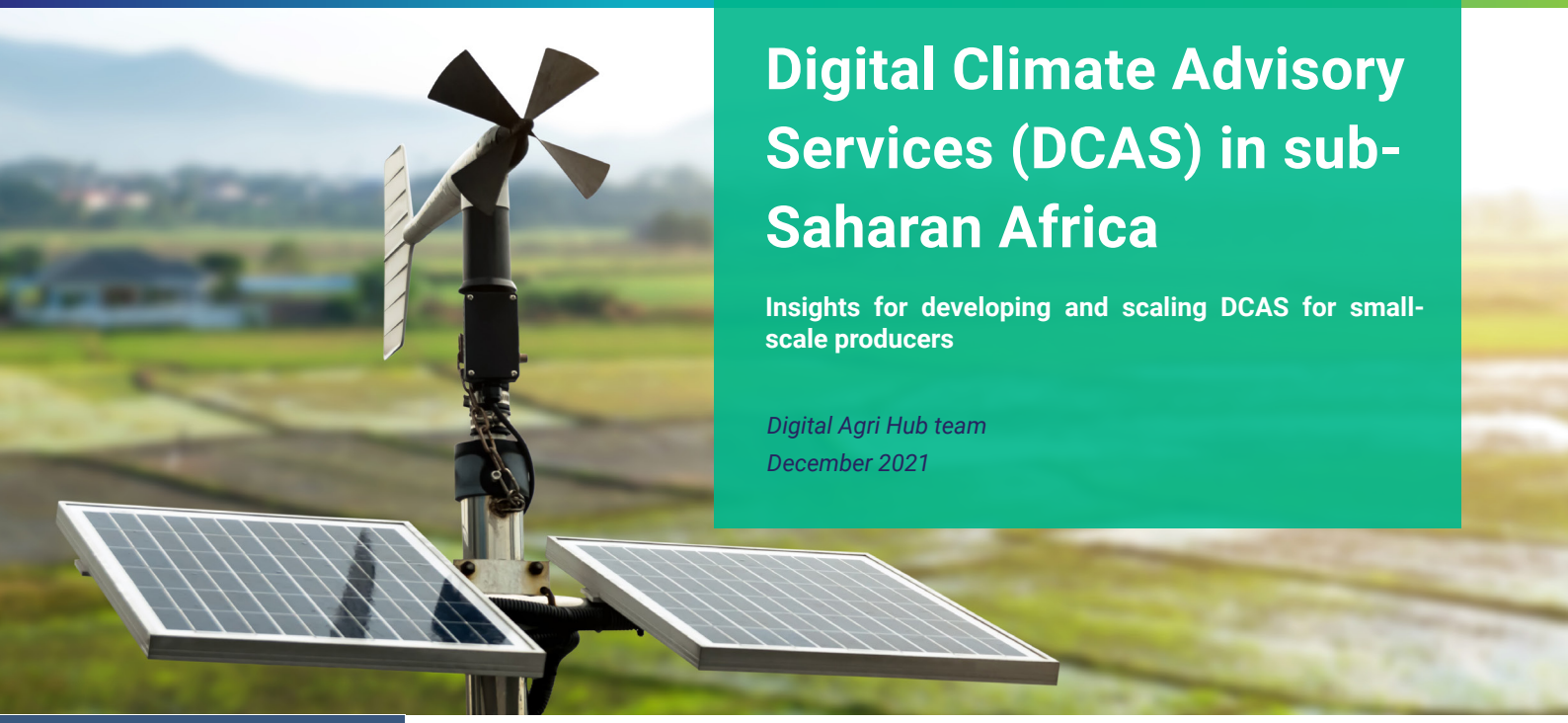
Digital Agri Hub

digitalagrihub.org



Digital Climate Advisory Services (DCAS) in sub-Saharan Africa

Insights for developing and scaling DCAS for small-scale producers

Digital Agri Hub team

December 2021

Scope of the info brief

To provide a country-level framework and insights for assessing the potential to develop and scale Digital Climate Advisory Services (DCAS). The framework is intended for service providers and other actors in the DCAS value chain, with a special focus on small-scale producers in sub-Saharan Africa.

BILL & MELINDA GATES foundation

UKaid from the British people

USAID FROM THE AMERICAN PEOPLE

Emerging insights

- When it comes to developing and scaling Digital Climate Advisory Services, countries in sub-Saharan Africa[1] differ significantly in at least three dimensions: 1) the institutional environment (the policy/regulatory framework, e.g. for data sharing); 2) the technical/infrastructure environment (e.g. penetration of mobile phones); and 3) the business environment (e.g. possible business carriers to partner with).
- Due to these differences, institutional, technical and business strategies for developing and scaling DCAS need to be adapted depending on the specific cases, following what in the assessment framework are indicated as possible 'pathways'.
- From the technical perspective, pathways may include the development of new products by DCAS providers, such as downscaled weather forecasts, or blending with data and products developed by National Meteorological Services (NMS) and their bundling (also to be seen from a business perspective) with other products and services.
- Other infrastructure-related factors, such as mobile phone and Internet penetration, cannot be easily influenced by a single DCAS provider, and need broader, multi-stakeholder partnerships (e.g. with mobile operators).
- From the institutional and business perspectives, in the case of national policies and regulations that give a strong role to the public sector, pathways lean towards public-oriented business models (Business-to-Government, B2G), with service contracts paid from national budgets or donor funding.
- When favoured by the institutional and business environment, pathways lean towards public-private partnerships (PPP).
- When establishing a PPP, a strategic focus is partnering with the 'right' actors in the DCAS value chain: providers of weather and climate products, knowledge organisations in the agricultural domain, ICT platform providers, mobile operators, scaling partners (such as extension services, non-governmental organisations), and a variety of potential business carriers (such as value chain aggregators and agribusiness, financial institutions and insurance companies, investors).
- The underlying business models of a PPP may range from Business-to-Business (B2B) to Business-to-Customer (B2C). Business models can also evolve over time (from B2G to B2B and B2C), and different ones co-exist.[2]

1 For our analysis we selected 10 countries: Ethiopia, Ghana, Kenya, Mozambique, Nigeria, Senegal, South Africa, Tanzania, Uganda and Zambia.

2 We would like to consider this report as complementary to other ongoing work; for instance, the Digital Climate Agriculture Playbook by Agrifin-Mercy Corps.

Target audience

Solution providers, investors and other stakeholders in the DCAS value chain.

Introduction

Digital Climate Advisory Services are of strategic importance in sub-Saharan Africa, and in low-and middle-income countries in general, as they provide essential information for farming. This is especially relevant for small-scale producers, since they mostly rely on rainfed agriculture, and pastoralists. This group's need for such services is especially acute given current climate variability, and is likely to become even more so in future due to climate change, which is expected to further exacerbate erratic rainfall distribution and increase extreme meteorological events.

The current state of DCAS in most of the countries considered here[1] is, however, constrained by chronic public underinvestment in the sector and lack of enabling environment for forging partnerships in the DCAS value chain.[3] Public-private partnerships could be a solution to the sustainable improvement of DCAS if policy/regulatory frameworks are in place that favour appropriate institutional arrangements, investments in infrastructure and business revenue models. It is therefore important to map the different actors and their roles in the value chain, as well as to assess the different environments, i.e. institutional, technical/infrastructure and business, so as to gain more insights on where and how to intervene in order to develop DCAS. Examples of areas of intervention to be explored include prospects for establishing partnerships with different actors, potential for scaling given the current ICT infrastructure and mobile penetration, and possible underlying business strategies and models. It is important to bear in mind that the above framework does not capture the further dimension of the impact of DCAS on the final beneficiaries – small-scale producers. Integrating this crucial element into the assessment goes beyond the scope of this report and will be part of future analyses and briefs. The importance of this aspect is, for instance, discussed in a recent report by the Food and Agriculture Organization of the United Nations (FAO, 2021).

Framework

The DCAS value chain

The concept of a value chain for climate-related services is not new, Nguyen et al., 2021, and Rogers and Tisrkunov, 2013. It refers to the various actors and processes needed to deliver DCAS, from the generation of weather and climate information to the delivery of products, services and feedback from users. There are several studies that attempt an evaluation of DCAS, adopting the perspective of the value chain, or in any case that of a multi-stakeholder assessment. Examples include: Rogers and Tisrkunov, 2013; Snow et al., 2016; Vaughan, Hansen, Roudier, Watkiss and Carr, 2019; Boogaard, Ceccarelli and Hoek, 2021.

Assessment

For this assessment, we are using proxy indicators for three environments, drawn from different sources:

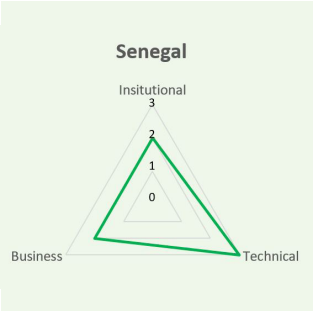
1. **Institutional/policy environment.** Any evidence of policy/regulatory framework on DCAS. Sources: existing reports (for example, see references in the previous section).
2. **Technical/infrastructural environment.** Network coverage for mobile phones (3G/4G); state of penetration of mobile phones (ownership); and percentage of population using Internet. Sources: GSMA Connected Society, 2020; GSMA Intelligence, 2020; ITU, 2020.
3. **Business environment**. For example, Enabling the Business of Agriculture (EBA) indicators; number of competitors (total DCAS service providers); level of donor funding (assuming funding enables a more enabling environment for PPP).

From the above indicators, we derive scores and draw profiles at country level. The scores for the three environments are represented by means of spider diagrams. Scores range from 0 (least favourable environment) to 3 (most favourable environment). The idea behind these indicators is that they can be constructed from secondary data only, and the assessment is therefore easily replicable for other countries and geographies.

Key findings

For most of the indicators and country profiles, we will be referring to the publication by Boogaard, Ceccarelli and Hoek, 2021, with some modifications: we have updated the technical/infrastructural indicators related to network coverage, mobile ownership and Internet use from the ITU Digital Development Dashboard. With regards to the business environment, we should, however, consider the adverse impact of the COVID-19 pandemic on the economies of most of the countries examined. We did take into consideration the future economic perspectives, mostly based on the African Development Bank Group (2021) although this did not result in a change in the scoring.

Senegal



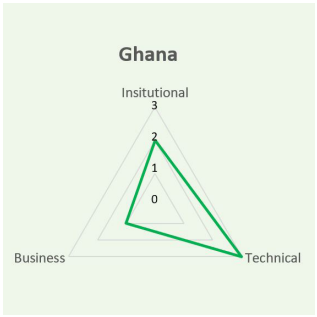
While there is no specific legislation concerning private sector participation in the delivery of weather information and services in Senegal, there is a consultative platform for the public and private sector, fostering regular cooperative dialogue. Evidence of openings to private sector providers in running the services is limited, except for the delivery segment, e.g. through radio broadcasting. In Senegal there is also very good capacity in the domains related to DCAS and a collaborative attitude among institutional actors. Overall, this leads to an institutional environment score that is intermediate.

3 Typically including providers of weather and climate products, knowledge organisations in the agricultural domain, ICT platform providers, mobile operators, scaling partners, and potentially one or a variety of business carriers.

Senegal scores well on the technical and infrastructure dimension, as network coverage is high (99%), Internet usage is relatively high, and smartphone ownership is expected to show considerable growth.

The business environment score is average due a moderate number of agro-meteo services and substantial funding from the international community. Examples of agro-meteo services are FieldFocus by 6th grain, mAgri platform/agCelerant by Manobi SA and Ignitia. It should be noted that international climate funding mainly targets climate change in coastal regions. On the other hand, Senegal is one of the countries where USAID has made substantial investment (US funding in agriculture 2011-2017).

Ghana

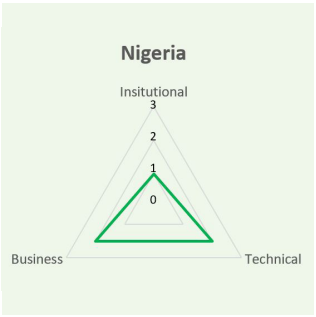


The institutional environment in Ghana is relatively favourable, because the general policy environment is sufficiently open, and the legal framework does not limit agro-meteo services. There is evidence of the establishment of PPPs by the NMS, i.e. GMet, and the level of local institutional actors is high. This gives an overall favourable institutional environment.

On the technical-infrastructure side, Ghana scores above average. Network coverage is high (97%), Internet usage relatively high, and smartphone ownership is expected to show considerable growth in the future.

There are many services already active, including weather providers such as Ignitia, aWhere, TAHMO (in collaboration with IBM weather company) and the Ghana met office (for example, in partnership with Esoko). This means that there is strong competition, leading to a low score in the business environment. Funding from the international community in the climate sector is relatively low, although the USA has invested substantially (US funding in agriculture 2011-2017). This has enhanced preparedness for the forming of PPPs around agro-meteo services.

Nigeria



In principle, Nigeria has been opening up the government sector and services to the contribution of the private sector. However, specifically with reference to weather and DCAS, current legislation does not allow the participation of other entities in the provision of information and services, in other words, the Nigerian Meteorological Agency NIMET is the sole provider. Despite statements that it is open to PPPs, there is little evidence of engagement by NIMET with the private sector to date. The above factors yield a low score in terms of the overall institutional environment.

For the technical environment, Nigeria has an average score: the growth curve for smartphone ownership is less steep than, for example, Ghana and Senegal; Internet use and network coverage (91%) is lower than in both these countries.

We found a limited number of operational agro-meteo services (FieldFocus by 6th grain, Smartfarm by CropIn, Farmerline, Ignitia), although the site www.seedstars.com/ states that Nigeria is dominating the agritech market. International funding of climate-related initiatives is somewhat low. Altogether, this leads to an average score in terms of the business environment. It would be interesting to further explore to what extent external weather providers operate in the above-mentioned services (e.g. Ignitia), and how they cooperate with NIMET.

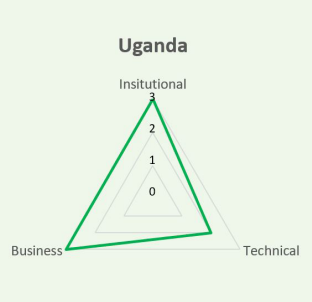
Ethiopia

The current institutional and technical environments in Ethiopia are relatively unfavourable. Despite reasonable network coverage the current infrastructure leaves much to be desired, notwithstanding some openings in the mobile phone sector.

A positive score in terms of business environment is related to the scarcity of service providers operating in this domain at present (and hence, in principle, to low competition). However, this reflects very limited room for providing services, if not under the NMS, which is the mandated body given the current policy and legal framework, despite some positive openings from government in promoting PPPs. Also, the level of donor funding for Ethiopia is substantial, especially from the USA; all this suggests that services will be based on large donor- and public-funded initiatives for some time to come. Any potential partnerships will have to include government organisations, including the National Meteorological Agency, the Ministry of Agriculture and the Agricultural Transformation Agency. There are several providers that can operate delivery platforms of weather services, although they ultimately rely on Ethio telecom, which so far retains a monopolistic position for SMS and interactive voice response (and in perspective, Internet-based) services.

Uganda

There is a specific enabling environment for revenue generation in Uganda, providing the Uganda National Meteorological Authority (UNMA) with the legal authority to market weather and climate information products and services. This also allows partnerships to be formed with existing commercial information companies. Together with a generally favourable policy environment and organisational readiness, this makes it attractive to consider operating in a PPP set-up. As a downside, there is limited coordination between organisations potentially operating in the value-chain.

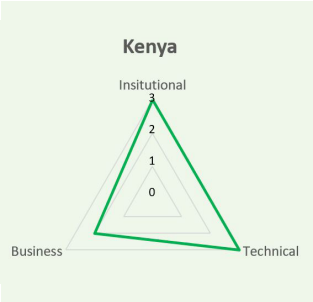


The technical environment is only relatively favourable, with good network coverage (98%), but lower than average indicators of mobile penetration and Internet use.

In terms of competition, the business environment does appear favourable due to the limited number of agro-meteo services. Services found are M-Shamba, Farmerline, Ensibuuko and Climacell (early stage). Furthermore, the international community has been active in working together with local government and organisations. Funds covering agro-meteo services included the Adaptation for Smallholder Agriculture Programme (ASAP), Global Climate Change Alliance (GCCA), Least Developed Countries Fund (LDCF) and the Green Climate Fund (GCF), including projects such as strengthening climate information and early warning systems. Altogether this leads to a high score.

Kenya

The overall policy environment for establishing PPPs is highly favourable in Kenya. Although there is no specific legislation concerning collaboration with the private sector in the weather- and climate- related domain, in real terms private service providers are permitted to develop added value services. Kenya has many institutional partners with high capacity, operating in relevant fields for the value chain. This results in a high score in terms of institutional environment openness.

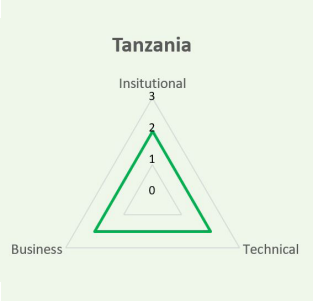


Kenya scores high on the technical environment, with a network coverage of 96%, although in terms of penetration of mobile telephones and Internet use it has lower values than in countries such as Ghana and Senegal.

The number of services is high, with an active role played by the Kenya Meteorological Department (KAOP, M-Farm, IShamba, PAD). Besides, aWhere is partnering in several services such as iShamba and UjuziKilimo, and Weather Impact is part of the CropMon initiative. The international community is stimulating climate-related research and services through substantial investments. This confirms an open and enabling environment for private initiatives.

Tanzania

Although the Tanzania Meteorological Agency (TMA) is the only mandated institution for the provision of weather services in this country, there is a generic legal framework for PPPs and, more specifically, a national strategy under development for the exchange of weather and climate information. However, TMA is not currently equipped to engage effectively with private partners and evidence of a capacity/collaborative attitude is limited. The overall institutional environment score is therefore intermediate.



The country has an average score for the technical/infrastructural environment, as its mobile phone penetration is relatively high (61%). Network coverage and Internet use are average compared with the other countries.

There are several agro-meteo services, such as FieldFocus by 6th grain, Esoko and Tigo Kilimo. International funding is substantial, specifically from USA, but also from international climate funds, including the Adaptation Fund (AF), Least Developed Countries Fund (LDCF), Global Climate Change Alliance (GCCA). One of these financed projects specifically focuses on strengthening climate information and early warning systems in Tanzania. Finally, although this was not included in the score, there are quite a number of DCAS that may not have weather information as part of their service: Farmforce, Eprod, Arifu, One acre fund, Viamo, Connected Farmer by Mezzanine Ware/Vodacom, FarmRadio, FarmAfrica and PICSA. There is competition, but also potential space for partners and international initiatives to hook onto.

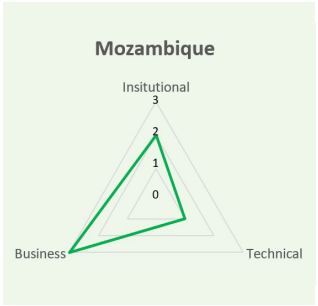
Zambia

The general policy and regulatory framework in Zambia is positive and there are some openings, specifically in the national meteorology policy, which will allow the NMS (The Zambia Meteorological Department, ZMD) to generate additional revenues through the marketing of weather and climate information. ZMD's current situation is that of limited capacity, due to deteriorating infrastructure and shortage of technical staff. The overall score for this dimension is intermediate.

As to the technical environment, the score is low due to relatively low network coverage (87%), and the limited level of Internet usage and mobile phone penetration.

There are not many agro-meteo services. Services are, for instance, FieldFocus by 6th grain and Olam. Large-scale international funding on climate comes from several funds, including a project, financed by the Pilot Program for Climate Resilience (PPCR), which targets the private sector in support of climate resilience.

Mozambique

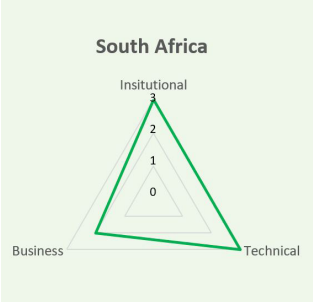


Although the legal and policy framework seems to indicate An enabling environment for the future, there is currently limited evidence of collaboration of mandated organisations with private companies and opening towards PPPs. Also, the capacity of institutional actors in the value chain is only average. This leads to an intermediate scoring in the institutional sphere.

The technical environment score is low due to limited network coverage (85%), mobile phone penetration and very limited Internet usage (8%).

Business perspective scores high. There are few other agro-meteo services (e.g. Smartfarm by CropIn and Farmerline) and there was/is substantial international investment by donors on climate adaptation and early warning, e.g. the Pilot Program for Climate Resilience (PPCR) and Global Climate Change Alliance (GCCA), leading to a more favourable environment to explore possible PPPs.

South Africa



The legal framework, in general terms and specific to the NMS, allows the South African Weather Service to develop both public good services that are funded by government and paid-for commercial services. This favours the involvement of the private sector. South Africa has numerous centres of excellence, which can provide high-level knowledge partners in the value chain. The overall institutional environment score is therefore high.

South Africa also scores high on the technical dimension, with 100% of network coverage, and comparatively high mobile penetration (78%) and use of Internet (56%).

We found a moderate number of agro-meteo services, such as FieldFocus by 6th grain, Africa Weather (with NMS), Manstrat Agricultural Intelligence Solutions, Olam, Weather Impact (Rain4Africa), and an early stage service called Ulima by TechnoBrain. Adding the low funding from the international community, we returned an average score. For South Africa, the level of donor investments is probably a less relevant indicator of the business environment compared with capital investments, which are higher than in many African countries.

Lessons learned

The proposed assessment framework allows us to evaluate the possibilities from the standpoint of different actors in the value chain. For example, if we choose a commercial service provider view, several DCAS development pathways can be undertaken, depending on the country and the three different environments considered. In the case of an 'unfavourable' institutional environment, the pathway would focus on developing a public-oriented business model (B2G), with strong collaboration with the NMS, relying on donor and government subsidised contract services. This is the case, for instance, in Ethiopia. It is also important to aim at a multi-year perspective, allowing the consolidation of the service, for example, in terms of improvement of the quality of the forecasts, also partnering with knowledge organisations with a recognised reputation, and possibly moving towards forms of more commercially attractive PPPs. An almost opposite case is when a 'level playing field' is established for commercial service providers. In

this case, the need for establishing PPPs is not that pressing, and limited agreements, e.g. for provision of weather station data, can probably suffice. In principle, both B2B and B2C models can be pursued. Based on the country profiles, this second pathway applies to countries such as Kenya, South Africa and Uganda. However, commercial partnerships with the 'right' local (private and to some extent public) partners seem advisable, as current trends point to the need for bundling services (on information and/or goods) to sustain the services.

To effectively deliver the service to the 'last mile' – the farmer, a DCAS provider would most likely need local partners, such as a mobile network operator, public extension services or agribusinesses, for inputs such as fertiliser and seeds, or as off-takers buying the produce, operating in specific value chains. In fact, it is difficult to see an easy scalable business model without collaboration among actors in the value chain. Moreover, a trend is observed where there is a transition from B2C to B2B models and a preference for the latter (Boogaard et al., 2021). This is mainly due to questions over the willingness (or rather ability) to pay for such services by small-scale producers in Africa -while B2B models supporting bundled services offer other revenues with possibly higher margins.

References

1. African Development Bank Group. (2021). *African Economic Outlook 2021*. ADBG.
2. Boogaard, H., Ceccarelli, T., & Hoek, S. (2021). *Developing agro-meteorological services in Sub-Saharan Africa: a scoping study*. Wageningen: Wageningen Environmental Research. Retrieved from https://research.wur.nl/en/publications/developing-agro-meteorological-services-in-sub-saharan-africa-a-s
3. FAO. (2021). *Global outlook on climate services in agriculture – Investment opportunities to reach the last mile*. Rome: Food and agriculture organisation of the United Nations.
4. GSMA Connected Society. (2020). *The State of Mobile Internet Connectivity 2020*. London, UK: GSMA. Retrieved from https://www.gsma.com/r/wp-content/uploads/2020/09/GSMA-State-of-Mobile-Internet-Connectivity-Report-2020.pdf
5. GSMA Intelligence. (2020). *The Mobile Economy Sub-Saharan Africa 2020*. London, UK: GSMA. Retrieved from https://www.gsma.com/mobileeconomy/wp-content/uploads/2020/09/GSMA_MobileEconomy2020_SSA_Eng.pdf
6. ITU. (2020). *Measuring digital development, Facts and Figures*. ITU Publications. Retrieved from https://www.itu.int/en/ITU-D/Statistics/Documents/facts/FactsFigures2020.pdf
7. Nguyen, D., Dam, V., Le, T., Simelton, E., Swaans, C., & Barlis, A. (2021). Climate service value chain towards end users. *Agro-Climate Services: Needs and Opportunities*. Hanoi: CARE International in Vietnam and Vietnam Institute of Meteorology, Hydrology and Climate Change (IMHEN). Retrieved from CGIAR: https://ccafs.cgiar.org/resources/publications/climate-service-value-chain-towards-end-users
8. Rogers, D., & Tisrkunov, V. (2013). *Weather and Climate Resilience: Effective Preparedness through National Meteorological and Hydrological Services. Directions in Development*. Washington D.C.: World Bank. Retrieved from https://www.researchgate.net/publication/272094720_Weather_and_Climate_Resilience_Effective_Preparedness_through_National_Meteorological_and_Hydrological_Services_Directions_in_Development_Washington_DC_World_Bank_doi101596978-1-4648-0026-9
9. Snow, J. T., Biagini, B., Benchwick, G., George, G., Hoedjes, J., Miller, A., & Usher, J. (2016). *A New Vision for Weather and Climate Services in Africa*. New York, USA: UNDP. Retrieved from http://www.undp.org/content/dam/undp/library/Climate%20and%20Disaster%20Resilience/WeatherAndClimateServicesAfrica.pdf
10. Vaughan, C., Hansen, J., Roudier, P., Watkiss, P., & Carr, E. (2019). Evaluating agricultural weather and climate services in Africa: Evidence, methods, and a learning agenda. *WIREs Climate Change, 10*(4), e586. Retrieved from https://wires.onlinelibrary.wiley.com/doi/full/10.1002/wcc.586

Digital Agri Hub is developed by Wageningen University and Research (WUR), in partnership with GSMA, Grameen Foundation and the Netherlands Advisory Board on impact investing (NAB); and funded by the Bill & Melinda Gates Foundation, the United Kingdom's Foreign, Commonwealth & Development Office (FCDO) and the United States Agency for International Development (USAID). The views expressed here do however not necessarily reflect the views of the Bill & Melinda Gates Foundation, FCDO, USAID, the United Kingdom Government or the United States Government.