GLOBAL CENTER ON ADAPTATION

Adaptation Insights *03*

FOOD SECURITY

A Practical Roadmap for Scaling Digital Climate Advisory Services in Africa

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Authors & Acknowledgements

Adaptation Insights: A Practical Roadmap for Scaling Digital Climate Advisory Services in Africa is the result of a collaborative effort between the Global Center on Adaptation (GCA), the Consultative Group on International Agricultural Research (CGIAR), and the International Center for Tropical Agriculture (CIAT).

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It draws on the expertise and insights developed through GCA's collaboration with the CGIAR to support the integration of adaptation and resilience solutions within investment projects under the Africa Adaptation Acceleration Program (AAAP).

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GLOBAL CENTER ON ADAPTATION

ABOUT THE GLOBAL CENTER ON ADAPTATION

The Global Center on Adaptation (GCA) is an international organization, hosted by the Netherlands, which works as a solutions broker to accelerate action and support for adaptation solutions from the international to the local, in partnership with the public and private sector, to ensure we learn from each other and work together for a climate resilient future.

CGIAR

ABOUT THE CGIAR

The CGIAR is an international organisation which undertakes research for development, in partnership with public and private sector actors, that advances food security, poverty alleviation, social inclusion and climate change adaptation and mitigation in the agriculture and food sector. Under AAAP, GCA and CGIAR have a partnership to accelerate the scaling of adaptation solutions developed by CGIAR into large development initiatives.

AFRICAN DEVELOPMENT BANK GROUP

CIAT

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Abbreviations

Acronyms	Definitions
AAAP	Africa Adaptation Acceleration Program
AICCRA	Accelerating Impacts of CGIAR Climate Research for Africa
API	Application Programming Interface
AU	African Union
BCR	Benefit–Cost Ratio
B2B	Business-to-Business
B2G	Business-to-Government
BREFONS	Program to Build Resilience for Food and Nutrition Security in the Horn of Africa
CC	Climate Change
CCAFS	CGIAR Research Program on Climate Change, Agriculture and Food Security
CCDR	Country Climate and Development Report
CIAT	International Center for Tropical Agriculture
CIS	Climate Information Services
CRM	Customer Relationship Management
DACAS	Digital Agro-Climate Advisory Services
DAES	Department of Agricultural Extension Services (Malawi)
DCCMS	Department of Climate Change and Meteorological Services (Malawi)
DCAS	Digital Climate Advisory Services
DRC	Democratic Republic of Congo
EW4All	Early Warnings for All
FAO	Food and Agriculture Organization
FCDO	UK Foreign, Commonwealth and Development Office
FSRP	Food Systems Resilience Program
GDP	Gross Domestic Product
GF	Gates Foundation
GEE	Google Earth Engine
GCA	Global Center on Adaptation
GSMA	GSM Association
IFAD	International Fund for Agricultural Development
IFI	International Finance Institution
IGAD	Intergovernmental Authority on Development
IoT	Internet of Things
IRR	Internal Rate of Return
IVR	Interactive Voice Response
MNO	Mobile Network Operator
NPV	Net Present Value

PICSA	Participatory Integrated Climate Services for Agriculture
PPP	Public–Private Partnership
RCT	Randomised Controlled Trial
REC	Regional Economic Community
ROI	Return on Investment
SAPP-II	Sustainable Agricultural Production Programme – Phase 2 (Malawi)
SDG	Sustainable Development Goal
SMS	Short Message Service
SSA	Sub-Saharan Africa
USSD	Unstructured Supplementary Service Data
WISER	Weather and Climate Information Services for Africa
WMO	World Meteorological Organization

Foreword

Across Africa, climate change is no longer an abstract projection—it is a daily reality for millions of farmers. Growing seasons now start later and end unpredictably. Heatwaves arrive earlier and last longer. Rains fail when they are most needed or fall suddenly just as crops are ready for harvest. These shocks - more frequent, more intense, and more uncertain - are reshaping food production across the continent. As a result, knowledge once passed down reliably through generations can no longer guide decisions in the field with the same confidence

In this new reality, every farmer, from those cultivating a single hectare to those supporting entire cooperatives, needs timely, trusted, plain-language guidance in the languages they speak and through the channels they use. They need to know when to plant, what varieties to choose, how to manage soils and inputs, when to protect their crops from pests or storms, and when to expect rainfall, dry spells, temperature spikes, or damaging winds. That is why Digital Climate Advisory Services (DCAS) have become indispensable. DCAS translate complex climate and agronomic data into simple, actionable advice that helps farmers navigate an increasingly volatile climate.

Recognising this need, the Global Center on Adaptation co-published the Blueprint for Digital Climate Advisory Services in 2021, setting out a global agenda to scale DCAS for smallholder farmers. Since then, our work through the Africa Adaptation Acceleration Program has moved from vision to implementation. Together with governments, international finance institutions and regional partners, GCA has influenced DCAS components in 17 major development initiatives, representing US$ 3.6 billion in investment. These programmes have the potential to improve the resilience of more than 18 million farmers across the continent.

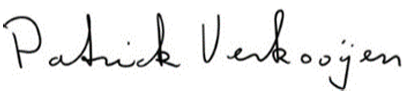
But progress has also brought important lessons. Scaling DCAS is not simply a technological challenge. It requires addressing systemic barriers such as fragmented delivery systems, inconsistent data quality, financial models that collapse after pilot phases, limited coordination across ministries and inequities that can leave behind the very farmers most vulnerable to climate change. These challenges are well known but until now they have not been brought together into a practical roadmap for change.

This publication responds to that need. Drawing on GCA's work across Africa, on emerging evidence from global partners and on deep collaboration with CGIAR, it identifies the structural barriers preventing DCAS from reaching their full potential. It sets out six guiding principles for designing DCAS that are reliable, inclusive and trusted and five accelerators that countries and partners can prioritize to move from promising pilots to sustainable, scalable national systems.

The message of this report is clear: DCAS can be one of the most powerful tools African farmers have to adapt to climate change but only if we build systems that are financially durable, grounded in high-quality data, co-created with farmers, equitable by design and supported by coherent policy and institutional leadership. Achieving that will require the combined strength of governments, IFIs, the private sector, research institutions and civil society.

GCA remains committed to this agenda. Working with CGIAR and partners across the continent, we will continue to help countries design, finance, and scale DCAS systems that put farmers at the centre and deliver impact where it matters most: on the ground, in the hands of those who feed the continent.

Climate change is rewriting the rules of agriculture. With DCAS, we have the opportunity and the responsibility to ensure farmers are not left to face this uncertainty alone.

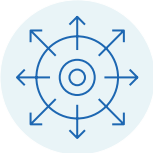


Professor Patrick V. Verkooijen
President & CEO
Global Center on Adaptation

Executive Summary

Climate urgency: Africa faces escalating climate risks—five of the continent's 30 worst weather disasters occurred between 2022–2023, affecting over 221 million people.

Digital opportunity: Mobile penetration is rising—44% of Africans have mobile subscriptions, creating unprecedented reach for climate-smart advisories.



Proven impact: ROI estimates range from **1:24 to 1:47**, with benefit–cost ratios up to **26:1**; yield gains of **10–30%** documented in Rwanda, Ethiopia, and Kenya.

Systemic barriers: Fragile business models, data and connectivity gaps, policy fragmentation, and equity risks hinder scale.

DCAS as a system: DCAS is not a standalone app—it must be embedded in national systems and bundled with services farmers already value.

Digital Climate Advisory Services (DCAS) are widely recognized as essential for climate adaptation in African agriculture. These practical tools—SMS alerts, voice messages, radio bulletins, and mobile applications—translate climate and agronomic data into actionable guidance that helps farmers manage climate risks.

The case for scaling DCAS is compelling. Africa's climate threat is intensifying, with five of the continent's 30 worst weather disasters since 1900 occurring between 2022–2023. Meanwhile, 44% of Africans now have mobile subscriptions, creating unprecedented reach. Evidence confirms impact: meta-analysis of SMS programs covering 128,000 East African farmers found a 22% increase in adoption of recommended practices, while synthesis studies demonstrate clear pathways from climate services to improved food security.

Yet scaling faces systemic barriers: fragile business models, data and connectivity gaps, policy fragmentation, and limited evidence sharing. These challenges risk undermining progress unless addressed through coordinated action.

Africa is undergoing a digital revolution, with mobile internet penetration projected to reach 37% by 2030. This surge, combined with improved capacity at national meteorological agencies and regional climate centers, creates the infrastructure for cost-effective rural outreach. DCAS can complement traditional extension services, which remain limited—only 0.1 to 1 officer per 1,000 farmers in most countries—by delivering timely, location-specific advisories at scale.

Evidence shows that DCAS programs deliver strong returns on investment. Benefit–cost ratios range from 7:1 to 26:1, and ROI estimates reach 1:47 in Ethiopia. Yield gains of 10–30% have been documented in Rwanda, Ethiopia, and Kenya, alongside resilience dividends such as avoided losses during drought years. These results underscore DCAS' potential to transform African agriculture and strengthen food security.

To unlock this potential, the report identifies six guiding principles: plan for sustainability, ensure data quality, build for scale through partnerships, design for equity, co-create locally, and maintain openness and accountability. It also outlines five accelerators to achieve continent-wide scaling by 2030: strengthening climate data and digital infrastructure, farmer-centric design and capacity, sustainable business models and finance, policy integration and institutional coordination, and global public goods and knowledge commons.

The next five years are decisive. With coordinated action across governments, international finance institutions, private sector, and research partners, DCAS can move from scattered pilots to a dependable part of African agriculture—locally led, fiscally sensible, and trusted by farmers.

KEY RECOMMENDATIONS

- **Embed DCAS in national systems:** Integrate into adaptation plans, budgets, and telecom policy for public-interest delivery.
- **Invest in data and infrastructure:** Modernize meteorological services, expand observation networks, and improve rural connectivity.
- **Scale through existing channels:** Bundle advisories with insurance, input credit, and procurement systems; leverage PPPs.
- **Design for inclusion:** Prioritize women, youth, and low-literacy farmers through multi-channel delivery and digital literacy programs.
- **Ensure financial durability:** Use blended finance, outcome-based payments, and transparent unit economics to sustain services.
- **Strengthen governance and standards:** Harmonize data protocols, enable interoperability, and establish clear service-level agreements.
- **Build evidence and share learning:** Publish performance dashboards, replicate proven models, and convene communities of practice.

Introduction

What are Digital Climate Advisory Services (DCAS)? DCAS are a range of practical tools and services that integrate climate information into agricultural decision-making, helping farmers adapt to climate variability and change (Ferdinand et al., 2021). They include SMS or voice alerts in local languages, radio bulletins, call centres, and mobile tools that provide local forecasts, planting windows, management tips and market information, among others. By closing the data-to-information-to-decision-to-action loop, DCAS reach last-mile beneficiaries, thus strengthening climate resilience at scale.

Digital advisories can also be combined with other services, such as market information, agricultural credit, crop or livestock insurance, input provision (e.g. fertilizer, seed, ploughing services) and output purchasing. The business case for DCAS may indeed rest on the provision of such other services rather than the advisories alone (Ouedraogo et al., 2023).

DCAS for whom? While farmers are the primary beneficiaries, DCAS is also valuable for other players – all along the value chain, e.g. for government, NGOs, extension services, private sector input suppliers to plan for which inputs are appropriate, for off-takers to understand likely production levels and to plan transport and storage needs (Figure 1).

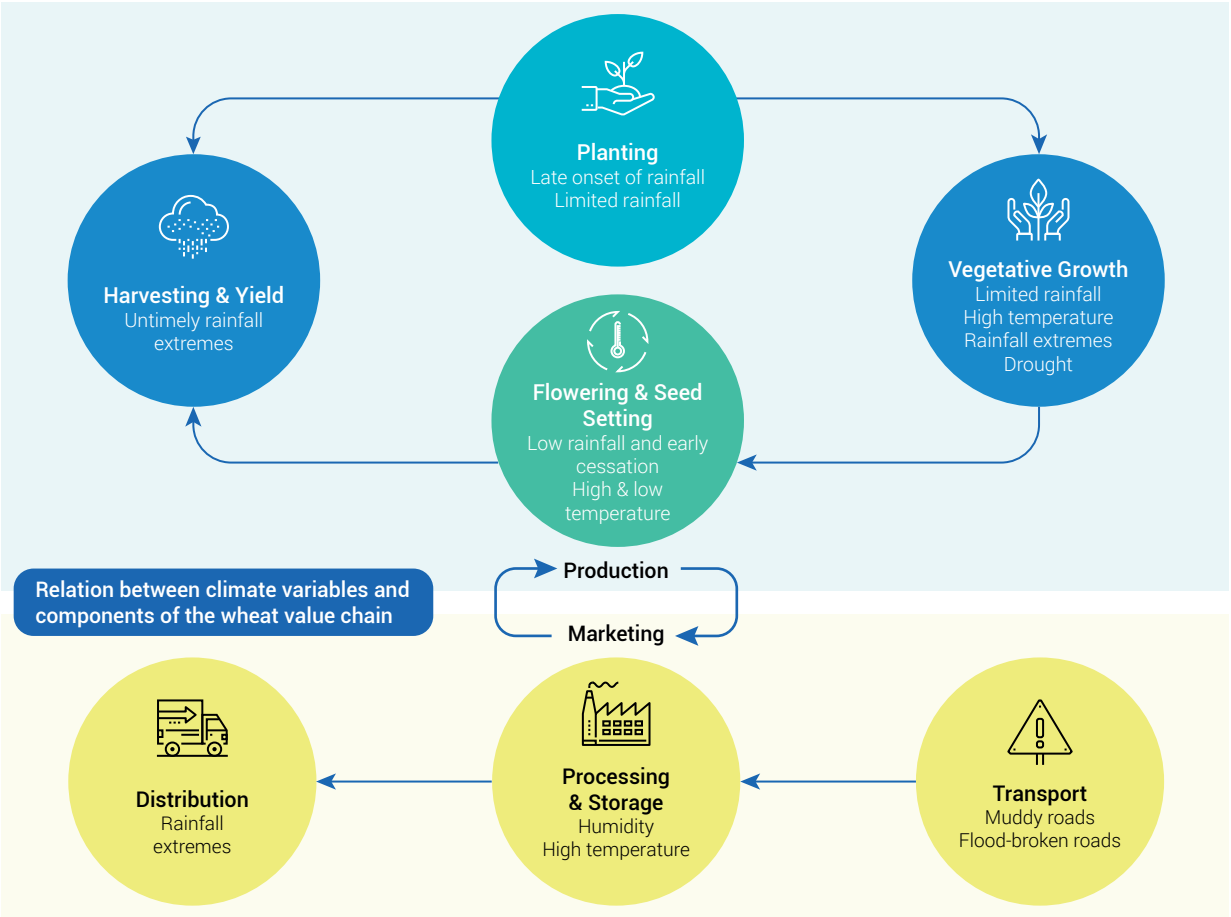


Figure 1. Relation between climate variables and food value chains, using the wheat value chain in Ethiopia as an example (redrawn from Mekuriaw et al., 2023). Agricultural advisories and adaptation solutions are relevant to many players in the value chain.

Image: © Manon Koningstein

Why DCAS, Why Now? Several converging factors make DCAS a strategic priority today.

First, the climate threat to African agriculture is immediate and intensifying—five of Africa's 30 worst weather disasters since 1900 occurred between 2022 and 2023, with over 221 million people affected by extreme weather in the 2021-2025 period, more than the combined total from the previous ten years (Yale Climate Connections, 2023; Down To Earth, 2025; WMO, 2024). For example, over the past 20 years, Madagascar has been hit by 35 cyclones, 8 floods, and 5 severe drought periods (World Bank Group, 2024). Climate-related disasters have taken a large financial and human toll: total losses from cyclones in 2020 alone were equivalent to 4.8 percent of GDP. Farmers urgently need timely, location-specific advisories to manage risks like erratic rains, droughts, floods and emerging pests.

Second, Africa is experiencing a digital revolution. As of 2023, 44% of Africans have unique mobile phone subscriptions (527 million), with mobile internet penetration at 27% (GSMA, 2024). By 2030, mobile internet penetration is projected to reach 37%. This digital surge, combined with strengthened capacity at national meteorological agencies and regional climate centers to generate timely climate information (Omukuti et al., 2023), creates the infrastructure for cost-effective rural outreach.

Third, evidence confirms that digital advisories deliver tangible benefits – see "The business case for DCAS".

Fourth, DCAS can facilitate scale where traditional extension cannot. Over 50 million farming families in Sub-Saharan Africa (SSA) – mostly small-scale producers – need resilience-building information, but public extension services are limited – only 0.1 to 1 officer per 1,000 farmers in most countries (AGRA, 2021). DCAS can reach farmers via voice messages and images, overcoming both geographic and literacy barriers that limit traditional services.

This paper examines the progress made in advancing DCAS in SSA and identifies strategic priorities for accelerating DCAS scaling. The key target audience includes members of the broader DCAS community (Box 1), but particularly those investing in and implementing DCAS initiatives. Evidence suggests there is growing momentum (e.g., digitalization of Africa), supporting data (e.g., the business case), established principles for quality implementation, and clear strategic priorities for scaling DCAS. Substantial strategic investment and effective business models are now required to establish and operationalize DCAS as accelerators of climate resilience at scale. Despite compelling evidence for DCAS effectiveness, scaling faces systemic barriers—fragile business models, data gaps, and policy fragmentation—that this paper addresses through six guiding principles and five accelerators.

Box 1. Different players in the DCAS community

- Public-led national platforms. Government agencies publish data, set simple quality standards, and deliver advisories through extension and public media. Examples include Kenya's observatory platform, Malawi's DCCMS–DAES workflow and Rwanda's attention to national climate services (Box 4). These models build trust and continuity, and make it easier for others to plug in.

- Private-led services. Regional agritech firms, social enterprises and food production and processing companies run SMS, IVR, and app-based advisories, sometimes with advanced analytics (e.g., pest or planting windows). They grow fastest when they integrate with public data, work through cooperatives and input/credit schemes, and agree on service-level commitments with ministries.

- Civil society delivery. Radio networks, farmers' organizations, and NGOs excel at last-mile communication and training, especially for women and low-literacy users. They turn technical guidance into plain language and local languages and run feedback loops that improve content.

- Public–private partnerships (PPPs). The most durable models blend public trust and reach with private speed and product fit. Typical arrangements include zero- or low-cost public-interest messaging through telecoms, advisory modules embedded in input/credit or insurance products, and shared dashboards so ministries can monitor quality and use.

01

The business case for DCAS

The business case for DCAS

1.1 Evidence Base for DCAS

Peer-reviewed evaluations demonstrate that digital agricultural advisory services, while showing modest average effect sizes, achieve high cost-effectiveness through ultra-low delivery costs (Table 1). Meta-analysis of six SMS-based programs covering 128,000 farmers in East Africa found a 22% increase in the odds of adopting recommended practices, with benefits exceeding information transmission costs by orders of magnitude (Fabregas et al., 2025). Synthesis evidence across multiple countries shows moderately strong pathways from climate services to improved food security through farmers' risk management decisions (Hansen et al., 2022).

Table 1: Peer-Reviewed Evidence on Digital Agricultural Advisory Services

Outcome	Context	Effect	Delivery Mode	Study
Adoption of recommended practices	East Africa, 128,000 farmers across six Random Controlled Trials (RCTs)	22% increase in odds of adoption; cost-effective despite modest absolute impacts	SMS-based extension	Fabregas et al., 2025 (AEJ: Applied Economics)
Climate services to food security pathways	Multi-country synthesis, 18 farmer evaluations	Moderately strong evidence for productivity and income benefits through risk management	Mixed: radio, SMS, extension, participatory	Hansen et al., 2022 (Climate Risk Management)
PICSA participatory approach	Ghana, Rwanda, 7-country synthesis	High share of farmers change practices; locally relevant	Participatory planning with seasonal forecasts	Clarkson et al. 2022 (Climate Services)
Network-based targeting	Malawi, agricultural technologies	Network targeting outperforms business-as-usual extension	Lead farmers and peer networks	Beaman et al., 2021 (AER)
Voice-based advisory	India, rice farmers RCT	Increased adoption of recommended inputs and practices	IVR (Interactive Voice Response)	Cole & Fernando, 2021 (Economic Journal)

1.2 High Returns on Investment

DCAS consistently deliver strong economic returns across diverse contexts and evaluation methodologies. The Blueprint for Digital Climate-Informed Advisory Services estimated an average ROI of 1:24—meaning every $1 invested yields approximately $24 in economic benefits through avoided losses and increased yields (Ferdinand et al., 2021). Rigorous independent evaluations corroborate these findings. A two-year randomized controlled trial by TomorrowNow.org, One Acre Fund, and KALRO across nearly 10,000 farmers in five Kenyan regions found that SMS-delivered forecasts increased yields by 12%—a statistically significant impact achieved through ultra-low-cost digital delivery (Tomorrow.io, 2025). The UK-funded WISER programme demonstrated a 7:1 to 26:1 benefit-cost ratio, generating over £200 million in socio-economic benefits across East Africa (UK Met Office, 2021). In Ethiopia, a recent analysis found an ROI of 1:47 over five years (Lersha-CIMMYT, n.d.). These returns stem from improved farm productivity, input use efficiency, and broader agricultural stability.

Farmer Productivity and Income Gains: Climate advisories have raised farmers' yields by 10–30% across various contexts (Ferdinand et al., 2021). Rwanda's climate services programme (2016–2019) trained over 111,000 farmers in the Participatory Integrated Climate Services for Agriculture (PICSA) approach. Rigorous evaluation showed that PICSA participation increased the value of crop production by 24% and income from crops by 30% relative to non-participants; when combined with Radio Listener Clubs, these gains rose to 47% and 56% respectively (Birachi et al., 2020). In Ethiopia, site-specific climate advice boosted wheat yields by 25% and net incomes by US$600/ha per season (Ehui and Odeh, 2025; Hansen et al., 2022; CGIAR, 2022).

Risk Reduction and Resilience: Beyond yield gains, DCAS enable farmers to synchronize costly inputs—such as fertilizer applications—with rainfall and crop growth patterns, select appropriate varieties based on seasonal forecasts, respond to early disease warnings, and time planting and harvesting to avoid dry spells and post-harvest losses. In Niger, over 90% of farmers reported avoiding major losses during a drought year by adjusting sowing dates based on seasonal forecast advisories (Ferdinand et al., 2021). These resilience dividends, though not fully captured in yield metrics, are crucial for livelihood security.

Cost Efficiency; Digital delivery dramatically lowers the cost of reaching farmers compared to traditional extension. An SMS reaching 100,000 farmers costs only a few cents per person, whereas extension officer visits cost significantly more and occur far less frequently. Rwanda's climate services project delivered seasonal forecasts via radio and SMS at approximately US$1.20 per farmer annually—the value of this information was estimated at US$10–15 per farmer per season in improved decision outcomes (Hansen et al., 2021). As scale increases, marginal costs per farmer decline further, enhancing cost-effectiveness.

1.3 Sustainability of business models – the Achilles heel

Given good Net Present Values (NPVs), high Benefit-Cost Ratios (BCRs) and high Internal Rates of Return (IRRs) (Box 2), why is DCAS not being applied at scale? Sustainability of the business models remains problematic. In the Program to Build Resilience for Food and Nutrition Security in the Horn of Africa (BREFONS) – funded by the African Development Bank (AfDB), a pathway to sustainability and scalability was suggested (Kropff et al., 2021). In the first phase, government creates a long-term public sector program that finances the research and development phase including piloting phase and capacity building (Partey et al., 2019). This phase could possibly be supported by donors and IFIs. It is suggested that from the outset the program operates as a paid service for producers, albeit covering only the costs associated with service maintenance. This would mean that early adopters are not bearing the financial risks of introducing a new technology but also encourages users to continue with the paid service once the program concludes, as they have become accustomed to its benefits and understand its functionality.

Box 2. Business case example: Malawi

For the Malawi Sustainable Agricultural Production Programme – Phase 2 (SAPP-II) – funded by the International Fund for Agriculture (IFAD), detailed economic analyses have been done (Pegasys & Lobelia 2025). Using cost data from the Blueprint, it was estimated that the upfront costs for creating a DCAS service would be US$ 1.3 million, with recurring costs totalling ~US$ 980,000 over a seven-year implementation period for targeting 80,000 rural farmer households. Including a 10% contingency factor, this results in a total projected cost of ~US$ 2.5 million.

A cost-benefit analysis demonstrates that the project is a viable investment at an 8% discount rate. It provides a NPV of US$ 6.54 million, a BCR of 3.94, and an IRR of 19%. While the economic results are encouraging, they are likely underestimated, as the analysis is based on crop yield benefits only, and does not include other benefits such as improved food security, nutrition, enhanced resilience, etc. For financing this investment, a blended finance mechanism and public-private partnerships (PPPs) are suggested such as PPPs with telecom companies.

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02

Africa's Starting Point: Progress and Systematic Challenges

Africa's Starting Point: Progress and Systematic Challenges

Promoting DCAS is seen as an important strategy of the broader agenda to transform food systems (Ouedraogo et al., 2023) as well as achieve climate resilience. For example, Steiner et al. (2020) made it one of the 11 key actions needed globally to transform food systems under climate change: "Take climate services to scale by connecting 200 million farmers and agribusinesses to ICT-enabled bundled advisory services by 2030". The Global Commission on Adaptation – led by the former UN Secretary-General Ban Ki-moon, Bill Gates, and the then World Bank CEO Kristalina Georgieva – was launched in 2018, with the aim of accelerating adaptation by elevating the political visibility of adaptation and focusing on concrete solutions. Under its mandate, the Blueprint for Digital Climate-Informed Advisory Services was published in 2021 (Ferdinand et al., 2021). This called for investing US$ 7 billion in DCAS globally to reach an additional 300 million small-scale producers by 2030 (Box 3).

Box 3. Tackling the DCAS challenge

The challenge posed by the Blueprint—to greatly scale DCAS—has catalyzed action across multiple actors. The Africa Adaptation Acceleration Program (AAAP), a partnership between GCA and AfDB, represents one significant response, influencing 17 development initiatives totaling US$3.6 billion. (Table 2).[1] Within these development projects, ~US$ 115+ million has been set aside for specific digital activities. It is estimated that at least ~18 million farmers will be impacted, if the development projects are successful in meeting their objectives. The projects are in various stages of development and implementation. Similar momentum is visible in bilateral programs (UKMET Office and FCDO-supported WISER, AIM4Scale, WB-funded AICCRA), private sector expansion (Ignitia, TomorrowNow, DigitalGreen), and African government investments in national platforms linked to digital farmer registry.

1. Budget amounts and farmer numbers impacted are less certain for projects that are still in design compared to projects that are already being implemented. For four of the projects in the portfolio, amounts to be allocated to digital and/or farmer numbers impacted have yet to be assessed.

Table 2. Select DCAS initiatives in the GCA-IFI portfolio under the Africa Adaptation Acceleration Program (AAAP)

Project (Country)	Description	Scale / Beneficiaries	DCAS Components
Ghana Tree Crops Diversification (World Bank)	Climate-resilient tree crop value chains (cocoa, cashew, etc.)	US$ 227 million investment; ~842,000 farmers targeted	Digital climate-informed e-extension for 10,000 cocoa farmers; climate risk assessments guiding advisory content
Ethiopia Wheat Resilience (AfDB)	Increase irrigated wheat production climate-smartly	US$ 94 milion; ~500,000 households (~2.3M people)	Scaling up climate digital advisories via farmer registration system; extension agent training (200 women agents). Private sector digital providers also active.
Nigeria Livestock Adaptation (World Bank)	Resilient livestock productivity & conflict mitigation	US$ 500 million; ~1.43M people (pastoralists)	Digital advisory for pastoralists (45M livestock farmers covered); inventory of digital tools, climate-risk mapping; PPPs with telecom companies
Tanzania Food Systems Resilience Program (World Bank)	Enhancing climate resilience through strengthening seed systems, and climate-resilient infrastructure	US$ 300 million; ~3M small-scale producers	Mainstreaming DCAS through national platform and private sector links; inventory of digital tools, climate-risk mapping

Africa's digital climate advisory landscape is moving from scattered pilots to more organized, country-led systems. Governments are opening data and integrating advisories into extension; regional bodies are stitching countries together; private firms and civil society are building and testing services that reach last-mile users; global initiatives are building capacity and advancing implementation.

An example of a global initiative is the Early Warnings for All (EW4All) initiative, led by United Nations Office for Disaster Risk Reduction (UNDRR), which is equipping regional climate centers (RCCs) with knowledge and cutting-edge forecasting tools. The IGAD Digital Agro-Climate Advisory Services (DACAS) platform in the Horn of Africa is another example: it links national meteorological agencies, research institutes, and service providers so farmers receive location-specific guidance through channels they already use. Similar moves are underway elsewhere as national meteorological services digitize archives, publish open interfaces, and co-produce content with agriculture ministries and local partners. More recently, through investment support from the West Africa Food Systems Resilience program (FSRP) and the Accelerating Impacts of CGIAR Climate Research for Africa (AICCRA) project, both funded through the World Bank, AGRHYMET regional climate center has set up an operational watch room on climatic, hydrological, and environmental extremes, to become a leading hub for climate intelligence, supporting early warning, risk anticipation, and regional coordination across West Africa.

On the financing side, large adaptation programs and agricultural investments are now embedding DCAS components rather than treating them as add-ons – an important signal that demand is shifting from pilots to systems.

Funders like the Gates Foundation (GF) have played a significant role in advancing DCAS in SSA. One of the focus areas in the GF agricultural strategy is digital farmer services, to help small-scale producers leapfrog many of the barriers to sustainably raising productivity and increasing incomes. Among other things, these services can give farmers detailed insights into local soil conditions, increase access to financial services and markets, and provide technical support for field operations.

2.1 Regional snapshots

East & Horn of Africa. Regional coordination is strongest here. IGAD's DACAS is creating a shared approach to data and methods across the Horn. Countries such as **Kenya** are developing national platforms (e.g., Kenya Agriculture Observatory Platform) that pull together weather, soil, and advisory content for use by extension, counties, and private apps. **Ethiopia** has expanded co-production between the meteorological agency and agronomy teams and has tested voice-based hotlines so low-literacy farmers can access tailored tips. Private sector digital providers are also active. Lersha bases its business model on fees for diverse services. **Rwanda** has scaled DCAS through a combined top-down/bottom-up approach (Box 4). Civil society (radio networks, farmer groups) remains central to delivery, while mobile operators are key partners for SMS/interactive voice response (IVR) at scale.

Box 4 – Rwanda: National Climate Services Build Resilience.

Rwanda's government, with partners, implemented a holistic climate advisory program (2016–2019) reaching nearly one million farmers (CCAFS CGIAR, n.d.). Through training extension intermediaries in the PICSA approach and deploying "Maproom" climate data tools, farmers began including climate forecasts in their seasonal planning. An impact assessment showed participating farmers experienced improved food security and crop productivity compared to controls (Hansen 2021). Farmers like Umutoni Jane, who leads a cooperative in Nyabihu District, attest that using seasonal rainfall outlooks and tailored crop advice helped them stagger planting dates and diversify crops, resulting in surplus harvests even in years of erratic rainfall. The Rwandan case demonstrates the power of combining top-down (national data and infrastructure) and bottom-up (farmer training and local facilitation) efforts, under strong government ownership. It has since inspired Kenya, Ethiopia, and others, and elements like PICSA have been replicated regionally.

West Africa. Governments are integrating DCAS into value-chain programs, often in partnership with private agritech providers. **Ghana's** e-extension for tree crops blends climate alerts with input access and finance (Box 5). **Nigeria** is incorporating livestock advisories into large resilience projects, with plans to reach agro-pastoralists through multi-channel delivery (SMS, voice, radio), including through PPS with telecom companies. **Senegal's** meteorological service (ANACIM) works with media and telecom partners so early warnings and seasonal guidance reach farmers nationwide – an example of a PPP anchored by a strong public agency.

Box 5 – Ghana: E-Extension for Tree Crops Boosts Yields

In Ghana's Tree Crop Diversification Project (2023–2029) a digital platform delivers weather forecasts, pest alerts, and agronomic tips to cocoa, cashew, coconut, and rubber farmers. The project, supported by GCA, integrates these advisories with on-ground services like access to improved seedlings and credit. Farmer Kwame Mensah, a cocoa grower in Western Region, receives SMS alerts about optimal spraying windows ahead of anticipated pest outbreaks – information derived from a climate-driven pest model. By acting on the alerts, he reduced crop losses to pests by an estimated 20% last season. Overall, the project expects a 41% average yield increase across the four tree crops. One key lesson is the importance of big data: the project analyzes historical climate and yield data (tens of thousands of data points) to personalize advice to each locale, illustrating how data analytics can directly translate to farm performance gains.

Southern Africa. Public extension remains the backbone. **Malawi's** Department of Climate Change and Meteorological Services (DCCMS) co-generates local advisories with the Department of Agricultural Extension Services (DAES), sharing content through radio, SMS, and field days. **Zambia** has trained extension and farmer leaders in participatory approaches that help turn forecasts into simple planting and input decisions; NGOs and farmer organizations act as "infomediaries," ensuring messages are understood and acted upon. Private services (e.g., input suppliers bundling advisory with credit) are growing, but usually alongside government channels.

Sahel and arid zones. Long distances, low connectivity, and mobility (pastoral systems) favor radio plus SMS/IVR and community intermediaries over smartphone apps. Cross-border information flows matter: aligning content and delivery for mobile pastoralists benefits from regional standards and shared tools.

2.2 Delivery and governance models in practice

Delivery of DCAS can be via different kinds of players (Box 1): public-led national platforms, private-led services, civil society delivery and PPPs. Across regions, the pattern is consistent: DCAS scale when public agencies provide the enabling environment (data, rules, basic delivery), private and civil society partners tailor and carry messages through the channels people use, and PPPs lock in quality and continuity. Where programs report stronger outcomes, three ingredients recur: plain-language content in local languages, two-way feedback that improves advice over time, and integration with services farmers already value – inputs, credit, insurance, or trusted extension support.

Private sector action on DCAS is promising and increasingly demonstrating sustainable business models. A notable PPP business model was initiated in 2017 by ESOKO, a private ICT company in Ghana, to sustain the delivery of climate information services through mobile phone platforms. In the start-up years more than 300,000 farmers (21% women) were paying an agreed US$ 0.2 monthly subscription fee to receive climate advisories. The service now reaches close to 1.2 million subscribers in Ghana (Partey et al., 2019; Prager et al., 2021).

Several private providers have achieved scale with commercially viable models:

- Ignitia delivers tropical-specific weather forecasting with 84% accuracy to 1.3 million+ customers across Ghana, Nigeria, Mali, and Burkina Faso. Its pay-as-you-go model ($0.02/message via phone credit) achieves remarkable retention: only 3% of subscribers unsubscribe.

- Apollo Agriculture has served 350,000+ farmers with bundled financing, inputs, insurance, and advisory services, documenting that Apollo farmers produce 2.6x more than other Kenyan farmers. Satellite-based machine learning enables credit scoring without traditional collateral.

- Farmerline serves 2.3 million farmers across 50 countries with voice messages in 27 local languages—critical for low-literacy farmers.

- The telecom company Safaricom in Kenya has developed DigiFarm, launched in 2017, focusing on access to quality farm inputs, input loans, learning content, and market access. As of FY2022, the platform had 1.4 million registered users, though active user numbers (119,000 in FY2024) indicate the ongoing challenge of sustained engagement—a common pattern across digital agriculture platforms (Safaricom Annual Reports, 2022, 2024). This highlights that registered users and active engagement remain distinct challenges requiring continued attention.

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03

Systematic Challenges and Barriers to Scaling

Systematic Challenges and Barriers to Scaling

Digital transformations are difficult, adoption of digital solutions remains limited and DCAS initiatives often fail in the post-project phase (Ofosu-Ampong et al., 2025). Despite pockets of success, several interlinked barriers are preventing DCAS from achieving continent-wide impact (Figure 2).

Figure 2: Barrier to Scaling DCAS

3.1 Financial Sustainability and Business Models

The evidence to support implementation of DCAS has been around for some time, but hunting unicorns is easier than finding a sustainable business model. Many DCAS efforts depend on short project grants, so services fade when funding ends. Monetizing advice for resource-poor farmers is hard; users often view information as a public good, and government programs face tight budgets which shift priorities to basic needs (security, education, healthcare etc.). The result is fragile services – even effective tools can vanish after a three-year cycle. In some countries, there is a reluctance by government to fully embrace private sector approaches. This is an important bottleneck as private sector services can be a pathway to sustainability.

3.2 Foundational Barriers

There are foundational barriers that limit scaling and sustainability, including data and connectivity gaps. Fortunately, the digital ecosystem is changing rapidly in Africa, so the hope is that these will be less of a problem in the years and decade ahead.

- **Data Gaps and Quality Issues:** Robust advisories require hyper-local, reliable climate and agronomic data – something many countries lack. Sparse meteorological station networks and limited historical climate data make it hard to generate accurate, downscaled forecasts (Ferdinand et al., 2021). Similarly, agronomic data (soils, crop models) are often incomplete. Where data exists, inconsistent standards for data quality and provenance hamper integration. In short, many services today operate on partial information, undermining farmer trust when forecasts miss the mark. Improving data coverage (e.g. via automated weather stations, remote sensing) and quality assurance protocols are an urgent need.

- **Connectivity and Access Gaps:** Many rural African communities still lack affordable internet or smartphone access. While basic mobile phone coverage has improved, high data costs and low smartphone penetration in remote areas severely limit the reach of app-based or internet-based services. Large swaths of the Sahel, Central Africa, and parts of Southern Africa also face electricity deficits and weak telecom infrastructure, which make last-mile delivery of digital advisories difficult (Box 6). The gender digital divide compounds this challenge: women farmers often have even less access to mobile technology than men. In SSA, women are about 30% less likely to own a smartphone than their male counterparts, so without intentional inclusion efforts, DCAS could inadvertently widen equity gaps. DCAS risks excluding the most climate-vulnerable farmers from benefits at the very time they need them most. Without deliberate strategies (e.g. subsidizing rural connectivity, providing solar chargers, multimodal delivery in local languages), the digital divide will leave the most vulnerable behind.

Box 6. Empowering DCAS Through Stronger Infrastructure and Market Access.

Beyond digital infrastructure, DCAS effectiveness depends on farmers' ability to act on information—requiring access to markets, roads, and electricity. GCA's infrastructure program works with IFIs to ensure rural infrastructure resilience complements digital advisory investments. In the World Bank funded Transport Corridors for Economic Resilience (TRACER) project in Zambia the aim is to enhance connectivity and resilience on key transport corridors. High-resolution climate data helped identify flood-prone areas and heat-vulnerable road sections, and opportunities for sustainable enhancements, such as better drainage systems and nature-based solutions that work in tandem with infrastructure. Gender-disaggregated analysis ensured that the needs of women and girls were not overlooked by identifying secondary or tertiary routes that often serve as essential lifelines for rural communities and vulnerable groups.

3.3 Policy and Institutional Gaps

Technology has outpaced the policy and institutional setup needed to scale DCAS. Many countries still lack clear national strategies for digital agriculture and climate services and data rights and sharing rules are vague. Capacity constraints in meteorological agencies and extension systems limit production and delivery of localized advisories. Coordination is weak across agriculture, meteorology, ICT, finance, and regulators, so services are hard to integrate, interoperate, and sustain.

- **User Awareness, Literacy, and Trust:** Even where coverage and devices exist, uptake is constrained by low literacy/digital skills, limited awareness of DCAS, and concerns about data use. Many farmers are unfamiliar with climate services, are skeptical of forecast accuracy or don't understand the probabilistic nature of climate information. One-size-fits-all messages miss local realities and quickly erode credibility.

- **Fragmentation and Platform Silos:** DCAS in many countries is stuck in pilots: dozens of donor- or startup-led apps run in parallel, each with its own data, interface, and short-term funding. Few survive beyond the grant cycle; content is repeatedly rebuilt; and farmers face a confusing mix of tools that don't talk to each other. The absence of common data standards, application programming interface (API), and protocols amplifies this fragmentation and blocks seamless bundling of weather, agronomy, markets, and finance into a single user journey. Figure 3 illustrates the diversity of digital initiatives in Tanzania for the livestock sector, underpinning the call for dealing with fragmentation and silos.

Figure 3. Digital initiatives in the Tanzanian livestock sector (AXA-Altai Consulting-Acre Africa n.d.)

- **Learning and Evidence Gaps:** There is a shortage of rigorous evidence and shared learning on what works (and what doesn't). Many projects report anecdotal success stories. The detailed monitoring and evaluation reports, which may have good insights, often remain internal and difficult to access by the wider community. As a result, our understanding of how much digital advisories improve climate resilience or yields – and under what conditions – remains limited. This makes it harder for decision-makers to justify large investments, and it means service providers might not be optimizing their approaches. Without building a stronger evidence base and a culture of learning, the DCAS community risks repeating mistakes.

Encouragingly, new mechanisms are emerging to address these gaps. The AIM4Scale initiative, launched at COP28 and chaired by Nobel laureate Michael Kremer, explicitly focuses on cost-effective, evidence-based innovations. At COP29, it mobilized over $1 billion for weather forecasting, including $591 million specifically for Africa to support farmer registries, soil information systems, climate advisories, and early warning systems. Similarly, the GSMA AgriTech programme has established innovation funds specifically supporting climate resilience startups, while programs like AICCRA are building shared evidence platforms across countries.

In summary, scaling up DCAS in Africa is not just a technical challenge, but a systemic one. Gaps in financing models, data, connectivity, policy, literacy, integration and evidence all intertwine to constrain progress. The encouraging news is that these challenges are increasingly recognized. There is growing consensus on the need for coordinated action to overcome them – and practical strategies exist to do so, as outlined below.

Image: © Manon Koningstein

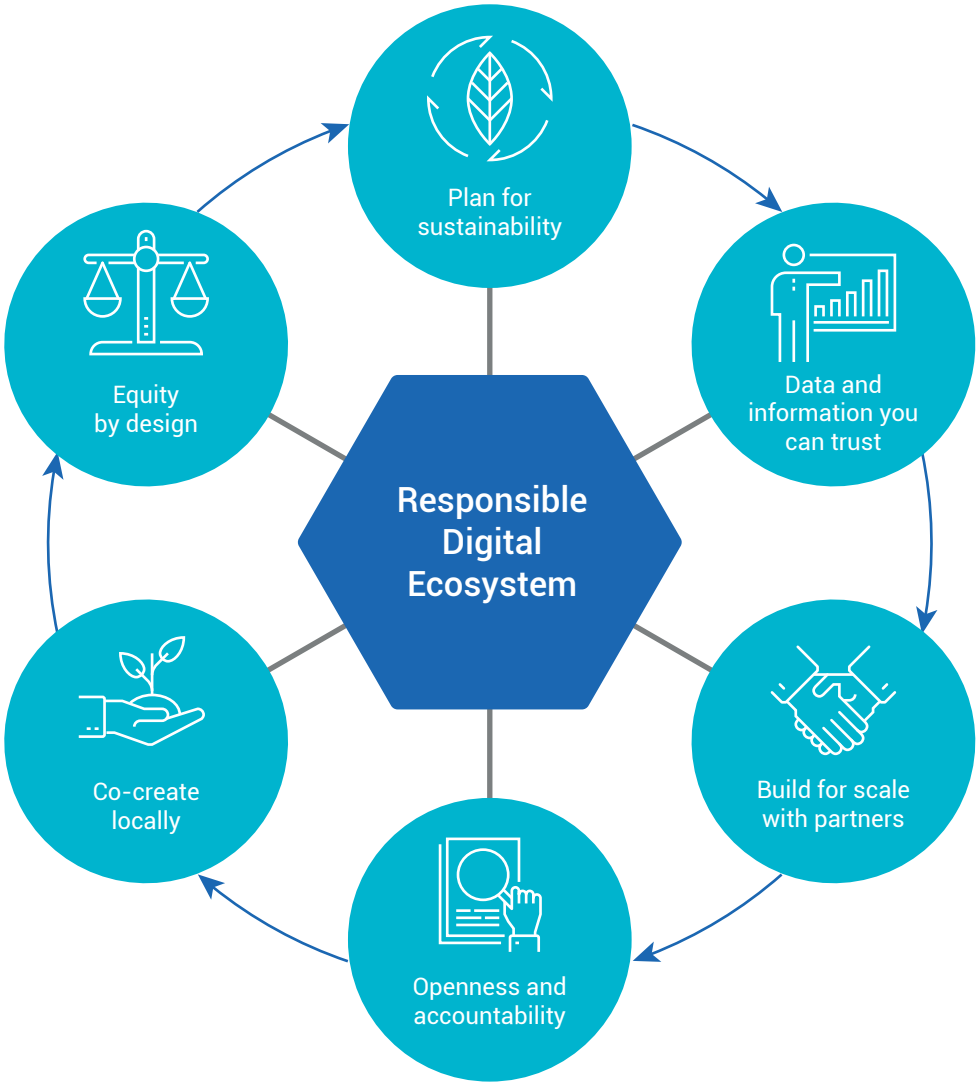
04

Six Guiding Principles for Effective DCAS

Six Guiding Principles for Effective DCAS

The Blueprint for Digital Climate Advisory Services suggested six principles for achieving effective DCAS. These principles are revisited and updated here based on global best practices and on-the-ground lessons learnt (Figure 4). The principles are to guide the design, investment, and implementation of DCAS for achieving services that are user-centric, equitable, and high-impact.

Figure 4: Six guiding principles identified for developing effective DCAS



4.1 Plan for Sustainability:

Short-lived pilots erode trust and waste resources. Sustainability requires diverse revenue paths and clear cost discipline. Every initiative needs a credible financing path from the outset: (i) Bundling advisories into insurance, input credit, or procurement. (ii) Securing B2B/B2G contracts and PPPs with agribusinesses, cooperatives, and ministries; effective PPP arrangements typically involve zero-rated SMS/USSD agreements with mobile operators, advisory integration into input financing schemes, and data-sharing protocols between meteorological agencies and private providers. (iii) Where DCAS functions as a public good, institutionalize core services in public extension and meteorological budgets. (iv) Use blended finance[2], outcome-based prizes, and smart, time-bound subsidies/e-vouchers to de-risk early scaling. (v) Require transparent unit economics and a credible path to breakeven (or justified long-term public financing) in every grant or PPP.

The goal is not perpetual grants, but services that endure. In a review of DCAS models, Kagabo et al. (2025) point to the promise of multi-stakeholder bundled business models, that offer diverse packages of products and services (knowledge services, inputs, mechanisation and financial services). Prager et al. (2021) describe nine diverse business models. Financiers and IFIs have an even larger role connecting need with financing to ensure sustained funding of DCAS delivery in local contexts.

Litmus test: Does the initiative have published unit economics showing a credible path to breakeven or a justified rationale for long-term public financing?

4.2 Data and Information You Can Trust:

DCAS only works when its underlying data are reliable and explainable. Countries should invest in observation networks and well-governed, open data layers (weather, soil, crop, markets), and apply clear standards for quality, metadata, and versioning. Advisory content must be validated locally – against real calendars, thresholds, and practices – and methods should be published so users and partners understand how guidance is generated. Trust follows when farmers see that forecasts and recommendations consistently match conditions on the ground – this also means that advisories should be tailored to farmer conditions and assets (Box 7). Trust also requires clear data-protection commitments. Use of local and indigenous knowledge is critical for trust. In Kaffrine (Senegal) trust was established with farmers because of knowledge integration from the outset, with recognition by external players of local indicators for weather (Ouedraogo et al., 2018).

Emerging technologies are expanding what's possible in data quality and advisory personalization. AI-powered platforms like Farmer.Chat demonstrate the viability of personalized agricultural advice at scale, while iSDA's Virtual Agronomist has provided agronomic advisories for over 500,000 smallholder plots across seven countries using machine learning. However, with only 13% of smallholder farmers across Africa having accessed digital solutions, the priority remains ensuring basic, reliable data infrastructure before scaling advanced technologies.

Litmus test: Are data quality standards, metadata, validation methods, and data governance policies published and accessible to users and partners?

2. In the DCAS context, blended finance refers to the strategic use of concessional funding from donors and IFIs—such as first-loss guarantees for agritech lenders, results-based payments tied to farmer adoption metrics, or matching grants for private providers serving remote areas—to de-risk private investment and accelerate market development for climate advisory services.

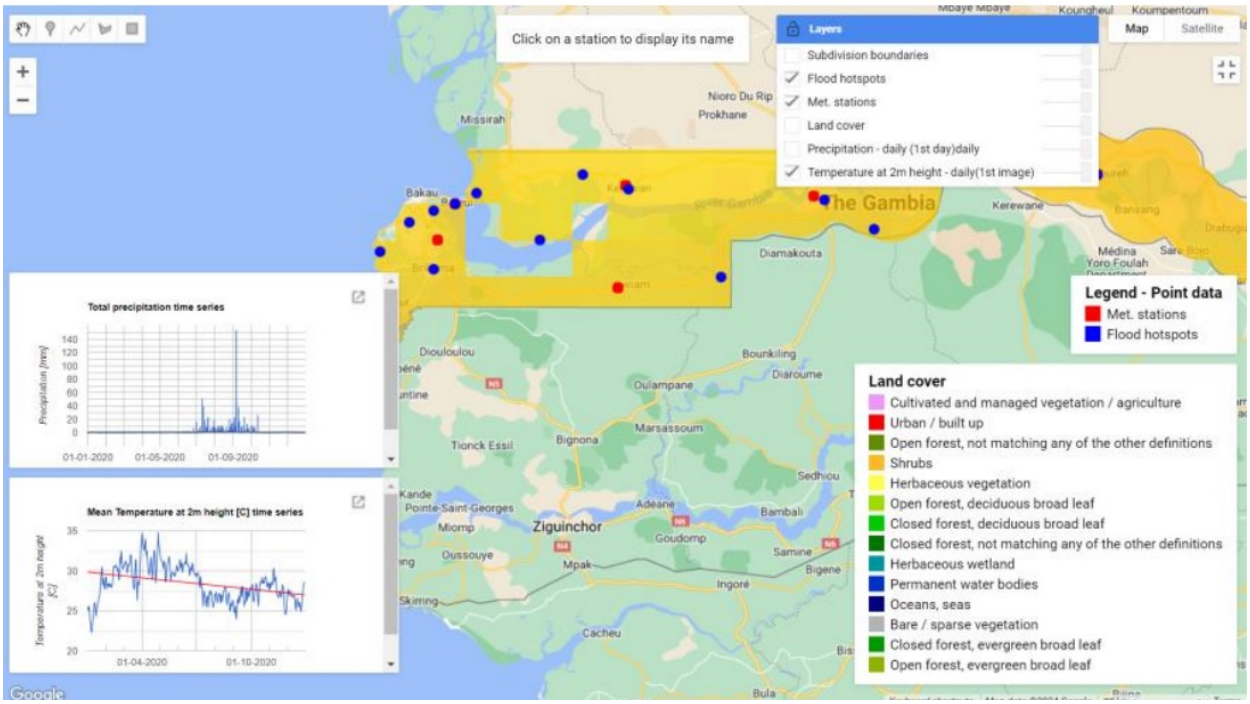
4.3 Build for Scale with Partners:

No single actor can reach millions or cover all functions, and fragmentation must be tackled. Solutions should be interoperable by design – open APIs, shared identifiers, common data models – so they plug into government platforms, mobile network operator (MNOs), cooperatives, and agri-finance channels. Playbooks and reusable assets should be shared, and proven models replicated across borders. Scale comes from partnership and reuse, not reinvention (Kagabo et al. 2025).

Regional climate centers and national meteorological agencies and agricultural ministries have a large role to play in setting the enabling environment through developing standard benchmarking and other procedures and infrastructures to assure quality information is reaching the downstream users (Figure 5). Structured PPPs with clear service-level agreements can extend reach and ensure quality. Intermediaries – extension agents, cooperatives, lead farmers, NGOs – are critical for demonstration and last-mile support.

Litmus test: Do systems use open APIs, shared identifiers, and common data models enabling interoperability with government platforms, mobile network operators, and farmer organizations?

Figure 5. Example of visualisation from the Google Earth Engine (GEE) platform for Gambia (Weather Impact & Green-Up, 2024).



4.4 Equity by Design:

DCAS can empower and build resilience of rural women; however, they also risk reinforcing gender-based inequalities if they fail to understand and effectively target the needs of women (Gumucio et al., 2020). If DCAS excludes women, low-literacy users, or remote farmers, it misses those most exposed to climate risk. Services should be built for accessible use – voice/IVR and mass media (TV/radio) with SMS prompts, local languages, USSD (unstructured supplementary service data), and low-cost devices – and backed by targeted outreach and digital literacy, especially for women and youth (Box 7). Programs should set and report disaggregated reach and usage targets, and ensure content reflects who does which tasks in farming systems, not just the main cash crop. DCAS programs that deliberately target women show larger relative gains for female farmers. Empowering women through DCAS can also have multiplier effects on household nutrition and education (as women tend to reinvest earnings in family well-being).

Litmus test: Are disaggregated reach and usage targets set and publicly reported for women, youth, and low-literacy users?

Box 7 – Ethiopia: AI-Enhanced advisory for wheat farmers and reaching low-literacy farmers.

As part of an IFAD-supported pilot, Ethiopian researchers and CGIAR developed an AI-powered "NextGen Agroadvisory" tool giving site-specific fertilizer recommendations based on weather, soil, and crop conditions (Ehui and Odeh, 2025). During 2022, about 20,000 smallholder wheat farmers tested the tool via an interactive voice response system in Amharic. Farmer Alem in Oromia followed the tool's guidance – adjusting fertilizer mix and timing – and saw his wheat yield jump by 28% from 2.5 to 3.2 tons/ha. Collectively, pilot farmers averaged 25% higher yields than neighbors. The government is now looking to scale this advisory nationwide through its extension hotline. The case underscores how cutting-edge tech (AI for precision agronomy) can be made accessible to illiterate farmers (voice-based system) and deliver appreciable results. It's also a prime example of research translating into practical tools when there's close collaboration among scientists, ICT experts, and extension services.

4.5 Co-Create Locally:

Services stick when they are shaped where decisions are made. Farmers, extension agents, and local innovators should be engaged from needs assessment through prototyping and iteration, with short test-learn cycles and genuine two-way feedback. Two-way feedback loops that let users rate usefulness and report outcomes create accountability and drive iterative improvements. Advice must align with local calendars, constraints, and channels people use. Co-creation builds trust, relevance and ownership, raising the odds that advisories are acted upon – not just received. Co-creation is not necessarily simple, as users are diverse and have different perspectives on what is needed (Giang Luu et al., 2024). These authors suggest that a first step in co-creation is understanding that diversity (availability, experience, gender, expertise, interest, influence, relevance, attitude, cost-benefit profile) so that it can be engaged in the co-creation process. Human-centric design approaches – placing the end-users at the forefront of technological innovation – can ensure that digital tools are tailored to local contexts, languages, and financial constraints (Kropff et al., 2021).

Litmus test: Were farmers, extension agents, and local stakeholders genuinely engaged from needs assessment through prototyping, with mechanisms for ongoing two-way feedback?

4.6 Openness and Accountability:

Credibility grows when users can see how services perform and how their data are handled. Providers should be explicit about forecast uncertainty and limitations, adopt simple service standards (e.g., uptime, refresh cadence, response time), and publish performance dashboards. Farmer data require clear consent and use rules, with straightforward grievance and feedback channels.

Programs should track what matters – active use, actions taken, decision quality, equity – and show how feedback changes the service.

Litmus test: Are performance dashboards publicly available, and are there functioning feedback mechanisms that demonstrably influence service improvements?

These six principles – **financial sustainability, data and information quality, partnerships for scalability, equity, co-creation,** and **accountability** – form a comprehensive framework. Applied together, they reduce pilot churn, increase trust, and align investments with the system shifts needed for DCAS to work at scale.

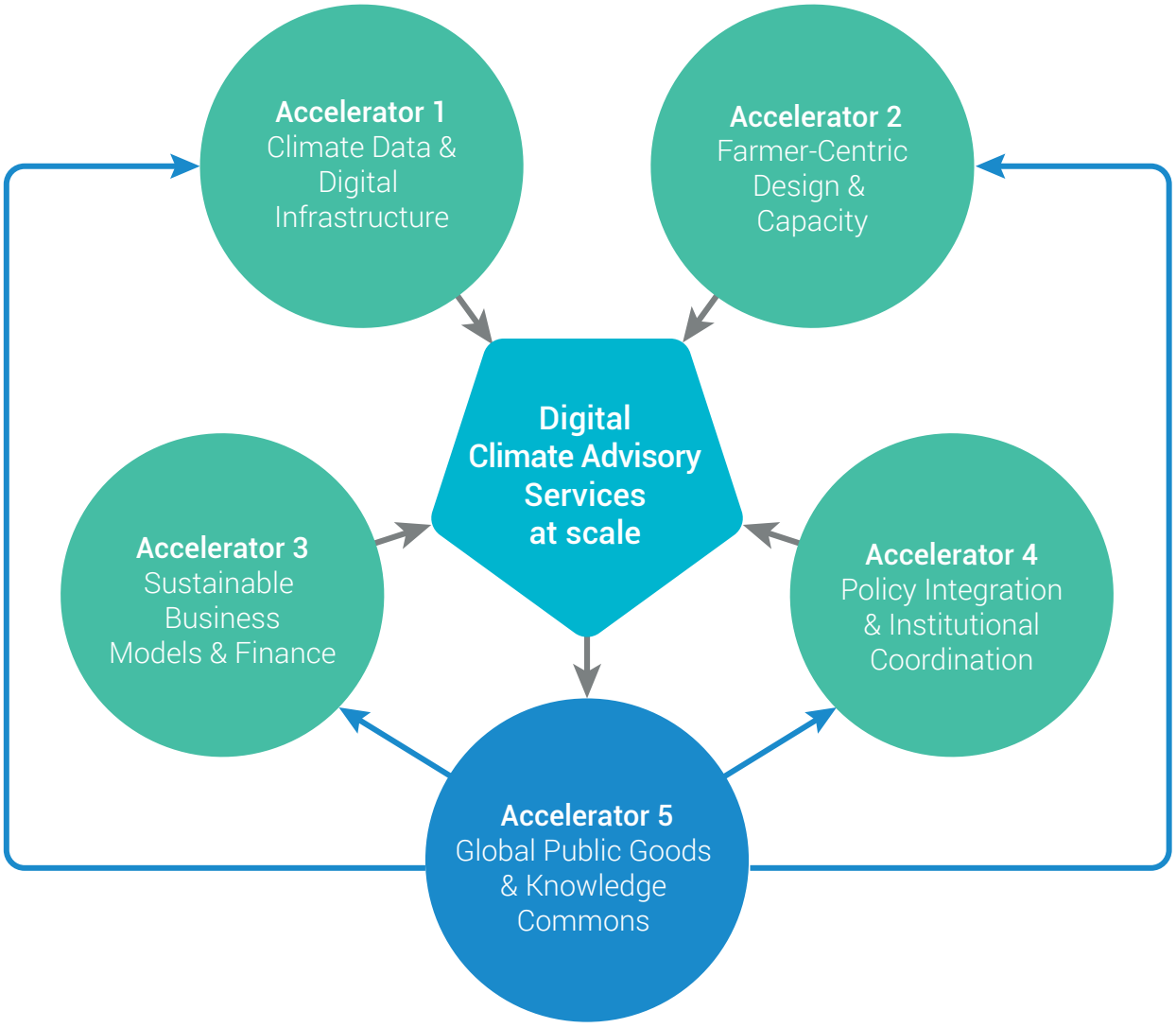
05

Five Accelerator to Scale DCAS in Africa by 2030

Five Accelerator to Scale DCAS in Africa by 2030

To achieve an Africa-wide scaling of DCAS by 2030, focused investment and policy action are recommended across five key "accelerators" (Figure 6). For each accelerator, we outline priority actions and targets to guide governments, IFIs, donors, and the private sector over the next 5+ years:

Figure 6: Priority Accelerators for Scaling DCAS by 2030



Accelerator 1 – Climate Data & Digital Infrastructure:

Build the backbone. Modernizing national meteorological and hydrological services – expanding observation networks, improving forecasting and downscaling capacity, and keeping stations online – raises the quality and timeliness of advice. In parallel, governments should stand up open, well-governed data platforms and APIs for climate, soil, and crop information, with stewardship, versioning, and access controls that encourage responsible reuse by public and private providers. Extending affordable rural connectivity through universal service funds, community networks, or satellite backhaul, and improving device affordability via targeted tax policy and low-cost energy solutions, completes the stack needed for last-mile delivery.

Progress indicators: National data portals are operational and actively used by third party developers; rural connectivity and device affordability metrics show improvement; advisory products routinely draw on public datasets rather than rebuilding them or creating proprietary alternatives.

Accelerator 2 – Farmer-Centric Design & Capacity:

Ensure people can find, trust, and use DCAS – especially women, youth, and remote farmers. Services should meet users where they are through multi-channel delivery: IVR and voice in local languages, radio reinforced by SMS, USSD, and offline-capable apps. Extension officers and leaders of farmer organizations can act as "infomediaries" if equipped with simple toolkits, trained through practical train-the-trainer models, and modestly incentivized against verified usage and quality. Digital literacy, understanding the probabilistic nature of forecasts and targeted outreach for women and youth must be built into every program, alongside two-way feedback so content and timing improve with use.

Progress indicators: Active usage grows among women, youth and low-literacy users; analytics show uptake of voice, radio and USSD channels; feedback loops are documented and routinely reflected in content updates.

Accelerator 3 – Sustainable Business Models & Finance:

Move beyond grant-dependent pilots to durable services. Advisory value travels best when bundled into products that already reach farmers – insurance, input credit, procurement systems, and agribusiness customer relationship management (CRM) – so costs are shared and benefits captured (lower defaults, reduced losses, better yields). Within IFI projects and similar such major investments, DCAS can be an anchor for broader adaptation action. Providers should pursue B2B and B2G contracts with cooperatives, agribusinesses, and ministries to reach scale efficiently, while blended finance and outcome-based payments de-risk early growth. Time-bound smart subsidies or e-vouchers can keep access equitable without locking in perpetual support. Every grant or PPP should require transparent unit economics and a credible path to breakeven or, where a clear good public case exists, long-term budgetary support.

Progress indicators: Initiatives demonstrate diverse revenue mixes beyond grant dependency; multi-year B2B or B2G contracts are established; services continue operating after initial grant periods end.

Accelerator 4 – Policy Integration & Institutional Coordination:

Make DCAS part of normal government business with clear rules and accountable owners. Countries should embed DCAS in national adaptation and agriculture strategies, assign mandates and budget lines, and establish an inter-ministerial coordination unit spanning agriculture, meteorology, ICT, finance, and regulation. Data governance frameworks must define ownership, consent, fair use, and open access for public datasets, while telecom policy enables public-interest tariffs for bulk SMS, USSD, or cell broadcast. Simple advisory quality standards and grievance redress build credibility; procurement reforms that allow outcome-based PPPs bring capable providers to the table. Regional economic communities (RECs) and the African Union (AU) can harmonize standards and support cross-border replication.

Progress indicators: National strategies and regulations are approved and funded; inter-ministerial coordination units are operational with documented workplans; PPPs operate under clear service-level agreements.

Accelerator 5 – Global Public Goods & Knowledge Commons:

Lower cost and raise quality for everyone through shared science, tools, and learning. Investments that improve forecast skill and agricultural downscaling, published with open methods and benchmarks, benefit all implementers. Open toolkits – reusable software components, content libraries, and pragmatic M&E frameworks – reduce reinvention, while regional initiatives take proven models to new countries with funded localization and documented results. Annual communities of practice convened by RECs keep lessons moving faster than projects.

Progress indicators: Implementers adopt shared toolkits and publish comparable performance indicators; proven models are replicated across borders with documented results; communities of practice meet regularly and share lessons.

The accelerators reinforce each other: Together, they provide a practical pathway from pilots to reliable, country-owned DCAS systems by 2030.

06

Call to Action

Call to Action

DCAS are not a silver bullet, but they are a powerful catalyst—one that can rapidly scale climate-smart practices to those who need them most, at relatively low cost. The building blocks are in place: proven approaches, political will, emerging digital infrastructure, and an engaged community of practitioners.

The next five years are decisive. Action is needed on five fronts:

- **Embed DCAS in national systems.** Governments must anchor DCAS in national plans and budgets, open priority datasets under clear governance, and align telecom policy for public-interest delivery.
- **Scale through existing channels.** IFIs and donors should finance climate data infrastructure, structure blended-finance instruments, and require interoperability in every DCAS operation. Advisories must integrate into extension systems, mobile operators, cooperatives, and agri-finance platforms.
- **Design for inclusion.** Fund multi-channel delivery (voice, radio, SMS), train infomediaries, and build digital literacy so women and low-literacy farmers benefit first, not last.
- **Financial durability.** Private sector and innovators must build and scale usable services. They integrate advisories into products farmers already use (insurance, input credit, procurement), pursue B2B/B2G contracts, invest in unit-economics discipline, and localize offerings through partnerships. Blend grants with outcome-based and commercial instruments.
- **Prove and improve.** Regional bodies (RECs/AU) should harmonize standards and orchestrate replication. They maintain shared toolkits and convene communities of practice, so methods, code, and content move quickly across borders. Research partners must improve forecast skill and downscaling for agriculture, publish playbooks and benchmarks, support pragmatic evaluations that feed back into product design, and broker the knowledge to action process.

If stakeholders act on these commitments, DCAS will move from a patchwork of pilots to a dependable part of African agriculture—locally led, fiscally sensible, and trusted by the farmers it serves.

DCAS is not a standalone app; it is part of the operating system of African agriculture.

07

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