

ICTs, Climate Change and Development: An Emergent Field within a Changing Climate

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On December 13th 2010 a group of researchers and practitioners from around the globe gathered in a one-day workshop to discuss key ICT-and-climate change topics, including the role of current and emerging technologies in adaptation, mitigation, disaster management and strategy formulation. This event was led by the University of Manchester's Centre for Development Informatics (CDI) with the funding support of IDRC, and took place as part of the ICTD2010 Conference at Royal Holloway, University of London.

The main issues that emerged during this event, which consisted of a mixture of thematic presentations, group discussions and a panel debate, are presented in this summary report.

*Further resources on the topic, including presentations and videos from the workshop, are available at: <http://www.niccd.org/workshop2010.htm>.

Introduction

Increasing interest in climate change has both top-down and bottom-up drivers. On the one hand, we are witnessing a top-down growth of importance of this topic within government and donor agency agendas, which in turn is translating into increased funds, discussion, and climate-related action in the development field. On the other, interest in engaging with the climate change agenda is also responding to the bottom-up impact that different kinds of shocks (economic and social as well as environmental) are having on poor communities around the world, who are on the front-line of climate change effects.

It is in the villages and the slums of the developing world that climate change is having and will continue to have its most damaging effects, but also where innovative approaches that integrate the use of information and communication technologies (ICTs) could have the most significant potential. The potential – and challenges – associated with the role of these tools needs to be analysed from a systemic perspective, one that considers the complex development environment within which climate change effects take place: exacerbating pre-existing vulnerabilities, but also creating new opportunities for adaptation and transformation.

Climate Change: A Partial Special Status within Development

Within the complexity that characterises development environments it is often difficult to separate the effects of climate change from those caused by prevailing poverty and socio-economic vulnerability. In some areas, we can identify climate change specifics, and we can thus identify a specific climate change role for ICTs. One example would be mitigation; thought of mainly as ways to reduce carbon emissions, with ICTs being central to the smart agenda for emissions reduction. Another example would be long-term climatic trends and their impacts such as rises in sea levels, glacial melting, changes in cropping and disease patterns. Again, the climate change link is fairly clear, and we can draw something of a boundary around ICTs, climate change and development (ICCD).

The difficulty arises, though, in the more day-to-day and short-term issues. Back on that front-line of climate change in the global South, there is rarely a clear dividing line between climate change and other issues. This not just the question of how much we should attribute floods, storms, landslides, heat waves, dry spells and so forth to climate change. It is also that all of those weather events occur within a broader context of other shocks, other vulnerabilities, and the broader context of institutions, resources and agency.

That can make it difficult to say anything particularly new about ICTs because we already have some conception of the link between ICTs and vulnerabilities. What it certainly means is that we need to keep a systemic and holistic perspective in mind.

We may therefore award climate change only a partial special status in development – privileging it as specific topic in some aspects such as mitigation, monitoring and long-term climate change but in others approaching it more as one issue amongst many. From that latter perspective, our contribution may be less about climate change *per se*, and more about the generic issues that it instantiates – ICTs and adaptation; ICTs and sustainability; ICTs and resilience – all of which must be understood as systemically linked in a development context.

Understanding ICTs, Climate Change and Development

A detailed review of available literature on the role of ICTs in climate change reveals the emergence of a fast-growing yet complex field of analysis. Sources that range particularly from the late 1990s to date, suggest that the evolution of ICTs' role within the climate change field has been characterised by three main stages: (a) Sustainable Development, (b) Climate Change Mitigation, and (c) Climate Change Adaptation (Ospina and Heeks, 2010b).

Although literature in this field has evolved from a global approach, to theorisation about the potential of ICTs (first focused on developed countries, incrementally on developing countries), and the emergence of ICT and climate change praxis - more recently in developing contexts - the debate is still in its early stages. Much remains to be done, documented and analysed particularly in regards to the role of ICTs in marginalised and vulnerable areas; those hardest hit by the impacts of climate change.

While environmental sustainability remains an issue of ongoing concern, research has evolved into more focused analysis on the areas of mitigation, monitoring, and increasingly, adaptation and strategy, which constitute the key components in the study of this field, as reflected in the *ICTs, Climate Change and Development Overview Model* (Heeks and Ospina, 2009).

In fact, the areas of mitigation, monitoring, adaptation and strategy lie at the core of ICTs' role within the climate change field, and a more detailed analysis of each of them – and of the linkages between them – can help us identify the various roles that ICTs can theoretically – and increasingly in practice – play; such roles being largely but not exclusively positive.

Most importantly, the components and the links that characterise the ICTs, climate change and development debate, as reflected in the ICCD Overview Model, can help us identify existing gaps and new areas where analysis on the role and potential of ICTs is still required, particularly in response to the needs and priorities of developing regions.

The analysis of those new areas and emerging themes should consider the main strategic implications of research undertaken in this field to date, which include the following aspects:

Shifting Priorities: Developing Countries and Climate Change

Developing country priorities and perspectives need to become a central part of the debate at the intersection of ICTs, climate change and development, if the potential of ICTs is to contribute to more holistic, inclusive responses to the challenges posed by the changing climate.

Close Linkages Between ICTs, Climate Change and Vulnerability

Consideration of the broader development context, including prevailing vulnerabilities in local livelihoods, among others, is pivotal to determine the viability, appropriateness, and ultimate sustainability of ICT-enabled responses to the changing climate.

Acknowledging the Challenges of ICTs within the Climate Change Field

Challenges related to the use of these technologies (e.g. issues of inclusion and marginalisation, lack of coordination and communication between actors, barriers of access and lack of capacity, among others) also need to be addressed and further explored as activities at the intersection of ICTs, climate change and development continue to evolve.

Fostering Knowledge Sharing and Collaboration: A Growing Need

Further research and collaboration between a new set of partners, development strategists and practitioners – working on ICT4D, on climate change, on disaster response, natural resource management and other focal areas – constitutes an emerging need in this field, and will be key to raise awareness on the potential and challenges associated with the use of these tools from a developing country perspective.

Positioning Resilience in the Analysis of ICTs and Climate Change

The concept of resilience plays a key role in the understanding of ICTs within the climate change field. Analysis of resilience from a systemic perspective allows us to broaden the understanding of adaptation beyond the vulnerability inherent to developing livelihoods. We can then understand that adaptive capacities are also built on resilience sub-properties that can be strengthened by ICTs, thus contributing to the achievement of development outcomes (Ospina and Heeks, 2010a).

Tackling the Issues: Emerging Research, Documenting Practice

In response to the rapidly-evolving nature of this field, a new research agenda on the role and potential of ICTs for development in climate change is starting to emerge. This agenda reflects the core issues of mitigation, monitoring, adaptation and strategy, while integrating an increasing focus on developing country priorities and an increasing focus on the way in which ICT4D actors and organisations are responding to and integrating into this field.

New research on topics such as ICTs and climate change mitigation in the context of emerging economies, ICT-enabled learning networks for climate change adaptation, the role of ICTs in disaster management at the community level, informational governance of climate change organisations, climate change as a strategic priority for ICT4D organisations, as well as new and emerging ICTs for climate change and development (see workshop materials at: <http://www.niccd.org/workshop2010.htm>), are some examples of emerging research that is contributing to form a new body of knowledge in the ICCD field.

But while interest in ICT, climate change and development research progresses, much remains to be done in terms of documenting practices, experiences and lessons learned with the use of these tools for climate change mitigation, monitoring, adaptation, and strategies within vulnerable developing environments, since evidence to date remains largely anecdotal.

Capturing, measuring and reflecting on the enabling effects of ICTs in mitigation actions of emerging and developing economies, including the potential of innovation, green technologies, capacity building, changing consumption and demand patterns, and strengthened local competitiveness, are some of the opportunities suggested by research in this field. In terms of adaptation and monitoring, the role of ICTs in fostering community-based learning, participatory processes, integration of new and traditional knowledge and empowerment of local actors, are just part of the possibilities that are starting to be documented and analysed.

Likewise, documenting and analysing the ways in which organisations innovate and adjust their governance in response to the new set of challenges posed by climate change, or reflecting on the way in which ICT4D organisations continue to integrate these issues, diversify their partnerships and expertise, and ultimately contribute to shape and implement the climate change research and practice agenda, are also part of the research – and practice – that lies ahead in this field.

The Broader Development Perspective: Appropriate Technologies

Regardless of the thematic focus of the research, the role of ICTs within the climate change field needs to acknowledge the complex set of elements, relationships and vulnerabilities that prevail in developing settings, and that further constrain the ability of developing countries to withstand, recover from and adapt to the effects of the changing climate; both short-term shocks or chronic trends.

Consideration of the broader development context within which vulnerable communities operate also implies acknowledging the appropriate, locally relevant set of ICT tools and approaches necessary to foster and support effective climate change responses. Innovative responses do not necessarily require the introduction of state-of-the-art technologies, but can be fostered through novel ways of using existing tools – such as community radios, television or first-generation mobile phones – or by combining existing resources with more advanced applications such as smart phones, geographic information systems, remote sensing, Web 2.0, among others.

The sustainability and continuity of successful/innovative solutions largely reside in the appropriateness of the applications, and in the ways in which they respond to the priorities that local actors have identified themselves. Understanding the context, building local capacity, fostering cross-sectoral synergies and inclusion, and implementing mechanisms that are flexible, measurable and interoperable, are some of the factors that need to be considered in the design of ICT and climate change policies and strategies at the micro, meso and macro levels.

As new generations of ICT applications and technologies continue to emerge in the form of low-cost wireless/mobile technologies, wireless sensor networks, rapidly deployable communications, social networking and other Web 2.0 tools, the role of ICTs within contexts impacted by climate change will continue to grow. New ways of ICT-enabled information dissemination, networking, knowledge sharing and local empowerment will likely emerge within contexts affected by acute climate shocks such as cyclones, landslides or flooding, or by slow-changing trends such as sea-level rise or changing seasonality; and will have to be reflected in the new research and policy agendas of this field.

Ensuring a broader development understanding of the contexts in which ICT solutions are introduced will help to more accurately measure and demonstrate the success and feasibility of new and emergent tools in response to climate change challenges, as well as to identify the complementary measures, policies and investments that should be made in order to strengthen the ability of poor communities to adapt and build resilience to its effects.

Conclusions

The evolution of the ICTs, climate change and development field suggests interesting, dynamic and rapidly changing trends towards future research and practice. Emerging priorities are starting to reflect a mixture of both top-down and bottom-up approaches, which continue to shape donor and policy agendas, as well as practitioners' strategies on the ground.

Ongoing concerns for research and practice include the ways in which ICTs can help communities to adapt to the effects of climate change (including impacts and outcomes of using ICTs), as well as the ways in which these tools can help educate/raise awareness, monitor,

measure and evaluate climate-related practice. On the production side, opportunities for future research include looking at interoperability and low-carbon technologies, as well as how manufacturing processes could be made more sustainable and what entails making the technology “clean”. On the consumer side, energy consumption and increasing energy needs are becoming key issues, as well as the effects of new technologies in changing consumption patterns, among others. The potential of ICTs in increasing the efficiency and reducing levels of energy use through smart technologies, particularly in urban developing environments, is also an issue where major opportunities for research and practice lie.

While potential topics for future research are extensive due to the novelty of the field and the myriad of challenges posed by climatic uncertainty, a key factor for successfully turning ICCD research into practice is to build on existing lessons and experiences, and avoid re-inventing the wheel. Both the ICT4D and the climate change fields have built a very valuable body of knowledge that can help guide future actions, and determine which ICT applications could be the most useful and appropriate at the local level, including the most effective ways in which they can help to enhance the flow of information, the production and exchange of knowledge, and the access to those resources by all stakeholders.

At the same time, as financing for climate change actions becomes increasingly available, further efforts will have to be made in informing, creating capacity and helping prepare governments and other stakeholders to implement, measure, document and analyse initiatives in the areas of mitigation, monitoring, adaptation and strategy.

Ultimately, turning ICCD findings into action will require us to continuously foster research that responds to and anticipates developing country needs and priorities with regards to climate change. It will require a continued commitment to engage multi-stakeholders’ efforts towards adaptation, a key priority of poor communities, while promoting human-centered approaches and action-oriented research led by developing countries. Throughout this process, the adoption of a systemic, holistic perspective on the role of ICTs within climate change will be pivotal in order to assess and better understand the potential and challenges associated with their use, as well as to effectively embed their role within practices and strategies at the local, national and international levels.

Bibliography

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