Accepted version of the paper. Please cite as:

Fisher, S., Dodman, D., Van Epp, M., and Garside, B., 2018 The usability of climate information in sub-national planning in India, Kenya and Uganda: the role of social learning and intermediary organisations, Climatic Change, Volume 151, Issue 2, pp 219–245.

The usability of climate information in sub-national planning in India, Kenya and Uganda: the role of social learning and intermediary organisations

Introduction

Research on addressing the so-called "usability gap" between climate information and its potential users has explored how information is communicated and how different factors support uptake in different contexts, but scholars have noted that there remains a "persistent gap between knowledge production and use" (Lemos et al. 2012 p789). Literature on using climate information elucidates the technical challenges for users, but often emphasises the need for substantial producer-user interaction. This will not be feasible in many sub-national governments in the global South. Although many local governments do not currently need specific climate information for a major investment such as long-lived infrastructure, as Singh et al. (2017) argue, "for systems to transform and become resilient … actions that acknowledge short- and long-term implications must converge" (p10). Within scholarship around natural resource management, there has been increasing interest in how adaptive approaches such as social learning could offer more responsive climate-sensitive planning, but there is little evidence so far on how they might address the specific challenges of using climate information (see Collins and Ison, 2009; Wise et al. 2014; Ensor and Harvey, 2015). Intermediary organisations are playing significant roles in facilitating social learning and engaging local stakeholders around climate change issues, but little is understood about their role and impact on these processes (Jones et al. 2016; Kirchhoff et al., 2015). This paper fills this gap by providing an empirical analysis of social learning and the usability of climate information for climate adaptation in sub-national governments in the global South. It addresses two specific research questions: what role can social learning play in moving climate information from being theoretically useful to being practically usable in contexts where producers are not able to work with users, and what is the role of the local intermediaries facilitating these processes? Through bringing together scholarship on social learning and the usability of climate information we are able to link the value of broader institutional learning processes to shifting the context for usability. This builds on this climate information literature which until now has focused more narrowly on understanding usability through activities dealing explicitly with climate-related information.

Using climate information in local governments

'Climate information' refers to data on historical and current climate variables as well as future projections of climatic change. This is related but distinct from the term 'climate information services' (CIS), where climate data is tailored for a particular use (Vaughan and Dessai, 2014; Lourenco et al. 2015; Golding et al. 2017). While climate change only directly

affects some policy decisions and some of the decisions made by sub-national governments are shorter term, these options may also lead to path dependency and investment in livelihoods that are difficult to shift from in the medium term (Ranger and Garbett Shiels, 2012). Singh et al. (2017) argue that the use of climate information needs to be linked from short-term to medium and long-term, to "start to challenge how risks and uncertainty are perceived, prepared for and managed" (p10).

There are well documented challenges to using scientific evidence in policy-making, but certain characteristics of climate information make its use particularly challenging. One dimension is the range of uncertainties involved (Ranger and Garbett-Shiels, 2012). Wilby and Dessai (2010) describe how any climate information includes many assumptions, predictions and unknown elements of how the global climate system and society will respond to changes at different scales. As well as this uncertainty, another challenge can be its longer-term nature and how that fits within local planning cycles and use of short-term information. Singh at el. (2017) conclude the most successful examples of the uptake of climate information, use daily, weekly and seasonal climate information to make decisions over short time horizons, with very few examples of long-term climate information being used to inform decisions at sub-national scales. This finding is echoed at the national level where the longer term perspectives pose particular challenges (Jones et al. 2017). The impacts of climate change - and therefore policy issues that might be informed by the information - are often multi-sectoral and do not fit neatly into local institutional silos (Rai and Fisher, 2016). This can affect the perception of fit of different pieces of information and the interplay with other types of knowledge used in planning (Lemos et al. 2012). The multi-sectoral nature of impacts as well as the other challenges outlined above often require significant change in institutional norms and practices.

How can these challenges be addressed?

Research on the application of seasonal climate forecasts (SCF) identifies key factors that support uptake such as: engagement with the producer of the information; the relevance of the information to the decision in question; the scale and timeliness of the information provided; and trust in the information provider and perception of credibility, salience and legitimacy (Singh at al. 2016; White et al. 2017; Cliffe et al. 2016). This work has largely drawn on agriculture and farmers' decision-making. Building on this, scholars have analysed the uptake of climate information with longer timeframes and in different sectors, including in developing country contexts (see for example Dilling and Lemos, 2011; Golding et al. 2017; Ziervogel et al. 2010). However, there is still limited evidence around local governments and the use of climate information.

A solution widely put forward to address the challenges is the co-production and tailoring of climate information – including CIS – and research shows that the level of interaction between producers and users does affect how climate information is taken up (Dilling and Lemos, 2011; Meadows et al. 2015; Jones et al. 2017). However, climate scientists have often framed participation as one input into a linear process, not opening up the possibility of shifting of priorities, roles and use over time (Lemos et al. 2012).

Lemos et al. (2012) argue that there has been insufficient focus on how a piece of information goes from being useful to *usable* over time. They propose a model which goes beyond interaction to consider other how other factors such as the fit of the information and the interplay with other forms of knowledge, "critically shape each other to increase or constrain usability of climate information" (p791). Fit is a dynamic concept that can be altered (or perception of it altered) through a variety of factors such as the characteristics of the information and who communicates it and how. Interplay between new information and existing sources can be influenced by users' behaviour, experience and cultures; information that complements existing knowledge and adds value to existing routines can more easily be usable.

Flagg and Kirchoff (2018) also argue that "while scholars know a great deal about the characteristics of climate information that influence use and about how climate information is produced that affect use, much less attention has been paid to developing a systematic understanding of context-related factors and their influence" (p2). They further develop Lemos et al.'s model by arguing that the context of individual, organisational and institutional (which they characterise as micro, meso and macro) factors also constrain uptake. They argue that even with the interaction and customisation efforts of climate information proposed by Lemos et al. (2012), useful information may not be used if the context for use is not aligned across the three scales.

INSERT Figure 1

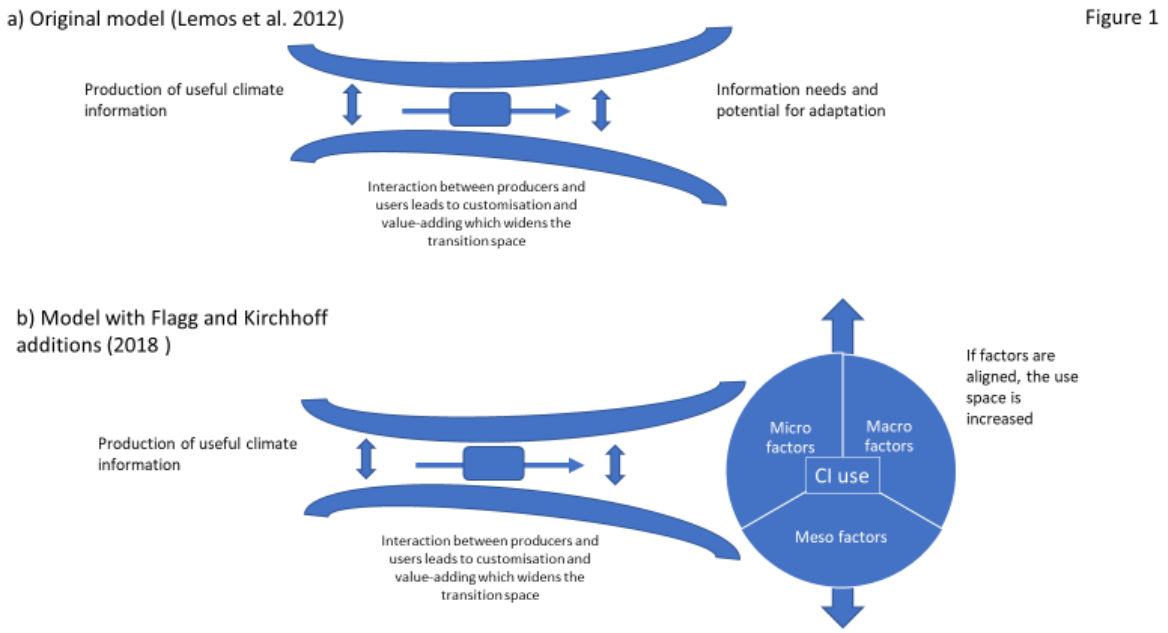

Figure 1: A model for the usability of climate information (Lemos et al. 2012) with proposed addition to take account of context-in-use (Flagg and Kirchhoff, 2018)

Boundary organisations that link producers and users also help to bridge gaps between communities by building trust, capacity and legitimacy (Kirchhoff et al. 2015; Graham and

Mitchell, 2016). While there have been positive developments in the co-production of basic services by local governments and non-state actors (Allen et al 2015, Mitlin 2008), this remains a time- and resource-intensive exercise which has tended to focus more on concrete interventions than in the type of long-term strategic planning required for responding to climate change. There is also a limited community of and resources for climate scientists to engage in these activities (Kirchhoff et al. 2015). It is likely therefore that some local governments will not have the opportunity to engage in direct co-production of climate information and will be reliant on knowledge brokering or intermediaries to access climate information to steer planning decisions.

Social learning is one approach put forward to engage stakeholders around climate-related planning, without necessarily engaging directly with the producers of climate information. Social learning, defined as "where learning occurs through some kind of situated and collective engagement with others" (Collins and Ison, 2009 p364), engages diverse stakeholders in a participatory process to reconceptualise "the nature of the issue itself and how it might be progressed" (p369) and create collective solutions. This has been most successful at very local levels between small communities, but it is less clear how this translates into the context of governmental organisations (Butler et al. 2015; Cundhill and Rodela, 2012). In social learning for climate change adaptation engaging with climate information is one part of the process, but not the sole (or necessarily the main) aim. In local governments in the global South, longer term (often medium term) information may be needed to provide a steering function for short-term decisions, rather than for a specific high value decision such an infrastructure investment (Singh et al. 2017). This means the policy processes may need different levels of engagement with technical detail and scientific expertise, with some processes needing producers input to tailor information whilst others can use existing information as long as officials can understand its potential use.

Defining social learning[1] has been a contested issue but there are several dimensions of social learning processes which reappear across case studies and have been drawn out through reviews of the theoretical literature (Reed et al. 2010; Harvey et al. 2013; Cundhill, 2010). Reed et al. (2010) argue that to be social learning the process needs to "demonstrate that a change in understanding has taken place in the individuals involved … [and] go beyond the individual to become situated within wider social units or communities of practice within society and occur through social interactions and processes between actors" (p6). The authors also stress the need to separate the process of social learning from the potential outcome and Ensor and Harvey (2015) describe how it is crucial for processes to be attentive to "how social and political context determine patterns of power, authority and accountability" (p519). The Climate Change and Social Learning Initiative (CCSL) draws out four components of social learning processes in its monitoring framework - engaging stakeholders, seeking to change capacity and understanding, using iterative reflection cycles and challenging institutions - based on a combination of theoretical review and extensive practitioner consultation (Van Epp and Garside, 2014; forthcoming). Through engagement processes as well as through formal capacity building activities actors may co-create

[1] We also include iterative learning-based methods such as adaptive co-management within this definition.

knowledge and solutions, change their understanding of the problem and build capacity in a variety of ways to respond. Iterative processes are those that are continually repeated to critically reflect on evidence and solutions and integrate what is learned into decision making. Cyclical reflection on climate change adaptation has also been proposed in work on adaptation evaluation, robust decision-making and adaptation pathways (Fisher et al. 2015; Reeder and Ranger 2010; Wise et al. 2014). In this paper we draw on these discussions and define a social learning process as incorporating the following dimensions of activity: the engagement/participation of stakeholders, building capacity and understanding, and using iterative processes for continual reflection. The fourth component defined in the CCSL framework of 'challenging institutions' and discussed elsewhere in the literature as systems change, we consider in this paper to be a cross-cutting objective underpinning the other three dimensions and also a potential outcome of social learning processes. These dimensions of power and politics which underpin changes in systems do need to be carefully attended to and monitored as part of any social learning process.

Building on this definition of what constitutes the intentional *process* of social learning, we go on to consider the potential *outcomes* of such interaction and their linkages with the usability of climate information. These outcomes can be characterised into three domains: cognitive (factual information); normative (values, beliefs) and relational (trust, networks and relationships) (Lebel et al., 2010) and at various scales (Rodela 2011). These scales are: individuals, to learning within common networks and communities, and finally systemic change within institutions and policy. These levels within social learning correspond to those defined by Flagg and Kirchhoff (2018) in their review of contextual factors for the use of climate information and they note they are the first to frame the barriers in this way. Social learning therefore offers a conceptual basis to develop this framing and conceptualise interaction between these levels and how they might be shaped for the use of climate information. However, within work on social learning there remains limited evidence on how individual transformation drives systemic or network-level transformative change (Ensor and Harvey 2015). This is important to note for the usability of climate information as the use of future-orientated, uncertain information often runs counter to existing institutional norms around use of evidence and planning processes and so requires some form of systemic change (Lemos et al. 2012).

Social learning processes within local governments in the global South have often been supported by NGOs facilitating the local process, financed and given technical support from a global climate programme. These NGOs are often not technically boundary organisations as discussed in the climate information literature, as they are not facilitating producer-user interaction, but are playing a broad role around implementation, capacity building and packaging and synthesising existing information. This expansion of the role of NGOs into the climate information value chain has been relatively unexplored (Jones et al., 2016). Kirchhoff et al. (2015) argue that "we know very little about potential 'carry-over' effects that may aid climate information dissemination and use [such as] users working outside the boundary chain … to share climate information widely" (p21).

In the above review, we identify particular challenges to the usability of climate information in local governments: the uncertain nature of the evidence, the longer time frames of some impacts and the multi-sectoral nature of impacts and solutions, all of which challenge many local government practices. The literature around using climate information has framed the challenge primarily in terms of the technical fit of the information and advocates the co-production of this information between users and producers, which will not be feasible in all contexts. There has also been little focus on how information moves from being useful to usable over time, or on how the context for use might constrain or support uptake and usability beyond the specific context of producer-user interactions. Building on research and practitioners' experience of social learning processes we identify engagement, capacity and iteration as three principles for institutional processes that might address the complexities of planning for climate change and alter the contextual factors for the usability. This paper brings together these literatures and uses three case studies of sub-national government planning processes in the global South to address two research questions:

- What role can social learning play in moving climate information from being useful to being usable in contexts where producers are not able to work with users?
- What is the role of the local intermediaries facilitating these processes and addressing these challenges?

Analytical framework and methods

We have drawn on the literature above to develop an analytical framework for the case studies. The framework examines the mechanisms through which elements of social learning could address the specific challenges of using climate information and alter the fit and interplay of the information drawing on Lemos et al's model (2012). The framework (see Figure 2) shows the broad theoretical model through which social learning processes might lead to these changes. The tables underneath the model shows the detailed theoretical mechanisms through which social learning processes could address the specific challenges of using climate information and alter fit and interplay; these mechanisms draw on the literature review above, reflecting dimensions of cognitive, normative and relational changes (Lebel et al. 2011). The case studies are all within local government planning and so the outcomes are at both the network scale (amongst a community of stakeholders/practitioners engaged in the programmes) and also at the systemic scale (changes in institutions and policy) (Rodela, 2011). In some cases initial changes are seen within key individuals and not yet spread to networks and institutions which we note in the evidence tables.

INSERT Figure 2

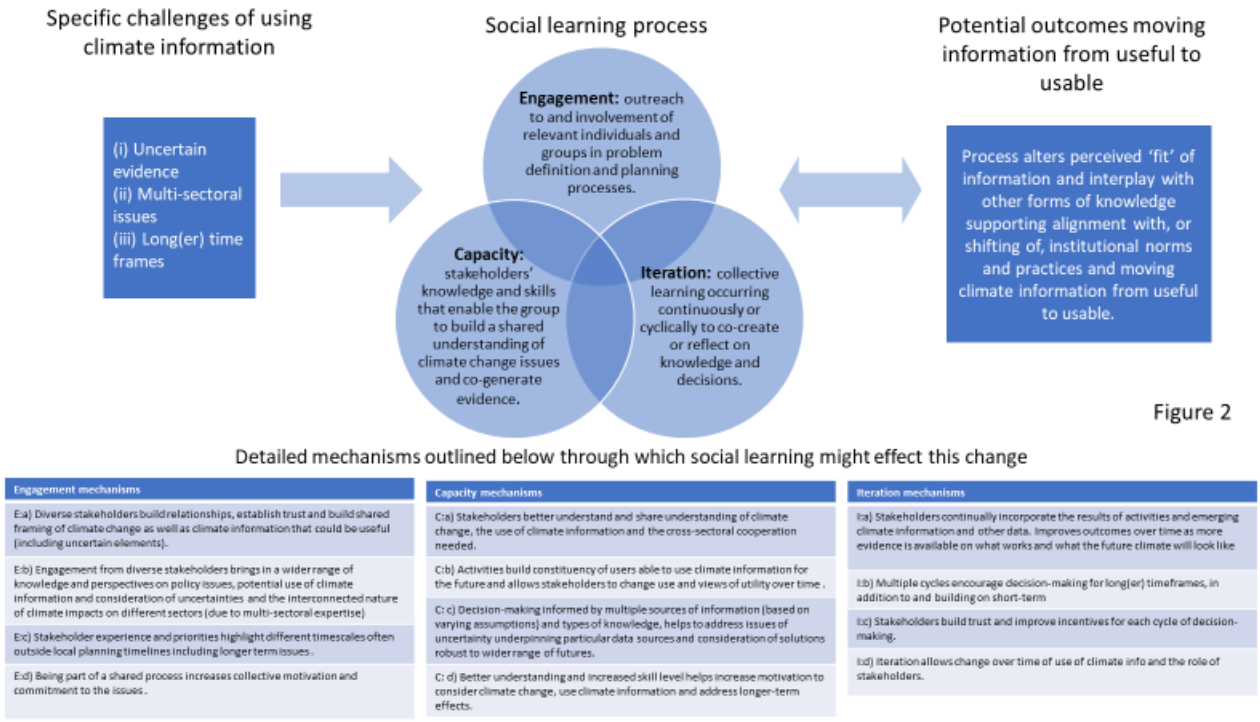

Figure 2: Analytical framework showing how a social learning process could address the challenges of shifting the usability of climate information through changing fit and interplay.

The three case studies were chosen to explore three different types of sub-national planning processes – urban resilience planning, local climate funds, and mainstreaming climate change – to identify common factors between the elements of the social learning processes being used and the usability of climate information. All three are well established local climate programmes and have had an active planning process around climate change in the past five years, including engagement of a range of stakeholders and instigating iterative processes. All three have received support from an intermediary organisation – either a local or national NGO. Given the limited evidence of uptake of climate information in local planning processes to date, the choice of three active and well-regarded climate programmes was to develop understanding of the potential mechanisms by which usability might shift over time. These mechanisms can then be studied in more detail through wider and more representative case studies in future work.

The three cases are:

- Shared learning dialogues in Gorakhpur city, India;
- District climate planning in Bundibugyo district, Uganda;
- Devolved climate planning in Isiolo County, Kenya.

We used a qualitative research design involving semi-structured interviews with key stakeholders (13 in Gorakhpur, 23 in Bundibugyo, 16 in Isiolo[2]), document and policy analysis, observation, and focus groups with local communities engaged in the social learning process

[2] The difference in the number of interviewees reflects the different number of key stakeholders involved in the project in question and those that were still accessible to the project teams having not moved to posts in other cities/districts.

in question. We undertook three focus group discussions in Gorakhpur, two in Bundibugyo and two in Isiolo County[3]. We worked with the local intermediary organisations as gatekeepers and partners in understanding and analysing their case, and this involved repeated discussions and reflections on emerging evidence with them. While this emphasised their perceptions, we balanced this with other data sources and believe the access and insights this offered merited the approach. Stakeholders were selected for being active in the climate planning process and representing the diversity of groups involved including the intermediaries themselves, government staff, international organisations, NGOs and local community groups. The interview schedule was based on the core dimensions of social learning and the challenges of climate change (longer time horizons, uncertain evidence, multi-sectoral issues). Transcripts were coded along these dimensions. Data was then re-analysed within each social learning and climate category to identify evidence for specific mechanisms from the analytical framework. Data collection was carried out June-September 2016, and an international workshop was held in October to discuss cross-cutting findings.

Case studies

We now go on to discuss the social learning processes and use of climate information in each case and present the key evidence against the framework in summary tables.

Shared learning dialogues

Gorakhpur in India is part of the Asian Cities Climate Change Resilience Network (ACCCRN) funded by The Rockefeller Foundation. ACCCRN uses shared learning dialogues (SLDs) to develop city resilience strategies. The SLD is an approach to social learning which explores climate risks, urban systems and interaction with risk, and defines possible responses with a stakeholder group.

Gorakhpur was one of the 10 initial cities involved in ACCCRN and became part of the programme in 2008 with the support of the Gorakhpur Environmental Action Group (GEAG). In an engagement phase in 2009-10, GEAG worked with the Municipal Corporation, compiling climate information and undertaking dialogues with city-level stakeholders, deliberating on city vulnerabilities. GEAG set up formal engagement processes through a civil society forum, a city-level steering committee and thematic groups to develop a city resilience strategy. To build capacity and knowledge, GEAG with engagement from committee members undertook community and household vulnerability assessments. GEAG (with an international organisation) undertook background analysis of the climate context using historical rainfall, temperature and precipitation data, and ranges of downscaled precipitation and temperature projections drawn from several GCMs looking up to 2046-2065. GEAG introduced climate

[3] In Gorakhpur we undertook three FGDs. They were with community members who had been engaged in GEAG/ACCCRN resilience-building activities in Mahewa ward and Moharipur ward; in Moharipur we had a separate FGD after the main discussion with women only. We also went on site visits to a resilient house and to see resilient farming practices in Mahewa ward. In Uganda we undertook 2 FGDs with communities engaged in NAPA activities in NAPA Committee in Bulambuli Sub-County and other ACCRA activities in Bukonzo sub-county. In Kenya we undertook 2 FGD, the first with all the ward adaptation committee members in Kinna ward, and the second with the women involved in the adaptation committee and other local committee such as the peace committee.

change to key stakeholders (including community members) with a pragmatic focus, framing the issue in terms of local impacts on systems. As a GEAG staff member explained:

> [When defining climate change] … often the definition comes from the top – 1.5 degree rise or whatever. But for people on the ground, living in the flood plains or areas affected by waterlogging … they are interested in their lives and how they are affected.[4]

The activities in the resilience plan were focused on a three year timeframe, but longer term perspectives were included as the project reviewed the Masterplan (to 2021) and used the range of projections. In 2011–14 additional funding was provided for projects on peri-urban agriculture and micro-resilience planning. Local-level engagement processes were set up with local communities, and the interaction between vulnerable communities and the committee members was an important dimension of building capacity and shared understanding. GEAG staff conceptualised the engagement processes as horizontal between municipal stakeholders and vertical reaching down to vulnerable communities and up to the Municipal Corporation. In a complementary project,[5] climate change was integrated into district disaster management plans. An international research organisation working with GEAG analysed several climate models to communicate the range of predicted rainfall and maximum temperatures. A key individual working in the District Disaster Management Authority (DDMA) built on the capacity gained through the engagement with GEAG and ACCCRN to make changes in the timing of the Emergency Operation Centre provided during the monsoon, as the models suggested rainfall would come later in the year. In terms of iteration, institutional structures put in place such as a Climate Change Cell in the Corporation provide the potential structure for a cyclical approach to resilience planning. Staff from a municipal network supporting other cities in India through an ACCRN-type approach, explained that when framing climate change for the municipal officers in their work, they also deliberately chose to limit the detail of climate information as they felt stakeholders were not yet ready to deal with the complexity:

> Typically we give the gist of the information and the discussions revolve around that. They do not really grasp the science component, and in the limited time of three hours we don't find it useful to dwell on that point.[6]

Table 1

Mainstreaming climate change into district planning

In Uganda, the African Climate Change Resilience Alliance (ACCRA) has been working with Bundibugyo district for over five years to mainstream climate change into local development planning. Engagement approaches in Bundibugyo have included: building capacity for mainstreaming into the district development plan; supporting local National Adaptation Programme of Action (NAPA) activities and developing climate-relevant indicators for

[4] Interview with GEAG Director, 27.06.2016

[5] Funded by CDKN in 2013-2014

[6] Interview with ICLEI SA project officer, 24.06.2016.

monitoring systems. ACCRA carried out capacity gap analyses and used these to target formal capacity building activities. With ACCRA, the district developed a proposal for NAPA funding to improve the development plan. The activities in the proposal were selected based on issues that the sub-counties had identified and were mainstreamed during ACCRA's previous engagement with the district, showing some element of iteration in progressive activities. Iteration was also used at the local level. The project used exchange visits with other districts and iterative learning processes in farmer field schools to build community members' capacity to carry out resilience-building activities such as soil and water conservation. Using lessons from the NAPA pilot, ACCRA pursued the participatory development of climate-relevant indicators for the national monitoring system, showing that ACCRA had reflected on their ongoing climate work in at iterative way. District and ministry officials jointly validated indicators gathered from the five districts. These activities focused on vertical engagement, ensuring officials understood the realities on the ground. The development of indicators also offers a formal mechanism to iteratively check on progress over time and improve and update activities. ACCRA framed climate change through current impacts rather than using future-orientated climate information in their work. For example, in 2010 ACCRA facilitated a field visit to Bundibugyo for six key ministry representatives to increase national level government officials' understanding of climate issues through seeing local (current) impacts. There is little scientific evidence available on long-term (and even short-term) climate trends available to district-level planners, and Bundibugyo has had no weather stations for several decades although plans are now underway to install three in the area.

Table 2

County climate investments

Isiolo County in Kenya has been working to be ready for climate finance and to mainstream climate change in planning and implementation since 2010, with the support of a coalition of national and international NGOs and national government agencies called the Adaptation Consortium. The consortium uses an integrated approach consisting of four key elements: a public county-level climate change fund (CCCF) under local government; county- and ward-level adaptation planning committees (CAPCs and WAPCs) to make climate-related public goods investments; integrating participatory research and climate information into planning; and strengthening monitoring and evaluation to track progress. The WAPCs prioritise the investments in public goods, which they send to the CAPC for approval. Investments have to meet seven criteria that promote climate-resilient growth and adaptive livelihoods. The CAPC cannot veto local plans, but only work to strengthen ward-level proposals. WAPC members also sit as representatives on the CAPC. The Isiolo CCCF has completed two cycles of investment in public goods. The two rounds were implemented over a span of three years, between 2013 and 2016.

Engagement happens through committee structures and a range of workshops and activities supported by the consortium. County-wide engagement processes on climate change have also taken place, such as resource mapping, whereby stakeholders from the county government and community leaders and elders came together with GIS mappers. The resulting atlas is a resource for county planners, using local and technical knowledge on

natural resources and has been used to plan new infrastructure investments. The consortium provide support and training to stakeholders on a range of tools for the CCCF such as resilience assessments, climate information and financial management. To build shared understanding, the WAPCs conduct participatory resilience assessments establishing factors that strengthen or weaken the resilience of local systems. The WAPCs then use the resilience assessments to prioritise investments in public goods. Iteration is built into the process as monitoring and evaluation. CAPC members undertake monitoring visits to see how investments have been implemented, and WAPC members with the communities develop theories of change to assess how the investments should contribute to building resilience and reflect on these over time (although implementation of this was limited).

Climate change was introduced to local communities through presentations and discussions in participatory resilience assessments and to county officials through workshops including summaries of future national and regional trends[7]. However, so far this has not played a major role in investment decisions, which have focused on immediate needs. Interviews with county stakeholders showed that climate change was being framed broadly in terms of what is changing now and experience from the last 5-10 years and the county officials felt from their experience that pastoralist communities were more interested in seasonal changes rather than changes over long term periods. As the National Drought Management Authority official said when talking about community planning: *"*most important is the yearly and seasonal forecasts. Longer forecasts give a general picture, but people are a little sceptical about predicting the future, and issues of metrological science and probability".[8] The County Director of Meteorology in the county government also stressed how the climate projections were reliant on regional models and according to him it is "not clear what will happen in terms of the frequency of extreme events, rising temperatures … rainfall … Models are not clear about the future".[9] The uncertainty around the models here made them unusable in the eyes of the officer.

Table 3

The three projects have differing levels of resources. ACCRA in Uganda has implemented a set of small projects and so has primarily worked within existing structures. In Gorakhpur and Isiolo, the work had more sustained funding sources, so could be planned over longer periods with more ambitious aims. All case studies were around climate planning processes for 0-5 years, work in Gorakhpur and Isiolo also included climate projections over the next 20-60 years to steer shorter term investments. In Uganda, ACCRA took a learning-based approach and climate change was introduced through current climate variability and as a general concept rather than with specific pieces of information. In Gorakhpur the approach was explicitly built on a shared learning. Isiolo did not have an explicitly learning-based approach,

[7] In other counties the Consortium with the Meteorological Department has trialled tailoring climate information directly for farmers and pastoralists through a variety of methods to support short-term decisions (daily, weekly, seasonal).

[8] Interview with NDMA official, Isiolo County, 21.09.2016.

[9] Interview with County Director for Metrology, Isiolo County, 22.09.2016.

but one built on participation and engagement. Nevertheless, the key dimensions of social learning were included in the model.

Discussion

We now go on to discuss three cross-cutting findings. The first two relate to the process of social learning and the third to outcomes from the process.

Intermediaries use a simple framing of climate change to support changing perception of fit and interplay before introducing new information over time.

Firstly, the case studies show that climate change was initially introduced through the intermediary organisations, and they often did not introduce the scientific information on climate change or the complexities of the evidence for strategic reasons. Lemos et al. (2012) identify the perceived fit of the information as a key factor in whether or not it becomes seen as usable. In the case studies, intermediaries withhold certain pieces of information to fit into a strategic longer-term process of engagement. They perceive it to be useful but only *usable* later in the social learning process, seeking to alter the institutional context and perception of fit before introducing the information itself. The facilitators understand this as building the enabling relational and normative mechanisms that will allow cognitive use of the information in the future, and this was supported by some interview evidence of shared framings, developing professional networks and new institutional structures building the enabling environment for using climate information (see evidence on mechanisms E:d and C:d). There is some initial evidence of the perception of fit amongst government officials changing over time and the strategies of intermediary organisations developing to introduce pertinent forms of information. In Uganda, ACCRA chose to use a broad framing of climate change with an emphasis on current and visible impacts and little use of future-orientated climate information. In Gorakhpur, climate information using ranges of future projections was introduced further into the process by GEAG as increasing commitment and shifting values and discourses amongst government stakeholders changed their perception of its utility. In Isiolo, the engagement processes built commitment to the CCCF mechanism and networks between county officials and community committees (see E:d). Local knowledge and technical inputs were mapped through a process of resource mapping focusing on current variability, supporting the shifting interplay between different forms of knowledge. Climate information on future trends was communicated in workshops and resilience assessments but not yet used to give a longer term steering function to the investment decisions. However, building on the commitment and motivation behind the CCCF itself, there are now increased efforts on the part of the consortium to develop this angle with the national meteorological department (who are formally part of the Consortium), including through working with an officer within the county government and developing a climate information plan (moving into cognitive mechanisms E:c, C:c).

Operationalising iterative processes is challenging and formal M&E structures can anchor this within government systems.

Secondly, the case studies show that iterative processes were challenging to operationalise with government stakeholders even when explicitly included in the model of engagement.

Other social learning case studies show time and repeated cycles are needed to embed critical reflection (Butler et al. 2015). In Gorakhpur, high-ranking government officials were transferred several times during the activities highlighting the disjunct between the need for continued participation within iterative processes and the reality of a mobile civil service. Interviewees did not perceive of the processes as iterative, and there were no examples of committee decisions being re-considered or developed over time. In Uganda, community groups formed iterative cycles to work on specific issues but iterative processes were not instigated with government stakeholders as this was not perceived to be feasible. However, staff within GEAG and ACCRA went through their own internal reflections and instigated changes in their support to local stakeholders over time. In Uganda for example, projects ACCRA instigated such as the development of indicators built on earlier work on mainstreaming and capacity and addressed challenges around the institutionalisation of climate change into budgetary processes. GEAG also perceived their role to be shifting over time and had reflected on what they could offer government stakeholders through different phases of the programme (see mechanism I:d).

Where iteration seemed to have most potential within local government was within institutional M&E systems. In Kenya, the CCCF mechanism uses repeated planning and M&E cycles which offered an institutionalised window to reflect and consider amendments (see mechanism I:a). Stakeholders at county and community levels commented on the indicators and monitoring visits as a chance to re-evaluate progress, and there was one example of an investment that was poorly managed and changes were made. The role of the county committee in improving ward-level proposals also offered the opportunity for iterative reflection. Despite these structures, stakeholders commented that incentives for critical reflection were insufficient for a truly iterative approach, and the examples we show here are a reflection of improving existing practice (first loop learning), rather than questioning the approach itself (second loop).

Social learning processes broadened the framing of climate change issues to include multi-sectoral dimensions, with some limited consideration of longer timeframes. Uncertain evidence remained relatively unexplored.

Thirdly, evidence from the case studies show that the social learning processes broadened stakeholders' perception of climate change, supporting a framing around multi-sectoral impacts and solutions. If medium-term information is to have a steering function for shorter term decisions as Singh et al. (2017) suggest, framing climate change as a multi-sectoral issue could support and broaden the perceived fit of information that is relevant to steer those decisions, and support the interplay between the evidence bases of different sectors. Supporting other findings in the literature, we see that processes of engagement of diverse stakeholders also built social relationships and trust (mechanism E:a in the case study tables; Meadow et al. 2015). This was sometimes combined with more formal capacity-building activities on specific climate change issues, changing the ability of stakeholders to use information, and informal capacity building, altering how stakeholders related to each other. Stakeholders in Uganda started to frame climate change as a cross-cutting issue and district officials gathered to plan together (see mechanism E:c). In Kenya the CCCF provided a forum for multi-sectoral issues and in Gorakhpur the engagement between civil society and

municipal committees and vulnerable ward members allowed the multi-sectoral impacts of climate change within the local wards to be better understood. Taking Rodela's framing of scale (2011), observed changes are taking place at the network level in terms of improved relationships, and to some extent the systems level in terms of the institutional structures created (although the functioning of these was inconsistent).

The engagement processes in the case studies did not formally address challenges of longer timeframes and uncertainties around climate information. Much of this was due to a strategic rationale on the part of the intermediaries, as we have argued above. In a few instances however, stakeholders did become more aware of a wider range of timeframes through engagement with others with different planning horizons. For example in Gorakhpur, assessing the city masterplan, using climate models and community engagement introduced a variety of timeframes to the project (see mechanism E:c). Changes in perception of fit and interplay occurred around different forms of knowledge such as community narratives, sectoral expertise and planning timelines but further work is needed to see how these broader changes could relate to the usability of specific pieces of climate information as this was only attempted with select individuals. While longer time frames and uncertain evidence were often deliberately left by the intermediaries, it remains an important question at what point to introduce these concepts. These issues were only touched on through social learning processes even when bringing together stakeholders with these perspectives and intermediaries may need to consider how to plan for and prepare for the more challenging dimensions of usability as the programmes become more embedded.

Conclusions

In conclusion, this paper contributes to scholarship on the uptake of climate information by showing how social learning processes can shape the context for the usability of such information within sub-national governments when it is not feasible or necessary to have extensive producer-user interaction.

Firstly, we show that in all three cases the intermediary organisations, which facilitate social learning with government stakeholders, chose not to use detailed climate information as an entry point to working on climate change issues and this allowed them to instigate learning processes with stakeholders supporting changes in the perceived fit and interplay of information over time. Literature on climate information has focused on formal boundary organisations and/or producer-user interactions and the role of local organisations within the climate information value chain needs further attention (Kirchhoff et al. 2015; Jones et al. 2016). Work on social learning recognises the importance of the facilitators and their understanding of the 'problem' and process at hand (Ensor and Harvey, 2015), and this paper shows that in the context of climate information, the question is not only about 'good' facilitation, but embedded understandings of local capacity, usability of information with different characteristics, and relevance of different timeframes to different actors. The introduction and framing of climate information was continually reconfigured through the choices of the intermediaries and further research is needed on their conceptual models and situated knowledges around the fit and interplay for climate information.

Secondly, the paper shows that iterative processes were not instigating critical reflection as different stakeholders participated in each session and previous decisions were rarely re-considered. Case studies using social learning amongst local communities show reflection can be mobilised through participatory evaluations (Butler et al. 2015), and this paper shows that iteration seemed to have potential in sub-national governments where it was built into formal M&E processes. Iterative reflection within the intermediaries themselves led to changes in practice over time and also led to the introduction of new climate information. Plummer (2013) argues community iterative cycles need to cascade upwards to hybridise with other governance systems, and we suggest from the case studies in this paper that iterative processes may need to hybridise horizontally from the network of practitioners to the government system to bring the benefits of an iterative approach to using climate information when there are significant institutional barriers to such an approach. Lastly, the paper shows how social learning broadened the framing of climate change to a multi-sectoral issue, with some evidence of initial changes amongst officials in understanding and interest in longer time horizons.

Through analysis of the case studies, we build on Lemos et al's model (2012) and Flagg and Kirchhoff's (2018) additions to show that through using social learning processes different forms of climate information may still move from useful to usable through changing perceptions of fit and interplay and altering the context for use as shown in Figure 3. This is highly relevant for contexts where direct producer-user interactions may not needed (as the decisions in question are shorter-term in nature and need only be steered by broader trends) or are unlikely to play a major role in the short to medium-term due to resource and capacity constraints.

Insert Figure 3

Figure 3: Shaping the context for use through social learning building on Lemos et al. (2012) and Flagg and Kirchhoff (2018).

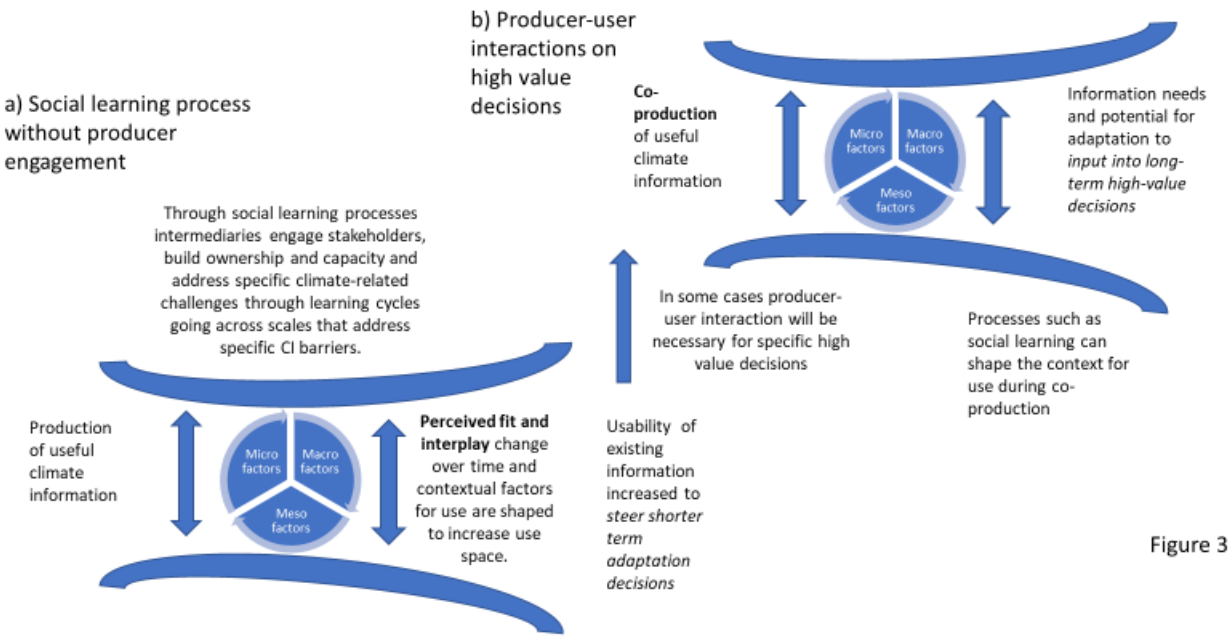

Figure 3

Bringing in scholarship on social learning to this model makes explicit the conceptual linkages between relational, normative and cognitive changes that can alter the context across individuals, networks and institutions and elucidates how the context of usability can be shaped before introducing climate information. For example we see in these case studies how intermediaries work to shape the fit of climate information and interplay with other forms of knowledge before the climate information is introduced. This preparatory stage is important to build ownership and commitment to project models and the idea of climate change before challenging more institutional norms with the characteristics of the information available. In some cases where climate information may need to provide a steering function to short-term decisions this may be sufficient. In others where there is a high value, long-lived decision to be made, the perceived fit and interplay will be in place to move on to more productive interactions with producers. Building on the additions of Flagg and Kirchhoff (2018), we show how through social learning the 'use space' can be conceptualised as more dynamic than in the proposed model - which implies a more linear participation - and a space that can and should be actively shaped as part of the process of moving from useful to usable. We also show that breaking down the type of decisions that might need climate information, to those where only 'steering' is needed, to those with specific high value decisions is helpful. This helps elucidate where social learning processes and mechanisms identified might be sufficient to support usability and where direct producer-user interaction will also be needed.

As noted elsewhere, social learning is not a panacea (Butler et al. 2015; Wise et al. 2014). Evidence on outcomes is still emerging and the ideals of iterative learning can be at odds with deeply embedded inequalities and institutional cultures. Within the framework above, it is

important to be attentive to how vested interests and power operates within and between the two stages suggested. For example, producer-user engagement could be driven from a top-down perspective where producers or powerful actors choose when and how to engage starting from the second stage of the diagram rather than allowing the bottom-up iterations to happen first on what might be useful and usable. Equally, intermediaries supporting the social learning processes in the first stage of the diagram would need the power and resources to access important stakeholders including producers if needed (recognising this is a limited resource). They could also have an impact on the definition of 'useful' to inform producers in the future by tracking and reporting progress to usable. Actively monitoring and tracking processes and outcomes of social learning can help ensure that such dimensions are explicitly understood and discussed (Van Epp and Garside, forthcoming).

To conclude, we argue that scholars working on increasing uptake of climate information need to engage more seriously with the relational and normative dimensions of changing fit and interplay as well as the broader context for use moving from individuals to networks and institutions embedded in local power structures and politics. These dimensions can be conceptualised and built through supporting, actively monitoring and then evaluating processes such as social learning and the results of these experiences can then be fed back into improving policy and practice as well as adding to and developing the model we present here.

Table 1: Summary table for Shared Learning Dialogues in Gorakhpur

	Mechanism	*Summary of findings*	*Evidence from the case study*
Engagement	**E:a) Relationships /trust/shared framings**	***More diverse engagement and building of shared framings and two-way learning. Little evidence of framing future issues or use of climate information.***	The SLD process brought together more diverse stakeholders than were typically engaged in municipal planning to develop resilience plans and pilot projects. Interview analysis showed some stakeholders shared a locally-based framing of climate change (although other framings co-existed) and the value of potential policy solutions such as micro-resilience planning was recognised. Committee members learnt about local climate issues in the wards and engaged with informal settlements in a way they had not before. Showing this two-way information exchange, a committee member (an academic) commented that: "Not only they learnt, I also learnt many things … It was a kind of mutual learning" (Interview, 29.06.2016). Unequal relationships in terms of power and authority were still evident in relationships between elite actors in committees and communities in the vulnerable wards, and some of the elite framings of environmental problems and community engagement that persisted. There were also clearly challenges to engagement within government structures. Little evidence of shared framing of future issues/use of climate information.
	E:b) Range of knowledge and perspectives	***Some engagement with new sectors and aligning of messages to engage government actors.***	Engaging with other actors in the SLDs made some stakeholders more aware of other sectoral planning cycles and multi-sectoral impacts. GEAG recognised working with climate information with associated uncertainties had a higher risk of failure in engaging stakeholders and played down this dimension to engage municipal officers.
	E:c) Different timescales	***Some engagement with different timescales including longer-term.***	Stakeholders were exposed to thinking on different timeframes for planning through the dialogues, for example from the inclusion of climate models. The resilience plan focused on activities over a three-year timeframe but projections to 2046-65 were included to give longer perspective. The Masterplan (valid to 2021) was also reviewed, adding a longer timeframe. The District Disaster Management Authority (DDMA) official had not used future-orientated information to plan, but after the project on integrating CCA into DRR they considered future rainfall patterns in their planning.
	E:d) Collective motivation and commitment **.**	***Some institutional structures in place and individual behaviour change***	The DDMA officer changed the timing of emergency support around the monsoon based on evidence of future predictions at least partly due to engagement with GEAG. Institutional structures were agreed within the Corporation demonstrating commitment to the process.
Capacit	**C:a) Understanding of issues and information**	***Changes seen within local communities engaged in processes.***	Focus group evidence suggested engagement gave women in the local wards confidence and improved their capacity to organise themselves around key issues of concern. Farmers were taught new approaches and techniques, and communities also gained technical knowledge.

	C:b) Constituency of users	***Varying levels of commitment.***	Some members in both cities saw participating as ad hoc, and changing membership between dialogues made building constituency of future users difficult. Some shifts in committee members in Gorakhpur in how they valued community inputs into processes with some recognising the value of their knowledge.
	C:c) Multiple sources:	***Key individuals who has a long engagement showed increased capacity to work with different sources of information.***	Capacity of certain key individuals to use different sources increased over the length of engagement partly from the exposure to technical information and climate models provided by GEAG. The DDMA official also talked about starting to assess ranges of rainfall patterns in the future from a set of models based on work with GEAG, rather than planning for one trend.
	C:d) Motivation	***Some increased motivation, new structures and agreed plans.***	Some increased motivation within municipal officers, shown in institutional structures being created and plans agreed. As a GEAG staff member commented: "One major change is their realisation that climate change is something affecting the city. The approval for having a climate cell in city government is a major step" (30.06.2016).
Iteration	**I:a) Incorporating results of activities emerging climate information**	***Some new reports fed into ongoing work.***	New information was generated (climatic and non-climatic) from commissioned reports and fed into processes such as the complementary project on integrating CCA into DRR plans run 2013-14.
	I:b) Multiple cycles encourage long(er) timeframes	***Little shared understanding of longer-term issues.***	Work had been going on for seven years and so there had been repeated cycles of engagement. However stakeholders did not have a shared understanding and commitment to consider longer term issues. For example the former Town Planner working on the Master Plan commented that: "It is not possible to consider the climate change in 30-40 years for the physical plan. "We see today's case" (Interview, 29.06.2016) and the Municipal Commissioner focusing on maintenance of the city - "We have no time to think about other issues, we have to deal with daily issues. Numerous complaints about potable water, garbage". (Interview, 28.06.2016).
	I:c) Stakeholders build trust, and improve incentives for each subsequent cycle of decision-making	***Evident in a few key individuals, but lack of consistency in key stakeholders made this challenging.***	Key stakeholders were more invested in the process after a long period of engagement, however many municipal officers had been transferred and did not have the experience of multiple cycles.
	I:d) Change over time of the use of climate information / role of stakeholders	***Intermediary understood role to be shifting and identified increased options for using uncertain, future-orientated information.***	GEAG saw their role as shifting over time, as the President described: "It is an iterative process of shared learning … in some cases [we work as] as a partner, sometimes as a target for advocacy" (30.06.2106). Over 6–7 years GEAG started to identify how they might help address the longer term and uncertain dimensions of climate change, uncertainty and future projections were used to in their later work on DRR in 2013-14 for example.

Table 2: Summary table for ACCRA's work on mainstreaming in Uganda

	Mechanism	*Summary of findings*	*Evidence from the case study*
Engagement	**E:a) Relationships /trust/shared framings**	***Some trust was built but some local stakeholders did not trust climate information from external sources.***	Interviewees commented on how trust was formed between local officials and ACCRA, resulting in officials' receptiveness to climate information sent when it was available. Some sub-county officials said they trusted that (and other) climate information when they received it. However, several community members and sub-county officials indicated they are more likely to rely on traditional knowledge.
	E:b) Range of knowledge and perspectives	***Multi-sectoral sharing of perspectives from different levels from district to national.***	At both national and district levels ACCRA brought together officials from a number of different sectors to work together to mainstream climate change into government planning. ACCRA's interventions also focused on bringing together stakeholders from different geopolitical levels, in order to share their knowledge and perspectives and broaden their understanding. ACCRA specifically sought to integrate the knowledge and needs of community members in climate planning through a bottom-up process for developing adaptation indicators to be used at district level. Though improving use of climate information was not an explicit focus of most of ACCRA's interventions, the program recognized the importance of climate information, strategically bringing the Uganda National Meteorological Authority onto its steering committee alongside representatives of other key national ministries. Finally, ACCRA ensured use of available climate information in the development of Bundibugyo's 2011-2015 District Development Plan.
	E:c) Different timescales	***Institutional structures discourage longer timeframes and no evidence on learning and exchange leading to considering longer term issues.***	At district level, the 5-year Development Plan planning cycle, as well as a lack of funding, discourages long-term planning for climate change. Though the Vision for 2040 informs 5-year plans at national level, our interviews did not find evidence that interaction between national- and district-level officials led to district-level officials' exposure to the idea of planning for longer timeframes.
	E:d) Collective motivation and commitment	***An institutional mandate supported motivation, and some evidence of wider commitment being built.***	A top-down mandate to monitor climate change adaptation at district level meant district officials were motivated and committed to the intervention, which strategically filled a gap in district knowledge and capacity that enabled the target districts to fulfil this mandate. Beyond this baseline, there is evidence that ACCRA expanded some stakeholders' motivation and commitment to be involved in climate planning and adaptation efforts, though lack of funding with which to participate was a barrier for most stakeholders at district level and below. At national level, ACCRA worked to develop champions for the process of mainstreaming climate into national planning.
Capacity	**C:a) Understanding of issues and information**	***Evidence of a common language and understanding, and commitment to cross-sectoral planning.***	The common language and understanding that the formal capacity development has contributed to has enhanced stakeholders' ability to learn from each other regarding climate change. While climate change is officially described as a crosscutting issue, and district decision makers plan for it together, institutional silos and barriers remain, especially in terms of funding, which is allocated according to sector and currently inadequate for key departments.

	C:b) Constituency of users	***Evidence suggests some increase in capacity to engage in issues.***	ACCRA's interventions built the capacity of community members and government officials at multiple levels to better understand climate change issues and how to address them.
	C:c) Multiple sources	***Planning still reactive rather than using anticipatory information.***	Disasters in Bundibugyo are primarily addressed in a reactive manner and planning only happens for certain kinds of future risks when there is budget available for the relevant cross-sectoral disaster response teams. For instance, the district Water Officer noted that he only has plans for disasters that happen frequently, like floods; for droughts, which are less frequent, there is no plan.
	C:d) Motivation	***Some increased motivation and new funding secured has helped.***	Positive results stemming from a participatory, learning-based multi-stakeholder process for developing and implementing indicators for climate change adaptation monitoring resulted in increased motivation and commitment at district level. Bundibugyo District won a 20% budget bonus from the national government in 2011 by scoring highly on environment mainstreaming in the Ministry of Local Government (MoLG)'s annual performance assessment for local governments.
Iteration	**I:a) Incorporating results of activities emerging climate information**	***Government systems were a perceived barrier to working iteratively, but community examples showed positive results.***	ACCRA's strategy of primarily working within existing government structures and systems – many of which have significant barriers to iteration – prevented this dimension from being a focus at district level beyond iterative work by community members during the NAPA pilot. At national level, ACCRA pushed for an iterative process for the verification of national-level indicators.
	I:b) Multiple cycles encourage long(er) timeframes	***Little focus on longer-term issues.***	ACCRA's interventions did not focus on laying the groundwork for iterative processes, thus we see little evidence of longer timeframes factoring into decisions as a result of multiple learning cycles.
	I:c) Stakeholders build trust, and improve incentives for each subsequent cycle of decision-making	***Evidence of building on iterative cycles at community level.***	iterative cycles within the NAPA pilot improved community members' understanding of the different impacts on different stakeholder groups, and the interconnected nature of climate change impacts on different aspects of life and livelihoods. The decision of the district and sub-county to extend the NAPA pilot by a year and a half, and the eagerness of the committee to bring back the activities (contingent on further funding) and their willingness to spearhead such an effort, are all testament to the sustainability of the outcomes of the process.
	I:d) Change over time of the use of climate information / role of stakeholders	***Some local community actors and local officials shifted understanding of their own roles.***	There is evidence from the NAPA pilot that community members came to see themselves as capable agents of adaptation over the course of the project, and that district officials shared this view. Some government officials from sectors not previously engaged in climate change planning shifted to understanding how their sector was relevant, but some remained outside of planning due to a lack of a top-down mandate and/or lack of funding for such work.

Table 3: Summary table for the County Climate Change Fund in Kenya

	Mechanism	*Summary of findings*	*Evidence from the case study*
Engagement	**E:a) Relationships /trust/shared framings**	***Strengthening of existing relationships and linkages, but still a variety of problem framings.***	The interviews showed that at the county level the multi-sectoral linkages built through the CCCF process built on and strengthened existing relationships. The individuals involved in the WAPCs claimed they gained confidence and increased their ability to articulate their views and make the necessary connections to technical and government staff to call on them when needed for climate-relevant and other services. There was still tension between community members and the county governments around certain management issues, so not a unified shared framing of the problems and solutions at hand.
	E:b) Range of knowledge and perspectives	***Local community perspectives brought into formal planning processes through variety of tools*.**	Members of the county committees were able to discuss multi-sectoral issues and learn from each other and community members through processes such as resource mapping, creating/reinforcing cross-cutting institutional spaces and relationships. The CCCF mechanism challenges existing norms and practices around the role of community members and types of knowledge used in local planning. Female members of the WAPC talked about how previously they were never called to meetings held by the local chiefs as it was assumed the chiefs and elders could represent their views, but this had changed through the WAPC process.
	E:c) Different timescales	***Investments made were short-term and intermediaries felt too early to add longer-term steer using climate information.***	The public good investments were typically short term in nature and the County was not yet adding a longer term perspective (or steer) to the technical specifications of the investments. Longer term climate information was available from the Kenya Meteorological Department and presented through a general framing in county-level workshops. The local intermediary (RAP) felt it was too early for much climate information to be useful in engagement, especially that focusing on future trajectories.
	E:d) Collective motivation and commitment	***Commitment to the project aims, but links not yet made to longer-term issues.***	There was demonstrable commitment to the CCCF mechanism but it was not yet clear how this translated into commitment to address longer term climate issues as well as the development deficit.
Capacity	**C:a) Understanding of issues and information**	***Both local community members and local planning officers had wider understanding of issues.***	There has also been a focus through the CCCF process on informal engagement that supports capacity transfer, either through WAPC members learning more about the technical aspects of their local investments by engaging with technical officers or through county officers having more exposure to community priorities and experience of managing climate variability. The resource-mapping process allowed more co-generation of evidence, bringing together community members, county technical staff and mapping specialists to generate a county-wide resource that also validated community knowledge and made the resources and the usage patterns visible to technical staff, increasing their capacity to understand and plan for differentiated impacts for different groups. Showing the two-way exchange of knowledge, one of the facilitators said: “When

			coming up with natural resource management maps, you can see a lot of information is coming from communities that even the technical people couldn't understand" (Interview with Director of RAP, 15.09.2016). Unequal power relationships still operated though in terms of whose knowledge had greater impact and dominance in the planning domain.
	C:b) Constituency of users	***Increased recognition of the role of others within the planning sphere.***	There was some shift in county officials recognising that community members had knowledge to contribute to the planning process and for example in the resource mapping process, community elders were able to give details of resource availability in different seasons that were not well known to the county officials. The addition of the County Director of Meteorology added an institutional function overseeing climate information at the local level.
	C:c) Multiple sources	***Wider use of local information sources*.**	The resource maps allowed local knowledge to be validated and used in county processes, and this challenged norms about whose knowledge is useful in different contexts. Using the resource maps and resilience assessments challenged the kind of information that decisions can be based on, but did not challenge planning timeframes nor the linear planning process.
	C:d) Motivation	***Motivation around the project aims, not yet linked to longer term issues.***	As engagement, there was evident motivation and commitment to the CCCF process but so far this has focused on current climate variability and the development deficit rather than longer term climate change.
Iteration	**I:a) Incorporating results of activities emerging climate information**	***M&E processes gave opportunity to reflect on implementation, but driven by institutional processes not new information.***	The main iterative process was the annual cycle of making local investments and monitoring and evaluation (M&E) around those investments. Once an investment was made, the implementation was tracked and then its impact on building resilience evaluated. As the government official overseeing the process told us, "it adds value. [On] the monitoring visits we see things that need to be improved, without monitoring some key lessons could not be addressed" (Interview with NDMA official, 14.09.2016). However, the reflection process was clearly challenging within a government system where M&E has been based on activities undertaken and finance spent, rather than on achieving results, especially results around building resilience to climate change. The communication of seasonal forecasts by the county government led to community leaders considering their plans in light of the forecast (this was part of regular government process not specific to the CCCF). Annual planning cycles drove the timing of decisions rather than emergence of new evidence.
	I:b) Multiple cycles encourage long(er) timeframes	***Focus on short term investments despite repeated cycles.***	The annual planning cycle did not provide much scope for considering longer timeframes as the focus was on shorter-term gains and there was no evidence of longer term issues being considered in terms of the location or viability of certain investments (for example water holes and livestock vaccination programmes). County planning timeframes for the Integrated Development Plans were five year cycles and the Consortium had plans to engage with this process.

	I:c) Stakeholders build trust, and improve incentives for each subsequent cycle of decision-making	***Each cycle built commitment to the mechanism, but no evidence yet of incentives for longer-term issues.***	Over the two cycles of investments there was increased commitment to the CCCF mechanism, shown by participation in meetings, lobbying for the mechanism and giving time to support its function. However, there was no evidence yet of the building of incentives to explore longer term issues. There were more institutional mechanisms put in place to support the use of climate information (see details in I:d). These institutional prompts may increase incentives over time.
	I:d) Change over time of the use of climate information / role of stakeholders	***Intermediary was shifting their role over time, and increasing the use and structures in place for climate information.***	The Consortium was supporting a greater focus on climate information in the previous 2-3 years. The Kenya Meteorological Department had - partly through engagement with the Consortium's work in other Counties - made provision for County Directors of Meteorology in each County and CIS County plans. The focus of these was largely on tailoring information for farmer and pastoralist decision-making, at daily, weekly and seasonal scales. The Consortium also worked on promoting the ownership of the CCCF mechanism by County staff and a nationally run secretariat rather than the international partners.

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