Policy Brief

Transformational Agroecology in Burkina Faso

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1. Introduction

At the heart of the Sahel, Burkina Faso is an arid, landlocked country facing multiple interrelated challenges, stemming from climate change, land degradation, and armed conflicts. Half of the rural population lives below the national poverty line, and the number of people facing acute food insecurity during the annual lean seasons has risen from nearly 700,000 in 2019 to 2.7 million in 2024 (nearly 12 % of Burkina's population) (WFP, 2025; World Bank, 2021). The agricultural sector employs 80% of the country's working population (World Bank, 2021) but only contributed 16.3% to Burkina Faso's GDP in 2023 (Statistica, 2023).

The causes of rural poverty in Burkina Faso are linked to several controllable factors, some of which include:

- Shortage and poor quality of arable land, land insecurity, poor communication and transport networks, and lack of access to suitable financing options for a large fraction of the farming population (IFAD, 2023).
- Poor infrastructure and high energy costs that support the production, storage, transport, and marketing of local agricultural products (IFAD, 2019).
- Limited state investment in education, health and governance, and misaligned agricultural incentives for the cultivation of target crops (maize, cotton and rice), leading directly or indirectly to a 'dependency' on external inputs and support, to the detriment of farmer autonomy, the trade-balance and government debt (Mentz-Lagrange & Gubbels, 2018; Westerberg, 2017).
- Increasing population growth, land degradation and changing laws governing land property sales, leading to intercommunal conflicts and the socio-economic marginalization of youth in particular (Noria Research, 2020).

Figure 1: Farmer preparing zai pits on his field

Compounding these factors, recent years have been characterized by more extreme rains, flooding events and longer droughts. While the clear-cutting of vegetative woody biomass for fuelwood and agriculture, and the shortening of traditional fallow periods (often up to 15-20 years) have contributed significantly to large-scale land degradation and biodiversity loss, especially in the northern and eastern regions of Burkina Faso (Reij et al., 2005; Sylla et al., 2021). Moreover, in the semi-arid regions of West Africa, soils are sensitive and vulnerable to degradation mainly due to their low structural stability associated with the type of clay (kaolinite) and low organic matter inputs in most land use types (Batino et al., 2007).

Through the lens of conventional agriculture, low fertiliser use has generally been considered a key contributor to lagging agricultural productivity growth in sub-Saharan Africa (Morris, 2007). As a result, Burkina Faso introduced fertiliser subsidy programmes in 2008, targeting rice, maize and cotton. But according to empirical evidence, the subsidy has incentivized farmers to allocate more land to these target crops, to the detriment of cowpea, intercropping, and crop diversity overall (Ahmad et al., 2022). Others have shown how over-reliance on conventional farming and chemical inputs has led to soil degradation, the loss of valuable ecosystems (forests, wetlands, agro-biodiversity), the bio-accumulation of agro-chemicals in soils and water bodies, and the corrosion of local systems of knowledge and trade (TWN, 2015; Mentz-Lagrange & Gubbels, 2018; Dawson and Sikir, 2016). The annual cost of land degradation in Burkina Faso is estimated at US$1.8 billion, or 26% of the country's Gross Domestic Product (UNCCD GM, 2018).

In the light of the challenges faced in rural areas, the Burkinabe-founded NGO *Association Nourrir Sans Detruire (ANSD)* started working in 2011, within 3 of its 22 rural departments of the eastern region. ANSD's mission is to strengthen rural communities to overcome hunger and promote socio-economic development, building on agroecological principles (see Box 1). When ANSD started its work, only a few 'rare and far-in-between' farmers were experimenting with agroecology. Now, 14 years later, ANSD has reached approximately 89 villages and 125 intervention sites (1 or more per village, depending on the village size). Today, one quarter of the farming population in the 3 departments has achieved an advanced state of agroecological farming system, covering some 25,000 hectares of farmland, as explained below.

Box 1: Agroecology and ANSD

Agroecology integrates research, education, and action to bring sustainability to every part of the food system. It is also community-focused, allowing farmers to develop, choose, and disseminate their own solutions to agricultural challenges. Through field schools, exchanges, village-level action plans, and collaboration with local leaders and government agencies, farmers and project collaborators have found effective ways to spread innovation amongst farmers (Brescia, 2024). In this way, ANSD and its network have created pathways to more nature-positive and economically viable livelihoods across more than 100,000 ha of farmland[1] within the Gayeri, Bilanga and Tibga departments of eastern Burkina Faso, and one quarter (25,000 ha) of all farmland is now under advanced agroecological management.

Agroecology, contrary to 'conventional farming,' allows farmers to work with and mimic nature's processes, and promotes regenerative use of natural resources (Wezel et al., 2020). Techniques such as stone contour barriers, water retention pits (e.g., zai, half-moons), and farmer managed natural regeneration of trees (FMNR) - are serving to rehabilitate the productive capacity of the land through better control of rainfall, runoff and erosion, as well as through improved soil fertility management and the sustainable increase of soil biomass and manure availability. In Burkina Faso, the adoption of agroecological practices is spreading and is increasingly featured in the popular press as a strategy to combat drought and food insecurity (Minute.bf 2024; Minute.bf 2025).

1 With a population of 270,000 inhabitants (across Bilanga, Gayeri and Tibga from the 2019 census), and on the basis of household survey data, it is known there are an average of 21,250 households (12.7 individuals per household) that each have an average of 5.1 ha of cultivated land. This implies that some 100,000 hectares are cultivated in the study area.

Figure 2: Farmer adding organic compost to a zai pit

Until present, the successes associated with regenerated farmland and improved farmer wellbeing have been captured in farmer testimonies and case studies (ANSD, 2015a; ANSD, 2015b; ANSD, 2015c; ANSD, 2015d; Brescia et al., 2024). There was consequently an interest to undertake a more comprehensive impact valuation, **to understand the extent of agroecological adoption within the ANSD case-study area, how deep the transformation is within individual farms, how rural livelihoods are impacted, and where resources are best spent to help ensure long-term profitability, sustainability, and further scaling efforts?** This policy brief summarises the lessons from the impact valuation.

At a national level, it should be noted that in recent years the government of Burkina Faso has initiated sustainable agriculture and land management programs to address soil degradation and its effects on the environment, human and animal health (including the National Strategy for Soil Restoration, Conservation and Recovery in Burkina Faso, 2020-2024 and the National Land Management Program 1 & 2) (Komonsira, 2025). Such programs are hard to implement in practice, but much can be learned from ANSD's approach to agroecology, as argued in this policy brief.

1. 1. Key Messages for Policymakers

- Advanced agroecological farmers have an average yield of 1,230 kg/ha, compared to 695 kg/ha for farmers who are in an early transition phase. In the most extreme case, de facto conventional farmers, monocropping cereals, without canopy cover, can increase their yields from a baseline of 320 kg/ha to at least 1,400 kg/ha by transitioning to advanced agroecological farming.
- Agroecological practices substantially increase manure availability and soil organic matter, and regenerate degraded land. This is in contrast to the use of inorganic fertilisers, which have no demonstrable impacts on yield for the agricultural season of 2023/24 in the case-study area.
- Advanced agroecology is market-ready, generating positive, measurable, social and environmental impacts alongside an impressive, annualized rate of return of 43%, at the heights of extremely well-performing commercial return-seeking capital. But to unlock the true potential for scaling, perverse subsidies preserving the status quo should be phased out, and new blending instruments should be developed to mobilize additional agri-finance and help farmers bridge the transition costs.
- Farmer-led, community-driven agroecological innovation, extension, and development needs to be supported as a viable solution to Burkina Faso's rural poverty and land degradation problems.
- Agroecology offers an important platform for integrating peacebuilding into existing community-led land restoration programs. Through their participatory design, these programs are grounded in local dynamics and interests and build trust and

credibility between communities and other actors – key pillars for effective mediation and conflict resolution. Complementary peacebuilding and land regeneration have the potential to amplify positive changes while addressing root causes of the conflicts, including poverty, competition over natural resources, and weak governance.

2. Case Study Area and Data Collection

To analyse the impact of agroecology on farmer livelihoods, land use productivity, incomes and food security, we relied on expert interviews, focus groups with farmers, and quantitative analysis of a survey undertaken with over 400 randomly sampled farming households between June and September 2024 (Figure 3). The survey was designed to objectively represent the underlying population of farmers, to cover the full spectrum of farmers, from conventional to advanced agroecological farmers, using detailed land use budgets that elicit differences in farming practices, the use of inputs, production quantities and prices for all inputs and outputs.

The data from these sources have been used to make a comparative land budget analysis for the 12 months prior to the interviews,[2] on the basis of a 1-year cross-section, and to build a Cost-Benefit Analysis (CBA) - a vital component for comparing the total costs and benefits of agroecological adoption over time.

Sampling was done in ANSD intervention and non-intervention villages. However, non-ANSD intervention villages are few, and as expected, farmer-to-farmer-led learning has spread to them as well. Due to insecurity at the time the survey was undertaken, approximately one-third of all villages were considered accessible and low risk. Three to four villages from each of the departments were randomly selected from a list of accessible villages, and some 25 to 50 households were interviewed in each village.

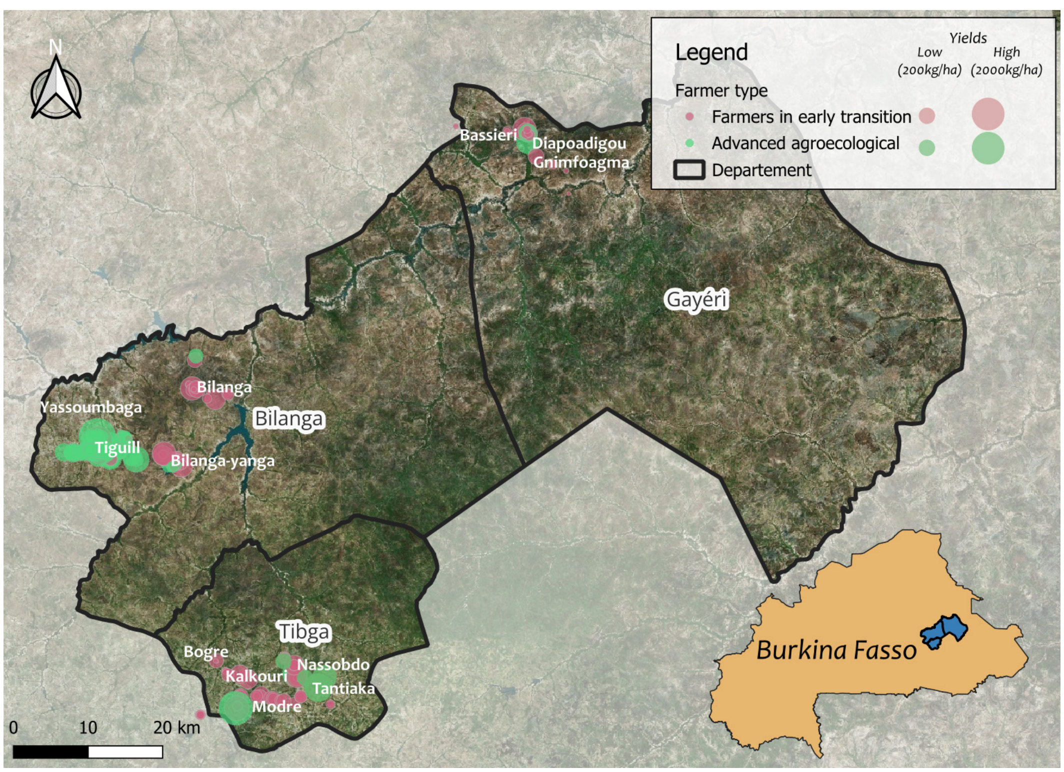


Figure 3: Case-study area and departments, household plot locations, villages where the survey was implemented, and farmer plots in early transition (red) and advanced agroecological (green) and magnitude of yields

2 from June 2023 to June 2024

3. Results - What Happens When Farmers Use Agroecological Practices

Farmers in the study have between 0.5 and 15 hectares (ha) of arable land with an average of 5.1 ha. They grow a diversity of subsistence and cash crops, including sorghum, which generates an average of US$ 165 per ha from the farmers' main plot, followed by groundnuts, maize, cowpea, millet, sesame, and rice Figure 4). The average size of the main plot is 3.1 hectares, on which they grow up to 6 crop associations. The average yield across the whole population is 825 kg/ha, with a minimum of 200 kg/ha and a maximum of 2,800 kg/ha.

Households apply agroecological practices that best suit their circumstances, preferences, and capabilities. The practices used are diverse, spanning agronomic, physical structures, and vegetative practices within sustainable land management categories, as shown in Figure 5. The vast majority of farmers (95%) employ at least two of these agroecological techniques (from a minimum of 1 to a maximum of 16), indicating that nearly everybody has started a transition journey.

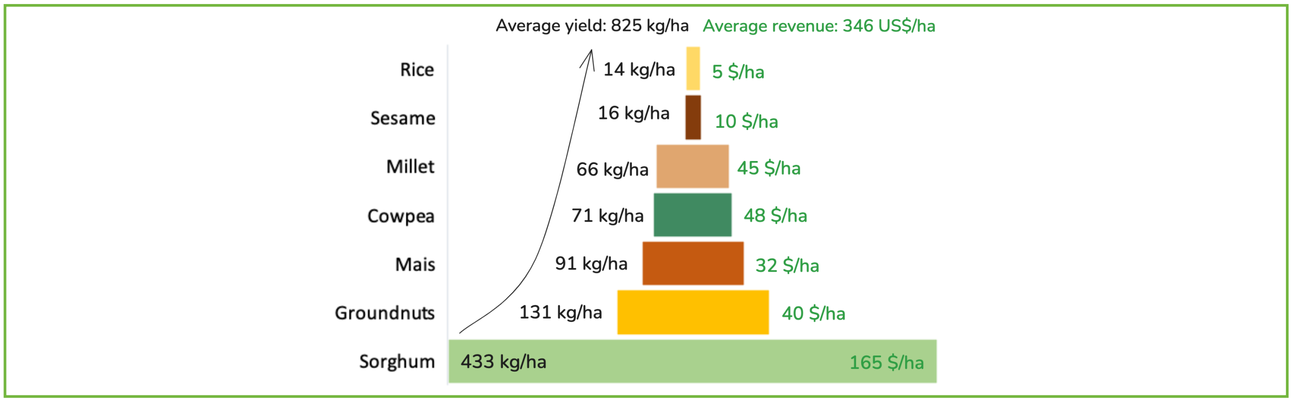


Figure 4: The relative importance of crops cultivated on farmers' main plot of land, by their revenue

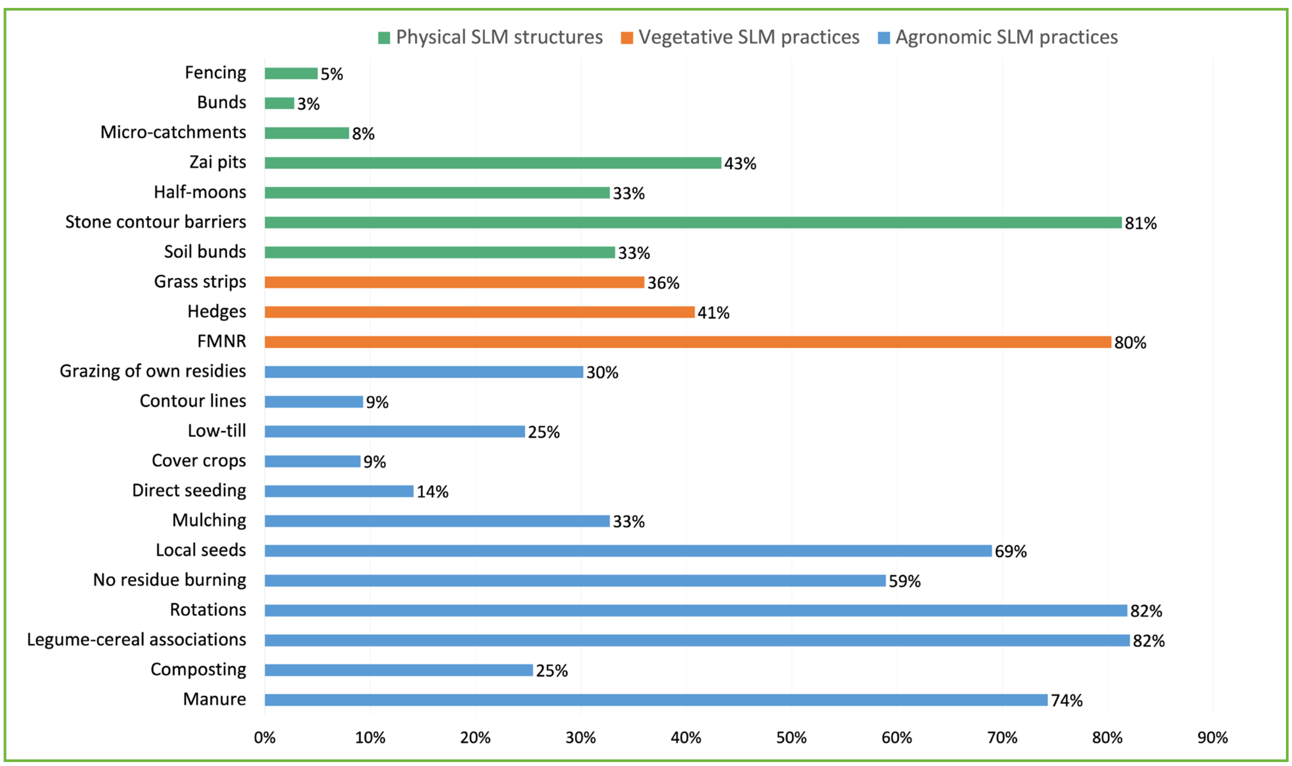


Figure 5: Agroecological & sustainable land management (SLM) practices used in the case-study area and associated adoption rate amongst farm households

Table 1: Characteristics of advanced agroecological farmers and conventional farmers in transition

	Average number of AE practices used on main plot	Approximate duration of agroecological adoption
Average farmer	8 (min 0 - Max. 16)	5.8 yrs
Advanced agroecological farmer	10 (min 7 - Max. 16)	6.7 yrs
Conventional farmers in transition	7 (min. 0 - Max. 14)	5.5 yrs

3. 1. Defining an Advanced Agroecological Farmer

With everyone adopting some degree of agroecology, how do we define an agroecological farmer? Detailed statistical analysis revealed that one particular group of farmers stands out. Namely, farmers who employ at least 3 agroecological practices out of a group of impactful practices, including zai, halfmoons, low tillage, no burning, stone contour barriers, farmer managed natural regeneration of trees (FMNR), along with legume-cereal inter-cropping in all cases. These farmers also have in common the use of at least 2 tons of manure per ha. We define these as 'advanced agroecological farmers,' and they currently comprise 25% of the farming population in the departments of Gayeri, Bilanga, and Tibga. The remaining three quarters of farmers are referred to as 'farmers in early transition to agroecology.' The results from our study demonstrate the remarkable impact of these interventions on land use productivity and farmer livelihoods:

- **The average farmer who is already on the transition journey towards advanced agroecology, can expect to increase his crop yields from 695 kg/ha to 1,230 kg/ha**, generating a net annual income of US$489/ha for advanced agroecological farmers, compared to US$293/ha for farmers in early transition (including revenue from fuelwood, forage grasses, and non-timber forest products or NTFPs, such as locust beans, tamarin pods, and shea nuts) (see Table 2 and Figure 6).

Table 2: Land use budgets of a typical 'advanced agroecological farmer' and that of a 'farmer in early transition'

Per hectare yields, revenues, costs and net-income	Advanced agroecological farmer	Farmers in early transition
Yield (kg/ha)	**1,230 kg/ha**	**695 kg/ha**
Total revenue (US$/ha)	**$ 558**	**$ 328**
Crop-based revenue	$ 490	$ 297
Forest-based revenues	$ 68	$ 31
Cash costs (US$ per ha)		
Manure and compost (derived)	-42*	-17
Chemical pesticides	-10	-8
Chemical NPK fertilizer	-11	-5
Hired labour, plowing & seeds	-6	-5
Total cost (US$/ha)	**-69**	**-35**
Net crop and forest income (US$/ha)	**$489**	**$293**
Approximate share of produce sold	**40%**	**19%**

*The survey elicited the quantity of manure (in 400 kg carts of manure) used by the farming households, and the carts were valued according to their market price. In reality, however, much of the manure is not purchased, but rather collected by farmers from their fields or stalls, before being applied prior to planting. Therefore, the true 'cash-cost' of manure use is arguably lower than what is reported here.

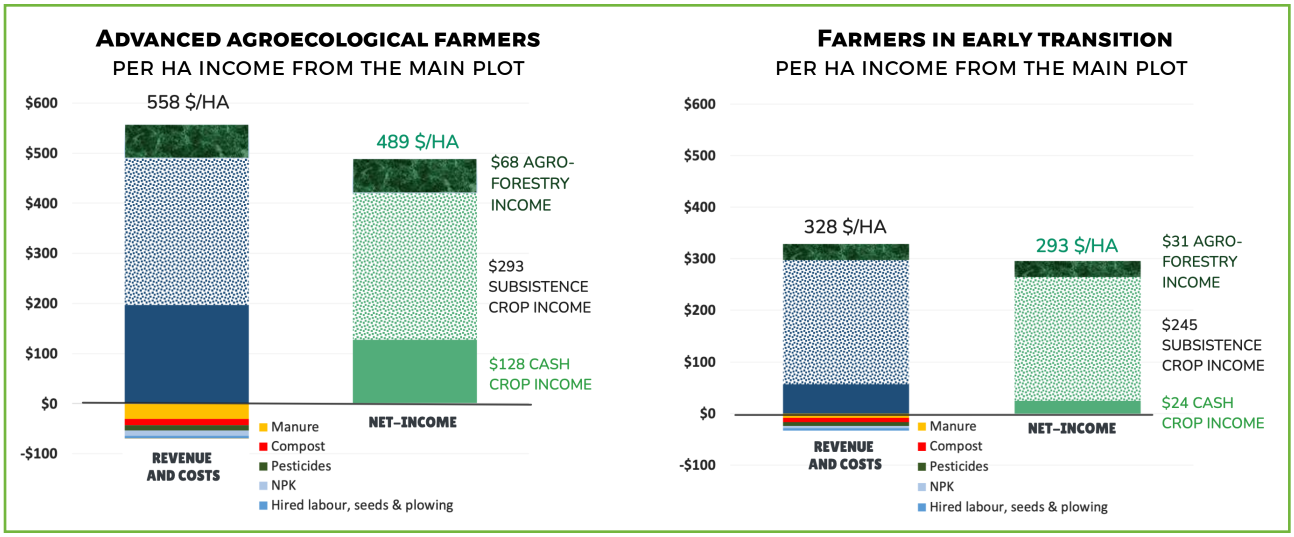


Figure 6: Average annual revenues, costs and net-income for advanced agroecological farmers and farmers in early transition

- **Aside from income diversification, agroecology also promotes increased market-readiness,** with a higher share of production from the main plot (40 %) destined for sale amongst advanced agroecological farmers, compared to farmers in transition (28 %).
- **Agroecological farming does not preclude the use of inorganic inputs,** as for the vast majority of farmers, it is a process of constant innovation, improvement of farming systems, and transition, rather than a 'perfect' end state. Accordingly, most farmers in the eastern region use some degree of conventional inputs.

3.2. Differences In Land Productivity and Yields Explained

Underlying each category of farmers, there is a wide spread of outcomes, in terms of yields and net incomes, according to where on the transition journey farmers find themselves and their endowments (Figure 7). However, simple bivariate comparisons do not explain the drivers of these differences or control for cofounding factors. For example, advanced agroeco-

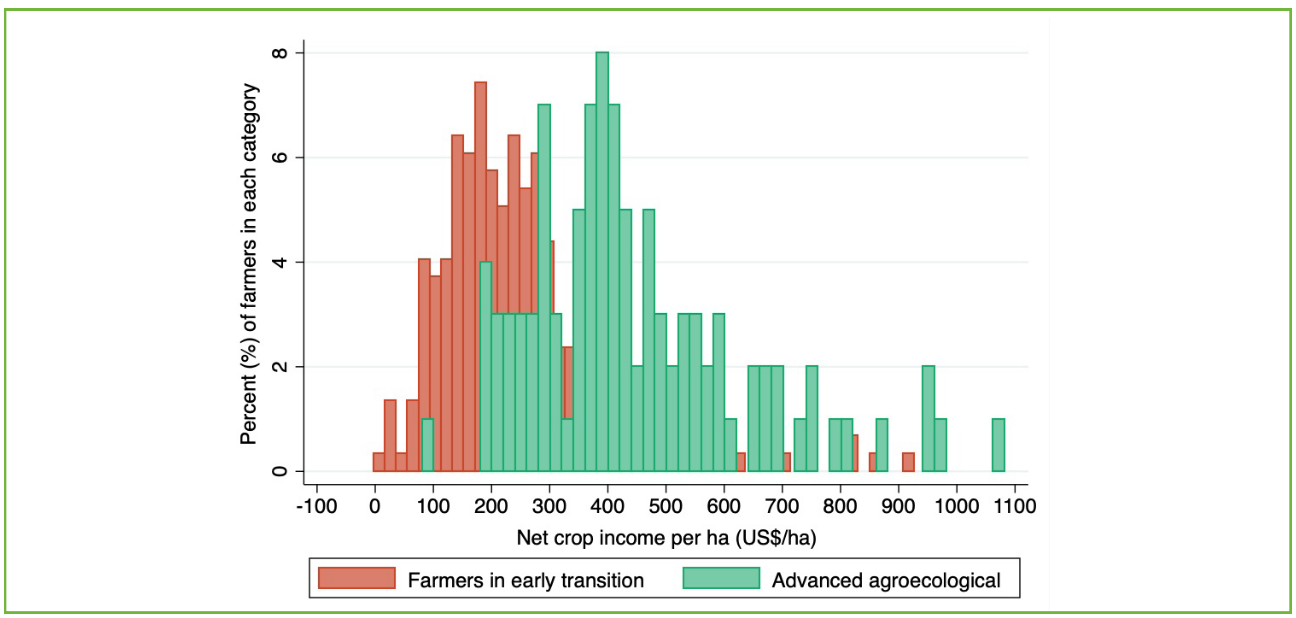


Figure 7: Distribution of per hectare net crop income, for the two farmer segments

logical farmers may be more productive because they are better educated, have more household members, or use a more efficient level of inputs.

To control for all the variables that may be driving yield and income differences, further statistical (production function) modelling was undertaken, which confirmed and explained the role of agroecology in improving land use productivity. It showed that:

- Agroecological farmers have more 'working age' household members, use more manure, and spend more on herbicides, which partly explains why they have higher yields and incomes.
- **Independently of input use and household labour, agroecological farming techniques increase yields and revenues, significantly**: at the most basic level, a conventional farmer (with 8 adult household members between 14 and 64 years) who is monocropping cereals, has no canopy cover in his fields, and uses no agroecological techniques, has the de-facto opportunity to increase his yields from 320 kg/ha to 1,420 kg/ha, by implementing at least five key agroecological techniques (see Figure 8).
- **Crop yields increase as more trees are regenerated** (see Figure 9). As tree canopy cover increases by 1%, yields increase by 0.14%. So, for example, by increasing tree canopy cover from 1 to 50 trees per ha (+490%), the average farmer can expect an additional yield of 29% (or 140 kg/ha), holding all other factors constant. Legume-cereal intercropping increases yields by 38% independently of all other practices; avoided crop residue burning and conservation tillage, by respectively 14% and 16%; and Zai and halfmoons by an additional 12% (Table 3).
- **There is no specific order in which farmers implement these practices,** and often they are implemented simultaneously, but the avoidance of residue burning usually precedes effective roll-out of farmer managed natural regeneration (FMNR) of trees.
- **Increased use of manure provides a significant boost to yields.** For each 1% increase in manure, yields increase by 0.13%. Thus, by increasing manure use for example from just 0.4 T (1 cart) to 2 T (5 carts) per hectare (an additional $7 worth of manure), yields increase by 131 kg, providing approximately $62 worth of additional crop revenues[3], or a benefit-cost ratio of 9 ($62/$7). As the farmer applies more manure, the benefit-cost ratio decreases, but remains positive within the whole spectrum of application rates applied by farmers (ranging from 0 to 14 T per ha).

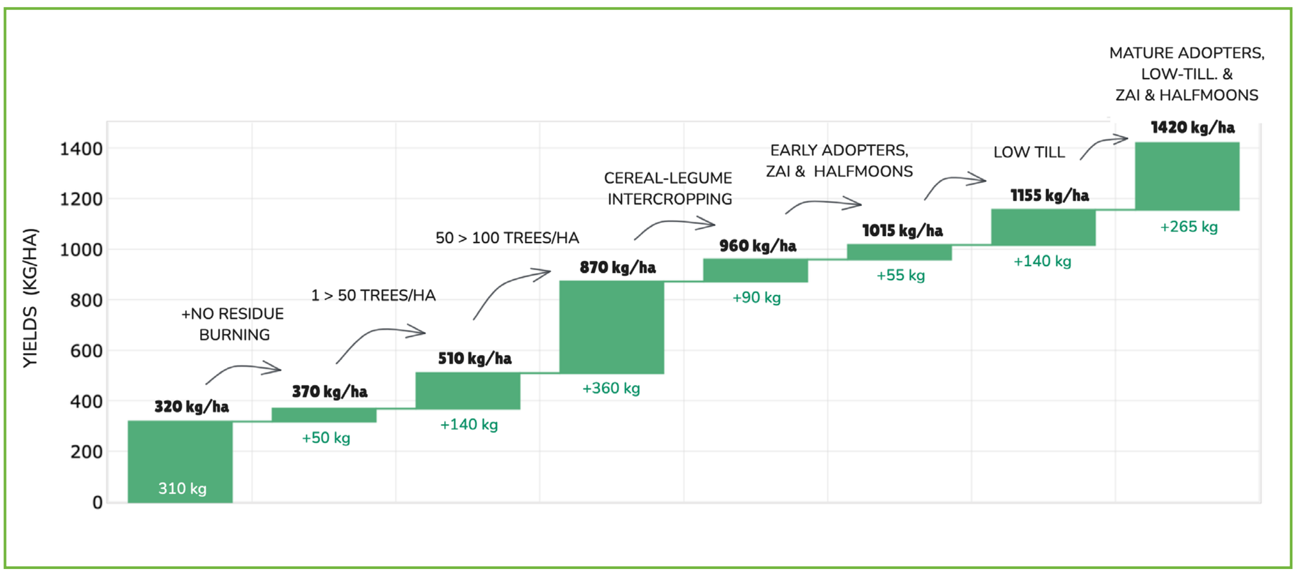


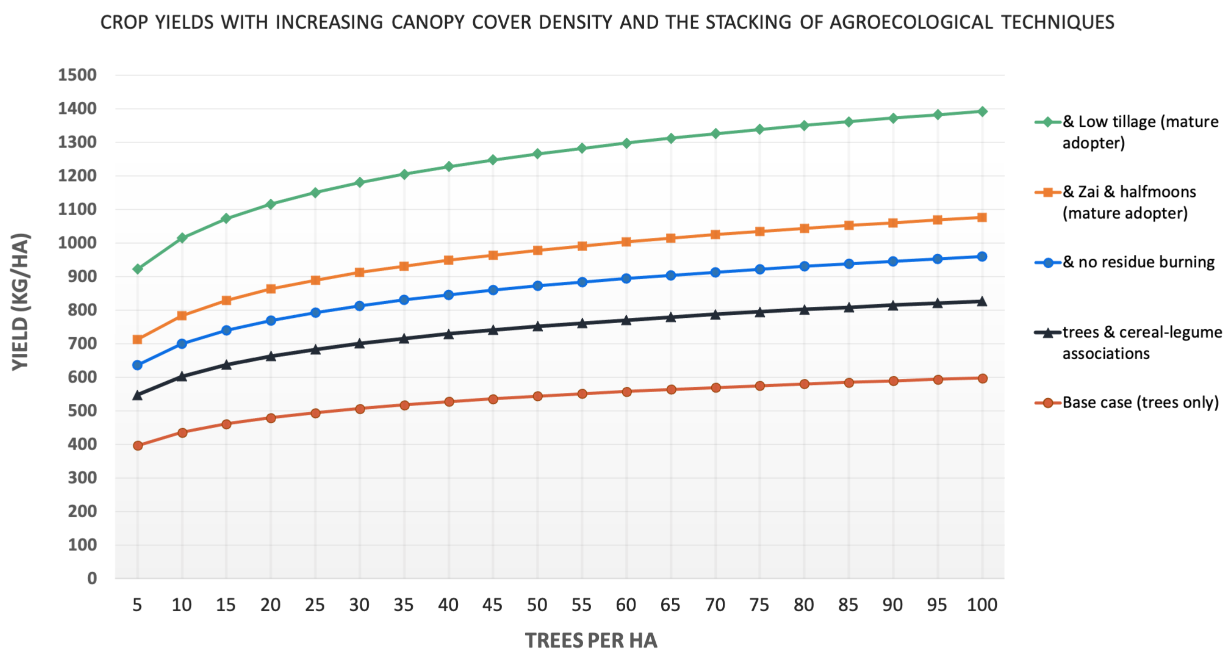
Figure 8: An example of how crop yields increase with increased uptake of agroecological practices (that can be applied in any order)

3 With an average price per kg of US$ 0.47 (276 CFA/kg) of all produce from the main plot (including cowpea, sesame, sorghum, maize, millet).

- **Chemical herbicide use also increases yields, but with limited impact.** On average, for every 1% increase in herbicide spending, yields increase by 0.04%, but for any spending beyond $8 per hectare, the additional cost is greater than the value of the incremental yield, generating a net loss to the farmer.
- Inorganic fertilizers have no demonstrable positive impact on yields. This is arguably because soil health is already regenerated thanks to agroecology, as it is well known that agronomic efficiency is low when mineral fertilizer is applied on fertile, and therefore unresponsive, soil (Vanlauwe et al., 2011). Inorganic fertilizer use, thus, has a negative benefit-cost ratio, on average, across the case-study area.
- Fungicides and insecticides, along with a range of socio-demographic variables, had no demonstrable impact on land use productivity (Figure 10).

Table 3: Summary - agroecological practices and inorganic inputs and their impact on yields

	Effect on crop yields
Cereal monocropping → Legume-cereal intercropping	+38%
Residue burning → No residue burning	+14%
Conventional tillage → Low till	+16%
Zai and half-moon pits (after 7 years of implementation)	+12%
Examples of changing input levels	**Effect on crop yields**
Canopy cover density 1 trees/ha → 15 trees/ha (+300%)	+21%
Manure use from $2/ha to $9/ha (or 0.4 T/ha → 2 T/ha) (400%)	+23%
Herbicide use from $2/ha → 9 $/ha (350%)	+6%



*Other agroecological practices, such as composting or stone barriers, also contribute to soil health but could not be untangled with respect to their individual impact in a statistical analysis, as they are usually combined with other practices such as Zai and FMNR.

Figure 9: Example of how yields change with increasing canopy cover and the application of other agroecological practices

3.3. The Determinants of Higher Manure Availability and Use

With manure being such an important driver of yields, it is relevant to question what makes some farmers able to apply more manure than others? Using production function modelling again, we found both cause and effect between agroecological practices and rises in manure use. For example, while controlling for household labour availability:

- **The termination of crop residue burning increase manure use by an average of 60 %** (0.37 T/ha to 0.6 T/ha); with the installation of stone contour barriers, manure use is increased by 33 %; mature adopters of zai planting pits and halfmoons use 22 % more manure; for every 1 % increase in canopy cover density, manure use is increased by 0.31 %; and for every additional Tropical Livestock Unit (TLU), manure use increase by 0.02 %. As the farmer introduces these various practices and the agro-ecosystem matures (at least 7 years of application), the average manure application rate increases from 0.4 T/ha to 4.6 T/ha per year, as illustrated (see Figure 11).
- **More forage and biomass also allow farmers to have larger livestock holdings** and, therefore, income from their livestock. Advanced agroecological farmers have an average of 7.6 TLU and generate livestock-derived income in the order of US$ 478 per household, against US$ 163 for 'farmers in early transition' with an average of 3.9 TLU per household.
- As such, **agroecology creates a circular and self-reinforcing cycle of increasing productivity**: more fodder biomass, shade, contour barriers, and micro-catchments on farms, supporting higher livestock holdings, generating more manure and higher land productivity, approaching maximum yield potential (Figure 12). This is because agroecological practices enhance the availability of fodder biomass and crop residues and prevent manure from washing off fields with heavy rains.

3.4. Total Household Income and Living Income

When adding the full spectrum of household income sources, including farm and non-farm income such as own-business earnings and remittances, the net income of a typical agroecological farming household amounts to US$ 2,951 (US$ 580 per adult), against US$ 1,331 for farmers in transition (US$ 261 per

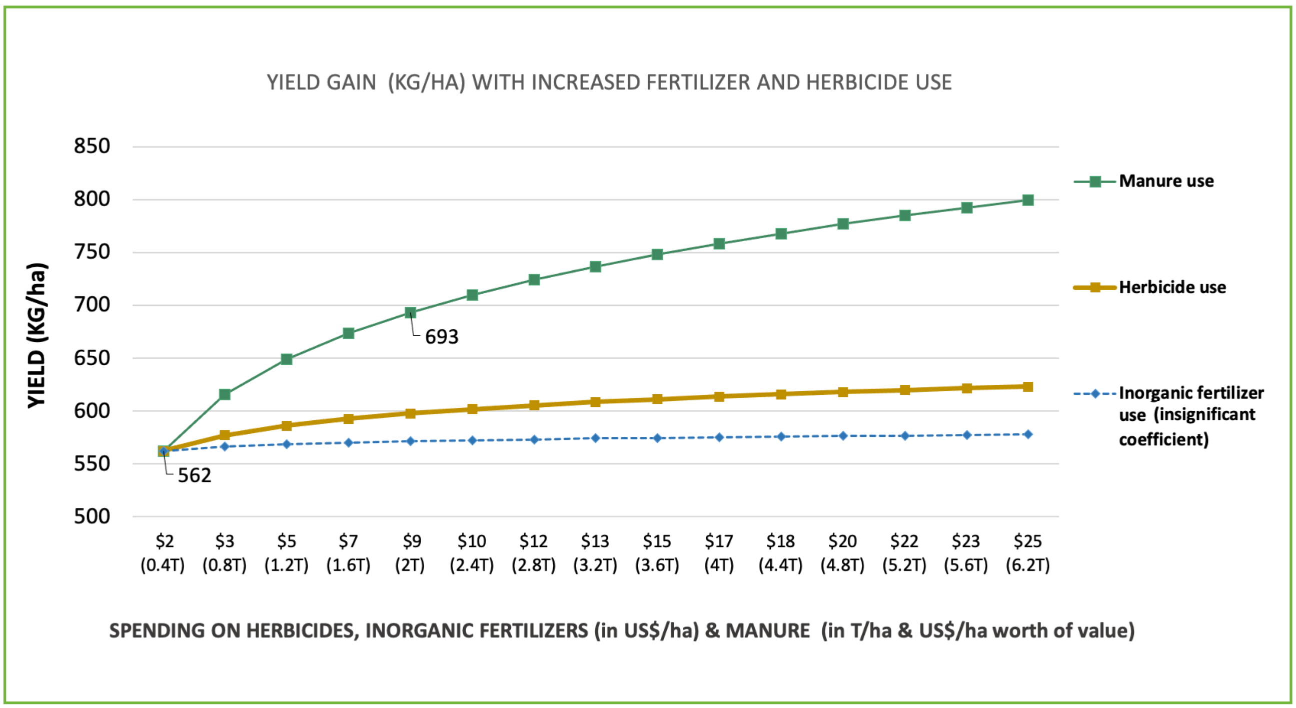


Figure 10: Relationship between herbicide use, fertilizer use and yields for a typical farm households

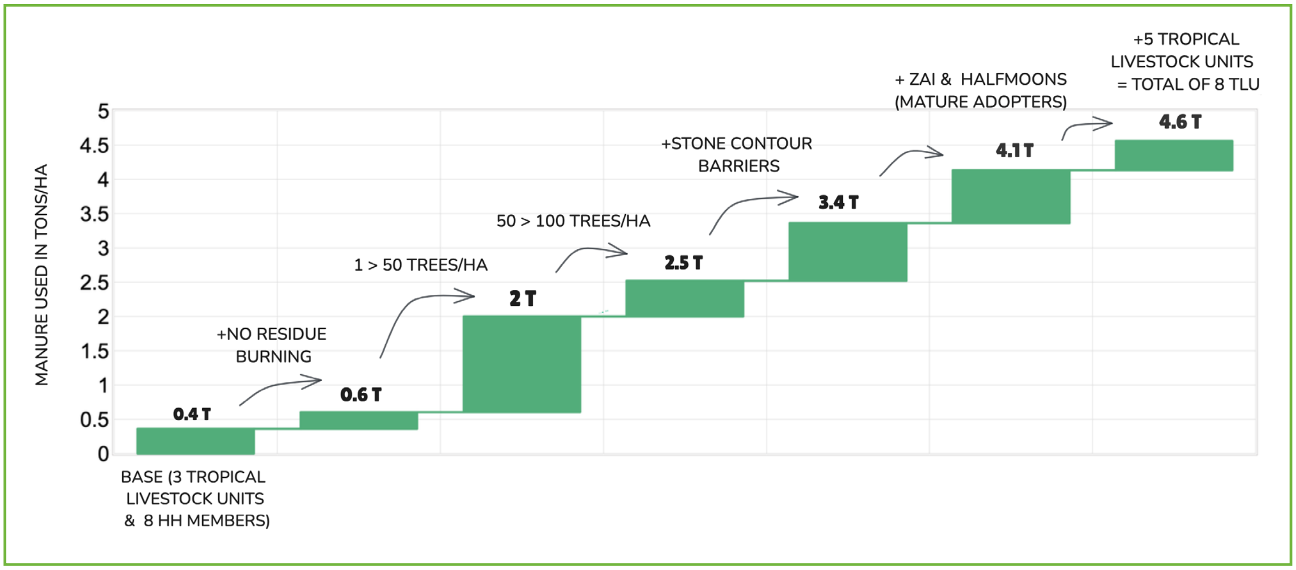


Figure 11: An example of how manure use increases with increased uptake of agroecological practices that can be applied in any order (2 T = 5 carts)

Figure 12: The self-reinforcing cycle of agroecology, livestock, manure use, and land productivity

adult). Relative to the Living Income Benchmark for rural households in Burkina Faso of US$ 2,112 (in 2024), study results show that on average, **advanced agroecological farmers have a living income surplus,** i.e. they are earning what is required to meet a decent standard of living for all its household members, in terms of nutritious food, shelter, education, health care, and extras for emergencies (Table 4 and Figure 13). In contrast, farming households in early transition have **a living income gap** of US$ 781.

3.5. The Investment and Business Case for Advanced Agroecology

Zai, stone contour barriers and FMNR is a popular combination of agroecological practices, as seen in the case-study area and throughout the central and northern regions of Burkina Faso, as well as in Senegal and Niger (Bado et al., 2018). The three techniques work in synergy:

- **Stone bunds counteract water erosion**, improve water infiltration, and accumulate organic matter and manure upstream.

- **Zai pits concentrate fertility**, reduce evaporation losses, and act as water-catchment pools;
- **Trees improve** soil fertility and increase food supply, non-timber forest products (NTFP) and firewood, and trees like Acacia albida or Piliostigma reticulatum provide fodder during the dry season.

Investment costs, such as the digging of zai pits[4], the pruning of trees, the use of compost, the acquisition of equipment and the construction of stone contour barriers, can be significant for the smallholder. But over time, crop yields, fodder, timber and NTFPs increase. To meaningfully assess how these benefits compare to the additional investment costs, all the future cash flows are converted into present value terms, using a 4.5% discount rate[5] for a 15-year time horizon. This is consistent with traditional farm management systems using relatively long fallow periods of 10-15 years to restore soil fertility (Bado et al., 2018).

Table 4: Total net farm household income and the living income gap/surplus

Total household income (CASH and non-CASH) from	Average household	Advanced agroecological (n=100)	Conventional farmers in transition (n=296)
Farmers' main plot	$933	$1544	$757
All other plot & vegetable gardens	$188	$289	$159
Forest products from the whole farm (lower bound)	$224	$414	$134
Livestock produce	$243	$478	$163
Own-business income	$127	$183	$108
Miscellaneous income (NGO support, dividends from a local enterprise, compensation payments, retirement)	$19	$44	$10
Average annual household income	**$1,734**	**$2,951**	**$1,331**
Living income gap/surplus	**-$378**	**$839**	**-$781**

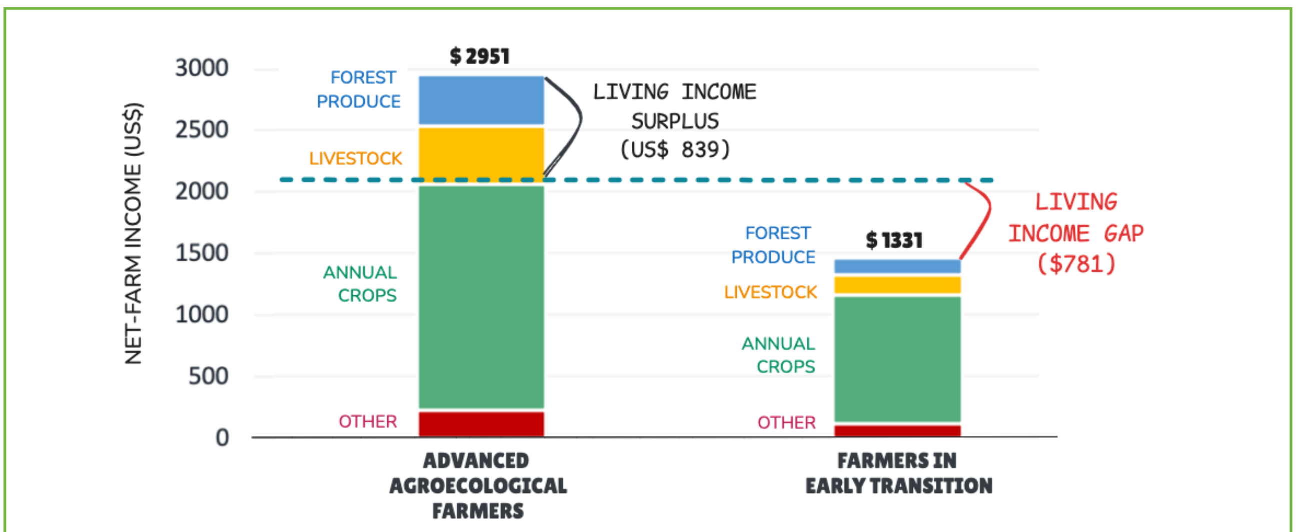


Figure 13: Average net-farm household income, including the living income surplus/gap

4 It is assumed that all additional labour effort is acquired through the hiring of paid workers.
5 Using a 4.5 discount rate, representing Burkina's Faso's average real interest rate, for the previous 10 years.

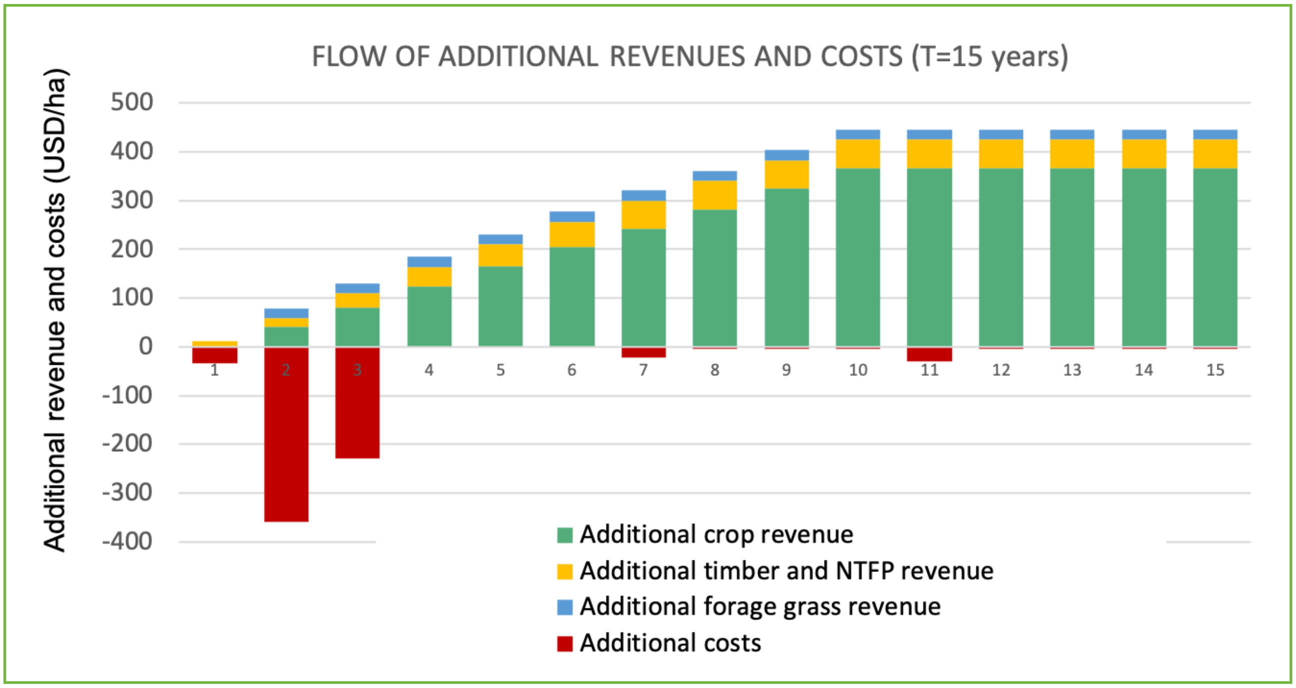


Figure 14: Flow of additional costs & revenues when transitioning to advanced agroecology

With these assumptions, the adoption of 'Zai, stone barriers and FMNR' generates US$ 4.8 in benefits for every US$ 1 invested. With a Net Present Value of US$ 2,308, the average annual additional income is US$ 154 per ha. The year-by-year (undiscounted) revenue and cost flow is illustrated in Figure 14. The internal rate of return earned by the farmer is an impressive 43%. Therefore, with lending rates ranging from 2-3% amongst development banks such as IBDR[6] and up to 20-30 % amongst rural banks in the case-study area (see main report), the 'Zai-Stone bunds-FMNR' package creates significant societal value under all possible financing models.

The pay-off period required to reimburse the initial outlays, however, is 5.4 years. Herein lies the potential challenge for large-scale adoption of agroecological transformations, as farmers in the case study are cash-constrained, and loan durations are usually no longer than 2 years maximum. However, such constraints can be overcome with tailored policy instruments, finance solutions, and repurposed subsidies.

For example, under the 'Programme National de Gestion des Terroirs – Phase 2' (PNGT2) that ran from 2002-2007 and that was funded by the government of Burkina Faso and various multilateral donors, agroforestry and soil and water conservation techniques were promoted (Gouvernement du Burkina Faso, 2019). The typical subsidy for contour barriers amounted to US$ 170 per ha[7]. Under such a grant, the pay-off period is reduced to 4.5 years, and financial performance is further increased (Table 5).

3.6. Other Proof that Agroecology Pays Off by Improving Food Security, Soil Regeneration and Bankability

Other indicators of resilience point in the same direction. The total food stock of advanced agroecological farmers at the time of the household survey was 300 kg (the median), triple that of farmers in transition (median of 100 kg). In the year preceding the interview, nearly half (45%) of 'farmers in early transition' had experienced running out of food, against

6 According to Carlucci & Guzzetti (2024), the International Bank for Reconstruction and Development (IBRD), applies a rate of 2.2% for Nature Based Solutions under flexible loans for Burkina Faso, comprising a 1.56% real rate of interest based on the 10-year Treasury Inflation Protected Securities yield from U.S. bonds along with a 0.64% lending margin based on IBRD flexible loans for Burkina Faso).

7 With a material stone cost of $272 per ha using market-prices, against $102 per ha with the subsidy, as per focus group discussions in Ougadougou, May 2024.

Table 5 – Cost-Benefit Analysis results per hectare farmland, when transitioning to advanced agroecology, example of a 'Zai pits, stone barrier and FMNR' package (discount rate of 4.5%, 15 years time horizon)

Evaluation criteria	Without subsidies	With subsidies for stone contour barriers
Net Present Value (NPV) in US$/ha	$2,308	$2,464
Average annual net-benefit in US$/ha	$154	$164
Benefit-Cost Ratio (BCR)	4.8	6.4
Implementation costs (first 3 years) in US$/ha	$621	$451
Payback period	5.4 years	4.5 years
Internal Rate of Return (IRR)	43%	61%
Return On Investment (ROI)	540%	746%

only 13% amongst advanced agroecological farmers. Advanced agroecological smallholders also have lower debt levels ($8 versus $35 per household). They are more credit worthy, as indicated by their superior ability to borrow from rural banks (44%) and other finance institutions, relative to all other farmers (4%).

Farmer perceptions of soil health also align with the economic results, with 89% of all farmers considering that agroecological adoption has been successful or very successful, in terms of its ability to provide food all year round, and improve household incomes and soil fertility. Furthermore, 80% of farmers stated that their income has increased since adopting agroecology.

Factors contributing to enhanced yields and soil health amongst agroecological farmers include nitrogen fixation, the addition of organic matter through leaf litter and decaying roots, a modification of soil porosity and infiltration rates leading to reduced erosion, as well as increased shade, which helps retain soil moisture (Nair, 1984). All these factors also improve climate resilience through the reduction of drought stress and flood risks.

4. Positioning Agroecology Within the Wider Agricultural Policy Landscape

Since 2008, Burkina Faso has provided input subsidies on mineral fertilizers, and these are still in vigour for rice, maize and cotton. These have been shown to incentivize farmers to allocate more land to these target crops, to the detriment of intercropping and crop diversity overall (Ahmad et al., 2022).

Moreover, with improper or excessive use, they can lead to nutrient imbalances (Shanmugavel et al., 2023), soil acidification (Agegnehu et al., 2023), and the biophysical environment can constrain the effectiveness of inorganic fertilizer inputs. For example, fields that lack secondary nutrients and micronutrients**,** or are already fertile, are typically unresponsive to inorganic fertilizers (Nziguheba et al., 2021; Vanlauwe et al., 2011). Others argue that due to the high cost and the need for repeated use of inorganic fertilizers, they will continue to remain out of reach to poor farmers (Olowoake, 2014), while inflicting a heavy cost on the public treasury when they are subsidized (Westerberg, 2017).

For the 2024-25 Burkinabe cotton campaign, for example, subsidies for conventional inputs **amounted to US$ 67.2 million**[8] (Minute.bf, 2024b). With an output of 286,623 tonnes, the resulting subsidy was in the order of **US$ 0.23 per kg of cotton produced.** That is a staggering amount, corresponding to 30-50 % of the retail price for cotton, which ranged from US$ 0.41 to US$ 0.70 in 2025 (Selina Wamuciii, 2025). In contrast, under previous rural development initiatives, such 'PNGT2' that provided subsidies for contour barriers in the order to US$ 170 per ha[9] (as per

8 The sum-total of subsidies provided by the Burkina Interprofessional Cotton Association, the Burkinabe government, and cotton sourcing companies.

9 With a material stone cost of $272 per ha using market-prices, against $102 per ha with the subsidy.

focus group discussions in Ougadougou, May 2024), the grant value amounts to approximately **$0.04 per kg of food crop** produced[10], corresponding to approximately 10% of the farmgate market price for staple crops in the case-study area. Moreover, unlike conventional inputs, agroecology provides positive co-benefits to wider society, in terms of carbon sequestration, biodiversity enhancements and ecosystem-based climate change adaptation.

There is also ample evidence that input subsidies for conventional crop production are indirectly fuel-ing land degradation. By virtue of its 'subsidized costs,' farmers are expanding crop production over forest-land, pastures and marginal lands that would otherwise not be economically viable to exploit for crop production (Nelgen et al., 2024; Westerberg et al., 2019).

Regrettably, while Burkina Faso, used to have strong policies to support agroecological development, implemented by NGOs from the 1990's to 2010, the current orientation and large-scale mobilization for agricultural production is dominated by support for external inputs (pesticides, herbicides, subsidized chemical fertilizers, heavy equipment, tractor subsidies, irrigation equipment, free plowing services for farmers) as well as the conversion of wetlands and scrublands to croplands, and experimentation with the production of exotic crops such as cocoa, pinapple, wheat and sunflower (Bourgou, 2025). The current National Strategy for the Development of Agroecology in Burkina Faso (2023 – 2027) seeks to "integrate agroecology into agricultural policies" as one of its strategic objectives. This provides an invaluable opportunity to shift policies and practices in favor of agroecological transitions (Komonsira, 2025)

5. Policy Recommendations

We have shown that investments in a regenerative agroecological farm economy deliver high-impact and market-ready development returns – increasing farm household incomes, improved food and energy security, and making more nutritious food available while delivering in line with the regeneration of nature.

For that purpose, we recommend:

1. The creation of a level playing field and using catalytic capital

In order for a large-scale transformation to agroecology to happen, agricultural subsidies that encourage "business as usual land-degrading practices" should be repurposed. Instead, the government should seek to co-invest in strategies that improve the profitability of farming and reduce farmers' dependence on recurrent expenditures on inputs (such as inorganic fertilizers) for a few targeted crops, which makes them vulnerable to fluctuations in yields, climate hazards, and price movements.

Our granular data shows that **agroecological investments offer a return on investment that is on par with the rates sought by commercial capital providers.** But with seasonal and irregular cash flows, **perceived** credit risk is still an obstacle to financing smallholder farmers and the agri-food sector overall (OECD, 2022). Going forward: risk mitigation instruments can be used single-handedly or in blended finance mechanisms[11] to mobilize significantly more capital into agroecology, recognizing that ODA can contribute to only a fraction of the minimum US$ 300 billion funding gap required to transition to sustainable agriculture worldwide (Havemann et al., 2020). These include instruments, such as:

- repurposed subsidies for agroecology and crop insurance products,
- credit guarantees, catalytic first-loss capital & concessionary loans,
- enhanced collateral through support for appropriate agri-tech,
- along with technical assistance by NGOs such as ANSD.

2. Meeting International policy commitments and targets through agroecology

Efforts to create a level playing field and promote agroecological development align with Burkina Faso's international policy commitments and targets. These

10 For a typical Zai-Stone barriers-FMNR combination, which generates an additional crop output of at least 3870 kg/ha over 10 years (increasing yields from 600 kg/ha to 1380 kg/ha),

11 Blended finance refers to the combination of capital that has commercial risk-return expectations with funding that is concessionary in some form (typically from the public sector), in order to generate additional measurable developmental impact (ODI, 2019).

include increasing FMNR by 800,000 ha in rural communities, along with participatory development of sustainable land management, under Burkina Faso's Nationally Determined Contributions (World Bank, 2024b); as well as Burkina Faso's commitment to enhance the productivity of 2.5 million ha of degrading savannas and cultivated lands and to reach a minimum of 1% of organic matter, which requires the adding of 5 tonnes (T) of organic matter per hectare every 2 years (UNCCD GM, 2018). For the latter objective, we have demonstrated that agroecology is also the answer, with advanced agroecological farmers, using an average of 4.4 T/ha per year (11 carts) of manure, against only 1.3 T/ha per year (3.3 carts) for farmers in early transition.

3. Investing in equipment and technical capacity

Short-term constraints to the wide-scale adoption and scaling of agroecology include the additional labour effort that it requires. Labour effort can be eased by improving the availability of appropriate technology and equipment. Examples include smaller tractors and cultivators that can navigate between trees, one-row or handheld planters, wheelbarrows for transporting organic material, roller-crimpers for avoiding herbicide use, bullock plows using animal traction, as well as simple equipment such as cutlasses, wellington boots, shovels, pickaxes for pruning, and protective gear.

To make such tools available, local manufacturers should be supported where feasible, as they can provide implements adapted to local conditions and better technical service supply. The Burkinabe public sector can be a key player here - promulgating enabling policies, building technical and business management skills, and stimulating demand, for example, through subsidies for such equipment and enabling the financial & infrastructural environment (Sims & Kienzle, 2016). Group ownership, for example, at the level of agroecological village committees, and custom hire service provisions, are promising models to follow (Mrema et al., 2014).

4. Using agroecology for conflict resolution and mediation

Since the end of 2018, vast areas in the north and east of Burkina Faso have witnessed an increase in the rate of violence driven by Jihadist armed groups. An estimated 2 million people have been displaced by conflict. Increased political violence is rooted in decades of poor governance and limited state investment in education, health, and infrastructure, which have led to the socio-economic marginalization of the rural population and youth in particular. Moreover, intercommunal tensions have been fueled by increasing population growth, land degradation, changing laws governing land property sales[12] , the reinforcement of protected natural areas and hunting areas[13], and indirect incentives (e.g., through agricultural subsidies) to expand cropland over 'marginal' grazing lands. The associated grievances have created enabling conditions for extremist recruitment (Noria Research, 2020).

Agroecology in the Sahel can address root causes and mitigate conflicts by allowing farmers to produce more on existing land, thus reducing pressures on arable cropland expansion. New income streams create enhanced resilience within farming households, as already witnessed in the ANSD intervention area[14]. By creating favorable conditions, agroecology also enables farmers to have larger livestock holdings, through a guardianship contract or a form of temporary transhumance between farmers and pastoralists

12 Law 0034, which came into effect in 2009, has allowed farmers to sell their cropland to the highest bidder, rather than requiring the transmission through the family. This has led to a process of concentration of landownership, at times, at the expense of the younger generation that are deprived from accessing farmland and has encouraged the emergence of a landowner class that is often deemed to be close to the central state. It is also believed that pressure brought about by the restriction has accentuated agricultural activity moving towards transhumance areas (Noria Research, 2020).

13 Thereby reducing the ability of locals to reach arable land and fishing and hunting areas. The central state, in the shape of Forestry and Water Commission officials, may also extort locals or « demand 100,000 Francs for a few branches cut down in a park ». Also, since 2017, in the Pendjari park on the border with Benin, private security guards started pushing out locals from protected zones. The land-use policies lead to reducing the food-producing areas available to the rural population and social frustration is all the greater since these privatized zones are generally monopolized by groups and individuals who are labelled by locals as being "foreigners" (Noria Research, 2020).

14 During the focus group in Ouagadougou in May 2018, we talked with a farmer, who had been displaced 2 years ago, but had rebounded fast in a new village – he said, thanks to agroecology - allowing him to generate impressive yields, in synergy with high livestock holdings

during the rainy season, thus increasing their income base and enhancing synergies between the two groups of stakeholders (Bourgou, 2025).

More broadly, agroecology offers the opportunity to integrate peacebuilding into existing community-led land restoration programs that, by their participatory design, build trust and credibility, are grounded in local dynamics, and allow for a nuanced understanding of local conflicts. This ensures community buy-in and reduces the risks of external interventions. As such, there is an important opportunity to use existing and new agroecological programs as entry points for integrating peacebuilding and mediation, thereby more effectively addressing the interrelated crises of land degradation, climate change and conflict in the Sahel.

6. Conclusion

Burkina Faso stands to generate win-win-win solutions by orienting agricultural subsidies, extension, infrastructure, technologies, and equipment towards agroecological systems that:

- build soil health as an asset, and yield nutritious and diversified foods;
- sequester carbon and foster biodiversity conservation;
- use locally sourced organic materials to improve the productivity of soils and reduce farmers' dependence on expensive external and chemical inputs;
- generate higher per hectare profitability and materially improve the economic performance of the entire farm household, with multiplier effects on the whole community;

Full business value may be further realized with community-managed grain reserves, referred to as *warrantage* locally, which is the subject of a pending, complementary report.

This study comes at a timely moment. Multiple ministries are involved in the implementation of the National Strategy for the Development of Agroecology (2023 – 2027) (FAOLEX, 2024), and overseas development assistance (ODA) is on the decline. Meanwhile, Burkina Faso faces increasing public sector debt and elevated borrowing costs (World Bank, 2024) [15]. In this context, the importance of 'endogenous low-cost development' offered by agroecological innovation cannot be underestimated.

Moreover, agroecological systems can better withstand the risks of climate change and market volatilities. This is proactive climate change mitigation and adaptation. Those regions and nations lagging behind will face disadvantages in all these areas.

With this study, we have sought to provide evidence and highlight opportunities for West African governments to review their agricultural policies, processes, infrastructure, and investments, and to more deeply engage farmers in the innovation and the 'co-creation of knowledge' to support agroecological transitions. Burkina Faso also has the opportunity to develop a "lighthouse" example of scaling agroecology that can meet national interests and be a reference point in West Africa and more broadly.

15 Burkina's debt is 54% of GDP and is predominantly financed through domestic borrowing from the regional market, exceeding 9% per annum for 12-month bills.

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Publication Date:
June 2025

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Acknowledgements:
We are grateful to the diligent and hard-working Burkinabè interviewer team and farmers - including Natama Soleymane and Justine Natama (from Tibga), Tambiga Clement, Mano David and Mano Lamoussa, (Gayeri), Adama Lankoande and Josué Sagadou (from Bilanga) - in addition to the more than 400 farming households who agreed to participate in surveys and focus groups. We are also sincerely thankful for the valuable inputs provided by key informants, including Philippe Ouaba and Antoinne Dori from ANSD, as well as for the support and advice provided by ANSD's president, Clarisse Diasso and the Groundswell International team, including Dioma Komonsira, Tsuamba Bourgou, Steve Brescia, Rebecca Wolff and Peter Gubbels. Lastly and importantly, we would like to thank The Casey & Family Foundation and the Heidehof Stiftung GmbH for their financial support for this study.

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