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Technical Brief

FOOD SECURITY

Best Bets for Gender-Responsive Digital Climate Advisory Services (DCAS)

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INTRODUCTION

WHY GENDER RESPONSIVENESS DETERMINES DCAS IMPACT

Digital Climate-informed Agricultural Advisory Services (DCAS) are a cornerstone of climate-resilient agriculture (Ferdinand et al., 2021). Delivered through SMS, apps, USSD, IVR, radio and helplines, DCAS are increasingly promoted where public extension systems are thin and climate variability is intensifying. At farm level, the core problem they address is decision-making under uncertainty. Rainfall onset and distribution are less predictable, heat stress is increasing, and extreme events can quickly wipe out investments in seed, fertilizer and labor (Hansen et al., 2019). DCAS reduce this uncertainty by translating weather and climate information into actionable guidance on when to plant, what to plant, how to manage soil moisture, when to apply inputs and when to harvest. When advisories are timely and trusted, they can reduce false starts, avoid wasted fertilizer applications before heavy rain, and encourage protective action ahead of floods, dry spells or heatwaves.

DCAS are attractive from a scaling perspective, but information alone rarely changes behavior. Because they can reach many users quickly and repeatedly, DCAS offer a pathway to deliver timely guidance across large geographies at relatively low marginal cost compared to face-to-face extension (Tall et al., 2018). Yet DCAS only translate into real impact if farmers can receive the message, trust it and act on it. Impacts are strongest when advisories are co-produced, locally relevant, well timed and linked to feasible options and supporting services.

The biggest failure point in DCAS is the gap between information and action, and it is wider for women (GSMA, 2025). The effectiveness and legitimacy of DCAS depend on whether they address the gendered and intersecting inequalities that shape who can access information, who can act on it and who ultimately benefits (Huyer et al., 2017). The information-to-action gap is often larger for women because they may lack phone access, rely on shared devices, have less time and mobility, and face barriers to adopting recommendations that require cash, labor or control over resources (Midamba and Ouko, 2024). Women farmers in many low- and middle-income countries face systematic constraints in land rights, asset control, finance, mobility, literacy and decision-making power (Gumucio et al., 2020; Gumucio et al., 2022). If DCAS are designed as if all farmers have equal phone access, equal control over resources and equal freedom to respond, they can unintentionally amplify inequity. Better-resourced users, often men, gain more from advisories while women remain dependent on mediated, second-hand or unusable advice.

Gender-responsive design strengthens DCAS at every step of the impact chain (Huyer et al., 2017). Gender-responsive DCAS reduce access and use barriers by prioritizing multimodal delivery including voice and radio, local language and culturally resonant formats, schedules aligned to women's routines, and trusted intermediaries such as women extension agents, producer organizations and savings groups. This improves reach through channels that work for women, strengthens uptake and trust through co-production, and improves actionability by aligning recommendations with what women can realistically implement and linking advisories to enablers such as inputs, extension follow-up, market access, credit or insurance. Gender-responsive monitoring, using sex-disaggregated use, outcomes and complaints data, makes it possible to see whether the service is genuinely reducing climate risk for women and men, and to adapt the model before inequities become locked in at scale (Gumucio et al., 2022). In short, gender responsiveness is not only about fairness. It is a practical condition for DCAS to reliably solve the problems it is meant to address at scale.

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FIVE BEST BETS FOR GENDER-RESPONSIVE DCAS

Drawing on the climate services literature and program experience across Africa and South Asia, five best bets stand out for making DCAS both effective and equitable. Each is summarized below and elaborated in the sections that follow.

CO-DESIGN WITH USERS, EARLY AND OFTEN

Build DCAS with women and men farmers from the outset, starting from their decision calendars and constraints, and institutionalize women's participation in content teams, governance and feedback processes.

TURN ADVISORIES INTO SERVICE BUNDLES

Pair short, concrete advice with the means to act on it: right-sized inputs, mechanization, group-based insurance, credit and market linkages that expand women's feasible action space.

RESPONSIBLE FINANCING AND GENDER-RESPONSIVE MEL

Blend public finance with B2B revenues and tiered pricing to keep services affordable, and track sex-disaggregated reach, use and outcomes to adapt the model each season.

MULTIMODAL AND INCLUSIVE DELIVERY

Combine radio, IVR and voice, SMS and USSD, and social platforms so users can choose what fits their devices, literacy and routines, with timing aligned to women's daily rhythms.

EMBEDDED, INTEROPERABLE AND WELL-GOVERNED SYSTEMS

Anchor services in national strategies and extension mandates, build shared digital infrastructure, and work through trusted local intermediaries such as women's groups and community radio.

Together, these five best bets treat gender responsiveness not as an add-on but as a practical condition for DCAS to deliver climate resilience and equitable development outcomes at scale.

CO-DESIGN WITH USERS, EARLY AND OFTEN

Digital climate advisories work best when they are designed with, rather than merely for, the people expected to use them (Vaughan and Dessai, 2014; Tall et al., 2014). Early conceptual work on climate services underscored salience, credibility and legitimacy as core criteria, all strongly shaped by co-production between providers and users. Empirical studies from Mali, Senegal, India and elsewhere show that advisory products built around provider assumptions often miss women's decision points, assume access to land, labor or cash that many farmers simply do not have, and employ formats that are hard to interpret for low-literate users (Carr et al., 2016). In contrast, initiatives that start from farmers' decision calendars, map out constraints and iteratively test content and interfaces with different user groups tend to see higher uptake and more meaningful use (Ferdinand et al., 2021).

User-centered design must be intersectional (Gumucio et al., 2019; Gumucio et al., 2022). Gender-responsive reviews argue for explicitly recognizing how gender, age, intra-household roles and asset access shape needs and capabilities. This implies segmenting users into archetypes, for example women managing kitchen gardens, young tenant farmers or pastoralist women, building advisory packages around their specific decisions, and institutionalizing women's participation in content teams, governance committees and feedback processes.

In practice. Build DCAS with women and men farmers, incorporating their perspectives from strong contextual analyses. Use quick field immersions, focus groups and co-design workshops with women's groups, youth and local leaders to shape content, channels and timing. Treat these users as experts in what works, not as beneficiaries, and thereby increase awareness of and trust in the services.

MULTIMODAL AND INCLUSIVE DELIVERY

Best-practice DCAS combine multiple modes of delivery rather than relying on a single channel (Tall et al., 2014; Dorward et al., 2015). Syntheses of climate services in Africa and South Asia highlight radio, often in edutainment formats, SMS, IVR, face-to-face facilitation and, increasingly,

simple apps and social media as complementary channels rather than substitutes. Evaluations of PICSA (Participatory Integrated Climate Services for Agriculture) and related approaches in Rwanda, Malawi and Tanzania show that blending participatory planning tools with radio and mobile messaging can substantially improve understanding and sustained use of advisories (Clarkson et al., 2017; Coulibaly et al., 2015; GIZ, 2023).

Women are more likely to rely on shared phones and face greater time and mobility constraints (Gumucio et al., 2019; GSMA, 2025). This makes radio, voice-based services and group formats such as listener clubs and savings groups particularly important. Inclusive practice involves designing IVR systems with simple local-language menus and call-back options aligned to women's time use, pairing radio programs with interactive segments and local discussion groups, and using women's associations as hubs for collective registration and interpretation of messages. Where smartphones are present, pictorial content and short voice notes shared via moderated WhatsApp groups or light apps can complement these more ubiquitous channels, especially for younger women. The key is not technology per se, but a channel mix that meets different users where they are.

In practice. Combine radio, IVR and voice, SMS and USSD and social platforms so people can choose what fits their devices, literacy and routines. Align the timing of messaging to local rhythms such as market days, evenings or after children go to school, and use popular existing programs or group meetings as natural touchpoints to reach diverse groups.

TURN ADVISORIES INTO SERVICE BUNDLES

Climate information on its own is rarely sufficient to drive sustained changes in practice (Tall et al., 2014; Hansen et al., 2019). Farmers often know what they should do but lack access to inputs, capital, labor, machinery or markets to act on that knowledge. Climate risk interacts with these constraints to make experimentation particularly costly for poorer and more marginalized producers. The DCAS blueprint synthesizes global experience to argue that advisory services achieve greater impact when embedded in bundles that couple information with tangible means to act: input access, mechanization, insurance, credit and off-take arrangements (Ferdinand et al., 2021). Case studies from platforms such as Esoko in Ghana, Lersha in Ethiopia and weather-indexed insurance schemes across East and Southern Africa show higher uptake of climate-smart practices where advisories are tied to small seed packs, mechanization-on-demand, microfinance or contract farming relationships (Tall et al., 2014).

Bundling is particularly powerful from a gender perspective (Gumucio et al., 2019; WEF, 2024). Women tend to face tighter liquidity, weaker land rights and greater mobility constraints. When advisories are paired with right-sized inputs, group-based insurance and women-friendly finance channels, the perceived risk of adoption declines and women's feasible action space expands. The emerging best practice is to treat climate information as one component in a broader service bundle that is sequenced over the season and tailored to specific user segments, rather than as a stand-alone product.

In practice. Keep messages short and concrete, in the form of if rainfall is below X by date Y, then do Z, and link them to clear follow-up options: where to get the recommended seed, who to call for mechanization, how to join a savings group linked to insurance, or when a demo plot will be shown.

EMBEDDED, INTEROPERABLE AND WELL-GOVERNED SYSTEMS THAT LEVERAGE LOCAL INTERMEDIARIES

Fragmented, project-based delivery has clear limits (Vaughan et al., 2019; Simelton and McCampbell, 2021). Many DCAS have been launched as stand-alone pilots, only to stall when funding ends or when they cannot integrate with extension, market and financial systems. More durable and equitable services tend to be anchored in national adaptation and climate-smart agriculture strategies, formalized within extension mandates, and supported by long-term partnerships among meteorological services, agriculture ministries, research organizations, private platforms and civil society (Vaughan and Dessai, 2014; Tall et al., 2014). The DCAS blueprint makes a strong case for treating baseline advisory layers as public goods, building interoperable digital infrastructure through open APIs, shared registries and common content standards, and encouraging coopetition among providers so that users experience joined-up services rather than siloed apps (Ferdinand et al., 2021).

Embedded systems work through local intermediaries, not around them (Dorward et al., 2015; Clarkson et al., 2017). Public extension workers, lead farmers, agro-dealers, community radio hosts, VSLA leaders, women's self-help groups and local NGOs remain the key human interfaces that interpret digital messages, organize group discussions and help convert advice into practice. Gender-responsive work shows that when women's organizations, radio listener clubs and savings groups

are treated as core DCAS partners, receiving training, stipends and voice in decision-making, women's access, confidence and influence over climate-related decisions increase markedly (Gumucio et al., 2019; Gumucio et al., 2022).

In practice. Support intermediaries as last-mile delivery channels and strengthen their capacities, provide them with timely digital tools and content, and give them formal roles in governance and feedback loops through integrated inputs in monitoring and evaluation systems.

RESPONSIBLE FINANCING AND GENDER-RESPONSIVE MONITORING, EVALUATION AND LEARNING

Sustainability and equity hinge on how services are financed and how performance is measured (Ferdinand et al., 2021; GSMA, 2025). Estimates of the investment needed to reach hundreds of millions of smallholders underscore that donor grants alone are insufficient, yet narrow fee-for-service models risk excluding the poorest and most marginalized, including many women. Best-practice cases combine public finance for core climate data and baseline advisories with B2B revenues from agribusinesses, insurers and financial institutions, results-based arrangements that reward inclusive reach, and tiered pricing or cross-subsidies that keep essential services affordable for low-income users (Hansen et al., 2019).

Performance should be judged by who benefits and how power relations shift, not only user numbers or yield gains (Vaughan et al., 2019; Cornwall, 2016). Gender-responsive evaluations propose practical frameworks for tracking disaggregated reach and use, changes in decision autonomy and confidence, and women's leadership in farmer organizations (Gumucio et al., 2022; Carr et al., 2020). In this view, financing instruments and MEL systems become active levers for equity. They can hard-wire inclusion targets and gender performance clauses into DCAS business models, and ensure that learning about differential impacts leads to iterative redesign rather than remaining in reports.

In practice. Set up simple tracking by sex, age and location on who is registered, who listens or reads, and what they find useful, combined with occasional short check-ins. Use the insights to tweak content, timing and bundles every season, and share quick summaries of what was learned and changed with users to build trust.

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RECOMMENDATIONS / KEY POINTS

For program teams and providers designing or scaling DCAS, the evidence points to five priority actions.

START FROM USERS, NOT TECHNOLOGY

Use field immersions, focus groups and co-design workshops with women's groups, youth and local leaders to shape content, channels and timing. Treat users as experts in what works, not as beneficiaries.

CHOOSE A CHANNEL MIX, NOT A CHANNEL

Blend radio, voice and IVR, SMS and USSD, and moderated social platforms, and schedule messages around market days, evenings and women's time use.

BUNDLE INFORMATION WITH THE MEANS TO ACT

Keep messages short and concrete, in the form of if rainfall is below X by date Y, then do Z, and link each advisory to follow-up options such as seed, mechanization, savings groups and insurance.

INVEST IN INTERMEDIARIES AND SHARED INFRASTRUCTURE

Train and resource extension workers, lead farmers, radio hosts and women's organizations as last-mile partners, and give them formal roles in governance and feedback.

MEASURE WHO BENEFITS, THEN ADAPT

Track registration, listening and usefulness by sex, age and location, adjust content and bundles every season, and share what changed with users to build trust.

CONCLUSION

Gender responsiveness is a condition for impact, not a courtesy (Gumucio et al., 2022). The biggest failure point in DCAS is rarely the quality of the forecast. It is the gap between information and action, and that gap is systematically wider for women because of unequal access to phones, time, mobility, resources and decision-making power (GSMA, 2025; Midamba and Ouko, 2024).

Services designed as if all farmers face equal conditions risk amplifying inequity, with better-resourced users, often men, capturing most of the benefit while women depend on mediated or unusable advice. The five best bets set out here close that gap by design: co-production, inclusive channel mixes, service bundles, embedded systems that work through trusted intermediaries, and financing and monitoring arrangements that hard-wire inclusion into business models.

Applied together, they distinguish DCAS that merely scale technologically from those that scale in ways that are socially just and resilient, delivering both climate resilience and equitable development outcomes for the hundreds of millions of smallholders these services aim to reach (Ferdinand et al., 2021).

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