

POLICY BRIEF: WOMEN AT THE CENTER OF CLIMATE RESILIENCE

Gender-Responsive Weather and Climate Information Services (WCIS) for East Africa



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KEY MESSAGES

- WCIS delivers measurable returns on investment through avoided losses and yield increases.
- Women's inclusion is not a social add-on; it is a productivity and risk-management strategy.
- Participatory co-production platforms work and are ready for scale.
- Finance and institutional reform are now the binding constraints, not proof of concept.
- Moving beyond pilots to systems is essential for climate security and food security.

EXECUTIVE SUMMARY

Significant gender disparities in access to and use of Weather and Climate Information Services (WCIS) must be addressed to ensure inclusive climate risk management. Policies and programs should intentionally integrate the voices of women, youth, refugees, internally displaced persons (IDPs), and persons living with disabilities (PLWDs). Expanding co-design and co-production of WCIS across East Africa is essential to deliver timely, relevant, and actionable information.

Evidence from Kenya, Rwanda, Tanzania, and Uganda demonstrates that WCIS delivers tangible results. Between 38–49% of farmers reported bean yield increases of 0.2–0.3 t/ha, while 31–45% experienced smaller gains of up to 0.1 t/ha. Additionally, 30–33% of farmers avoided seasonal losses of up to USD 30, and 33–71% avoided losses of up to USD 100, thanks to impact-based early warning systems. However, these benefits are not reaching everyone equally. Women, youth, persons with disabilities, refugees, and internally displaced persons face barriers in access, voice, and decision-making power. Men dominate formal WCIS channels, while women often rely on informal networks and are restricted from acting on information even when they receive it.

These disparities are driven largely by restrictive socio-cultural norms that limit access to agro-weather technologies and exclude women and other vulnerable groups from household and community decision-making. As these groups are highly dependent on climate-sensitive agriculture, they face disproportionate livelihood risks from climate variability and extremes.

This brief presents key messages and policy options to close gender gaps and promote inclusive WCIS and stronger policy frameworks. Strengthening inclusive access to accurate and timely weather and climate information will improve risk management, enhance adaptive capacity, and support productivity gains in the agriculture sector. The evidence is clear: when climate information is co-produced with communities, localised, and designed with gender inclusion, adoption increases, losses decline, and resilience strengthens. This brief outlines priority actions for governments and development partners to scale proven models, mobilize finance, institutionalize co-production, and close the digital and gender divide in climate services.

BACKGROUND

Climate change poses a major threat to agricultural productivity globally and is particularly acute in East Africa, where most households depend on rain-fed agriculture (Abdullahi et al., 2024; IPCC, 2022). Climate variability in East Africa manifests through erratic rainfall, prolonged drought, localised flooding, and pest and disease outbreaks. Smallholder farmers, particularly those growing beans and other staple crops, are highly exposed (Ouya et al., 2024). Its impacts fall disproportionately on women and other vulnerable and marginalised groups. Restrictive gender and cultural norms limit their access to resources and information, reduce adaptive capacity, and undermine livelihoods (FAO & World Bank, 2017; Gumucio et al., 2020). Women bear the highest labor burden in agriculture yet have the lowest access to WCIS technologies and decision-making spaces (Gumucio et al., 2020). This results in delayed planting decisions, low uptake of climate-smart practices, preventable household food insecurity, and foregone productivity gains.

Women have fewer opportunities to access digital and formal Weather and Climate Information Services (WCIS), including radio, mobile phones, smartphones, and extension services (Ouya et al., 2024). They rely more on In-

Indigenous knowledge and informal communication channels such as community meetings and word of mouth, which are often less timely and less effective (Hansen et al., 2019). Expanding access to reliable WCIS is therefore essential for preparedness, risk management, and climate-resilient livelihoods.

Despite global, regional, and national commitments to inclusion, significant barriers persist. Limited decision-making power at household and community levels, restrictive norms, and inadequate, gender-tailored dissemination systems continue to constrain equitable WCIS access and use (Carr & Onzere, 2018; FAO & World Bank, 2017). Bridging this gender gap is critical to building resilient agri-food systems and strengthening food and nutrition security.

A policy response must be multi-sectoral and action-oriented. Priorities include:

- Reforming policy and institutional frameworks to mainstream gender in WCIS
- Co-producing and co-designing services with women and marginalised groups
- Investing in targeted delivery mechanisms that reach those currently excluded
- Leveraging Indigenous knowledge alongside scientific forecasts

By prioritising inclusivity and strengthening partnerships, WCIS can empower vulnerable populations, enhance adaptive capacity, and accelerate climate-resilient agricultural transformation across East Africa.

WHAT THE EVIDENCE SHOWS

Use of WCIS led to yield increases of 0.2–0.3 t/ha among 38–49% of farmers in Tanzania and Uganda, and smaller but positive gains of up to 0.1 t/ha among 31–45% (Ouya et al., 2024). Income gains were reported particularly by male farmers engaged in commercial production. Impact-based early warning systems enabled farmers to avoid losses: 49% in Rwanda, 33% in Kenya, 32% in Uganda, and 31% in Tanzania. Financially, 30–33% avoided losses of up to USD 30, and 33–71% avoided losses of up to USD 100. Men reported increased income, enterprise diversification, and improved livestock and investment decisions. Women reported enhanced household food security, reduced intra-household conflict, and greater participation in leadership and group-based adaptation. The constraint is not capacity; it is access, agency, and structural barriers.

Additional benefits will be realized if ECREA project's demonstrated institutional innovations are ready for scale, including AgroClimate Advisory Committees (AACs), Radio Listener Clubs (RLCs), participatory Integrated Climate Services for Agriculture (PICSA), mobile-based advisories and SMS, and gender-responsive leadership training. These platforms localized advisories, integrated Indigenous knowledge with scientific forecasts, generated feedback loops, created safe spaces for women and youth, and increased trust in climate services. Hybrid delivery models combining radio, mobile, and community-based forums produced the strongest uptake and impact.

CO-PRODUCTION AND PARTICIPATORY DESIGN OF WCIS

Co-production and participatory design of Weather and Climate Information Services (WCIS) are essential to ensure that climate services are relevant, trusted, and widely used in East Africa. When Indigenous knowledge is integrated with scientific forecasting, services become more context-specific and credible for end users, particularly smallholder farmers.

Effective co-design requires coordinated engagement among government agencies, NGOs, the private sector, research institutions, and local communities. Inclusive processes ensure that the needs of women and other marginalized groups are explicitly addressed, strengthening decision-making, uptake of climate services, and community resilience.

Digital technologies provide powerful opportunities to scale WCIS delivery. Although many digital tools in the region remain underdeveloped, hybrid approaches that combine mobile platforms, community radio, and

face-to-face dissemination are demonstrating strong results. Pairing digital innovation with participatory design greatly enhances the reach, quality, and usability of WCIS, helping ensure services are both scientifically robust and locally relevant.

Policy priorities include institutionalizing participatory co-production, investing in digital infrastructure, supporting hybrid dissemination models, and resourcing stakeholder coordination to accelerate adoption and impact.

ACCESSIBILITY AND USE OF WCIS AMONG VULNERABLE GROUPS

Accessibility gaps remain largest for women farmers, youth, persons with disabilities, refugees, internally displaced persons, and remote rural populations. Constraints include lower phone and radio ownership, weaker digital literacy, mobility limitations, limited control over income and land, exclusion from extension services, language barriers, and low institutional capacity in NMHS and extension systems (Ouya et al., 2024). Even when women access WCIS, men often retain final decision-making power, reducing the translation of information into action (Carr & Onzere, 2018).

Access to Weather and Climate Information Services (WCIS) in Kenya, Uganda, Rwanda, and Tanzania remains uneven. Socio-economic, gender, and technological barriers disproportionately limit access for women, youth, persons with disabilities, internally displaced persons, and refugees. Gender gaps are particularly stark. Men typically have higher digital literacy, greater control over financial resources, and fewer cultural restrictions, which enhances their ability to access and use WCIS. Women and other vulnerable groups often lack mobile phones and digital tools and are constrained from participating in training and extension activities, resulting in reliance on informal information networks.

Digital platforms such as SMS alerts and mobile advisories are increasingly used to deliver agro-weather information and can extend reach to remote communities with limited internet connectivity. Community radio is also a critical dissemination channel. However, challenges persist, including language barriers, insufficiently localized content, and weak institutional support. As a result, many marginalized populations remain digitally excluded and unable to fully benefit from WCIS.

Targeted policy action is required to close these gaps by expanding equitable digital access, strengthening gender-responsive extension systems, and ensuring WCIS content is locally relevant and accessible to all user groups.

BARRIERS TO WCIS ADOPTION

Despite growing momentum for co-production of Weather and Climate Information Services (WCIS), several barriers continue to limit uptake and impact in East Africa. Key barriers include fragmented institutional mandates, under-financing of NMHS and last-mile systems, power asymmetries in co-production platforms, gender-blind WCIS products, underdeveloped digital tools in local languages, weak monitoring and evaluation systems, and short-term project cycles instead of sustained investment.

Co-production requires active participation from farmers, extension providers, meteorological agencies, researchers, the private sector, and media. However, its effectiveness is constrained by power imbalances, inadequate financing, and weak institutional support for participatory approaches (Ouya et al., 2024). Gender inequalities compound these barriers, with women and other marginalized groups facing social and economic constraints that limit engagement in climate services.

Digital tools offer strong potential to scale WCIS, yet many platforms and decision-support systems remain underdeveloped and poorly tailored to local contexts.

Adoption barriers are driven by a combination of socio-economic and structural constraints:

- lower education levels and remote locations reduce access
- Weak digital and telecommunications infrastructure limits connectivity
- Men consistently receive more climate advisories and early-warning information than women
- Women have lower digital literacy, fewer financial resources, and less mobile phone ownership
- Restrictive cultural norms reduce women's participation in training and extension services
- Language barriers and non-localized content weaken the usefulness of digital advisories
- Poor internet coverage delays access to time-critical climate information
- Institutional fragmentation also constrains WCIS delivery. Limited coordination among meteorological services, agricultural agencies, and extension systems leads to duplication, information gaps, and weak last-mile dissemination.

Closing these gaps requires resourcing co-production, investing in localized digital tools, addressing gender barriers directly, and strengthening institutional coordination to ensure WCIS reaches those who need it most.

INVESTMENT PRIORITY

- Institutionalize co-production nationally by legally recognizing AACs and RLCs, requiring gender-balanced participation, embedding feedback loops, and financing these structures beyond projects.
- Finance national meteorological capacity to improve forecasting accuracy, impact-based early warning systems, data-sharing architecture, and sub-national advisory localization.
- Close the digital gender divide through device subsidies, connectivity support, digital literacy training, and WCIS tools accessible to persons with disabilities.
- Scale hybrid delivery models combining SMS, community radio, and in-person facilitation with local language messaging and simple advisory formats linked to actions.
- Monitor what matters using gender-disaggregated indicators and RBET (Reach-Benefit-Empower-Transform) measurement, tying financing to equity outcomes.
- Move beyond pilots by creating national budget lines for WCIS, performance-based financing instruments, and regional harmonisation through EAC and IGAD platforms.

Investing in inclusive WCIS delivers higher agricultural productivity, avoided humanitarian costs, strengthened national early-warning systems, enhanced social cohesion and gender equality, and progress toward NDCs, CAADP, and SDGs 2, 5, and 13. Every dollar invested in inclusive WCIS reduces future crisis spending and strengthens national climate resilience.

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