is critical that these strategies do not result in negative impacts or externalities for the social, economic, and environmental objectives associated with sustainable development. This risk arises because formulation of adaptation strategies, in a bid to becoming context-specific might sometimes assume a myopic lens and not account for the larger elements of sustainability. Although many papers have discussed various facets of adaptation, the perspective of 'sustainable adaptation' as presented in this paper is innovative, and clearly marks the differences from simple adaptation. Following these principles as a first step and guide towards social justice and environmental integrity, the concept of sustainable adaptation can help in adaptation policy formulation and decision-making that is congisant of the principles of social justice and environmental integrity. The paper builds a case that sustainable adaptation can offer better solutions for climate-compatible development, as it considers wider effects of adaptive responses on vulnerable groups, regions, and systems. In doing so, the paper can contribute towards better understanding and commitment of decision-makers by providing a new perspective for formulating adaptation strategies within the larger framework of sustainable development.

Keywords
Sustainable adaptation, sustainable development, vulnerability, adaptive responses, multiple stressors, local knowledge, feedbacks

In brief

This paper highlights the need to identify points of linkage and create synergy between adaptation strategies and sustainable development in order to promote 'sustainable adaptation'. Using case studies from Chile, Nigeria, Norway and South Africa, the paper highlights four principles of sustainable adaptation, viz.: recognition of the context of vulnerability, including multiple stressors; recognition of different values and interests that can affect adaptation outcomes; integration of local knowledge into the adaptation responses; and consideration of potential feedback between local and global processes.
The paper discusses the possibilities and limitations for achieving sustainable adaptation in practice, and argues that attention to the principles of sustainable adaptation can make a significant contribution to socially and environmentally sustainable responses to climate change.
The paper further argues that adaptation is a process, rather than a set of strategies and measures for addressing specific impacts. Thus, the principles of sustainable adaptation are based on, and will further influence, a host of broader socio-economic and environmental factors over different spatial and temporal scales.
The paper concludes by stating that the translation of these principles into practice faces several gaps and this discussion primarily seeks to stimulate thinking that links adaptation and sustainability.

Integrating protected areas into climate planning

Ervin J, 2011
Biodiversity, **12**(1), pp.2-10
http://www.tandfonline.com/doi/abs/10.1080/14888386.2011.564850

Review

Historically, protected areas were viewed as areas exclusively for the protection and conservation of biodiversity. Over time, however, the approach to protected area management has shifted away from being an exclusionary approach to one of inclusiveness based on sustainable livelihoods and involvement of local communities. Recently, climate change considerations have made it imperative for protected areas to be designed, created, located, and managed in ways that can best meet multiple objectives, including enhancing resilience to climate change and promoting mitigation and adaptation strategies. Although protected areas increased rapidly from 1988 to 2008, huge gaps exist in their inclusion of species and ecosystems and in their coverage across local, national, and global levels. Moreover, much of the recent growth in protected areas is attributable to the coverage of low-productivity lands. In this context, the paper makes several important policy suggestions. For example, the local, national, and regional climate planning exercises need to incorporate explicitly protected areas as part of these strategies and countries need to assess their economic value and their contribution as carbon sinks. It is important to make protected areas more 'climate-relevant' and planners can tap into climate funding sources to enhance management, including the restoration of many ecologically vulnerable areas. The suggestions and guidelines provided by this paper can play an important role in policy formulation, decision-making, and policy implementation with regard to enhancing linkages between protected areas, biodiversity conservation, and climate change.

Keywords
Protected areas, climate planning, mitigation, resilience, adaptation, biodiversity conservation, carbon sinks, ecosystem services

In brief

This paper argues for the need to make protected areas of more direct relevance in the light of climate change. This includes the contribution of protected areas towards sustainable livelihoods, the provision of ecosystem services, and ensuring climate mitigation, resilience, and adaptation.
The paper advocates mainstreaming protected area planning into sectors, such as transportation and energy, reviewing the economic importance of protected areas while addressing climate-related concerns, and ensuring that protected areas form an integral part of climate adaptation efforts.
The paper gives guidelines on ensuring that climate change issues and concerns incorporate the future of protected areas. These guidelines depend on the location of the protected areas their management, and their ability to directly incorporate and maximize climate change mitigation, resilience, and adaptation. The paper emphasizes that, despite trade-offs between biodiversity conservation (the original mandate of protected area creation) and management for climate change, protected areas provide considerable social, economic, and ecological benefits, which makes them a natural and cost-effective investment for mitigating climate change. The paper highlights how the management of protected areas can be optimized to maximize the benefits that they provide to adaptation, mitigation, and resilience building.

Spending adaptation money wisely

Fankhauser S and Burton, I. 2011
Centre for Climate Change Economics and Policy Working Paper No. 47 and Grantham Research Institute on Climate Change and the Environment Working Paper No. 37. Leeds and London: Centre for Climate Change Economics and Policy and Grantham Research Institute on Climate Change and the Environment
http://www.cccep.ac.uk/Publications/Working-papers/Papers/40-49/WP47_adaptation-money.pdf

Review

Developmental agencies have initiated mainstreaming activities by integrating adaptation into their developmental assistance portfolio, in a bid to build adaptive capacities. Some institutions are also working out mechanisms to manage the additional financing that is likely to be leveraged under the UNFCCC, as per the Copenhagen Accord and Cancun Agreement, viz., the funds via the Global Environment Facility (GEF), the Adaptation Fund, and the Green Climate Fund. The Adaptation Fund has only recently become operational and the GEF has committed more than $300 million for adaptation measures, focussing largely on capacity building and preparing for adaptation through the preparation of National Adaptation Programmes of Action (NAPAs), for example. The strong and constant emphasis on the mode of disbursement of adaptation finance, its governance, monitoring, reporting, and verification, in a way reveals the underlying lack of trust. Among other factors, this lack of trust can be rooted to unfulfilled promises of finance by donors on one hand, and lack of faith on the effective spending of money by the recipient countries on the other. Discussions within this paper are pertinent for guiding policy choices and agenda setting for adaptation because it lists out some criteria to guide decisions related to adaptation finance. This paper offers an interesting dimension to the debate surrounding operationalization of adaptation finance by highlighting that the major criteria of proving 'additionality' often renders integration of adaptation and development difficult, even in cases where mainstreaming can be easily targeted.

Keywords
Adaptation finance, climate change, development, hard and soft adaptation, developing countries

In brief

This paper highlights the composition of 'good adaptation' in order to ensure judicious spending of adaptation finance. In doing so, the paper seeks to deviate from the standard debates on the source of adaptation finance and the monitoring of its allocation and expenditure. The paper argues that the fixation with proving additionality might often stand in the way of financing good adaptation. This includes developmental activities, that can contribute towards building a minimum level of adaptive capacities in the short-term and enable good adaptation in the long-term, specifically certain win-win strategies, 'soft adaptation' as compared to 'hard' or structural adaptation measures and integration of adaptation into development. Recognizing that climate change is a complex problem, the paper stresses that conventional resource allocation methods might not prove as effective and might result in maladaptation or insufficient adaptation or, 'adaptation deficit'. The paper emphasizes that initiating adaptation activities at the right time is also crucial in order to reap maximum gains and minimize costs by taking early action. Additionally, the paper recognizes that 'hard adaptation' projects, being more tangible, often receive more attention than soft adaptation and thus concludes with the need for specific institutional mechanisms to support appropriate adaptation actions that are efficient, effective, and equitable. The paper also mentions that a programmatic approach towards adaptation that includes knowledge management can prove to be effective.

How to measure carbon equity: carbon gini index based on historical cumulative emission per capita

Fei T., Jiankun H., Xunzhang P. and Chi Z., 2011
Working Paper 584. Milan: Fondazione Eni Enrico Mattei
http://www.bepress.com/cgi/viewcontent.cgi?article=1594&context=feem

Review

One of the key aims in climate negotiations is to enact a reasonable global long-term emission reduction target and allocate this target amongst different nations. While there was an agreement on 2°C as the global target in the Copenhagen and Cancun negotiations, there has been no agreement on a method for this allocation. Many have argued for equal allocation of this carbon space. The income allocation-related literatures have provided many meaningful indexes and tools for inequality research. The key contribution of this paper is to re-establish Lorenz curves and Gini indexes based on the historical cumulative emission per capita. After adjustment, such indexes can be applied to the emission space allocation-related carbon inequality issue, which the authors have tried to do in this paper. This is a crucial contribution as there are few studies on the measurement of inequality research with respect to both theory and application. The quantification of the carbon allocation inequality has great significance as it can help investigate the climate change inequality issue in different perspectives. It can, for example, measure inequality levels and trends, and then identify the key factors that affect that inequality.

Keywords
Carbon equity, greenhouse gas emissions, inequality, Lorenz curve, Gini index, carbon space

In brief

Using economic tools such as the Lorenz Curve and Gini Index with adjustment to per capita historical cumulative emission, this paper constructs a Carbon Gini Index to measure inequality in climate change discussions. The analysis, using the Carbon Gini Index, shows that 70% of carbon space in the atmosphere has been used for unequal distribution, which is almost the same proportion as the income gap between the richest and poorest in the world. The paper uses historical cumulative emissions per capita to analyze quantitatively the impact of the starting year on a party's historical responsibility—a significant stumbling block in climate negotiations. The analysis concludes that different starting years have had a substantial influence on the Gini Index value; the later the starting year, the lower the Gini Index. The paper suggests for global levels of carbon, the Gini Index does not change much when comparing the 1850 starting year and 1900 starting year. But the starting years of 1950 and 1990 result in underestimates of carbon inequality. The paper concludes that irrespective of the starting year, there exists inequality of carbon space and therefore, future allocation needs are a key point of contention.

Community forest monitoring in REDD+: the 'M' in MRV?

Fry BP, 2011
Environmental Science and Policy, 14(2), pp.181-187
http://www.sciencedirect.com/science/article/pii/S1462901110001802

Review

As climate talks progress to develop an institutional framework on the REDD+ mechanism, there is growing debate on how to develop a Monitoring, Reporting and Verification (MRV) system for the REDD+ mechanism that is transparent, accountable, and sustainable. While such a system aims to monitor emission reduction, it will also be key to monitor support received through international channels. This paper only discusses MRV in the context of emissions, where the author argues for the prospect of an MRV system that is locally based and engages trained members from the communities to complement other profession techniques. Measuring carbon stock is an expensive and technical process, which is the primary reason for the lack of agreement on a MRV system for a REDD+ mechanism, as any global programme should be financially sustainable. The author also argues for a locally-based monitoring system, given the commonplace devolution of natural resource management to local communities through the use of participatory and locally-appropriate techniques. However, the use of such a system would require developing an MRV protocol with standardized guidelines agreed internally in order to ensure replicability at different locations. With this in place, REDD+ will become more cost-effective, strengthen the local institutional set-up, and, crucially, provide alternative livelihoods.

Keywords
MRV, REDD, community forest monitoring, payment for ecosystem services

In brief

This paper provides a timely literature review of community-based efforts to monitor natural resources. The authors further analyze the advantages of community-based approaches as compared to professional approaches in terms of lower costs, enhanced local ownership, greater cultural relevance, and improved institutional strength at the community level. In addition, through the literature review, the author identifies successful elements from international case studies to assess how locally-based monitoring could fit into a REDD+ MRV framework. The author further argues that professional monitoring will continue to be required in areas where local people do not depend on natural resources, or where there is actually no access, or where resource threats are multiple and complex, or where the relationship between the communities and the local authorities is poor. However, further studies are required to examine the quality of the locally produced data vis-à-vis professionally derived data. The author cautions that it is important to study how locally produced data can feed into a global mechanism, which would require effective information transfer. Such a system requires building capacities in developing countries and also standardization of formats of data keeping. This could be achieved by using a systems-based indicator approach.

Renewables and climate change mitigation: irreversible energy investment under uncertainty and portfolio effects

Fuss S, Szolgayova J, Khabarov N and Obersteiner M, 2010
Energy Policy, 40, pp.59-68
http://www.sciencedirect.com/science/article/pii/S0301421510005318

Review

The tone of this paper is very relevant, beginning with a description of the uncertainty surrounding climate action. The paper sets out a framework that has two layers. It does away with the net present value methodology as it ignores the options involved in the sequence of decisions pertinent to climate action. Therefore, it uses real options analysis. While this paper may not be the first to use such an analysis, it is unique in having a second layer of framework where not only are finance principles used, but also the portfolio selection approach. Perhaps the most important take away from this paper will not be the framework developed here for climate policy-makers, but what it concludes with respect to carbon price. The authors say that their analysis points to the conclusion that the uncertainty about the level of the carbon price has a more profound effect on the optimal composition of technology portfolios than the uncertainty associated with the materialization of different socio-economic pathways in the future. Policy-makers are given some food for thought on how to remove the uncertainties around carbon price.

Keywords
Renewable energy, mitigation, investments, uncertainties, carbon pricing

In brief

New technologies will play an important role in stabilizing greenhouse gases to a safe level. However, there are various kinds of uncertainties that have to be kept in mind, namely, scientific uncertainty, market uncertainty, technological uncertainty, socio-economic uncertainty, and policy uncertainty. This is not, of course, an exhaustive list, but the paper provides insights on how to put risks into perspective. Scoping this perspective still further, the paper suggests that it is difficult to assess the importance of different technologies in achieving robust long-term climate risk mitigation, given the various uncertainties, it is difficult to assess the importance of different technologies in achieving robust long-term climate risk mitigation. One example debated currently in this context is biomass-based energy, which can be used to produce both carbon-neutral electricity and at the same time offer the possibility of 'negative emissions' by capturing carbon from biomass combustion at the conversion facility and permanently storing it.This paper analyzes the impact of uncertainty on investment decision-making at the plant level in a real options valuation frame-work, and then uses the Greenhouse Gas Initiative (GGI) Scenario Database as a start point for deriving optimal technology portfolios across different socio-economic scenarios for a range of stabilization targets, focussing, in particular, on the new, low-emission targets using alternative risk measures. The paper, though a stylized exercise, presents a framework for understanding risk and technology choice and can become useful for future research in this area.

Negotiating around tradeoffs: alternative institutional designs for climate finance

Ghosh A, 2010
European Climate Platform (ECP) Report No. 10. Stockholm: Climate Policy Research Programme (Clipore) of the Swedish Foundation for Strategic Environmental Research (Mistra) and Brussels: Centre for European Policy Studies
http://www.ceps.be/book/negotiating-around-tradeoffs-alternative-institutional-designs-climate-finance

Review

The paper rightly points out that besides the concern over the scale of resources generated as climate finance, the issue of who gets to control, collect, disburse, and monitor funds is critical. The paper outlines the institutional options and their implications for the Green Climate Fund, pointing out that these are far from ideal. While the paper presents different governance options, it does not prescribe or recommend any one option as the win-win situation. Instead, the key contribution of the paper is in terms of providing a new perspective to the related discussions by highlighting that governance issue is one of the key stumbling blocks in climate negotiations. The paper also stresses that the governance issue and the pursuit of ideal solutions often delay action, and that it is important to have agreement from major developed countries to ensure that smaller countries have both money and technology. Therefore, it is important to recognize the trade-offs between voice, co-ordination, scale, and the different kinds of actions that are necessary to confront climate change.

Keywords
Negotiating, trade-offs, institutional design, climate finance, technology, Copenhagen Accord, Cancun Agreement, MRV

In brief

Recognizing that climate finance will be leveraged through varied sources, the paper dwells on the issue of the governance of climate finance.The primary question that the paper deals with is that of how different governance priorities would affect the institutional arrangements for a credible financing mechanism in the climate regime. The paper identifies various funding channels—Multilateral Development Bank (MDB) funds, United Nations funds, Government-promoted funds, Public-private investment funds, Carbon markets and Unilateral fiscal support–and further identifies the key concerns of contributing and beneficiary Parties. These include concerns such as monitoring, aid versus grant, prioritisation of adaptation, etc. According to the Cancun Agreements, the GCF is accountable to and under the guidance of the Conference of the Parties to the UNFCCC. The fund will have a 24 member board, comprised of equal numbers of representatives from developed and developing countries; an Independent Secretariat; a Transitional Design Committee to design the fund, comprized of 40 members (15 developed, 25 developing) and will be open to observers. A Standing Committee will further be established to improve coordination and Monitoring, Reporting and Verification (MRV) of finance. Using this framework of governance functions to reflect the concerns of how far different design options will fulfil alternative priorities for raising funds, allocating them, monitoring flows and activities, and giving contributors and recipients a say in its governance, the paper evaluates the four options; consolidate and specialize, create and legitimize, innovate and de-bureaucratise and separate and indigenize.

International climate finance from border carbon cost leveling

Grubb M., 2011
Climate Policy, 11(3), pp.1050-1057
http://www.ingentaconnect.com/content/earthscan/cpol/2011/00000011/00000003/art00007

Review

The Copenhagen Accord proposed to raise climate finance of $100 billion per year. But scepticism has been expressed from several quarters that this may not be possible. On the other hand, it has been argued that countries that adopt carbon tax to mitigate climate change should also adopt border tax adjustment measures to ensure a 'level playing field' between domestic and foreign producers— an argument that has been opposed by developing countries. The paper attempts to find a solution to both of these challenges with one initiative. Using the revenue collected may be more acceptable, in political terms, but, from a legal standpoint, the way the revenue is collected through a trade measure may not change anything at the World Trade Organization (WTO). Of course, if a measure is accepted by all the members of the WTO, then the issue of WTO-compatibility becomes irrelevant. Moreover, if developing countries adopt latest technologies quickly then this source of finance might dry up with time. Further, the incidence of the proposed tax might fall on developing countries (producers) disproportionately, as they export products that face severe competition in the global market and, hence, are highly price elastic in nature. Given this, border cost levelling tax may not be the kind of source of finance that the Copenhagen Accord promised.

Keywords
Climate finance, border levelling, Copenhagen Accord, WTO, OECD, carbon tax, developing countries

In brief

The paper is about examining the case of border cost levelling as a source of climate finance in accordance with the objective to reach $100 billion per year as proposed in the Copenhagen Accord. The paper uses the 'distinct term' called 'border cost levelling', but it is not clear how this is different from the term 'border tax adjustment' that has been commonly used. The paper argues that such a measure is WTO compatible but the existing literature does not give any clear answer. The paper argues that it would be difficult to secure $100 billion per year through normal public sector channels in view of the financial crisis and related problems in OECD countries. Given this, border carbon cost levelling could prove to be an innovative source for raising climate finance. It argues that such a measure would be WTO compatible and developing countries might accept this as the money raised through it will be spent in developing countries.

The adaptive capacity wheel: a method to assess the inherent characteristics of institutions to enable the adaptive capacity of society

Gupta J, Termeer C, Klostermann J, Meijerink S, van den Brink M, Jong P, Nooteboom S and Bergsma E, 2010
Environmental Science & Policy, 13(6), pp.459-471
http://www.earthsystemgovernance.org/publication/gupta-joyeeta-adaptive-capacity-wheel

Review

From a social science perspective, it becomes critical to study the conditions under which institutions can stimulate the adaptive capacity of society to deal with the potentially serious and irreversible impacts of environmental change. There are clear advantages to using the Adaptive Capacity Wheel. First, its elements provide a comprehensive idea of the dimensions relevant for assessing the adaptive capacity of society through its institutions. Second, colours have been used to represent the results of the assessment. Third, the Adaptive Capacity Wheel can be used to generate quantitative results. Quantitative results can be used to rank, for example, which institutions score better and which worse on an adaptive capacity scale. The aggregated picture can draw attention to a set of institutions that is working in a specific field. The Adaptive Capacity Wheel can be viewed as a useful qualitative tool for assessing institutions, for comparing and contrasting them and in promoting self-reflection among policy-makers and other social actors. Comparing the results of policy sectors in an aggregated way may stimulate cross-sectoral learning on how institutions in each sector are built.

Keywords
Adaptive Capacity Wheel, institutions, uncertainty, governance, leadership, stakeholders

In brief

Given the uncertainty surrounding the likely consequences of climate change in the future, there is an emphasis on the role of institutions in strengthening the adaptive capacities of communities according to the rate of environmental change. This reactive mode of operating institutions would need to be converted to a more deliberate and proactive mode, while accounting for autonomous changes and possible redesign of institutions.
This paper highlights that institutions that promote adaptive capacity encourage the involvement of a variety of perspectives, actors and solutions, enable social actors to continuously learn and improve their institutions, allow and motivate social actors to adjust their behaviour, can mobilize leadership qualities, can mobilize resources for implementing adaptation measures, and can support principles of fair governance. The paper discusses a total of 22 criteria for these dimensions to form the Adaptive Capacity Wheel, in order to assess the inherent characteristics of institutions and stimulate the adaptive capacities of communities in response to climate change. In doing so, the paper attempts to bridge the existing literature on institutions, governance and management with the more recent literature on adaptation and adaptive capacity to derive a research protocol for application of the Wheel.

The role of patent protection in (clean/green) technology transfer

Hall BH and Helmers C. 2010
NBER Working Paper 16323. Cambridge, Massachusetts: National Bureau of Economic Research
http://www.nber.org/papers/w16323.pdf?new_window=1

Review

Historical evidence indicates that patents have helped in increasing innovations. Whether it was mercantilism that drove innovation during the industrial revolution rather than the incentives provided in British law is another argument. Unleashing the prospects of patents for influencing technological innovation for mitigation, however, requires further efforts. This paper presents the concept of 'double externality' that often plagues the process of the development and dissemination of climate technology. This concept alludes to the fact that there exists a strange relationship between the 'non-excludability' of knowledge in the area of clean technology and the negative externality of environmental pollution. The paper also argues that, given the environmental and knowledge externalities and the uncertainties in climate change impacts and effectiveness of new technologies, patents by themselves do not offer a panacea. Additionally, a 'one-size-fits-all' situation does not apply owing to differences in the type of technology and the specific country context. This paper holds potential to assist policy-makers and civil society to understand the nuances of climate change with respect to patents and intellectual property. While framing climate policy, this paper will be a good reference to understand the interaction of intellectual property and climate-change with global perspectives and micro insights, and advance the research on Intellectual Property Rights and development of clean technologies.

Keywords
Patent protection, mitigation, clean technology, uncertainties, trade, Foreign Direct Investment, licensing, intellectual property

In brief

This paper presents the role of patent protection in influencing mitigation action through the development and diffusion of a large number of clean technologies. This paper first reviews the historical evidence on the role of patents to foster innovation and international technology transfer. Additionally, the paper illustrates transfer of technology through trade, Foreign Direct Investment, and licensing in the presence of a stronger patent regime. Within this paper, technology development is theorized, empirical evidence and case studies are provided, and specific climate change technologies are discussed. The paper draws attention to the fact that a variety of technologies are in various stages of their development to contribute effectively to mitigation action in different spheres. However, given that the development and spread of technologies will vary from country to country, having a standard mechanism to typify the link between Intellectual Property Rights (IPRs) and green technologies seems difficult. The paper highlights that while IPRs can help bridge the gap between private and social returns to innovation, they might not adequately capture the environmental externalities. The key conclusion of the paper is the recognition of an externality in both the environmental as well as the knowledge space, implying that intellectual property may not be the ideal and only policy instrument to foster effective transfer of clean technology.

A review of frameworks for developing environmental health indicator for climate change and health

Hambling T, Weinstein P and Slaney D, 2011
International Journal of Environmental Research and Public Health, 8(7), pp.2854-2875
http://www.mdpi.com/1660-4601/8/7/2854/

Review

There has been a growing interest to identify and develop specific indicators that can help monitor human health vulnerability to direct and indirect climate-change impacts and, in the process, help detect early health impacts for targeted interventions. However, inherent uncertainties and the multi-disciplinary nature of climate-health linkages have presented major challenges to achieving significant progress in this direction. In this regard, the paper presents the concept of Environmental Health Indicators (EHIs) and the Driving force-Pressure-State-Exposure-Effect-Action (DPSEEA) framework, as tools for not only assessing and monitoring multiple casual linkages between environment and health but also identifying potential points of interventions and measuring their effectiveness. It is centred on the idea that developing and using scientifically valid and politically relevant EHIs can aid to summarize, synthesize, and convert complex epidemiological and environmental data into a form that can be more easily interpreted by end-users, such as policy-makers. It provides scope for identifying response measures higher up in the causal chain than would have been possible through environmental monitoring or health surveillance alone. This would greatly enhance the capacity to prepare and respond to projected climatic changes as well as plan available resources in a more efficient and effective manner. The approach discussed in the paper thus has potential to inspire policy-makers and practitioners in the field to adopt new approaches for reducing disease burden attributable to climate change.

Keywords
Environmental health indicators, climate change, DPSEEA framework, ecosystem health approach, human health vulnerability, disease burden

In brief

This paper encompasses a review of 11 current frameworks that outline the correlation between environmental factors and human health in order to identify the framework that is most suitable for developing Environmental Health Indicators (EHIs). The purpose of developing EHIs is to be able to monitor and assess the vulnerability of human health to potential climate change impacts. The paper argues for the necessity of adopting an 'ecosystem health approach', which would allow for a more explicit understanding of critical linkages between ecosystems and human health. A framework that utilizes a causal chain approach, grouping indicators into determinants and outcomes, may be a more systematic and informative approach to elucidate and interpret the relationship between the environment and human health. Evaluated against set criteria, 'Driving force-Pressure-State-Exposure-Effect-Action' (DPSEEA), is described as the framework most suited to providing guidance towards the development of EHIs. Subsequently, the linkages between climate change and health are discussed, and a set of criteria is identified that can be used to design climate-specific EHIs. An important caveat mentioned is that while some of these characteristics are mandatory for a climate-related EHI, others may be ranked in terms of their importance.

Public access to comprehensive greenhouse gas mitigation information: the example of climate-relevant investments

Harnisch J. 2011
Greenhouse Gas Measurement and Management, 1(1), pp.7-10
http://www.tandfonline.com/doi/abs/10.3763/ghgmm.2010.0017

Review

There has been considerable debate on whether the globe is likely to witness a 2, 3, or 4°C rise in temperature following current development trajectories. While this information is required, it does not allow managers and policy-makers to understand the drivers of emissions and provide proper insights into technology trends and options. This paper argues for the identification of the drivers of emission patterns years before the emissions actually occur, and provides insights into these patterns. Financial information can provide an early warning indicator of trends in specific sectors. Other relevant mitigation information pertains to technology-mix and market share information for selected priority technology markets. The paper emphasizes the need for a clear commitment for longer-term funding of such a 'mitigation information centre' by a group of countries and/or organizations and its importance as a prerequisite upon which to base mitigation policies. The paper is a relevant piece of research for policy-makers as it recognizes an impending problem of an institutional and technological gap in the ways in which GHG reporting is carried out around the world and proposes a solution by emphasizing the importance of including timely access to quality information on market trends and drivers of emission reductions.

Keywords
Climate change, development assistance, fast-start funding, financial flows, green investment, mitigation, monitoring.

In brief

This paper argues that to address greenhouse gas measurement and management and the broader climate mitigation challenge, there is a pressing need for public access to additional types of mitigation-relevant information. Any shift in policy focus at the international level from binding emission caps at the national level is likely to influence the development of international, national, and corporate mechanisms, including methodologies for monitoring and abatement of greenhouse gases. These changes will further depend on a larger set of data to direct specific mitigation activities, beyond simple greenhouse gas emission data. Additionally, if the future climate regime calls for higher conformity in relation to technology standards or efficiency standards as opposed to total emission targets, then the new reporting systems would need totally different types of datasets. This paper emphasizes the need to have access to updated information beyond emission data, such as data on investment flows and technology market shares.This information access is essential in order to complement the existing quantitative information on greenhouse gas emissions from countries, sectors, products, and companies. Specifically, there is a need for suitable indicators pertaining to investment in climate-friendly and energy infrastructure to support decision-makers in anticipating and detecting economic and political trends of relevance. While the use of fragmented, existing information for this purpose is useful and desirable, appropriate coordination at the global level with funding support and clear demarcation of responsibilities is likely to be a critical success factor.

The new competition for land: food, energy, and climate change

Harvey M and Pilgrim S, 2011
Food Policy, **36** (1), pp.S40-S51
http://www.sciencedirect.com/science/article/pii/S0306919210001235

Review

Land, as a resource, faces pressure from multiple directions, all claiming to be the best possible use of land resources. Specifically, the key sector for which land is likely to be diverted is energy, particularly to meet transport needs and the demand for food. Recent debates indicate that food production remains the priority for land use. However, given that the world is facing a decline in available oil reserves and in the absence of alternate options of energy, there will be major impacts on the national, regional, and global economies in different ways, due to competition for land. Enhanced and sustainable social welfare will depend on developing new forms of agricultural production of both energy and food, highlighting the significance of 'the sustainable intensification of global agriculture'. This paper is important as it highlights the elements of a complex interaction: growing and changing demand for food; demand for energy and materials derived from biomass in the context of oil depletion; GHG emissions from current agricultural practices and land-use change; and climate change itself as a constraint on land available for cultivation at high levels of productivity. A key element of future development will be to meet increasing demands on land by the intensification of low-carbon gas-emitting agriculture, by all technological means possible. The paper highlights innovation pathways in three different biofuel producing areas—USA, Brazil, and Europe; and highlights that these are shaped not only by different political objectives but also different natural resource endowments and different potentials for technological innovations. The key message is that different technologies will emerge and dominate different regions, including different transport and vehicle systems.

Keywords
Land, food, energy, biofuel, climate change, USA, Brazil, Europe, technology, agricultural intensification, greenhouse gas emissions

In brief

The paper discusses the competition for land resources and the issue of land-use change due to the rising demand for food and energy, specifically for the transport sector. The linkages between land, food, and energy become further convoluted in the light of climate change. This is so not only because agriculture contributes to greenhouse gas emission, but also because climate change itself can alter the productivity and availability of land. This paper reviews the key factors leading to increased competition for land as a resource—primarily the demand for liquid fuel and the decline in available global oil reserves. Additionally, the paper points out that political factors and related market forces can add to the demand for land. The paper reviews the biofuel innovation pathways in the USA, Brazil, and Europe, and suggests that political, social, and technological factors have a major influence on the competition for land. The paper concludes that there is a need for an integrated approach to the food-energy-environment nexus, and strong political support is required to boost innovation and sustainability, to enable sustainable intensification of agriculture rather than the expansion of the area under cultivation.

Accounting for carbon dioxide emissions from international shipping: burden sharing under different UNFCCC allocation options and regime scenarios

Heitmann, N and Khalilian, S. 2010.
Marine Policy, **35**(5), pp.682-691
http://www.sciencedirect.com/science/article/pii/S0308597X11000443

Review

GHG emissions from aviation and maritime transport account for approximately 5% of total anthropogenic emissions and they are rising rapidly. Being a significant source, they should be included in any future climate agreement. Yet, this has proven to be a difficult issue. While the Kyoto Protocol instructs Annex I countries to reduce emissions from bunker fuels, working through the International Maritime Organization (IMO) and the International Civil Aviation Organisation (ICAO), little progress has been made towards the reduction of these emissions within these bodies. Even the Copenhagen Accord or the Cancun Agreements did not have anything on these emissions. However, the overall effectiveness of global GHG mitigation efforts would be improved if emissions from the sector are also included. Further, these sectors could be sources for new and additional climate finance. However, implementation thereof depends on political will and global agreement, which at the moment is not likely. As there are apprehensions from most of the developing countries on the pretext that it would be differentially disadvantageous to them to agree for such a regulation. These include large economies that are landlocked or that do not engage significantly in shipping, and that will be highly disadvantaged if a shipping regulation is passed. Therefore, robust studies are required that would enable the design of appropriate instruments for the sector. The paper asserts that an allocation of international shipping emissions should be conducted on the basis of the operating company, since they have most control over the emission levels of their ships by regulating speed and routes. Furthermore, they are in a position to charge their clients or the ship owners for their services.

Keywords
International shipping, burden sharing, UNFCCC, greenhouse gas emissions, Kyoto Protocol

In brief

Greenhouse Gases (GHG) emissions from international shipping are currently unregulated as they are not included in the Kyoto Protocol's emission reduction targets. The paper suggests that there could be two approaches to deal with these emissions; a UNFCCC-based approach where emissions will be allocated to individual countries; and a sectoral approach where emissions will be allocated within the shipping sector, which only considers UNFCCC based approaches. The paper investigates options for allocating CO2 emissions from international shipping to individual countries and evaluates these proposals on the basis of environmental effectiveness (the potential emission reductions), possibility of legal implementation (the potential for preventing regulation evasion), and fairness of burden sharing (based on the 'Polluter Pays' principle, with polluters defined as countries that import and export goods and countries that employ ships). The paper concludes that while there is no single allocation option that meets all criteria, the simplistic option of allocation to Parties in proportion to their national emissions is the best avenue as, in the Copenhagen Accord scenario, it burdens the largest economies in terms of overall emissions and trade benefits in the Kyoto Protocol scenario.

Climate change, individual responsibilities, and cultural frameworks

Heyd T, 2010
Human Ecology Review, **17**(2), pp.86-95
http://www.humanecologyreview.org/pastissues/her172/heyd.pdf

Review

The central argument of this article is that the cultural dimensions of society are vital for deciphering individual responses to global environmental change. The paper defines the role played by cultural frameworks as to 'manifest themselves in the ensemble of beliefs, values, priorities, practices, and material support that characterize particular patterns of human thought, attitudes, and behaviour'. The most prominent contribution of the article is to identify the two areas of individual/ societal responses to global environmental change in which these frameworks play a role and highlight them with respect to adaptation and mitigation strategies. Such individual action, even if limited by inadequacies of the institutional support at national and international governance levels, can form a second order solution by bringing in the changes that could address the looming issue of climate change. The paper supports its arguments by citing various cases, but does not lead to a detailed empirical case study. Therefore, it remains largely as a harbinger, and depends upon succeeding research to justify its arguments or provide advice for the formulation of strategies. However, the paper gives a fresh perspective to the governance of climate change and identifies a gap for further research.

Keywords
Climate change, cultural frameworks, governance, individual responsibilities, behaviour, societal response

In brief

The author emphasizes the scope of individual responses against the background of limited development at the level of national governments and international institutions, with the basic assumption that individuals bear ethical and prudent responsibilities with respect to climate change. The author further proceeds to identify and explicate the main areas where cultural dimensions frame these responses significantly. They shape the individuals' conceptualization of environmental forces and mould their adaptation strategies and actions accordingly. These dimensions constrain or enable the collective action in non-governmental, citizen-led governance. The paper concludes with the consideration that the cultural frameworks prevalent in society are an indispensable facet in inculcating an understanding of its responses to climate change.

Predictability, equitability, and adequacy of post-2012 international climate financing proposals

Hof AF, den Elzen MGJ, and Beltran AM, 2011
Environmental Science and Policy, **14**(6), pp.615-627
http://www.sciencedirect.com/science/article/pii/S1462901111000724

Review

Climate finance has been a key issue in climate talks as it is an important enabling factor to promote mitigation actions, to develop robust adaptation strategies and to evolve new technologies. The UNFCCC asks developed country Parties to provide new and additional financial resources to developing country Parties to cover fully agreed incremental costs of climate actions (Art 4.3) with Art 4.7 further emphasizing that developing country commitments will depend on the financial resources transferred from the developed countries. Para 1(e) of the BAP also called for enhanced action on the provision of financial resources to support mitigation, adaptation, and technology cooperation. Further to this climate talks in Copenhagen concluded with a commitment by developed countries to provide $30 billion for by 2012 and mobilizing jointly $100 billion a year by 2020, which was reinstated in the Cancun Agreements. While the Accord suggests raising funds from a wide variety of sources, public and private, bilateral and multilateral, including alternative sources of finance but how this funding will be raised is still open to interpretation. The Cancun Agreements ascertain that a significant portion of such funding will flow through the Copenhagen Green Climate Fund. A key message of the paper is that the amount of revenue generated not only depends on carbon price but also on the global emission reduction effort and how this effort is distributed between countries, suggesting that revenue generation indirectly depends on the mitigation target.

Keywords
Predictability, equitability, adequacy, post-2012, climate financing, mitigation, emission targets, Copenhagen Accord, pledges

In brief

The paper assesses four proposals to generate climate finance for developing countries. These are: auctioning emission allowances (Norwegian Proposal_N, auctioning on 2% from Annex 1 countries' emission allocations); a global carbon tax (Swiss Proposal- a global carbon tax of $ 2 per t CO_2 with a basic exemption for each country of $ 1.5 t CO_2 per capita); an emissions trading levy; and a tax on international aviation and shipping emissions (bunker fuel emissions tax–a tax on international aviation and shipping emissions at a level equal to the global carbon price). The paper uses three criteria of adequacy, predictability, and equitability to assess these proposals. Adequacy and predictability are assessed by calculating the level of revenue generated by each proposal for three mitigation scenarios—one that is based on the unconditional Copenhagen Accord pledges, one that is based on the conditional Copenhagen Accord pledges, and one that is compatible with meeting a 2 °C climate target. Equitability is assessed by comparing the regional distribution of costs with the distribution according to a direct budget contribution based on a historical responsibility and capability criterion, so that principle common but differentiated responsibilities and respective capabilities are met. The paper concludes that the Swiss Proposal of a global carbon tax and the proposal of a tax on international transport or the bunker fuel emissions tax are the most promising climate finance proposals of the four. However, the paper cautions that the low-ambition level of current unconditional pledges under the Copenhagen Accord, which would result in low carbon prices, would greatly undermine resource generation from all financing proposals except for the Swiss Proposal.

Infrastructure in the face of climate change: what implications for long term investors?

Holm A., 2010
Climate Report No. 22. Paris: CDC Climat Research
http://www.cdcclimat.com/IMG/pdf/Climate_report_22_Infrastructure_climate_and_long_term_investors_c_CDC_Climat_research_2010.pdf

Review

This paper highlights a pertinent issue related to the viability of economic ventures that are dependent on infrastructural arrangements in the light of climate risks, especially in emerging economies. While such infrastructural investments can address potential climate risks by integrating adaptive measures in their design and operation, opportunities for reduction of greenhouse gas emissions can also be tapped. The paper points out the role of different institutions and the institutional capacities in making infrastructure 'green' or 'adapted'. In this paper, 'green infrastructures' refers to those which help in reducing greenhouse gas emissions; while 'adapted infrastructures' refers to those that help in adapting to future climate conditions of the given region. Given the complexities of the issue, this paper has given an approach to implement climate compatible actions that keeps risks and reward in mind. The paper sheds light on the policy and regulatory frameworks to support and foster cooperation between public and private sectors for long-term investments in the climate change context. Though not explicit, there is also an underlying mention of building soft infrastructure in this paper. Another value of this paper is in its presentation of various tools and options that can be used by long-term investors to integrate climate risk criteria into infrastructural investments.

Keywords
Infrastructure, climate change, long-term investors, risk management, private investments

In brief

This paper argues that the construction of climate compatible infrastructure is intrinsically linked to public policy, but equally also to the private sector as emphasized during the Copenhagen discussions. The paper indicates that to optimize the management of risks linked to climate change, long-term investors can work around the choice of infrastructures. The paper concludes by highlighting that long-term investors can consciously integrate climate concerns into their calculation of the risks and profits of infrastructural investments, with appropriate support from public policy incentives in order to obtain obvious economic benefits and also accrue social benefits for society at large. One important objective of the paper is to point out that it is in the interest of long-term investors to incorporate the cost implications of climate change in their investment or risk calculations. The paper finds, however, that the task is huge. Before scale up begins, it must be properly synchronized with public policy. While there are many questions that need to be answered, like the choice of technologies for GHG reduction and myriad other questions, the paper is optimistic that science will be able to rise to the challenge and answer the questions. The paper indicates that in 'all likelihood, the learning process will be long, complex, and meticulous, like international climate issues themselves. It is nevertheless indispensable in view of the climate situation and it promises to be highly instructive for all the public and private players involved'.

Climate change-related vulnerabilities and local environment public health tracking through GEMSS: a web-based visualization tool

Houghton A, Prudent N, Scott JE, Wade R and Luber G. 2011
Applied Geography, 33, pp.36-44
http://www.sciencedirect.com/science/article/pii/S0143622811001494

Review

Understanding and responding to impacts of climate change requires a robust monitoring and tracking system that can leverage existing datasets and resources to identify population groups or regions that are potentially more vulnerable to these impacts. This paper presents an application of the Geospatial Emergency Management Support System (GEMSS) tool, which may offer a platform for developing local climate change Environmental Public Health Indicator (EPHI) tracking programmes. While the model can provide the general public and policy-makers a means to track long-term changes, it can at the same time provide emergency workers with information that can be used to respond to short-term trends during a climatic hazard. However, it is imperative that additional research and statistical analysis validates the results of such a model and addresses limitations in terms of data gaps, quality, and scale issues, etc. The paper argues that such an advanced tailor-made visualization and tracking design can also encourage and aid research on local adaptation needs and effectiveness of adaptation options in reducing vulnerability. The approach discussed in the paper, if improved and adopted, can potentially enhance the ability of decision-makers to leverage and channel existing resources for strategic climate change adaptation strategies for the health sector.

Keywords
Human health vulnerability, public health tracking, climate change, Environmental Public Health Indicators, heat stress, flooding, GEMSS, web-based, hotspots

In brief

GEMSS (Geospatial Emergency Management Support System) is a web-based, geospatial data integration and assessment platform designed to evaluate vulnerability of public health systems to climate change. The paper used the city of Austin, Texas in the USA as an experimental case location and evaluated its vulnerability to heat stress and flooding over a six-year period from 1999 to 2005. The experimental case was evaluated using existing datasets, and developed hazard-specific Environmental Public Health Indicators (EPHIs), indicators that combined local environmental, health, vulnerability, and climate policy data on an online, user-friendly GIS viewer that is open to both policy-makers and the general public, to perform visual assessments for identifying vulnerable populations. As an open-source web-based tool, GEMSS can link and compare diverse spatial information. GEMSS thus has the potential to be an easy-to-access tool for policy-makers to identify vulnerability hotspots, and visualize and promote targeted mitigation and adaptation interventions. The paper highlights the multiple benefits that GEMSS provides, which include monitoring and assessing climate-related vulnerability, improving the capacity of policy-makers to understand impacts on vulnerable communities, raising public awareness, and strengthening epidemiologic research related to climate change and public health vulnerability.

Climate instruments for the transport sector: considerations for the post-2012 climate regime

Huizenga C and Bakker S. 2010
Manila: Asian Development Bank and Washington, DC: Inter-American Development Bank. 96pp.
http://environmentportal.in/files/CITS-english.pdf

Review

So far, the impacts of existing mechanisms, such as the Clean Development Mechanism, Global Environment Facility, or Clean Technology Fund in the transport sector have been limited for reasons like lack of funding, stringent MRV requirements, and competition with other sectors. While climate talks for mechanisms post-2012 are underway, NAMAs, as a mechanism, are perceived to spur climate mitigation actions in developing countries, especially in sectors like transport. In this light, this paper brings out the critical role that NAMAs can play in supporting mitigation activities in the transport sector of developing countries.

One important contribution of this paper is that it argues that both the conventional cost-effectiveness approach, as well as the criteria for incremental cost envisaged in the current negotiating text, can impede the role of the transport sector in contributing actively to mitigation. In this regard, this paper voices the need for new and relevant evaluation criteria for the development of supported transport NAMAs. The paper also points out that NAMAs could contribute to capital investment costs as well as barrier removal costs.

Keywords
Climate instruments, transport sector, NAMA, Asia, Latin America, cities, MRV, transport demand management

In brief

The report highlights several case studies that were conducted in Asian and Latin American cities to explore how urban transport policies and programmes could be developed as supported NAMAs. The report covers issues related to the scope, institutional involvement, financing, and monitoring of NAMAs. The proposed NAMA in Jakarta, Indonesia, is centred on the city's transport demand management policies—namely, road pricing, parking policies and public transport. The proposed Mexico City NAMA focussed on the optimization of the existing conventional bus system. The NAMA in Belo Horizonte, Brazil, proposed an integrated mobility plan that includes investments in non-motorized and public transport infrastructure, as well as combined land-use. The case study in Hefei, People's Republic of China, focussed on one aspect of the NAMAs: the potential of standardized baselines (SBLs) to simplify the MRV, a critically important component for the successful implementation of transport sector NAMAs. All case studies concluded that transport sectors have the potential to yield significant local and global environmental benefits as well as economic and social benefits. The authors argue for the need to operationalize NAMA mechanisms for any post-2012 climate agreement to achieve full mitigation potential in developing countries.

A 'must-go path' scenario for sustainable development and the role of nuclear energy in the 21st century

Jeong H, Kim Y and Lee Y. 2010
Energy Policy, **38**(4), pp.1962-1968
http://www.sciencedirect.com/science/article/pii/S0301421509009276

Review

An increase in the world population has accelerated the consumption of fossil fuels and deepened the pollution of global environment. As a result of these human activities, it is now difficult to clearly guarantee the sustainable future of humankind. Given this, a 'must-go path' is envisaged in the paper where an important condition is the sustainability of energy without further pollution. Some other interesting points in the paper seem apparent, but are thought-provoking. First, non-renewable energy resources have to be saved from complete depletion. Second, energy from the current nuclear power plants, which produce energy from fission of uranium, cannot be considered sustainable because the uranium resource is also limited and it unavoidably accumulates the spent fuel, which is highly radioactive, and therefore problematic to future generations. And the paper also argues that economic systems and industries for the wide use of renewable energy are not yet well prepared, mainly because renewable energy is usually weather dependent and uncontrollable. Therefore, for the time before renewable energy becomes efficient as a meaningful energy source for the current civilization, it seems advantageous to continue the use of nuclear energy, which supplies relatively clean energy when it is compared to the energies from fossil fuels. It means that the role of nuclear energy is essential in the early 21st century. The paper makes an interesting observation on fast nuclear technology: if nuclear energy were made safer, fast nuclear systems may be an option as a stop-gap arrangement in the path from fossil fuels to complete renewable energy.

Keywords
Sustainable development, nuclear energy, renewable energy, fast reactor, technology transfer

In brief

This paper suggests an intuitional 'must-go path' scenario for the sustainable development of human civilization. The paper does this primarily by extrapolating human historical data over 30 years between 1970 and 2000. The important tenet of the paper is based on the fact this 'must-go' path is essentially the sustainability of energy usage without further pollution. Here, it may be noted that in certain countries nuclear energy may be advantageous to increase sustainability. The key recommendations are that for countries with mature nuclear technology it will be worthwhile to deploy fast reactor systems. Energy efficiency has to be promoted and international cooperation to accelerate technology transfer needs to be accelerated. It concludes that more cooperation between countries and worldwide collaboration coordinated by international organizations are essential to make the 'must-go path' scenario real in the upcoming 20 or 30 years. The paper ends by emphasizing that the present energy system has set into inertia, and the bigger the system the stronger will be the force required to change this present system. It says that the 'must do' action will be painful but should be our 'must-go' path. A global effort has to be synchronized to overhaul the system.

REDD monitoring, reporting and verification systems in Nepal: gaps, issues and challenges

Jha BN and Paudel G. 2010
Journal of Forest and Livelihood, **9**(1), pp.21-32
http://www.forestaction.org/im/images/stories/journals/3._Bidya_N._Jha_and_Govinda_Paudel.pdf

Review

Nepal has diverse forms of forest management regimes including different community-based models and, therefore, can provide insights from its experiences in the sector, to inform the design of a new mechanism for the future of REDD+. A monitoring system for the forestry sector has been place in Nepal since the 1960s, originally designed with the purpose of generating revenue from the forestry sector, and periodic forest resource assessments are conducted under the monitoring system using different methodological tools. The monitoring system is also part of Nepal's forest policy. However, there are gaps in the existing forest resource monitoring system in Nepal as it has yet to meet the standards of the Intergovernmental Panel on Climate Change (IPCC) Good Practice Guidance (GPG). Besides this, the authors highlight gaps in Nepal's current monitoring system, such as lack of a consistent and systematic approach for monitoring and recording forest information, lack of transparency as the forest resources inventory database are not publicly available, lack of comparability as the methods and data used are inconsistent, lack of sufficient data on a variety of parameters, sources of error and uncertainty, human resources capacity and dependency on external sources for remote-sensing data. This signifies that in designing appropriate REDD+ MRV, principles, such as relevance, comprehensiveness, consistency, efficiency, robustness, community participation, equity, long-term stability, and compatibility with existing institutional mechanisms should be considered and have important implications for future climate regime.

Keywords
Forests, REDD, co-benefits, greenhouse gases, Nepal, forest inventories, challenges, monitoring, reporting, verification

In brief

The authors analyze the existing forest resource monitoring system in Nepal to identify possible issues and challenges for designing and implementing a MRV system for REDD projects in Nepal, and suggest an MRV system design that builds on existing institutions. The authors, through their understanding of the current policy provisions and institutional infrastructure in Nepal, identify existing gaps for designing and adopting the REDD MRV. The key learning from this paper is the increased role of existing institutions; higher cost is incurred in establishing a new structure for REDD+MRV. This is discussed in a case study on the central forest monitoring organization in Nepal, the Department of Forest Research and Survey (DFRS). This can be expanded by adding an additional division to deal with REDD+ implementation or restructuring the current Forest Survey Division under the DFR Scan to make it compatible with REDD implementation. The authors further suggest that medium resolution satellite imageries for mapping deforestation can be acquired and can be accompanied by ground-based forest inventories engaging local communities in the national forest resource assessment of Nepal (FRA 2010). This can be taken as an opportunity to design a low cost REDD+ MRV system than can be recommended to the international regime.

Renewable energy policies and technological innovation: evidence based on patent counts

Johnstone N, Hascic I and Popp D. 2010
Environmental and Resource Economics, **45**(1), pp. 133-155
http://www.springerlink.com/content/31530165m2382l28

Review

Although the renewable energy market is growing, the widespread penetration of these interventions still faces limitations. While it is clear that the support for R&D in these spheres leads to increased innovation, public policy options introduced by the state can influence and encourage their adoption. The study adds value by empirically testing the effectiveness of policy interventions in both price-based policy supports and quantity-based instruments. It also demonstrates that within the field of renewable energy, price-based instruments (tax measures, tariffs and investment incentives) encourage patenting in solar biomass and waste-to-energy technologies. On the other hand, quantity-based instruments (obligations and tradable certificates) are important for wind technology. The study provides empirical evidence that can be used to inform the strategies of other countries, especially in the developing world, to spur the growth of the renewable energy market and adoption of its technologies. The breadth of countries and the time period taken for the empirical analysis adds much value to the study findings. Additionally, as the study demonstrates that amongst a range of instruments only a select few have a significant impact on innovation in renewable energies, policy-makers across different countries can opt for pursuing these specific interventions based on their choice of renewable energy intervention.

Keywords
Environmental policy, innovation, patents, renewable energy, technological change, OECD countries

In brief

This study aims to examine whether public policy has played a significant role in fostering innovation in renewable energy technologies within the Organisation for Economic Co-operation and Development (OECD) countries. The analysis for this study covers a 26 year time-period (1978-2003). The study uses variable patent activity as a proxy for technological innovation and examines the role of public policy instruments on this issue. The study assesses the effect of numerous policy variants, for instance price supports, tax credits, voluntary programmes, tariffs, and obligations on patent activity in the spheres of solar energy, wind energy, bio-energy, ocean, and geothermal energy. The data analysis indicates a sharp rise in patent activity related to wind and waste-to-energy since the mid-1990s and continuing innovation in the field of solar energy. Innovation efforts using biomass, geothermal, and ocean energy however are found to be low. The study argues that public policy specifically does play a key role in prompting an increase in patent activity in renewable energy technologies, which can be equated to innovation in this sphere. The study reveals taxes, obligations and tradable certificates as the most significant policy instruments, while stressing that the efficacy of policy instruments differs for different renewable energy sources.

The right to development in a climate constrained world: the Greenhouse Development Rights framework

Kartha S, Baer P, Athanasiou T and Kemp-Benedict E. 2010
Der Klimawandel, Part 4, pp.205-226
http://www.springerlink.com/content/v378t71001g58835/

Review

The key to any future climate regime will require an agreement on the basis of effort-sharing i.e., who should do what, how much, and when. This has, to date, been a critical stumbling block in climate talks and, evidently, the international climate policy impasse will not be broken without a fair global effort-sharing architecture. The suggested Greenhouse Development Rights (GDR) framework asserts that the 'right to sustainable development' is not only ethically justifiable, but also, fundamentally, a non-negotiable foundation of any climate agreement. The framework suggested by this paper is, interestingly, premised on the urgency of global decarbonisation and the fact that the world is twice-divided—first sharply polarized between the nations of the North and the nations of the South and, second, between the rich and the poor people within those nations. While defining responsibility and capacity, the authors deviate from using national per capita averages and use individuals as an entity, taking into account unequal distribution of income within countries. The paper suggests that the atmospheric space remaining for developing countries would be extremely constrained, even when developing countries are still struggling out of poverty and desperately seeking a meaningful improvement in their living standards. Given that access to energy is the key to development, the paper suggests technology and financial transfers from developed countries to the developing countries, and that the Responsibility Capacity Index (RCI) and GDR framework could serve as the basis for determining each nation's obligatory financial contribution to a single climate fund. Obligations on this scale seem implausible but are unavoidable. To accomplish this, developed countries should drive ambitious domestic reductions, ensuring sufficient atmospheric space for developing nations. There should also be equally ambitious international reductions, enabled by technological and financial support from the developed countries. It is only by accepting such a two-fold obligation that developed countries can enable a climate regime that is consistent with the right to development.

Keywords
Greenhouse Development Rights, atmospheric space, emissions, Responsibility Capacity Index, sustainable development, UNFCCC

In brief

The paper suggests a 'Greenhouse Development Rights (GDR) framework' to ensure the right to sustainable human development while at the same time driving global emissions reductions. The paper defines a global emissions objective of keeping the temperature increase below 2°C by charting out a '2°C emergency pathway', and point outs that doing so will demand ambitious initiatives, and a robust climate policy architecture. The framework is based on the simple proposition that the poor must be excused from the burdens of any climate transition. The suggested framework is based on equity principles of responsibility and capacity as defined by the UNFCCC principle of common but differentiated responsibilities and respective capabilities. GDR defines both responsibility and capacity in terms of a development threshold—a level of welfare below which people are not expected to share the costs of the climate transition by expending their limited resources to keep within a global carbon budget. These measures of responsibility and capacity are then combined into a single indicator of obligation—the Responsibility Capacity Index (RCI). The paper suggests ways to operationalize the index to progress climate talks through a two-fold obligation approach.

Comparison of Annex 1 and non-Annex 1 pledges under the Cancun Agreements

Kartha S and Erickson P. 2011
Working Paper WP-US-1107. Stockholm: Stockholm Environment Institute
http://sei-us.org/publications/id/393

Review

Effort sharing has been one of the central issues in climate negotiations. Many commentators analyzed the mitigation pledges of all countries to examine them in the context of effort sharing. While mitigation obligations have always been in the context of developed countries, mitigation as elaborated in the Cancun Agreements may result in significant changes in the international climate regime. This was the first time that even developing countries were obliged to undertake emission reduction targets and actions pledged under the Copenhagen Accord, and the Cancun Agreement anchored these pledges in the formal process. While bottom-up efforts were much discussed and many argued for a pledge and review system, it is evident that these pledges are inadequate to achieve the stated global target of a 2 °C limit on temperature change. Given that developing country pledges are higher that of the developed countries, it is a reversal of the principle of CBDR that called for developed country Parties to take the lead. Further, this raises questions on the future of Kyoto Protocol and its second commitment period and may be perceived as a step backward by postponing a decision on a second commitment period indefinitely through a new regime that is flexible and voluntary. The authors highlight critiques claiming that current pledges reflect inequitable effort sharing, with developed countries pledging less for mitigation than developing countries. Such critiques point out that the pledges from developing countries are, in part, conditional on developed country support, and that most global emissions now arise from developing countries, where most mitigation must ultimately occur. In this context, the authors analyze all four studies. On comparing developed country pledges with the low and unconditional pledges of developing countries, the authors conclude that these low pledges are either equal to, or much larger than, the high pledges of developed countries. Again, the authors highlight that the second argument confuses the need to efficiently distribute mitigation with the need to equitably distribute effort.

Keywords
Annex 1, non-Annex 1, mitigation, Cancun agreement, pledges, comparison, technological cooperation, financial support

In brief

The authors review four recent detailed studies (UNEP: The Emissions Gap Report; Climate Action Tracker; McKinsey & Company Climate Desk v2.1; Frank Jotzo, advisor to the Garnaut Review) of country pledges under the Cancun Agreements so as to compare an aggregate of developed country pledges to that of developing country pledges. The authors conclude that there is a broad agreement that developing countries' pledges amount to more mitigation efforts than developed countries' pledges, despite the diversity of assumptions in their pledges. While comparing pledges is complicated due to the fact that countries have expressed their pledges in different ways, in each study the pledges are converted to an actual emissions target in 2020, and then compared against a plausible reference; business as usual. At a global level, mitigation pledges could cause global temperature rise of greater than 2 °C and possibly as much as 5 °C. Therefore, it is required that developed countries increase their level of ambition through science and equity.

Climate change adaptation strategies in the Mekong and Orange-Senqu basins: what determines the state-of-play?

Kranz N, Menniken T and Hinkel J. 2010
Environmental Science and Policy, **13**(7), pp. 648-659
http://www.sciencedirect.com/science/article/pii/S1462901110001139

Review

Literature has always recognized the need to integrate climate change issues into transboundary river management. However, very little is known as to what degree climate change risks have been incorporated in the policy formulations of different transboundary river commissions. This paper tries to fill this gap by comparing policy formulation processes in two river basins using the activity diagram of the Management and Transition Framework in order to explain the differences in progress towards formulating climate change adaptation strategies. It infers that the factors responsible for effective transboundary regimes are also critical for developing climate change adaptation strategies. But, citing these limitations, the paper actually broadens the research issue and also indicates the effect of such integration on overall cooperation and management of transboundary regimes. The paper highlights the need for capacity in transboundary river commissions to formulate adaptation strategies for managing water efficiently within the basin under uncertain conditions. Another key contribution of the paper is that it identifies the research gap on the influence of integration of climate change risks into the cooperation and functioning of transboundary water governance.

Keywords
Adaptation, Mekong, Orange-Senqu basin, transboundary, river basins, climate change, uncertainty

In brief

This paper attempts to explain the varying degrees of progress towards climate change adaptation action along transboundary river basins with the help of regime effectiveness theory. It uses the activity diagram of the Management and Transition Framework for a comparative analysis of the Orange-Senqu river basin in southern Africa, and Mekong river basin in South East Asia. The paper demonstrates how effective river basin commissions and other elements of transboundary regimes interact in forming climate change adaptation policy. The paper concludes that factors constituting the high effectiveness of governance regimes in transboundary river basins are also likely to foster the development of climate change adaptation strategies. These regime effectiveness variables are characteristics of rules and procedures, organizational structures, and approaches of individual riparian countries in the international context. The paper also points out certain limitations of the comparison elements, such as the hydrological, political, and socio-economic setting, underlying principles of regional cooperation or conflict, interests and values of the various actors in the negotiation process, and the possible linkages and trade-offs with other policy fields. The relationships of the involved parties with these and other factors have not been analyzed.

Using adaptation tipping points to prepare for climate change and sea level rise: a case study in the Netherlands

Kwadijk JCJ, Haasnoot M, Mulder JPM, Hoogvliet MMC, Jeuken ABM, van der Krogt RAA, van Oostrom NGC, Schelfhout HA, van Velzen EH, van Waveren H and de Wit MJM. 2010
Wiley Interdisciplinary Reviews: Climate Change, **1**(5), pp.725-740
http://wires.wiley.com/WileyCDA/WiresArticle/wisId-WCC64.html

Review

While suggesting the concept of Adaptation Tipping Points (ATPs), the paper tests the applicability of this idea in the context of water management strategies in the Netherlands. The ATP idea deviates from the top-down approach by infusing ideas from the bottom-up approach, and analysis is carried out using the Driving forces-Pressures-State-Impacts-Responses (DPSIR) concept. This paper recognizes problems in current approaches that support climate adaptation policy and provides an alternative approach (ATPs) to help policy-makers plan the adaptation. The authors employ the concept of ATPs in their study and demonstrate the success of the concept in providing solutions and support to help long-term planning by decision-makers to cope with an uncertain future. The concept of ATPs as put forth in this paper is pertinent in relation to crossing critical thresholds in ecosystems. This concept also provides a basis for communicating uncertainty to policy-makers, in terms of the level beyond which specific strategies or actions become ineffective.

Keywords
Adaptation tipping points, Netherlands, uncertainty, flood defence, water management, sea level rise

In brief

This paper deals with the concept of 'Adaptation Tipping Point (ATP)', and its relevance in improving the existing bottom-up approach while dealing with decisions in long-term water management adaptation. A detailed review is provided on the existing top-down and bottom-up strategies employed in climate adaptation, what they entail, and the disadvantages of both these methods. The paper also suggests that the recognition of ATPs does not ensure that adaptation will be successful, and provides a brief overview of reasons limiting this success. The methodology employed in this study includes results from a number of simulation studies and model concepts; assessments of current water management systems were concentrated on flood defence, typified by the protection of Rotterdam Harbour, and on fresh water supply. The paper also traces the concept of ATPs in the Netherlands over time. The authors argue the case for employing the concept of ATPs based on its ease, clarity, and ability to allow for a greater understanding of pitfalls in a system, alongside backing decision-makers in the face of an unclear future. The paper concludes that the sector most vulnerable to sea level rise by an ATP is likely to be fresh water supply in the west of the Netherlands.

Addressing climate change in comfort standards

Kwok AG and Rajkovich NB. 2010
Building and Environment, **45**(1), pp.18-22
http://www.sciencedirect.com/science/article/pii/S0360132309000456

Review

Historically, there are a few popular international standards that refer to adaptive thermal comfort, such as the International Standard ISO 7730, ASHRAE 55 (American Society of Heating, Refrigerating & Air-Conditioning Engineers), and CEN 15251 (European Committee for Standardization). However, not much exists in local building standards and codes for using adaptive thermal comfort. This paper addresses a key issue of the need for more research on contextualised comfort ranges and subsequent adoption of adaptive comfort models and strategies in building codes and standards in such a way as to ensure that they are widely adopted by building proponents, including architects and designers. This would be essential to facilitate the transition to a climate resilient, energy-efficient building sector. Building codes, standards and rating systems are among the most powerful instruments to bring in substantial changes in the way buildings are built and operated. This paper provides an opportunity for changes in the design and delivery of policies and practices in the building sector through extensive changes in the existing building codes and standards. Popular standards like ASHRAE and environmental rating systems like environmental rating systems like Leadership in Energy & Environmental Design (LEED) have attempted to contribute to this aspect but these efforts need to be buttressed and scaled up. This paper offers a solution in the form of a paradigm shift to changes in the building codes and standards on the basis of an 'adaptive comfort' model instead of the conventional 'static' model of comfort.

Keywords
Climate change, mitigation, adaptation, thermal comfort, energy use

In brief

Buildings continue to be among the largest contributors to GHG emissions worldwide. Mitigation and adaptation strategies have conventionally been suggested as either/or options to address climate change. However, the two approaches are reconcilable in the context of green buildings. This paper addresses the need for both adaptation and mitigation to be adequately addressed through building codes and standards. The potential of adaptive thermal comfort vis-à-vis a 'static model' to ameliorate the impacts of climate change has been emphasized in this paper. The paper concludes by highlighting the need to define an intermediate zone of comfort viz. a 'meso-comfort zone' and for further research to quantify the local, adaptive strategies for the same. The paper draws attention to certain key questions that can enable architects and designers to address climate change in comfort standards, with a major focus on influencing behavioural adaptation apart from structural changes in building design. Additionally, the need to build capacities of engineers and architects with respect to modified comfort zones to broaden the acceptable range of thermal comfort and thereby contribute towards reducing energy consumption is underscored. The application of flexible energy-efficient design for comfort in current and future buildings can go a long way in contributing towards the transition to a low-carbon economy, while also considering aspects of resilience and energy sustainability.

Improved probability of detection of ecological 'surprises'

Lindenmayer DB, Likens GE, Krebs CJ and Hobbs RJ, 2010 *Proceedings of the National Academy of Science of the United States of America*, 107(51), pp. 21957-21962 http://www.pnas.org/content/107/51/21957.full.pdf+html

Review

As the phenomenon of climate change unveils itself, some of its impacts can manifest in an unexpected manner in the form of unusual events. The chances of such surprises are intrinsic to coupled human-environment systems, due to the numerous dynamic interactions between their components and the existence of multiple stresses on these systems. Incidences of such surprises are not new and there have been empirical studies that have enhanced understanding of their causes. The paper sets out the state-of-the-art across such studies and draws lessons for better anticipation and planning to avoid such surprises. Certain dynamic aspects of such coupled systems often escape notice, either due to prioritization of only a few elements for economic value and/or due to logical biases. As a result, the impacts of some of these changes are realised only after a time lag and this may result in undesirable and often irreversible impacts. Currently however, there is a research gap for detecting such events. This paper analyzes four case studies of unusual ecological events across different ecosystems in North America and draws lessons for the early detection and better investigation of such ecological surprises. A key message that emerges for climate scientists, policy- makers, and development practitioners is the need to support and sustain long-term ecological research to monitor any change at the ecosystem level, thereby allowing for better preparedness to the potential impacts in the wake of ecological surprises.

Keywords
Probability, ecological surprise, human-environment systems, multiple stressors, uncertainty

In brief

Due to the uncertainty associated with climate change, specifically the degree and extent of the impact associated with the change in environment, the chances of witnessing ecological surprises, or unusual ecological events may increase in the future. This paper presents current knowledge gaps in terms of detection of 'ecological surprise' events. Utilizing case studies, the paper identifies important lessons to guide studies and new investigations for detection of ecological surprises, and steps towards planning for and alleviating undesirable ecological surprises. This paper cites the importance of learning from unexpected events of the past in order to develop the capacity to anticipate future events, and plan to manage or avert the potential impact of these events. This paper presents four case studies of a typical ecological event, which provides key insights and lessons for proactive planning to improve preparedness to deal with ecological surprises. The aforementioned planning includes steps such as: the continuation of existing research alongwith the initiation of new and long-term research on ecosystems and ecological processes; conducting parallel research on ecosystems to capture the dynamics of ecological interactions; developing conceptual ecosystem models, hypotheses and alternative hypotheses based on observed ecological changes; and learning from major past ecological disturbances.

Forests and climate change in Latin America: linking adaptation and mitigation

Locatelli B, Evans V, Wardell A, Andrade A and Vignola R. 2011
Forests, **2**(1), pp.431-450
http://www.mdpi.com/1999-4907/2/1/431

Review

As forest ecosystems play an important role in both adaptation and mitigation, there is a need to explore the linkages between these two, understanding their trade-offs and synergies. In forests, potential trade-offs can be observed between global ecosystem services, such as carbon sequestration and the local ecosystem services relevant for adaptation. Adaptation and mitigation have largely been treated as two distinct approaches to climate change, with global negotiations and policies related to forests focussing more on mitigation than adaptation. Adaptation and mitigation measures have the potential to be mainstreamed into forestry activities in Latin America. Mainstreaming adaptation and mitigation into forest projects can be facilitated by national and international policies, and also by the development of climate change standards for forest projects. Climate change can adversely impact ecosystems and forest-dependent communities thus endangering investments and the successful implementation of REDD+ and/or CDM projects. Additionally, integrating adaptation efforts into mitigation activities can bring about greater engagement of local stakeholders, hence promote greater social acceptability of these efforts. This becomes important while addressing scale issues, especially for grounding mitigation activities that are normally considered to have global benefits only, while not being of adequate use to address local issues. This is an important paper for policy-makers because, by using specific examples, it brings out the rationale behind promoting adaptation-mitigation synergies and it can thereby encourage exploration of policies that can effectively leverage these synergies.

Keywords
Latin America, forests, climate change, community-based adaptation, ecosystem-based adaptation, mitigation, REDD+, CDM, ecosystem services, livelihoods, resilience

In brief

This paper examines opportunities for linking climate change adaptation and mitigation in tropical forests, and understanding the influence exerted by adaptation activities on mitigation potential and vice-versa. Through case-studies in Latin America, this paper explores various approaches and motivations for linking adaptation and mitigation—either by integrating adaptation into mitigation projects, or vice versa. Mitigation projects can facilitate a forest's adaptation to climate change by reducing exploitation, strengthening market linkages, and promoting biodiversity conservation. Mitigation projects such as REDD+ and CDM efforts can enable community-based adaptation by strengthening livelihoods and ecosystem conservation. Interestingly, the paper differentiates between the adaptations of forest ecosystems and adaptation of forest-dependent communities. Additionally, adaptation efforts can help maintain the quality and quantity of forest stock, thus contributing to the carbon sequestration (mitigation) potential of forests. In Latin America, some mitigation projects have demonstrated encouraging results in terms of contributing towards community adaptation, and some adaptation projects have resulted in an increase in forest stocks. The paper identifies that there are still many more opportunities to fully tap adaptation-mitigation synergies.

Tackling long-term climate change together: the case of flexible CCS and fluctuating renewable energy

Ludig S, Haller M and Bauer N, 2011
Energy Procedia, 4, pp.2580-2587
http://www.sciencedirect.com/science/article/pii/S1876610211003535

Review

Future electricity generation scenarios have been controversial, particularly in terms of the share of renewable energy, the role to be played by Carbon Capture and Storage (CCS), and the priorities for investment in this sector. It is generally felt that, in the long-term, natural gas powered turbines are the best option to balance fluctuations in electricity demand and in renewable energy production. Coal power stations with post-combustion capture are another possibility, since these can be operated so as to temporarily produce more electricity at the cost of higher emissions. The paper tackles a very crucial aspect of decarbonizing of the economy through renewable energy only viz., the intermittency of most of the renewable energy resources. This paper has the potential to improve the awareness of decision-makers on relevant cutting-edge issues by way of explaining that post-combustion capture coal power plants are generally neglected when considering possibilities for a low-carbon economy. By improving the understanding of the role of this technology, it seeks to influence future investment decisions in this sector. The findings of the paper are suited to policy formulation, since they deal with the question of which are the most promising options for climate change mitigation.

Keywords
Climate change, renewable energy, carbon capture and storage, mitigation, power sector, investments, technology, low-carbon economy, scenarios

In brief

The paper presents a study to analyze the long-term role of flexible operation of post-combustion capture for coal power plants in balancing the fluctuating nature of renewable energy technologies and the need to reduce carbon dioxide emissions in the power sector. The paper looks at several factors that can influence the future importance of post-combustion capture coal power plants, like the penetration of renewable energy systems, natural gas prices, emission targets and economic constraints among others, and outlines scenarios in which these plants will be a good mitigation option. It therefore attempts to put forward the need for adoption of decarbonizing of conventional technologies, such as coal, so as to achieve the goals realistically. The study discusses a model that has been developed for Germany, accounting for both long-term investments in electricity plant fleet development and short-term fluctuations in demand and renewable energy sources. The study finds that the role played by flexible post-combustion capture will depend on emission constraints and fuel prices, availability of the competing oxy-fuel capture technology alongside renewable energy technologies and storage to reduce the need for this technology option.

Mobilizing private finance to drive an energy industrial revolution

Mathews JA, Kidney S, Mallon K and Hughes M. 2010
Energy Policy, **38**(7), pp.3263-3265
http://www.sciencedirect.com/science/article/pii/S0301421510001114

Review

The paper in very simple words proves the historical context and gives modern day examples of how private finance has been mobilized for projects with long-term returns. The paper in fact points out that even World War II was largely financed by bonds and that the UK paid out its last 60 year war bond only in 2005. It also points out that, given the trillions of dollars required to overhaul the fossil-based energy system, what better method to have in place than a climate bond? The paper says that if a new industrial revolution in energy systems has to take shape by which the world will move away from the fossil fuel-based system, novel and imaginative methods have to be thought of, and bonds should surely be explored. This paper appeals to our sentiments and can help policy-makers look at an obvious and yet innocuous method to finance climate action. To end this review, a line from the paper can be quoted— 'If capitalist industrial system created the problem in the first place, then in our (the paper's) view a way has to be found for capitalist sources to solve the problem.'

Keywords
Private finance, energy, industrial revolution, renewable energy, climate change, Kyoto Protocol, climate bonds

In brief

This paper points out that while uptake of renewable energies as a solution to climate change is widely discussed, the issue of public vs. private financing is not yet adequately explored. Also not explored are age old ideas like bonds, and in this case climate bonds. The debates surrounding the Kyoto Protocol or its successor, as found in the COP15 Climate Change Conference in Copenhagen in December 2009, maintained a strong preference for public over private financing. This paper again points out that, according to most observers, the energy revolution will never happen without the involvement of private finance or, for that matter, private investment. In this viewpoint, this paper discusses the ways in which private financing could be mobilized, especially advocating financial bonds to drive the energy industrial revolution that is needed if climate change mitigation is to succeed. The paper is succinct to drive home a simple point, that historically financial bonds have been the mechanism to finance large projects with long gestation periods.

Accommodating the challenges of climate change adaptation and governance in conventional risk management: Adaptive Collaborative Risk Management (ACRM)

May B and Plummer R. 2011
Journal of Ecology and Society, 16(1), p.47
http://www.ecologyandsociety.org/vol16/iss1/art47/ES-2010-3924.pdf

Review

Identification, analysis, and evaluation of risks are important for any kind of enterprize. The principles of risk assessment set by organizations such as the International Organization for Standardization (ISO) often guide formulation of climate adaptation strategies. The risk assessment process can contribute significantly towards decision-making for climate adaptation due to its intrinsic property of integrating through perspectives and scales. However, this paper says that identification and evaluation of risks through a top-down lens may not be appropriate, given the uncertainty of climate change. Hence, comprehensive risk management protocols call for consultation and monitoring. This paper, however, highlights that in many cases there is often very little scope for the generation of shared learning and knowledge through deliberative and iterative processes among stakeholders. Although there are emerging trends in risk assessment studies that aim for participation, co-creation of knowledge and networking, there is still a dearth of conceptual frameworks, which can incorporate such tenets. In order to fill this gap, this paper tries to draw principles of the concept of adaptive co-management into conventional risk management. By conceptualizing risk management as Adaptive Collaborative Risk Management, the paper attempts to initiate a process of addressing climate risks that emphasizes governance dimensions and integrates these with relevant technical solutions.

Keywords
Climate change adaptation, climate risk management, adaptive co-management, governance, Adaptive Collaborative Risk Management

In brief

This paper explores the trans-disciplinary aspects of risk management, and establishes the importance of risk management as a critical tool to strengthen adaptation to climate change. The paper discusses the challenges with which traditional risk management is confronted. It presents three emerging issues in the field of risk management in relation to climate change adaptation, viz., the need for greater stakeholder engagement and participation, the need for co-creation of knowledge and shared learning, and the need to promote networks of adaptive governance. In this context, the paper also enumerates the need for appropriate governance mechanisms for socio-ecological and socio-technical systems, apart from focussing exclusively on technical solutions. In order to address this need, the paper proposes a new conceptual framework for risk management with reference to the risks posed by climate change. This framework recommends the addition of two new dimensions derived from the principles of adaptive co-management to conventional risk management viz., collaboration and adaptation, to form a hybrid approach called Adaptive Collaboration Risk Management (ACRM). The paper argues that the ACRM system can provide for a greater degree of participation, learning, and governance as compared to conventional solutions.

The budget approach: a framework for a global transformation toward a low-carbon economy

Messner D, SchellnhuberJ, Rahmstorf S and Klingenfeld D. 2010
Journal of Renewable and Sustainable Energy, 2, p. 031003
http://jrse.aip.org/resource/1/jrsebh/v2/i3/p031003_s1

Review

Science shows that there is only a realistic chance of restricting global warming to 2 °C if a limit is set to the total amount of GHG emissions emitted globally between now and 2050. While the 2 °C aspirational target has been agreed in Cancun, there is no agreement on the amount of GHG emissions and allocation of these global emissions. The suggested budget approach can provide concrete figures for the allocation of emissions. In its analysis, this paper suggests that both industrialized countries and emerging economies will have to commit to climate actions. However, according to other studies, the emission reduction pledges submitted to the Copenhagen Accord would lead to warming significantly more than 2 °C. While a higher level of ambition is required from the developed countries, it is evident that it is neither possible nor necessary for all developed countries, to tackle mitigation solely through their own domestic emission reductions efforts. Therefore, along with stricter targets, the climate talks should agree on a complementary allocation and emissions trading scheme. In addition, financial and technology transfers can help to speed up progress toward low-carbon development in developing countries. The paper strongly argues that the carbon budget approach is the most equitable and efficient way of burden sharing.

Keywords
Budget approach, transformation, low-carbon economy, greenhouse gas emissions, Cancun agreement, technology transfer, developing countries, emission trading

In brief

The paper demonstrates that the carbon budget approach, which is a combination, of findings from climate science and economics with fundamental concepts of equity, could serve as a cornerstone for a future climate regime that is based on the concept of a low-carbon economy. The paper concludes with the following general principles, which could be the basis for a future climate regime: (i) The 2 °C target to be adopted as legally binding; (ii) a global emission budget up to the year 2050 that is compatible with the 2 °C target is adopted as legally binding; (iii) peak year of global emissions is to be reached between 2015 and 2020 and with the narrow emission budget remaining post-2050; (iv) the global budget is distributed on an equal per capita basis so that national budgets can be calculated for all countries and adopted on a legally binding basis; (v) each country is committed to produce internationally and objectively verifiable decarbonization road maps, which provide information on the planned national emissions path up to the year 2050; (vi) in addition, for the countries with presently high per capita emissions, reduction commitments up to 2020 are agreed in order to avoid delaying decarbonization efforts and; (vii) flexibility mechanisms as well as appropriate additional financial and technological transfers by the industrialized countries are agreed upon.

Transportation NAMAs: a proposed framework

Millard-Ball A, 2010
Washington, DC: Center for Clean Air Policy
http://www.ccap.org/docs/resources/924/CCAP_Transport_NAMA.pdf

Review

One of the debates in the climate talks around NAMAs is in the context of sustainable development benefits and the context of national circumstances of developing countries. The paper is important as it highlights the mitigation actions in the sector that could align with both the interests of the host country (in the context of co-benefits of the policies) and the broader participation of developing countries in mitigating climate change. Highlighting the need for transformational policies that can catalyze low-carbon growth, the paper emphasizes actions such as Bus Rapid Transit, land-use planning, and congestion pricing that can be undertaken for achieving mitigation in the transportation sector. The paper suggests that a huge potential exists in the transport sector, especially in developing countries, and points out barriers, such as high infrastructural costs and lack of up-front financing, amongst others, for uptake of emission reduction projects in this sector. The paper suggests operational details of a NAMA framework that could provide finance for activities for the transportation sector. The paper substantiates that credit-generating NAMAs are not promising for transportation and share many of the limitations of the existing CDM for transportation, such as determining the baselines, estimating the baselines, and additionality of the credits generated, amongst others.

Keywords
Transportation NAMAs, uncertainty, Copenhagen Green Climate Fund, low-carbon growth, mitigation, public and private investment, co-benefits

In brief

This paper proposes a framework for leveraging NAMA financing to help direct substantial financial resources from public and private investments for the development of low-carbon transportation choices. Specifically, the paper explores prospects for unilateral NAMAs that include independent actions taken by developing countries to achieve emissions reductions without support, supported NAMAs that include developing-country actions with financial or other support from developed countries and Credit-generating NAMAs, which include actions that could be partially or fully credited for trade in the global carbon market, based on a mutually acceptable crediting baseline. The paper identifies supported NAMAs as being potentially the most viable of three options in relation to the transport sector. The paper proposes the establishment of a number of principles to promote effective adoption of supported transportation NAMAs. These include: development of low-carbon transportation plans for countries and metropolitan regions; creation of a transportation 'window' in the Copenhagen Green Climate Fund with dedicated, sector-specific funding and evaluation criteria; planning and capacity building; funding bundles of projects and policies; and accepting uncertainty. The paper highlights the co-benefits of the mitigation actions in the transport sector, such as action to tackle local air pollution and reductions in travel times, amongst others, and concludes by suggesting that supported NAMAs have the greatest potential in the sector.

The next generation of scenarios for climate change research and assessment

Moss RH, Edmonds JA, Hibbard KA, Manning MR, Rose SK, van Vuuren DP, Carter TR, Emori S, Kainuma M, Kram T, Meehl GA, Mitchell JFB, Nakicenovic N, Riahi K, Smith SJ, Stouffer RJ, Thomson AM, Weyant JP and Wilbanks TJ. 2010 *Nature*, **463**(7282), pp.747-756 http://www.nature.com/nature/journal/v463/n7282/full/nature08823.html#a1

Review

Scenarios have long been used to enhance our understanding of the complex interactions of the climate and its impacts on ecosystems and societies and vice-versa. Given, the uncertainties in impacts and responses to climate change, construction of scenarios enable scientists to evaluate uncertainty about human contribution to climate change, the impact of climate change on societies, the range of impacts depending on the range of change in the climate, and the impact of different response options as part of adaptation and mitigation efforts. The paper builds on the premise that policy-makers have new information needs that will mandate a change in the focus of scenario building. A major change that this paper interestingly points out is the move from considering a 'no-climate policy' scenario to different plausible mitigation options. Analysis of adaptation also requires development of socio-economic scenarios suitable to support analysis of vulnerability. The paper holds an interesting discussion that will be useful for both scientists and policy-makers as it traces how scenarios have evolved and why. This discussion is important as this new generation of scenarios will improve society's understanding of plausible climate and socio-economic futures.

Keywords
Scenarios, climate research, assessment, uncertainties, adaptation, mitigation, futures, radiative forcing, projections, probabilities, emissions

In brief

This paper describes a process for creating a new set of scenarios to understand future climate change. It highlights the objective of generating scenarios to comprehend the uncertainties in understanding changes in climate and their associated impacts, and supports policy decisions that are robust under a wide range of possible futures. Tracing the genesis of scenario generation, the paper highlights that the first generation of scenarios was developed and applied in a linear cause-and-effect form, moving from socio-economic factors to climate to associated impacts. However, this process was plagued with massive time delays from the development of the emissions scenarios and their integration into climate model outputs, to their final use in impact assessments. As a much more time-efficient process, the research community has now developed a parallel track for generation of new scenarios that begin with identification of selected scenarios of Radiative Forcing for climate modelling exercises. The key conclusion of the paper is that the new integrated approach for developing and applying scenarios for climate change research can provide crucial insights into the complex interactions between climate processes and can also contribute towards assessing the potential costs and benefits of different levels of adaptation and mitigation.

A green venture fund to finance clean technology for developing countries

Nassiry D and Wheeler D. 2011
Center for Global Development Working Paper No. 245.
Washington, DC: Center for Global Development
http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1824645

Review

The Cancun Agreement highlighted the need for mobilizing $ 100 billion per year by 2020 through multiple sources. While venture capital can play a pivotal role in the development stages of clean technology, private equity and infrastructure fund investments can support deployment of technologies in the later stages. Many challenges, however, restrict substantial private sector investments for supporting clean technology in the early stages and there is a clear need for appropriate and compatible public-private investment options. Given that the financial mechanism of equity financing is not very robust in developing countries, and that the average banking mechanism is not very good at raising equity finance, the paper proposes a 'fund of funds' model to generate a public-private Green Venture Fund as a plausible alternative. If private or public finance with the mechanisms or quality control or project monitoring features of private finance can be embodied in the Green Venture Fund, then the process of technology development for clean energy is likely to be hastened. The paper provides useful guidance for developing country policy-makers to understand the intricacies of global finance at the micro-level and provides insights into the operational aspects of a possible Green Venture Fund at different stages of technology development and deployment.

Keywords
Climate finance, investment, Green Venture Fund, clean technology, technology innovation, technology development, technology deployment, public-private investments, developing and low-income countries

In brief

This paper discusses formulation of a public-private Green Venture Fund for the development, deployment, and diffusion of clean technology for developing and low-income countries. The proposed Fund will act like a model 'fund of funds' supported by public equity and promote the dual objective of innovation and commercialization of clean technologies. This paper details the structure of this Fund, the rationale behind its design, its operational elements, and key characteristics of two funds for Technology Innovation and Technology Deployment. The paper also highlights certain pertinent issues, such as setting technology priorities, given the different nature of public and private investments. The key message of the paper is a proposal for a green fund, a public-private initiative or mechanism to promote climate action primarily in relation to clean energy technologies that have great potential for uptake in developing countries. It is intended that the market-oriented approach 'will promote development and deployment of clean technologies at the requisite scale, and in time to avoid catastrophic climate change'. The Green Venture Fund, the paper expects, will provide returns that will draw investors to the fund on its own merit. This fund will also meet the development issues that are the primary focus for developing countries.

MRV under the UN climate regime: paper tiger or catalyst for continual improvement?

Niederberger AA and Kimble M. 2011
Greenhouse gas Measurement and Management, 1(1), pp.47-54
http://www.tandfonline.com/doi/abs/10.3763/ghgmm.2010.0009

Review

One of the most contentious issues in climate negotiations is that of 'MRV' (Measuring, Reporting, and Verification) of climate action. While the UNFCCC already has MRV in-built by way of national inventories and National Communications (NATCOMs), the issue of MRV is now being discussed both in the context of mitigation actions and support for climate actions by the developed countries. Though the term MRV was coined in Bali, its interpretations and operationalization have been a point of contention ever since. A National Climate Management System (NCMS) framework suggested by this paper builds on the underlying principles within the UNFCCC in a bid to enable effective MRV of NAMAs. The framework, it is suggested, could result in better climate management, and is applicable to all nations. Additionally the framework intends to be cost-effective, non-prescriptive and flexible, suitable for internal or external verification, scientifically based, practical and usable. The paper argues that the suggested framework has its advantages as a proposal in climate negotiations as it respects national sovereignty (often a stumbling block in climate negotiations), is consistent (across different countries), flexible (considers national circumstances), facilitative and outcome-oriented. Expanding the MRV regime to include mitigation actions is an opportunity to support developing countries in their efforts to improve their climate performance over time.

Keywords

Certification, continual improvement, low-carbon development, management system, mitigation, MRV, UNFCCC

In brief

The Monitoring, Reporting, and Verification (MRV) process offers an opportunity for developing countries to increase the efficiency of their mitigation actions while developing sustainably. The paper primarily revolves around the debates associated with this argument and suggests a pragmatic approach to ensure that national mitigation actions are measurable, reportable, and verifiable. The paper proposes adopting a certification scheme for National Climate Management Systems (NCMS). The NCMS would further require countries to establish a climate policy, set national goals and timetables, secure resources to implement related national actions, and track their progress over time. The advantages of engaging in an NCMS certification scheme have been presented, and a parallel is also drawn between the proposed operationalization plan for the NCMS and ways in which mitigation in the forestry sector is currently being handled. This includes the presence of a national strategy or action plan, reference levels, and a clear monitoring system. Additionally, the mechanism to integrate the nationally-driven NCMS impeccably into the UNFCCC process has also been highlighted. The key conclusions are that an NCMS certification scheme is well-suited to add value to the existing MRV system for developed and developing countries.

Shaping forest safety nets with markets: adaptation to climate change under changing roles of tropical forests in Congo Basin

Nkem J, Kalame FB and Idinoba M. 2010
Environmental Science and Policy, **13**(6), pp.498-508
http://www.sciencedirect.com/science/article/pii/S1462901110000675

Review

The development of markets for forest produce, in many cases, has diminished the safety net value of forests for local people. Markets for Non-Timber Forest Products (NTFPs) cannot, therefore, be viewed as a panacea to promote adaptation to climate change through enhanced revenues. The traditional role of forest communities in directly reaping the benefits of forest products is now shifting with the emergence of new regional and global markets, not only for forest products but also for services, such as carbon storage and sequestration. This paper cautions that the transition from local to the global must not undermine the benefits that local communities obtain or supplant the 'safety net' function of forests. By highlighting uncertainty in the flow of benefits from markets per se, this paper emphasizes the huge gap between the expectations of various policy measures, including REDD and payment for ecosystem services, and on-the-ground realities for local communities. This paper highlights caution in the approaches that are promoted for climate compatible development and specifically addresses the needs of local communities who are, arguably, the most vulnerable to climate change. It points the way for further research to address complex issues of markets and benefit sharing and improves awareness of what is needed for climate compatible development.

Keywords
Forest safety nets, markets, adaptation, Congo Basin, NTFPs, livelihoods, vulnerability, climate change, goods and services, REDD

In brief

This paper explores the role of markets for Non-Timber Forest Products (NTFPs) in facilitating the climate change adaptation of local communities in the Congo Basin. While forests are regarded as safety nets in the climate change movement, emerging market systems that facilitate a shift to a more cash-based economy may reduce this traditional function. This paper contends that the size of trade in timber and non-timber forest products, overexploitation, and unsustainable practices threaten the integrity of forest ecosystems and the goods and services they provide. The disappearance of the traditional safety net may induce an enhanced vulnerability to climate change. Using case studies from two provinces in the Democratic Republic of Congo, the paper highlights that much of the monetary gains derived from NTFP markets benefit wholesalers and retailers rather than local people. Inequitable flows of revenue to local communities do not appear to justify the development of NTFP markets as an adaptation measure, at least not currently in the Congo basin. The key message of the paper is that market-based approaches, whether for forest products or for carbon, need not necessarily facilitate adaptation to climate change, and must be applied with caution to prevent creating new socio-economic issues.

NAMA crediting: how to assess offsets from and additionality of policy-based mitigation actions in developing countries

Okubo Y, Hayashi D and Michaelowa A. 2011
Greenhouse gas Measurement and Management, **1**(1), pp.37-46
http://dx.doi.org/10.3763/ghgmm.2010.0002

Review

The Bali Action Plan (BAP) paragraph 1(b),(ii) calls for NAMAs by developing country Parties in the context of sustainable development, supported and enabled by technology, financing and capacity building, in a Measurable, Reportable and Verifiable (MRV) manner. The NAMAs are, therefore, provided with technology, finance and capacity-building support. These NAMAs, as well as the support provided to them, are MRV-able. There has been considerable debate on the extent of MRV of actions, wherein the Copenhagen Accord and the Cancun Agreements envisage international MRV for supported NAMAs, while unsupported NAMAs would only require domestic MRV. The authors dwell on the issue of NAMAs and MRV in this paper and conclude that only a sub-set of policy options that can directly be quantifiable in terms of the emission reductions achieved are best suited as credit generating NAMAs. The authors argue for more standardized approaches to allow for covering policies that are more difficult to quantify and suggest a combination of an approach using default parameters and monitoring of key factors. In addition to policy type, characteristics of countries and sectors also play an important role in determining whether the policies are MRV-able. Therefore, availability of centralized, transparent data collection systems, an effective sector organization and feasibility of differentiating impacts of policies are important. The authors however, caution that while the stringency level of MRV and additionality demonstration will be crucial for the credibility and political viability of a potential NAMA crediting mechanism, in this case only a small sub-set of policies in advanced, well-governed developing countries could be eligible. Therefore, it is important to strike a balance between accuracy and complexity in the MRV and additionality approach.

Keywords
NAMA, crediting, offsets, additionality, mitigation, developing countries, baseline, carbon finance, MRV

In brief

This paper argues that for credibility of the international climate policy regime after 2013; robust measurement, reporting, and verification procedures are required, especially in the context of the post-2013 NAMAs. The authors take examples of two policies—renewable energy feed-in tariff in Korea and an energy efficiency programme in Thailand—to assess the potential of these policies to be taken up as crediting NAMAs and analyze potential challenges with respect to MRV of these policies. In the Korean case, where the government has set a target for penetration of new and renewable energy as 5% of its primary energy supply in 2011, the authors conclude that such a scheme seems to be highly suitable for NAMA crediting as baseline emissions factor can be calculated, the overall production level of renewable energy after introduction of the scheme can be monitored, and the scheme can be assessed using both an investment and a barrier test. In the case of Thailand's energy efficiency programme, the authors conclude that it is relatively challenging as a credited NAMA, as a large volume of required data cannot be obtained easily. The paper highlights potential challenges that are crucial for the design of a new NAMA mechanism.

Sustainable development and a dwindling carbon space

Environmental and Resource Economics, 45(1), pp.3-23
http://www.springerlink.com/content/r334x743353026vn/

Review

This paper builds its arguments on some of the factors accounting for the lack of progress in climate talks. These factors largely relate to historical responsibility and allocation of resources for mitigation action. The paper highlights that the 2°C mark suggested by scientific evidence as a global limit to temperature rise defines, in many ways, the carbon space, and deep emission cuts will be required to stay within that space. While the UNFCCC asks developed countries to take the lead in climate actions and the Kyoto Protocol has commitments for developed countries, staying within this limit will require substantial mitigation to occur in developing countries also. However, developing countries are not primarily responsible for climate change and neither do they have adequate capacities to take on mitigation commitments without due support. It is also important to note that developed countries are still far from achieving their Kyoto targets. The paper raises an important issue: that the key stumbling block to any agreement is the deep deficit of trust between developed and developing countries. The paper argues that to overcome this deficit, OECD countries should take a convincing lead in emissions reduction, share their knowledge and other capabilities in this field with developing countries, co-develop new technologies and management regimes for energy use, and co-fund efforts, especially where these lead to incremental costs and incremental efforts.

Keywords
Carbon space, climate change, sustainable development, burden sharing, differentiation, UNFCCC, Kyoto Protocol

In brief

This paper provides a good historical overview of the issue of equity and fair allocation in climate negotiations. The paper addresses questions related to the sharing of carbon space between countries and/or efforts to stay within it, in the perspective of sustainable development. Different allocation mechanisms are reviewed alongside taking responsibility for climate change, capability to engage in abating it and the potential for future contribution. The paper argues that as well as action by developed countries, mitigation will also be required to take place in developing countries and that this will require a flow of substantial support to developing countries. The author proposes that Green New Deals, as proposed in the context of a widened response to the economic crisis, could become a first phase of a fundamental transition towards a decarbonized global economy worldwide. Concerns related to equity as well as sustainability must be incorporated and integrated into coherent transitory strategies. The paper concludes that sharing the carbon space in a fair way requires convergence of per capita emissions in future and, if global emissions are to stay within the carbon space consistent with the 2 °C target, then developed economies should respond quickly and deeply in the form of mitigation action.

Linking ICTs and climate change adaptation: a conceptual framework for e-resilience and e–adaptation

Ospina AV and Heeks R. 2010
Manchester: Centre for Development Informatics, Institute for Development Policy and Management, School of Environment and Development, University of Manchester
http://www.africa-adapt.net/media/resources/413/Linking%20ICTs%20and%20Climate%20Change%20Adaptation.pdf

Review

A complex set of relationships define the linkages between vulnerabilities, adaptation, and development in the light of climate change. Understanding these relationships is essential to deploy targeted interventions for the successful application and sustainability of adaptation interventions. Information and Communications Technology (ICT) can contribute to an understanding of these relationships while building the resilience of vulnerable systems. The role of ICT in building resilience and adaptation to climate change is a relatively new concept. This paper presents an applied ICT-based framework to support elements of resilience and the delivery of adaptive responses that directly address climate change vulnerability, specifically with respect to climate-sensitive livelihoods. The innovative aspect of this paper is that it fragments resilience as a broad concept to its elements and underscores the role of each of these elements in contributing towards adaptive capacities; and in turn the role of ICT to support each of these elements. Discussions in this paper can assist practitioners and researchers working on ICT for development by furthering their understanding of the linkages between ICT, adaptation, and development, especially in developing countries. Such a holistic framework can also provide a prototype for innovative ICT-based models for the design and delivery of climate change resilience and adaptation policies and practices across climate-sensitive sectors.

Keywords
ICT, climate change, resilience, development, adaptation, livelihood systems, vulnerability, adaptive capacities

In brief

Information and Communications Technology (ICT), is a more comprehensive term used to describe the larger spectrum of communications, media, and information technology. This paper aims to analyze the potential of ICT in assisting with adaptation to climate change, and in identifying associated challenges. Specifically, the paper talks about the role of ICT in strengthening the adaptive capability of developing nations at the forefront of climate change. The authors aim to create a conceptual foundation on which further developmental action can be taken, and present an e-resilience framework in order to assess the vulnerability of livelihood systems to climate change, examine the role of resilience as the adaptive capacity of a livelihood system, and present innovative ICT that can strengthen resilient elements in a vulnerable system. The paper observes the wide-ranging scope of these tools, describing their action in assisting national economies at a macro-level as well as the role played by them in key vulnerability areas affected by climate change. The paper finally discusses the challenges faced in applying ICT to hasten climate change adaptation. In the process, the paper addresses the complex set of relationships that exist between vulnerabilities, adaptation, and development.

Off-grid rural electrification experiences from South Asia: status and best practice

Palit D and Chaurey A. 2011
Energy for Sustainable Development, **15**(3), pp.266-276
http://www.sciencedirect.com/science/article/pii/S0973082611000500

Review

There are a few compelling attributes about the paper. First, the issue of energy access is extremely pertinent to development. Energy access solutions via renewable energy make the original argument even more palatable. Then the choice of location, South Asia, which requires a major push with respect to energy access. It is important to note that even though this paper specifically concentrates on South Asia, its findings with respect to business models, institutional arrangements, and enabling policy make it a good read for any policy-maker from any developing country that has energy access issues at hand. The paper not only looks at experiences in South Asia with country-wise analysis, it also gives comparisons between grid and off-grid solutions; in off-grid it also demarcates between mini-grids as well as stand-alone models. There are some interesting facts that may seem to be contradictions and are brought forward. For example, while the village electrification level in Bangladesh and India is moderate to high; the actual number of connected households is comparatively low. Therefore, the question of energy access at the household level is highlighted, and mechanisms with respect to technology, business and finance to provide energy access using renewable energy are given in the paper. More importantly the paper is not a mere normative analysis, but gives actual insights into what is practiced.

Keywords
Energy access, off-grid, rural electrification, South Asia, developing country, renewable energy, Bangladesh, India

In brief

This paper is about energy access, primarily in South Asia. The paper points out that South Asia accounts for the greatest proportion of the global population without access to electricity. It further adds that such a situation continues to exist despite several initiatives and policies to support electrification efforts by the respective country governments. The paper brings in the importance of rural electrification and energy access to human development. It details the role of governments in their support to providing energy access through different public finance mechanisms, including subsidies. Importantly, it outlines the role of technologies, particularly off-grid technologies. The paper points out that the off-grid technologies prioritized in the institutional frameworks seem to fit to a large extent with the geographical characteristics of the demand, resource potential, and delivery model in which the technology dissemination is taking place. The importance to policy-makers is in its recommendations including developing a regulatory mechanism to extend the tariff fixation for mini-grid projects and providing cross-subsidies to ensure long-term sustainability of such projects. In addition, the paper points out that economic linkages, access to credit and institutional arrangements also need to be organized appropriately, especially for off-grid renewable energy to facilitate successful outcomes.

Lessons for low-carbon energy transition: experience from the Renewable Energy and Energy Efficiency Partnership (REEEP)

Parthan B, Osterkorn M, Kennedy M, Hoskyns SJ, Bazilian M. and Monga P. 2010
Energy for Sustainable Development, **14**(2), pp.83-93
http://www.sciencedirect.com/science/article/pii/S0973082610000190

Review

Public–private energy partnerships, such as the Renewable Energy and Energy Efficiency Partnership (REEEP) are structured to maximize the local and regional impact of low-carbon decentralized energy options in developing countries. The type and quality of projects that are selected for REEEP funding are focussed toward developing stable long-term policies and regulation for renewable energy and energy-efficiency and encouraging sustainable investments and business models. The REEEP project experiences, as captured by this paper, highlight the niche role of the organization and how it has succeeded in working with diverse stakeholders in order to influence the effective uptake of renewable energy and energy-efficiency solutions. Most importantly, the paper brings out key management lessons for the selection of projects, project developers, and assessing the success of the project through specific measurement and verification methods. The learning from the REEEP projects can inspire policy-makers and practitioners in the field of renewable energy and energy- efficiency to adopt new approaches that have been tried and tested elsewhere. This fits well with the replication and scaling-up potential that is demonstrated by most of the REEEP-supported projects. The paper is relevant for demonstrating the importance of energy partnerships in successfully delivering practical low-carbon solutions in developing countries.

Keywords
Low-carbon energy, policy, regulation, finance, developing countries, REEEP, renewable energy, energy efficiency

In brief

This paper traces the inception and progression of the Renewable Energy and Energy Efficiency Partnership (REEEP) during the course of five years of its operation. The paper provides a detailed account of the operational functionalities of developing and executing the programmatic framework through the call for proposals. The paper highlights key learnings from the various REEEP-implemented projects. This includes CDM benefits to poor households through carbon credits, voluntary carbon markets, and voluntary emission reductions. Additionally, lack of renewable energy and energy efficiency technology finance, risk-reduction instruments, and retail-level institutions in several developing countries are recognized. The lessons and experiences as shared through this paper are targeted towards policy-makers and managers working at the interface of climate change and development issues in developing countries. These lessons are primarily centred on aspects of programme management and policy development for a low-carbon economy, also covering aspects of finance, regulation, and engagement of the private sector. The paper concludes that providing clean energy solutions to the poor can sustain a profitable business if supported by the right policies and practices. In doing so, the paper builds a case for investing resources to scale up successful initiatives, such as REEEP.

Adaptation in integrated assessment modelling: where do we stand?

Patt AG, van Vuuren DP, Berkhout F, Aaheim A, Hof AF, Isaac M. and Mechler R., 2010
Climatic Change, **99**(3-4), pp.383-402
http://www.springerlink.com/content/q0026gu420415704/

Review

Integrated Assessment Models (IAMs) have become a common tool for assessing strategies to address climate change, including the costs and benefits of such strategies over time. A better modelling of adaptation costs and benefits could have important implications for setting mitigation targets. Integrated analysis of adaptation can assess the costs, benefits, and uncertainties of these policies, and ought to be able to provide important insights for their development and implementation. This paper is important because it brings out the scope of IAMs to combine domain knowledge from various disciplines in order to derive policy-relevant insights, while highlighting its limitations and scope for sharpening these models and the consideration of adaptation within these. This paper reflects on the direction that IAM modelling work has taken, and makes suggestions for how it should proceed in order to provide advice to policy-makers that is relevant but not misleading. The paper is important as it draws attention to the disaggregated nature of adaptation. It also encourages increasing the resolution of adaptation effectiveness measurement by focussing on its bottom-up characteristics. While policy-makers and practitioners make use of results from IAM, it is also necessary to understand the inherent limitations of these models. Firstly, the costs and benefits will depend on whether the adaptation is reactive or proactive. While IAMs model damages as a function of changes in the global mean temperature, there is a certain level of autonomous adaptation that cannot be adequately captured. There are two important flaws with such an approach. Firstly, the level of adaptation will depend on the rate of climatic change, which would further determine the ability to adapt. Second, most adaptations are made in response to the perceived risk of extreme events or the experience of the changing variability in climatic parameters, which might not necessarily exhibit a linear form. Additionally, it is important to consider adaptation actions that will provide benefits in the short-term versus long-term to appropriately discount for the lack of optimal use of information.

Keywords
Integrated Assessment Modelling, adaptation, bottom-up, vulnerability, adaptive response

In brief

The history of Integrated Assessment Modelling and climate change are closely interlinked, and as new information and ideas come to light, it becomes necessary to incorporate them into the Integrated Assessment Models (IAMs) used at present. This paper discusses different IAMs, how adaptation is currently being considered in these models, challenges involved in incorporating them, and their potential policy applications. Current IAMs address adaptation either by subsuming it in the estimates of damage costs, or by making it a separate control variable altogether. The paper suggests that capturing the bottom-up characteristics of adaptation can improve its treatment within IAMs. The key conclusion of the paper is that until adaptation in IAMs is incorporated accurately to best fit ground conditions, these models may overestimate the net benefits brought about by specific adaptation activities. Additionally, such misleading results will also misrepresent the necessary level of mitigation required. The spatial resolution needed to conduct an accurate estimated costs-benefit analysis of adaptation measures is often more at the local level, whereas most current models focus on the global level.

Climate change and peak oil: The urgent need for a transition to a non-carbon-emitting society

Penuelas J and Carnicer J. 2010
Ambio: *A Journal of the Human Environment*, **39**(1), pp.85-90
http://www.springerlink.com/content/n708l77106782038/

Review

Even though varied views exist on when the global energy industry is likely to reach 'peak oil', it is widely accepted that, given the limited availability of oil and growing carbon emissions, countries need to make concerted efforts to shift to low-carbon or no-carbon sources of energy. Clearly, the transport sector provides an important area of intervention as it is heavily reliant on oil. By linking global challenges, such as peak oil and climate change and suggesting possible actions, the paper aims to rally political will and public commitment on the issue. The paper's emphasis on the merits of a well-informed policy apparatus and citizenry for an energy transition is in keeping with this objective. The paper makes the case for a multi-level (multilateral, bilateral, national, and local) and multi-pronged (directed at diverse energy production and consumption sectors) effort for appropriate interventions to facilitate the move towards a non-carbon-emitting society. The discussions in this paper hold value for future research work on identifying and addressing barriers to this energy transition in relation to the 'peak oil' discourse and assessing the relevance of these options across different geographical, ecological, and socio-economic contexts.

Keywords
Peak oil, emissions, oil prices, energy transition, alternative energy sources, public transport systems, improved energy technologies

In brief

Set against the backdrop of the challenges that exist at the interface of energy, environment, and development, this paper presents the different perspectives on 'peak oil'. Peak oil is defined as the point where global petroleum production will peak and then begin to decline. The scarcity of oil holds significant repercussions for hydrocarbon markets, including increased price volatility and exploration of dirtier unconventional oil. At the same time, it creates a demand for alternative sources of energy and the need to use energy effectively and efficiently. The paper strongly argues that developed countries are in a position to take a lead in the domain of clean and efficient energy use and can facilitate the developing world in transitioning towards a clean, environment-friendly, and low-carbon energy pathway. The paper lays out a range of policy and technology options that can be pursued by countries for this energy shift and transition. The options it proposes include, amongst others, strengthening and scaling up of carbon taxation and cap-and-trade programmes with a prioritization of the former, electrification of private transport, harnessing of renewable energy sources and deployment of carbon sequestration strategies. Additionally, the paper underscores the need for further scientific research on peak oil-climate-society dynamics and its popular dissemination.

Does REDD+ threaten to recentralize forest governance?

Phelps J, Webb EL and Agrawal A, 2010
Science, **328**(5976), pp.312–313
http://www.sciencemag.org/content/328/5976/312.short

Review

In natural resource management studies, much importance has been given to devolution and decentralization of governance, thereby increasing the role and ownership of communities dependent on natural resources. Many have always argued that decentralization is a win-win governance strategy for forest conservation. While the REDD+ mechanism being discussed at the international level provides for the role of communities, largely it is due to feedback from donors and the UNFCCC does not currently mandate safeguards, benefit sharing, or local involvement. Further, there is lack of clarity on financing for the REDD+ mechanism, which is often considered similar to the carbon markets. Offsets generated through mitigation activities generally do not incentivize the role of communities or social benefits. It is therefore an important contribution from the authors to highlight this issue when the international community is set for operationalizing a REDD+ mechanism. Communities should also be involved in the REDD+ design and implementation as they are key stakeholders in any field of natural resource management and crucial for understanding trade-offs and synergies between rural livelihood activities, alternative land-uses and REDD+ goals. While the REDD+ mechanism is being designed, this brief is a crucial input that argues for decentralized governance by engaging with communities at every level of a REDD+ project, including the design stage. Further, a subtle take-away from this paper is that there needs to be clarity on the nature of financial transfers for the REDD+ mechanism from the developed country. While offsets and carbon markets may be useful in some sectors, they may not be effective mechanisms for those sectors with high social impact, such as natural resources or forests that provide livelihoods for communities. The urgency to design and implement a REDD+ mechanism at global level in order to achieve required emissions reductions should not impede on the need for science-based decentralized REDD+ governance that could enhance forest carbon sequestration while also benefitting forest dependent communities.

Keywords

REDD+, forest governance, decentralized forest management, incentives, communities, emissions

In brief

While there is an increased global agreement on a REDD+ mechanism, the authors in this brief article caution the global community that the mechanism may be poised to interrupt a trend developed over the past 25 years. In developing countries, the trend has progressed towards decentralized forest management, allowing for increased rights and responsibilities for local actors, which helps substantially in conserving forests in many areas. According to the authors, the REDD+ mechanism should provide for decentralized strategies, as heavily centralized REDD+ implementation can be detrimental to efficiency and equity. Governments have decentralized forest management for many reasons: to reduce costs and increase efficiency by transferring responsibilities; to respond to local demands for rights and international donor pressures; to transfer benefits to users; and in recognition that conservation is possible across diverse tenure regimes. The authors argue that while effective decentralization reforms have increased local actors' benefits and rights in forests, reduced costs of protection, and provided opportunities for biodiversity conservation, a REDD+ mechanism on the contrary calls for a national approach so as to avoid leakage, ensure permanence, and provide reliable Monitoring, Reporting, and Verification (MRV). The authors recognize the efforts to promote community involvement in REDD+ funding and requirements for REDD+ but caution that even then the mechanism may undermine decentralization.

Climate change adaptation, development, and international financial support: lessons from EU pre-accession and solidarity funds

Przyluski V and Hallegatte S. 2010
Working Paper 525. Milan: Fondazione Eni Enrico Mattei
http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1710476

Review

Funding adaptation would need proper governance structures in order to organize and disburse the funds efficiently. There are two prominent issues plaguing adaptation finance—one relates to the status of adaptation funding and the second relates to the effectiveness of adaptation spending. While adaptation finance is considered as part of international aid by some, it is seen by some as compensation from developed countries for their historical responsibility. As far as allocation is concerned; another major issue relates to where is the money most efficient as compared to where the money is most needed. This issue is made particularly difficult by the fact that most projects are not implemented solely for adaptation purposes, as they also have other benefits in terms of health, safety, or potential economic growth, thus making it difficult to define a clear criterion for adaptation efficiency. In cases where projects have adaptation and development benefits, one option is to finance only the incremental cost of adaptation, i.e., the additional cost of a development project induced by anthropogenic changes in climate conditions. Problems come in terms of finance for retrofitting existing infrastructure versus creating new infrastructure altogether. Assessing the incremental cost is easy only in few cases. A lot has already been discussed, with recent papers addressing the question of mainstreaming adaptation into development. Literature on related issues has largely revolved around either ensuring compatibility between development and adaptation or the architecture of adaptation finance. This paper lies between these two streams of literature and deals with the practical implementation of a development under conditionality, namely, adaptation-development, and its requirement in terms of financing architecture. The paper brings an interesting comparison between 'black-spot' programmes that are clearly defined with definitive goals and objectives, as opposed to 'concept-based' or umbrella programmes that are often all-encompassing, but miss bringing about the most needed change on the ground. This is so because these programmes often have the ambition of reaching some all-encompassing goals, which makes them difficult to implement, and further monitor and evaluate the successful realization of these goals. Thus, it is important for policy-makers and practitioners to tailor funding programmes appropriately.

Keywords
Climate change adaptation, development, International financial support, European Union, lessons, solidarity funds, mainstreaming, additionality

In brief

This paper discusses financing the grey areas of development with the conditionality of addressing the additional risks of climate change, and discusses what governance architecture would be required to manage these funds. By drawing lessons from the experience of similar funding programmes in Europe, which faced similar issues of additionality and incremental cost, nebulous concepts, need for mainstreaming, ownership, and sovereignty issues. This paper lists out seven key lessons that emerge from the European funding programmes– targeted programmes for adaptation or development, despite being less flexible, often proved to be more efficient than vague or umbrella programmes. A multi-scale and multi-step approach can overrule issues related to sovereignty and ownership and facilitate capacity building. There are issues for leveraging private funding in cases where funding is sought only for projects or components demonstrating additionality. 'Non-substitutability' of funds between objectives and between regional allocation is important to ensure the full use of funds for designated activities in places where it is most needed. It is also helpful to have subnational eligibility criteria so that regions within a country can also be eligible for funding if they are vulnerable. The paper highlights that funding for strengthening institutional capacities is extremely important. In developing and least developed countries, the paper suggests funding should be targeted for specific activities, and it can be more concept-based or integrated into routine activities that are more flexible.

Open questions about how to address 'loss and damage' from climate change in the most vulnerable countries: a response to the Cancún Adaptation Framework

Ranger N, Surminski S and Silver N. 2011
Policy paper. Leeds and London: Centre for Climate Change Economics and Policy and Grantham Research Institute on Climate Change and the Environment
http://www2.lse.ac.uk/GranthamInstitute/publications/Policy/docs/PP-Cancun-Adaptation-Framework-response.pdf

Review

Climate change induced natural disasters are on the rise and the most vulnerable countries are under an increasing onslaught and are the most affected. The UNFCCC has acknowledged this and is contemplating various measures at a global level. Due to their lack of financial as well as technical resources, combined with large numbers of poor people, they are ill prepared to face disasters, and rather rely on post intervention mechanisms, depending on foreign aid and assistance after heavy loss of life and property. As the magnitude of the disasters increase, they face further escalation in human and property loss. Realizing this, UNFCCC during the 16th Conference of Parties (COP) at Cancun called on concerned parties to come forward with their views and ideas on a loss and damage mechanism for the Subsidiary Body for Implementation (SBI), to consider for implementation. In this regard, this policy paper looks at the various ex-ante and ex-post measures that can be adopted by the vulnerable countries and discusses the steps required for evolving a coherent disaster management mechanism to minimize the loss of life and property.

Keywords
Vulnerability, loss and damage function, ex-ante and ex post intervention, COP 16

In brief

The most vulnerable countries to the risk of natural disasters largely rely on post disaster response as they are unprepared to take preventive steps. This results in loss of precious life and resources. This paper is in line with the result of COP 16 of the UNFCCC at Cancun as it calls for a stand on a loss and damage mechanism and discusses in detail the various options in ex-ante and ex-post categories of intervention. The most vulnerable countries depend on aid from the international community and funds from expensive capital markets for resources, which are usually too little and come at a heavy price. It delves in detail into the various post-response measures and their pros and cons as part of disaster preparation, like micro-insurance schemes and catastrophe risk transfer products. These measures provide some security to the affected parties, but post intervention does not prevent the terrible loss of life and so is not the right approach. Also, the cost of ex-ante measures is a fraction of ex-post measures, as illustrated by the examples given in the paper. It then gives broad principles for the framework of the loss and damage mechanism both at the local and multi lateral levels, the various proposals currently in the UNFCC process, like the Proposal on the Munich Climate Insurance Initiative (MCII) and the proposal on the Alliance of Small Island States (AOSIS) and the inputs required and the outcomes expected.

A decision framework for environmentally induced migration

Renaud FG, Dun O, Warner K and Bogardi J. 2011
International Migration, **49**(s1), pp.e5-e29
http://onlinelibrary.wiley.com/doi/10.1111/j.1468-2435.2010.00678.x/pdf

Review

The framework suggested in this paper can form an important piece of work for stimulating discussions by institutions that are entrusted with provision of humanitarian or financial support to people who have been forced to or have decided to migrate. This paper provides the foundation for developing a list of criteria that can then be used to determine appropriate assistance to the displaced or migrated population. This framework is unique in that it is cognizant of the need to inspect the impact response to an environmental extreme on the affected populations, but also on their ability to cope and recover. Additionally, this framework can enable policy-makers to better understand the characteristics and requirements of migrants. Within the ambit of climate change negotiations, it is only recently that country Parties are trying to develop a framework for managing climate change migration and facilitating adaptation in a post-2012 regime. Discussions in this paper can contribute to the negotiating text as there is a marked need for more information, specifically related to opportunities to integrate migration concerns into the adaptation discussions.

Keywords
Decision framework, environmentally induced migration, negotiations, post-2012, adaptation, extreme events

In brief

Global environmental change, including climate change, is increasingly affecting ecosystems and the communities who rely on their environment for survival. This paper attempts to address the gap between conceptualizing environmental change and migration by offering a decision framework to categorize groups of people who move owing to changes in the environment. The paper revisits a known typology of environmental migrants, namely, 'environmental refugees', 'environmentally-forced migrants', and 'environmentally-motivated migrants'. The approach inspects the conditions leading to the decision by a community to move, including the state of the environment and adaptive abilities of individuals, groups, or communities that are affected. The paper highlights, while considering migration as a response strategy to environmental stress, the pace of change in the environment where it will have a significant influence on the mode of displacement and migration-related decisions. Environmental degradation is often related to socio-economic and political conditions and vice versa. The paper emphasizes that deciphering the exact extent of the influence of environmental factors on migration as a decision is rather tricky, owing to the co-existence of multiple push and pull factors.

City carbon budgets: a proposal to align incentives for climate-friendly communities

Salon D, Sperling D and Meier A. 2010
Energy Policy, **38**(4), pp.2032-2041
http://www.sciencedirect.com/science/article/pii/S0301421509009410

Review

In recent years, the role of stakeholders at different level of governance has emerged as crucial to take climate actions, given that international negotiations may not conclude with a global agreement. In such a regime, based on multi-level governance, local governments would be the key. Local governments can reduce emissions through policies that enable land-use zoning, building codes, transport infrastructure investments, and alternate transport. Such policies should aim to influence the behavioural choices of communities. Many local governments have developed climate action plans with emission reduction strategies. In this context, the city carbon budget put forth by this paper is important, as this framework could be used to substantially enhance city-level actions by coordinating standalone local level efforts. The paper strongly argues that these voluntary efforts could be made mandatory in the long term. However, these efforts should ensure that actions and plans are proposed in a manner most appropriate to local circumstances. Further, implementation of a city's carbon budgets will require time and considerable effort, alongside political agreements that the authors have not addressed in this case, but that are crucial. Thus, any future climate regime should consider the evolving paradigm of emergence of new stakeholders at different levels of governments.

Keywords
City carbon budgets, transport, behaviour, greenhouse gas emissions, local governments

In brief

This paper proposes a framework for climate policy instruments for local governments to reduce GHG emissions from cities. The proposal put forth is that local governments would be assigned a city carbon budget, and would be required to keep annual GHG emissions from local transport and buildings within this allocated city carbon budget. The paper identifies and evaluates options for creating an effective and acceptable institutional structure, allocating emission targets to localities, measuring emissions, providing flexibility and incentives to local governments, and assuring compliance. The paper argues for a mandatory but flexible climate policy framework that would empower local governments to take responsibility for their future emissions patterns. Given that local governments, have very limited resources, the authors oppose financial penalties as these may draw fierce opposition from local governments, and support financial rewards or incentives to assure compliance in the proposed framework. In terms of sharing responsibility, the framework suggests that the responsibility of selecting and implementing actions should be with local governments but, for methodological consistency in both budget setting and emissions measurement across cities, it is important for national governments to step in. In terms of allocation of budget, the paper proposes per capita emissions reduction targets that achieve the environmental goal of emissions reduction by all local governments without affecting economic growth.

Mainstreaming climate adaptation into development assistance: rationale, institutional barriers and opportunities in Mozambique

Sietza D, Boschütza M and Klein RJT. 2011
Environmental Science and Policy, **14**(4), pp.493-502
http://www.sciencedirect.com/science/article/pii/S1462901111000025

Review

The concept of mainstreaming of adaptation actions into developmental activities is well-recognized. Apart from national governments, this concept also holds relevance for donors as it provides a framework to safeguard their developmental activities in the least developing and developing countries that are vulnerable to climate impacts. Planning processes in different countries have tried to imbibe this concept while preparing their National Adaptation Programme of Action(s) (NAPAs) and National Communications. However, there is still a dearth of analysis on the limitations and opportunities facing different countries for operationalizing the mainstreaming process. This paper offers important insights for addressing this gap by analyzing the mainstreaming process in Mozambique—a country whose development process is heavily reliant on Official Development Assistance and that is frequently impacted by extreme weather events. The paper also offers a multi-level framework to analyze institutional barriers and points of intervention for mainstreaming and the elements of this framework can be customized to any developing country context. The analysis illustrates that the availability and management of information, continuity of institutions and networking within and among national and international institutions, together with the availability of financial resources, are important criteria for effective mainstreaming, even in the presence of a favourable legislative environment.

Keywords
Mainstreaming, climate adaptation, Mozambique, Official Development Assistance, investments, institutional barriers

In brief

Located on the South-Eastern African coast, Mozambique is a nation in urgent need of climate adaptation and development to be able to bring its 22 million inhabitants to a respectable standard of living. This paper explores the opportunities and barriers inherent in mainstreaming climate adaptation as part of current developmental projects already underway in Mozambique. The paper offers a multi-level framework to analyze institutional barriers and points of intervention where the process of mainstreaming climate adaptation can begin; advantageously, this framework can be individualized according to the requirements of any developing economy. Analyzing Mozambique's internal investment patterns, the paper demonstrates that a significant amount of the nation's limited financial resources are spent as developmental assistance in regions with high exposure to climate extremes. Despite awareness of climate risks, administrators within the country are impeded by the lack of skilled human resources, unavailability of relevant information, erosion of institutional memory, lack of institutional coordination and participation, scarcity of funds, and excessive focus on short -term developmental priorities without concentrating on creating long-term, sustainable development.

Ethanol production and fuel substitution in Nepal: opportunity to promote sustainable development and climate change mitigation

Silveira S and Khatiwada D. 2010
Renewable and Sustainable Energy Reviews, **14**(6), pp.1644-1652
http://www.sciencedirect.com/science/article/pii/S1364032110000596

Review

With an uneven development distribution, Nepal is among the poorest and least developed countries in the world. The rapidly growing transport sector is a major consumer of fossil fuels in the country and energy security for transport is a major challenge. Furthermore, air pollution of the valley has not decreased significantly, despite a number of regulations to improve the local environment. This paper is a relevant piece of research for policy-makers as it proposes a solution to meet the twin objectives of reducing ambient air pollution and meeting energy security through the substitution of gasoline by ethanol. For a land-locked nation with no natural fuel reserves, changing its fuel usage pattern is a necessity. The paper clearly defines the cost-benefits of substituting gasoline with ethanol while explaining how this would also lead the nation to break its oil dependency. The paper estimates that the positive effects of fuel substitution would include a 14% gasoline import reduction resulting in an annual saving of $ 10 million, an incentive for improved sugarcane yields, and a surge in income and job creation in the rural areas, along with significant positive effects in the agricultural and transport sectors. Thus, the paper illustrates how bio-ethanol production can be attractive both for national development and for climate mitigation measures. Additionally, the paper highlights the importance of understanding the potential of national efforts towards bio-ethanol production for leveraging international financial sources to make the necessary investments.

Keywords
Ethanol, bio-energy, developing countries, fuel substitution, sustainable development.

In brief

This paper explores the potential for ethanol production and fuel substitution in Nepal, based on established sugarcane production, installed capacity for sugar and ethanol production, economic opportunities for the national economy, and the potential, to reduce greenhouse gas emissions. The paper is based on extensive research on the change in fossil fuel sales through 1996 to 2007, patterns of passenger transport in the Kathmandu valley and the huge ethanol production potential in Nepal and cost versus benefits of substituting gasoline with E10 and E20. Nepal does not have fossil fuel reserves and energy security for transport is quite a severe problem. The transport sector is the largest consumer of petroleum products and vehicle emissions are major sources of ambient air pollution in the Kathmandu valley. The paper presents the country's huge potential to generate electricity from hydropower, making battery-operated electric vehicles an attractive option, but focusses on potential for ethanol production based on molasses. It also discusses the role it could play in saving foreign currency while also releasing the country from accumulating debts for oil imports and promoting sustainable development. According to the paper, the positive effects for the country can be manifold through gasoline import reduction, an incentive for improved sugarcane yields, and a surge in income and job creation in the rural areas along with significant positive effects in the agricultural and transport sectors.

A method to finance a global climate fund with a harmonized carbon tax

Silverstein DN, 2010
MPRA Paper No. 27121. Munich: Munich Personal RePEc Archive
http://mpra.ub.uni-muenchen.de/27121/

Review

Designing climate financial mechanisms is, largely, a political process and it is important to understand its political underpinnings to mobilize the required consensus. Additionally, the financial mechanism, apart from being robust, should also be simple, predictable, equitable, and adequate. This paper presents an equitable alternative to address climate needs across all nations at both a global and regional level and has the potential to raise interest and agreement, thus increasing the chances of policy uptake. Thus, the paper suggests a common carbon tax rate across all nations, generated from transferring a percentage of the collected carbon tax based on historical responsibility for carbon emissions and national wealth. The paper argues that while emissions caps can prove to be tangible and useful goals for emission reductions, carbon taxes and regulations can prove to be a more efficient approach. A harmonized carbon tax can form a bottom-up approach compared to cap-and-trade and can motivate behavioural changes in terms of consumption, instead of responding on the basis of national or per capita emissions targets. This paper, thus, makes a valuable contribution to the current proposals on carbon finance to expedite the transition to low-carbon economies without jeopardizing economic growth.

Keywords
Harmonized carbon tax, financing mechanisms, consensus, cap and trade, market mechanisms, climate negotiations

In brief

The paper introduces the problem of climate-funding, elaborates the risks associated with cap-and-trade offsets, and expands the idea of a harmonized carbon tax and global climate fund. The paper argues that a common carbon tax will be the simplest route to start funding for climate action. After reviewing the risks of cap-and-trade with carbon offsets and the advantages of a harmonized carbon tax, the paper proposes a method to utilize a harmonized carbon tax to finance a global climate fund. Formulas for collection and disbursement require parameters for a globally harmonized carbon tax rate, a rate for climate fund contribution, a national wealth threshold for fund contributions, and individualized factors for each nation.The paper argues that market mechanisms are difficult to implement in comparison to public financing, which can result in diversion of time towards structuring the fund's financial framework rather than structuring climate action. The paper suggests disbursement of the collected revenue for climate aid based on a set of national climate need factors for adaptation, preserving strategic carbon sinks, low-carbon infrastructures and population management.

Win-win scenarios at the climate–development interface: challenges and opportunities for stove replacement programmes through carbon finance

Simon GL, Bumpus AG and Mann P. 2011
Global Environmental Change, **22**(1), pp.275-287
http://www.sciencedirect.com/science/article/pii/S0959378011001336

Review

COP 15 at Copenhagen launched an initiative titled Safe Access to Firewood and Alternative Energy in Humanitarian Settings (SAFE) stoves project to upscale the distribution of fuel-efficient stoves, with pilots in Sudan and Uganda starting in 2010. This programme marked a growing recognition in the climate and development community about considering domestic cook-stoves as an opportunity to address climate concerns and rural livelihood issues together. The paper cautions that while carbon finance provides an opportunity to fund scale-able and enforceable stove programmes, it may also often result in becoming counter-intuitive. In this regard, the paper highlights the barriers for achieving developmental objectives by clean cook-stoves and the technical and policy challenges in enabling greenhouse gas emission reductions through them. Furthermore, improved cook-stoves form one of the very few developmental strategies that are receiving support through carbon finance. By putting forth the challenges and uncertainties in achieving such win-win strategies, the paper identifies future areas of research. The objective in identifying and addressing these challenges is to provide financial resource flows to generate, implement, and maintain improved cook-stoves to create the dual and mutually reinforcing benefits to development as well as emissions.

Keywords
Win-win scenarios, climate, development, improved cook-stoves, greenhouse gas emissions, Peru, Uganda, Cambodia, mitigation, carbon finance

In brief

This paper explores the potential for win-win outcomes from a climate and development perspective using carbon finance for the distribution of improved cook-stoves. The paper highlights that improved cook-stoves present a good example of dual benefits for local development and global climate change mitigation, with one supporting the other. The paper also describes how the results of such programmes are context-specific and that, in practice, they face a set of cultural, financial, governance, and technological challenges for achieving 'win-win' outcomes. Domestic cook-stoves contribute a significant share of greenhouse gas emissions, hence replacing traditional stoves with cleaner ones offers the dual benefit of reducing indoor air pollution and greenhouse gas emissions–a 'win-win' climate-development solution. This mitigation link of improved cook-stove programmes has started attracting carbon offset financing for generating emissions reductions credits. Given that carbon financed improved cook-stoves projects are in their infancy, this paper provides a review of opportunities and drawbacks of supporting cook-stove programmes through carbon finance, using case studies from Cambodia, Peru and Uganda. The paper concludes that, the key challenge for future carbon-financed improved cook-stove projects will be to promote congruence between climate and development objectives in order to overcome mutually reinforcing impediments.

Rethinking adaptation for a 4°C world

Smith MS, Horrocks L, Harvey A. and Hamilton C, 2010
Philosophical Transactions of the Royal Society, **369**(1934), pp. 196-216
Available online at: http://rsta.royalsocietypublishing.org/content/369/1934/196.full.pdf+html

Review

Given the slow progress on mitigation action, and if the climate talks fail to reach a consensus, the world is likely to witness the impacts of rapid and extreme climate change. Under a severe climate change scenario, current discussions on adaptation might need a radical shift, instead of a simple scaling-up of current strategies by a proportionate measure. The paper provides an interesting deviation from viewing adaptation as simply being incremental, to that of being potentially transformational in the long-term in the case of extreme climate change. The paper holds merit because it argues that despite the uncertainty in long-term climate change, it is possible to deploy short-term decisions based on established methodologies, nested within a long-term process that might be transformational in nature to deal with the extreme climate. In this regard, the paper provides policy-makers and practitioners with characteristics of adaptation options that can range from small to transformative changes in the long-run. Categorizing the interactions between adaptation decision lifetime, uncertainty in key drivers and the type and range of adaptation responses can allow for internalization of the various barriers to such adaptation. Such a radical change can involve revisiting the basic principles defining the overall adaptation objective itself apart from deploying different smaller steps to achieve the objective. This paper has an important message for strengthening the commitment of decision-makers in formulating policies and taking adaptation decisions with a long lifetime, in response to an extreme climate under a spectrum of plausible futures.

Keywords
Adaptation planning, transformational, uncertainty, decision-making, scenarios, long-term decisions

In brief

Aimed at policy-makers and administrators, this paper seeks to address the question of adapting to severe climate change over a long period of time. Adaptation planning for a global increase in temperature of 4°C is likely to face diverse psychological, perceptive, and institutional barriers in the process of formulation and implementation. The paper argues that while long-term planning is difficult to address due to the inability to accurately predict the effects of climate change over an extended timeframe, it is possible to create short-term adaptation strategies nested within a larger long-term framework that can be changed in accordance with the effects of extreme climate change. The paper emphasizes the relationship between three factors—viz., the time taken from the implementation of an adaptation decision to the appearance of the changes brought about by it, the uncertain nature of key drivers and the type and range of adaptation responses—as crucial for responding to radically different future climates. Based on the variability of these factors, the paper offers recommendations for adaptation decision-making and uses a case study of the Thames estuary to establish a precedent of how adaptation decisions with long lifetimes can be formulated and mainstreamed effectively.

Climate information requirements for community-level risk management and adaptation

Srinivasan G, Rafisura KM and Subbiah AR. 2011
Climate Research, 47, pp.5-12
http://www.undp.org.cu/crmi/docs/ir-clinfocommunitydrm-td-2011-en.pdf

Review

Although most experts and policy-makers are receptive to the idea of connecting the providers and users of climate information, there are limitations that hinder the actual realization of such synergies. Additionally, the present scenario of generation of climate information in developing countries often exhibits a bias towards the perspective of the information provider rather than the user. This often leads to a lack of awareness amongst potential users regarding the value and timely application of this information for risk management and adaptation decisions. Apart from underscoring the need to customize climate information according to user requirements, this paper provides a methodology for bringing about a shift in current climate information generation and application systems. Interestingly, instead of following a deductive approach, the paper utilizes cases of failures in local level decision-making for risk management due to non-credibility of the available climate information to present this case. Specifically, the paper draws lessons from Bangladesh for designing an institutional framework for appropriate packaging of information by integrating community feedback. This framework encompasses the design of climate information channels from information providers to the end-users. By offering an operational framework for linkages between information provider and user, the paper adds value for creation of community-centred climate services.

Keywords
Climate services, climate information, users, climate risk management, adaptation, uncertainty, operational framework, Bangladesh

In brief

With the preponderance of large populations in developing nations living in areas prone to climatic extremes, the need for accurate and timely climate information at the community level is exacerbated. Most of the people living in developing nations depend on agriculture and other climatically-dependent economic activities; however, due to the lack of reliable climate information and effective risk management, adaptability is compromized. The paper discusses gaps in the existing climate information and risk management architecture, and presents an institutional framework for a climate information service that monitors weather and climate systems and provides communities with information regarding the same. The paper is assisted by case studies from South Asia, and cites the six-step methodology adopted by the Asian Disaster Preparedness Centre in implementing the Climate Forecast Applications (CFA) for the Disaster Mitigation Programme, as it illustrates the case of implementing the CFA project to provide accurate climate information on flooding to communities in Bangladesh. The paper recommends the development of institutions called 'Climate Forums' to act as an interface between producers and users of climate information, including forecasters, disaster management agencies, and communities, facilitating prompt responses during extreme climate events.

Baseline for trust: defining 'new and additional' climate funding

Stadelmann M, Roberts T and Huq S, 2010
IIED Briefing 17080. London: International Institute for Environment and Development
http://pubs.iied.org/pdfs/17080IIED.pdf

Review

A major impediment to fast-start climate finance is that there is no baseline for figuring out the level of contribution by industrialized countries. The paper analyzes different baseline scenarios from both the industrialized countries and recipient countries comprehensively. This paper can help in coordination, collaboration, and mobilization amongst key stakeholders for bringing the much-required fast-start climate finance into existence. This is primarily because significant negotiations may be required, but seizing this opportunity to define baselines will not only build trust on both sides but also reduce the uncertainty of climate finance options in the future. Availability of climate finance can further aid in policy agenda setting, decision-making, as well as policy implementation related to mitigation and adaptation. The paper compares different scenarios succinctly and can prove a useful guidance for negotiators to reach a consensus, rather than to continue the stalemate on financing climate action. The paper makes a strong case for having in place baselines for evaluation of current and future country pledges and argues that it is an essential initial step for not only building trust and accountability among the contributing and receiving countries, but also from the standpoint of climate justice.

Keywords
Fast-start climate finance, baseline, new and additional, predictability, climate negotiations, climate justice

In brief

This policy brief underscores that the major area of conflict in climate negotiations is finance. A major source of mobilizing climate action will be providing the fast start capital of $ 30 billion. This brief discusses the establishment of a baseline for 'new and additional' climate funding, thereby setting the tone for climate action by bringing the $ 30 billion 'fast-start climate financing' into existence. The pivotal aim of this policy brief is to point out to policy-makers the importance of a proper baseline to determine what is 'new and additional' and initiate the fast-start climate finance. In order to know what is 'new and additional', it is important to establish a baseline. Thus, eight possible baseline scenarios are presented with varying degrees of feasibility and effectiveness in leveraging climate finance. These eight scenarios are plotted on a rough scale that varies between options that are conducive to recipient countries and those that favour the contributing or donor countries. The advantages and disadvantages of each of the different scenarios are tabulated for easy reference. In conclusion, the policy brief puts forth a strong appeal for defining these baselines from a climate justice perspective.

Design principles for global commons: natural resources and emerging technologies

Stern P.C., 2011
International Journal of the Commons, 5(2), pp.213-232
http://www.thecommonsjournal.org/index.php/ijc/article/view/305/235

Review

Elinor Ostrom's design principles for the 'tragedy of commons' have been well-acknowledged in terms of their application to issues of local resource use. Though there is scope for the paradigm of self-governance in international agreements and regimes, there has not been any critical analysis of whether the same principles of management can apply to issues of global resources. This paper illustrates the challenge of framing problems of global commons such as climate change, compared to problems of common pool local resources, owing to issues of scale mismatch, diversity of culture and institutions and dynamic complexity. Additionally, the paper offers new principles for design of a governance regime for global commons. Drawing a parallel between characteristics of risks associated with climate change and those associated with emerging technologies, the paper highlights a critical gap in terms of non-inclusion of non-governmental organizations in the design of institutions for risk governance. Thus, the paper can bring a change in the qualitative relevance of existing knowledge, offers its contribution to the design of climate governance and also cites pertinent knowledge gaps. It offers value to policy formulation in terms of finding new guidelines for governance of large-scale commons and also agenda setting in terms of institutional design for risk governance.

Keywords
Common pool resources, climate governance, global commons, emerging technologies

In brief

This paper attempts to enhance the eight 'design principles' first postulated by Elinor Ostrom, based on her work on stable local common pool resource management. The author examines the question of whether Ostrom's design principles are sufficient to govern resources on a global level, and if not, what are the modifications and elaborations that must be applied in order for it to do so. It illustrates the challenge of framing issues facing global commons today, such as climate change, and draws an analogy between the risks of emerging technologies and the problems of common pool resources. The paper presents new design principles along with critical analyzes of the challenges of scaling up Ostrom's design principles from local to global commons. This includes investing in science in order to understand the resource and its interactions with users, independently monitoring the resource and its utilization, ensuring stakeholder deliberations and defining the significance of scientific results, integrating scientific analysis with stakeholder deliberation, facilitating participation of lower-level actors and engaging a variety of institutional forms in decision-making, and planning for institutional adaptation and change.

Adaptation to climate change and desertification: perspectives from national policy and autonomous practice in Malawi

Stringer LC, Mkwambisi DD, Dougill AJ and Dyer JC, 2010
Climate and Development, **2**(2), pp.145-160
http://homepages.see.leeds.ac.uk/~lecajd/papers/Stringeretal.ES+P.pdf

Review

A synergy between national and local efforts for adaptation is essential to ensure that strategies presented at the national level are reflective of local conditions and will receive greater social acceptance during implementation. There is a fair degree of agreement between NAPA and NAP on policy and implementation related to issues such as food security and management of water resources, role of education and awareness building, and livelihood diversification in promoting adaptation at the local level in Malawi. This also matches the autonomous adaptation efforts that households currently practice. Despite the above convergences, institutional structures to support efforts to address the challenges of desertification and climate change are not well integrated horizontally at the national level. If a more integrated institutional structure could be developed, this would enhance the possibilities for reaching shared goals as well as providing improvements to efficiency and effectiveness. Lack of coordination within ministries handling issues in a compartmentalized manner adds to the challenge of dealing with cross-cutting and cross-scale issues such as climate change and desertification. This is an important paper because this analysis has indicated that better horizontal alignment of policy adaptation strategies at the national level could help facilitate local autonomous adaptations and improve vertical integration, particularly if cooperation and communication can be enhanced horizontally among relevant ministries.

Keywords
Malawi, desertification, climate change, adaptation, NAPA, UNFCCC, UNCCD

In brief

In south-eastern Africa, the nation of Malawi currently faces multiple social and economic challenges, ranging from climate change and deforestation to rampant poverty. The paper explores the ways in which the interlinked challenges of climate change and desertification are managed in Malawi. It also examines the synergy and conflict between local autonomous adaptation strategies and national adaptation policies, which are in accordance with international commitments to the United Nations Convention to Combat Desertification (UNCCD), and the United Nations Framework Convention on Climate Change (UNFCCC). Malawi's National Action Programmes (NAPs) that cover desertification issues and the National Adaptation Programmes for Action (NAPA), still fall short of defining specific roles for the local government in supporting adaptation strategies, specifically in urban areas, which is indicative of a weak vertical synergy. The article assesses the extent of support offered across various levels of administration in order to address climate change and desertification issues in addition to support given to autonomous adaptation at the community level. The article concludes that policy on desertification and climate change is poorly mainstreamed towards development processes, and suggests that national policy should facilitate local adaptation strategies to enhance resilience at a community level.

Micro-insurance for local adaptation

Suarez P and Linnerooth-Bayer J. 2010
Wiley Interdisciplinary Reviews: Climate Change, 1(2), pp.271-278
http://onlinelibrary.wiley.com/doi/10.1002/wcc.37/full

Review

Many pilot projects are underway that can inform debate on the appropriate role of insurance in an adaptation strategy. This paper argues that such pilot projects can offer the dual benefit of reducing poverty while adapting to climate change and is thus pertinent for discussions in a developing and least developed country context. Additionally, discussions in this paper can be a motivation for the international donor community to support similar projects globally. It also provides insights on how micro-insurance can be part of an international climate adaptation strategy. The paper also highlights the limitations of the coverage of current micro-insurance, which protects banks against loan default in case of an extreme event, but does not directly act as an all-inclusive safety net for farmers in case of large losses. These issues of affordability and scaling-up of micro-insurance to target not only the banks but also individual farmers can also draw attention to the support needed from the international donor community as a contribution to building resilience. The Malawi example is pertinent because it brings out the role of trust building, insurance education and extension activities to engage farmers through training and capacity building for the successful implementation and uptake of micro-insurance as part of an adaptation strategy. Interestingly, the paper also warns that insurance companies should not provide perverse incentives for farmers to continue work on marginal lands instead of moving on to better more resilient livelihoods, if possible. Thus, insurance schemes and programmes should consider the role of price triggers to allow room for such transitions or correct market distortions to promote adaptive practices and avoid potential maladaptation. The paper brings out how this local development strategy can fit into being part of an international climate adaptation strategy.

Keywords
Micro-insurance, adaptation, financial instruments, Malawi, ENSO, subsistence farmers, markets

In brief

The potential of financial instruments, such as insurance, is well-known for risk reduction and transfer mechanisms in the case of extreme events. However, there are issues with respect to their feasibility to cater to the most vulnerable as part of an adaptation programme. This paper presents the specific example of a drought micro-insurance project for subsistence farmers in Malawi. This project aimed at enabling farmers to access higher yielding variety of seeds, raising crop productivity, and consequently decreasing their vulnerability to climate change.
The paper highlights that this project is actually able to insure the farmers against crop losses due to drought, beyond the obvious developmental gains. This is done by integrating into the insurance pricing mechanism forecasts of seasonal rainfall, which in turn are dependent on El Nino-Southern Oscillation (ENSO).
This paper specifically describes the components of this pilot programme in Malawi, the challenges it faced in its first year of operation and the applicability of this insurance programme integrated with ENSO-dependent seasonal rainfall forecasts. In conclusion, the paper presents the ways forward for the development of micro-insurance programmes under a changing climate, by gathering learning from Malawi.

Seven tools for creating adaptive policies

Swanson D, Barg S, Tyler S, Venema H, Tomar S, Bhadwal S, Nair S., Roy D. and Drexhage J. 2010
Technological Forecasting and Social Change, **77**(6), pp.924-939
http://www.sciencedirect.com/science/article/pii/S0040162510000727

Review

Policy-making is a complex task, especially when faced with uncertain and dynamic conditions. Policies that are rigid and not designed to perform effectively under uncertainty might not be able to achieve optimal performance and objective. This paper offers critical insights for decision-making in a changing climate. The seven tools can enable policy-makers to identify the key uncertainties and risks that can affect performance and enhance their abilities to better deal with anticipated and unanticipated uncertainties. Additionally, the application of these seven tools can enable policy-makers to incorporate innovative mechanisms to help policies deal with surprises. By acknowledging uncertainties and deploying these tools to enhance the adaptive capability of the policy, policy-makers can significantly strengthen the process of policy design and implementation under uncertainty. These tools are targeted at policy-makers and managers designing and implementing public policies at different levels, policy analysts and planners dealing with socio-economic analysis and climate change adaptation, and sectors such as agriculture, water resources, human health, energy and infrastructure, information and communication technology among others. The paper is innovative as it considers elements additional to a regular policy planning process to enable on-going policies to achieve successful outcomes in an uncertain and complex world.

Keywords
Adaptive policies, India, Canada, uncertainty, policy design and implementation, dynamic, anticipated risks, unanticipated risks, policy performance

In brief

This paper aims to introduce the concept of adaptive policy-making for guiding policy-makers to incorporate the principles of sustainability into the decision-making process when under complex, dynamic, and uncertain conditions. Adaptive policies are those that can adjust to a range of anticipated and unanticipated condition, that can affect policy performance in the future. The paper argues that policies that cannot continue to perform effectively under dynamic conditions might not be able to achieve their proposed objectives, might result in being counter-productive (maladaptive policies), and might prove to be an impediment to the ability of individuals, groups, and stakeholders to cope with, or adapt to, changing conditions. Through a review of policies within the agriculture and water sectors in Canada and India, this paper provides seven tools that have helped policy-makers in policy design and implementation under conditions of uncertainty. Anticipated conditions can be addressed within adaptive policies using tools, such as scenario planning, multi-stakeholder deliberation, and monitoring key performance indicators to trigger automatic policy adjustments. Additionally, adaptive policies can be prepared to deal with unanticipated conditions through a process of formal review and learning, thus enabling self-organizing and social-networking in communities, decentralizing decision-making, and promoting variation in policy responses.

Planning for urban climate resilience: Framework and Examples from the Asian Cities Climate Change Resilience Network

Tyler S, Reed S O, MacClune, K and Chopde, S. 2010
ISET Working Paper 3. Institute for Social and Environmental Transition
http://www.i-s-e-t.org/images/pdfs/isetworkingpaper3-resilienceplanning.pdf

Review

This paper demonstrates the operationalization of an urban resilience framework and provides guidelines for resilience planning through practical experiences in the cities of India, Indonesia and Viet Nam. The paper argues that model projections, inherently, have many uncertainties and are often unable to capture the incremental nature of risk. Therefore, these should be supported with a good understanding of city-level conditions, including the existing governance systems. The climate resilience planning approach of the Asian Cities Climate Change Resilience Network (ACCCRN) is centred around an innovative shared learning process that encompasses sharing of knowledge and experience and, in the process, accounts for learning through active engagement of local stakeholders, policy-makers and the scientific community. The ACCCRN approach aims at enabling the cities to develop and implement a host of adaptive responses to deal with the current and likely future impacts of climate change on their city. Programmes such as ACCCRN offer an invaluable opportunity to initiate bottom-up action by the stakeholders, enabled through a sound understanding of their vulnerability and formulation of the most appropriate strategies in a participatory manner. The ACCCRN marks an innovative effort in Asian cities and contributes to the development of some early strategies that also indicate the perception and actual practice of resilience at the city level.

Keywords
Urban resilience framework, resilience planning, Asian Cities Climate Change Resilience Network, India, Thailand, Vietnam, Indonesia, climate risks, vulnerability

In brief

This paper presents the development of resilience strategies in selected cities of India, Indonesia and Viet Nam as part of the Asian Cities Climate Change Resilience Network (ACCCRN). Key lessons derived from the urban resilience planning include that resilience planning is a long-term process, shared learning is a useful approach to resilience planning, and—as political leadership can be transient in nature—resilience planning can also be mobilized by a set of key stakeholders and decision-makers at the city level. The paper also highlights that a Climate Resilience Strategy at the city level should provide context, evidence and analysis to justify actions for strengthening urban resilience, and set priorities which the local government should act on. Core areas of importance that emerged as part of the resilience planning in the ACCCRN cities include awareness raising, capacity building of human resources and institutions, infrastructure development, and urban ecosystem management.

Nationally Appropriate Mitigation Actions (NAMAs) in Developing countries: challenges and opportunities

Van Asselt H, Berseus J, Gupta J and Haug C. 2010
Bilthoven: Netherlands Environmental Assessment Agency
http://www.rivm.nl/bibliotheek/rapporten/500102035.pdf

Review

Within the climate negotiations, discussions on NAMAs have acted as a mechanism to enhance developing country participation in the context of mitigation. This debate is largely concentrated on the 'major emerging economies', specifically the BASIC group of countries: Brazil, South Africa, India, and China. The analysis in this report is therefore timely in terms of providing underlying interests and country positions of this group pertaining to NAMAs. The report concludes that all these countries hold a similar perspective on issues such as common but differentiated responsibilities and respective capabilities. Specifically, the point put forth is that the mitigation actions of developing countries are different from the mitigation commitments of developed countries and this further highlights the voluntary nature of the NAMAs, the need for financial support and the overriding developmental imperatives of developing countries. The report highlights the fact that achievement of a consensus on consideration of NAMAs within the future climate regime is reliant on the balancing of country positions on NAMAs. The paper offers critical insights for the international debate as it will help in identifying prospects for a deeper engagement of the BASIC countries.

Keywords
NAMA, BASIC, major emerging economies, climate negotiations, MRV, national circumstances

In brief

This report discusses the role of NAMAs (Nationally Appropriate Mitigation Actions) in current climate negotiations. This includes issues around the nature and context of NAMAs, the scope of NAMAs, linking NAMAs with policy support, and measuring, reporting and verifying the NAMAs. The paper specifically analyzes the positions of the BASIC group of countries, i.e. Brazil, South Africa, India, and China, on the subject of NAMAs, and provides interpretive analysis of the underlying interests prevalent in these nations. The analysis is built on understanding the influence of domestic factors and national circumstances on a country's position on climate change. The paper also explores future scenarios for these countries to start specific types of activities under NAMAs in a post-2012 regime. The key conclusions of the paper are that the country positions related to NAMAs are very similar. Specifically, while the NAMAs and commitments of developed countries are clearly considered to be separate, the BASIC countries emphasize mitigation action without hampering their growth and development. The decision on activities to be categorized under NAMAs lies with the country itself, and financial resources to support these activities should be garnered from the financial mechanisms proposed by proposed by the G77 and China.

Engaging private sector capital at scale in financing low carbon infrastructures in developing countries

Ward M., 2010
Wellington, New Zealand: GtripleC (Global Climate Change Consultancy)
http://www.gtriplec.co.nz/assets/Uploads/papers/engaging_private_sector_capital_at_scale_2010_11_15.pdf

Review

This report marks a deviation from the present debate in climate finance of incremental costs of mitigation and concessional public finance to developing countries from developed countries. The report focusses on the mechanisms to secure investments in climate action and emphasizes that the private sector can be central to the delivery of these actions. Secondly, it does not focus strongly on the scale of investments required in the UNFCCC mechanisms centre around the $ 30 billion as part of the fast-start finance solution and around $ 100 billion per annum in the long-term, starting from the year 2020. Instead, the paper takes us directly to $ 2 trillion —a figure that has been circulating in the financial world as the cost of limiting global temperature rise to 2o. The commensurate mitigation action will require huge resource mobilization in terms of infrastructure for low-carbon growth and energy-efficiency and therefore the financing needs will also be huge. The report argues that some of the emerging solutions in the form of green funds and equity funds in the form of public-private investments are promising and hold potential for being leveraged by developing countries.

Keywords
Low-carbon infrastructure, developing countries, private sector investment, mitigation, UNFCCC, China, India

In brief

This report focusses on scaling up financing for low-carbon infrastructure and energy efficiency, especially in developing countries, such as India and China, apart from industrialized nations such as the US and EU countries. The report seeks to harness the financial milieu that already exist in the global financial system to leverage funds. The report also draws on the scale of financing that may be required. An important message of this report is that policy-makers will find it helpful to look at the private sector to finance climate action, particularly in mitigation, and look at the implementation side as well. The report is important as it documents the sources of finance and goes on to address the nature of those financial sources. For instance, it describes how debt and equity are different from each other, not only in terms of expected returns but also in their appetite for risk. The arguments or propositions might be well-known, but there is a clear attempt to bridge a gap between finance as we know it in the everyday world and concepts in climate change. The paper has various illustrations, case studies, and concepts in sync with some added reality checks.

Dam reoperation in an era of climate change

Watts RJ, Richter BD and Opperman JJ. 2010
Journal of Marine and Freshwater Research, **62**(3), pp.321-327
http://www.publish.csiro.au/paper/MF10047.htm

Review

Climate change poses additional risks to the security of water resources, which in many parts of the world are already facing the pressure of meeting competing demands. There are future climate change scenarios where certain tropical regions of the world may face increased flood hazards, while the severity of droughts may increase in some arid regions. Additionally, there are some regions where the magnitude and frequency of floods may increase in the short-term, but flows may drastically decrease in the long term. This may have serious implications for water supply, energy generation, flood hazard, human health, and ecosystems. Often, structural measures such as increasing storage capacity by construction or modification of dams are recommended to counter such scenarios. However, construction of large dams has been contested for a long time owing to the issues of natural flow imbalances and rehabilitation of adjoining communities. This paper offers a fresh perspective on the utilization of existing dams for adjusting flows to match with the future scenarios of water stress. The paper also highlights th e importance of hydrological modelling for such reoperation, flexibility of institutions, and availability of resources to support such activities. In doing so, the paper offers a new framework for building capacity for climate change adaptation in institutions related to water resources management.

Keywords
Climate change, water security, hydropower, water supply, dam reoperation, floodplains, flood management, wetlands, flow variability

In brief

This paper proposes strategic changes to flow regimes in fresh water dams for adaptation to the impacts of climate change. Three different types of dam operations, viz., flood management, hydropower generation, and water supply, are analyzed for their potential to contribute towards adaptation. The paper argues that dam-reoperation to address climate concerns might require a trade-off from the conventional dam operations. Through different case studies, the importance of incorporating floodplains in flood management for increasing dam storage capacity, and coordinating multiple dam operations and intra-basin legislations for the maintenance of water flows under a climate change scenario are highlighted. Through some best practices, the paper demonstrates how the management of floodplains and wetland ecosystems, along with coordinated operations and legislations at different administrative levels, can be integrated to strategize dam flows in order to maintain water supply under changing climatic conditions. The paper recommends four distinct strategies for adaptation, viz., groundwater aquifer storage and recovery, inter-dam transfers, alternate delivery arrangements for landholders with riparian rights, and coinciding water release from dams with the flows of unregulated tributaries. Instead of additional structural interventions, the paper identifies certain strategies for increasing the functional diversity of existing dam infrastructure.

Adapting to climate change in the compact city: the suburban challenge

Williams K, Joynt J and Hopkins D. 2010
Built Environment, **36**(1), pp.105-115
http://dx.doi.org/10.2148/benv.36.1.105

Review

In recent years, the idea of a compact city has gained impetus in both research and policy domains from the point of view of sustainability and curbing unplanned urban sprawl. Furthermore, the focus is mainly on the development and planning of city centres, not the suburbs, which are likely to witness major impacts due to climate change. This paper argues that mitigating and adapting to climate change needs to be considered alongside other proposed changes in the urban structure from a sustainability point of view. Thus, the existing urban form needs to meet the dual objective of meeting sustainability goals and addressing climate concerns through an integrated approach. This integrated approach would involve both structural changes in the built urban form as well as mobilizing support from social and political stakeholders. Given that the stakeholders and institutional mechanisms for action in suburbs will be diverse—including individuals, private enterprises and public entities, the governance challenges for suburban adaptation would be different. Though this paper uses the specific example from United Kingdom, the need for suburban adaptation is an imperative for many rapidly growing urban areas in developing countries as well, that are also highly vulnerable to the impacts of climate change.

Keywords
Suburbs, climate change, compact city, United Kingdom, adaptation, mitigation, stakeholders

In brief

Given that the structure and function of urban systems are going to be impacted by climate change, this paper challenges the focus on the compact city concept, with the specific example of cities in the UK. This paper argues that planning for compact cities from an urban sustainability point of view while considering mitigation opportunities does not often address adaptation concerns adequately. Additionally, the focus of this planning often limits itself to city centres, and this paper presents a case to expand this scope to include suburban areas. The challenges of climate change adaptation in suburban areas are also discussed, while emphasizing the need to juxtapose climate response alongside economic growth and development in these areas. The key challenges in doing so are mainly associated with retro-fitting of settlements, diversity of ownership of the housing stock and land management among others. In conclusion, the paper underscores that in the move towards compact cities, suburbs are likely to witness transformations; and while this move has the potential to contribute to mitigation, adaptation also needs to be given prominence with a focus on suburban areas.

Fair and effective multilateralism in the post-Copenhagen climate negotiations

Climate Policy, **10**(6), pp.638-654
http://www.ingentaconnect.com/content/earthscan/cpol/2010/00000010/00000006/art00005

Review

Negotiations in Copenhagen could not generate a unanimous and concrete outcome and resulted in the Copenhagen Accord (CA), which was not accepted by all Parties. The CA and the process that led to it resulted in widening mistrust amongst Parties. Not only is it unlikely to address climate change, but a non-multilateral approach would set a dangerous precedent for other global issues. Equity, both procedural and substantive, is hence central to international climate policy. Therefore, it was important to re-achieve the trust in multilateral process negotiations in Cancun through an ideal outcome. Any outcome is ideal if it meets three criteria. First, environmental efficacy -- that is, success on the ultimate objective of the Framework Convention on Climate Change (UNFCCC) which is to is to stabilize greenhouse gas concentrations in the atmosphere to prevent dangerous anthropogenic interference with the climate system within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner. Second, equity -- that is, equitable sharing of the burden and efforts of Parties in accordance with the common but differentiated responsibilities (CBDR) and Respective Capabilities. Third, national interests–that is, fully taking into account economic and social development and poverty eradication as the first and overriding priorities. The authors argue for changes in the current forms that could be helpful in agreement, such as an equitable negotiating process that is inclusive of all state actors and conclude by urging investments in the UNFCCC, which remains the only legitimate, fully inclusive forum. Only a legally binding agreement ensures that others also act ('fair') and a binding nature is the best assurance of implementation ('effective').

Keywords
Fair, negotiations, post-Copenhagen, multilateralism, Kyoto Protocol, UNFCCC

In brief

In light of the lack of global agreement on a new legal treaty in Copenhagen and the lack of trust in multilateral processes after Copenhagen, the paper discusses possible options for a fair and effective multilateralism. The paper perceives two scenarios for the future of multilateral negotiations on climate change: a 'big bang' scenario—a comprehensive package with a defining overall solution up-front that is framed as a global carbon budget, for the long-term and for all countries; and a 'fragmentation' scenario: all efforts to reach a global agreement are abandoned and issues are dealt with in a fragmented manner – with mitigation largely negotiated in the Major Economies Forum, climate finance in the G20, and with adaptation in the UNFCCC. While the first scenario will achieve what science demands but fail to achieve political acceptance, the second scenario is highly realistic politically and will make incremental progress that falls short of what science demands. The authors considered positive trends in other multilateral environmental processes and the implications of different negotiation styles—cooperative versus competitive—suggesting that there should be a balance between global interests in cooperating to address climate change, and national self-interests for the economy, in order to achieve an agreement.

Contested environmental policy infrastructure: socio-political acceptance of renewable energy, water and waste facilities

Wolsink M. 2010
Environmental Impact Assessment Review, **30**(5), pp.302-311
http://www.sciencedirect.com/science/article/pii/S0195925510000156

Review

The paper follows an analytical evidence-based approach for establishing the various reasons for not-so successful implementation of infrastructures in the domain of various relevant environmental policies and reasons for the absence of social acceptance in the context of the Netherlands. This holds true for many countries worldwide and need serious deliberations by policy-makers on the benefits of following a participatory approach for developmental issues, especially related to infrastructure citing. This research paper has the potential to bring about changes in the design and delivery of policies and practices related to infrastructure, citing evidence of public resistance and/or failure of infrastructure development plans that were essentially meant for the well-being of the public but failed due to the absence or weakness of the system of garnering social-acceptance. This paper holds merit in terms of bringing to the fore a strong focus on the value of social acceptance for the adoptability and sustainability of environmental policy options, and parallel lessons can be drawn for the development and citing of mitigation and adaptation infrastructure in any country.

Keywords
Wind power, waste management, water management, social acceptance, infrastructure, environmental conflict, policy learning

In brief

This paper addresses the challenging issues of the citing of environmental infrastructure that defies social acceptance in the context of the Netherlands. Social acceptance as defined by this paper "is not simply a set of static attitudes of individuals; but refers more broadly to social relationships and organisations, and it is dynamic as it is shaped in learning processes". Through the case study examples, the paper highlights that centralized environmental policies might often overlook local aspirations and undermine the need to garner local support and acceptability for meeting the end objectives of these policies. Deployment of innovative strategies and designs is often accompanied by institutional changes, which in turn mandate acceptance at various levels, especially socio-political. The examples that have been analyzed include the development of wind power as a renewable energy innovation, space-water management as a new water management practice instead of hard structural infrastructure, and a policy on waste management and disposal with the intent to reduce waste. Interestingly, common patterns are observed in the conflicts around these infrastructure, developments that are built within the environmental policy domain. To overcome these conflicts, it is suggested that collaborative planning is enhanced. Supported with examples, evidence and pathways to more successful implementation of policies with inclusive participatory practices of Social Impact assessment are reinforced.

Climate change adaptation in a developing country context: The case of urban water supply in Cape Town

Zervogel G, Shale M and Du M. 2010
Climate and Development, **2**(2), pp.94-110
http://www.ingentaconnect.com/content/earthscan/cdev/2010/00000002/00000002/art00002

Review

The paper talks about the shifts in policy focus from directly promoting adaptation responses to supporting adaptive capacity, because of the inherent uncertainties involved in climate change. Due to the existing strain on resources as well as capacity, and given the social, economic, and political structure of many developing countries, scientific knowledge has been difficult to apply effectively. These constraints make the priorities and realities of the global north different to that of the global south. In the global south, development of adaptation strategies is met with suspicion if adaptation is seen as a long-term response that does not address immediate development needs. It is clear that adaptation has to be linked with urgent development needs in order to be mainstreamed. The article also suggests that the global south needs to prioritize developing adaptive capacity and adaptation plans rather than focussing on isolated elements of adaptive capacity. The paper emphasizes building awareness, leadership and institutional capacity for facilitating adaptation at the city level, using the specific example of how adaptive capacity can be built at municipal level in the context of urban water supply.

Keywords
Adaptation, developing country, Cape Town, urban water supply, governance, adaptive capacity, municipal level

In brief

This paper discusses a specific case study from the city of Cape Town, South Africa; exploring the water management processes prevalent in the city and the authorities' current response to water stress, and the integration of climate-integrated information into the city's water management. The paper aims to identify factors obstructing and facilitating climate change adaptation in water supply management at an urban level as a route to understand how to build adaptive capacity. The results presented in this paper suggest that the best way to facilitate adaptation is to focus on areas where developmental needs are connected to responses to the impact of climate change, and focus on adaptation as a process rather than a series of specific outcomes. The paper concludes that this approach might ensure that climate change responses are not seen as competing with non-climate development priorities, but as an integral part of the solution. The shortage of usable scientific information to assist decision-making and weak leadership and legislation were identified as the main obstacles that resulted in the lack of cooperation between stakeholders, resulting in impediments in adaptation action in the water sector in Cape Town.

Government, markets, and green growth: energy systems transformation for sustainable prosperity

Zysman J and Huberty M. 2010
Berkeley: Berkeley Roundtable on the International Economy, University of California, Berkeley
http://brie.berkeley.edu/publications/wp191.pdf

Review

The paper makes an interesting comparison of the growth of clean energy with the growth of information technology that proved to be both a transformative and a growth-generating technology. However, there are differences between energy systems and ICT that are immediately obvious. One of the differences, which the paper dwells upon in detail, is that the energy system in the advanced countries is fully built-out, and new capacity will only be added slowly. Consequently, new approaches to energy growth must be implemented by retro-fitting the existing system. Both the public and private sector have limited resources relative to the scale of investment required, compared to the initial era of semiconductor and ICT innovation. The paper gives a valuable insight into how changing today's energy system is a necessity for mitigating climate change, ensuring the security of the energy supply, and reducing the economic cost of energy. It argues that the successful pursuit of a high-efficiency, low-carbon energy system will require more than just one-off technological innovation. The paper urges policy-makers to aim for an energy systems transformation that generates a sustainable trajectory towards on-going efficiency improvements and emissions reduction.

Keywords
Information technology, green growth, governments, technological innovation, emission reduction

In brief

Moving towards low-carbon, high-efficiency energy systems, mitigating climate change, securing energy supplies, and resolving the imbalance of payments caused by energy imports are impending problems that nations worldwide are striving hard to resolve. This paper addresses three aspects of this problem: the role of markets, prices, and governments in this energy transformation; identification of policy interventions that can become productive investments in the future; and the potential for low-carbon, high-efficiency energy to drive green growth. The paper highlights that the policy choices for an energy system transformation largely relate to carbon pricing to support technological development and investments in low-emissions energy, technology policy to support research and development, regulatory policy to create an enabling environment for new forms of energy production, distribution and use and action by the countries for investments in public infrastructure and industrial policies. This paper argues that the energy supply system consists of separate elements that are inter-linked and complementary. Changes to most of these elements in ways that maintain their linkages and complementary relationships are required in order to establish a low-carbon, high-efficiency economy. Additionally, understanding the demands of such an energy systems transformation is crucial to addressing the connection between energy policy and growth.

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