CARIAA
Collaborative Adaptation Research Initiative in Africa and Asia

Lessons learned on consortium-based research in climate change and development

CARIAA Working Paper #1

Allison Gonsalves

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About CARIAA Working Papers

This series is based on work funded by Canada's International Development Research Centre (IDRC) and the UK's Department for International Development (DFID) through the **Collaborative Adaptation Research Initiative in Africa and Asia (CARIAA)**. CARIAA aims to build the resilience of vulnerable populations and their livelihoods in three climate change hot spots in Africa and Asia. The program supports collaborative research to inform adaptation policy and practice.

Titles in this series are intended to share initial findings and lessons from research and background studies commissioned by the program. Papers are intended to foster exchange and dialogue within science and policy circles concerned with climate change adaptation in vulnerability hot spothot spots. As an interim output of the CARIAA program, they have not undergone an external review process. Opinions stated are those of the author(s) and do not necessarily reflect the policies or opinions of IDRC, DFID, or partners. Feedback is welcomed as a means to strengthen these works: some may later be revised for peer-reviewed publication.

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Abstract

Collaborative research efforts are emerging as a way to effectively address complex challenges such as adapting to climate change. Collaborations that span geographic, disciplinary and sectoral boundaries represent a divergence from traditional research approaches that may require new ways of working. This study addresses a research gap related to conducting consortium-based research, offering benefits, lessons learned and emerging good practices for effective boundary-spanning approaches.

This paper draws its evidence from a review of literature on collaborative research primarily in the areas of climate change and development, and a series of case studies of participants engaged in multi-sited collaborations working on climate change adaptation and related development issues. While research consortia differ in their objectives and contexts, insights emerged through this study that can inform their overall design and management, under themes of knowledge co-creation, collaboration, and oversight of partnerships.

Key words

climate change adaptation; consortium-based research; communities of practice; co-construction; research management

Acronyms

CARIAA	Collaborative Adaptation Research Initiative in Africa and Asia
CoP	Community of Practice
DFID	Department for International Development
IDRC	International Development Research Centre

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Contents

Introduction

This study was commissioned by the Collaborative Adaptation Research Initiative in Africa and Asia (CARIAA), a seven-year research program funded by the UK's Department for International Development (DFID) and IDRC. It serves as part of CARIAA's inception work in establishing research consortia to investigate climate change impacts and adaptation in three climate change "hot spots" in Africa and Asia, regions featuring a combination of significant current and projected biophysical climate change impacts and large numbers of people exposed to these impacts. CARIAA aims to inform adaptation policy and practice by providing evidence on how to increase the resilience of vulnerable populations in these hot spots. CARIAA is funding research consortia—groupings of 5 partner organizations with expertise in climate and development research, policy or practice that will participate in the design and delivery of a common research program – to undertake this research. This approach aims to encourage institutions with varying geographic scope and types of expertise — including knowledge of the social, biophysical, and political dimensions of adaptation and resilience — to come together to address the different facets of adaptation and resilience through comparative and collaborative research.

Collaboration across national and continental boundaries also provides crucial opportunities to share knowledge and experience. Considering the scope and complexity of the CARIAA programme, access to lessons and experiences from past programmes implemented by other consortia or similar models of institutional partnership could help to avoid common pitfalls and optimize opportunities for drawing on good practice. As such, the goals of this study were to contribute to the literature on lessons learned on successful and effective collaboration in boundary-spanning research in the field. We endeavoured to capture lessons learned from seven case studies of different collaboration models from the perspective of funders, researchers and affiliated partners. The findings presented here emerge from interviews with directors and staff members of these initiatives, and are relevant to other boundary-spanning, geographically dispersed collaborative research projects, potentially across a broad range of subject areas, but of particular note to climate change adaptation and international development.

1. Background

1.1 Background and structure of the study

We are often told that working in collaboration is a good thing; collaboration provides opportunities to improve accountability and communication, draw on different knowledge bases, co-construct more relevant knowledge, and can stretch research dollars with a wider geographical scope (ECB 2013). For climate change adaptation, a complex real-world problem, collaboration might be the only way to come up with meaningful and practicable answers and applications (Lonsdale et al. 2010). While collaborative approaches may lead to successful outcomes, their establishment and maintenance takes a different shape than traditional, single -institution research. Research exploring emergent or good practices[1] for consortium-based research is sparse however (Brandstetter & Sakakibara 2002; Green et al. 2005), particularly in relation to climate change adaptation consortia.

This study seeks to address this gap, using a case-study approach to draw out lessons learned from recent cases of collaborative research in adaptation and related fields (Yin 2003). It asks whether boundary-spanning research, like the approaches frequently advocated for addressing complex issues such as climate change adaptation (Clark et al. 2011), necessitates new or different approaches to collaboration. Analysing multiple case studies to explore how consortia work can lead us to important conclusions about the practices that define successful consortia (Cundill et al. 2013). However, little of this comparative analysis has been conducted to date, and there is limited peer-reviewed literature on the topic. With this approach, we seek to build on limited existing research from individual case studies (ECB 2013; Fisher & Harvey 2012; Lonsdale & Goldthorpe 2012), and provide new insights into the very particular case of multi-sited collaborative work addressing the complex issue of climate change adaptation.

This paper first presents a literature review and identification of models that frame and inform the analysis. In section 2 we begin with a literature review that draws out good practices from a broad spectrum of collaborative research fields. Section 3 details the case study approach and methodology, participants, along with the analytical framework. Results of the study are presented in section 4, with a focus on three themes: knowledge construction across boundary-spanning research settings; collaboration as engagement in communities of practice; and lessons learned regarding management and oversight of consortia. The paper then concludes with a summary of the findings and recommendations. We begin by defining the terms used in this report.

[1] We use the terms “emergent” and “good” practices in this study in line with David Snowden’s Cynefin Framework. Snowden and Boone (2007) argue that practices in complicated contexts can be “good” (as opposed to “best”), while practices in complex contexts should be termed “emergent” given the uncertainties of complex challenges.

1.2 What is a consortium?

Generally speaking, consortia are models of collaboration bringing together multiple actors (individuals, institutions, or otherwise) who are independent from one another outside of the context of the collaboration, to address a common set of questions using a defined structure and governance model. Consortia are increasingly used to conduct applied scientific research, often for the purposes of simultaneously implementing multiple studies that work towards a common goal (Greene, Hart & Wagner 2005; Wagner et al. 2005). In the area of climate change adaptation, our research finds that consortia with heterogeneous partner-types have also recently emerged as models to build capacity, share ideas, improve accountability and communication with communities and better meet the needs of beneficiaries on the ground. These may engage academic think-tanks and research centres, non-profits, on-the-ground beneficiaries or community based organisations, policy makers and more. In this paper, we use the term "boundary-spanning" to indicate collaborations that form across not only diverse disciplinary contexts, but also diverse settings, identities and practices (cf. Tushman 1977; Clark et al. 2011). We use this term in lieu of more traditional wordings like multidisciplinary or transdisciplinary to indicate a shift away from a strictly academic focus and an acknowledgement that research and knowledge construction also occurs at the intersection of research, policy and practice.

In the literature review that follows we consider the particular challenge that climate change presents and how particular models of boundary-spanning research might offer effective approaches to addressing it. In doing so we draw upon a number of bodies of literature, namely research on epistemic cultures and communities of practice in adaptation to climate change, which help in understanding the potential of boundary-spanning research to address the complexity of climate change adaptation.

1.3 Climate change adaptation as a complex, or "wicked" challenge

Contemporary climate change research increasingly recognises that the traditional positivistic approach to science sits at odds with the complexity of nature and society. The challenge of transforming the way we conceptualise and undertake research on complex issues is not limited to climate change of course, and relates to a shift toward "post-normal" science to address high-stakes challenges with high degrees of uncertainty (Funtowicz & Ravetz 1991; Turnpenny et al. 2011; Datta 2012). Climate change is rightly termed a "wicked" problem, as defined as a "pressing and highly complex policy issue involving multiple causal factors and high levels of disagreement about the nature of the problem and the best way to tackle it." (Australian Public Service Commission 2007: 1). Addressing wicked problems marked by these levels of complexity and uncertainty, many argue, calls for a shift in approaches toward holistic, flexible and collaborative strategies, rather than the narrower and more specialized expertise needed for clearly defined problems (Australian Public Service Commission 2007; Lonsdale et al. 2010), but these shifts have been shown to be challenging in practice (Turnpenny et al. 2009). The Australian Public

Service Commission (2007) suggest that collaborative approaches to solving wicked policy problems place the capturing and sharing of learning at the heart of organisational culture. To do so, they argue, requires working across organisational boundaries and building relationships, creating a shared understanding of the problem and people's framings of it from early stages.

One of the big questions surrounding this kind of work asks how differently-situated stakeholders (researchers, policy makers, practitioners, impacted communities, etc.) may come together in productive and well-integrated ways to address the different dimensions of the challenge at hand. In line with Cash et al's (2006) call for research and action on climate change impacts that spans disciplinary, sectorial, geo-political, and institutional boundaries, as well as spatial, temporal and jurisdictional scales, collaborative programs can cut across disciplinary silos and provide the potential for the broader and more integrative programs. Collaborative forms of engagement on climate change adaptation also present the potential for "incremental adaptation [to give] way to transformative adaptation" (Lonsdale et al. 2010: 3) and moving away from 'business-as-usual' research approaches, which tend towards incremental problem solving or improving skills without examining the underlying beliefs and assumptions guiding research or underpinning 'the problem' (O'Brien 2012). Building on the themes developed above, this study examines consortium-based models of collaboration which bring together partners from a broad range of backgrounds (academic research, civil society, government, etc.) to engage in the co-production of knowledge in ways that ensure that concepts, tools and methods will:

- address climate change and development challenges holistically (e.g. as challenges that are at once environmental, social and political) and;
- move beyond merely academic concerns or interests toward producing findings that can be absorbed an implemented by beneficiaries.

2. Literature Overview

This section provides a review of literature that identifies good practices for collaborative teams, both from the field of climate change adaptation and from other cases of collaborative and consortium-based research from fields such as the medical sciences. The nature of knowledge production in boundary-spanning research such as climate change adaptation necessitates an investigation into best practices for effective collaboration. Thus, this literature review begins with an identification of research on the co-construction of knowledge as it relates to the field of climate change adaptation. We then draw lessons from a specific type of collaborative engagement: communities of practice (CoP). The emphasis CoPs place on leveraging innovation across organizations can provide beneficial collaborative structures for addressing complex problems like climate change adaptation. We explore the existing literature on communities of practice to determine how it may be useful to inform other types of collaborative research structures as boundary-spanning

consortia. We then conclude our literature review with the identification of best practices for the construction and management of collaborations from a variety of perspectives. While we draw from research that does not exclusively focus on climate change adaptation, we identify points of alignment that helped to inform this study.

2.1 Modes of knowledge production in boundary-spanning research

The framing of climate change as a "wicked" policy problem has particular implications for research in this field, as actors are called upon to collaborate across institutional, disciplinary and epistemic cultures (Knorr-Cetina 1999; Grist 2008). Epistemic cultures are "sets of practices, arrangements and mechanisms bound together by necessity, affinity and historical coincidence which, in a given area of professional expertise, make up how we know what we know" (Knorr-Cetina 2007). The scientific laboratory, for example, will necessarily have a different knowledge-making, or epistemic culture than a court of law. This bears significant importance in understanding how research is conducted, communicated and translated into policy and practice across different communities. It is particularly relevant for issues like climate change adaptation in the context of international development where approaches cut across many, sometimes disparate, epistemic cultures that can be difficult to reconcile (Harvey 2011). Recent research has sought to address these challenges using concepts that include "boundary work" (Clark et al. 2011), "knowledge brokering" (Michaels 2009) and transdisciplinarity (Hirsch Hadorn et al. 2006; Lang et al. 2012), amongst others.

The advent of highly-networked research engagement and globally distributed research consortia (often convened through new information communication technologies such as online communities) has enabled the merging of epistemic communities across greater distances, and with greater numbers of actors than ever before. This shift requires considerable negotiation of compatibilities and epistemic "truths" in these new research settings, and presents a challenge for effective management (Harvey 2011), as this study will explore.

2.2 Consortia and communities of practice

A community of practice (CoP) is a group of people who share an interest in problem, and who interact with each other to share knowledge and skills related to addressing the problem, over time (Wenger 1998). CoPs differ from project teams (McDermott 1999). While project teams are driven by defined, shared goals and feature clear membership and roles, CoPs tend to be organically created, and can have multiple objectives and members who oscillate between different roles and tasks. Consortia, while frequently boundary-spanning and defined by multiple research objectives and clear membership also differ from CoPs in their structure. Consortia are structured with clear objectives and shared research goals, and are considerably less organically created and free-formed than CoPs. However, CoP theory offers a great deal to inform the structure and effective functioning of

a research consortium. Through their interactions, participants in CoPs engage in informal practices that can be thought of as "situated learning", which promotes problem solving (Lave & Wenger 1991), making them effective at addressing complex problems like climate change adaptation, and leveraging innovation across organizations (Paas & Parry 2012). Current models of CoPs have been characterized by increased dispersion, facilitated by advances in information and communication technologies that permit virtual meetings and inter-organizational information exchange (Paas & Parry 2012).

Wenger (1998) suggests that the core elements of a community of practice are three interrelated concepts: 'mutual engagement', 'joint enterprise' and 'shared repertoire'. Mutual Engagement entails the establishment of norms and the building of collaborative relationships. These relationships bind the community together. Members then create a shared understanding of the goals or expectations that bind them together. This is their joint enterprise and should be negotiated by all participants. Finally, despite the potential geographical distances between partners, successful communities of practice rely on a shared repertoire of resources to make meaning of research questions, findings and applications. This repertoire can include experiences, stories, tools, ways of addressing problems – a shared practice (Wenger 1998). There is much to be learned from CoP theory that applies to developing an understanding of how consortia work best.

A key feature of consortia that differs the more traditional structure of project teams is the potential for work to carry on as long as its members believe they have something to contribute (and the resources to carry on the work). Whether participants referred to a project team or a consortium, we organized much of our "lessons" around CoP theory, using its elements as a lens through which we analysed participant responses. This was done with the understanding that while participants did not always refer to projects that might be considered to be communities of practice, they still referred to aspects of CoPs that "work". This understanding helped us to derive lessons

2.3 Benefits of collaboration and lessons for management

Our review of literature on the benefits and emergent practices of collaborative research models has focussed on studies of research and development projects, capacity building across diverse sectors, and collaborative work on climate change. Table 1 summarises some key messages.

Table 1: Summary of benefits and emergent practices documented

Benefits of Collaboration	• Improved communication at community level • Increased geographic coverage • Decreased duplication • Increased complementarity • Increased likelihood of attracting attention of funders • Greater generalizability of findings • More comprehensive understanding of issues

Emergent/good practices	• Clearly defined organizational structure • Strong leadership; clear roles and responsibilities • Shared understanding of diverse objectives and motivations • Transparent communication • Emphasis on institutional learning • Ensure research is relevant to end users

Source: ECB 2013; Fisher & Harvey 2012; Lonsdale & Goldthorpe 2012; Dodgson et al. 2006; Greene et al. 2005.

3. Research overview and methodology

Relative to the emerging body of literature on the benefits and best practices of collaborative research discussed above, there is limited research exploring boundary-spanning research consortia, as defined in an earlier section of this paper (c.f. Fisher & Harvey 2012). This study focuses particularly on the benefits and emergent practices for effective collaborative multi-sited research. It is structured using a multi-sited/multiple case study approach (Yin 2003). In all, seven case studies were conducted with participants involved in multi-sited collaborations in roles as funder organizations, lead institutions, and partner organizations. Each semi-structured interview was carried out via Skype with participants from seven different organizations. There was some heterogeneity to the sample of cases examined. Often these organizations were involved directly in climate change adaptation research, but some cases involved initiatives where climate change research was less central to a broader international development mandate. Case selection was conducted via snowball selection, based on peer recommendations of initiatives that demonstrated long term sustainability and met our selection criteria for this study. Selection criteria for the participants were based on the following requirements:

- We looked for participants whose engagement in boundary-spanning collaborations entailed research and action were related to climate change adaptation, or participated in collaborations whose structure was sufficiently similar to permit reasonable comparisons to the CARIAA consortia structure;
- We ensured to select participants who had been involved in a boundary-spanning collaboration for sufficient time to yield lessons learned;
- We wished to ensure a variety of perspectives to inform our study, and as such, we recruited cases that represented a variation in initiatives

While the data generated by these interviews is robust, a limitation of a sample size this small is that the results presented herein may not be generalizable to the experiences of all collaborators in all consortia. Table 2 describes the features of each case and the position of

the participating actor[2]. While many helpful lessons were gathered through these interviews, it should be noted that the participant pool was small, and the data generated here is not representative of all consortia or collaborative research practices in the field of climate change adaptation research.

Table 2: Descriptions of anonymized case studies and interviewees

Case	Description of Consortium or Collaboration	Respo-ndant
A	Boundary-spanning consortium of researchers and professionals working on different approaches to climate change adaptation in Eastern Canada. Joint initiative by the provincial government, crown corporations and the federal government.	R1
B	A multi-sited network of ten core cities in India, Indonesia, Thailand and Vietnam, experimenting with a range of activities that will collectively improve the ability of the cities to withstand, to prepare for, and to recover from the projected impacts of climate change. Funded by a large private foundation, and supported by a large number of regional, national and local partner organizations working towards climate change resilience.	R2
C	A research consortium that encourages critical debate and policy dialogue on the future of agriculture in Africa. The Consortium is a partnership between research-based organizations in Africa and the UK, with work currently focusing on Ethiopia, Kenya and Malawi.	R3
D	Provide core budget support for grantees to invest in long-term research planning. The organization supports grantees in the improvement of their research quality, communications and organizational structure. A joint effort of numerous private foundations plus international federal funders who support independent research institutions.	R4
E	A network that helps decision-makers in developing countries design and deliver climate compatible development. This is done by providing demand-led research and technical assistance, and channeling the available knowledge on climate change and development to support policy processes at the country level.	R5, R6
F	This consortium is an international organization that advances international agricultural research for a food secure future by integrating and coordinating the efforts of those who fund research and those who do the research.	R7
G	A five year program for supporting research on climate change adaptation in Africa. This including funding a multi-partner research initiative, fellowship schemes and participatory action research.	R8

[2] Organizations and participants' names have been anonymized for the purpose of confidentiality. Each interview was approximately 60 minutes long, and participants were provided with the interview guide beforehand.

3.1 Analysis

The data was organized as case-studies of various collaborations, which were analyzed in two iterations of thematic coding (Miles & Huberman 1994). The first iteration drew out emergent themes and sub-themes related to ways of working in consortia, emergent practices, challenges and benefits of collaborative work across distributed geographical regions. As the data was coded and as more themes emerged, we revised and expanded codes. We were especially interested in descriptions of benefits and pitfalls of boundary-spanning and geographically dispersed collaborations, to help us draw conclusions that could inform the continued development of best practices for consortia.

In a second iteration, we analysed across cases to generate cross-case themes (Stake 2006). This allowed us to explore combinations of themes or concepts that seemed relevant to the benefits or pitfalls of consortia work. To make sense of the data, we mobilized theoretical concepts related to Wenger's (1998) communities of practice, and Knorr-Cetina's (1999) concept of epistemic cultures. These concepts helped us to frame the emergent themes in ways that spoke to existing literature on multi-sited collaborative work, but also gave a new lens to help us to organize concepts related to disciplinary cultures and core elements of communities of practice.

4. Results

The results of this study are presented here in three parts, with Parts I and II linking more closely to the theoretical framing presented in Section 2 above and Part III highlighting more operational and managerial considerations. More specifically:

> **4.1** focuses on knowledge construction in boundary-spanning research, and the implications for boundary-spanning consortia.
>
> **4.2** explores the benefits and challenges inherent in collaborative work, as framed through the lens of communities of practice theory. We present evidence of the critical practices that funders and partners cultivate in boundary-spanning research consortia.
>
> **4.3** maps out the challenges and emergent practices for the management and oversight of research consortia. Data presented here offers insights on goal setting and reporting, the development of indicators for success, and solutions for dealing with under-performance in boundary-spanning, geographically distributed consortia.

4.1 Co-constructing knowledge in boundary-spanning collaborations: Challenges and opportunities

Drawing on discussions in Section 2.1 above, our results consider the challenges and opportunities of working across epistemic, disciplinary, and institutional cultures highlighted in our case studies. Issues linked to multi-disciplinarity may not be relevant to all research consortia, as many consortia are formed of very similar partners, where the added value of the partnership is more focused on reach or visibility. Across the cases examined in this study, however, multi-disciplinarity was identified as an important potential benefit of consortium-style partnerships, given the nature of the challenges that they seek to address. As one responded noted, "the opportunity to transgress disciplinary silos can create a 'different' ambience that is attractive to researchers and users and can support buy-in. Creating capacity for boundary-spanning projects can lead to more integrated perspectives and contribute 'newness' to the field." (R1).

Respondents emphasized the following themes:

- Working across epistemic, disciplinary and institutional cultures can **broaden the base** of researchers and stakeholders in a network to tackle multi-dimensional problems
- Boundary-spanning work requires **brokering a shared understanding** of how motivation differs across these cultures.
- It is important to attend to the **process** of doing boundary-spanning work.

Broadening reach

Working in a research consortia can challenge members to develop a broader vision of the challenges at hand, connecting the array of knowledge sets and actors involved. In the context of climate change this challenge and opportunity was described by R1, who suggests that, "Climate change is a big puzzle… you need a multi-disciplinary team [recognizing] the importance of tangibles but also intangible deliverables." To do this, it is necessary to create capacity or networks that can allow for the exchange of information across different disciplines and sub-disciplines. "Breaking the silos often allows for the optimization of already existing resources that, just by combining them, creates options or an evolution towards a more integrated perspective" (R1).

RESEARCH HIGHLIGHT 1: Fostering multi-disciplinarity in a climate science consortium

Case A is a boundary-spanning consortium that manages 30-40 projects annually and brings together over 400 scientists and professionals from a variety of different disciplines. Their experience highlights the value and importance of attending to the variations in epistemic cultures present in consortium work and the processes involved in leveraging these. The consortium focuses on climate science, impacts and adaptation, and structures its human resources to reflect the diverse field it is situated in. On top of a staff of 20-25, they also contract 20-25 staff from various funding and government agencies and provide facilities (office space, super-computers) for another 40-50 researchers, doctoral and post-doctoral researchers. The result is an extremely diverse and boundary-spanning work environment. "Sometimes we joke that people from government like to come here because they feel that it is more like university, and people from university like to come to [this organization] because they feel that it is more of a workplace" (R1). However, despite the growing positive emphasis on networked, boundary-spanning approaches to climate change research, many partners (such as engineers and scientific researchers) were thought to be "too much in their silos", a difficulty that requires significant negotiation on the part of the organization. This negotiation of knowledge production across these epistemic cultures is vital to ensuring the relevance and communication of new knowledge for "users" who stand to benefit from it.

Making this shift to a boundary-spanning approach climate science research also permits consortia to speak to a broader base of stakeholders and end-users and provides the advantage of working across various dimensions of the climate change challenge. A good example of this comes from Case F, where the institutional structure was recently transformed from agendas built around individual agricultural institutes toward a collaborative, consortium-style model of programming:

> [Now] it's not just about livestock, or it's not just about soils, or it's not just about water. It's about all of the above in different places…It has been incredibly powerful and great to see when people come to us [and we can say] 'let's engage and let's talk', and we don't say 'yes, I can talk [about] livestock' (which we did with the commodity focus) (R7).

Across these case studies, the value of consortia is often seen to reside in the access to new boundary partners that these relationships enable. R8 notes the efficiency of "having partners on board that already have a stated or established route of … reaching the boundary partners that you want to reach." In doing so, she argues, "you don't have to lose too much time in terms of transaction costs, building affinities, you know, issues around reciprocity…and coalition politics and networks...There is already an established trust and

you can just concentrate on that partner and leave the other partners to do the rest" (R8). This kind of "matchmaking" in establishing consortia, entails identifying what kind of expertise is needed, who can provide it, and the best ways for making those connections at the outset of an envisioned partnership (Michaels 2009).

Brokering Understanding

While respondents spoke at length about the benefits of boundary-spanning consortia for addressing climate change adaptation, they also cautioned that working across epistemic cultures can pose tensions at the levels of communication, methodology, and evaluation. Differences in the established cultures in lab environments, policy milieus and other "lifeworlds" (Knorr-Cetina 2007) can pose challenges for researchers and users of research. In boundary-spanning consortia, tensions can emerge when different organizations have different understandings of what constitutes good practice, or how to evaluate success. Scientists who feel ill-at-ease in making definitive statements about new findings or prescribing how others should act based on their research results, for example, may find their reservations sit in tension with advocacy partners who are used to crafting simplified and specific advice to decision-makers on how to take action (see Pielke 2007). This was highlighted in Case B, where R2 noted that "there are different cultures pulsing in a different way and different values and different theories of change." She went on to explain that what is valued as good or relevant work varies across organizational cultures:

> Academics think that if you write a really good paper and do a really good piece of research, [it] will change the world. A private sector firm may think that if you can create an enterprise about it that's going to change the world. An NGO might think [another way]…they are just fundamentally not necessarily going to reconcile. I think just to know that is really helpful, and then you can figure out how to use that as an opportunity to have a discussion to move the agenda forward (R2).

These observations point to one dimension of the challenges that exist in brokering understanding across heterogeneous partnerships. In consortia, understanding the diversity or homogeneity of the set of the partnership, can make a big difference when striving to find the right balance. In collaborative groups where there is a diversity of epistemic cultures and theories of change, the lead organization or funder may need to broker understanding between partners, leading to a more nuanced awareness of problems and solutions across cultures (Harvey 2011). Sometimes, simply identifying potential points of conflict can be critical to finding the right balance. Brokering knowledge becomes essential to the enculturation of new members into the various lifeworlds of researchers and research-users. This might be achieved through strong onboarding[3] that includes

[3] "Onboarding" was a term used frequently by participants to indicate the process by which new participants in a collaborative effort acquire the knowledge, skills and behaviours required to become 'insiders' to the initiative.

explicit articulation of a joint vision, as well as shared matrices for evaluation and impact assessment.

Attending to the Process

Critical to the successful management of boundary-spanning research consortia is the attention paid to the *process* of working across disciplinary boundaries. In Case A, R1 describes this as the greatest learning outcome he has experienced as the director of an organization convening and supporting consortium based research:

> …it's almost as if investing time and money into feeding this process is the most important. People don't think this way, even myself when I came to [our organization] I wasn't thinking this way. I was thinking that having expertise and resources to do all kinds of analysis and reports, but then I discovered that it's the process that makes the difference between having relevant projects or not, and having data that would be used or not (R1).

Previous research points to growing interest in potential benefits that the concept of boundary work holds for designing research programs with stronger links between knowledge and action (Cash et al. 2003). Negotiating the boundary between, for example, scientific research and policy can be murky work, as a boundary that is too porous may result in the 'mixing' of scientific objects with politics, but a boundary that is not porous enough will not lead to any form of meaningful cross-boundary communication (Clark et al. 2011). To promote meaningful boundary work brokers must ensure participation from all stakeholders, measures for accountability and the production of 'boundary objects' to stimulate communication and interaction across disciplinary contexts (Clark et al. 2011). While these measures are seen as acceptable minimums for successful boundary work, little is still known about how individuals take on the boundary work of communicating, mediating and translating, and how they motivate others to engage in these kinds of supportive activities (Michaels 2009). As a boundary organization, Case A operates as a convenor and supporter of a consortium, a role that necessitates developing processes to balance the tension between research and practice: "The researchers want to prioritize doing research, and the users [of the research] want to prioritize making decisions. So the way we are functioning, we bring those two closer as much as possible, and try to do the work for them in certain aspects…Then [our organization] tries to play the role to facilitate the leveraging approach." (R1)

Boundary-spanning collaboration entails focussing on the relevance of the science, not just its quality, by making decisions and creating projects that are a win-win for researchers and users, bringing these two groups closer together. Breaking through or connecting disciplinary silos can be an important way of accomplishing this, and is best achieved through reflective practice that places emphasis on the processes employed when making decisions about research goals, communicating expectations, considering the relevance to end users and brokering across the research/practice divide.

4.2 Learning from/as communities of practice

As we noted earlier in this paper, CoPs have been identified as beneficial collaborative structures for addressing problems like climate change adaptation, through their emphasis on leveraging learning and innovation within and across organizations (Paas & Parry 2012). Current models of CoPs have been characterized by increased dispersion, facilitated by improved information and communication technologies that permit virtual meetings and inter-organizational knowledge exchange (*ibid*). Research consortia can adopt many of the practices of successful communities of practice by establishing a number of key elements at the outset. In this section we draw on Wenger's core elements of CoPs to describe some of the critical practices that funders and partners noted in the case studies, and describe some of the benefits and tensions inherent in this form of collaborative work.

Joint enterprise

Across all study participants, establishing a shared vision was regarded as the cornerstone of good practice in consortia. Participants reported that the success of the consortium is grounded in the creation of a joint vision where partners are clearly linked, but also are independent and can carry on with their own projects. Participants suggested that developing a clear vision collaboratively (involving funders, researchers and intended end-users) can facilitate this process, and can start the collaborative process with a sense of being on equal footing. This is usually achieved through a preparatory or inception meeting. It is also equally important, in instances where consortia report to multiple funders, to come to some kind of shared vision for the collaboration amongst those funders, despite potentially different mandates.

A tension noted in consortium-based research on climate change adaptation is that a focus on disciplinary knowledge which is tied to academic results such as journal articles, workshops or symposia often leads to outputs that are intangible or have capital in limited communities. In considering research foci for consortia, an emphasis on the "why" of research design has the potential to push partners toward tangible benefits for users/community partners, because results and outcomes are more closely tied to stakeholder needs and learning outcomes. The "why factor" becomes a point of reflection where actors can step back and question if assumptions going into research projects are tested, and creates spaces to critically interrogate the goals of funding partners to lead to more relevant findings at the boundary of science and policy. Opportunities to reflect carefully on the goals for the project, and why those are the goals for the project were regarded as necessary by several respondents. These are reflected in the kinds of questions proposed in both Cases A and G:

- What will this research/contribute to the field and to stakeholders/communities?
- Why are we doing this?
- What is the sum total of the results that we are looking for?

- What (concretely) would impact look like?

For example, R8 suggests:

> [We] cannot just say 'Oh, we want to be able to address issues in hot spots in this area'. Why? How is resolution of problems in a particular hot spot - what is the net total of that? What would it mean to communities? [It's important] for the people within that hot spot to recognize and see that help is really aligned with their own specific needs...

Much like in a CoP, it is important that this kind of critical reflection around the goals of the initiatives is shared among all consortium members. R2 discusses the importance of involving partners in these decision making processes from the very beginning: "It is important for there to be a clear joined up vision on what the overall goal is, to establish ownership over that, having a joined-up results framework or M&E framework can be an important device to get alignment...Participating in designing that can be very helpful [for partners]" (R2). This can sit in tension with the logic of many models of project design, where partners are brought on board after the "why" has been established and ratified between funders and a lead partner (Harvey 2011).

Research Highlight 2: Establishing joint enterprise in a multi-funder initiative

In situations where multiple funders wish to be involved in basic implementation matters (staffing, allocation of resources, design and activities), the potential differences in vision can present considerable challenges. Case D has one such funder. R4 notes that this creates a differential basis of engagement, that "can allow things to start to be steered in a particular direction, which is more in the interests or priorities of a particular funder". A recommended practice is to have clear guidelines and expectations, and to establish parameters for working with funders. However R4 indicates that this is hard: "…what works well in relationship with one individual is not necessarily the same thing that works for another individual, simply because they're different people, temperament and different needs and different requirements. It's a constant navigation, which makes it difficult to come up with a recipe" (R4).

Funders can help establish joint enterprise by creating spaces for partners to convene and innovate and by ensuring financial and technological support for projects that extend beyond the initial goals of the collaboration. However, R8 cautioned that excessive involvement from funders can be both burdensome and can prove disempowering for other partners. Tensions can arise when funders share in the consortium's joint enterprise, a particularly salient concern with high funder and partner turnover. It is also important to consider how power relations between funders and other stakeholders might impact the partnership in cases of close funder involvement.

Mutual engagement

At the heart of successful CoPs is a diverse group of members who "share a high degree of trust, sense of purpose and common values; they create shared understandings and a feeling of belonging" (Paas & Parry 2012). A challenge for consortia is to create an environment where members are engaged at an optimum level of active participation. This does not mean, however, that all partners will participate equally or be similarly motivated. R7 discusses members' motivations for participation as "carrots and sticks":

> There are some people on my team who believe more in sticks and people that believe more in carrots. I feel that the best thing we can offer is an exciting new way of doing research …So that's the carrot. People want to do really good research with neat partners… You want to be doing neat stuff and you want to think that you're making a difference….And then the stick is doing things like saying: OK 10% of your budget has to be doing gender research. So they call everything that they're doing gender.

Climate change research is a dynamic and fast-moving field and it can be a challenge to maintain commitment, especially when there are potentially bigger initiatives or new opportunities constantly competing for researchers' attention. It is therefore necessary to create research opportunities that provide long-term benefits and sustain collaborative enterprise. Motivating partners in consortium-based work can be challenging, as the above example demonstrates: Not all carrots (incentives) are made the same in consortia. For various partners in a consortium, different motivators will have variable currency. The opportunity to spend more time writing for publication with new collaborators may provide great incentive for some partners while others may see this as an added burden that falls outside of the type of work they'd like to prioritise, such as engaging more with communities. This heterogeneity in motivators represents a challenge for managers of collaborative research processes, because the distribution of tasks and responsibilities among partners can then significantly affect buy-in (Fisher & Harvey 2012). R8 suggests that participatory action research may be a way of ensuring equal participation from all partners, to varying degrees.

Establishing mutual engagement also entails establishing norms around issues related to intellectual property and organizational identity. R3 discusses the tension faced by members wishing to make their work visible in ways that reflect and preserve their organizations' established identity:

> There have been some places where we have tried to foster more institutional partnerships/ collaborations and struggled because of the tension of them feeling "if we work with you in that way, we may lose some of our identity in a sense or we may lose some control or some claim over the credit." … I have tried to …ensure that we have as many views represented as possible, celebrate as many partners as possible, give them

> as much credit as they need to help advance their respective agendas. So there's always a balancing and it's constant.

R2 suggests that these questions need to be addressed at the outset of collaboration: "At the design phase, put on the table questions of intellectual property and have a process or set of protocols along how joint research gets generated, be clear about authorship and how that gets determined and at what point. " (R2) Thus, the process of mutual engagement is one that is negotiated, and it is imperative that this begins at the outset, so that the norms of collaboration are established, and issues pertaining to identity and property are resolved.

The establishment of strong mutual engagement at the outset of a partnership does not necessarily ensure that this cohesion will be sustained, however. For instance, it has been found that in some intra-organizational CoPs, a high turnover of staff can interfere with the development of trust, a sense of shared history and cohesiveness (Loumbeva et al. 2009). Case D presents an example dealing with this on a regular basis from a funder's perspective:

> The mobility of people through organizations presents some challenges because when new people come in, they have to get up to speed with what the program is about. That often comes with individuals having different styles, needs, different levels of comfort and what they would like to have access to in terms of information. Having engaged partners is hugely important, this makes an enormous difference because it allows issues or problems and areas of satisfaction to surface much earlier (R4).

In sum, finding ways to motivate both funders and partners from the outset and keeping partners engaged amid evolutions in boundary-spanning research is a key to maintaining the shared goals and vision of the consortium work, and to ensuring that work progresses smoothly and in a timely manner.

Shared Repertoire

A core feature of a CoP, the shared repertoire, points to the distribution of knowledge and resources among the group. Due to the breadth of actors intervening in the field of climate change and development, there is likely no area that a single institution could cover comprehensively. As such, for some, the opportunity to bring established, like-minded institutions onboard to add value to a program of work is seen as the most positive aspect of working in consortia. As one participant argues: "…the number one benefit is how you could reduce, you know, in terms of just division of labour, so that you could all effectively concentrate on an area where you feel that you would be able to demonstrate your effectiveness and the value that you bring to the consortium" (R8). Consortium-based work in this complex and trans-disciplinary field is a more rounded way of working because the knowledge doesn't "sit" in a single place. "The more that you would work to [share] certain, specific parts of the work, the more you're able to bring depth and value to the theme that you're researching" (R8). Thus, the consortium not only brings a breadth of knowledge to

research, it also brings a capacity for that knowledge to be put into action. That capacity is achieved through the division and distribution of tasks and facilitating learning across various partners and stakeholders in line with their respective strengths.

R8 describes the critical importance of appropriately distributing tasks to ensure this shared repertoire emerges from the start. "… you don't want the institution that is going to be doing the bulk of the work to start off on the wrong footing, and the wrong footing for me would be if there is a sense that the collaboration or the partnership is not equal and that the institution in place is perhaps going to be doing a lot of the process work, and much of the substantive work is going to be taken away …or outsourced by another institution" (R8). There may be concern about the "quality" of roles available in consortium work, and questions about which institution is entitled to which role. In a large consortium, there will be a variety of different institutions who are available to do different kinds of work, and questions arise around what constitutes meaningful or good work, what kinds of work match the strengths of that institution, and how tasks can be allocated to align with those strengths. This connects with the discussion of motivations above, and can be important to establish early on, in line with different partners' perspectives.

Learning, the central goal to any community of practice, is considered to be key to establishing a shared repertoire for all interviewees. As such, opportunities to develop skills, produce and exchange explicit or academic knowledge, and develop tacit knowledge and shared understandings (Wenger 1998) are all motivators for participating in a consortium. They are also keys to establishing a shared repertoire. Many respondents in this study noted that knowledge is embedded in people, institutions and contexts, and that learning that can be facilitated through in-person meetings, workshops, and symposia. Most consortium structures had opportunities to engage in these kinds of learning forums built into their program activities. In Case B, one of the funder's roles is to bring as many people in the consortium together for face-to-face meetings, as often as possible. Face-to-face meetings are universally regarded as best and most generative forum for learning (often leading to innovation or the creation of new projects). The practice is a part of this funder's commitment to strong onboarding, and is thought to contribute to transparent processes around budgeting and collective planning. Others have suggested that face-to-face meetings in the form of learning forums can "lubricate a partnership. It gives it that sort of oil that the engine needs to say 'listen, we're making progress.'" (R8). This type of collaborative learning is thought to be critical to working in consortia, and is very much related to the need for constant reflection on process.

In Case E, R5 and R6 also regard face-to-face meetings as contributors to relationship-building and the development of trust among all partners. They indicate that there is a riskiness associated with launching a new consortium, particularly with the development of new partnerships. Requiring face-to-face meetings in the early stages can iron out problems at the outset and develop positive working strategies that can contribute to the strength of the relationship. R5 and R6 provide an example of an "Action Lab" - a two day workshop

where potential partners break off into working groups to discuss the most interesting research problems and approaches to research that each member is currently invested in. From there, new partners are invited submit proposals to a research fund, of which the funders select the top 6 projects. R5 and R6 suggest that "Some of our most exciting projects came out of that process – some really interesting stuff that probably wouldn't have happened unless you brought people together who might not otherwise think of partnering on a project...".

4.3 Monitoring and evaluation of consortium performance

The final area of observations highlighted in this study focused on the oversight and management of consortia, either between consortium leadership and other members, or between funding organisations and consortia. This included issues related to monitoring and evaluating (M&E) the progress of consortium work, addressing performance and accountability, and considering how collaboration might extend beyond the scope of envisioned consortium activities. Across all of these issues, the need to ensure that management and oversight processes (particularly M&E) maintain an appropriate balance between internal learning and ensuring accountability stands out as an important issue (see Fisher & Harvey 2012). We focus our discussion here on the following four areas:

- Establishing shared goals and expectations on reporting
- Defining and monitoring indicators for success across a multi-dimensional partnership
- Mitigating and dealing with under-performance
- Incentivising growth and evolution over time

Reporting Goals and Expectations

Communication with partners around evaluation is crucial, but can be challenging if processes are excessively burdensome, mis-aligned with members' capacities, or lack in transparency. One participant described the realities for research organizations that draw on funding from multiple sources in a crowded and competitive field: "If I put myself in the position of a research organisation in Senegal, they are probably receiving funding from 15-20 organizations. So, they have to meet requirements for all of those funders …Which basically prevents them from doing the work that they need to do." (R4). In consortium-based research these pressures may be further amplified by the creation of both internal (between consortium members) and external (to funders) reporting requirements, which may not necessarily align with one another.

Secondly, developing reporting standards that are aligned with the partners' capacities for reporting can be sensitive business and often require mentoring from the funder or an outside facilitator. This can be a particular challenge in consortia that are boundary-spanning and may have varying degrees of experience with the language and reporting practices expected by the lead organization or funder. Intermediaries or working groups

who work to find ways to communicate understandings across disciplinary and cultural boundaries can help to manage expectations for reporting.

Finally, transparency is thought to be helpful in terms of planning and onboarding new partners, particularly with respect to budgeting in consortia (who is getting what, and what rates are being paid). Transparency is also important with regard to developing strong funder-partner relationships, although at times transparency in reporting can become hazardous. In many consortia, as reported in Case F, criteria for performance evaluation – which is linked to allocation of funds among partners – is made fully transparent for all partners to see. While this makes resource sharing transparent, it presents challenges linked to partners' different capacities for undertaking monitoring of their work. For example, R7 tells of a partner who has performed well, which she had observed from site visits and communications with coordinators. However, when the time came for partners to submit reports "some of them wrote it up well, and some of them didn't …But I had also been talking to people so I knew what they were doing, …then what do you do? Do you rate them on what you know, or on what they report? And the answer is, well to be transparent and fair, you've got to go with what they write…And that is very tricky." In this case, having very transparent criteria for funding and for evaluation means little flexibility for those with limited capacities in terms of reporting. Transparent evaluation criteria can level the playing field for many partners, but also means holding all partners to the same standards for reporting.

Setting Indicators and Monitoring Success

Defining indicators to monitor complex programs is a major challenge for boundary-spanning research consortia. For example, while climate change adaptation programs often seek to reduce risk or vulnerability and increase adaptive capacity or resilience, many of these outcomes are not directly measurable, or may be linked to multiple factors (Beaulieu 2010). The pressure to achieve hard "impacts" on policies or development outcomes presents climate change research programs with further evaluation challenges (Kristjanson et al. 2014). The process of developing evaluation frameworks for consortia that involve multiple research teams and more than one funding organization raises questions about what kinds of reporting formats work best for different people and organizations, how to ensure that monitoring and evaluation processes contribute to learning. Funders may seek to develop common matrices, but each funder will inevitably have its own internal standards to satisfy. Respondents emphasized the importance of clarifying what these matrices hope to measure, and what funding organizations hope to learn from these reporting systems. One case in particular presents the struggle to work with a variety of different funding organizations, many of whom joined in the process at different times along the program, and the complicated matter of making evaluation processes relevant to all partners, in ways that satisfy both accountability and learning needs:

> We're really working closely with the existing funders so that they're completely on board with what the program aims to do, how it's configured and how we actually report on what's happening and what's changing. Right now there's a really good buy-in to that. It's a more iterative and creative process right now where we're just sharing prototypes of materials and formats that we can use so we can get feedback from everyone right at this [planning] stage, so that when we get into the [next] phase we're spending less time debating on what kind of format works for different people, and more on what are we learning (R4).

Monitoring is often set up to track changes at the level of the organization based on certain proxies (number of research outputs, events held, people trained, etc.). This is akin to report-carding, which is important for monitoring, though it presents a partial picture. There are also questions about whether partner institutions are being evaluated based on their own organization's performance (competency based) or are they being compared to others in these monitoring approaches. This can be a major concern for consortium partners who may vary in terms of size and capacity. "If you're a small 5 year old, 6 person organization in Delhi receiving funding, the question is, are you being compared with a 30 year old, 100 person organization also just around the corner in Delhi. Does that put you at a significant disadvantage?" (R4).

It is also important for consortia to ensure they are able to monitor the nature of change that is taking place, or what might be called a "big picture analysis". Aspiring to a big picture level of learning means clarifying the demand for analysis and information (generally from high level policy actors), and identifying patterns and trends across data sets to generate a comprehensive picture of change. This level of analysis attempts to address the "why" factor noted earlier. Which impacts are being assessed, and why are these important indicators? Gathering this kind of insight from across a widely-dispersed multi-partner initiative, particularly where partners are working on a common challenge from quite different entry-points, can present challenges. It also means that the capacity for monitoring, evaluating and learning from observed change must be distributed across a partnership and not embedded in a single organisation (Fisher & Harvey 2012).

Under-performance

The challenges of operating and managing interlinked projects with dependencies that sit across partners were noted by several respondents. Often, geographically distributed consortia will find themselves stumbling on activities that require contributions from distant researchers or project managers, underscoring the need for good coordination, and strong monitoring processes. To anticipate difficulties, Case B presents us with a description of how a joint vision can mitigate some of the pitfalls that arise when there are numerous path dependencies:

> We've had situations where we have worked even in one country where there is a partner who has a major illness and is linked to a bunch of other organizations and for a better part of a year we were stalled. So if everyone has a clear vision on what the whole is driving towards and their own role in relationship to that, you can figure out where you need to have those interlinkages and where they're just not necessary...Collaboration isn't always a good thing...you need to be very strategic about what things need to rank and what things are better to just carry on with (R2).

Research Highlight 3: Anticipating conflict

As a representative of the funding partner for Case B, R2 identified organizational culture as a key consideration in boundary-spanning consortia. This partner often acts as a broker where at times it might manage conflicts, and at other times act as mediator. All of the respondents in this study reported on the necessity of funder intervention when potential conflicts are on the horizon. However, the respondents also cautioned about the importance of developing trust and understanding before an intervention is carried out. "To be able to have a separate conversation depends on level of trust...There are things that happen behind the scenes where you can see that a partner is getting pushed into something, you can sort of back them a little bit. As a funder I feel you can do this - maybe in just a small way like sending an email" (R2). Overall, there was a sense across respondents that while donor-involvement in management was at times necessary, generally a model of self-management within the consortium was seen as most desirable to ensure a degree of autonomy and self-sufficiency.

Some respondents reported that at times it was necessary for the funder or consortium lead to step in and take over tasks in cases of under-performance, and others still recommended trying everything possible to keep the partnership alive, and to maintain partners' roles. For example, R8 suggests that the detection of non-performance can often require increased involvement of the funder (or lead) such as more site visits, strengthening of the research process, capacity building, or bringing in consultants. "Staying in means exploring all the options...There are a series of things that are done and you have to make sure that you exhaust all of those options before you actually say that, yes, we are pulling the plug" (R8). This is supported by findings from Fisher and Harvey (2012) who argue that disengagement of one partner can create a negative cycle that pulls them further and further away from the daily activities of networked partnerships. They suggest that the temptation may be for other partners to focus on their synergies and not spend time drawing in a reluctant or under-performing partner, but recommend that taking the time to evaluate the merits of working towards bringing the disengaged partner on board can strengthen the collaboration.

Incentivising growth and evolution over time

Several cases presented stories that detailed difficulties keeping partners engaged throughout the consortium's work. It is understood that often partners might give attention to the consortium work at the outset, but that this could change as a project advances. Because partners in a consortium are likely to pursue other sources of funding or research activities outside of the partnership, the question of how to encourage them to remain engaged emerges. One frequently noted option for addressing this was by providing opportunities for "spin-off" partnerships and projects to emerge. Roughly half of the case studies conducted here advocated for opportunities for consortium members develop new collaborative enterprises that would then be supported in part by the funder organization. In particular providing funds to support collaborative activities that extend beyond the mandated goals of the consortium were seen as crucial. Two suggested opportunities were:

- Providing seed funds or small bursaries for enhanced collaboration was seen as a very good practice not only for encouraging members to stay engaged in the consortium, but also to encourage innovation and new knowledge production. Foremost of these is the opportunities that exist for networking among researchers and users.
- Consortia that offer unique partnerships between Northern and Southern researchers/users often create conditions for the evolution of networks that are more strongly connected to local policy contexts and have a better understanding of how to get work/research done on a local level. This is attractive to all members. This is also a unique opportunity for actors to gain new perspectives on research and policy, and to "get names on papers".

5. Conclusions

In this study, we have explored the potential contribution of boundary-spanning research consortia to complex global challenges like climate change. While all research consortia have different objectives and contexts within which they must operate, there are some insights to be gleaned from the experiences of the participants in this study that can inform their design and management. Overall, we found that the experiences highlighted from working in, managing or funding consortia centered around three themes: the process of knowledge co-construction; collaboration; and oversight or management of the partnership. The insights shared in this paper can be seen as contributing to an emerging body of research about best practices in boundary-spanning consortia. Key findings, and the cases in which they appeared, are summarised in Table 3 below:

Table 3: Summary of findings

Theme	Recommendations	Cases
Knowledge Co-production	Boundary spanning collaborations create opportunities to leverage a broader base of stakeholders	A; F; G
	Collectively identifying diverse backgrounds and potential conflict areas can broker understanding across settings	A; B
	Effective collaborative research entails paying as much attention to the process of knowledge production as its products	A
	Learning how to communicate, motivate and evaluate across boundaries is critical; methods for doing so are specific to context-specific, to be developed collectively	A; B; F
Working in Collaboration	Ensuring meaningful work and active participation can enable sustained commitment from a variety of collaborators	F; G
	Establishing a joint vision for the research, and understanding of the "why factor" are central to ensuring buy-in for participants	A; B; C; D; G
	Distributing the diverse expertise found in a boundary-spanning and geographically dispersed team brings more efficiency and effectiveness to a consortium	E; G
Oversight & Management	Indicators for success should be developed collaboratively to mitigate uncertainty in the context of changing management	D; F
	Management should consider how to assess 'big-picture' learning across collaborators when establishing goals and vision	D
	Under- or non-performance can be mitigated by establishing a strong sense of joint enterprise up front	B; G
	In cases of non-performance, partner and funder organizations should "stay in" as long as possible to support disengaged parties	G

Some conclusions from this study demonstrated a great deal of coherence among the responses from participants. Of note, participants declared the importance of establishing efforts to achieve "mutual engagement" through projects of "joint enterprise" when establishing successful consortia and other kinds of boundary-spanning collaborations. This is significant as strong on-boarding practices have not as yet been defined in the current literature, and while many studies have pointed to the importance of cross-disciplinary boundary work, there has been less said on efforts to bring stakeholders and participants "into the tent" as a vital practice in the establishment of a consortia as a community of practice.

This study sought to identify not only lessons learned and emergent practices for research and action addressing issues related to climate change, but also questioned whether consortium-based research on climate change adaptation demanded new approaches to research and interaction. As a complex, uncertain and "wicked" problem climate change adaptation is thought to require a movement away from traditional incremental approaches to research, and move towards reflective approaches that question the underlying assumptions about the problem (O'Brien 2012). The results of this study support this suggestion, but rather than being a property of climate change adaptation specifically, we suggest that the practices put forth across these case studies are in line with other trans-disciplinary and policy-relevant areas of research in general, particularly those seen as "wicked" and being addressed at scale. Many of the insights gained from this study reflect similar lessons about working on complex, uncertain problems within distributed consortia on other issues, such as health (c.f. Green et al. 2005). This presents important opportunities for collaborative research on climate change to draw on existing models of practice from outside of the field.

As part of a broader trend toward post-normal approaches to science, along with strategies for dealing with complex multifactorial problems in health care, climate change adaptation work is increasingly moving towards efforts to transition from the traditional 'researcher as authority' model to a more distributed effort at knowledge construction and research interactions. The results of this study point towards this trend, and highlight the importance of continuing to learn about performance in boundary-spanning research.

References

Australian Public Service Commission, 2007. Tackling wicked problems: A public policy perspective, Commonwealth of Australia.

Beaulieu, N., 2010. Evaluation as an integral part of climate change adaptation in Africa. International Development Research Centre, International Development Research Centre. Available at: http://www.idrc.ca/EN/Documents/Beaulieu-evaluation-as-integral.pdf.

Brandetter, L. & Sakakibara, M., 2002. When Do Research Consortia Work Well and Why? Evidence from Japanese Panel Data. American Economic Review, 92(1), pp.143–159.

Cash, D.W., Adger, W.N., Berkes, F., Garden, P., Lebel, L., Olsson, P., Pritchard, L., Young, O., 2006. Scale and Cross-Scale Dynamics: Governance and Information in a Multilevel World. Ecology and Society, 11(2), p.8.

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.

Cundill, G., Lotz-Sisitka, H., Mukute, M., Belay, M., Shackkleton, S., Kulundu, I., 2013. A reflection on the use of case studies as a methodology for social learning research in sub Saharan Africa, NJAS-Wageningen Journal of Life Sciences.

Datta, A., 2012. Deliberation, Dialogue and Debate: Why Researchers need to Engage with Others to Address Complex Issues, IDS Bulletin 43 (5), 9-16.

Dodgson, M., Mathews, J. & Kastelle, T., 2006. The evolving role of research consortia in East Asia. INNOVATION: management, policy & practice, 8(1), pp.84–101.

ECB, 2013. What We Know About Collaboration: the ECB Country Consortium Experience, Emergency Capacity Building Project. Available at: www.ecbproject.org/consortium/guide.

Fisher, C. & Harvey, B., 2012. Behind the Scenes at a Climate Change Knowledge Sharing Network: IDS Insights from Phase One of AfricaAdapt, (No. 402), IDS Working Papers.

Funtowicz, S.O. & Ravertz, J.R., 1991. A new scientific methodology for global environmental issues. Ecological economics: The science and management of sustainability, pp.137–152.

Greene, S.M., Hart, G. & Wagner, E.H., 2005. Measuring and improving performance in multicenter research consortia. JNCI Monographs, 35, pp.26–32.

Harvey, B., Negotiating openness across science, ICTs and participatory development: Lessons from the AfricaAdapt network. Information Technologies & International Development, 7(1), p.19-31.

Hirsch Hadorn, G., Bradley, D., Pohl, C., Rist, S., Weismann, U., 2006. Implications of transdisciplinarity for sustainability research. Ecological Economics, 60(1), pp.119–128.

Knorr-Cetina, K., 2007. Culture in global knowledge societies: Knowledge cultures and epistemic cultures. Interdisciplinary Science Reviews, 32(4), pp.361–375.

Knorr-Cetina, K., 1999. Epistemic Cultures, Cambridge, MA: Harvard University Press.

Kristjanson, P., Harvey, B., Van Epp, M., Thornton, P.K., 2014. Social learning and sustainable development. Nature Climate Change, 4, pp.5–7.

Kuhn, T.S., 1970. The structure of scientific revolutions 2nd ed., Chicago: University of Chicago Press.

Lang, D.J., Wiek, A., Bergmann, M., Stauffacher, M., Martens, P., Moll, P., Thomas, C.J., 2012. Transdisciplinary research in sustainability science: practice, principles, and challenges. Sustainability science, 7(1), pp.25–43.

Lave, J. & Wenger, E., 1991. Situated learning: Legitimate peripheral participation, Cambridge, UK: Cambridge University Press.

Lonsdale, K.G., Gawith, M.J., Johnstone, K., Street, R.B., West, C.C., Brown, A.D., 2010. Attributes of Well-Adapting Organisations, Available at: http://www.ukcip.org.uk/wordpress/wp-content/PDFs/UKCIP_Well_adapting_organisations.pdf.

Lonsdale, K.G. & Goldthorpe, M., 2012. Collaborative research for a changing climate: Learning from researchers and stakeholders in the ARCC programme, Oxford, UK: Adaptation and Resilience in a Changing Climate Coordination Network, UKCIP.

Loumbeva, N., Salokhe, G., Kolshus, K., Lamoureux, L., 2009. Report of the Review of the Pilot Phase of FAO Thematic Knowledge Networks. KCEF and KCEW, Available at: ftp://ftp.fao.org/docrep/fao/012/ak992e/ak992e00.pdf.

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

Miles, M. & Huberman, M., 1994. Qualitative Data Analysis: A Sourcebook of New Methods, Beverly Hills, CA: SAGE Publications.

O'Brien, K., 2012. Global environmental change II From adaptation to deliberate transformation. Progress in Human Geography, 36(5), pp.667–676.

Paas, L. & Parry, J.-E., 2012. Understanding communities of practice: An overview for adaptation practitioners, Adaptation Partnership. Available at: http://www.adaptationpartnership.org/resource/understanding-communities-practiceoverview-adaptation-practitioners.

Pielke, R.A., 2007. The honest broker: making sense of science in policy and politics, Cambridge, UK: Cambridge University Press.

Snowdon, D.J. & Boone, M.E., 2007. A leader's framework for decision making. Harvard Business Review, 85(11), p.68.

Stake, R.E., 2006. Multiple case study analysis, New York: Guilford Press.

Turnpenny, J., Jones, M. & Lorenzoni, I., 2011. Where now for post-normal science?: a critical review of its development, definitions, and uses. Science, Technology & Human Values, 36(3), pp.287–306.

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(3), pp.347–358.

Tushman, M.L., 1977. Special boundary roles in the innovation process. Administrative Science Quarterly, pp.587–605.

Wagner, E.H., Greene, S.M., Hart, G., Field, T.S., Fletcher, S., Geiger, A.M., Vogt, T.M., 2005. Building a research consortium of large health systems: the Cancer Research Network. JNCI Monographs, 35, pp.3–11.

Wenger, E., 1998. Communities of practice: Learning, meaning, and identity, Cambridge, UK: Cambridge University Press.

Wuesler, G., Pohl, C. & Hirsch Hadorn, G., 2012. Structuring complexity for tailoring research contributions to sustainable development: a framework. Sustainability Science, 7(1), pp.81–93.

Yin, R.K., 2003. Case study research: Design and methods, SAGE Publications.

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