

## **Title**

Securing women's land rights to strengthen climate-resilient farming in eastern Democratic Republic of Congo.

## **Author and affiliation**

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## **Extended abstract**

This study evaluates the impact of gender-responsive land formalization on the adoption of climate-smart agricultural practices and on household food security in eastern Democratic Republic of Congo (DRC). It draws on a three-year program implemented by Nature Seed Care Agri-Organisation that combined mobile registration clinics, subsidized registration for women, and community-led dispute mediation. The research employs convergent mixed-methods designed to estimate causal effects, identify behavioral and institutional mechanisms, and derive actionable recommendations for scaling tenure interventions in fragile, customary-land settings.

## **Background and research questions**

In eastern DRC, women perform substantial agricultural labor but frequently lack legally recognized land rights, which constrains long-term investments in soil conservation, agroforestry, and diversified cropping. The study addresses three questions:

- (1) What causal effect does formal recognition of women's land use or tenure have on adoption of climate-smart practices?
- (2) Through which mechanisms does tenure recognition influence agricultural investments and household food security?
- (3) Which programmatic components reduce barriers to registration and are scalable within customary tenure regimes?

## Program and research design

The program combined three complementary components: mobile registration outreach coordinated with local authorities, targeted fee subsidies for women, and community mediation to resolve tenure disputes. Rollout occurred across 48 communes over three years, creating variation in exposure that the study leverages for causal inference.

## Sampling and quantitative data

The quantitative analysis uses panel data from 1,200 households in 96 villages stratified by intervention exposure, agroecological zone, and customary tenure regime. Households were randomly sampled from local rosters compiled with cooperatives and extension services. A baseline survey preceded rollout, with two follow-up rounds at 12 and 30 months. Primary outcomes include binary indicators of adoption for soil conservation measures, agroforestry planting, and cropping diversification; secondary outcomes include input use and continuous measures of seasonal food security derived from a 30-day dietary diversity and food consumption score. Covariates include household demographics, farm size, off-farm income, access to extension, and shock exposure.

## Identification strategy and econometric approach

Causal effects are estimated using difference-in-differences models with village and survey-round fixed effects and standard errors clustered at the village level. To address selection into registration and program participation, propensity score weighting and instrumental variable approaches are employed, using administrative scheduling of mobile clinics as an instrument for individual registration status. Robustness checks encompass household fixed-effects panel models, alternative matching methods, and sensitivity bounds for unobserved confounding.

## Geospatial and plot-level verification

Household data are linked to georeferenced plot observations collected by enumerators using GPS. Plot-level indicators document erosion signs, tree cover, and observed conservation measures, enabling validation of self-reported practices

and spatial analysis of adoption patterns relative to market access, road proximity, and localized conflict exposure.

### Qualitative component and process tracing

A qualitative strand includes 40 semi-structured interviews with women who obtained formal recognition and those who did not, customary leaders, commune officials, extension agents, cooperative representatives, and legal aid providers. Twelve villages hosted focus group discussions (mixed and women-only) to explore norms, intra-household bargaining, and perceived costs and benefits of registration. Qualitative data were coded thematically to unpack mechanisms and identify implementation barriers and lessons.

### Preliminary findings

Preliminary quantitative estimates indicate that women with legally recognized land use or tenure arrangements are about 35% more likely to adopt at least one major climate-smart practice soil conservation, agroforestry, or crop diversification compared with comparable women without recognition. Impacts are particularly pronounced for agroforestry and soil conservation, consistent with stronger effects on longer-term, lower recurring-cost investments than on purchased inputs. Households where women hold recognized rights show modest but statistically significant improvements in seasonal food security and dietary diversity, with effects concentrated during lean months. Heterogeneity analysis suggests larger impacts on smaller farms, female-headed households, and households heavily dependent on subsistence agriculture.

### Mechanisms and implementation insights

Qualitative evidence identifies three primary mechanisms. First, formal recognition increases women's perceived tenure security, raising their willingness to invest in long-term practices. Second, recognition strengthens women's bargaining position within households and communities, improving access to cooperatives and extension services. Third, tenure documentation reduces transaction costs for accessing inputs and climate finance where proof of rights is required. Barriers that dampen impact include administrative fees, long travel distances to registration centers, customary resistance from male household heads, limited gender-sensitive

legal aid, and low awareness of procedures. The mobile clinics and community mediation demonstrably lowered transaction costs and resolved many disputes, though their sustainability hinges on institutionalization and recurrent funding.

### Policy relevance and contributions

This research provides rigorous evidence that gender-responsive tenure formalization can be an effective lever for promoting climate-resilient agriculture in fragile, customary contexts. The final paper will present extensive robustness checks, sensitivity analyses, and appendices with survey instruments and qualitative protocols. Policy recommendations focus on three scalable actions: (1) subsidize or waive registration fees for women; (2) integrate gender safeguards into national and local land administration reforms; and (3) link tenure recognition to extension services and climate finance instruments. Operational guidance for mobile registration clinics and community mediation is supplied, including monitoring indicators and indicative cost estimates to inform scale-up decisions.

### Conclusion

By combining rigorous causal estimation with rich qualitative process tracing, the study produces actionable recommendations for policymakers, donors, and practitioners aiming to align land governance reforms with climate adaptation and food security goals. If accepted, the author requests a presentation format that enables interactive discussion with policymakers and practitioners to facilitate rapid translation of evidence into policy and program design.

### References (selected)

Key methodological references, survey instruments, codebooks, and qualitative protocols will be included in the full submission.