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The changing role of NGOs in supporting climate services

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This report examines the evolving role of non-governmental organisations (NGOs) in the production, communication and uptake of climate information. In particular, we focus on NGOs' roles as knowledge brokers and intermediaries and how these contribute to the overall effectiveness of the climate services value chain in developing countries.



KEY MESSAGES

- Climate services play a key role in supporting the resilience of people and communities but continue to be inaccessible to large numbers of climate-vulnerable people. Through programmes like BRACED, NGOs are increasingly taking on intermediary roles, helping users to acquire, understand, value and consider climate information within their decision-making processes.
- There is a risk, however, that NGOs will make uncoordinated attempts to move into the climate services sector, while national meteorological and hydrological agencies are also being tasked to be more user-driven.
- To maximise the potential of NGOs to contribute positively to climate services, we propose five areas of interaction and engagement to help to address these risks. These are: improving knowledge sharing; enhancing coordination on planned activities; enhancing collaboration across systems and scales; focusing on knowledge co-production; and emphasising learning processes. These areas require new actions from not only NGOs, but also national meteorological and hydrological agencies, national and local governments, and international funders.

INTRODUCTION

Climate services play a key role in supporting the resilience of people and communities (Hewitt et al., 2012; Vaughan and Dessai, 2014; Tall et al., 2014). Recent progress in our scientific understanding of the climate system and forecasting capacities has improved the utility of climate information considerably. However, despite major technological improvements, heightened investment and a clear demand for better climate information services, many existing systems in developing countries have not effectively delivered high quality and usable information services to the people who most need them. Growing recognition of the importance of expanding access to locally-appropriate services has led NGOs to play an increasing role as brokers and intermediaries of climate information (Guido et al., 2016). In principle, this trend recognises and capitalises on many of the advantages that development NGOs often possess. This includes their close engagement with individuals and communities, along with their ability to

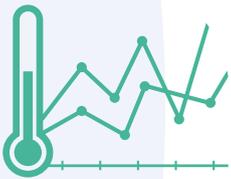
facilitate interactions between scientists, decision-makers and local communities.

In this report, we examine the evolving influence of NGOs in the production, communication and uptake of climate information and seek to assess its implications. In addition, we explore the growing influence of what we term the 'resilience agenda' on the changing role of NGOs, particularly the push for climate services to be an integral tool for resilience-building. To explore this further, the report draws on a review of the literature related to climate services, knowledge brokers and intermediaries, and the resilience agenda. It also reflects on early experiences from the Building Resilience and Adaptation to Climate Extremes and Disasters (BRACED) programme. We conclude with a series of recommendations and questions for further research on the changing role of NGOs in the delivery of climate services, recognising the interactions with, and importance of, other development actors, such as funders, National Meteorological and Hydrological Services (NMHSs) and governments.

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RECENT TRENDS IN THE DEVELOPMENT OF CLIMATE SERVICES



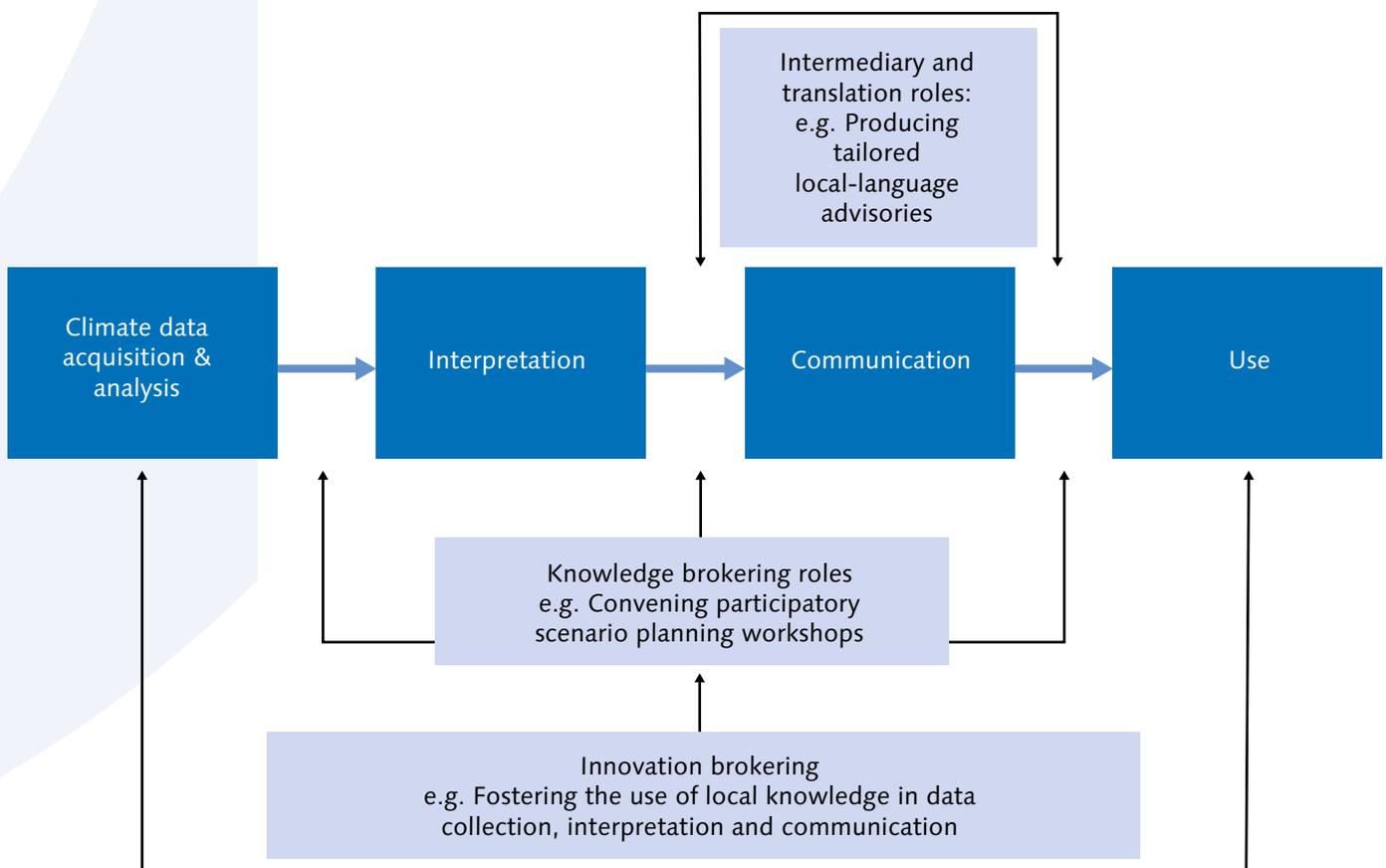
Climate services are a key factor in ensuring that relevant information is guiding strategies to cope with and adapt to climate variability and change

The welfare of people and societies is increasingly linked to their ability to manage risks and opportunities related to a changing climate (Hewitt et al., 2012). With this in mind, climate services are a key factor in ensuring that relevant information is guiding strategies to cope with and adapt to climate variability and change (Tall et al., 2014).

The concept of climate services refers to the generation, provision, and contextualisation of information and knowledge derived from climate research for decision-making at all levels of society (Vaughan and Dessai, 2014). Importantly, climate services constitute the full range

of activities and actors involved in, on the one hand, climate research and the production of climate information, through to the translation, provision and uptake of information among relevant decision-makers on the other. To illustrate this, the boxes in Figure 1 describe the steps involved in the delivery of a public weather service, including their links to valuable brokering and intermediary roles (see Table 1 for more detail). These roles can help to 'move' climate information through the various stages of the value chain, rendering it more tailored for use in particular contexts, while providing feedback loops to inform actors further up the chain.

Figure 1: Brokering and intermediary roles in the climate services value chain



Source: Adapted from CARE (2016).



The process of developing climate services has evolved substantially over the past few decades. Improvements in observational technology, statistical methods and high-performance computing have significantly boosted our understanding of the climate system. Such advancements have helped enhance weather and seasonal-to-interannual forecasting capabilities and the refinement of long-term climate projections (Vaughan and Dessai, 2014). For example, we now have a far greater ability to forecast important variables such as mean sea-level pressure (an indication of past and near-term locations of surface weather systems). As a result of these improvements, four-day forecasts issued in 2014 were on average equivalent in accuracy to a one-day prediction issued in 1980 (UKMO, 2016). Early warning systems – particularly those in relation to flood, drought and cyclone hazards – now play an increasing role in support of disaster risk management measures, providing decision-makers with added time to prepare for and anticipate the location and extent of extreme weather events. From a longer-term perspective, seasonal outlooks and climate predictions allow planners to

consider the implications of phenomena such as El Niño or the impact of gradually increasing temperatures on infrastructure and investments.

While such improvements are no doubt useful for decision-makers, it is also clear that the quality of climate services vary considerably. Countries in Europe and North America have long histories of investment in the skills, technologies and human resources needed to support effective climate services. Conversely, many African and Asian countries lack the basic observational infrastructure needed to gain an accurate understanding of historical climate trends. Many developing countries are also heavily reliant on the ability of Regional Climate Centres and Regional Climate Outlook Forums to provide tailored early warning information and seasonal outlooks, which are subsequently fed down to NMHSs (Jones et al., 2015).

Another significant evolution within the architecture of climate services relates to communication, outreach and engagement. Inadequate quality of infrastructure, investment and institutional

Box 1: Characterising climate knowledge brokers

Climate knowledge brokers help ensure that those who need to take climate sensitive and climate-related decisions have access to the best available knowledge. They act as filters, interfaces and translators between climate knowledge producers and users, across different disciplines, fields and sectors. They also employ a range of methods and communication approaches to meet their diverse users' needs (CKB, 2015). Brokering encompasses a range of intermediary activities that enable access to information, support sense-making or interpretation, bolster the use of knowledge, or foster innovations in using information. These are sometimes framed as a spectrum of brokering functions (see Shaxson et al., 2012 and Hammill et al., 2013). Brokers often work across traditional disciplinary or professional boundaries, helping build connections between scientific research and relevant policy contexts or fields of

professional practice. Knowledge brokering can be distinguished from traditional communications approaches, where information is simply 'pushed' towards often vaguely-defined audiences. Instead, it aims to mediate between the supply of evidence and the demand for evidence or information to assist in decision-making.

Knowledge brokers can be individuals, teams or organisations. They frequently play these roles without being formally identified as brokers (Bielak et al., 2008). While perspectives in the literature vary, we take the position that brokers may either be a) located 'in between' knowledge producers and users (i.e. not formally tied to generating climate information or user communities) or b) playing these roles from within these functions, such as knowledge brokering roles situated within a national Met office.

capacity are frequently compounded by the deficient communication of services across different actors. Despite the clear need for engagement across all stakeholders involved in delivering climate services, it is also evident that 'in many cases, the connections between climate information users and providers is weak or non-existent' (Vaughan and Dessai, 2014). This has significant implications in the context of development and humanitarian response. For instance, in the case of seasonal forecasts for smallholders in sub-Saharan Africa, ineffective information provision means 'those with the greatest potential to benefit from seasonal climate forecasts may be least able to realize those benefits.' (Archer, 2003: 1525). In instances where connections do exist, climate information is often poorly tailored to decision-making needs. This is due, in large part, to a limited

understanding of needs and constraints in local contexts. For example, the inappropriate translation of key climate terms can lead communities to ignore advice from early warning systems. An example of this was seen in the Philippines during Hurricane Haiyan, when the use of the term 'storm surge' led local people to underestimate the impacts of the typhoon (Wilkinson et al., 2015). The recognition of this shortfall has led to a considerable amount of energy in the past few years being spent on promoting greater engagement between producers and users of climate information (Dilling and Lemos, 2011; Lewis and Buontempo, 2016):

Climate scientists and service providers now strive to work closely with sectoral experts, practitioners, and policy makers in a process of joint problem solving. In theory at least, the 'co-production' of

climate services leads to services that are more effective, more usable, and more suited to user's needs. (Vaughan and Dessai, 2014)

This focus on engagement and interaction has led to an increasing need for knowledge brokering and intermediary roles. These roles have a number of functions related to the links between climate information production and use (See Box 1 and Table 1). The primary purpose of brokerage and intermediary roles has been to help users acquire, understand, value and consider climate information within their decision-making (Hamill et al., 2013). This can often involve tailoring and translating technical information in formats that are easier to understand, along with also encouraging decision-makers to use climate information in policy-making and planning, as well as appropriately communicating the levels of certainty regarding the information in question (Ambani and Percy, 2014).

Other important roles for intermediaries and brokers include:

- mediation between different research disciplines
- facilitation of knowledge exchange between formal and informal knowledge providers
- communicating user needs back to the producers of climate information (and in some cases actively involving them in its production) (Feldman and Ingram, 2009).

The links between brokering and intermediary roles, and steps along the climate services value chain are highlighted in Figure 1. Evidence suggests that intermediaries can increase the positive impact of climate information services on local level resilience. For example, they can work with users and local communities to improve the usability of seasonal forecasts, translating them into formats that are more accessible and relevant to farmers (Wilkinson et al., 2015).



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CLIMATE SERVICES AND THE RISE OF THE RESILIENCE AGENDA

Over the past 10 years, resilience has risen rapidly to the top of the global development agenda (Bahadur et al., 2013). Resilience relates to the capacity of a system – whether a household, community or country – to manage change, either through maintaining the same basic structure and ways of functioning, or adapting and transforming to new risks and opportunities (DFID, 2011). Béné et al. (2016) argue that the popularity of resilience in development circles can be attributed to its power as a 'mobilizing metaphor', across different

fields of practice to bridge near-term response and longer-term development interventions, also capturing complex systems dynamics. The concept has been applied across a large number of disciplines for a range of purposes, partly due to its growing popularity amongst donors. It is therefore not surprising that the term suffers from a lack of clarity in its definition and application (Bahadur et al., 2013).

Climate services, as a whole, have been endorsed by many development

organisations as a valuable tool in supporting resilience-building activities. Reasons for this are manifold, but relate primarily to the potentially strong role of climate information in equipping decision-makers to understand and plan for the multiple risks that are likely to be faced by people and communities both now and in the future (Rogers and Tsirkunov, 2013). Importantly, not only is resilience considered a key pillar of many recent global development frameworks, but each has championed the role of climate services in building the resilience of vulnerable people and communities (see Box 2). For example, resilience is listed within two of the 17 United Nations Sustainable Development Goals (SDGs) and at least eight of the individual targets listed within them. Alongside this, resilience features prominently within the United Nations Framework Convention for Climate Change (UNFCCC) Paris Agreement and the United Nations Office for Disaster Risk Reduction (UNISDR).

Global scientific coordination efforts and commitments, such as the Global Framework for Climate Services (GFCS) have also taken on the challenge of pushing climate services further up the political agenda. That has, in part, been buoyed by the momentum behind the resilience agenda. Delivered through the World Meteorological Organisation, GFCS aims to support more effective incorporation of science-based climate information and prediction into planning, policy and practice on the global, regional and national scales. Each member is also encouraged to develop their own National Frameworks for Climate Services that act as a mechanism for facilitating the development and delivery of climate services in-country. These, along with other platforms such as the Climate Services Partnership and African Ministerial Conference on Meteorology, serve to showcase the utility of weather and climate services as a tool for resilience-building. They also press national governments, donors and other development actors to invest in the infrastructure and policies needed to roll out effective climate services at the national level.

Box 2: References to climate services and early warning systems within three global development frameworks

'Improve education, awareness raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction, and early warning' **Target 13.1 SDGs** (UN, 2015).

'Parties should strengthen their cooperation on enhancing action on adaptation, taking into account the Cancun Adaptation Framework, including with regard to: Strengthening scientific knowledge on climate, including research, systematic observation of the climate system and early warning systems, in a manner that informs

climate services and supports decision-making.' **Article 7(7a) Paris Agreement** (UNFCCC, 2015).

'Enhance the development and dissemination of science-based methodologies and tools to record and share disaster losses and relevant disaggregated data and statistics, as well as to strengthen disaster risk modelling, assessment, mapping, monitoring and multi-hazard early warning systems' **Priority 1 (25.a) Sendai Framework for Disaster Risk Reduction** (UNISDR, 2015).

THE CHANGING ROLE OF NGOS IN SUPPORTING CLIMATE SERVICE DELIVERY

In assessing the current literature and observing recent trends within the climate and development communities, it is clear that the perceived relevance of climate services among funders and development NGOs is increasing. As the pressure to support resilience-building activities in a changing climate mounts, climate information and climate services can be expected to play ever more prominent roles. It is therefore critical to consider the benefits and limitations of NGOs' changing roles in supporting the delivery of climate services.

How has the resilience agenda changed the roles of NGOs in climate service delivery?

With rises in both the interest in resilience-building and delivery of climate services within the international development community, there has been a rapid expansion in the range of activities delivered under their banners, with new actors and approaches being brought in as a result. NGOs have been keen to demonstrate the impact that their existing development activities play in supporting the resilience of people and communities in the face of changing risks. In many ways, common NGO-led activities, such as social protection schemes, livelihood diversification programmes and asset creation projects, can be seen as resilience-building programmes; in some cases, NGOs have re-framed their activities as resilience-oriented in recognition of the attention that resilience receives within the donor community (Hussain, 2013).

Given these links, large resilience-oriented donor funded programmes, including the BRACED programme, are seeking to leverage the networks, influence and impact that NGOs have in supporting resilience-building activities at the community scale in developing countries. Indeed, NGOs within BRACED, and beyond are increasingly seeing climate services as an integral part of supporting resilience at local and national levels and, as such, are increasingly seeking to play a role in their development and delivery. This includes a number of different NGO-led roles and functions in line with Figure 1 and Table 1:

- collecting observational climate data
- linking local communities (and traditional knowledge of local climates) with producers of climate information
- translating technical climate information into local languages and non-technical formats
- communicating weather, climate and early warning information amongst beneficiaries
- explaining the levels of uncertainty inherent to the climate information in question
- supporting the uptake of climate information in local and national decision-making.

At the same time, NMHSs have also expanded beyond their traditional remit of providing national level weather information to begin to provide similar services to user groups. This has happened not only partly in response to their diminishing capacity in their conventional roles (Frankenburger, 2014), but also in an aim to provide more user-driven

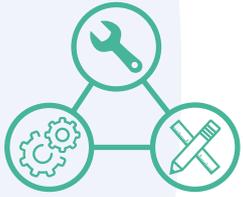


information (Lewis and Buontempo, 2016). It is also in response to new funding windows aimed at strengthening climate services for development in Africa and Asia. Thus, two sets of actors are converging upon a relatively new space; the extent to which this convergence leads to improved quality and coverage of climate services depends in part on the way these dynamics build effectively on one another. The implication of these shifting roles on how climate services are delivered, as well as how they might contribute to sustainable development outcomes, is an area that has not received sufficient attention within the academic literature.

While it is clear that the climate services community has pushed for greater cross-disciplinarity and bottom-up engagement in the delivery of climate services for some time (Vaughan and Dessai, 2014), the prominence of the resilience agenda has undoubtedly accelerated this shift. Funders are increasingly supporting large multi-million dollar initiatives, such as DFID's BRACED and the multi-donor Global Resilience Partnership, while investments in climate services are seen as an effective tool for resilience-

building. It is also the case that the integration of climate services into activities, such as social protection or livelihood programmes, is seen by many development actors as an easy way of bridging the resilience agenda with wider development approaches – often the mainstay of NGOs. Given the prominent role of NGOs in the delivery of donor-supported resilience activities and active engagement in defining, operationalising and promoting resilience, it is perhaps of little surprise that NGOs have become increasingly involved in the delivery of climate services as a result. Their influence and reach, as well as experience in delivering local-level interventions, are attributes that many funders are keen to exploit in supporting climate resilience. A large emphasis on Information Communication Technologies (ICTs) and data-driven solutions as part of the SDGs and other resilience-related frameworks has also brought interest in the use of technological solutions to expand communication and use of climate information to support resilience. The trajectory of the resilience agenda – both in political and financial terms – is therefore likely to have large knock-on impact on the delivery of climate services

(and the role of NGOs in supporting it). This will require careful consideration by donors, NGOs and NMHSs alike.



NGOs bring new perspectives, skills and resources that other actors may not possess, particularly in relation to user groups that NMHSs have traditionally struggled to reach

NGO roles and functions in climate service delivery

NGOs play a diverse range of roles in support of climate services. Many of these – such as the production of guidance and support materials indicating how climate information can be used in local decision-making processes – have long been the mainstay of NGOs. In many ways, they build on and complement the supportive function of NGOs in other related sectors such as healthcare, education and the provision of basic services. However, other functions, such as translating climate information and acting as advisory and/or agricultural extension services, may be less familiar to NGOs.

Building on existing knowledge brokering typologies (Shaxson et al., 2012, Hammill et al., 2013), Table 1 highlights the wide range of roles and functions played by NGOs. Seven distinct roles are identified: Knowledge producers; Knowledge brokers; Innovation brokers; Knowledge translators; Consumers of climate information; Policy advocates and information intermediaries. While each role is distinct, it is important to bear in mind that there may be overlaps in each of the classifications. For example, many of the activities involved in knowledge brokering (i.e. supporting better understanding and use of information) require NGOs to act as translators (i.e. making that information available in languages and formats that can be readily understood by users). Thus, the framework is designed to provide a simple way of grouping each of the core roles played.

NGOs bring new opportunities, but require new skills and capacities

The expansion of NGO activities into new knowledge brokering and intermediary roles is widely seen as important and welcome. NGOs bring new perspectives, skills and resources that other actors may not possess, particularly in relation to user groups that NMHSs have traditionally struggled to reach. In many African and Asian countries, NGOs are in a position to provide those functions that are currently poorly met by national governments. Yet, given the rapid nature of this transition and increasing competition among NGOs to compete for donor funding related to climate services, a certain degree of caution is also warranted. In particular, there is a need to ensure that NGOs possess adequate and sustained technical and resourcing capacities. This applies to all aspects of the boundary functions that NGOs are expected to play – from the production of climate information through to brokering and communication. In some contexts, questions have been raised around the ability of NGOs to provide necessary support, particularly in research and technical services related to climate change (Tilstone et al., 2013). It is clear, however, that NGOs have made strides in recent years to develop their technical capacities to support and deliver climate services. The increasing influence of the Red Cross Red Crescent Climate Centre – a reference centre for information and technical guidance for the International Federation of Red Cross and its national societies, as well as the wider development community – is one such example. In addition, most large international NGOs (INGOs) now recruit specialist climate, disaster and/or resilience advisors who are well-versed in the technical details of climate service delivery.

Table 1: Roles and functions performed by NGOs in support of climate services

Category	Role	Key functions	Details/examples
Knowledge producers	Producing knowledge and information relevant for decision-making	Supporting observational climate information	Provision of resources and training to support the collection of rainfall and temperature data in remote areas or areas not covered by weather stations
		Supporting further research	Carrying out and/or funding research comparing community observations of historical trends against available data
Knowledge brokers	Enhancing understanding and use of knowledge in decision-making and fostering co-production	Encouraging learning and knowledge sharing	Supporting learning and feedback loops within the development and communication of climate information, as well as between actors in different fields
		Convening and facilitating collective interpretation and co-generation of knowledge	Facilitating workshops and meetings between producers and users of climate information
Innovation brokers	Influencing the wider context to enable innovation in climate services	Encouraging innovation in how climate information is produced and used	Documenting and communicating the value of non-specialist knowledge sets such as indigenous knowledge in the production of seasonal forecasts
Knowledge translators	Making knowledge accessible and actionable	Translating knowledge	Translating seasonal forecasts into local languages and communicating technical information into easy to interpret formats
		Advisory/extension services	Acting as technical experts on the interpretation and use of climate information for local beneficiaries
		Development of user guidance tools	Producing tools kits for how climate information can be used in national and local decision-making processes
Information intermediaries	Ensuring the information is accessible	Communicating early warning information to beneficiaries	Providing early warning to local beneficiaries through the networks and technologies available
		Knowledge repositories	Hosting knowledge portals to ensure that climate information (in various formats) can be more readily accessed
Consumers of climate information	Incorporating information into decision-making	Guiding humanitarian response	Supporting better targeting of relief efforts in the aftermath of a disaster event
		Integrating into NGO decision-making	Using climate information to inform the operational and programmatic operations of the NGO
Policy advocates	Encouraging changes in policy and decision-making	Promoting the uptake of climate services into decision-making	Lobbying and supporting communities, local governments, national governments to use weather and climate information as part of their decision and planning processes
		Representing the needs of different stakeholders	Communicating and representing the needs of different stakeholders at relevant forums – whether local communities, civil society actors or technical experts

Note: Shaded areas indicate brokering and intermediary functions.

The importance of NGO technical capacities is particularly relevant when considering the trust they inspire and legitimacy they are afforded through long-term engagements and consultation with local actors (Banks and Hulme, 2012; Gemmill and Bamidele-Izu, 2002). In certain contexts, trust in NGOs can be higher than that of other actors, including government, academia and the private sector. If local communities and beneficiaries start to incorporate climate information into decision-making processes on the basis of the advice and trust of NGOs, these organisations bear added responsibility to ensure that information is relevant, tailored and conveyed appropriately. Perhaps the largest challenge in this regard relates to the communication of uncertainty. Many NGOs play a crucial role in supporting the translation of technical climate information into local languages and easier-to-understand formats. Yet the communication of uncertainty in seasonal and climate projections is an especially difficult task for scientists, let alone non-specialists (Pidgeon and Fischhoff, 2011). NGOs are well placed to support the improved translation of climate information, but they similarly require adequate technical capacity and investment in the two-way exchange of information between producers and users of climate information. This is necessary to ensure that disseminated information adequately reflects underlying data.

Given the trade-offs between preserving technical detail and seeking simplicity in terms of understanding, a large number of value judgements are also required. However, these are rarely made explicit in the final communication of information. CARE's Adaptation Learning Platform and the Oxfam-led ACCRA programme's partnership with the Uganda National Meteorological

Agency are examples of initiatives where NGOs have been particularly effective: acting as intermediaries to bring together NMHSs, civil society and local beneficiaries to develop trust in the value of each others' information and enabling coordination and communication thereafter (see Box 3 for more examples of NGOs' roles as brokers and intermediaries). However, these same examples underscore the time and resources needed. Both require considerable relationship building between different stakeholders, as well as continuous refinement to get the process right.

NGOs are extending and replacing the roles of others

One of the principal advantages of NGO support for climate services is the opportunities this unlocks. Unlike some NMHSs and government extension services traditionally responsible for the communication of climate information, NGOs tend to be more willing to experiment with new technologies and provide innovative solutions to communication and outreach challenges. For example, NGOs have been at the forefront of using ICT and other communicative technologies, such as local radio broadcasting of weather information and SMS alerts. Others, like the Red Cross Red Crescent Climate Centre, have pioneered the use of participatory 'serious games' and use immersive theatre and music to raise awareness of the benefits of embedding climate information into decision-making (Suarez et al., 2012). Many have also gained experience from the application of early warning alerts in other related sectors, such as the 2014 Ebola crisis in West Africa and, more generally, from disaster risk reduction and humanitarian initiatives. In addition, part of the reason for NGO's

Box 3: Examples of NGOs as brokers and intermediaries within climate services in Kenya

In arid regions of Kenya, predicting the climate is crucial for livelihood security, and traditional ways of forecasting are getting harder. To help combat this, DFID Kenya is supporting the Adaptation (Ada) Consortium, which is led by the International Institute of Environment and Development (IIED), and is comprised of NGO partners Christian Aid, Anglican Development Services (ADS), the Resources Advocacy Programme (RAP) and Womankind Kenya, Kenya Meteorological Services (KMS) with the UK Met and the University of Sussex, with the project secretariat being based within the National Drought Management Authority (NDMA). The objective of the project is to deliver improved climate and weather services for five of Kenya's most arid counties, alongside the establishment of decentralised adaptation funding. Meanwhile, the UK Met Office's work is focused specifically on improving existing regular weather and climate information, which is produced by KMS on seasonal timescales. It also monitors the initiative and evaluating possibilities for rolling out the scheme across the region.

CARE's Adaptation Learning Programme (ALP) uses Participatory Scenario Planning (PSP) to understand the climate information services value chain. PSP enhances scientific climate forecasts by combining with local past and future

climate knowledge, and therefore has a strong emphasis on being accessible to whoever needs it. ALP has facilitated development of sub-national multi-stakeholder forums comprised of meteorological services institutions, communities, relevant government sectors, NGOs and community-based organisations (CBOs). It collectively interprets seasonal forecasts and probabilities into potential risks, to develop local livelihood and sector specific seasonal advisories. These are then communicated to users through agreed local channels, thus enabling better decisions across sectors and ensuring learning loops to feed information up and down the chain. In Kenya, the PSP method has helped local communities make better agricultural decisions by facilitating consideration of the different types and varieties of crops that respond to different levels of risk. In particular, key decisions about what crop to plant and how much to plant in order to mitigate risk have been made easier by the PSP tool. The PSP approach has been scaled up across all 47 counties in Kenya and been recognised as a key tool for the Kenya Meteorological Department in decentralising its services.

For more information on Ada see: <http://www.adaconsortium.org/>; for ALP see: <http://careclimatechange.org/our-work/alp/>

enthusiasm for trialling new engagement and outreach methods may be down to funding modalities: NGOs typically have to showcase new solutions to weather and climate challenges and propose ways of reaching impact at scale in order to compete for limited donor funding.

While NGOs have helped support the expansion of climate services in many

African and Asian countries, doing so has sometimes brought added pressures on other actors in national climate service systems. For instance, the increased desire for climate information to be included in NGO programming and decision-making, along with the active role that NGOs are playing in the communication of weather and climate services, has put additional pressure on NMHSs. Few NGOs



As NGOs take on new roles in translating, brokering and communicating climate information, there is a need to assess areas in which they are adding value in doing so

produce their own climate information and are reliant on global, regional and national meteorological services to provide them with necessary data and technical support. In many African and Asian countries, NMHSs have few resources and are critically understaffed (Ziervogel and Zermoglio, 2009). With increased pressure, NMHSs are starting to show signs of being overstretched and strained in some countries. Further, increased demand for localised data has the potential to reinforce the practice of payment for access to some types of climate information – as is the case in a number of African and Asian NMHSs (Curry, 2001). While this may present a viable means of providing critical finance to NMHSs, such paywalls are a barrier to the free and publicly accessible climate information that is the mainstay of so many effective climate services.

Another issue to consider is the potential for NGOs to find themselves in competition with conventional climate outreach and extension services. If managed and incentivised effectively, it is certainly possible for NGOs to build on the core remits of NMHSs or fill in key capacity gaps through collaborations, as in the case of ADA (see Box 3). However, not all climate services projects have such a comprehensive mix of stakeholders integrated into project design. Indeed, if each NGO resilience-building project did so, it is difficult to see how NMHSs in many African and Asian countries could provide the staff, resourcing and attention required to contribute meaningfully. With an increasing number of NGOs set to enter the climate services domain, there is a notable risk of not only duplicating efforts but creating parallel roles that compete with those typically mandated to NMHSs. As NGOs take on new roles in translating, brokering and communicating climate information, there is a need to

assess areas in which they are adding value in doing so, where they may be in danger of creating disjuncture with existing activities or, alternatively, where they may be communicating conflicting advice to user groups.

Given high levels of access in some areas, NGOs are increasingly using their networks to contextualise, translate and deliver climate information to beneficiaries. They have a significant reach in many developing country contexts, so building on their legitimacy will no doubt encourage more people and decision-makers to use climate information in their work. However, this places considerable responsibility on NGOs to ensure their translation of information is technically accurate and fully communicates the uncertainties associated with climate information – failure to safeguard this can increase exposure to risk and promote maladaptation (Vaughan and Dessai, 2014). This is particularly the case in countries where NMHS's have limited capacity to perform outreach activities and may see their roles supplanted by NGO activities. Indeed, the implications of the shifting role of NGOs in delivering climate services – both positive and negative – have yet to be thoroughly explored within the academic literature.

There is a need to improve coordination of climate services

With the above in mind, one of the key challenges presented by the expansion of NGO roles in climate service delivery is coordination (Tall et al., 2014). Few countries – developed or developing – have the institutional arrangements needed to adequately record, monitor and manage the broad range of climate service activities conducted across government, civil society and academia. In addition,

there is often limited investment made into documenting NGO climate-related activities centrally, making it difficult to track which organisations are working where, with whom and doing what. NGOs may be reporting to any one of the large number of international donors funding resilience-building and climate service provision. This further compounds the challenge of ensuring NGO activities are well coordinated. A number of countries have taken the step of organising national (and, in some cases, local) working groups related to disaster risk reduction, resilience and adaptation. Often, these also serve as inputs for tracking progress in relation to the many formal international agreements, such as the SDGs, the Sendai Framework for Disaster Reduction, and the Paris agreement on climate change. Though far from comprehensive, these agreements do support key stakeholders from across government, civil society and academia and enable them to share planned activities. In addition, these bodies tend to play an important role in knowledge sharing and communicating best practices in the delivery of climate services.

While efforts to coordinate NGO activities are on the rise and improving, it is worth noting that there are currently few mechanisms to guarantee quality of climate service interventions at the local level. It is common for scientists to periodically evaluate whether forecasts are valid.* In contrast, few quality assurance mechanisms exist for the communication

of climate information amongst knowledge brokers and intermediaries. If anything, the standardisation which lends credibility to national-level forecasts may partly explain the initial reluctance of some NMHSs to consider other forms of communicating technical climate information as these may be more difficult to evaluate and there is potential for misinterpretation of the uncertainties associated with probabilistic forecasts. Challenges may also emerge in cases where NGOs seek to support or directly disseminate early warnings and provide advisory services, given the implications of potential negative consequences arising from actions taken. A number of NGOs have tried to bring NMHSs and local communities together to agree on the terminology and content of disseminated climate information, including county-level participatory scenario-planning exercises run by the ADA consortium. However, these activities are rare and depend on the interests and capacities of respective NGOs. In addition, little research has been conducted into the interpretation, use and uptake of the translated climate information disseminated by NGO-supported activities and consortia in developing country contexts. The importance of this is crucial, given the potential for misinterpretation and maladaptation, raising issues of liability and questions of who is responsible when people act in the face of information deemed to have been poorly communicated or inaccurate.

* It is worth noting, however, that this is rarely done openly by NMHSs, and NGOs may have a role to play in encouraging them to validate their forecasts and make the results public.

CONCLUSIONS

This review has examined the growing importance of climate information services in the context of climate resilient development. Growing demand for –

and investment in – climate services has prompted increasing involvement of NGOs in a range of roles within the climate services 'value chain'. In particular,

NGOs have assumed important roles as brokers and intermediaries for climate information. These roles capitalise on their strong links to communities and vulnerable populations, to engage them in the production, interpretation and use of climate information. The pace of these transitions – linked in part to resources that increasingly flow into programming aimed towards building resilience – has contributed to uneven and sometimes poorly coordinated efforts to strengthen these services. While more work is needed to better understand both the positive and negative impacts of these changes in terms of how climate services are delivered and used, this review provides scope for some preliminary observations and questions that will help guide further research under the BRACED programme.

Recommendations

Our review highlights five types of interactions and engagements that could help address key gaps. We have structured these from 'light touch' information sharing to deeper models of knowledge co-production. We have also included engagement in learning and joint reflection processes as a cross-cutting dimension that can feature across all levels of interaction. We see these forms of engagement as actions to be pursued as a matter of principle and as core elements of practice, given the implications of a failure to do so, as outlined above. In this sense, these recommendations build on the proposed 'Ethical Framework for Climate Services' that set out principles of practice for the climate services field, some of which overlap with the themes below (Adams et al., 2015).

Sharing

As a starting point, a clearer sense of who is delivering services, what types

of approaches are being instigated and which actors and users are being engaged (e.g. participatory planning processes with local authorities) is needed. This is particularly the case in places like Kenya, where there has been a surge in the number of actors and initiatives engaged in the climate information value chain. A more limited 'sharing' model may be most appropriate in areas where overlaps in focus, approaches and stakeholders are not significant, but could provide learning opportunities or new perspectives. While this form of interaction is not inherently demanding, it presents persistent challenges amidst a constantly evolving landscape of initiatives to track and engage with. Meanwhile, there are national and regional coordination platforms, such as National Frameworks for Climate Services and other bodies responsible for coordinating climate services and resilience-building activities. These have proved effective in a number of contexts, particularly when hosted by a respected partner. However, in some cases, a well-designed institutional or programme outreach strategy may suffice for this level of interaction.

- For *funders*, this may involve tracking and communicating their own investments into climate services and calling on funding recipients to allocate time for engaging with in-country and regional counterparts.
- For *national governments and service providers*, this means identifying and engaging with relevant communities of practice. In some instances, NMHSs may require incentives and support to collaborate, as well as clearer policy guidelines, given the potential ambiguity in their roles and mandates. This could be facilitated through their involvement in a range of different donor and government funded activities.

- For *NGO intermediaries and brokers*, this means investing additional time at the outset of initiatives, to identify relevant actors and initiatives, beyond their existing networks, whose work may intersect with theirs and devising an outreach strategy that can accompany their activities.

Coordinating

While information sharing helps alert key actors to activities and opportunities that exist elsewhere, this does not necessarily address the current over-burdening of key actors within the climate services value chain, particularly NMHSs. Improved coordination is needed to ensure that the range of actions being undertaken do not place undue strain on key points in the system, nor on user groups being targeted for engagement. Building on good practice in resilience thinking, coordination across systems and scales is an important aspect of this form of interaction. Beyond the tracking challenges posed in sharing information, coordinating also demands a willingness to be flexible and shift from *leading to supporting or contributing* roles in certain contexts, which may present challenges to inflexible models of delivery.

- For *funders*, this means considering potential duplication in initiatives among different funding agencies. It also makes it important to resist the urge to 'go it alone' and instead work through national and regional strategies that may steer their investments in line with established activities, thereby avoiding the risk of duplicating roles or creating parallel systems. It may also mean adopting more adaptive approaches to management for the initiatives they do fund, to allow for plans to change in consideration of coordination opportunities.
- For *national service providers*, this may present an opportunity to play a convening role where they are not already doing so. This could be done by devising national (or regional) strategies for climate service delivery that include a clear vision and roles for NMHSs, NGOs, government and funders.
- For *NGO intermediaries and brokers*, this again means investing additional time at the outset of initiatives to identify relevant actors, but also retaining the flexibility to update programming strategies in consideration of these other activities.



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The gaps in the effective delivery of climate services exceed the capacities of the actors currently in place

Collaborating

Our review highlights that, in many contexts across Africa and Asia, the gaps in the effective delivery of climate services exceed the capacities of the actors currently in place. Collaborations across areas of the climate services value chain can help bridge knowledge gaps, raise the potential impact of interventions and raise levels of understanding across these different settings. One example of such a collaboration would be between agencies charged with interpreting climate information and those seeking to communicate these advisories to user groups in actionable formats.

- For *funders*, this means continuing to promote collaborative programming on climate information services, but recognising that these models represent a shift in ways of working that may take additional time to bear fruit.
- For *national service providers and NGO intermediaries and brokers*, this means adopting a collaborative mindset in recognising the limits of a single mode of engagement or disciplinary tradition and building the capacities to work with partners at the boundaries of their areas of practice.

Co-producing

Closely linked to collaboration, co-production processes move from jointly implementing action to generating new knowledge from multiple knowledge sources. They provide ways to link local, indigenous and technical knowledge sitting at different scales and contexts in ways that expand the range of possibilities of what individual tools or approaches may offer. The regional Climate Outlook Forum process convened by ICPAC, for example, has brought together user groups, intermediaries and NMHSs to produce consensus forecasts that have engaged producers, traditional authorities

and user groups in novel ways, while also maintaining scientific integrity (Guthiga and Newsham, 2011). To date, however, co-production processes in climate services have not seen widespread adoption. It is clear from the literature on knowledge brokering that co-production processes require skilled facilitation and support to help navigate the epistemic tensions that often arise. 'Bridging organisations' such as knowledge brokers and intermediaries play important roles in this regard (Berkes, 2009). However, in cases such as ICPAC's (above), these roles are sometimes managed internally.

- As such, *funders and national service providers* should recognise the value that co-production processes play across the climate information services value chain, and invest in the presence of those skills within the climate services 'system'.
- If *NGOs* see themselves as playing the role of 'bridging organisations' in this respect, they should take stock of and, as necessary, build their capacities to perform that function effectively, as it may represent an important value for the sector.

Learning

Cutting across all these levels of interaction is the need to promote iterative learning processes that capture experience in supporting climate services and support more informed future action. Again, this is a core tenet of resilience thinking, as well as a principle in responding to a complex challenge like climate change. Effective learning processes should bring together different experiences of climate services to promote enhanced collective understanding of what works for whom, ultimately leading to changes in systems and practices (Ensor and Harvey 2015, see Box 4 below). For all actors concerned, this demands an openness to engaging in learning

Box 4: Learning to support co-production: the partnerships and processes for developing decision-relevant climate information

The Christian Aid-led BRACED consortia in Burkina Faso and Ethiopia focus on the communication and use of climate information amongst agro-pastoralists. Recognising the need to strengthen understanding about the complex sets of relationships and processes required to develop and enable uptake of relevant risk information, they have integrated a learning component from the outset and developed an analysis of partners' views on the processes of co-production (Visman et al., 2016).

Building resilience to climate extremes and disasters requires new forms of collaboration that bring together the capacities of a wide range of cross-sectoral partners. Alongside development and communications organisations, the National Meteorological and Hydrological Services are key partners in each consortium, while

the Met Office and King's College London provide cross-project support in climate and social science. Prior to project inception, there was limited shared understanding across consortia partners of the co-production process through which relevant climate information would be developed. Implementation has increased recognition of the need to:

- a. identify places for ongoing learning and review, within and between at-risk groups, partners and government stakeholders
- b. share responsibilities and build capacities for collaborative learning, rather than relying on an intermediary organisation
- c. ensure learning activities are relevant to all partners, as operational partners prefer practical approaches to learning with demonstrable benefits for at-risk groups.

processes and spaces for learning and exchange, as well as facilitative capacities that can help draw out and consolidate learning across different experiences.

Within this 'learning agenda' sits the need for closer monitoring of the impacts of investments into the climate information services in terms of a) the delivery of robust and actionable information that can help strengthen user groups' resilience, and b) the impacts on the range of organisations engaged across the climate services value chain. For

instance, are investments strengthening the longer-term sustainability of national systems? Are they contributing to stronger links across areas of the value chain and enabling new intermediaries to reach user groups more effectively? Are they contributing to a more coherent system overall? To date, limited work has been done to track these trends beyond assessing individual pilot activities. This represents an important opportunity for collective effort on monitoring and research in Africa and Asia.

QUESTIONS FOR FURTHER STUDY

A number of recommendations can be reasonably drawn from the recent literature reviewed for this report. The review has also raised questions requiring further study. Work under the BRACED Climate Information Intermediaries project will examine these areas in the coming year. This will take place through fieldwork and engagement with agencies and NGOs that use climate information services as a core part of their resilience building activities.

- First, as we have posited in this review, the rise of a 'resilience agenda' in development assistance is a driving factor behind the proliferation of interventions integrating climate services. The resilience agenda is, at least in part, driven by intermediaries such as development NGOs. Does a framing of climate services under this agenda facilitate the emergence of relationships likely to have positive long-term outcomes for climate resilient development? Are there any unintended impacts that arise from this reframing?
- Second, the nature of the demand for climate information services needs to be better understood. Is this coming solely from one particular set of actors or a broad range, including user groups? And, crucially, to what extent do these actors share a common vision or interest in the further development of these services? This question is being explored elsewhere within the BRACED programme from a community perspective (see Box 4), but research is also needed at higher scales.
- Finally, based on our review, it seems plausible that a recommended way forward in terms of building a more effective climate information services value chain is to invest in the capacities of NMHSs to undertake robust data collection and analysis. This should take place while also increasing their awareness of, and ability to, work alongside brokers and intermediaries, without pushing them to play all these roles themselves. Alongside this, an investment into a cadre of brokers and intermediaries who are have the capacity to work with NMHSs is needed, but an awareness of local needs and realities needs to be brought. Finally, this would need to be accompanied by increased donor support for models encouraging co-production and avoiding investments that create unnecessary duplication within the system. Conversely, NMHSs could be encouraged to continue to expand and enhance their relevant technical advisory, communication and engagement roles. It is clear that further research is needed to understand which models of operation are suitable across different regional and country contexts.

In sum, we are witnessing exciting evolutions in the role of climate services in building resilience in Africa and Asia. NGOs will undoubtedly continue to play a major role in these changes. In this light, research to help us better understand how investments into climate services can lead to the positive and lasting impact seem timely and important.

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