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Conservation Agriculture and Sustainable Crop Intensification in Lesotho



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FOREWORD

Lesotho is a small mountainous country characterized by extensive land degradation and erratic climatic conditions. It has a population of 2 million people of whom 68% live below the poverty line. The country is beset with high unemployment rates, rapid spread of HIV/AIDS and low standards of food and nutrition security. This complex interaction of socio-economic factors and environmental constraints has dramatically affected agricultural productivity – maize yields have fallen from an average 1,400 kg/ha in the mid-Seventies to a current 450-500 kg/ha in most of the districts.

In recent years a growing number of development agencies have been promoting conservation agriculture (CA) as a means to enhance rural livelihoods through sustainable production intensification. Amongst several initiatives, the CA-based practice that so far has shown the highest potential is a planting basin system, locally called *likoti* (a Sesotho word for “holes”), mostly employed by subsistence farmers in the production of maize and beans. WFP alone estimates that so far about 5,000 households have adopted *likoti* with its support in different districts, covering about 8,163 ha of land under CA (or 2.5% of the total arable land). However, these figures do not include the farmers who have adopted the *likoti* practice with the support of other organizations as well as those who have adopted the practice on their own accord.

Present case study prepared under the AGP’s Framework for Sustainable Crop Production Intensification draws on the data collected by FAO in 2006 and illustrates the impact of *likoti* on sustainable crop intensification in the south-eastern highlands of Qacha’s Nek district and in the western lowlands of Butha-Buthe and Berea. According to these data, the adoption of *likoti* has brought about significant advantages compared to conventional tillage. The most important are:

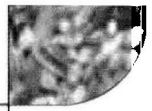
- (i) *Higher agricultural productivity, due to improved efficiency in the use of inputs and other resources.*
- (ii) *Greater environmental sustainability, due to improved soil structure and enhanced fertility.*
- (iii) *Improved livelihoods and social sustainability, due to the accessibility to the technology by all social categories, including the most vulnerable.*

The adopters of *likoti* – including the poorest – have thus been able to rehabilitate and strengthen their livelihood capital base, thereby supporting their communities to build system resilience in the face of widespread poverty and increasing vulnerability that affect the country.



Indeed, as this case study shows, the suitability of CA for bringing about improvement in productivity and livelihoods in the different social and economic conditions, even the poorest, is one of the most important benefits associated with its adoption. As one farmer well put it, the main advantage of *likoti* is just that “*Everybody can do it*”.

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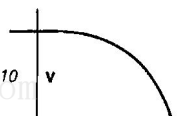
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This case study would not have been possible without the goodwill and the benevolent support of the farmers who patiently answered the questionnaire, and shared with us their precious knowledge and experience.





ABBREVIATIONS AND ACRONYMS

AFM	Apostolic Faith Mission
AIM	Africa Inland Mission
AIS	Agricultural Innovation Systems
BOS	Bureau of Statistics of Lesotho
CA	Conservation Agriculture
CFNG	Conservation Farming Network Group
DFID	UK Department for International Development
EIU	Economist Intelligence Unit
FAO	Food and Agriculture Organization
FCS	Food Consumption Score
FFSSA	Forum for Food Security in Southern Africa
FFW	Food for Work
IFAD	International Fund for Agricultural Development
LASR	Lesotho Agricultural Situation Report
MAFS	Ministry of Agriculture and Food Security of Lesotho
NGO	Non Governmental Organization
SARB	South African Reserve Bank
SSA	Sub-Saharan Africa
SWC	Soil and Water Conservation
UNAIDS	The United Nations Joint Programme on HIV/AIDS
UNDP	United Nations Development Programme
WFP	World Food Programme

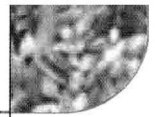
CURRENCY EQUIVALENTS

Currency Unit = Maloti

US\$1.00 = M7.3687 (exchange rate effective December 5th, 2009. Source: SARB)

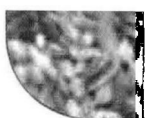
WEIGHTS AND MEASURES

Metric System



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CHAPTER 1

Introduction

In recent years, the spread of conservation agriculture (CA) has revealed to be a sustainable way to intensify crop production and sustain rural livelihoods in several African countries. Indeed, the potential benefits associated with the use of conservation farming practices are many. Long-term yield increase and output stability can be achieved while at the same time stopping and reversing land degradation. Larger outputs are often obtained by employing relatively fewer inputs, thereby reducing costs. Compared to conventional tillage methods, CA thus leads to higher net profitability, greater environmental sustainability and – especially important in Africa – higher food security. Furthermore, conservation farming techniques which rationalize the use of labour are particularly helpful in those rural areas where migration and health emergencies have reduced the labour supply and contributed to the increasing “feminization” of the agricultural sector (a comprehensive discussion of the advantages and disadvantages associated with the use of conservation agriculture in Africa is provided in Annex I).

The present case study reviews and analyses the information collected under a baseline survey, undertaken in Lesotho with the aim to assess the potential costs and benefits associated with the adoption of a planting basins system, locally called *likoti*. The study’s main objective is to illustrate the impact of CA on crop production intensification, with a special emphasis given to aspects of sustainability such as social, economic and environmental.

The following section introduces the socio-economic context of Lesotho and stresses the close interdependency between increasing vulnerability and progressive environmental degradation. Section three describes the process through which CA practices have spread in the country. Section four outlines the case study. It provides a technical description of the farming practice and reviews the main characteristics of the surveyed sites and of the sample population. Section five analyses the results of the survey and assesses the impact of *likoti* on crop production intensification with a special focus on the social and the environmental sustainability. The last section synthesises the findings and discusses the lessons learnt on the factors that so far have been mostly determinant to the successful adoption of CA, as well as on the issues that would be worthy of more careful consideration in order to fully exploit the potential of CA in Lesotho.

CHAPTER 2

Lesotho: a Context of Growing Vulnerability

Lesotho is a small, landlocked country of about two million people, of whom 76% are rural¹. With a GDP per capita estimated at US\$1,541 in 2007² and 68% of the population living below the national poverty line (UNDP, 2009), it is one of the world's poorest countries. Its economy is based on limited agricultural and pastoral production, light manufacturing (led by export-oriented garment factories owned by East Asian investors) and remittances from migrant labour (albeit declining compared to the past).

Even though social indicators are generally better than the Sub-Saharan Africa (SSA) average, in 2009 the United Nations Development Programme (UNDP) ranked Lesotho as 156th out of 182 countries based on its Human Development Index, and as 106th out of 135 countries based on its Human Poverty Index. The delivery of social services is extremely weak: health personnel are in short supply, health centres are not adequately equipped, and schools lack teaching materials. Over the last ten years, a major health problem has been the increasing spread of HIV/AIDS. According to UNAIDS, in 2008 23.2% of the population aged 15-49 was infected, one of the highest figures in SSA³.

The spread of HIV/AIDS, along with high unemployment rates, mainly due to the retrenchment of many Basotho miners⁴, are among the most important causes of poverty and vulnerability. Along with the migration towards urban and peri-urban areas, and the absorption of many young female workers by the textile industries, these trends are affecting the traditional social structures within the household and at village level. As a result, the social protection mechanisms which so far have helped the Basotho people cope with shocks and stresses are in decline. At the same time, public welfare policies have failed to take over these tasks (Turner, 2005).

¹ Lesotho BOS, 2006. *Lesotho Census of Population and Housing, 2006*

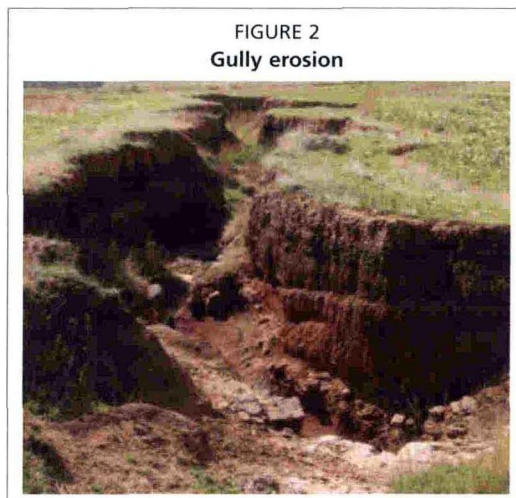
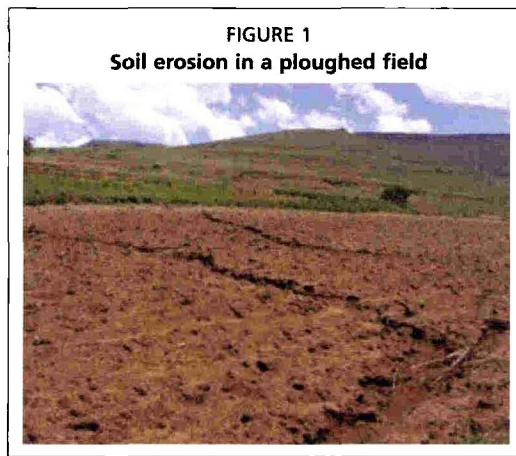
² According to the EIU (2005), since 2003 GDP has substantially risen, but the increase has been the result of the appreciation of the rand against the US dollar, rather than a decrease in poverty levels.

³ UNAIDS/WHO/UNICEF Epidemiological Fact Sheets, 2008 Update

⁴ Since the end of the 19th century, South African mines have been the main source of employment for Lesotho's labour force, absorbing about 80% of Basotho migrants. In recent years, however, the number of workers engaged in this activity has fallen dramatically (from a high of 127,000 in 1989 to only 62,000 in mid-2004) (Hassan and Ojo, 2002; EIU, 2005).

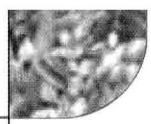


The economic and social transformations described above occur in a risk prone environment, where the scarcity of natural resources, especially fertile land, is at the same time a cause and a consequence of poverty. Lesotho's ecology is fragile because of its mountainous topography (it lies on a high plateau that rises from 1,500 metres in the west to 3,350 metres in the east), the thin soil layer and the limited vegetative cover⁵ (EIU, 2005). Under such unfavourable conditions, the high pressure of human and livestock activities on the land has led to major environmental problems. Forests, as well as pastures, are progressively disappearing. At the same time, the impressive extent of soil erosion increases river siltation and gully erosion⁶ (Figure 1 and 2).



⁵ FAO (2003) estimates that in Lesotho the land area covered with forests is of 14,000 ha, or the 0.5% of the total land area (3,035,000 ha). On average, in Africa forests cover 22% of the land area.

⁶ According to the Government of Lesotho, in 1988 there were about 6,800 *dongas* (the South African expression for gullies) covering an area of some 60,000 ha and representing a loss of 0.7 tons of soil per annum. (GOL, 1988)



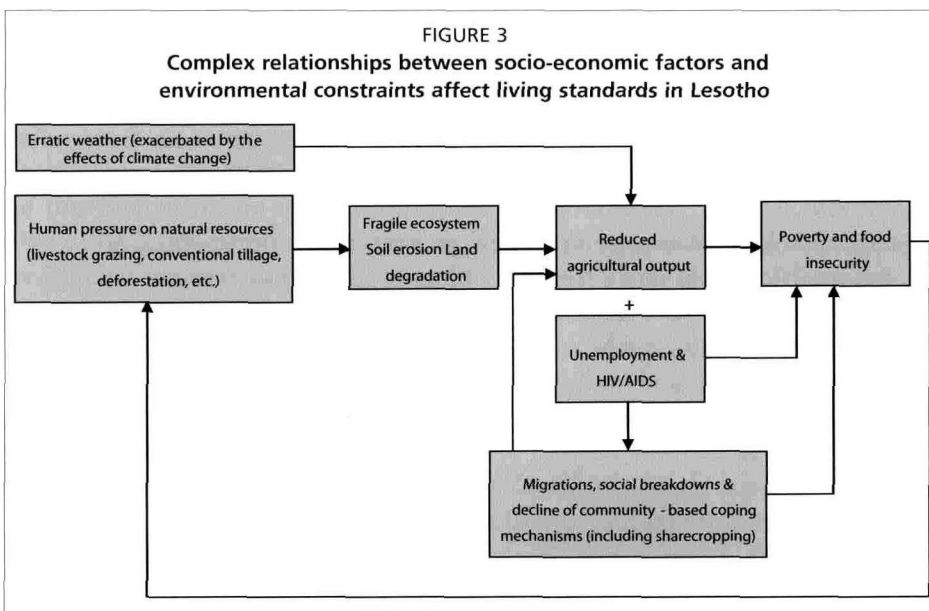
Naturally acid soils with poor contents of phosphorus and organic matter, along with land degradation and extreme climate conditions, have steadily reduced the potential agricultural output. The sector's share of GDP has fallen from 50% to about 15% since the mid-seventies, while yields have fallen by about two-thirds during the same period (EIU, 2005). The agricultural potential is limited not only by the scarce availability of fertile land and by external shocks, but also by the social and economic transformations which are limiting the access to physical as well as social assets.

As highlighted by Boehm (2003), farming in Lesotho is “an activity characterised by a high level of sociality”. Since very few farmers own all the necessary assets and means of production, Basotho depend on various forms of co-operation and sharecropping agreements (*seahlolo* or *lihalefote*). In order to successfully achieve these agreements, farmers need to use a number of “social skills”, including trust, reliability and reciprocity. In other words, they need to rely on social capital. But, as has been already mentioned, social capital in Lesotho has been increasingly affected by unemployment, the associated increase in income poverty, and the spread of HIV/AIDS. All these factors limit the effectiveness of social assets and sharing mechanisms, thereby affecting the capability to sharecrop and ultimately to farm. Indeed, an assessment of the food security situation undertaken by the Forum for Food Security in Southern Africa (FFSSA, 2004), found that the recent food crises⁷ stemmed only partially from crop failures and adverse weather conditions. Rather they reflect long-term, latent food insecurity, in turn caused by poverty (lack of physical assets), deteriorating social capital, and negative social and economic trends due to migrations, retrenchments, and the HIV/AIDS pandemic (FFSSA, 2004).

All the problems mentioned so far are exacerbated by poor governance and inefficient governing institutions. Even though corruption remains low compared to other African countries (EIU, 2005), poor law enforcement, insecure property rights, inadequate delivery of public services, and inadequate local government (including problematic integration of traditional and modern institutions), slow down economic growth and development, and discourage people's participation in civic and political life (Hassan and Ojo, 2002; Turner, 2005). As a result, Basotho live in a context of growing vulnerability, reflected in increasing poverty and inequality, deteriorating health conditions (including low standards of food and nutrition security), and increasing exposure to external shocks and changing climatic conditions (Figure 3).

⁷ Since 2001, recurrent droughts have led the government and international donors to set up emergency food relief programmes. After the 2001/2002 food crisis, a state of famine was newly declared in February 2004, when FAO and WFP estimated that about half of the population needed food assistance. Again, in 2007, between 400,000 and 550,000 people were affected by food shortages, according to FAO/WFP estimates.

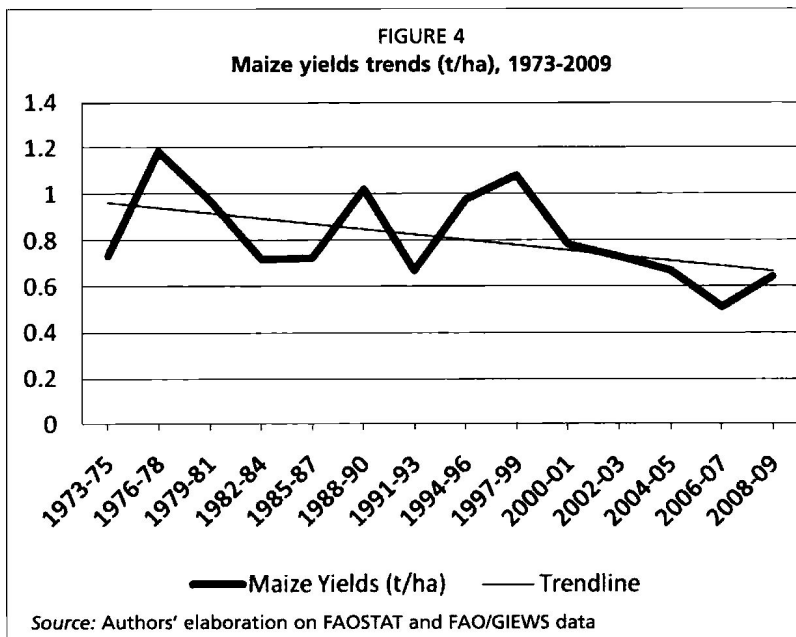
FIGURE 3
Complex relationships between socio-economic factors and environmental constraints affect living standards in Lesotho



CHAPTER 3

The Diffusion of Conservation Agriculture as an Innovative Process to Cope with Vulnerability and Food Insecurity

In Lesotho, agriculture consists primarily of maize and (to a much lesser extent) wheat mono-cropping. In spite of abundant and irregular rains, rainwater harvesting methods are rarely practised (Gay and Hall, 2002). Agricultural productivity is highly variable (especially due to erratic precipitations), and it has steadily declined over the latest 30 years – maize yields have fallen from an average 1,200 Kg per hectare in the mid 1970s to a current 450-500 Kg per hectare in most of the districts (Figure 4). Nonetheless, agriculture remains a source of livelihood for the vast majority of the population, most of which is engaged in subsistence farming.



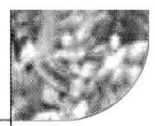


In spite of recent attempts to strengthen the involvement of the private sector and encourage diversification into high-value export products (such as the Agricultural Sector Adjustment Programme assisted by the African Development Bank in 2000) progress has been limited by the poor prospects of profit as well as by ineffective agricultural development policies. The livestock sector provides a significant proportion of rural income (usually for better-off households) and is well integrated in the national and the regional economy through the export of wool and mohair. However, the importance of livestock has also started to decline due to the recurrent droughts, poor animal quality and inadequate disease control.

The potential opportunities for the agricultural sector to develop and contribute to the country's economic growth are contested. This is in part due to contradictory figures on agricultural production (in the latest seasons, estimates of the cereal gap varied by over 300% depending on the source). Whatever the precise data, it is hardly contestable that agricultural production is in sharp decline. Shortage of arable land, mainly due to land degradation, and erratic climate are commonly mentioned as the most determinant factors. However, these problems have affected the country since it was a British protectorate in the nineteenth century. Therefore, it is most likely that the main causes of this decline depend on the farmers' limited or inadequate capability to deal with and adapt to the environmental conditions.

The abandonment of the fields by migrant workers, and the consequent scarce investments, have limited the adoption of products and technologies suitable to the local conditions, and ultimately hampered the growth of productivity. At the same time, the use of conventional tillage methods and of intensive agricultural practices, often promoted by development assistance programmes, have contributed to increased land degradation and lower soil fertility. More recently, the poor performance of agriculture has been linked also to the high rates of poverty and vulnerability (discussed above) which affect the economic as well as the social capabilities needed to farm. Finally, in some cases, poor crop production has been the paradoxical outcome of policies aimed at encouraging food production – such as subsidies and emergency interventions – which resulted in late plantings or disincentives to plant.

Of course, none of these factors, alone, is the unique or main cause of the dramatic decline of yields and output. A complex combination of interrelated factors has contributed to the current situation. With regard to the future, some see the agricultural sector as a disaster, while others recognise the potential for increasing agricultural productivity and stress the role of agriculture in combating poverty and enhancing food security (Gay and Hall, 2002; FFSSA, 2004). Those who support the potential role of agriculture in development recognise the need to face – and overcome – several challenges. Among the most important of these is the need to foster agricultural development through the promotion of more sustainable, ecologically friendly practices, such as



soil and water conservation, reclamation of limited areas of degraded land for intensive food production, and mixed and low external input farming (Gay and Hall, 2002; Turner, 2001).

Even if, at least in the medium term, it seems unlikely that agriculture will be the driver of economic growth and provide significant numbers of jobs, proper policy options and interventions aiming at enhancing the availability of food could stimulate local agricultural markets, and contribute to creating employment and increasing wage rates through higher productivity (FFSSA, 2004). In order to boost agricultural yields and stabilize outputs, however, appropriate solutions should especially focus on environmental as well as social sustainability. In fact, in such a risk prone natural environment, conventional tillage methods impose a severe stress to the soil and decrease crop productivity. Furthermore, practices which rely on expensive purchased inputs and mechanical implements increase farmers' vulnerability to external shocks. On the other hand, conservation agriculture (CA) can provide an effective solution to reversing the spiral of declining productivity caused by land degradation and extreme environmental conditions. In addition, some CA practices are particularly suitable to small-scale and poor resource farmers (see Box 1 for a brief introduction to CA and Annex I for a comprehensive discussion of the advantages and disadvantages associated with the adoption of CA in Africa).

BOX 1 Conservation Agriculture in brief

CA is a concept for resource-saving agricultural crop production that strives to achieve acceptable profits together with high and sustained production levels while concurrently conserving the environment. CA is based on enhancing natural biological processes above and below the ground. Interventions such as mechanical soil tillage are reduced to an absolute minimum, and the use of external inputs such as agrochemicals and nutrients of mineral or organic origin are applied at an optimum level and in a way and quantity that does not interfere with, or disrupt, the biological processes. CA is characterized by three principles which are linked to each other, namely:

1. Continuous minimum mechanical soil disturbance (i.e. no tilling and direct planting of crop seeds).
2. Permanent organic soil cover.
3. Diversification of crop species grown in sequence and associations

It has generally been demonstrated that CA allows yields to increase while improving soil and water conservation and reducing production costs (FAO, 2001. *The economics of conservation agriculture*; Kassam et al., 2009). In addition, CA has been shown to work successfully in a variety of agro-ecological zones and farm sizes. Indeed, further advantage associated with CA is that it can be applied to different farming systems, with different combinations of crops, sources of power and production inputs.

Based on: www.fao.org/ag/ca