



THE ECONOMICS OF
LAND DEGRADATION

Policy Brief

Ghana Case Study: The Case for Farmer Managed Natural Regeneration (FMNR) in the Upper West Region of Ghana

Background

The Sudanian Savanna zone recorded the highest tree density in the 1940s with a population of 230 trees per hectare (Chevalier 1946). Over the years, the incidence of land degradation has reduced the tree densities to about 11 trees per hectare, particularly on farmlands (Nikiema et al. 2003). Ghana's deforestation rate is about 2 per cent per year (135,000 hectares per year) (Forestry Commission 2017). Over the period 2001 to 2018, the Upper West region, recorded the highest rate of forest cover loss in Ghana, followed by the Upper East and the Northern region (Global Forest Watch 2019). Uncontrolled bush burning, extensive cattle grazing, and small-scale mining contribute to the degradation of agricultural, and forestlands in these regions (MOFA 2019). In addition, these regions have experienced unusually high climate variability and ensuing floods, droughts, bushfires, and storms within the last 30 years. As a consequence, soil fertility and yields have declined in the Upper West Region (MOFA 2019). Moreover, it is the third most impoverished region of Ghana, and with a limited resource and income base, farmers are particularly vulnerable to weather extremes.

In the light of these challenges, the Center for Indigenous Knowledge and Organization Development (CIKOD)—a community focused NGO—supports farmers in the Lawra and Nandom districts of the Upper West Region of Ghana. Both districts are affected by annual bush fires. With steeper slopes and higher population pressure than the southern parts of the region, soil erosion is a major problem in those districts (MOFA 2019). CIKOD's interventions in the Upper West Region started in the year 2014 with the purpose of re-greening secondary forests, fallow lands, and farmlands while simultaneously increasing crop yields and incomes of subsistence farmers through

the introduction of sustainable land management practices and Farmer Managed Natural Regeneration strategies (Karbo et al. 2014).

Farmer Managed Natural Regeneration

FMNR involves selecting and protecting the most vigorous stems re growing from living stumps of fallen trees or naturally growing trees, pruning off all other stems and branches, and pollarding the chosen stems to grow into straight trunks (Weston et al., 2015). According to Weston et al. (2015), FMNR as a practice is found in most parts of the Sahel and only differs in magnitude and tree density. Some of the most well-known examples are in Niger where smallholder millet-growing farmers in the southern part of the country have been protecting and managing trees and shrubs that regenerate spontaneously on their farmland (Larwanou et al. 2006).

Importance of FMNR to rural economies

FMNR is considered a major contributor to the re-greening efforts. When incorporated into farmlands, trees can help increase water infiltration into the soil and reduce soil temperatures, which in turn improve the annual yields of crops grown together on the land (Sidibé et al. 2015). Tree cover also improves above and belowground carbon sequestration and reduces wind speed, hence protecting the crops (Westerberg et al. 2016). Forest products (e.g. fruits, nuts, fuel wood, forage and thatch) that result from FMNR are the backbone of rural household economies in SubSaharan Africa.

International and national policy context

The promotion of FMNR and agroforestry are aligned with current national policies and development priorities

in Ghana. As a signatory to the United Nations Convention to Combat Drought and Desertification (UNCCD) and SDG target 15.3 on Land Degradation Neutrality, Ghana has demonstrated its commitment to enhance the sustainability of agricultural systems and combat land degradation.

National level policies and regulations which promote sustainable savanna woodland management include:

1. the National Environmental Plan (NEAP) under the Ghana Environmental Resource Management Project;
2. Ghana Strategic Investment Framework (GSIF) for Sustainable Land Management (SLM) (2009-2015);
3. National Wildfire Management Policy; and
4. Forest and Wildlife Policy 2012.

Nevertheless, natural regeneration practices appear contrary to the Northern Ghana's agricultural practices. Policies, programmes and incentive packages tend to focus on the provision of subsidies for conventional farm inputs (seeds, NPK fertilizers) and traditional tractors (that do not allow for conservation-tillage options and navigation amongst trees). Further, the Directorate of Agricultural Extension Services under the Ministry of Food and Agriculture (MOFA) is responsible for extension services

to farmers. However, the activities related to FMNR (i.e. pruning, thinning, grafting, fire management, etc.) fall under the Forestry Services Division and Wildlife Division of the Forestry Commission (FC) and are not fully covered by MOFA. Therefore, to ensure that woodland management techniques are extended to the farming sector, there may be the need to bring about synergy between the activities and mandates of MOFA and the FC.

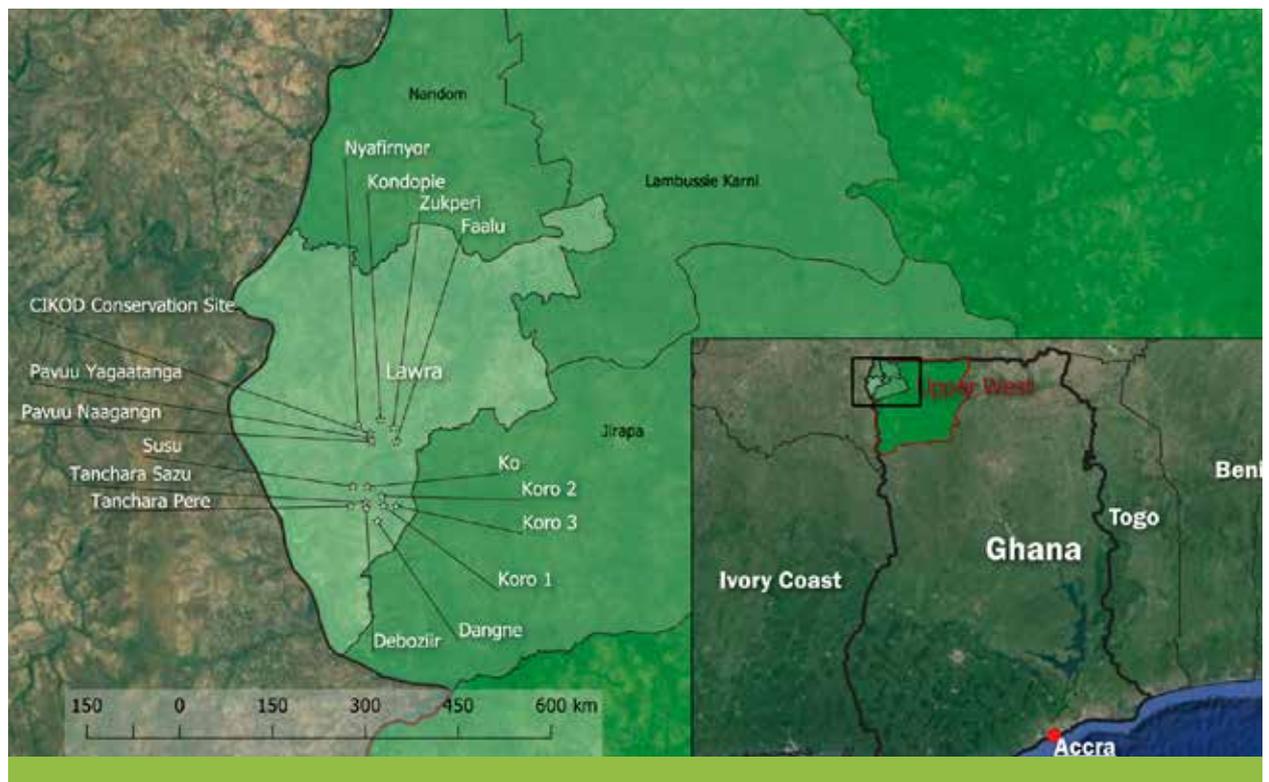
Case study area

The Lawra district (Figure 1) of the Upper West region was selected as the case study. This study compared crop yields for FMNR and non-FMNR farmers. FMNR farmers are classified as having at least 8 trees per acre, with an average of 13 trees per acre (33 per ha) and a maximum of 40. Non-FMNR farmers are classified as having between 1 and 7 trees per acre, with an average of 5.

Qualitative (focus group discussion) and quantitative (household survey) data were collected in April to May 2019. Over 500 households were interviewed in both CIKOD intervention communities and control sites. Data from the survey were used to undertake production function analysis and assess the contribution of farm inputs and farming practices on crop yields.

FIGURE 1 :

Map of Ghana showing the study communities in the Lawra District, Ghana



Results - the impact of FMNR on farmer livelihoods

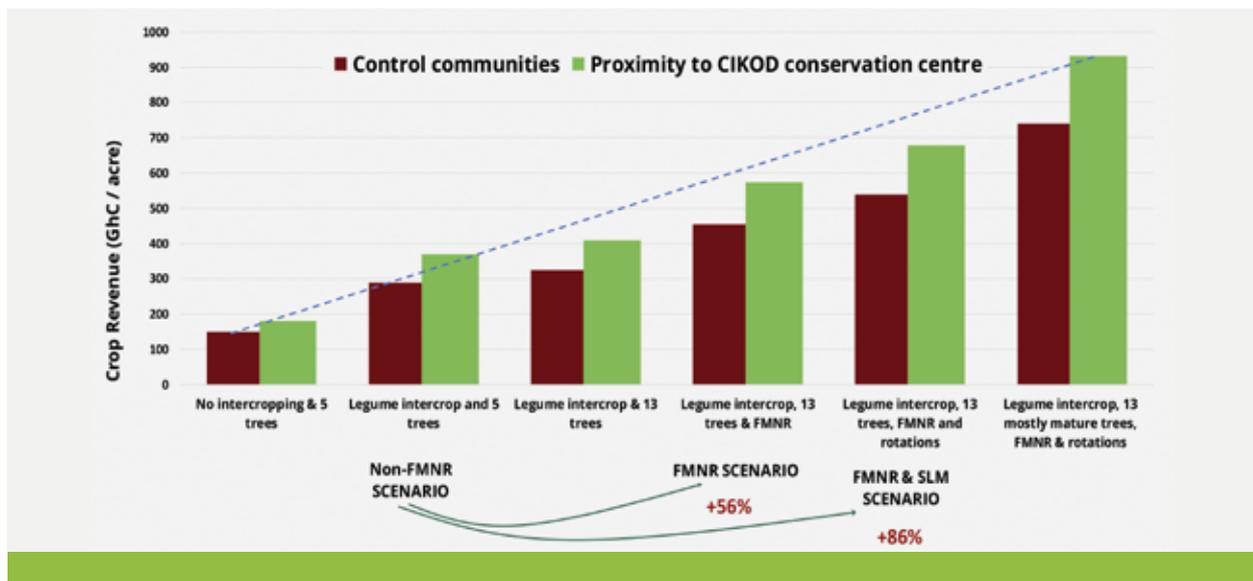
The study found that FMNR combined with crop rotation will provide the typical farmer with an additional income of GHS 255/acre/year (EUR 102/hectare¹) in present value

¹ Using the following conversions: 1 GHS/acre = 0.4 EUR/hectare on the basis that 1 acre=0.4 ha and GHS1=EUR 0.16.

terms (Figure 2). This equates to GHS 590 per household per year (EUR 94), since households have an average of 2.3 acres dedicated for the main plots (farmlands). This is a substantial improvement considering that the lower food poverty line – what is needed to meet the nutritional requirements is GHS 792 (EUR 126) per adult equivalent per year (Ghana Statistical Service 2018).

FIGURE 2 :

Crop revenue according to farming practice and community location



Furthermore, farmers have higher crop yields from the adoption of FMNR practices such as intercropping with legumes, crop rotations, presence of higher tree densities, more mature trees in the field, tree pruning and the exclusion of fire (Figure 3). In particular, by moving from low tree density and no sustainable land management (SLM) to FMNR and SLM can increase farmers' crop yields by 86 per cent. As trees in fields mature, the crop yields increase further.

The trees also provide significant amount of cash and non-cash forest produce, such as fuel wood, ebony and mango fruits, dawadawa seeds and shea nuts. Most of these products are harvested in the lean season when food is otherwise scarce, providing an important supplement of income and food.

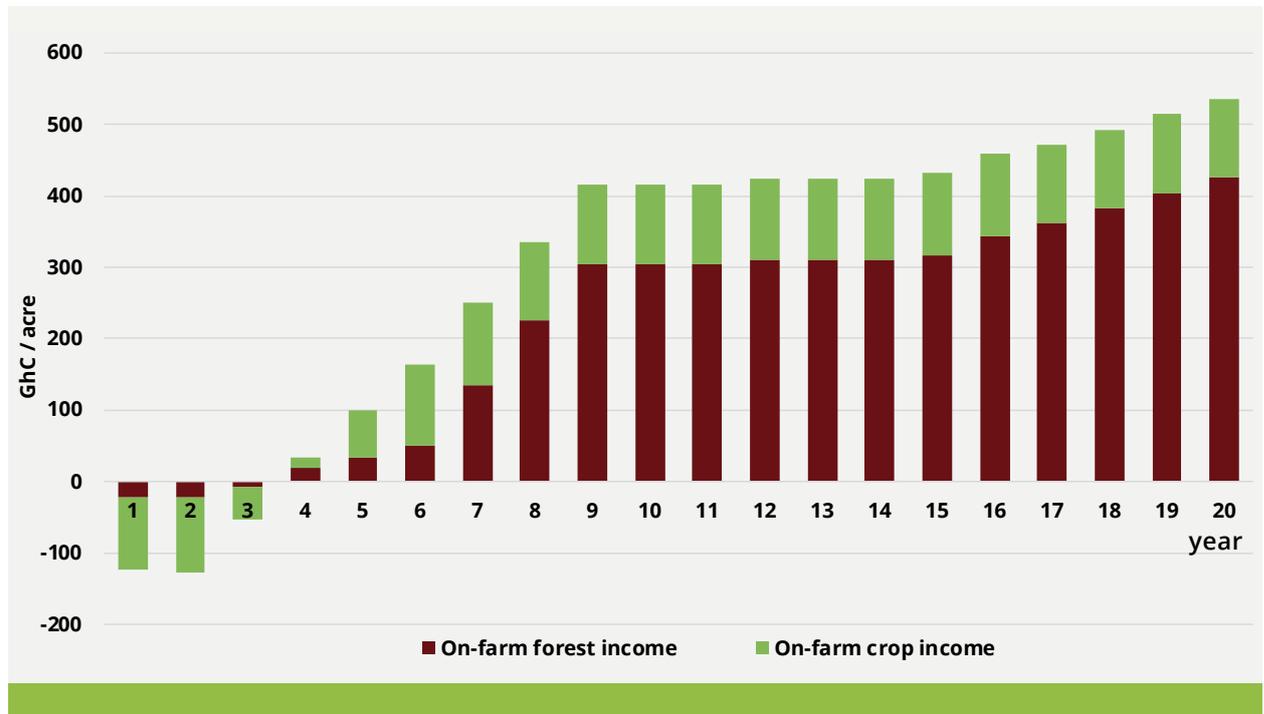
PHOTO 1 :

The use of FMNR and SLM practices on a farm in Kondopie



FIGURE 3 :

Additional income from on-farm forest and crop produce as a result of adopting FMNR and crop rotations over a 20-years time period (non-discounted for illustration)



The dashed line shows the potential for increasing crop revenues when moving from a low tree-cover and no intercropping, to a higher tree cover and farmer managed natural regeneration and crop rotations. Figure 3 also indicates that if farmers in control communities were to receive the same quality of training as farmers located closer to the CIKOD conservation centre, their crop revenues would increase even further.

Constraints to uptake of FMNR

The adoption of FMNR involves additional labour, land preparation and equipment acquisition costs such as wellington boots, cutlasses, pruning tools and pick axes. Labour costs relate to the thinning and pruning of trees and land preparation, since the tractors in the area are not adapted to navigate around trees on uneven terrain.

That said, FMNR adoption remains a low-cost land regeneration technology², with an average payoff period of only 3.3 years to farmers. When accounting for training costs (borne by NGOs), the pay-back period is slightly above four years.

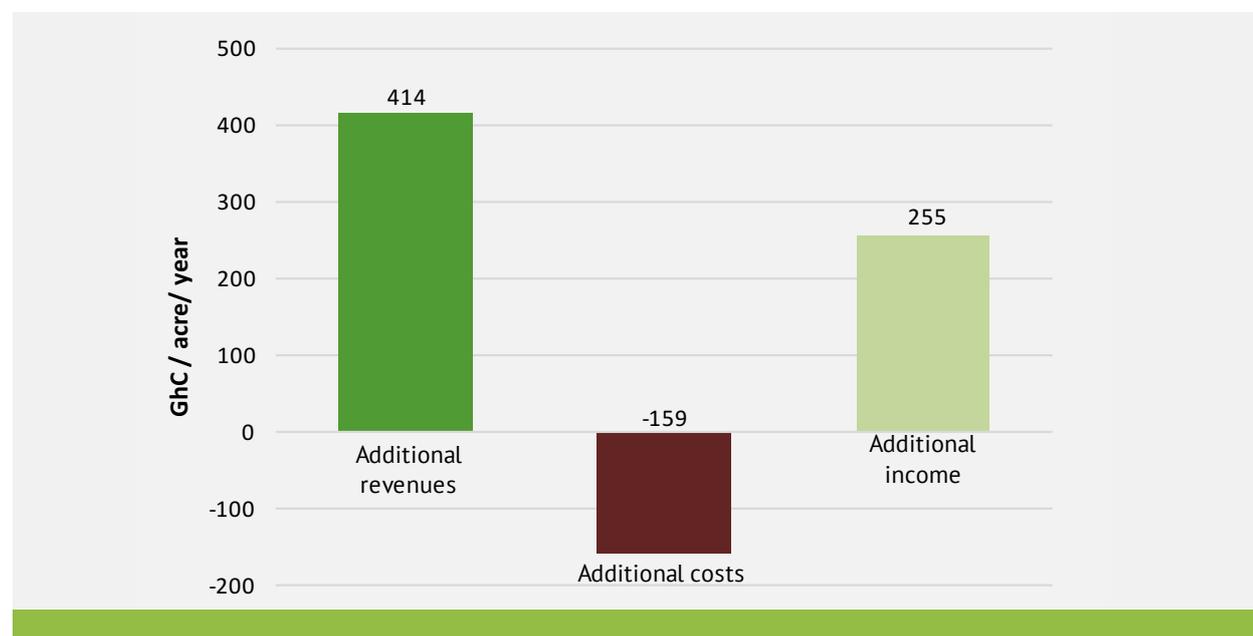
² Costing an additional GHS 1980/acre in present value terms over 20 years, or 160 GhC/acre/year, relative to non-FMNR farming.

Key findings

- Farmer Managed Natural Regeneration (FMNR) constitutes a long-term investment in soil quality.**
FMNR and crop rotations enable farmers to increase the productivity of their cropland by at least 83 per cent within five years. As tree density increases so does crop yields.
- FMNR communities are considerably more food secure and climate resilient.**
In qualitative terms, focus groups discussions showed that FMNR farmers are more food secure relative to non-FMNR farmers since they can harvest a wide range of on-farm forest products (fruits, nuts and pods) during the lean season when they otherwise would face food shortages. The average present value of enhanced forest produce (ebony fruits, shea nuts, dawadawa, mango and fuel wood) and crop yields as a result of adopting FMNR and crop rotations is in the order of GHS 255per acre per year (EUR 102 per hectare per year).
- FMNR creates co-benefits by addressing multiple problems simultaneously.**
These problems include land degradation, food

FIGURE 4 :

Additional revenues, costs and income in present value terms from implementing FMNR and crop rotations, farmer perspective (discounted at r=5%)



insecurity, fuel wood, and timber and fodder shortages. By combining FMNR with other Sustainable Land Management (SLM) practices, agricultural yields can be further improved. Moreover, well-conceived FMNR projects facilitate good governance, greater collaboration and community cohesion. Significant obstacles to up-scaling remain however, ranging from insufficient fire management, low and poor availability of rural credit, contradictory policy incentives and the absence of strong land and tree tenure. NGOs, the private sector and government agencies, can address different aspects and help create an enabling environment for farmers to practice FMNR.

Recommendations

For landusers

- Invest in FMNR for long term diversified returns;
- Intercrop with legumes, make use of crop rotations, compost, mulching and tied ridges for higher agricultural productivity;
- Other SLM activities can be adopted to build the long-term health of soils.

For NGOs, international development partners and lending institutions

- Empower community leaders to prevent fire and manage fire, the very basis for FMNR;

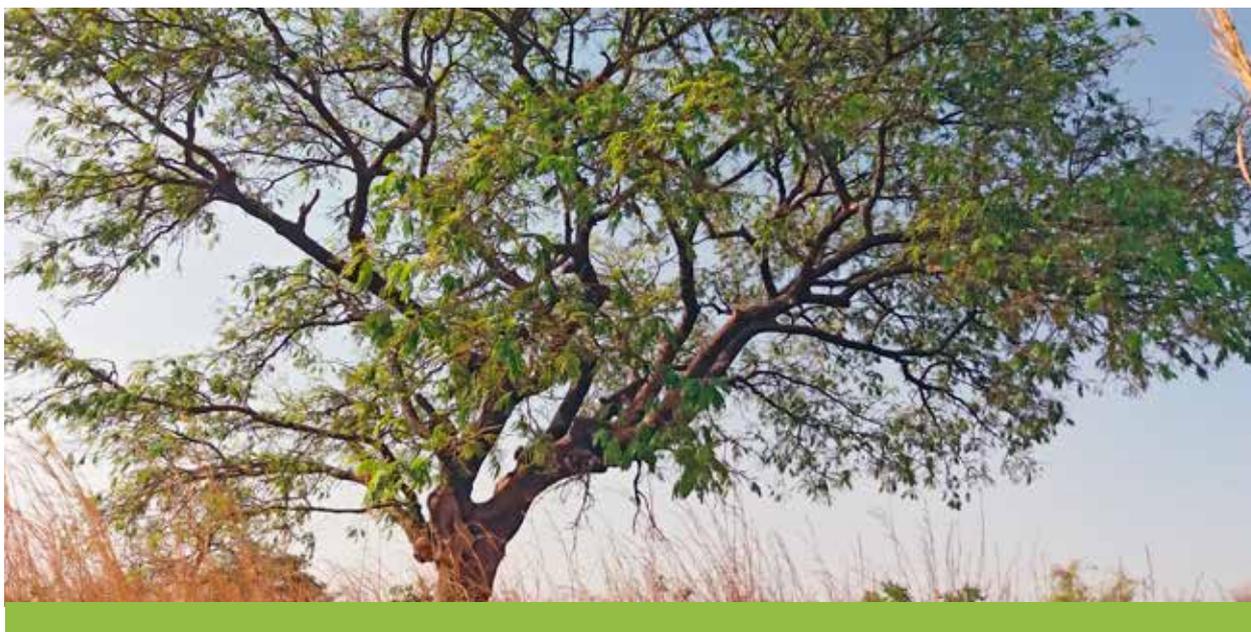
- Empower farmers to monitor and track changes to help improve access to investment capital and manage their farming enterprises better;
- Help improve farmers' access to rural credit and critical farming equipment for FMNR and SLM (e.g. smaller tractors, wheel barrows, cutlasses, wellington boots and protective gear).

For public decision-makers

- Focus on promoting FMNR to meet international commitments;
- Integrate agriculture and evergreen farming into school curriculums;
- Manage bush fires and encourage cooperation between the Ministry of Food and Agriculture and the Forestry Commission in extension service provisioning;
- Improve land and tree tenure and farmers collateral;
- Use economic incentives to promote FMNR;
- Develop more inclusive agricultural programmes that target smallholders and could be restructured to support this group.
- Improving farmers' access to capital and equipment. For example, farmers need access to water to make high quality compost. According to Banuoko (2019), financial support for equipment and assets such as donkey carts and wheel barrows, or labour to help with the digging of water holes closer to the fields would have a considerable impact.

Conclusion

FMNR offers a promising low-cost and profitable strategy for re-greening northern Ghana. It meets national and international commitments while also improving farmer livelihoods and resilience. It is community driven, and it provides biomass for livestock, fuel wood, and better soil fertility. On-farm forest products and enhanced crop production improve farmers' food security and income levels throughout the year. Results of the present study show that within only five years of implementing FMNR and crop rotations, farmers can expect an 86 percent rise in crop productivity. As trees mature, the synergy between trees and crop yields become even more pronounced. In addition, farmers engaging in natural tree regeneration will enjoy a wider income base from the collection or harvesting of on-farm forest products.



Author(s): Lawrence Damnyag and Vanja Westerberg

Further reading and references can be found in:

Westerberg, V., Doku, A., Damnyag, L., Kranjac-Berisavljevic, G., Owusu, S., Jasaw, G., Di Falco, S., (2019). *Reversing Land Degradation in Drylands: The Case for Farmer Managed Natural Regeneration (FMNR) in the Upper West Region of Ghana.*

For further information and feedback please contact

ELD Secretariat info@eld-initiative.org
c/o Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
Friedrich-Ebert-Allee 32+36
53113 Bonn, Germany

The research and policy brief were realized with funding of the European Union (EU) and the German Federal Ministry for Economic Cooperation and Development (BMZ).

The results and recommendations in this paper represent the opinion of the author(s). The views expressed herein can in no way be taken to reflect the official opinion of the ELD Initiative, GIZ, BMZ or the EU.

Co-funded by the
European Union



Implemented by
giz Deutsche Gesellschaft
für Internationale
Zusammenarbeit (GIZ) GmbH



ALTUS
IMPACT

