



# Mali Case Study: The Economics of Cotton Production and Land Degradation in Mali

## Background

Farming is the motor of the Malian economy, employing 80 per cent of the work population and accounting for over 35 per cent of GDP (FAO 2017). Cotton has an important place, accounting for 11 per cent of the value of the country's exports, second after gold (OEC 2020), and 15 per cent of GDP (Maiga 2017). Cotton is produced in Mali's southern region of Sikasso. The subdivision of Koutiala is the heartland of cotton production and is often referred to as the capital of white gold (LopezRidaura 2005), where production dates back to the 1950s. There is evidence of heavy land degradation in Koutiala due to decades of monocropping, land clearing, loss of biomass and inappropriate farming practices such as tillage parallel to contour lines. Moreover, excessive use of mineral fertilisers and chemical pesticides are contributing to soil salination. Together this is leading to out-migration of farmers to other subdivisions of Sikasso, such as

Bougouni, which has more diversified agroecological farming systems. Support for intensive cotton and maize production systems started in the mid-1980s in Bougouni (Ollenburger et al. 2016).

Public support for cotton farming is an expensive affair. The government-owned *Companie Malienne du Developpment du Coton (CMDT)* spends an estimated CFA 14.3 billion per year<sup>1</sup> (EUR 22 million) on subsidies for imported farm inputs such as fertilisers and pesticides. Untargeted financial support may also encourage the cultivation of soils that are less favorable for agricultural use. This can be problematic over the long run, given the difficulty of restoring tropical soils to productive capacity (Morris et al. 2007).

*1* CMDT covers between CFA 5000 to CFA 7000 of the total price of urea, NPK and Phosphate diammonique bags. With current levels of use (4.1 bags per ha), subsidies amount to 20490 CFA/ha. Across 700'000 ha of cotton production, this amounts to CFA 14.3 billion.

## FIGURE 1

### Cotton and shade trees in Mali



In response to the previously mentioned challenges, this study analyses the following questions:

- What should be done to safeguard the productive capacity of farmland in Mali?
- What is the per hectare profit from cotton production in the subdivisions of Koutiala and Bougouni?
- What is the contribution of organic and conventional cotton producers respectively to the Malian economy?

The study then advises on measures to improve the sustainability and profitability of cotton farming systems in Mali.

This policy brief summarises the main results of the Economics of Land Degradation (ELD) study titled “The economics of cotton production and land degradation in Mali”. The research was undertaken as part of the project “Regreening Africa”, co-financed by the European Union and the German Federal Ministry for Development and Economic Cooperation. It was conducted between February 2018 and December 2019, and involved data analysis from three household surveys, and inputs from 600 conventional and organic cotton producers in Koutiala and Bougouni

## Results

### Conventional cotton farmers

Conventional cotton farmers in Koutiala have an average yield of 950 kg/ha, but they spend significant amounts on organic fertilisers (using an average of 30 wheelbarrows of compost or manure) to maintain yields at this increased level.

In Bougouni, average yields are in the order of 1050 kg/ha, but farmers spend significantly less on organic fertilisers, relative to Koutiala (7 wheelbarrows per ha).

The result is a significantly lower per hectare profit among Koutiala producers, compared with Bougouni producers. This suggests that soils are more degraded in Koutiala. Consequently, an average farmer in Koutiala is earning a per hectare profit of CFA 97,848 (EUR 150) against CFA 147,430 (EUR 225) in Bougouni.

Accounting for the societal cost of subsidising inputs and the cost of illness from pesticide use in cotton production, the societal profit is approximately only CFA 74,340 (EUR 113) per hectare in Koutiala, compared with CFA 119,015 (EUR 181) per hectare in Bougouni.

FIGURE 2

### Costs, yields, revenues, private and societal profit for cotton producers in Koutiala

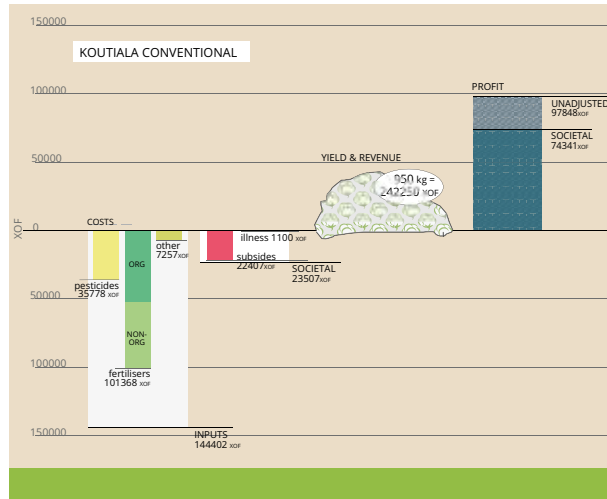
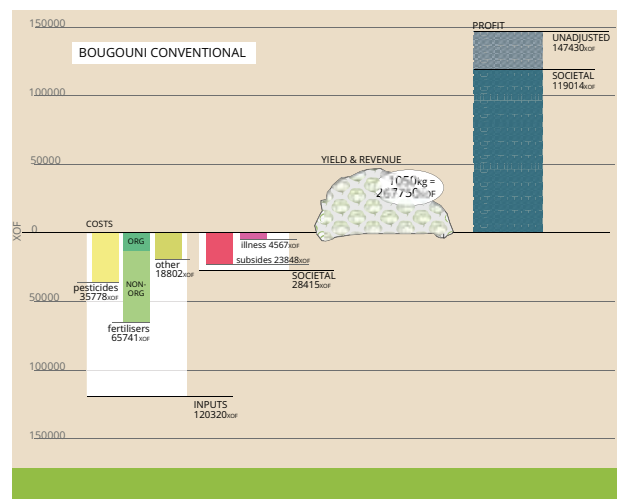


FIGURE 3

### Costs, yields, revenues, private and societal profits for cotton producers in Bougouni



### Organic cotton farmers

Whilst organic producers have significantly lower yields of 450 kg/ha, they spend little on inputs. Moreover, there are no health costs to the farmer associated with chemical pesticide use, and the inputs they use are not subsidised. Hence, there is not an implicit societal cost associated with organic cotton production. The result is a private and societal profit in the order of CFA 80,656 (EUR 123) per hectare.

Contrary to what many would expect, the profit from organic cotton production is therefore slightly higher than that of conventional cotton production in the heartland of cotton production, Koutiala.

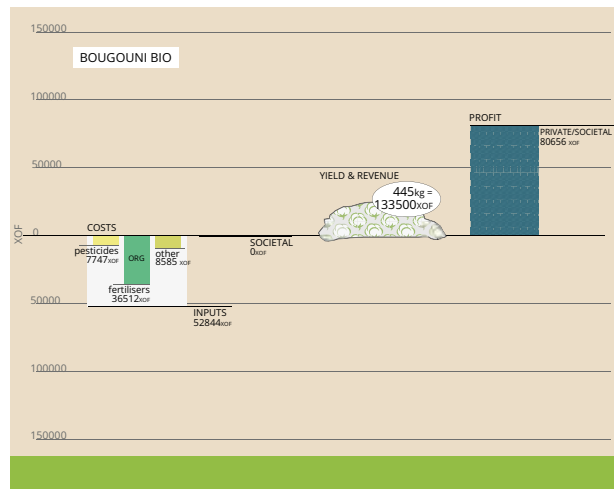
The contribution of organic producers to the Malian economy should therefore not be underestimated.

### Consequences on migration and food insecurity

Clearly there are short-term profits to be made from moving conventional cotton production from Koutiala to Bougouni. Aside from a high population growth, this may be one of the reasons that 12 per cent of households in Koutiala have seen at least one household member migrate to another administrative subdivision in Sikasso to produce cotton, and another 13 per cent of household heads

FIGURE 4

### Costs, yields, revenues, private and societal profits for organic cotton producers in Bougouni.

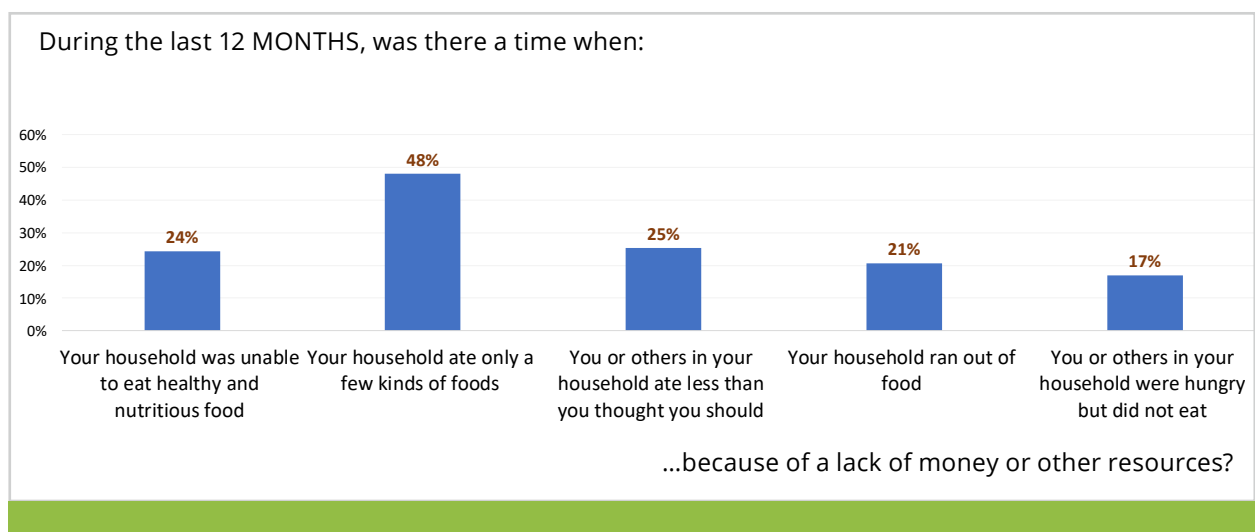


consider migrating in the near future, according to the survey.

Overall, food security is compromised in Koutiala. A quarter of all households of the survey stated they did not have enough food to feed their family and had a poorly varied diet in the year preceding the interview (Figure 5). This situation has previously been referred to as the paradox of Sikasso: Despite high levels of support for farming, farmers are poor.

FIGURE 5

### Questionnaire: Food security in Koutiala, 2018/2019. Adapted from FAO Food Insecurity Experience Scale.



## Focus group on the value of agroforestry products



### Solutions, regeneration and prevention of land degradation

To avoid Bougouni following the same trajectory of land degradation as Koutiala, preventive measures should be taken in Bougouni whilst regenerative measures are needed in Koutiala.

The results from the analysis of household data of cotton producers in Bougouni and Koutiala lead to the following recommendations:

1. **End crop residue burning in Bougouni<sup>2</sup>.** Farmers should favour the use of residues in compost or stock animals to browse on residues. Organic farmers, for example, can increase their yields by 400 kg/ha by ensuring that crop residues are browsed by their own animals instead of burned or consumed by another farmer's livestock. Likewise, with an additional six wheelbarrows of organic (compost and manure) fertiliser per hectare, Bougouni farmers will increase their yields by an average of 100 kg/ha.

<sup>2</sup> 74% of farmers are burning residues in Bougouni, against only 1% in Koutiala (ELD survey results), where they cannot afford to lose any more organic matter (according to Mr Diarra at CMDT).

2. **The adoption of agroforestry systems above the legally required minimum number of ten trees/ha.** Agroforestry systems of around 20-30 trees per ha increase yields by at least 100 kg/ha. Furthermore, an additional ten trees per hectare of favourite species such as shea nut, dawa dawa, *Faidherbia Albida* and mango provide farmers with an average additional income of CFA 27,000 (EUR 41) per hectare from the collection of nuts, pods, fruits and fuelwood.
3. **Using leguminous species (e.g. soy beans, cashew nuts, cowpea, stylosantes) in crop rotations with cotton.** Conventional farmers employing such measures enjoy 150 kg/ha higher yields, and everything else equal.
4. **Adapting inorganic fertiliser recommendations to soil conditions.** There is evidence that the generalised pan-territorial dose (150 kg NPKSB 14-23-14-5S-1B and 50 kg of urea 46%N) can be inefficient and unprofitable. Instead, recommended fertiliser doses should take account of spatial soil conditions, so that relatively small amounts are applied per hectare when soils are not degraded, and vice versa (Honfoga and Parrales 2018).



5. **Malian government and farmers should make better use of rare financial resources through better targeting farm support policies.** Currently, cotton farmers enjoy an average additional yield of 64 kg/ha, worth approximately CFA 16,300<sup>3</sup> (EUR 25) for each additional 50 kg bag of NPK fertilisers applied, selling for CFA 16,000 (EUR 24) on the international market. This means that for each CFA 1 spend on NPK fertiliser, society gets roughly CFA 1 in return. There is no added value, suggesting that public resources could be better spent.
- **Broaden the scope of government support to other crops for farmers practicing conventional cotton-maize systems.** 75 per cent of farmers in Koutiala state they would produce something different from cotton could they benefit from farm credit or subsidies for any kind of crop. Diversifying these support systems to other crops could help safeguard food-security, climate change adaptation strategies and make it easier for the organic cotton sector to develop.

## Policy recommendations

On the basis of the findings from the Regreening Africa project in Mali (see Westerberg et al. 2020 for more detail), the following recommendations are made for decisionmakers in Mali:

- **Review current levels of subsidies for conventional farm input** (in the order of 45-64 per cent of the international market price for fertilisers) and encourage the adoption of evergreen and sustainable land management (SLM) practices — such as agroforestry, crop rotations with leguminous species, direct seeding, mulch based system, etc.<sup>4</sup> — that allow for the regeneration of soils and creation of organic fertilisers to prevent further land degradation.

In particular, stakeholder organisations, such as organic farmer associations and NGOs, are requesting financial assistance for key assets and education that can enable farmers to adopt SLM practices. These assets include wheelbarrows, tree nurseries, composting facilities and small-scale water reservoirs close to farmland, and extension services with widened SLM curricula.

It is also important that SLM practices are inscribed into the extension service programs and institutions such as the CMDT, La Fédération Nationale des Producteurs de l'Agriculture Biologique et Equitable (FENABE) and Mouvement Biologique Malienne (MOBIOM) to help guarantee a gradual transition towards more sustainable land management practices.

Organic producer organisations (FENABE and MOBIOM) would like to see a number of reforms, notably relating to: improving transparency over how organic cotton prices are set; avoiding delays or non-payment of the organic premium; provision of equal terms of support for organic and conventional cotton producers and ideally decoupling the organic value chain from the CMDT.

- **Yield or output are poor indicators of performance of the cotton sector in West Africa.** It can often be observed how West African countries compete over who will produce the highest volume of (raw) cotton (see e.g. Commodafrica 2019), but total production does not tell whether it is profitable to farmers or the economy as a whole. The underlying research shows an interesting case, where organic farmers produce on average almost half (450 kg/ha) of the volume of conventional farmers in Koutiala (950 kg/ha), yet the per hectare societal profit amongst organic cotton producers is larger than that of conventional farmers producing on degraded soils of Koutiala.

In conclusion, it is high time to invest in longterm soil fertility to lower farmers' dependence on expensive inputs and allow them to enjoy larger profit margins. Farmers in areas such as Bougouni, where soils are not yet degraded, are advised to take preventive measures through sustainable and evergreen farming methods to ensure that they can continue to benefit from decent incomes on existing land.

<sup>3</sup> When cotton lint sells at CFA 255 per kg, as in 2018/2019.

<sup>4</sup> The interested reader can consult GIZ – Benin (2019) for more information.

### Further reading can be found in:

Vanja Westerberg, Aichatou Diarra, Hady Diallo, Report for the Economics of Land Degradation Initiative in the framework of the “Reversing Land Degradation in Africa by Scaling-up Evergreen Agriculture” project. Available at [www.eld-initiative.org](http://www.eld-initiative.org)

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