Knowledge for action: an analysis of the use of online climate knowledge brokering platforms[1]

Anne Hammill (IISD), Blane Harvey (IDRC), Daniella Echeverria (IISD)[2]

International Institute for Social Development (IISD), Canada, and the International Development Research Council (IDRC), Canada

Online climate knowledge brokers (CKB) and knowledge brokering platforms can play an important role as intermediaries linking the production and use of knowledge needed for action on climate change. This paper examines the current state of alignment between CKB platforms with the information-seeking and knowledge sharing behaviour of users of online climate change information. It reviews the case for knowledge brokerage and how brokerage activities are put into practice online for climate change and development. The paper then outlines the results of research undertaken to understand how CKB platform users assess, access, and apply knowledge. This included interviews and surveys with over 200 users of online climate change information to understand their needs, preferences and behaviours, as well as in-depth case studies of four CKB platforms: AfricaAdapt; Climate Finance Options; Climate Change Policy & Practice; and the Eldis Climate Change Resource Guide. The paper highlights key findings and recommendations about user behaviours and preferences, potential areas for innovation in online knowledge brokering, and the need for taking climate knowledge brokerage beyond its online functions.

Keywords   knowledge networks, climate change, online platforms, users, surveys, case studies, knowledge sharing

Introduction

As more stakeholders take steps toward operationalising climate compatible development (CCD), the demand for information and knowledge related to the concept is growing. But the landscape of information and knowledge sought is vast and fragmented; it can range from introductory explanations on the causes of climate change and scientific projections of future climate conditions, to descriptions of renewable energy technologies, experiences with weather index insurance, and the state of international climate negotiations. What is more, the array of stakeholders supplying and using this information and knowledge is correspondingly diverse, making the gap between research, policy and practice all the more challenging to manage.

Online climate knowledge brokers (CKB) and knowledge brokering platforms[3] can play an important role in managing this gap. Knowledge brokering (KB) is broadly understood as a set of intermediary activities that link knowledge production and use. Within the context of developing climate change policy, the intent of KB is to help decision-makers 'acquire, value and consider expertise that they would not otherwise obtain or incorporate into their decision making' (Michaels, 2009: 995).The internet has expanded the range of possibilities for knowledge brokering, offering greater reach, more access, and new technologies for storing, filtering and translating knowledge into new formats. Indeed, this combination of complexity of the climate change issue, glut of relevant information and actors, and progress in information and communications technologies (ICTs) has led to a steady growth of online CKBs, both in terms of the number of initiatives launched and the range of services offered. Current CKB platforms cover a large number of climate change and development topics, focusing on different places, scales, and sectors. They also exhibit varying levels of ambition and technological sophistication, and implicate a wide range of actors and organisations in terms of how they are funded, managed, and targeted for use.

Like many online platforms, however, many of these CKB initiatives can be supply-driven, established and managed by the producers of climate change knowledge products with the assumption that making more knowledge available online will result in evidence-based policy and practice supporting CCD. Platforms are not necessarily designed with a thorough understanding of the range of current and potential users and their respective needs, priorities and preferences. This can result in services that are not fit for purpose, gaps in information and knowledge provision, unnecessary duplication of efforts, and an overall misuse of resources. Moreover, most efforts at addressing the misalignment between knowledge supply and demand tend to focus on adjusting or expanding the supply; existing platforms are revised, more tools are offered, and new sites are established. Unless knowledge brokers develop a clear understanding of what constitutes demand, such efforts will fall short of expectations.

This paper examines the current state of alignment between CKB platforms with the information-seeking and knowledge-sharing behaviour of users of online climate change information. It begins by reviewing the case made for knowledge brokerage and how this is put into practice online for climate change and development. The paper then summarises the results of research undertaken to understand how CKB platform users assess, access, and apply knowledge. Interviews and surveys were used to understand some of the current user needs, preferences and behaviours vis-à-vis online CKB platforms, while in-depth case studies of four platforms (AfricaAdapt, Climate Finance Options, Climate Change Policy & Practice, and Eldis Climate Change Resource Guide) provided more focused user profiling and analysis against which managers could review their current strategies. The paper concludes by highlighting key findings and recommendations around user behaviours and preferences, potential areas for innovation in online knowledge brokering, and the need for taking climate knowledge brokerage beyond its online functions. These findings should be of interest to those currently working in knowledge brokerage roles in the climate change community, those who are planning, funding or working in partnership with knowledge sharing initiatives, and to knowledge brokers in other fields as a basis for comparative analysis.

Background

The complex nature of climate change and the challenges it presents to development policy and practice are well documented. A so-called 'wicked problem' for decision makers, climate change is characterised by difficulty in its definition and attribution, uncertainty, and unclear solutions (Turnpenny et al., 2009). These challenges, many authors now argue, call for the bringing together of multiple sources and forms of knowledge to better understand the drivers, impacts and options for responding to climate change. The roles and tools needed to successfully bring together this diverse knowledge in the face of power differentials, cultural and epistemic disconnects and competing interests remain the source of much discussion.

From the policy-making perspective, Dilling and Lemos (2011) suggest that climate change research has failed to do enough to ensure that decision-makers receive information that is useable in applied contexts. The provision of useable information, they argue, is a function of an effective interplay between research 'push' (the provision of an information 'supply') and demand-side 'pull' coming from decision makers seeking to take more informed action. Dilling and Lemos argue that a critical factor in the usability of much climate information is 'the creation of the conditions and mechanisms that enable *iterativity*, that is, the purposeful and strategic interaction between climate knowledge producers and users so as to increase knowledge usability' (2011: 681). This concept of iterativity links well with other theories which have examined how different types of knowledge and experience come together to strengthen decision making on climate change. These include social learning (Collins and Ison, 2009), adaptive co-management (Armitage, Marschke & Plummer, 2008), and boundary work (Clark et al., 2011). Together, they point to the need for spaces or processes (either physical or virtual) which can facilitate the bringing together of these diverse actors and knowledge sets. The rise in prominence of climate knowledge brokering (KB) is a product of this need.

Less examined in the literature on climate change, much of the evidence on knowledge brokering has come from the health sciences, where the need to see new findings from research quickly translated into outcomes for patients is high (Meyer, 2010). Here a growing body of evidence has led some to suggest that knowledge brokers may be a 'missing link' between evidence and action, although Ward *et al* note that 'there remains a lack of evidence about how brokering works, the factors that influence it and its effectiveness' (2009: 9). Understandings and framings of knowledge brokering are varied, making it a challenging process to define, and indeed to formalise in professional practice. While some authors see KB as a set of practices carried out specifically at the interface of science and policy (Magnuszewski et al., 2010; Michaels, 2009), others take a broader view. Shaxson *et al* (2012), for example, use the term 'K*' to describe 'the set of functions and processes at the various interfaces between knowledge, practice, and policy [to improve] the ways in which knowledge is shared and applied' (2012: 2). For the purposes of this study we base our analysis on this broader understanding of KB. We see it as encompassing the full spectrum of intermediary and brokering functions depicted in Figure 1 below, and not only the narrower 'knowledge broker' function of fostering knowledge co-production it includes.
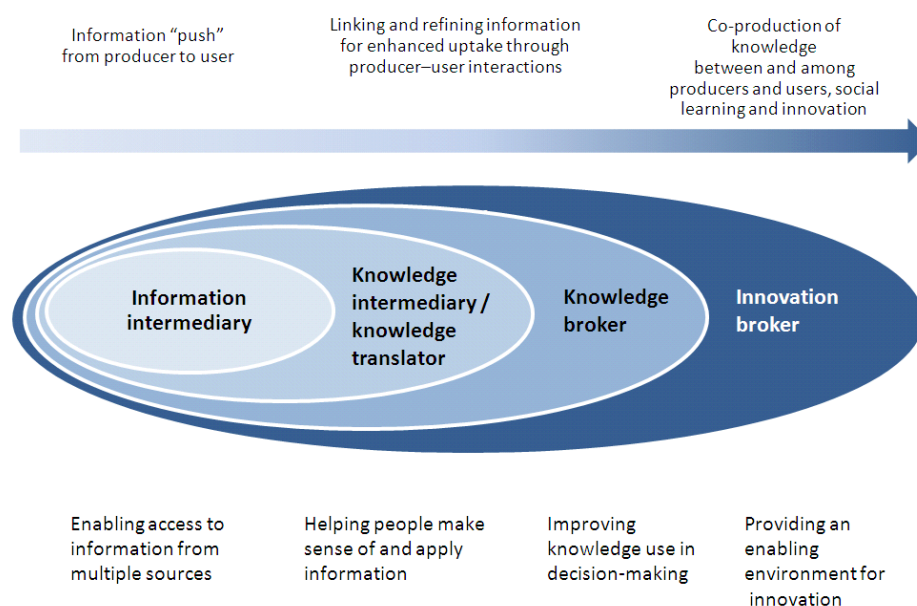
Figure 1: A spectrum of intermediary and brokering functions (adapted from Harvey, Lewin & Fisher 2012 & Fisher 2011)

It is worth emphasising that knowledge brokering should be, first and foremost, a *human* undertaking, and is often carried out through face to face engagement and facilitation processes. While information and communication technologies are increasingly being used to expand the reach and potential of brokerage activities, this human dimension remains an essential component of their success. This view is supported by Sharatt & Usoro (2003) who note that new information systems tend to reinforce existing behavioural norms rather than changing attitudes towards open communication and sharing. They argue that what is required is a combined approach focused on both social and information systems.

The potential of ICTs in enabling climate change knowledge brokering
The massive growth of information and communication technologies (ICTs) has increased our ability to reach ever-larger audiences in more cost-effective ways and with increasingly sophisticated forms of information. This has led to increased innovation in, and use of ICTs for translating and disseminating climate change information to a wide range of global audiences. The rise of social media and so-called Web 2.0 tools which allow for greater user interaction has spurred interest in the potential for facilitating interaction between users of climate information and enabling networked governance in monitoring climate impacts and developing adaptation responses (Ospina and Heeks, 2010). As a result, the potential of ICT-enabled knowledge brokering, knowledge networks, and communities of practice have sparked particular interest in the field of climate change, where experiential knowledge may be embedded in widely-dispersed communities or institutions and poorly documented (if at all), yet is essential for planning and action across a range of scales.

Magnuszewski et al (2010) suggest that access to databases, forums for discussion, distribution of electronic documentation, online training and frequently asked questions are the primary advantages offered to knowledge brokering practices via the use of ICTs. To this list we would add the growing power with which data (particularly when it is open and linked to other data sets) can be filtered, visualised, mapped, and otherwise processed by end-users to respond to their needs or interests (see Davies and Edwards, 2012). Furthermore, beyond improving access to and availability of empirical evidence, ICTs may allow this knowledge to be exchanged through networks of actors in a variety of formats, including non-text-based formats like photos and video, thereby potentially spanning boundaries of language and literacy that remain pervasive in many developing countries. Van Baalen, Bloemhof-Ruwaard, & Van Heck (2005) have argued that the emergence of such online networks of practice is pre-conditioned on a shared sense of urgency to tackle a specific challenge, and an awareness that knowledge on this challenge is fragmented, both of which are widely recognised in the case of climate change.

Despite the promise that web-based technologies may offer for knowledge brokering on climate change, however, challenges remain. Perhaps most obvious among them is the continued disparity in access to online information between developed countries and countries in Asia and Africa who are often most vulnerable to climate change (the so-called digital divide). Recent statistics from the International Telecommunication Union (ITU), for example, reveal that internet access at the household level in Africa sits at 7% while 2/3 of households in the Asia-Pacific region still lack access (ITU, 2013). Other challenges or risks may also include a lack of capacity or resources to interpret the knowledge made available through these platforms or to put new knowledge into action, as well as the context-specific nature of particular adaptation responses, all of which might lead successful adaptations in one context to fail or ultimately be maladaptive in another.

The figures on internet connectivity cited above tell an incomplete story of the potential for ICTs for knowledge sharing in developing countries. Other platforms, particularly mobile telephony and radio have far greater availability and are beginning to be used in innovative ways address climate change and development (Harvey et al., 2012). Mobile phone subscription rates have now reached 89% in developing countries more broadly and 63% in Africa, though internet access via mobiles remains prohibitively expensive for many (over 38% of per capita GNI in Africa) (ITU, 2013). Radio, long the platform of choice for reaching rural audiences, remains the dominant mass medium in Africa and in many other parts of the developing world (Myers, 2008). Of particular relevance for knowledge brokering is the increasing convergence of radio with other ICTs, particularly mobile phones and the internet, creating the exciting new programming formats and opportunities for interactivity (Myers, 2008). With this said, most climate knowledge brokers have yet to take full advantage of the opportunities presented by extending their reach beyond web-based communities and technologies.

Despite these concerns and considerations, there has been a recent emergence of a wide range of online platforms aimed at harnessing the power of ICTs for sharing resources and lessons learned, and facilitating interaction between those working on climate change. In the context of climate change and international development, these platforms have frequently been initiated and

hosted by international agencies such as the United Nations Development Programme (UNDP), research institutes such as the Institute of Development Studies (IDS) of the University of Sussex, and NGOs, and funded by bilateral or multilateral donor agencies including the UK Department for International Development (DFID), the European Commission and IDRC.

The fact that the vast majority of these platforms are hosted and funded by agencies that are also major contributors to the climate change knowledge base, and are largely based in the global North, has led to some concerns that they may be more shaped by the availability of research or evidence than by a clear understanding of user needs. This concern is echoed in other fields, such as health care, where much engagement in developing country contexts remains driven by 'push'-style approaches led by research, evidence, or technology (Pakenham-Walsh, 2012). A more desirable alternative, Pakenham-Walsh argues, is a needs-led approach, 'an approach where the information is based on research, informed by evidence, enabled by technology, and organized by subject (where appropriate) but fundamentally led by needs' (Pakenham-Walsh, 2012*:* 10). If we agree that adopting a needs-led approach is a more appropriate starting point for the design of online platforms for knowledge brokering on climate change, one obvious question that follows is 'how well do we understand the needs of those who use these platforms and to what extent are the platforms meeting their needs?' We explore this question below in reporting on our analysis of the survey on information-seeking and knowledge-sharing behaviour of users of online climate change information, and through case studies of four CKB platforms.

Research methodology: user-oriented analysis of CKB platforms

This research was conducted in three stages between December 2011 and January 2013 as outlined below.

Consultation and research framing

A consultation with representatives of CKB platforms and development communication specialists was convened on the margins of the United Nations Framework Convention on Climate Change (UNFCCC) climate negotiations in December, 2011. Participants shared insights on the issues, and helped frame the research questions, identifying survey approaches, assumptions, and biases as well as some key issues to track during the project. Overall, participants felt that there was an observed and potentially growing misalignment between intended and actual use of online CKB platforms, and that trying to unpack user needs and behaviours would be an important contribution to knowledge brokering for climate change action. Participants also noted that research targeting actual users of CKB platforms should lead to recommendations on how to satisfy existing user needs rather than how to increase the number of users and broaden the reach of CKB platforms.

Broad user survey

Building on this consultation and on on-going literature review, the authors drafted a user survey designed to better understand who is using CKB platforms, what they're looking for and what they're willing to share. The survey was piloted at a face-to-face meeting with knowledge

brokers and users of climate information in May 2012 and further revised and structured as summarized in Box 1. The web-based survey, conducted in English, Spanish and French, was distributed through the research team's professional networks, the Climate-L listserv as well as at relevant meetings with a total of 163 respondents.

Box 1: Broad CKB User Survey

a. **Who are you?** Nine short questions about respondents' age, sex, job profile, language preferences and geographic location aimed at getting a sense of the general demographic and professional profile of self-identified online CKB platform user**s**.

b. **What is the role of the Internet in your life?** Three questions to understand the importance of online resources and services to respondents, and their level of comfort in using ICTs.

c. **What kind of information do you seek online for your work and how?** Six questions on the types of professional tasks undertaken by users, the kind of information needed to complete these tasks, where they go online to find it, and challenges they may encounter in doing so.

d. **Do you share knowledge online?** Five questions about respondents' level of engagement in knowledge-sharing and factors influencing willingness to share knowledge online.

Four in-depth case studies
The broad online user survey was complemented by in-depth case studies which were carried out from October to December 2012. Four CKB platforms were selected for closer examination, whereby intended and actual user experiences were compared in detail. The platforms selected, AfricaAdapt, Climate Finance Options, Climate Change Policy and Practice, and the Eldis Climate Change Resource Guide, are outlined below.

The case studies were selected to sample a breadth of content, geographic focus, intended audience, and forms of interaction with and between users. Case study research consisted of a preliminary mapping exercise and semi-structured interview with CKB platform managers, followed by semi-structured interviews and in-depth surveys with identified platform users via Skype, telephone and using online surveys. A total of 43 platform users participated. Preliminary results were then shared with platform managers to discuss initial impressions and answer any questions.

Biases and limitations of the methodology
The research methodology introduced a number of potential biases that may have affected results. The broad user survey was advertised via email and conducted using online software (Survey Monkey www.surveymonkey.com), meaning that respondents were self-selecting and

were perhaps more likely to be active users of online resources and services. This was anticipated from the outset. For the in-depth case studies, the reliance on platforms managers for the names of interviewees may have yielded more positive responses than a fully randomized sampling, though managers were asked to identify both regular users and a random sampling of users. Moreover, the relatively small sample size of platform users did not provide a basis for extrapolating demographic or professional profiles and linking them to expressed views. Finally, the four particular case studies selected for this study do not represent the full complement of online CKB platforms available, or the full range of online technologies and services that are currently being used in climate knowledge brokering.

Research findings

Broad user's survey
Demographic and professional profile: research-oriented users from developed and developing countries
Of the 163 respondents, 133 completed the English survey, 10 the French, and 20 the Spanish. About half of the respondents identified themselves as being located in the Global South (Africa, Asia-Pacific, Central and South America) and 46% were female. Almost three quarters (74%) of all respondents were between the ages of 26 and 45, and 63% used English regularly on their job. The number of years respondents had been working on climate change issues was almost equally distributed among the four categories, with over half (58%) falling in the middle range of two to ten years.

The top three organisation types represented in survey responses were International non-governmental organisations (NGOs) or civil society organisations (CSOs) (27%), Academic (15%) and Consultancy (15%). National or local NGOs or CSOs (11%) and National / Local Government (10%) were not far behind. This predominance of research organisations and job profiles does not appear to align with the emphasis on policy-makers among many online CKB platforms. Moreover, there were almost no (i.e. less than 1%) respondents who identified themselves as working for the media, in health care, library or information services, or a political party. The absence of media representation suggests that these online CKB platforms may not be reaching this important community of intermediaries, although other factors could also influence this finding, particularly the outlets through which the survey was distributed.

Internet proficiency, level of comfort with ICTs: the centrality of the Internet and the rise of smartphones
In terms of internet proficiency, 91% of respondents stated that the internet was central to their daily personal and professional activities, with only 1% saying it was not important. This underscores the extent to which, even in developing country contexts, internet proficiency and dependency is increasing, meaning that the potential value of online CKB platforms is only growing. Almost 90% of respondents identified themselves as having laptops for accessing the Internet while 55% had desktop computers, 51% smartphones, and 19% tablet devices. The high numbers of smartphone users, in line with other studies, suggest the increasing uptake of these

devices in both developed and developing countries (Batchelor, 2012). As one blogger has noted about smartphone penetration in Africa, the anticipated smartphone revolution in the developing world will also be its computer and internet revolution at the same time (Evans, 2012). Should online CKB platform managers targeting users in the global South be taking note and thinking about whether resources and services are easily accessible and operable through handheld devices?

Information seeking behaviour: looking for documents to prepare documents and starting the search at Google
The survey revealed that 88% of respondents seek information online to accomplish professional tasks. When asked to describe a specific task they undertake where they look for information related to climate change, responses were varied in the level of detail they provided. The following categories identified as most common:

- Preparation of a research document or report, such as article, dissertation/thesis, brief, etc.;
- Inputs for training activities and educational curricula; and
- Project / programme development, including developing proposals and looking funding sources and potential partnerships.

When seeking information to complete such tasks, online CKB platforms are rarely the first port-of-call. Only 7% of respondents noted using them as a starting point for seeking out work-related information, while generic search engines such as Google represented 51% of responses, and specific institutional websites, such as the UNFCCC's, represented 34%.

In terms of the content that users seek out, the survey revealed that user preferences have not necessarily kept pace with the availability of new technologies for visualising data, posting multimedia content such as videos, or stimulating user interaction through social media. The top three reported content types that users seek out are all typically paper-based documents, namely research reports, policy documents and journal articles. This raises the question of whether the focus of online platforms should be aligned with these more basic information needs, whether users will gradually come to place a higher value on some of these more technologically sophisticated tools, or whether other issues such as user capacity or platform design are at play. It also suggests that more reflection is needed on the advocacy and innovation roles that CKB platforms might be able to play with regard to the use of climate change information.

Finally, when discussing the challenges of seeking out information, there was no overwhelming consensus. The biggest challenge, according to respondents, was the lack of sufficiently localised information (e.g. about the city/country in which they are working), while some noted that the language of online content was a challenge.

Knowledge sharing behaviour: a preference for receiving information but also a willingness to share
Survey respondents generally characterised themselves as being sharers of information (both personal and professional) online, though the extent of their engagement is limited. While none

saw themselves as disengaged from knowledge sharing, 66% were minimally or occasionally active. The 13% identified as highly active sharers may represent a high response rate attributable to the sample of respondents.

Finally, while the consultation and research framing activities conducted at the outset of this study suggested that the credibility and reputation of a given online space for sharing is the primary concern for those who chose to share, survey responses did not support this view. Instead, existing membership with a platform and the platform's match (in terms of thematic focus or orientation) with the results they seek to share as the most important factors.
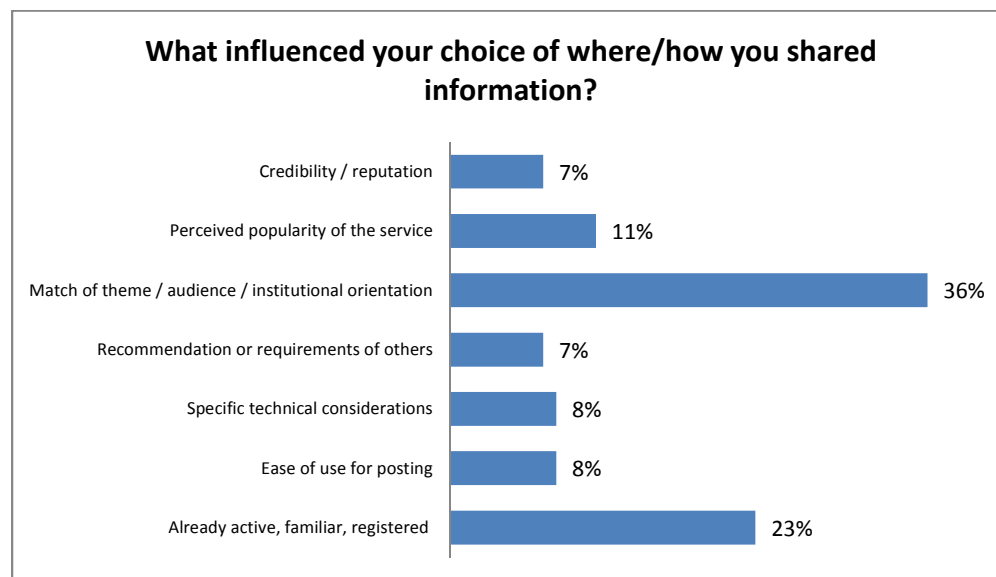

Figure 2: Factors influencing choice of where / how survey respondents share information

These observations highlight the value of regularly engaging members (even if only to remind them that they are members of a given community) and communicating the core values, focus, or uniqueness of a given platform. It also appears to sit in tension with initiatives positioning themselves as 'one stop shops' that cater to all needs and interests.

Case studies
The four selected case studies allowed for contextualised analysis of user needs relative to online CKB platform resources and services. As noted above, the case studies differed in terms of their institutional affiliation, subject focus, intended audience, content type, and engagement with users. The four case study CKB platforms are summarised in Table 1 below. In the section that follows we highlight key findings from across the four studies. More detailed analyses of the cases are available in Hammill, Harvey & Echeverria (2013).

All four platforms were established after 2008 (representative of when the majority of CKB platforms have been established), are managed by well-known organisations in the field of climate change, and funded through bilateral and/or multilateral funding mechanisms. In terms of overall purpose, all four seek to facilitate access to and exchange of timely information on climate change. Access is understood to be facilitated through the concentration of relevant information and knowledge resources in one virtual space (i.e. portal or clearinghouse), the organisation of these resources in this space, as well as through the usability of these resources (i.e. the translation of selected information and knowledge into different products and formats).

Table 1: Overview of online CKB platforms selected for case study analysis

Platform	AfricaAdapt	Climate Change Policy & Practice	Climate Finance Options	Eldis Climate Change Resource Guide
Manager(s)	Environment and Development Action in the Third World (ENDA-TM), Forum for Agricultural Research in Africa(FARA), IGAD Climate Prediction and Applications Centre (ICPAC)	IISD	UNDP, World Bank	IDS
Funder(s)	DFID, IDRC	Swiss Agency for Development Cooperation (SDC)	UNDP, World Bank	CDKN
History	Est. 2008 as part of DFID/IDRC Climate Change Adaptation in Africa research program	Est. 2008 in response to mandate of UN Chief Executive Board to promote coordination of UN bodies on climate change	Est. 2010 in response to an identified gap in the provision of comprehensive and understandable climate finance information	Est. 2009
Purpose	Facilitate the flow of climate change adaptation knowledge across Africa	Facilitate the exchange of news and information on climate change-related activities of UN bodies and intergovernmental organisations (IGOs), including international negotiations	Increase developing country access to information on all aspects of climate finance to support more low-carbon and climate-resilient investments	To keep researchers, practitioners and policy advisors up to date with the latest in climate change and development research
Unique selling point	Focus on climate vulnerable communities; focus on Africa; complemented by offline activities like radio programs and face-to-face meetings	Combination of internal writing by content experts and outreach; online newsletter highlighting recent posts that also brings users to the site	Centralised information source on climate finance; information verified by reliable sources (i.e. UN and World Bank) – 'authoritative stamp'	Editorially selected, summarised, and freely downloadable research documents; highlighting research from smaller, southern organisations
Target	Researchers,	Governments,	Policy makers and	Practitioners,

audience	practitioners, policy makers, media groups, civil society, and ultimately vulnerable communities	international development agencies, practitioners, civil society	project planners in both public and private sector	government decision-makers, international development agencies, researchers, civil society
unique visitors/mo. *	700	16,230	3,512	2,163
Subject focus	Climate change adaptation in Africa	Climate change activities in UN system; international negotiations	Climate finance for developing countries	Climate change adaptation, mitigation and development
Geographic focus	Africa	Global	Developing countries	Developing countries
Content type	News and events; project descriptions; thematic info; community 'voices' (interviews); documents; presentations; photos; videos; links to resources	News and events; guest articles; policy updates; jobs; calendar of events; links to other IISD knowledge-bases (e.g. Land, Biodiversity) – all online (i.e. no downloads)	News; profiles of funding sources; successful cases in accessing and blending funds; glossary; documents; links to relevant decision-support tools, initiatives, organisations, and experts	News on latest research; Quick introductory guides, in collaboration with specialists, to emerging issues; Downloadable documents; Links to relevant organisations; Country profiles with list of related documents
Tools, services, features	Bilingual (English / French); discussion forum; RSS feed; searchable archive;	RSS feed; Link to Facebook page; iCalendar Feed; searchable archive (by issue, date, region)	Google Translate; Link to Twitter feed; searchable database; discussion forum s for communities of practice (for registered users)	Google Translate; searchable document library; document list RSS feed; subscription for Email updates; bookmarking and sharing; access to content via the Eldis open API; link to Eldis Communities where users can interact with each other
Editorial approach	A combination of user-generated content and curated content posted by the editorial team.	Website posts written by internal experts or external featured guests. Users can contact manager re. info they wanted posted online or to submit feedback.	Website content selected and edited by platform manager(s). Users encouraged to submit content and provide feedback.	Website content manually sourced weekly from multiple publishers and managed by editor. Users encouraged to submit content.
Mode of interaction	Start with 'we inform, they act' to build trust towards intended goal of co-production of	'We inform, they act'– emphasis on improving availability and accessibility of existing information	'We inform, they act' but moving towards building communities of practice for co-producing content	'We inform, they act', but linked to Eldis Communities, which is a virtual space with tools for online

	knowledge			information and knowledge sharing

*Average number of unique visitors to the platforms between September 1, 2012 and February 28, 2013.
** The numbers for the Eldis CC Resource Guide include estimated number of unique visitors to the Country Pages.

Two initiatives also rely on additional activities to enhance the value of their platforms (offline user engagement with AfricaAdapt and mailing lists with Climate Change Policy & Practice).User engagement on these platforms ranges from unidirectional 'push'- style communication between the platforms and users to more interactive user-to-user and user-to-platform manager engagement. Three of the four platforms aim to move toward a more interactive model of engagement through the establishment of online communities.

Managers' perspectives: use and added value of the platforms
In initial discussions, management teams of the four CKB platforms described the users that they sought to reach, the ways they expected users would find and engage with their platforms, and what they felt was unique 'selling point' of their respective platforms. All platforms had conducted at least one survey of their users to better understand their needs and preferences and some conducted them regularly. While there is considerable overlap in the overall categories of users each aims to reach, and at times a tendency toward wanting to reach a very wide range of user-types, the selling points that managers described were quite different.

AfricaAdapt's managers highlighted the African and 'on the ground' nature of their service, with a focus on highlighting research and case studies on climate change adaptation in Africa and a special emphasis on indigenous knowledge. They noted three areas that shape the unique nature of the network, namely its strong focus on communities which are vulnerable to climate change, the fact that it is 'for Africa, and by Africans', and the fact that it links online and offline activities for knowledge sharing.

According to IISD's Climate Change Policy & Practice (CCP&P) platform managers, their high priority users are government decision-makers, while those working in international development agencies, and practitioners in civil society organisations were ranked slightly lower. They described their unique selling point as the combination of in-house expert writing with outreach. All of the posts are written by well-connected internal CCP&P content experts who follow specific organisations and issues and can follow-up with press officers in different organisations to prepare an article for the website. Content is distributed via a well-established email listserv with 16,000-20,000 subscribers. As such the platform itself does not host a wide range of tools. Its purpose is relatively narrow and well-defined – i.e. to organise, store, and provide access to news stories.

The priority users for Climate Finance Options (CFO) are practitioners whose work focuses on climate finance in developing countries, though the users may not necessarily be residing in these countries. Scientists and researchers, private sector actors, and civil society were identified as the next most important users. Recognising that the majority of their current users are UN and other multilateral agency representatives, the CFO manager noted that the aim was to move

beyond this user group and push information out to 'folks in trade organisations or at the village level.' According to its managers the platform's unique selling point is twofold: First, it offers a comprehensive range of up-to-date climate finance information in a centralised virtual space, and secondly, it does so with the UN and World Bank seals of approval, giving users quality assurance.

Finally, the managers of the Eldis Climate Change Resource Guide (ECCRG) target practitioners, followed by government decision makers, international development agencies, scientists and researchers, and civil society actors. One manger felt that government decision makers and international development agencies should be given increased priority, though there was recognition that, when considering actual audience rather than desired users, greatest use would be by researchers and academics. Features that the managers felt were unique to the ECCRG and/or resulted in users returning to the site fell broadly into three categories: 1) The uniqueness of the information available due to the work invested in sourcing and selecting relevant and sometimes difficult-to-find resources (its content curation); 2) The quality of the information available, owing to the value added by translating and editorialising the content for a non-expert audience; and 3) The accessibility of that information, insofar as summaries of academic publications are brought out from behind pay-walls and the resource guide's Application Programming Interface (API) is openly accessible.

While managers across the four services generally agreed that word of mouth and web searches were predominantly how users initially came to know their services, AfricaAdapt also noted their offline events as a means of gaining new users, and ECCRG noted using Google Ad-Words. Email correspondence through newsletters of listserv traffic were widely cited as the means through which users were prompted to come back to the site, though these appear to be used to differing levels among the platforms, with CCP&P being particularly driven by this form of traffic.

Results from surveys and interviews with 43 users of these four platforms (approximately 10 per platform) found that current user demographics and usage patterns were broadly in line with the managers' expectations. This result was encouraging and speaks to the value of regular user surveys.

ICT proficiency and access:
Respondents from the four case studies reported a level comfort with ICTs and reliance on the internet that matched closely with our broader user survey, with the internet playing an essential role in nearly all respondents' lives, regardless of their location. In terms of access to ICTs, however, results of some case studies strongly contradicted results from the general survey. Despite the very limited number of mentions of access to or quality of ICTs and internet resources in the general survey, this proved to be one of the key challenges faced by five AfricaAdapt users (almost all of whom are based in Africa). Issues of accessibility dominated for Eldis Climate Change Resource Guide as well where lack of access to online journals, lack of credit cards or e-banking to pay fees, poor connectivity and high-cost internet services were identified. Further, among the 20 users of these two platforms surveyed (18 of whom are based

in the Global South), only 3 owned smartphones and none owned tablets. These responses are a marked departure from the general survey and the CFO and CCP&P case studies (which also had respondents from the South) and may serve as a caution against assuming that the spread of mobile web access in the global is unfolding smoothly and uniformly.

While our surveys provided insufficient data to draw strong conclusions on these questions of access they do raise questions for further research on CKB use and may point to persistent challenges for online platforms in some contexts. Linked to this point, four of the 11 AfricaAdapt respondents (including all but one francophone respondent) had discovered the network through face-to-face meetings, supporting the value of this activity to establishing the network's membership, in part to overcome connectivity challenges.

Information seeking behaviour
In terms of information-seeking, the four case studies again aligned closely with general survey respondents seeking similar climate information in similar formats (primarily documents) and for similar tasks, and using Google and institutional websites as their primary starting points. Some differences in emphasis exist however, reflecting the different focuses of each CKB platform. Content sought by AfricaAdapt users, for example, had a stronger focus on local testimonials and project profiles, while CCP&P users rated 'news, jobs and events' highly.

In assessing the trustworthiness of the content hosted by the four CKB Platforms studied, the majority deemed it 'very/always trustworthy' in all cases. Interestingly, however, the platform which saw the strongest consensus around its content being 'very/always trustworthy' was AfricaAdapt (9 of 11 respondents), while the three remaining platforms had 60-70% of respondents give them this rating. While these results may be attributable to sample size or bias, they do seem to challenge the view that institutional 'seals of approval' on particular platforms necessarily correlate to a higher perception of trustworthiness among users. AfricaAdapt interviewees, for example seemed to associate trustworthiness with authenticity and information that 'matched' the realities they had witnessed on the ground as practitioners rather than by its peer review or other approval from outside bodies. One replied that the platform is '101% trustworthy. [I have] been working on this for some time so I know. [I] have tried implementing some of this information I found. It has worked out for me.' This may point to a more complex perception of validity and trustworthiness among users of climate change information than is often assumed.

Knowledge sharing behaviour
The general knowledge-sharing behaviour of users of the four platforms studied did not differ greatly from the results of our general survey, however the studies did give greater insight into the reasons for *not* sharing new knowledge. These included a lack of professional or personal incentive, a perceived lack of capacity or expertise to warrant knowledge-sharing, insufficient time, uncertainty about intellectual property rights, and quite often, a lack of technical understanding and awareness of the conditions for contributing to a given platform. This last point is particularly noteworthy to the three case study platforms that expressed an ambition to move toward a more interactive or user-driven model of engagement. The other factors point to

broader barriers that must be addressed if we aim to promote wider co-production of knowledge among diverse climate change actors.

Discussion and conclusions

Drawing on calls for a more needs-led approach to linking knowledge and practice we have examined the profiles and stated needs, information-seeking and knowledge-sharing behaviours of users of online climate change information. Through our four case studies we have also tried to ascertain the current alignment between these needs and what is currently being provided by CKB platforms. In total more than 200 users of online climate information were consulted, yielding a series of observations and conclusions that we will now explore.

CKB Platforms are not changing the way users initiate searches for information
The vast majority of research participants started their searches for climate change-related information at search engines or specific institutional websites; this was also the expectation of platform managers interviewed for the four case studies. Today's online search engines offer users a high level of control over their information-seeking, allowing them to engage in a more iterative process where they can tailor their searches as they learn more about what is available. Availability itself is being enhanced through tools such as semantic tagging, linked open data, and signposting, leading users to a broader array of information and knowledge than could ever be hosted on a single platform. Investing in search engine optimization may therefore be more effective than designing online platforms as one-stop-shops which attempt to respond to a plethora of needs. This will also help to convey a clearer focus for the platform in question, and as a result, may encourage users to share more via the platform. Climate knowledge brokers may also gain greater value from building on their social (rather than technical) roles, extending their reach *beyond* the online world by linking to face to face convening activities or other technologies such as radio or mobile phone, depending on the audiences they are targeting.

Users still prioritize accessing information and knowledge in 'traditional' (written) formats
Despite the growing popularity of social media and Web 2.0 technologies, users are still primarily accessing CKB platforms to download research reports, policy documents and journal articles. Whether this is a function of the particular use of CKB platforms, the platforms themselves, or the availability of alternative websites such as LinkedIn that fill the social networking niche, the demand for printable products is striking. This reinforces the point that platforms should not be detracted from the more basic knowledge management and infomediary roles of capturing and curating information; helping people access relevant resources and find their way through a glut of information using tools like searchable databases, archives, and bookmarking is important.

…but wouldn't mind accessing people
Despite the strong preference for accessing documents, the case studies (particularly AfricaAdapt, CFO and ECCRG) did reveal a desire among some users to be linked to other people and/or personal experiences. Addressing this demand will require more and different

investments from existing CKB platforms.   Platforms that start out as primarily online document repositories and want to move towards the sharing of 'soft knowledge' or hosting communities of practice may have a tendency to offer technology-driven solutions to make the leap, such as online rosters of experts and virtual spaces for discussion groups. However, institutions must be willing to invest resources into dedicated and consistent facilitation of these services and spaces, in order for this approach to work. However, if done well, platforms may be effective ways of linking people and building social relationships. Even so, evidence suggests that these online interactions would be greatly facilitated by offline and face-to-face interactions, as discussed below.

CKB platform users still prefer to receive information than share knowledge online
Most survey and case study respondents identified themselves as occasionally active when sharing information and knowledge online. People appear to be aware of the range of outlets for sharing information and knowledge but simply do not do so frequently. Given this, further research could investigate the boundaries and differences, if any, between personal knowledge-sharing and what users share on CKB platforms to gain a better understanding of barriers and incentives for sharing. Several case study respondents referred to a perceived lack of adequate expertise or not wanting to burden colleagues as deterrents for knowledge-sharing. The relationships and stakes can be different in professional online spaces, possibly even more so when they are dedicated to an emerging and trans-disciplinary area of research, policy and practice like CCD. Moreover, the role of so-called lurkers (those who access platform content but do not contribute) on CKB platforms should also be explored, as they are increasingly recognised as important knowledge brokers who span online-offline boundaries, acting as online followers and offline leaders (Cranefield et al., 2011).

Platforms may be aligned with most user expectations (which remain modest), but out of sync with other expectations
Our case study research suggests that, generally speaking, online platforms are doing a good job of addressing stated user needs and preferences. These have, with some exceptions, focused on providing easy access to relevant information translated or presented in formats that suit their needs. Further, email remains as a key channel for how users learn about what's new, with social media and Web 2.0 type interactivity remaining marginal models of information seeking behaviour. As such, user expectations remain predominantly modest, focused primarily on the more linear information- and knowledge-intermediary functions outlined in Figure 1 of this paper.

At the same time, user expectations are not the only driver of CKB platform behaviours. Those developing the tools and approaches may be keen to integrate more sophisticated brokering and innovation functions and technical features. Also, importantly, the agencies funding these platforms are increasingly expecting to see outcomes that go beyond users simply accessing knowledge resources. Evidence on putting research into use confirms that ensuring these outcomes are achieved and are attributable to the CKB platforms is much harder if they are restricted to solely selecting, translating and disseminating resources.

Should platforms drive or respond to demand for online knowledge brokering?
Linked to the previous point, we question whether this demand for relatively basic information and knowledge management services is due to a more limited set of perceived needs in this field than are generally assumed by specialists, whether needs for more co-constructive engagement are being met elsewhere, or whether users might simply not be aware of the range of possibilities that exist were CKB platforms to function differently. If this last possibility is indeed the case, it raises the question of whether there is a need to stimulate certain demands among users, how we might do so, and indeed, whether it is in fact possible (see Sharatt & Usoro 2003; Van Baalen, Bloemhof-Ruwaard & Van Heck, 2005)

Platforms should recognise the value of blending online and offline functions
The role of offline interactions in reinforcing online knowledge-brokering functions was a recurring theme, particularly in the case studies. These interactions served a number of purposes from simply advertising the existence of platforms, to building user confidence and trust in its content ('knowledge-based trust', see Ardichvili et al., 2003), to facilitating the co-production of knowledge that would be hosted on a website. Referring back to the knowledge brokering spectrum depicted in Figure 1, the more an online CKB platform strives to expand from performing information intermediary functions to include linking, tailoring, and (re)interpreting this information to suit different decision-making contexts and foster change, the more important the role of facilitated human interaction.

Get to know your users! Despite their many commonalities, users are not homogenous
While this study has revealed a high degree of consistency between the responses from the general survey and the four case studies in both information seeking and knowledge sharing behaviours, there were some important differences that should not be overlooked. While technological and information access barriers appeared virtually non-existent in the general survey, respondents from AfricaAdapt and Eldis reminded us that they continue to present a challenge. Similarly, respondents from these two platforms appear to have far fewer users of handheld devices for internet access than found elsewhere. There were also differences in expectations that users had of the platform and differences in interpretations of trustworthiness.

The point here is that there remains no substitute for understanding the specificities of a platform's users by engaging directly with them and regularly tracking how that use is evolving. In all four case studies we found that this was happening (albeit to different degrees), which is a positive indicator for CKB platforms.

Remember that CKB platforms are used by a small subset of CCD actors
Finally, both the survey and case studies demonstrated that online CKB platforms are largely used by research-oriented users in developed and developing countries preparing for reports, educational materials, and proposals. Policy-makers, media representatives, and local-level actors are for the most part not actively engaging with CKB platforms. There is also a wider issue of internet access such as well as disparities within developing countries. Only 31% of the developing world is online compared to 77% of the developed world (ITU 2013). Since the cost of getting online remains prohibitively expensive in some developing countries, those who do get

online are often from more privileged backgrounds (Chen & Wellman 2004; Furuholt & Kristiansen 2007). Thus, those actors and regions that stand to lose the most in the face of climate change and who play an important role in crafting appropriate responses to the challenge are not well represented via CKB platforms. While most platforms don't primarily target these so-called 'frontline actors', some refer to them in their plans to expand ('…reach the folks at the village level') or when describing the eventual beneficiaries of their services ('…ultimately, vulnerable communities'). If CKB platforms genuinely want to engage with such actors, they will need to go further and to integrate other tools and services such as radio, mobile phones, and offline interactions into their work. Otherwise, CKB platforms are essentially online spaces established and managed by researchers for researchers in relatively privileged settings.

About the Authors
Anne Hammill is Program Leader, Adaptation and Risk Reduction at the International Institute for Sustainable Development, based in Geneva, Switzerland. One of the Program's thematic areas of focus is decision-support tools for climate change adaptation, of which online platforms are a category. She holds a MA in Geography from the University of Victoria, Canada.
Email: ahammill@iisd.org

Blane Harvey is a Senior Program Officer at the International Development Research Centre in Ottawa, Canada where he leads the strategic outreach and engagement work of the Collaborative Adaptation Research Initiative for Africa and Asia (CARIAA). Prior to joining IDRC he was a Research Fellow in the climate change team at the Institute of Development Studies at the University of Sussex, UK. He holds a PhD in Education and International Development from McGill University, Canada.
Email: bharvey@idrc.ca.

Daniella Echeverría is a Research Assistant for the Climate Change and Energy team at the International Institute for Sustainable Development. Prior to joining IISD, Daniella worked for the Manitoba Council for International Cooperation. She holds a MA in Politics of International Resources and Development from the University of Leeds, UK.
Email: decheverria@iisd.org

References:
Ardichvili, A. Page, V. & Wentling, T. 2003. Motivation and barriers to participation in virtual knowledge-sharing communities of practice. *Journal of Knowledge Management*, 7(1), pp. 64-77.
Armitage, D., Marschke, M. & Plummer, R., 2008.Adaptive co-management and the paradox of learning. *Global Environmental Change*, 18(1): 86–98.
Batchelor, S. (2012).*Digital information on the move: The rise of the tablet.* [URL: http://www.impactandlearning.org/2012/04/digital-information-on-move-rise-of.html]

Chen, W., and Wellman, B. (2004). The Global Digital Divide – Within and Between Countries, *IT & Society*, 1(7): 39-45.

Clark, W. C., Tomich, T. P., van Noordwijk, M., Guston, D., Catacutan, D., Dickson, N. M., & McNie, E. (2011). Boundary work for sustainable development: Natural resource management at the Consultative Group on International Agricultural Research (CGIAR), *Proceedings of the National Academy of Sciences Early Edition*, doi: 10.1073/pnas.0900231108.

Collins, K. & Ison, R. (2009). Jumping off Arnstein's ladder: social learning as a new policy paradigm for climate change adaptation K. Collins & R. Ison, eds. *Environmental Policy and Governance*, 19(6): 358–373.

Connolly, F. (2010). *The Trouble with Knowledge Management.* Cognitive Edge Network [URL: http://cognitive-edge.com/blog/entry/4645/the-trouble-with-knowledge-management/]

Cranefield, J., Yoong, P. & Huff, S. (2011). Beyond lurking: The invisible follower-feeder in an online community ecosystem. *PACIS 2011 Proceedings*. Paper 50. [URL: http://aisel.aisnet.org/pacis2011/50]

Davies, T., & Edwards, D. (2012).Emerging implications of open and linked data for knowledge sharing in development. *IDS Bulletin*, *43*(5): 117-127.

Dilling, L. & M.C. Lemos (2011) Creating usable science: Opportunities and constraints for climate knowledge use and their implications for science policy. *Global Environmental Change,* 21, 680-689.

Evans, J. (2012) In Five Years, Most Africans Will Have Smartphones. [URL: http://techcrunch.com/2012/06/09/feature-phones-are-not-the-future/]

Furuholt, B., and Kristiansen, S. (2007). A Rural-Urban Digital Divide? Regional Aspects of Internet Use in Tanzania. *The Electronic Journal on Information Systems in Developing Countries*, 31(6): 1-15.

Fisher, C. (2011) Knowledge Brokering and Intermediary Concepts: Analysis of an e-discussion on the Knowledge Brokers' Forum. [URL: http://assets00.grou.ps/0F2E3C/wysiwyg_files/FilesModule/knowledgebrokersforum/201107211 04502-ugrvcfpatmivjojwi/Knowledge_Brokering_and_Intermediary_concepts_discussion_Summary.pd f]

Hammill, A., Harvey B. & Echeverria, D. (2013) Understanding needs, meeting demands: A user-oriented analysis of online knowledge brokering platforms for climate change and development. Winnipeg: IISD. [URL: http://www.iisd.org/publications/pub.aspx?pno=2805]

Harvey, B., Ensor, J., Carlile, L., Garside, B., Patterson, Z., Naess, LO. (2012). Climate change communication and social learning–Review and strategy development for CCAFS. *CCAFS Working Paper* No. 22. CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS), Copenhagen, Denmark. Available online at www.ccafs.cgiar.org

Harvey, B., Lewin, T., & Fisher, C. (2012). Introduction: Is Development Research Communication Coming of Age? *IDS Bulletin*, *43*(5): 1-8.

International Telecommunication Union (2013). ICT Facts and Figures: The World in 2013. Geneva: ITU

Magnuszewski, P., Sodomkova, K., Slob, A., Muro, M., Sendzimir, J., &Pahl-Wostl, C. (2010). Report on conceptual framework for science-policy barriers and bridges.*Project report from PSI-connect–Policy Science Interactions: connecting science and policy*.

Meyer, M. (2010).The rise of the knowledge broker. *Science Communication, 32*(1), 118-127.

Michaels, S. (2009). Matching knowledge brokering strategies to environmental policy problems and settings. *Environmental Science and Policy, 12*(7): 994-1011.

Myers, M. (2008). *Radio and development in Africa: A concept paper*. Ottawa, Canada: International Development Research Centre.

Ospina, A. V., & Heeks, R. (2010). *Linking ICTs and Climate Change Adaptation*. Manchester: University of Manchester. Available online at: http://niccd.org/

Pakenham-Walsh, N. (2012). Towards a Collective Understanding of the Information Needs of Health Care Providers in Low-Income Countries, and How to Meet Them, *Journal of Health Communication: International Perspectives*, 17: 9-17

Sharatt, M. & Usoro, A. (2003) Understanding Knowledge-Sharing in Online Communities of Practice. *Electronic Journal of Knowledge Management*, 1 (2): 187-196.

Shaxson, L., Bielak, A., Ahmed, I., Brien, D., Conant, B., Fisher, C. & Klerkx, L. (2012). *Expanding our understanding of K*(Kt, KE, Ktt, KMb, KB, KM, etc.): a concept paper emerging from the K* conference held in Hamilton, Ontario, Canada, April 2012*. United Nations University, Institute for Water, Environment and Health.

Turnpenny J., Lorenzoni, I & Jones, M. 2009. Noisy and definitely not normal: Responding to wicked issues in the environment, energy and health. *Environmental Science & Policy,* 12: 347-358.

Van Baalen, P., Bloemhof-Ruwaard, J., & Van Heck, E. (2005). Knowledge Sharing in an Emerging Network of Practice: The Role of a Knowledge Portal. *European Management Journal*, *23*(3): 300-314.

Ward, V., A. House & S. Hamer (2009) Knowledge Brokering: The missing link in the evidence to action chain? *Evidence & Policy*, 5(3): 267-279

Wenger, E. C., White, N., & Smith, J. D. (2009). *Digital habitats: Stewarding technology for communities*. CPsquare.

---

[1] This research was supported by the Climate and Development Knowledge Network [Project Reference Number KMGL-0040]

[2] The authors would also like to acknowledge the contribution of Ruth Goodman at IDS for her assistance in conducting the case study research.

[3] By *platform* we mean a technology package that integrates a number of tools available in the marketplace (for purchase or for free) that one can acquire, install, or rent, which is then tailored for the use of a targeted user group (Wenger, White & Smith 2009).