

presence in the WTO. At the time of the Uruguay Round Agreement on Agriculture (URAA), it was only a member of the Cairns Group. In the Doha WTO Round, Brazil became an initiator of the G20, a group of developing countries arguing for agricultural trade liberalization in the fifth WTO Ministerial Conference held in Cancún in 2003. At the General Council in 2004, Brazil participated in the creating a modality together with the developed nations such as the US, EU and Australia. In the behind of the growth of Brazil's presence, there are two factors: strong export competitiveness and low protection level for agriculture. Brazil reduced the tariff rates several times after the tariff reform in 1990. As a result, applied tariff rates were rather lower than the bound tariff rates for 1996. Since Brazil had cut down its agricultural protection levels before the beginning of the WTO agricultural trade negotiations, it enables Brazil to maintain its aggressive attitude

in the WTO.

(4) Trade disputes in the WTO

In 2004, Brazil celebrated two WTO farm subsidy victories. The WTO panel ruled that as much as half of EU sugar exports are illegal and separately confirmed that \$3 billion in US cotton subsidies violate WTO rules. Although both the US and the EU appealed to the appellate body, the body upheld the panels' rulings. These two rulings have significant importance for international farm trade, because they ruled against developed nations' "domestic" subsidies as well as export subsidies. These victories would enable Brazil to increase its agricultural exports. Hereafter Brazil will present a great influence to the WTO agricultural negotiations, furthermore, to an agricultural revision in our country. We need to keep eyes on Brazil.

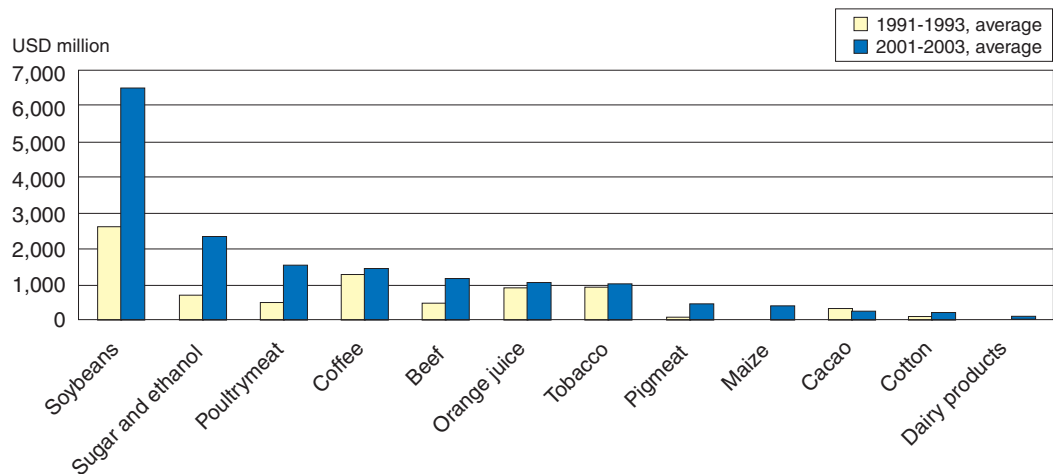


Fig. 1. Changes in exports of Brazil's major agricultural exportables

Fragility of the Sahelian Farmers and Soil Degradation: A Village Level Study

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1. Objective

It is often pointed out that there is a vicious cycle between the degradation of natural resources and poverty. However, it is not yet obvious if the prevention of desertification, which is one of the most significant problems in sub-Saharan Africa, really has an impact on poverty alleviation, and if poor farmers in fact accelerate soil degradation. Hence, this research aims to empirically investigate the relationship between the degradation of natural resources and poverty. For this purpose, Burkina Faso, a landlocked country in West Africa, was selected as the study site.

Burkina Faso is located on the southern edge of the Sahara desert, in the so-called

Sahelian region. Most of the country's territory belongs to the Savanna zone whose annual precipitation varies from 400 mm in the north-east to 1,200 mm in the southwest (Fig. 1).

It has been indicated that the problem of desertification and soil degradation is serious in this country. Because of the stagnation of agricultural productivity, the country remains one of the poorest in the world, and 61 percent of the country's total population is below the poverty line defined by "less than one dollar expenditure per day per capita." This poverty has made the rural population rely on external migration (mostly to neighboring Côte d'Ivoire) as well as remittance from relatives living outside the country. It is estimated that such revenue constitutes 10–20% of their total

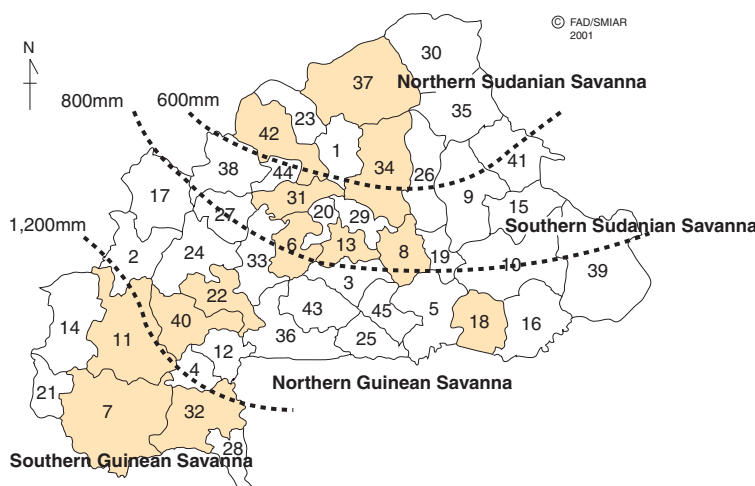


Fig. 1. Location of the Surveyed Provinces in Burkina Faso

income. However, due to the civil war in Côte d'Ivoire that took place in September 2002 (the so-called Ivorian crisis), a considerable number of Burkinabés were obliged to return from Côte d'Ivoire to their homes, and the total number is officially estimated to be some 350,000 as of July 2003. That is, the crisis in the neighboring country has imposed unexpected income reduction as well as unexpected population pressure on rural Burkina Faso. Due to this shock (i.e. unanticipated, transitory worsening of economic welfare), agricultural households that were always poor even otherwise will try to increase income from agriculture and may conduct fertility-depriving cultivation, and therefore there is a risk of desertification. Hence, this research focuses on this shock-induced desertification.

Specifically, there are two questions to be empirically answered by this research. First, has the crisis caused poverty in rural Burkina Faso? Second, is poverty likely to induce soil degradation and desertification?

2. Research Method

Thirteen out of 45 provinces in Burkina Faso were purposefully selected (Fig. 1). They are provinces relatively dependant on migration according to the 1996 national census. Then, sixteen villages were randomly selected from each province, making total number of sample villages 208. Next, group interviews were conducted in each sample village from December 2003 to January 2004 to gather information on the effects of the crisis from village chiefs, council members, leaders of village organizations, farmers, traders, etc..

3. Results

(1) The Ivorian crisis has caused poverty in rural Burkina Faso.

As shown in Table 1, sample villages received 129 returnees on average. This number is about 10% of average village population. Moreover, the village survey reveals that reliance on remittance and out-migration has reduced significantly after the crisis: the percentage of households in the village depending on remittance has declined from 42.9% to 8.0%, and the percentage of households in the village depending on seasonal out-migration has declined from 35.7% to 7.0% (Table 1). That is, the crisis has reduced households' per capita income in rural Burkina Faso.

(2) The Ivorian crisis has negative impacts on soil conservation.

The group of villagers was asked to evaluate the impact of the Ivorian crisis on farming practices by scoring on a five-point scale from -2 (very significantly negative effect) to 2 (very significantly positive effect). The scores are averaged for all the sample villages, and presented in Table 2. Four farming practices related to soil degradation and desertification are considered here: area planted to sorghum, area planted to millet, amount of chemical fertilizer used, and amount of manure/compost used. Sorghum and millet are subsistent crops in the study site, and each household can expand its area under cultivation by reducing fallow period and/or by exploiting virgin/seldom-used forests to meet increasing demand

Table 1. Village Level Impact of the Ivorian Crisis in Rural Burkina Faso¹⁾

Village population	Number of returnees	% of households that had depended on remittance	% of households still depending on remittance after the crisis	% of households that had depended on seasonal out-migration	% of households still depending on seasonal out-migration after the crisis
1,362	129	42.9	8.0	35.7	7.0

¹⁾ Averages of 208 villages surveyed.

for subsistence. Therefore, area expansion may cause soil degradation and desertification. On the other hand, in some regions where fallow period has already reduced, chemical and/or organic fertilizers need to be used to maintain soil fertility. Hence, if the amount has become smaller, soil fertility may not be well managed.

With respect to area under cultivation, the results indicate that the crisis has caused a significant area expansion for both sorghum and millet. As for soil fertility management, on the other hand, it is found that the use of manure/compost has significantly increased on average, while the use of chemical fertilizer has not been affected significantly by the crisis or even slightly declined. That is, there seems to be a shift from chemical to organic fertilizer probably due to the decrease in cash income. Although detailed results are not provided here, province level analyses confirm this tendency: in some provinces (6, 31, 32, and 34 in Fig. 1) the amount of chemical fertilizer decreases, while that of manure/compost increases. That is, they are clearly a substitute. Furthermore, both chemical fertilizer and manure/compost are used less after the crisis in province 42. This happens because farmers have sold livestock to make cash as their coping strategy to the negative income shock. Since this could be a dangerous sign of soil degradation and desertification, immediate policy interventions are necessary in this province.

(3) Poverty is likely to cause soil degradation and desertification in rural Burkina Faso.

In order to investigate the effects of the shocks induced by the crisis on soil degradation and desertification more rigorously, multiple regression analyses were conducted. The dependent variables are the four farming practices shown in Table 2. The explanatory variables are those of village characteristics (agro-ecological zone, population, distance to main

road, average number of years of fallow, food and livestock prices, etc.) as well as village level shocks that are presented in Table 1. Due to the limitations of space, only estimated parameters for the shock variables are provided in Table 3.

First, it is found that area expansion of sorghum and millet is caused neither by the population pressure by returnees nor the decrease in seasonal out-migration, but rather it is caused by the decrease in remittance. It implies that remittance income used to be used to purchase food. Second, the amount of chemical fertilizer is also significantly reduced by the decrease in remittance, but is not affected by other shocks. Therefore, the purchase of chemical fertilizer is also considered to depend on remittance income. Third, as suggested in section (2), chemical fertilizer and organic fertilizer are substitutes, and hence the regression result in Table 3 shows a significant positive effect of the reduction of remittance on the use of manure/compost. The number of returnees also has a positive effect on it. However, the reason for the significant negative effect of the decrease in seasonal out-migration on the amount of organic fertilizer is still unknown.

To sum, the poverty induced by the sudden reduction of remittance income affects significantly farmers' farming practices in rural Burkina Faso, and hence is likely to cause soil degradation and desertification.

Table 2. Impact on Soil Conservation

Impact on area planted to sorghum ¹⁾	0.83
Impact on area planted to millet ¹⁾	0.61
Impact on the amount of chemical fertilizer used ¹⁾	-0.06
Impact on the amount of manure/compost used ¹⁾	0.58

¹⁾ The impact is evaluated by the group of villages interviewed by scoring on a five-point scale from -2 (very significantly negative effect) to 2 (very significantly positive effect).

Table 3. Determinants of Accelerating Soil Degradation/Desertification (results of multiple regressions)

Dependent Variables Explanatory Variables ²⁾	Area planted to sorghum ¹⁾	Area planted to millet ¹⁾	Amount of chemical fertilizer ¹⁾	Amount of manure/compost ¹⁾
Decrease in % of households depending on remittance	0.68 (0.16)***	0.55 (0.15)***	-0.59 (0.23)**	0.29 (0.16)*
Decrease in % of households depending on seasonal migration	0.19 (0.20)	0.29 (0.18)	-0.12 (0.28)	-0.70 (0.21)***
Number of returnees (1000)	0.09 (0.18)	0.01 (0.17)	-0.32 (0.24)	0.66 (0.38)*

***, **, and * indicate significance levels of 1%, 5%, and 10% respectively.

¹⁾ Dependent variables are the 5 scale impact evaluation presented in Table 2.

²⁾ Explanatory variables are the village-level impacts shown in Table 1. Other variables used in the regressions are not presented in the table due to space limitation.