



The Energy and Resources Institute

Executive Summary



2012

CLIMATE AND DEVELOPMENT RESEARCH REVIEW

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1 INTRODUCTION

In the 20 years, since world leaders gathered at the first Earth Summit in Rio de Janeiro with a pledge to embrace sustainable development, climate change has emerged as a major challenge to both the environment and to development. Scientific understanding of climate change and its potential impacts on Earth's natural systems and people has advanced rapidly. Indeed, scientific understanding has advanced faster than the ability of most institutions to absorb it and act upon it. At the same time, the physical science of climate change holds many uncertainties. Leaders now face tough, and ever more urgent, policy decisions.

The research community has responded by producing a wealth of studies on the links between climate change and development, which span the global, regional, national, and local levels. As a result, a major body of climate and development literature has emerged in the past decade, authored by a wide range of stakeholders. The purpose of the *Climate and Development Research Review* is to draw the main findings from this body of research to inform policy-makers and practitioners who are working towards climate compatible development.

The Review aims to highlight both where climate and development researchers are currently focusing their enquiry, and the big debates and issues emerging from the literature for the use of policy makers and practitioners. The Review also pinpoints some of the innovations in climate compatible development captured in the recent literature, in order to demonstrate the frontiers of policy and practice. The Review is informed by research over the past decade but focusses particularly on debates and issues in the published literature of 2010-2011.

This Executive Summary distills the key messages from the *Climate and Development Research Review*. You may find the full Review on www.cdkn.org/cdrr2012 together with those abstracts of the papers selected for inclusion which are freely and publicly available.

The Review also provides a synthesis of the major themes identified in hundreds of the most policy-relevant research papers published on climate and development between January 2010 and August 2011. The authors undertook a meta-synthesis of 572 papers, and a closer review of 93 papers, published during this period. All the papers chosen for inclusion in the review spoke to two key questions:

- How does climate change affect development?
- How can development contribute to climate change adaptation and mitigation?

Across the papers selected as most relevant and influential for climate compatible development in this period, four major themes emerged:

- **Decision-making in the face of uncertainty** – How should decision makers operate in a context of uncertainty around climate impacts, including uncertainty around extreme weather events? How do issues of poverty and power affect decision making?
- **Natural resource management in a changing climate** – How can natural resources be managed most effectively across scales in a changing climate, and how can lessons be best captured and shared?
- **Innovative finance for climate action** – Are current climate finance mechanisms fit for the purpose? What relative contributions could public and private sources make? How can climate finance be generated, managed, and spent effectively?
- **Technology transfer and division of effort for the low-carbon transition** – How can the integrated use of market instruments and government regulation transform energy systems? How should climate mitigation efforts be distributed among groups and countries as part of the transition to a low carbon economy?

For each theme, we summarise new and emerging trends in the research literature.

2 KEY MESSAGES OF THE REVIEW

Decision making in the face of uncertainty

Policy makers are already aware that vulnerability to climate change varies from place to place and among different groups of people. But more frequent climate extremes, coupled with uncertainty about the future impacts of climate change, pose serious challenges to current thinking and require a paradigm shift in both discourse and governance. Recent research papers have questioned whether responses by human systems at risk can match the rate of climate change.

The *Climate and Development Research Review* finds that, according to a recent research, the principles of ‘sustainable adaptation’ are well conceptualized but have not been translated into concrete action. Currently, top-down approaches are insufficiently grounded in local realities. Many policies are ‘misfits’; they fail to factor in diverse pressures on human and ecological systems and the range of responses to climate change at the local level. In some cases, decisions lead to ‘maladaptation’, that is, unintended consequences which eventually undermine climate resilience. Researchers contend that policy will be best positioned if the local context is first analysed, to illuminate potential tipping points in climate impacts beyond which adaptation may be ineffective.

Decision makers are challenged to create adaptive policy in the face of climate uncertainty: “policies which can adapt to a range of anticipated and unanticipated conditions that can affect policy performance in the future” (Swanson et al 2010). Researchers are challenging decision makers to embrace transformative processes for climate adaptation: political and socioeconomic transformation will be needed to brace human systems for an uncertain future climate. Analysts at the forefront of this field are exploring what ‘transformation’ means in reality. Researchers have evaluated existing efforts to mainstream climate change into development and

this work has yielded valuable insights into how mainstreaming can be achieved more effectively. Genuine community participation is important in identifying climate adaptation priorities and responses. Understanding barriers to adaptation through case studies provides rich lessons on how to create more inclusive, robust adaptation processes with greater impacts. When diverse stakeholders are involved in planning for climate resilience, better outcomes are likely. Institutions have a strong role to play in encouraging and fostering better adaptive capacities amongst stakeholders; recent research explores the best approaches to strengthening institutional capacity for climate adaptation.

Conceptual steps have been made in understanding the longer term benefits of adaptation actions taken now; early action on climate adaptation means that substantial, compound benefits accrue – in much the same way that taking mitigation action early accrues significant benefits over time and avoids the need for extraordinary interventions later.

The related concept of an ‘adaptation decision lifetime’ is highly relevant to policy makers. This refers to the timespan between implementation of an adaptation initiative and its impact (or perceived impact). A policy with a long adaptation decision lifetime can be less attractive than one with a short decision lifetime, regardless of the ultimate impact of the policy. Grasping a better understanding of these lifetimes can help policy makers analyse policy options; encouraging them to look beyond what is easiest and quickest to implement, to what is the most important and effective.

Recent studies show how effective responses to climate change can be enhanced by sharing data through Information and Communication Technologies (ICTs). For example, tailor-made visualization techniques can help decision-makers identify groups that are particularly vulnerable to climate disasters. Improvements to top-down integrated assessment

models bring socio-economic and vulnerability scenarios into analysis alongside climate scenarios. In summary, the most effective systems for decision making in the face of uncertainty are: adaptive, innovative, people-centred, grounded in local realities, and take full account of the political economy context.

Natural resource management in a changing climate

Human activities are already consuming natural resources at unsustainable rates. Climate change poses an additional threat to natural resources under pressure. The *Climate and Development Research Review* concludes; that the different pressures on natural resources cannot be solved in isolation. Stakeholders must understand and address the complex dynamics that connect resources, and the trade-offs that might be required in managing them.

Many recent studies examine policies that work across scales — national, regional and local — to address the natural resource dynamics at each level. Effective policy making and delivery across scales can help to secure the joint adaptation and mitigation benefits of many forestry and land use activities and manage the trade-offs. For instance, the costs and benefits of using land for food or biofuel production versus for forest conservation (and hence); carbon storage are more easily assessed at scale.

The tensions and complexity among different actors benefitting from natural resources at local, subnational and national scales, is especially pronounced for tropical forests, as forest nations prepare for a new international REDD+ regime (a scheme to pay forest managers for Reduced Emissions from Deforestation and Degradation). Researchers are increasingly mapping such benefit-sharing issues, and the monitoring, verification, and reporting challenges associated with forest carbon stores.

The possibility for managing ecosystem services at a landscape scale is an emerging theme in the research literature. This includes the importance of managing protected areas in the context of the broader ecosystems in which they are situated. Although,

protected areas were traditionally established for biodiversity conservation, scientists increasingly recognise the value of the flows of ecosystem goods and services that they can generate in the broader landscape.

Policy experiments will be needed to learn the most effective natural resource management techniques in a rapidly changing climate. There is a growing recognition that knowledge-sharing through participatory approaches is vital for capturing policy successes and failures. How to transfer lessons from policy experiments in one location to another is different matter. With its emphasis on community-based efforts to monitor natural resources, the Review indicates that global agreements governing global public goods — such as forests — must factor in local realities and expectations. Non governmental organisations have an important role to play in designing institutions for managing the risks; not just the risks of climate change itself, but the risks involved in designing and delivering climate change policies.

In summary, recent research on managing natural resources in a changing climate highlights a range of complex, flexible, and adaptive approaches to resource governance. The complexity and multiple layers of these governance systems reflect the complexity of ecosystems themselves, and society's use of natural resources.

Innovative finance for climate action

Industrialized countries have pledged to mobilize \$100 billion per year by 2020 to support mitigation and adaptation activities in developing countries. With Official Development Assistance (ODA) already amounting to \$128.5 billion each year, there are questions on how to reach the finance target for climate change — finance that must be new and additional — in the current economic climate.

The *Climate and Development Research Review* finds that a clear, widely understood definition of climate finance is still missing. This has hindered efforts by potential recipients to understand which

finance sources are available and to tap into them. Donors are debating where and when resources should be allocated for their part.

The issue of climate finance has thus been fractious. Donor countries have been concerned about the effective use of their funds; recipient countries have been concerned about whether resources are truly ‘additional’, and the predictability and associated conditions of financial flows. Against this backdrop of massive need and uncertain commitment, innovation, transparency, and long-term commitments to climate finance will be crucial.

The *Climate and Development Research Review* tackles the question of eligibility for climate finance; an emergent area of research that reflects donors’ and developing countries’ preoccupation about which funds should flow where. Eligibility is difficult to determine in the absence of a clear and universally-accepted definition of climate finance itself.

A new research cited in the Review looks at innovative proposals to generate new flows of climate finance. These include proposals for a global carbon tax, border cost levelling (a charge for the carbon embodied in the international trade of carbon-intensive commodities such as steel and cement), and taking a percentage of proceeds from emissions trading or auctioned emissions allowances.

There is potential to tap many further private sources for climate finance. This avenue has not yet been adequately explored—even though the volume of private climate finance may already exceed that of public sources. The Review highlighted the private sector as a potentially large source of finance. Recent research also highlights the complementary role of the public sector to enhance investor confidence, by reducing risk or providing co-finance. Overall, it has proposed a range of fund structures and risk reduction mechanisms to unlock private sector finance for climate change.

Technology transfer and division of effort for the low-carbon transition

Recent research emphasizes the integrated use of market mechanisms and regulatory policy to both transform the development and uptake of clean

technology, and scale up climate mitigation efforts. Nations are striving to move towards low-carbon development pathways, but researchers warn that this transition must accelerate. Such a shift requires cooperation on technology and regulation, as well as national and local interventions in every sector. The *Climate and Development Research Review* finds that one-off technological breakthroughs and conventional policy instruments will not be enough to create a genuine systems transformation.

Climate change should not be positioned solely as an environment or development issue. Climate change objectives should be embedded in all sectors, including energy, transport, and land-use and government ministries should be accountable for them. Public policy has a key role to play in creating the enabling environment for innovation in low-carbon technology. For instance, the public sector can facilitate agile processes for awarding patents and has the potential to invest in the necessary research and development (R&D). There is also an important role for the public sector in making different types of data sets available; going beyond basic emissions data, to include such data as investment flows and technology market shares. Economic linkages, finance, and incentives for entrepreneurs are also seen as critical in leapfrogging to a low-carbon pathway, as well as the social acceptance of new policies — especially those related to infrastructure.

Furthermore, the issue of global effort-sharing on mitigation has been a stumbling block to progress on a global deal. There is not a clear consensus among nations on the present-day interpretation of ‘common but differentiated responsibilities’ for climate change mitigation, a principle that was embodied in the Kyoto Protocol. Despite a lack of agreement on what this means in practice, developing countries have made voluntary pledges to reduce emissions. These pledges are, in some cases, more ambitious than the obligations of developed countries. Unilateral action, such as ‘Green New Deals’, could help start a fundamental transition to a low-carbon global economy.

Last, addressing the outstanding issues on MRV (measuring, reporting, and verification) and working out the details of how MRV systems would work in practice is part of a bigger picture around global commitment to mitigate climate change.

3 MAIN CONCLUSIONS OF THE REVIEW

This review has shown that the current literature reflects a growing understanding of the current impacts of climate change, however their future impacts are still uncertain. This highlights the need for policies to deal with climate-related disasters as well as slow-onset and long-term climate change impacts.

There is value in top-down policy making that considers 'best estimates' of climate change impacts, including the potential for extreme events, and allows the possibility of transformational, rather than incremental, approaches to climate adaptation. However, it is vital that top-down approaches are grounded in local realities. Otherwise, maladaptation (efforts to adapt to climate change which end up undermining the original intent), 'policy misfits' and negative feedback can occur. It is vital to build capacities for individual, as well as collective, responses to climate change.

Institutions play a vital role in determining human stresses on natural resources because they govern access to, and allocation of, natural resources across society. Much climate and development research to date has focussed on community level climate adaptation but an emerging area of research is on the broader role of institutions, including across geographical scales and mapping to the range of

ecological scales on which biophysical change can occur.

Innovation and long-term commitment are needed to overcome the continued challenges to the mobilization of climate finance; lack of an agreed definition, lack of clarity on sources, and issues on where and how to channel and manage climate finance. In many cases, this is a question of framing support as a crucial investment opportunity, rather than a case of simple resource allocation.

One-off technological breakthroughs and conventional policy instruments will not be enough to transform energy production and consumption patterns. Far more fundamental public policy change will be required, globally. In developing countries, external investments and technology transfers are needed to support the transition to a low carbon economy.

Finally, adaptation has its limits. In the absence of an inclusive international agreement for ambitious climate mitigation, human society will be tested beyond these limits. There is a danger that the conversation becomes increasingly about how global society copes with the loss and damage inflicted by climate change; what happens when mitigation efforts are insufficient and adaptation fails.

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