Climate services for resilience: the changing roles of NGOs in Ethiopia

BRACED KNOWLEDGE MANAGER

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Contents

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Summary

The current and expected impacts of climate change are influencing government policies and services as well as donor and NGO activities. The shifts have been influenced by the 'resilience agenda' whereby actors seek to reduce vulnerability and strengthen resilience as a means to mitigate climatic challenges. A focus on resilience has required a much more diverse engagement, as the interrelationships between climate, health, poverty and wellbeing are increasingly recognized. This has made programming more complex. Within these changes, climate information services have received greater emphasis. Forecasting has supported the strengthening of emergency response programming, and early warning data is used to adjust safety net implementation. Non-governmental organizations (NGOs) across Africa and Asia have responded accordingly, and diversified their partnerships and activities within climate information services.

To enrich our understanding of these trends, this study traces the emergence of climate services as a core element of resilience programming and explores how development NGOs are contributing to the climate information services system in Ethiopia. It examines when, and how, the emergence of resilience programming has affected programme partnerships and activities in the country, tracing the high-level changes that have occurred since 2002. The study approaches climate information services as a value chain, looking systemically at the range of entry points where NGO engagement has had an impact.

More specifically, the study is focused and structured around three areas of inquiry:

1. Understanding the climate services landscape in Ethiopia: How has it evolved over time and why?
2. NGO contributions to the climate services system: How have development and humanitarian NGOs contributed to the design and delivery of climate services? Have their roles changed over time? How?
3. Changes in NGO practice: Has NGO engagement in the design or delivery of climate services (particularly under the banner of resilience) led to wider changes in organisational practice?

Ethiopia experiences high levels of vulnerability to climate change, with limited capacity to respond. The Government of Ethiopia faces a range of developmental challenges, for which it does not have sufficient resources to address. This results in complex decision-making and difficult trade-offs. The National Meteorological Agency (NMA) has attempted to address funding and capacity limitations with a range of partnerships. Coordinating bodies have emerged to bring together an array of governmental and non-governmental bodies engaging with climate information services throughout the country. While capacity and coordination have improved, much progress is still needed.

NGOs have played a key role in building the capacity of government agencies, and in so doing expanding the type of services offered. In seeking to reduce vulnerabilities and build resilience, NGO programming and engagement has become more complex. At the same time, NGOs have changed the types of partnerships and activities they are involved in, as well as being influenced by the broader NGO environment within Ethiopia. These changes present opportunities for impact at scale, but also challenges of a narrower scope of engagement and run the risk of becoming entangled in complex political issues as government partners.

Based upon these trends we conclude that:

- NGOs have played, and will continue to play, a critical role in expanding climate information services in Ethiopia. To-date, national agencies have expanded their physical capacity and ability to produce climate information. One of the key challenges is communicating information in effective, relevant and appropriate ways to smallholder farmers and pastoralists.
- There are a wide range of governmental agencies and non-governmental organizations engaging with climate services. Coordination efforts to-date are important first-steps, but much more activity of this nature is required.

- Donor and NGO activity have expanded government capacity and the provision of climate services, but these developments remain limited to specific geographic areas and pose long-term risks of sustainability.
- The new modalities of working and changes to activities of engagement are neither apolitical nor value-neutral. We need to better understand and acknowledge the politically sensitive nature of the operational environments and partnerships as well as the activities and data.
- Given the influence of the 'resilience agenda' on donor and NGO priorities, and the challenges of sustainability of activities within climate information services in Ethiopia, more research is required to understand the extent to which climate services are being integrated into programming and decision-making.

Acronyms

ACMAD	African Centre of Meteorological Applications for Development
AGHRYMET	Centre Régional de Formation et d'Application en Agrométéorologie et Hydrologie Opérationnelle (Agro-Meteorology and Hydrology Regional Centre)
AGIR	Global Alliance for Resilience
ANAM	Agence Nationale de la Météorologie
ASECNA	Agence pour la sécurité de la navigation aérienne en Afrique et Madagascar
CCAFS	CGIAR Research Program on Climate Change, Agriculture and Food Security
CFAR	Climate Forecasting for Agricultural Resources
CILSS	Interstate Committee for Drought Control in the Sahel
CONASUR	Comité National de Secours d'Urgence et de Réhabilitation
CVD	Comité villageois du développement
DGM	Direction générale de la météorologie
FEWSNet	Famine Early Warning Systems Network
GFCS	Global Framework for Climate Services
INERA	Institut National pour l'Etude et la Recherche Agronomiques
INGO	International Non-Governmental Organisation
IRI	International Research Institute for Climate and Society, Columbia University
NMHS	National Meteorological and Hydrological Services
PRESASS	PRÉvisions climatiques Saisonnières en Afrique Soudano-Sahélienne
PRESAO	PRÉvisions Saisonnières en Afrique de l'Ouest
RCOF	Regional climate outlook forum
SAP-IC	Renforcement de l'information climatique et des systèmes d'alerte précoce en Afrique pour le développement de la résilience et de l'adaptation aux changements climatiques au Burkina Faso
SOFITEX	Société Burkinabé des Fibres Textiles
UNDP	United Nations Development Programme
WASCAL	West African Science Service Center on Climate Change and Adapted Land Use)
WMO	World Meteorological

1. Overview

Ethiopia is one of the most vulnerable countries to the adverse impacts of climate change, and is also one of the countries with the least capacity to address them. While Ethiopia has experienced strong economic growth and advancement of human development indicators, climate change poses significant threats to these gains. Agriculture plays a critical role in the Ethiopian economy: it constitutes the largest share of exports and more than 80% of the population is engaged with the sector for their livelihoods. There have been important diversifications into manufacturing and services, but agriculture remains focal and will continue to play a critical role in shaping the future of the country. The leaders of Ethiopia have long recognized agriculture as important, establishing an agriculturally-focused higher education institution in 1931 and beginning agricultural extension services in 1943. During the initial decades of agricultural extension, the linkage to climate information was not strong and the National Meteorological Agency (NMA) primarily worked with the aviation authorities. However, this has changed in recent years as the role and importance of climate information has expanded. The NMA has experienced rapid growth, particularly in the last decade, and it currently manages over 1,300 meteorological stations throughout the country.

Climate-related factors are creating significant challenges for Ethiopia. The most well-known of these is severe drought, but the country also experiences severe flooding. Following the 1999/2000 and 2002/2003 droughts, the Government of Ethiopia and its international partners began a shift in programming toward more proactive activities that would reduce vulnerabilities and build resilience. The Productive Safety Net Programme (PSNP), launched in 2005, was focal to this effort and would evolve into Africa's second largest safety net. Early warning systems had been functioning before this point, but gained in significance as the early warning data informed emergency relief planning. In addition to humanitarian response, the early warning data influences development activities. For example, the PSNP adjusts to moments of crisis (e.g. postponing or retracting the public works activities while maintaining transfers). The early warning data is obtained from FEWS Net and the NMA.

Starting in 2009, FEWS Net began producing regular future scenario reports, with a focus on food insecurity (for 8 month periods). The NMA produces regular reports in Amharic, which are distributed to NGOs throughout the country, with data including rainfall distribution and weather forecasts. Alongside these developments, the NMA, with support from donors (GEF, UNDP and WFP), NGOs and government organizations (ATA and MoEFCC) has been rapidly expanding its network of meteorological stations. Multiple government agencies and a large number of NGOs increasingly engage with climate information. First-step efforts of coordination have strengthened activities. For example, in recent emergency events there have been multi-sectoral assessments led by the government and UN OCHA, in partnership with NGOs. Within recurrent events within the Somali regional state of Ethiopia, Oxfam reports that the NMA reports and the FEWS Net future scenarios are used to inform projects, situation reports and humanitarian requirement documents that influence funding and programming. While this is important progress, coordination efforts require on-going strengthening.

Beginning from the early 2000s, non-governmental organisations (NGOs) also expanded their activities into the climate information services sphere, some newly engaging in this type of activity. The interrelationships between climate, health, poverty and wellbeing have often been engaged with under the umbrella of the 'resilience agenda' (Jones et al 2016). The rise of funding and activity associated with the resilience agenda has facilitated a range of donors and NGOs to engage directly or indirectly in the acquisition, analysis and communication of climate information.

It is within the context of rising recognition, investment and activity in climate-related services within Ethiopia that this study is situated. Climate services, understood as services providing climate information[1]

[1] For the purposes of this study we consider climate services to include nearer term weather information. As such we examine the production and provision of information that spans daily to decadal scales.

in a way that assists decision making by individuals and organizations, are in the process of maturing in Ethiopia. While much has been accomplished, the needs remain great. For example, despite immense efforts by the government and its partners, the vast majority of smallholder farmers do not have access to locally-relevant weather forecasts. Yet, climate services have the potential to empower institutions and individuals to take anticipatory actions that strengthen resilience so that the nation and its people can effectively mitigate the challenges posed by climate change.

The aim of this study is to shed light on the role of climate information and climate information services in bolstering resilience, and to better understand how governmental agencies as well as humanitarians and development NGOs have influenced the development of the broader ecology of climate evidence generation and information provision in Ethiopia. In doing so, it outlines the institutional development of climate information services in the country, aiming to inform programmes like BRACED and the Weather and Climate Information Services for Africa (WISER) in order to enhance possibilities for collaboration between NGOs and government agencies intervening in the climate services landscape in the future. This objective is in line with the evidence that the provision of high quality and relevant climate information can translate into important improvements in the livelihood security of vulnerable people (Singh et al 2017). We acknowledge that there is no silver bullet to the problems of vulnerability and climate insecurity outlined here, and that other factors, including structural constraints such as unequal access to resources and power create massive obstacles to the promotion of resilience, which cannot be readily resolved by the provision of better information.

2. Ethiopian context

Summary:

- The majority of the population in Ethiopia relies upon agricultural livelihoods. Climate change has the potential to create new challenges and vulnerabilities.
- The impacts of climate change could reduce GDP by 2-10% by 2045.
- Due to resource limitations, the government makes difficult decisions, often with complex trade-offs.

Agriculture is the foundation of the Ethiopian economy. The sector constitutes the largest segment of exports and provides over 80% of employment (Taffesse, Dorosh and Gemessa 2012; Yirgu, Nicol and Srinivasan 2013). However, the majority of the population who are engaged in agricultural livelihoods experience high levels of vulnerability due to a host of factors, including: small land holdings, land degradation, soil erosion, deforestation, desertification, salinization, rainfall variability and a lack of irrigation, invasive species, biodiversity loss, and population growth (Adams et al 2013; Chamberlin and Schmidt 2012; CSA 2013; Evans 2012; Hallegatte et al 2016; Rahmato 2013; UNEP 2014). While agricultural yields per hectare are increasing on the national scale, production per household in many regions is declining due to land fragmentation, resulting in high levels of food insecurity (ACCRA 2011; Cochrane 2017). More than 60% of smallholder farmers cultivate less than one hectare of land (Taffesse, Dorosh and Gemessa 2012), with the average in some regions dropping to a fraction of even that (Spielman, Mekonnen and Alemu 2012). In years of consecutive variable rainfall, the food insecurity situation can be compounded and result in emergency situations (FEWS Net 2012).

Climate change is likely to harm development in Ethiopia by increasing already high levels of hydrological variability as well as the frequency and intensity of extreme climate events. The World Bank projects that this could reduce GDP by 2%-10% by 2045 (World Bank 2010). The Government of Ethiopian recognizes the challenge posed by climate change and projects that GDP growth could be reduced by between 0.5% and 2.5% every year unless steps are taken to mitigate the impacts of climate change and build resilience across different sectors (FDRE 2011). On the individual level, the impacts can erode assets and create vulnerabilities (Carter et al 2004). One of the primarily means designed to address this is the Productive Safety Net Programme (PSNP), which provides food or cash transfers to the most vulnerable and is widely praised as well-targeted and effective (Berhane et al 2014; Gilligan, Hoddinott and Taffesse 2009). However, the droughts in 2015/16 and 2016/17 demonstrated that the PSNP is not enabling households to strengthen their capacity to withstand and overcome shocks (Maxwell et al 2013; Rahmato 2013; Siyoum 2013). During the 2015/16 drought nearly one in every five people in the nation required costly emergency support – in addition to the 8 million people in the PSNP, another ten million required emergency assistance (OCHA 2016). As a result, improved climate information and climate service provision are critical areas of interest of the national government as well as its international partners and the NGO community. This includes improving the quality and availability of evidence as well as its communication.

2.1 Complex development challenges

Ethiopia is home to more than 100 million people (World Bank 2017), and the population is expected to continue its rapid expansion throughout this century and stabilize at around 250 million (UN 2015). Population growth, combined with declining land holding sizes, are resulting in higher rates of urbanisation. During time period focused upon in this study (from the early 2000s until 2017), Ethiopia has experienced high levels of macro-economic growth (between 8% and 12% GDP for most of this period; World Bank 2017). In addition to enabling the economy to diversify into non-agricultural sectors (manufacturing and services), the economic growth has facilitated the decline of the percentage of people living in poverty (CSA 2011; 2013), yet the rate remains amongst the highest in the world.

Amidst economic growth and diversification, the agricultural sector – and the environmental challenges it faces – have remained a key challenge. Studies by IISD / IDRC (Echeverria and Terton 2016) and SIDA (Cesar and Ekbom 2013), as well as documents of the Government of Ethiopia (NPC 2016) all emphasize the importance of more effectively strengthening the sector, and in particular supporting the large population of smallholder farmers. However, other challenges also demand the attention of the government and NGOs: population growth, urbanisation, rapidly increasing energy and infrastructure needs, limited physical, human resource and financial capacity, health infrastructure and services, quality of education, access to financing, controlling adverse impacts of foreign direct investment (FDI; e.g. rent seeking behaviour), the need for efficient marketing systems, and concerns of a global economic slowdown (Cesar and Ekbom 2013; NCP 2016). The Government of Ethiopia recognizes that its existing resources are inadequate to meet the social and development objectives of the nation (NCP 2016). Within this context, the Government of Ethiopia has to make difficult decisions, often with complex trade-offs. Encountering these competing demands and resource constraints, NGOs have emerged as key supporting actors within the climate information space, in seeking to develop the availability of quality climate information and the ability of different actors within society to access relevant information to support better-informed decision making.

3. Past and future climate trends

Summary:

- Ethiopia's climate is influenced by diverse topographical and agro-ecological settings, as well as multi-decadal global oscillations, complicating long-term forecasting and climate models for rainfall.
- Global Climate Models have projected an increase of mean annual temperatures between 1.4 and 2.9^{o} C by middle of the century. The result could increase water stress, particularly in regions already experiencing high water scarcity.
- Extreme rainfall events are projected to become more frequent by most models, increasing the risk of disasters such as floods and landslides.

Ethiopia is both topographically and climatically complex, with vastly different rainfall regimes across the country. Located in the Horn of Africa, just north of the equator, Ethiopia contains a plateau comprising the highlands in the centre of the country and the Great African Rift valley (Bekele 1997). Climatically, Ethiopia transitions from a dry, desert-like climate in the eastern Somali region, to a temperate climate in the highlands at the center of the country, followed by a tropical climate in the far western part of the country. Variations in topography complicate this east to west gradient creating pockets of tropical climate in north central Ethiopia, for example. Average annual rainfall can vary from 500mm in the arid northeastern and southeastern lowlands, to 2400mm in the southwest (Fekadu 2015). Mean annual temperatures are around 15-20°C in the highlands, while a much higher 25-30°C in the lowlands.

The seasonality of rainfall in Ethiopia is also complex with the number of rainy seasons and their importance in terms of percentage of total rainfall varying depending on location. Ethiopia's National Meteorological Agency (NMA) describes three seasons, the Belg rainy season from February to May (corresponding to the East African 'short rains'), the Kiremt rainy season from June to September, and the cool and dry Bega season from October to January. The Belg season is considerably more variable than the Kiremt, contributing to high vulnerability to shifts in rainfall in areas that are primarily dependent on the Belg rains.

3.1 Climate variability

ENSO (El Niño Southern Oscillation) is one of the main, predictable drivers of year-to-year rainfall variability in Ethiopia. During El Niño years, there is often reduced rainfall in northern Ethiopia during the main Kiremt season, while in southern parts of Ethiopia rainfall is typically enhanced from September – November (Jury 2016; Gissilia et al. 2004). During a La Niña event, rainfall is enhanced during the Kiremt season, especially in the northern part of the country, and reduced from November to the next May in the southern part of the country (Wolde-Georgis 2002). The Indian Ocean Dipole also effects rainfall in southern Ethiopia mainly during October – December (Shongwe et al. 2011; Marchant et al. 2007).

The 2015/16 drought that impacted over 10 million people was influenced by the strong 2015 El Niño event which increased the severity of the drought (Philip et al. 2017). Many of the past droughts in Ethiopia are also associated with El Niño events including 1973-74, 1983-84, and 1990-92 (Wolde-Georgis 1997). Beyond total precipitation deficits, both the timing and the spatial distribution of rainfall impact livelihood activities, such as agriculture and pastoralism (Singh et al. 2016). Decadal-scale features also play a role in Ethiopia's climate with the Atlantic Multidecadal Oscillation warm phase enhancing rainfall in northern Ethiopia, while the Pacific Decadal Oscillation increases rainfall in southern Ethiopia during its cool phase (Jury 2010).

3.2 Climate change

Temperature

Across equatorial Africa, temperatures have increased since the 1980s, including a 1.3°C increase in Ethiopia between 1960 and 2006 (Anyah and Qiu 2012; Conway, Mould and Bewket 2004; NMA 2007). There is high confidence that temperature will continue to increase in Africa, and at a rate faster than the global average (Niang et al. 2014). In Ethiopia, climate model projections show an increase in temperature across all seasons, potentially leading to an increased frequency of heatwaves and increased evaporation (Niang et al. 2014). Temperature rise, coupled with changes in other climatic conditions, have contributed to the altering of boundaries between different agroecological zones in the country. Temperature increases are more extreme in the dry and hot areas of the country, which are in the northern, northeastern, and eastern parts of the country (Aragie 2013). Looking forward, Global Climate Models have projected an increase of mean annual temperatures by between 1.4 and 2.9^{o} C by middle of the century (Conway and Schipper 2011).

Precipitation

As outlined above, the impact of climate change on rainfall is less clear. This stems not only from the fact that models are less skillful at predicting rainfall patterns when compared to future temperatures, but because there appears to be a discrepancy between historic and future projected rainfall trends across East Africa within global and regional circulation models (G/RCMs) - known as the 'East African Climate Paradox' (Rowell et al 2015). While the current data remains largely inconclusive (Bewket and Conway 2007; Cheung, Senay and Singh 2008; Rossell 2014; Wagesho, Goel and Jain 2013), there are some general trends being identified. In East Africa, the rains from March – May have shown a long-term decline in rainfall, in contrast to most climate change projections for the region which indicate an overall increase in rainfall due to climate change (Lyon and DeWitt 2012; Kent et al. 2015, Shongwe et al. 2011). The Kiremt rains have high year-to-year variability but have not shown a long-term drying trend (Rowell et al. 2015) A number of possible reasons for this apparent disconnect have been put forth including changing anthropogenic aerosol emissions, poor modeling, natural variability, a non-linear response to CO2 emissions and a shifting balance between competing forces (Rowell et al. 2015). This remains an active area of research with significant work in progress toward better understanding the drivers of recent and long-term changes in rainfall.

Despite this uncertainty, it is highly likely that large variability and changes in rainfall trends will persist in the future (World Bank 2010). Most models predict that extreme rainfall events will become more frequent, increasing the risk of disasters such as floods and landslides (FCFA 2016). It is also worth noting that increased net rainfall does not necessarily mean a reduction in the number and intensity of drought events, of which Ethiopia has a long history, with five occurring since 2003. Such impacts are likely to have negative consequences on economic development and wellbeing in the future (Aragie 2013). The NMA produces reports on the trends of climate change within two publications, namely the National Communications of Ethiopia to the UNFCCC and the National Adaptation Program of Action (NAPA).

Importantly, the impacts of climate change are likely to be accentuated by a combination of socioeconomic and environmental factors, including the expansion of farming and pastoralism under a drier, warmer and less predictable climate. However, policies, programmes, infrastructure and information can act as means to support strengthened resilience amid variability and uncertainty. As a result, the need for greater evidence and means to communicate that information are needed such that decision-making can, within a changing climate, support the continued economic growth and advancement of wellbeing.

4. Methods

To capture the evolution of roles and functions in the Ethiopian climate services landscape, and interrogate the roles of NGOs within it, we carried out a desk-based review of recent academic and grey literature on climate information services in Ethiopia and complemented that review with a series of semi-structured key informant interviews. Key informants were identified via the literature review, actor mapping, and snowball sampling from three categories:

- Respondents directly engaged in producing climate information services through data acquisition, analysis or interpretation;
- Representatives of development NGOs using climate information as part of resilience-building projects or programmes;
- Agency representatives from bilateral and international donor agencies that support climate services or resilience-building programmes in the country.

Interviews with 9 key informants were carried out in Ethiopia, between February and March 2017, followed by a workshop that was attended by a broad range of governmental and non-governmental actors.

The climate services landscape in Ethiopia has witnessed a dramatic evolution since the turn of the century. In this study, we adopt a 'value chain' approach to mapping the climate services system to observe the relationships between actors and processes that enable the flow of data to decision-relevant information (see Figure 1 below).

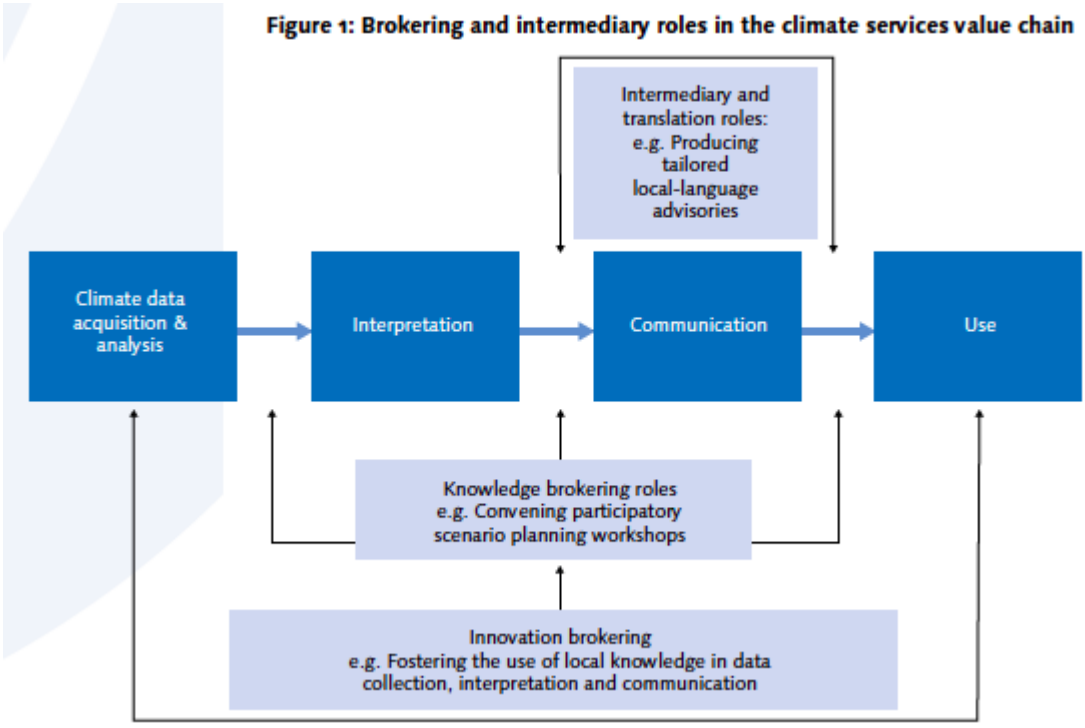

Figure 1. Generic value chain diagram for climate information services (Jones et al, 2016)

The climate information services system is dynamic, changing over time as new actors emerge, ways of working evolve, or external developments (such as the expansion of mobile coverage) triggers change in the information and communication landscape. To capture these evolutions, we mapped the landscape at two points in time:

- 2002, when the Government of Ethiopia and its partners began developing programming that would address climate-related challenges proactively, rather than as an emergency response.

This shift required a greater emphasis on accurate climate information, forecasting and early warning systems, before which the government had limited interest in climate information; and
- 2017, capturing the current state of the value chain within the country.

This study traces the development of major activities influencing the demand and provision of climate information in Ethiopia following the programming shift after the 2002/03 drought. Most significantly, the change led to the development of Africa's second largest safety net programme, the PSNP, serving more than 8 million people as of 2017. While unable to cover all governmental and NGO activities between 2002 and 2017, this study highlights the key trends and the largest activities within the climate information sphere.

We should note that the analysis is intended to document national trends. This is not always easy given the tendency for work on climate services (particularly on communication and use of climate information) to be undertaken as pilots at sub-national scales (usually local to provincial/district). This means that not all of the significant initiatives that currently exist or were underway during the baseline period have been captured in this analysis. We have sought to focus on those that have had country-wide uptake or influence, or to feature examples that are indicative of types of initiatives that were being carried out by different actors in many parts of the country.

5. Climate services: an evolving landscape

Summary:

- Since the early 2000s, the physical capacity and technical capacity to produce climate information has steadily developed. Researchers, technical staff, scientists, donors and NGOs have played a key role in strengthening these capacities.
- Significant challenges remain in improving coordination among diverse actors engaged with climate information services as well as communicating climate information to smallholder farmers and pastoralists.
- Multiple government ministries and agencies are engaging with climate information services, while coordination has improved, much progress is required.

Changes to the climate are not new to Ethiopia (Conway 2000), however the variability is increasing in ways that pose unique challenges for the agricultural base of the country (Bewket, Radeny and Mungai 2015; Suryabhagavan 2017). Assessments by ND-GAIN and the Center for Global Development have found Ethiopia to be among the most vulnerable to climate change, while also having amongst the least capacity to adapt (CGD 2014; ND-GAIN 2016). Due to diverse topographical environments and weather stations covering broad regions, meteorological forecasts often did not align with farmer experiences (Adimassu, Kessler and Stroosnijder 2014; Ayal and Filho 2017; Meze-Hausken 2004). Thus, one of the crucial areas of work in the early 2000s was the need to enhance the climate evidence base, which included expanding the number of stations to account for diverse topographical differences as well as conducting additional analyses to better assess rainfall trends and address areas of uncertainty.

Although Ethiopia has had a National Meteorological Agency (NMA) dating back to 1980, it is only recently that there has been any consideration of the need to harness climate information to support agriculture, and particularly small-scale farmers and pastoralists. When the NMA was established it had a limited number meteorological stations, but the capacity of the NMA has rapidly expanded in recent years; as of the end of 2017 the NMA had more than 1,300 data stations (see Figure 2). The expansion of NMA data collection aligns with broader shifts regarding climate information services in the humanitarian and development spheres. In the early 2000s, early warning data played an important role in supporting the shift of programming from high-cost emergency response activities to more proactive and predictable poverty alleviation ones. In 2003, the government undertook a large-scale consultation process, establishing the New Coalition for Food Security. The PSNP is the largest and most well know of these, but other initiatives were also developed, including the Household Asset Building Program, Complementary Community Investment and Voluntary Resettlement programs. Humanitarian activity continued in tandem, while attempts were made to improve efficiency with the use of early warning systems and forecasting information.

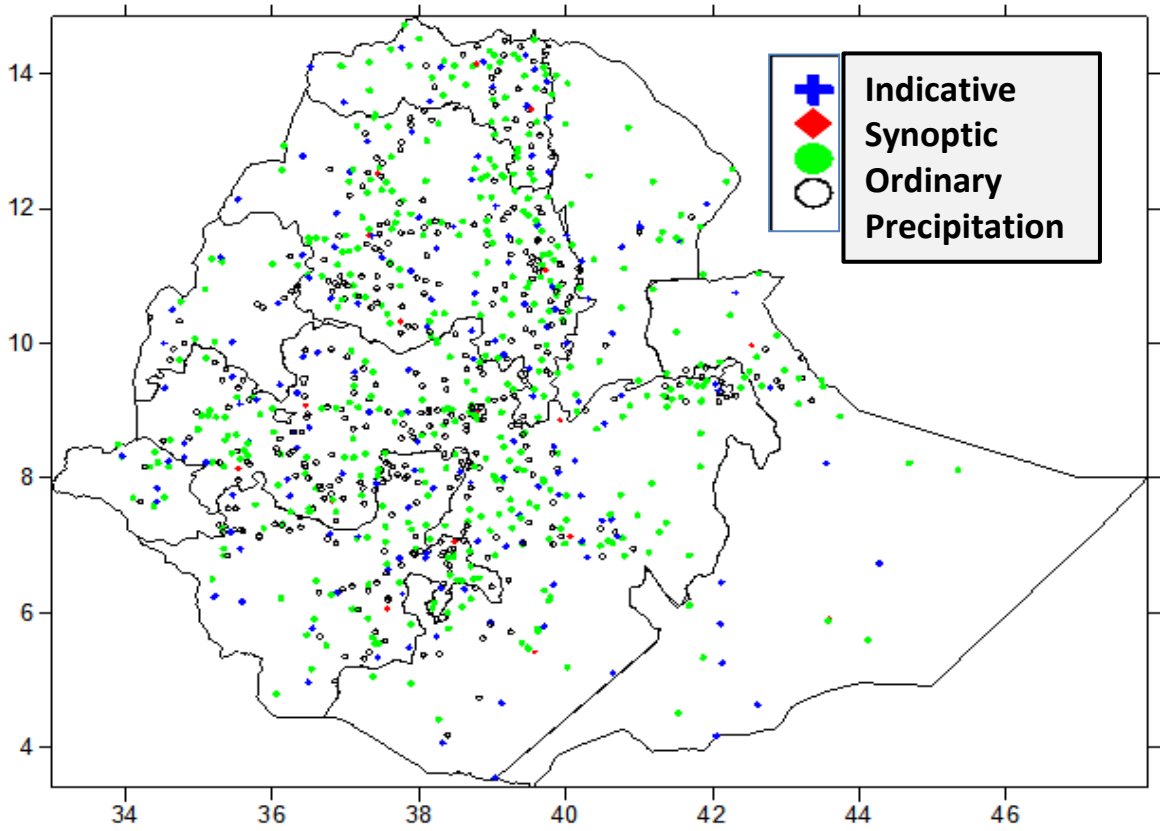

Figure 2. NMA station distribution (as of 2017)

One of the challenges during these emergent years was usability and communication of information as well as coordination. In addition to expanding its data collection capacity, the NMA also improved its capacity to analyse and produce reports on rainfall and forecasting. Using meteorological station data, the NMA now regularly produces short range (daily and 3-day) forecasts, medium range (10-day and monthly) forecasts, and long range (mid-season and seasonal) forecasts. It also produces agrometeorological bulletins on dekadal, seasonal, monthly timeframes. The NMA also produces hydrometeorological bulletins on a monthly and seasonal basis. The NMA has made important advancements in data transparency and data sharing, such as the Climate Analyses & Application (Maproom), which is available on its website. The page allows users to interact with different visuals of dekadal and monthly rainfall and temperature monitoring, which was a project partnership with the Enhancing National Climate Services initiative of the International Research Institute for Climate and Society at Columbia University (see Dinku et al 2016). With regard to data collection, the NMA collects environmental data (e.g. rainfall, temperature) while the Central Statistics Agency (CSA) conducts the annual National Agricultural Surveys and collects data on agricultural production. These two data sets continue to be published by different agencies and have been subject to limited analyses of their interrelations.

Efforts by NGOs have also made important contributions to the changing humanitarian and development activity, with climate information services playing a greater role over the period of interest in this analysis (2002-2017). The Famine Early Warning Systems Network (FEWS Net) broadened the type of reporting it published, such as the regular future scenario reports that focused on food insecurity (for 8 month periods), starting in 2009. These reports utilize district level information, such as crop diseases, commodity prices and rainfall performance (amongst many variables), with multiple scenario options, to predict potential food security outcomes. However, the provision of climate information to support smallholders and relevant agencies to take decisions in response to micro-climates and seasonal variability remained nascent. In response to this, as well as the clear links between climate change variability, vulnerability, insecurity and poverty in Ethiopia, donors and non-governmental organisations (NGOs) have increasingly given more consideration to supporting initiatives designed to improve the provision of climate information services to support smallholder farmers and pastoralists as they encounter climate variability and seasonality. This

interest has also been facilitated by the 'resilience' agenda promoted heavily by international development agencies (Jones et al 2016).

There are, however, diverse challenges in communicating climate information throughout the country. Cochrane and Adam (2017) identify this as one of the key knowledge gaps that would enable the translation of new knowledge to enhance smallholder livelihood practices and strengthen adaptive capacity. Amongst the barriers are: variable levels of literacy, diverse languages (and dialects), incomplete mobile network coverage (particularly in rural and remote areas), and challenges of ensuring clarity of information as well as what to do in response to it (Fekele 2015). The Ethiopian Institute of Agricultural Research (EIAR) is making efforts to experiment with the best modalities for improving the accessibility of locally-relevant climate information, however much more research and learning is required to better understand the most effective and appropriate means to communicate climate information.

Investment in, and effective use of, climate information services can buffer many of the socio-economic threats presented by climate change in Ethiopia and help to support robust decision making (Funk et al 2012). Accordingly, the acquisition and provision of climate information was given a massive boost by the interest shown by the Government of Ethiopia under former Prime Minister Meles Zenawi, who positioned the country as a leader in climate change talks at the international level. Under Zenawi's leadership, Ethiopia established ambitious targets to ensure that national development would be both green and resilient to the impacts of climate change. In the post 2002 period, the Government of Ethiopia positioned agriculture and the environment at the center of many of the government's key policy documents, including the: Sustainable Poverty Reduction Strategy (2002) Plan for Accelerated, Sustained Development to End Poverty (2006), and Growth and Transformation Plan (2010). In addition, the government supported these policies with a range of initiatives, including the: Productive Safety Net Programme (2005), the Ethiopian Commodity Exchange (2008), Disaster Risk Management and Food Security Service (2008), Household Assets Building Programme (2009), and the Ethiopian Agricultural Transformation Agency (2010). However, it has not always been clear which organisation is responsible for leading climate information service provision within these initiatives, nor have all the required coordinating bodies and information sharing agreements been in place to ensure information is shared amongst governmental agencies.

With regard to climate information services, the Ethiopian NMA has been one of the focal partners within collaborative initiatives involving donors, other national meteorological agencies, scientists, and NGOs. These partnerships have often been project-driven and as such the NMA has to balance emerging opportunities with its partners while also advancing its own agenda. An example of this is the NMA collaborating with NGOs to provide access to data while acquiring funding from NGOs to expand the NMA's network of automatic weather stations. Over the last two decades the NMA has established a wide range of collaborations and partnerships, which has included the EU Met, Meteo France, UK Met, World Meteorological Organization, European Centre for Medium-Range Weather Forecasts (ECMWF), World Bank and a host of NGOs.

In addition to the NMA, there are a number of other federal and regional state level agencies that have a direct mandate linked either to climate evidence or climate information communication. One of these is the Environmental Protection Authority (EPA), which defines, monitors and enforces environmental protection regulations, as well as conducting environmental impact assessments.[2] In 2015 the Ministry of Environment and Forest (MoEF) was renamed and restructured as the Ministry of Environment, Forest and Climate Change (MoEFCC). The MoEFCC is mandated with the oversight of issues related to environmental management, including upholding the Environment Policy. The MoEFCC is the key coordinating body with the Global Environmental Facility (GEF), which is a major actor in the country; to-date over US$400 million has been given in grant funding and over US$3 billion in additional co-financing.[3] Activities of the Ministry

[2] The EPA has a host of guidelines on specific activities that have direct impacts on the agricultural sector, such as on dams, fertilizers, floriculture, forestry, irrigation, pesticides, roads, pollution control and water supply, amongst others. Guiding these activity-specific policies is the Environment Policy of Ethiopia, which sets forth guiding principles, acting as an overarching umbrella for the work of the EPA.

[3] Details about the type, projects and financing are available: www.thegef.org/country/ethiopia

of Water, Irrigation and Electricity (MoWIE) have direct impacts on those reliant upon water resources, such as in relation to the construction of large-scale hydroelectric dams and irrigation infrastructure. Many of the activities managed by the MoWIE rely upon understanding long-term rainfall scenarios. Additionally, there are a host of national agencies conducting research relevant to climate information services, including the Agricultural Transformation Agency (ATA), the Ethiopian Environment and Forest Research Institute, and the Ethiopian Institute of Agricultural Research (EIAR).

Given the range of governmental agencies engaging with climate information services, coordination is crucial. The Environmental Council is a high-level body tasked with coordinating climate-related issues, chaired by the Prime Minister with members from all regional state governments as well as sectoral federal agencies. A second coordinating body, the agrometeorology task force, is managed by the ATA, which attempts to identify and resolve systemic institutional problems in the climate information sphere, particularly in identifying and addressing bottlenecks and inadequate communication between different ministries and agencies. In particular, the ATA has worked on ensuring that extension personnel have the capacity to use climate information, as well as supporting capacity building in other agencies. For example, staff in the Ministry of Agriculture and Natural Resources (MoANR) were, until recently, unfamiliar with forecast outputs and how to communicate the information derived from them, particularly at the regional level. This was part of a broader effort by the ATA to bring the MoANR closer to the NMA through the establishment of the agrometeorology task force. Due to its work, weather forecasts are now sent weekly to regional offices of the MoANR, and there are also regular video conferences and meetings between NMA and MoANR officials from across the country. The ATA currently has plans to scale up this task force into a platform with a broader range of stakeholders. While coordination efforts to-date are important first steps, further coordination is essential because in addition to the many public-sector actors, a number of NGOs and intergovernmental agencies are involved in activities with direct relevance to climate information services, including: Action Aid, BBC Media Action, CARE, Christian Aid, Farm Africa, FEWS Net, the GEF, the International Food Policy Research Institute, UNEP, UNDP, and UNICEF.

The MoANR is tasked with directly supporting smallholder farmers, primarily through the agricultural extension system. At the community level, there are support personnel who provide access to inputs (e.g. improved seeds and fertilizer) as well as offer training, often at government-run Farmer Training Centers (FTCs). Regionally, there are agricultural research centers, which conduct field trials of seed varieties and new crops, providing avenues for the availability of more locally-appropriate, drought-tolerant varieties and crops. The agricultural extension system has the potential to be the most suitable mechanism to communicate information to farmers, however there are a number of barriers that have slowed the utilisation of the agricultural extension system as a means to enhance farmer access to climate information. The barriers include resource and time limitations of an already-stretched extension system as well as limitations of personnel's familiarity with climate information systems and the means to best communicate it.

Recent high-level decisions and planning documents produced by the Government of Ethiopia indicate that the emphasis on agriculture, and supporting agricultural livelihoods, may be given less emphasis. Climate information continues to be recognized as a critical element for agricultural development (e.g. MoFED 2010; MoANR 2017), but the Government of Ethiopia continues to struggle in balancing the need for economic growth beyond the agricultural base. The newest Growth and Transformation Plan (GTP II 2015/16 – 2019-20; NPC 2016) presents a shift toward manufacturing supported by foreign direct investment (FDI), whereas in the past agriculture itself was viewed as the means to enhance economic growth (e.g. the Agricultural Development-Led Industrialization Plan). One of the greatest risks to the nation, as outlined in the GTP II, is vulnerability to drought. This enhances the potential role of climate information services, but within a specific realm, whereas in the past agriculture was viewed as an engine for economic growth as well as a potential risk and was therefore subject to greater governmental attention.

6. NGOs contributing to the CIS system

Summary:

- NGOs are primarily building the physical capacity of government agencies and supporting the improved collection, interpretation and production of climate information.
- The communication of climate information at the individual and community levels are in their early stages of development in Ethiopia.
- Efforts to experiment with new modalities of climate information communication, such as via the private sector, have been resisted by government agencies.
- Due to the role of donors and NGOs, the sustainability of current activities is a key concern across all actors in climate information services.
- It remains uncertain how sustainable new climate information services will be if there is a reduction in donor and NGO support.

NGOs are increasingly supporting climate information services, and are doing so in diverse ways, from providing resources to expand the NMA meteorological station network to experimenting with communication modalities to reach smallholder farmers and pastoralists. The USAID-funded FEWS Net has enhanced forecasting systems to make emergency relief efforts and the PSNP more effective and targeted. Large donor-funded and NGO-managed activities have worked to build government capacity at different levels of governance. The activities that NGOs undertake are commonly done in partnership with government agencies, typically building and expanding capacity, as opposed to providing services directly or independently (this type of NGO engagement is discussed in more detail in Section 7). This section outlines the development of NGO involvement in climate information systems, largely following the activities chronologically form the early 2000 until 2017.

The majority of study respondents interviewed for this study agreed that the last five years (2012-2017) have seen increased focus on climate information services in Ethiopia, and that this has been driven by the climate change agenda, which, they emphasized, was pushed by the need and demand for climate information as well as changing international donor priorities. It is not easy to differentiate between the climate change agenda as a key influence on donor financing as opposed to resilience, although some respondents felt that the resilience narrative had been more responsive to local people's lived realities than the sustainability agenda, because it includes the environmental dimension of people's livelihoods but is not solely defined by it. Not only that, 'resilience' has some advantages over a narrower focus on 'climate change' because the impacts are often difficult to untangle from broader issues relating to seasonality, vulnerability, and livelihood insecurity. Resilience also encapsulates broader aspects of livelihoods, rural development and food security, which may not be considered within funding and programming that is specific to climate change.

As outlined above, the Government of Ethiopia and its partners have long recognized the key role of climate data as a means to reduce risk and to strengthen the livelihoods of the majority of the people of the nation who are involved in agriculture. The Famine Early Warning Systems Network (FEWS Net) is one early example of this – a USAID-funded project providing early warning and analyses on food security since 1985. After 2009, FEWS Net began to play a more significant role in Ethiopia after it began to publish regular reports on future food security scenarios using geographic information system (GIS) technology. These reports are widely used throughout Ethiopia. As outlined above, international agencies (e.g. UN OCHA, WFP) utilize both FEWS Net and NMA data in creating projects as well as ensuring activities

respond to emergent needs. The PSNP utilizes early warning data from these reports in order to adjust the programme requirements (in periods of crises the public works requirement is postponed or retracted while maintaining transfers).

In addition to the long-running FEWS Net project and the establishment of the PSNP in 2005, during the late 2000s the private sector and some NGOs had begun experimenting with index-based weather insurance. Nyala Insurance, for example, launched two products (in 2007 and 2009). The first of which utilized weather data while the later relied upon local weather stations (Araya, 2011). Also in 2009, Oxfam was experimenting with index-based weather insurance, for which the NMA, Nyala Insurance and the PSNP were all partners (Dinku et al, 2009). Work of this nature in Ethiopia was amongst the most innovative globally, and made significant advances to develop appropriate, affordable and evidence-based index-based weather insurance.

In the East African region, starting in 2010, a number of activities emerged to support climate information knowledge management, enhance the capacity of policy makers, and strengthen the implementation of adaptation projects and programmes (Kadi et al 2011). These occurred as part of the Climate for Development in Africa initiative of the African Development Bank (AfDB), the Commission of the African Union (AU) and the United Nations Economic Commission for Africa (UNECA). For the East Africa region, these initiatives worked with the Intergovernmental Authority for Development (IGAD). One of the most important impacts of this initiative was to secure high-level support from regional governments and international agencies. To achieve this, international agencies and donors played a facilitating and convening role, which advanced the policy attention for climate information services within regional governments.

NGOs in Ethiopia have for decades been working on issues affected by the climate, particularly in emergency relief and developing agriculture to strengthen food security. Long-standing NGO efforts include: Catholic Relief Services which started operations in 1958, Oxfam in 1962, and CARE in 1984. However, it was only recently that climate information services took a more focal role within NGO activities. One of the largest donor-funded projects to operate within the climate information sphere at the local level was the Africa Climate Change Resilience Alliance (ACCRA; 2009-2014). In Ethiopia, the project supported the government, and particularly lower levels of the administration (district and community levels of governance), to strengthen climate change adaptation and disaster risk reduction planning. To achieve this, a consortium of NGOs (CARE, Oxfam, Save the Children, World Vision and the Overseas Development Institute) worked with government actors (Disaster Risk Management and Food Security Sector, NMA, MoANR and the former Ministry of Environment and Forest, now the MoEFCC). A key aspect of these partnerships was that NGOs supported the government, and built its capacity, to strengthen local level planning, with an aim to influence national level planning via these processes. While NGOs commonly provided services related to emergency relief and agriculture, their involvement within climate information services shifted the type of engagement to one which supported government agencies to better provide services.

While ACCRA worked with local levels of government, the Building Resilience and Adaptation to Climate Extremes and Disasters (BRACED) activities are some of the most significant attempts to deliver downscaled climate information to small-scale farmers in Ethiopia. One of the approaches BRACED supports is led by Christian Aid (2015-2017, called: Supporting communities in Ethiopia to overcome the negative impact of climate change, CIARE), and seeks to develop a long-term relationship with the NMA. The NGO-government collaboration allows the NGOs partners to gain regular access to data and downscaled forecasts, while the NMA obtained resources to expand its network of automatic weather stations. Furthermore, as partners in the project, NMA personnel would have the opportunity to engage in training and capacity building activities with the UK Met Office, strengthening its human resource capacity in areas such a downscaling forecast.

Within Christian Aid, there was an awareness of the limitations of NGOs delivering sustained solutions as well as the structural problem caused by their lack of accountability to local people in the long-term,

which could only be remedied by ensuring that local public-sector partners developed a stake in the programmes. In addition, there was also a desire to limit the establishment of parallel institutions and structures which would ultimately undermine national ones and would not last beyond the duration of the programme. These factors led Action Aid, Christian Aid, and the UK Met Office to contribute financing to secure NMA's involvement in the BRACED activities. The ensuing collaboration resulted in some changes to the BRACED activities and oriented the project toward capacity building in national institutions. These sorts of NGO activities are similar to those of ACCRA, whereby NGOs build the capacity of permanent actors, the government agencies.

Despite the consensus about the need for improved climate information services, stakeholders from the NGOs and government agencies highlighted debates about the type of activities being engaged in, and the scale at which they are implemented. For example, there was a lack of clarity about where the greatest potential impact from interventions could be found, and thus where efforts should be prioritised. Activities could strengthen capacity at the national level, such as within the NMA, or at the lower levels of government, as was done by ACCRA. Alternatively, it could focus on supporting those who provide climate information directly, such as extension workers in the MoANR and the agricultural extension training system, or on expanding efforts to directly reach smallholders, such as through mobile networks. These questions remained unanswered.

Whether services are provided by NGOs, or by a government agency with the additional support of donors and NGOs, there are serious concerns about sustainability. The shift from NGOs as service providers to capacity builders, in theory, seeks to reduce this challenge by building the capacity of the permanent public entity. However, both government and NGO staff question the sustainability of new government services if the donor- and NGO-support were reduced. In other words, capacity building has been important, but it has not addressed the fundamental challenge of resource constraints. In the event that donor funding for resilience-related or climate change-related programmes that integrate climate information services declines, it is unclear whether the NMA would be able to continue to invest in downscaled climate information service provision.

7. Changes in of NGO practices

Summary:

- In responding to new opportunities within the 'resilience agenda', NGOs have changed the type of partnerships and activities they engage in. The focus has shifted toward building the capacity of the permanent government agencies.
- National meteorological services, extension services, agencies with media expertise and NGOs have had to learn how to communicate forecast information in appropriate ways with information relevant to diverse audiences.
- The changes to the NGO landscape are linked to broader legal changes in Ethiopia, and are not specific to climate services.
- The new types of partnerships and activities offer opportunities and challenges for NGOs.
- NGO staff are doing more coordinating, training, supervising and capacity building, which often requires new skills, experiences and knowledge.

The final dimension of study in this analysis examines the ways in which the roles and activities of NGOs have changed, particularly within climate information services. In so doing, this exploration also seeks to identify how such changes have, or may, affect the modalities of engagement, types of activities and forms of partnerships. As has been outlined throughout this study, there appears to be a strong correlation between the 'resilience agenda' and the rise of NGO involvement with climate information services in Ethiopia. We argue that there has also been changes of NGO practices (partnerships and activities), which have been influenced by broader shifts in the Ethiopian government and NGO sector. This section explores these shifts and the implications of them.

Within the climate information services sphere, how the information was utilized by NGOs experienced changes throughout the period of interest. After an initial attempt to communicate forecast information, there was a recognition that the information was difficult to use by farmers and pastoralists. As a result, NGOs focused on the ways of communicating and the kind of information conveyed. For example, rather than a simple forecast, activities utilized innovative ways of communication, such as song and drama. As the NGOs advanced in their engagement within climate information services, they also expanded their engagement with the NMA and began working with different types of forecasts (seasonal, monthly, 10-day), as different users have different needs. Thus, the information being communicated was better geared to the needs of the target audiences.

As outlined in Section 6, larger consortia of NGOs have established new types of partnerships for engagement. For decades, NGOs have acted as service providers, particularly within the emergency relief and agriculture sectors. However, since the mid-2000s, the types of NGO partnerships for engagement have changed toward ones that work with government agencies to build their capacity to provide new or improved government services. Thus far, the capacity building partnerships have focused upon building physical capacity, such as expanding the automatic weather station network, and the ability of the NMA to produce climate information. However, limited activity and capacity continues regarding communicating climate information to users, such as smallholder farmers and pastoralists. While building physical capacity and advancing information production, NGOs themselves are leading the communication of climate information, in partnership with government agencies.

The model of partnering with governmental agencies and strengthening their capacity is increasingly attractive for NGOs, theoretically as a means to ensure services are sustained by permanent actors and not dependent upon external ones. This shift has also occurred because of a restriction of which activities the Government of Ethiopia is allowing NGOs to engage in. For example, the Farm Africa-led BRACED

project (Market Approaches to Resilience), has attempted to establish a market-based system of facilitating the communication of climate information via mobile phones on a commercial basis in pastoral areas. However, government opposition regarding the commercialisation of climate data forced a reconsideration of approaches within the project. The revised project required the development of a challenging partnership with the NMA involving activities outside of their regular programming. The experience of Farm Africa and its partners highlights the limits of the influence of some external actors on the climate information services ecosystem.

The shift away from NGOs as service providers, and toward NGOs as builders of government capacity has not only occurred in the climate information services sphere. NGOs play a large role in the agriculture and livelihoods sectors in Ethiopia, within which this model of operating is increasingly common. For example, to strengthen the agricultural extension system in Amhara regional state, One Acre Fund has been providing support and capacity building, in Benishangul Gumuz regional state it was a consortium of NGOs led by Save the Children, in Tigray regional state it was Farm Africa, and so forth. The benefit of this modality of working is that the permanent actor, the relevant government agency, gains capacity and can provide services over the long-term, whereas NGO funding and programming may increase and decrease with time. A second benefit of this approach is that the government can play a more active role in directing NGO activities to prevent duplication. However, there are costs to this model, particularly in a country where service provision is highly politicised (Berhanu and Poulton 2014; Chinigo 2013; Cochrane and Tamiru 2016; Gudina 2003; Ketsela 2006; Planel 2014). Within this modality of working, NGOs have less ability to determine where, when, and with who they work, and instead follow the direction of the government agency. This can result in NGOs engaging in complex political environments (Abbink 2006; Cochrane and Skjerdal 2015; de Waal 2015; HRW 2012; Tronvoll 2010)

The modality of NGOs working with, for, or under the government has been influenced by another trend in Ethiopia – the restriction of allowable NGO activity and funding under the Proclamation for the Registration and Regulation of Charities and Societies that took effect in 2009, commonly called the 'CSO law'. Following the implementation of the CSO law, more than half of all formerly registered civil society organizations did not re-register, while others that did register were closed or had their licences to operate revoked (Amnesty International 2012; Sisay 2012). The changes have radically changed the activities NGOs can engage in, and this is one of the reasons that NGOs have adopted the approach working with government partners, as opposed to civil society or national organizations. A second reason for this shift is that activities such as climate information are not explicitly barred by the CSO law as other activities are, such as those relating to human rights, women's rights, children's rights, citizenship rights, conflict resolution, and democratic governance (Article 14(5)). At present, the CSO law has restricted nearly all forms of advocacy, and thus a viable alternative is capacity building, particularly capacity building of government agencies. By narrowing the type of activities NGOs are allowed to engage in, as well as the partners that donors are eligible to fund, the Government of Ethiopia has been able to attract more donor and NGO partners to collaborate with its own agencies, while also exerting greater control over the non-governmental sector.

This is not to suggest, however, that the modality of working with or for the government does not, or cannot, result in positive outcomes. Within the government-supporting role, the BRACED projects are creating opportunities for partner NGOs to establish innovative ways of communicating climate information to local people. For example, BBC Media Action (see Box 1) is using radio to communicate climate information to smallholder farmers using a combination of poetry, song, and drama. In doing so they have increased the awareness of weather forecasts, whereas in the past forecasts would only be done through fairly standardized forecasting formats that did not receive widespread attention. BBC Media Action has also connected farmers with extension workers and agricultural experts who can provide detailed advice on actions which may be taken as a result of the newly available information, such as separating cattle to limit the spread of disease and encouraging soil and water conservation activities. In addition to the radio communication of climate information, BBC Media Action is also training staff within the extension system so they can communicate the information at the community (kebele) level.

To further support the expansion of its programming coverage, they have also established listening groups among pastoralists in communities where access to the radio is limited.

Working with the government, or under its direction, creates both opportunities and challenges. The decision of donors and NGOs to operate as capacity-builders of the government is neither apolitical nor value-neutral. This approach reflects choices and priorities that are contested, as working within the governmental system may benefit some more than others, and may give the appearance of support for government practices that some citizens view as problematic. We need to recognize and better understand the politically-sensitive operational environment, in addition to the political nature of data and its use.

Alongside the changing nature of partnerships, NGOs have had to shift their activities, often moving into new thematic areas of work as well as new types of activities. The 'resilience agenda' has facilitated greater NGO engagement with climate information services, some NGOs newly doing so. Yet, the integration of climate, health, poverty and wellbeing is complex. The challenge with supporting change to agricultural and pastoral systems that would make them more resilient is that climate information is only one component of a broad array of information that influences decision making. For farmers and pastoralists there are a host of factors which inhibit the use of potentially effective practices, including a lack of resources and declining land holding sizes, unequal access to extension services, limited access to credit or insurance, and asymmetrical markets. NGOs working with the NMA, for example, have a limited ability to engage in these diverse aspects, as other government agencies are tasked with those respective spheres of work, such as the MoANR, MoEFCC, MoWIE or the EPA.

Furthermore, while the agricultural extension system is well-placed to communicate climate information at the local level, many government agencies and NGOs have placed a range of information communication, training and awareness raising tasks upon these workers – from soil and water conservation to input utilisation and climate smart agriculture. These responsibilities are not always congruent and present unrealistic responsibilities on an already over-burdened extension system (Cochrane and Adam 2017). Additionally challenging is the nature of climate information itself, which requires communicating probabilistic information that is often based upon regional station data with limited supporting historical study, causing challenges of accuracy that affects the reliability of the climate information itself. The education and training of agricultural extension workers within the higher education system should be revised to include relevant training about climate information and effective means of communicating this type of information. Once integrated into the training curricula, these components can be added to the standard extension packages within the MoANR. This would also assist in aligning the messaging across the governmental agencies and NGOs to enhance consistency and clarity to improve the understandability of those who receive climate information.

The new types of partnerships are such that NGO staff are doing less project management and implementation, and more coordinating, training, supervising and capacity building. Thus, it is not only with who NGOs partner, but how their engagement occurs, that is experiencing change. Not all NGOs are equally equipped with staff that have the skills, experience and knowledge that would effectively transition NGO activities to these new roles.

8. Conclusion

This paper discussed the development of Ethiopia's climate information services sector from the early 2000s until 2017, and in particular the evolution of the roles of key governmental agencies and NGOs. It has shown that national institutions, specifically the NMA, have expanded their activities in the collection, analysis and provision of climate information for stakeholders in the agriculture and livelihoods sectors, a task it previously was not heavily engaged in. This evolution took place within a time where international donors were becoming increasingly reluctant to fund emergency relief programmes in Ethiopia, particularly following the 1999-2000 and 2002-2003 droughts. International donors and partners of the Government of Ethiopia wanted to invest in efforts to reduce vulnerabilities and strengthen resilience, so as to move away from a reliance upon costly, emergency relief. Improved capacity, new analysis and regular reporting by governmental and non-governmental agencies demonstrated that climate information can have significant impact, and how this information can enable programmes to become more adaptive, tailored and efficient.

Several large donor-funded projects have taken different approaches to utilize climate information and enhance the provision of that information to diverse stakeholders. ACCRA, an NGO consortium, worked with lower levels of government to support the strengthening of planning for disaster risk reduction and climate change adaptation. Another group of NGOs, with projects funded by BRACED, worked with national level partners to build capacity and expand the type of activities engaged in – both on the evidence building and information communication sides of climate information services. The NMA has been a partner in most of these projects, being provided with resources and capacity in the process. In working with government agencies, NGOs have influenced the sector by experimenting with new innovations to make weather forecasts more accessible to smallholders, although efforts in the private sector have proven less successful due to resistance from the government.

NGOs have a strong incentive to form and maintain close relationships with government agencies in order to gain approval to operate and to obtain access to weather data. This will continue to mean that donor-financed projects contribute to the agenda of the Government of Ethiopia. The potential for delivering effective climate information to a diversity of stakeholders is likely to increase, given the expanded interest not just of the international donor community in climate information but also of key Ethiopian agencies. The rapid expansion of mobile coverage and use will also provide new modalities to directly communicate climate information – following the successful model of the Ethiopian Commodity Exchange (ECX). However, in order to ensure that efforts are implemented at scale and sustained, NGOs need to better coordinate and work with multi-stakeholder platforms. Improved coordination will further support the government to develop national frameworks and procedures to coordinate the delivery of climate information. In particular, current initiatives to train extension workers to deliver climate information should be continued in order to increase the capacity of the government to implement solutions at scale.

As the rise of climate information services took place, the role of NGO partnerships and the nature of their activities have changed. NGOs are increasingly supporting government agencies to better provide services and expand their repertoire of services offered, as opposed to being service providers themselves. This poses both challenges (new skills, knowledge and experiences required, narrowed scope of action) and opportunities (ability to affect change in national institutions affecting the entire population). All of these donor- and NGO-supported activities, however, run the risk of lacking sustainability – a concern raised by all participants in the workshop held to discuss climate information services in Ethiopia, wherein representatives from federal and regional government as well as NGOs were present. The concerns about sustained activity, including that of the NMA, remains a primary concern for all those involved in climate information generation and communication.

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The BRACED Knowledge Manager generates evidence and learning on resilience and adaptation in partnership with the BRACED projects and the wider resilience community. It gathers robust evidence of what works to strengthen resilience to climate extremes and disasters, and initiates and supports processes to ensure that evidence is put into use in policy and programmes. The Knowledge Manager also fosters partnerships to amplify the impact of new evidence and learning, in order to significantly improve levels of resilience in poor and vulnerable countries and communities around the world.

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