



FROM SUBSISTENCE FARMING TO SUGAR-CANE MONOCULTURE: IMPACTS ON AGROBIODIVERSITY, LOCAL KNOWLEDGE AND FOOD SECURITY

*A case study of two irrigation and agricultural
development projects in Swaziland*



FOOD AND AGRICULTURE ORGANIZATION
OF THE UNITED NATIONS
ROME 2008

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LIST OF ACRONYMS

AIDA	Acquired immunodeficiency syndrome
BADEA	Arab Bank for Economic Development in Africa
DBSA	Development Bank of Southern Africa
EIB	European Investment Bank
EU	European Union
GDP	Gross domestic product
HIV	Human immunodeficiency virus
ICDF	International Cooperation and Development Fund
IFAD	International Fund for Agricultural Development
IMF	International Monetary Fund
KDDP	Komati Downstream Development Project
KOBWA	Komati Basin Water Authority
LUSIP	Lower Usuthu Smallholder Irrigation Project
NDS	National development strategy
NGO	Non-governmental organization
NMC	National Milling Corporation
PRA	Participatory rural appraisal
SEAGA	Socio-Economic and Gender Analysis
SKPE	Swaziland Komati Project Enterprise
SNL	Swazi Nation Land
SWADE	Swaziland Water and Agricultural Development Enterprise
TDL	Title Deed Land
UNAIDS	United Nations Joint Programme on HIV/AIDS
UNDP	United Nations Development Programme
WFP	World Food Programme



CHAPTER 1

INTRODUCTION

In 1999, the Government of the Kingdom of Swaziland established a 25-year national development strategy (NDS) to guide the formulation of development plans designed to eradicate poverty, create employment, and achieve gender equity, social integration and environmental protection. Within the sectoral strategy “agriculture, land and rural development”, the NDS identified a set of priorities, including the shift of smallholder farmers from rainfed subsistence farming to irrigation-based, commercial agricultural production.

Consistent with the priorities and strategies identified in the NDS, the Government of Swaziland has recently begun to implement two major water irrigation projects, the Komati Downstream Development Project (KDDP) and the Lower Usuthu Smallholder Irrigation Project (LUSIP), in one of the driest and poorest areas of the country (the Lowveld). The aim of these projects is to provide irrigation to 17 500 ha of land, helping local smallholder farmers to shift from a subsistence agricultural system to cash-crop production, mainly of sugar cane.

This study describes the changes prompted by the KDDP in local farming systems (e.g. their reduced diversity) and assesses their socio-economic impacts on rural livelihoods, with particular emphasis on food security and the loss of local knowledge. Chapter 2 provides an overview of the complex socio-economic situation of Swaziland, with a focus on the agriculture sector and rural livelihoods, and describes the recent macroeconomic trends in the country and their implications for food security. Chapter 3 focuses on the changes in farming systems and the reduction in agrobiodiversity (i.e. the variety and variability of animals, plants and micro-organisms – including crops, livestock, forestry and fisheries – that are used directly or indirectly for food, fodder, fibre, fuels and pharmaceuticals [FAO, 1999, 2004a]) that have occurred following implementation of the KDDP. It assesses the socio-economic and food security implications of such processes at the community, household and intra-household levels, based mainly on the results of a series of focus-group discussions with local female and male farmers that were carried out by a group of researchers. It also examines the consistency of these impacts with the development objectives and strategies identified by the Government of Swaziland. Based on the findings in Chapter 3, Chapter 4 provides recommendations on how to improve both the KDDP and the LUSIP (which is at an earlier stage of implementation) in order to maximize their socio-economic benefits for local communities.

CHAPTER 2

OVERVIEW

Socio-economic context

The Kingdom of Swaziland is located in southeast Africa, bordered by Republic of Mozambique to the east and the Republic of South Africa on all other sides, and has a total area of 17 360 km². Its population (2004) is estimated at slightly more than 1.1 million (52 percent female and 48 percent male), of which 76 percent live in rural areas (FAO/WFP, 2005).

Swaziland consists of three main agro-ecological zones, characterized by different elevations, landforms, geology, soils and vegetation: the Lowveld (6 416 km²; average altitude 200 m); the Middleveld (4 597 km²; average altitude 700 m); and the Highveld (5 029 km²; average altitude 1.300 m). Another agro-ecological zone, which occupies less than one-tenth of the country, is the Lubombo Plateau. Climate conditions vary considerably among the agro-ecological zones, ranging from temperate and subhumid in the Highveld (700–1 550 mm/year of precipitation) to semi-arid in the Lowveld (400–550 mm/year of precipitation). Overall, Swaziland has a subtropical climate with summer rains; the national long-term average rainfall is 788 mm/year, and about 75 percent of the precipitation falls in the period October–March. Nine livelihood zones may be identified in Swaziland, defined by types of crops produced, susceptibility to various shocks, and economic activity (FAO/WFP, 2007; FAO, 2005).

The country has a dual land tenure system, the Swazi Nation Land (SNL) and the Title Deed Land (TDL). The former, which accounts for 54 percent of the nation's total land area, is communal land held in trust for the nation by the King through chiefs who allocate usufruct rights to individual Swazi families. It is dominated by rainfed subsistence agriculture. The TDL, which covers the remaining 46 percent of the country, is privately owned and is characterized by capital-intensive, irrigated cash-crop production. Generally, in Swaziland, land is owned and controlled by men. However, within the household, women may be allocated some land (usually near the house) for growing secondary crops (FAO, 2005; FAO/WFP, 2005).

Swaziland, with a per capita annual income of US\$2 280 (2005), is classified as a middle-income country. The main economic sectors are industry (mainly agro-industry), which accounts for half of the gross domestic product (GDP), and services, accounting for 34 percent of the GDP. The total labour force is estimated at 410 000 (67 percent male and 33 percent female), with an extremely high unemployment rate (more than 40 percent if discouraged job seekers are considered). South Africa is the main trad-

ing partner, accounting for more than 80 percent of Swaziland's imports and receiving 74 percent of its exports (FAO/WFP, 2007; IMF, 2006).

Swaziland has one of the highest Gini coefficients in the world, at 60.9 percent (UNDP, 2005). Income distribution is very skewed (10 percent of the population receive about 43 percent of national income) and there is an ever-widening gap between rural and urban development. With such high poverty levels, much of the population is vulnerable to food insecurity. Overall, owing to these factors, in the 2006 Human Development Index compiled by the United Nations Development Programme (UNDP), Swaziland ranked 146th out of 177 countries (FAO/WFP, 2005, 2007; IMF, 2006).

Agriculture and livestock sectors

The contribution of agriculture to the country's GDP is estimated at about 11 percent. However, a large proportion of rural households practise subsistence agriculture, which is not included in this figure but is key to the food security of most Swazi families. Therefore, minimal shocks to agriculture have a profound impact on the ability of rural households to maintain their food security (FAO/WFP, 2007; FAO, 2005).

The agriculture sector employs about 32 percent of total economically active population (53 percent male and 47 percent female) in Swaziland. The country's cultivated area is estimated at 190 000 ha, of which 178 000 ha are arable land (11 percent of the total area) and 12 000 ha under permanent crops. Agriculture in Swaziland has a dualistic nature – SNL and TDL (above). Overall, the smallholder agriculture sector, based mainly on SNL, is the largest contributor to the livelihoods of the majority of the population and also represents the main raw material supplier for the agro-based industries (FAO, 2005).

Maize is the most important crop grown in Swaziland and virtually the sole staple for the majority of the population. The average maize planted area in the period 2001/02–2005/06 was 58 658 ha, of which the large majority was on SNL. In the last few years, the area planted with maize has declined. In the 2006/07 cropping season, the maize area was 20 percent below the five-year average at 47 409 ha, 98 percent of which was on SNL. The remaining SNL area is planted with relatively small amounts of cotton, groundnuts, pumpkins, various types of beans, sweet potatoes, and cassava. However, irrigated sugar-cane production accounts for about two-thirds of the contribution by the agriculture sector to GDP. In the last few years, the land and inputs allocated to sugar-cane production have shown a slow and steady increase as cane yields have remained high and the sucrose content has improved slightly (FAO/WFP, 2007). In 1992/93, the area under sugar cane was 37 384 ha, while in 2005/06 sugar cane was grown on about 52 200 ha, with 31 percent of TDL being cultivated with this crop (the rest of the TDL area, most of which is under irrigation, is used for commercial production of timber, grazing and the production of citrus, pineapples, vegetables, maize and fodder). The Government of Swaziland has encouraged sugar-cane production on irrigated TDL in order to improve its foreign-exchange earnings through exports of sugar-based products. At the same time, the increase in the area under sugar cane has coincided with the increase in the number of smallholder farmers on SNL growing sugar cane, which has been prompted by the implementation of major government-sponsored water irrigation and agricultural development projects such as the KDDP and LUSIP (FAO/WFP, 2005, 2007; FAO, 2005).

Livestock plays an important role in the production system and the livelihoods of Swazi smallholders. Cattle constitute the main type of livestock, but most households also own goats and other backyard stock such as chickens and ducks. The number of livestock has been declining constantly in the last few years, mainly because of a contraction in rangeland as a result of the increasing share of land being allocated to human settlements and sugar-cane plantations. For example, the cattle population fell from 588 288 in 2000 to 522 260 in 2002, a drop of 11 percent. The condition of pastures and livestock has also deteriorated owing to the adverse climate conditions (particularly the severe droughts) that Swaziland has experienced in recent years (FAO/WFP, 2005, 2007).

Macroeconomic trends and related impacts on food security

Swaziland's economic growth has weakened considerably in the past decade – with real GDP growth falling from 3.6 percent in the 1990s to slightly more than 2 percent since 2000 – mainly as a result of declining foreign direct investment. Since 2002, economic activity has weakened further, owing to a combination of factors, including an appreciation of the national currency (lilangeni) in 2002–04 and high oil import prices, which have hurt Swaziland's main exports (sugar, wood pulp, and garments) and manufacturing activities (FAO/WFP, 2007; IMF, 2006). Another factor that has had a negative impact on the economy is the removal of textile quotas. Since January 2005, this has led to factory closures and significant job losses (estimated at 15 000 jobs) in the garment sector.

The economic stagnation experienced by Swaziland in the past decade is also the result of several consecutive years of adverse climate conditions. Drought is a regular and recurrent feature of the climate in sub-Saharan Africa. However, since 1970, there has been considerable interannual rainfall variability, and most of the countries in this region, including Swaziland, have experienced more intense and more widespread droughts, with negative impacts on agricultural output, particularly maize (the main staple crop) and cotton. Due also in part to the drought, maize production levels in SNL in 2004 were only about 60 percent of the 1900 levels (IMF, 2006). Droughts have been particularly severe in the last few years. A recent FAO/WFP mission to Swaziland found that “the 2006/07 agricultural season was characterized by erratic rainfall (started late with unusually heavy rains in November and December followed by a prolonged dry spell in the critical months of January to March) and below-average cumulative rainfall. Unusually high temperatures accompanied the dry spells, thus increasing moisture loss.” Owing to such adverse climate conditions, total maize production in the 2006/07 cropping season was only 38 percent of the five-year average (2001/02–2005/06) at 26 170 tonnes (FAO/WFP, 2007).

The impacts of the adverse climate conditions experienced by Swaziland in the past decade on agricultural output have been particularly severe on SNL. As SNL is characterized by rainfed agriculture, it is vulnerable to droughts and other climate shocks (FAO/WFP, 2005, 2007; Rouault and Richard, 2003).

Other factors have also contributed to gradually weakening livelihoods and chronic food insecurity, with up to one-quarter of the country's population depending on food assistance in the last few years. In 2007, a total of about 407 000 food-insecure and vulnerable people will need assistance of about 40 000 tonnes of food in order to meet basic consumption needs and protect their livelihoods (FAO/WFP, 2005, 2007).

One of these factors is the highly skewed income distribution that characterizes Swaziland (above) – 66 percent of the population live on less than US\$1 a day, and 40 percent average only US\$230 a year. Food access remains precarious for many households, also because of an inefficient internal market for agricultural products. For example, the maize market is oligopolistic. The National Milling Corporation (NMC), a parastatal entity established in 1985, acts as a buyer of last resort for domestic production and is also, at the same time, the sole authorized importer of maize. This dual role gives the NMC an unfair advantage over its competitors, creating market imperfections that distort producer and consumer incentives. The NMC sells the imported maize to millers (two control more than 90 percent of the domestic maize flour market) at a price it determines, while the millers in turn determine the prices to charge consumers for maize meal. This oligopoly has contributed to keeping maize prices high (especially since 2002), with poor households having difficulty in accessing adequate supplies. Also as a consequence of such high prices, per capita consumption of maize in Swaziland has been declining since the beginning of the 1990s, and it is not evident that it has been substituted by other foods, particularly in the rural areas. Furthermore, the severe drought that Swaziland experienced in the 2006/07 agricultural season had a dramatic impact on the price of maize, which increased from E1 250 (US\$169) per tonne in January 2007 to E2 300 (US\$311) in April 2007, an almost 90percent increase, with devastating consequences on access to food. The price index for food, which accounts for 25 percent of the consumer basket on the basis of which inflation is calculated, had already increased from 9.1 percent in 2005 to 14.6 percent in 2006 (FAO/WFP, 2005, 2007).

In the last few years, another factor that has exacerbated food insecurity problems in Swaziland is the infection rate of human immunodeficiency virus / acquired immunodeficiency syndrome (HIV/AIDS). It is the highest in the world, with an estimated 42.6 percent of the population aged 15–49 years infected in 2004; in the 25–29 year age group, the infection rate was as high as 56 percent. As a consequence, overall mortality has doubled since the 1990s, and life expectancy dropped from 56.4 years in 1997 to 41.4 years in 2004. By 2010, life expectancy is expected to reach its lowest value, at 31.3 years, a level considerably lower than the average lower middle-income country and also one of the lowest in sub-Saharan Africa. Swaziland's extremely high HIV/AIDS infection rate has had a negative impact on the country's subsistence agriculture sector, contributing to increased levels of poverty and food insecurity among rural households. According to a recent study, as a consequence of HIV-related sickness and deaths, 38.5 percent of the households have suffered a reduction in the area under cultivation, 42 percent a change in cropping patterns, and 31 percent a diversion of labour to take care of the sick. Most importantly, 47 percent of the households have experienced a decline in crop yield, and 39 percent a loss of regular remittances (FAO/WFP, 2005, 2007).

HIV/AIDS has also contributed to the increased levels of poverty and food insecurity in Swaziland through its disproportionate impact on women, who have been found to have higher levels of morbidity and mortality at younger ages than men. According to one report (FAO/WFP, 2005): "Since women take the role of caretakers, breadwinners and providers of food, women's increasing morbidity and mortality rates adversely affect household's food security and particularly the nutritional status of young children" (IMF, 2006; Ministry of Agriculture and Cooperatives, the Federation of Swaziland Employers and UNAIDS, 2003).

CHAPTER 3

THE PROJECTS AND THEIR IMPACTS

National development strategy and water irrigation schemes

The NDS established in 1999 (above) identified key macro strategic areas, which included agricultural development, and eight specific sectoral strategies, including “agriculture, land and rural development” (Government of Swaziland, 1999). Within this sectoral strategy, several strategies were recommended, including:

- intensifying production of high-value crops;
- planning and constructing small to medium-sized dams to promote irrigation-based agricultural production, especially among smallholders;
- developing irrigation infrastructures in support of all commercially grown irrigated crops;
- promoting the shift from subsistence farming to commercial agricultural production on SNL.

Consistent with the strategies identified in the NDS, the Government has started several water resources development projects and irrigation schemes (most of these projects had already started to be planned and/or implemented before the development of the NDS). In 2000, in Swaziland, there were eight major dams with a height of more than 10 m and with a total storage capacity of about 253 000 m³; six of these dams were used for irrigation purposes, one for water supply, and one for hydroelectric purposes. In that same year, almost 50 000 ha of land (84 percent in the Lowveld and 15 percent in the Middleveld) were under irrigation, with about 40 000 ha (more than 91 percent) being used for irrigated sugar cane, followed by citrus (almost 6 percent); smaller areas were under vegetables, maize, potatoes, rice and bananas. In 2000, ten large irrigation schemes (> 500 ha), located mainly on TDL, accounted for 67 percent of the irrigated land, while medium (50–500 ha) and small (< 50 ha) irrigation schemes, which tend to prevail on SNL, represented 20 percent and 13 percent of the irrigated land, respectively. On SNL, there are also 1 500 ha of land irrigated thanks to numerous micro-irrigation schemes funded by several non-governmental organizations (NGOs) and the International Fund for Agricultural Development (IFAD) through the Swaziland Ministry of Agriculture and Cooperatives (FAO, 2005).

Recently, the Government of Swaziland has started two new major irrigation projects, the KDDP and the LUSIP in the Lowveld. Within a few years, these should lead to the

development of a total of 17 500 ha for irrigation. Through these irrigation schemes, the Government, consistent with the NDS, aims to promote irrigation-based, commercial agricultural production among smallholders on SNL, encouraging them to shift from rainfed subsistence farming to cash-crop production. The Government has actively promoted, in particular, the production of sugar cane, which seems relatively suited to the soil characteristics and the climate conditions of the areas under the KDDP and LUSIP. Furthermore, encouraging the entry of smallholder sugar-cane growers is part of the Government's overall strategy for poverty alleviation – the first smallholder sugar producers were established at Vuvulane in 1962 through the assistance of the Commonwealth Development Corporation (SSA, 2006a).

The Swaziland sugar industry has also actively encouraged the entry of smallholder growers, supporting them through the provision of technical services (extension services, pest and disease control, cane varieties, basic management training, etc.). This is important as the sugar sector accounts for 18 percent of the country's GDP (SSA, 2006a). The sugar industry has also played a key role in the development of both the KDDP and LUSIP as well as in their implementation. The Swaziland Water and Agricultural Development Enterprise (SWADE) is the parastatal organization responsible for implementing these two irrigation schemes. It has a board of 12 directors which include representatives of two of the main sugar corporations in the country – Illovo Sugar Ltd. and Royal Swazi Sugar Corporation Ltd. – as well as representatives of the Ministry of Natural Resources and Energy, the Ministry of Finance, the Ministry of Economic Planning and Development, the Ministry of Agriculture and Cooperatives, the LUSIP community and the chief executive officer of the SWADE, as well as a legal expert and a financial specialist (SSA, 2006a; FAO, 2005; SWADE, 2007).

Komati Downstream Development Project

The KDDP was started in 2001 with the aim of developing 6 000 ha of new irrigation schemes in the Komati Basin. This project extends over 27 000 ha (with a population of 22 000 people) and uses water from the recently completed (2001) Maguga Dam, the largest in the country (with a capacity of 332 000 m³ – so bringing the total storage capacity of Swaziland's dams to 585 000 m³) (FAO, 2005).

Different organizations have been involved in the various stages of this project. The construction of the dam (at a cost of US\$170 million) was conducted under the supervision of the Komati Basin Water Authority (KOBWA), a bilateral company established in 1993 by the governments of Swaziland and South Africa, under the Treaty on the Development and Utilization of the Water Resources of the Komati River Basin (1992). In June 1999, the Government of Swaziland established the Swaziland Komati Project Enterprise (SKPE), a parastatal organization responsible for implementing the irrigation schemes in the Komati Basin (using water from the Maguga Dam) and promoting the development of rural communities in this area (SWADE, 2007).

As of May 2007, 13 operational sugar-cane businesses had been established on about 2 580 ha within the KDDP, with more than 1 110 members (73.6 percent male and 26.4 percent female), and another 10 business entities are currently being developed. In only one of the 13 business associations that have been established within the KDDP does the number of female members exceed that of male members. In the other 12 associations, the share of female members ranges from 6 to 35 percent (SWADE, 2007).

In addition to sugar-cane production, other economic activities have been supported

under the KDDP. This has been done in order to ensure the food security of farmers, especially until they are able to pay back the loans received in order to start sugar-cane production and in order to have enough resources to purchase food. During the KDDP project development phase, it was estimated that it would take a farmer seven years to pay back such loans. A number of livestock businesses have been established in the KDDP area, including feedlots (5 are currently in operation, with a total of 47 weaners in stock), dairy (1 association with 27 dairy cows), poultry (1 association with 4 broiler batches plus a few individuals), and piggeries (1 association with 15 members plus a few individuals). Under the KDDP, 568 households (within 4 communities) have been provided with irrigation water for their backyard gardens and drinkable water for the houses; other similar schemes are currently being planned or commissioned by the Government. The SKPE, which became the SWADE in February 2005, is also trying to improve the environmental management skills of farmers, e.g. through training in sustainable land management practices and degraded land rehabilitation (FAO, 2005; SWADE, 2007).

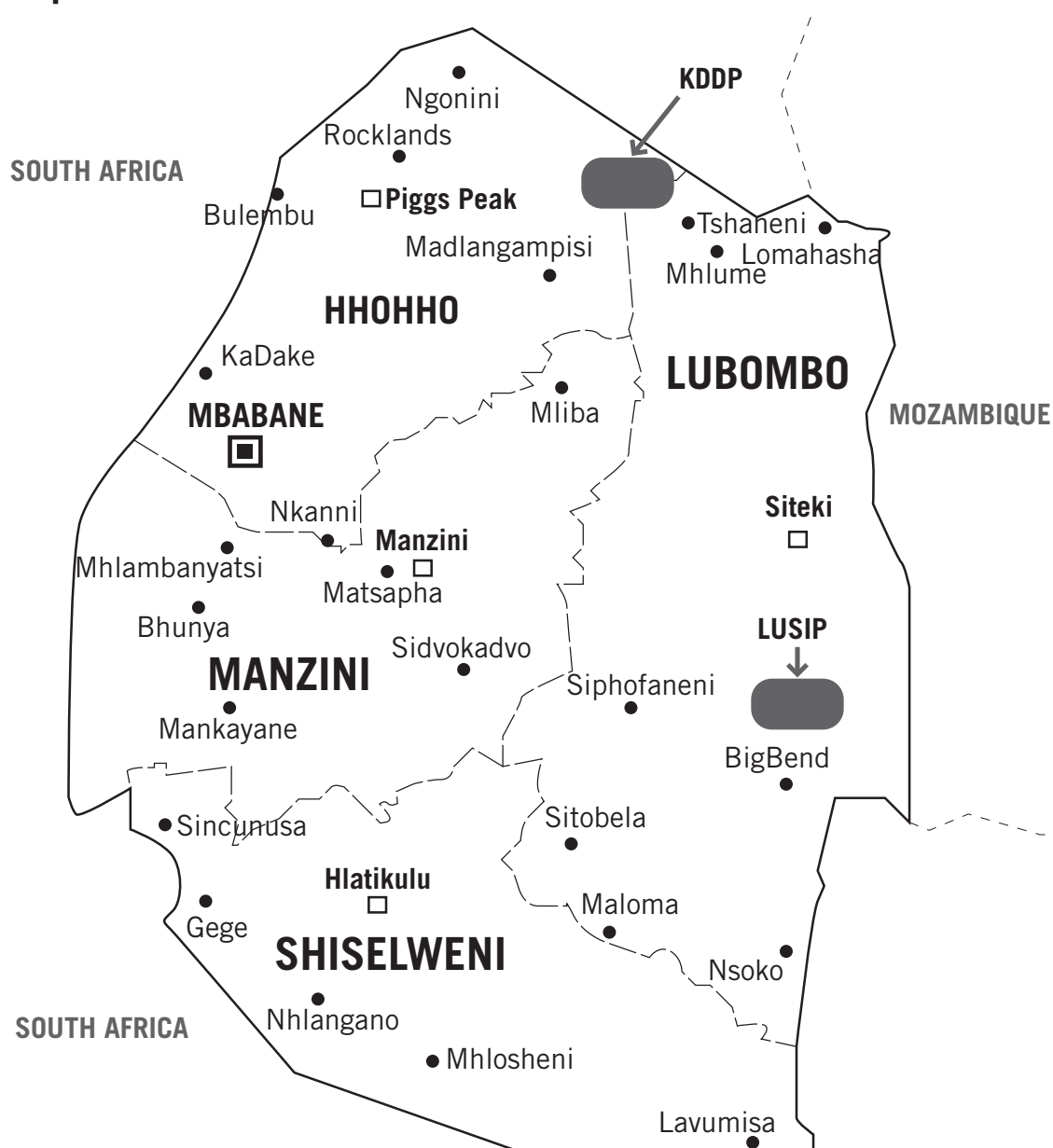
Lower Usuthu Smallholder Irrigation Project

The LUSIP is being implemented with funding from several international organizations, including the IFAD, the European Union (EU), the European Investment Bank (EIB), the Arab Bank for Economic Development in Africa (BADEA), the Development Bank of Southern Africa (DBSA), and the International Cooperation and Development Fund (ICDF); total project costs are estimated at US\$122.25 million. The implementation of the LUSIP is being managed by the SWADE, which is also responsible for the KDDP and any other irrigation scheme sponsored by the Government of Swaziland (SWADE, 2007).

Similarly to the KDDP, the LUSIP aims to integrate smallholder farming households into commercial agriculture (particularly sugar-cane production) through the provision of irrigation infrastructure. More precisely, it aims to develop 11 500 ha for irrigation through the construction of three dams to form an off-river storage reservoir in the Lower Usuthu Basin area, where the Usuthu River joins other waterways to form the Maputo River, at the border with Mozambique (Figure 1). The project is divided into two phases. Phase 1 will provide irrigation to 2 600 households (for a total of 15 300 people) to convert more than 6 500 ha of land currently used for rainfed subsistence agriculture to irrigated, cash-crop production (mainly sugar cane). Phase 2, which should be completed by 2015, will involve the development of an additional 5 039 ha in the Matata Block through the extension of the canal system. Phase 1 of the project is currently being implemented; most of the contracts for the construction of the main project infrastructures were stipulated in 2006, with the date of completion set for 2008 (FAO, 2005; SWADE, 2007).

The area where the LUSIP is being carried out is one of the poorest of Swaziland, with an annual average per capita income of EUR130 (about US\$185), corresponding to 40 percent of the national average (EUR317). According to the financing proposal prepared by the European Development Fund (one of the project funders), the successful implementation of the LUSIP will lead to a fivefold increase in the average income of local households, as well as increased access to clean water, improved health care, and more employment opportunities. However, these estimates were based on the assumption that the additional sugar produced would have been sold on the world market in the context of continued high EU sugar prices. In particular, it was projected that, with a local sucrose price of E1 500 per tonne, additional net cash incomes of E8 000 per hectare planted could be obtained (SSA, 2006; FAO, 2005; SWADE, 2007).

FIGURE 1 Map of the LUSIP area



Source: African Development Bank (2003).

Assessing the impacts of the KDDP and the situation in the LUSIP area

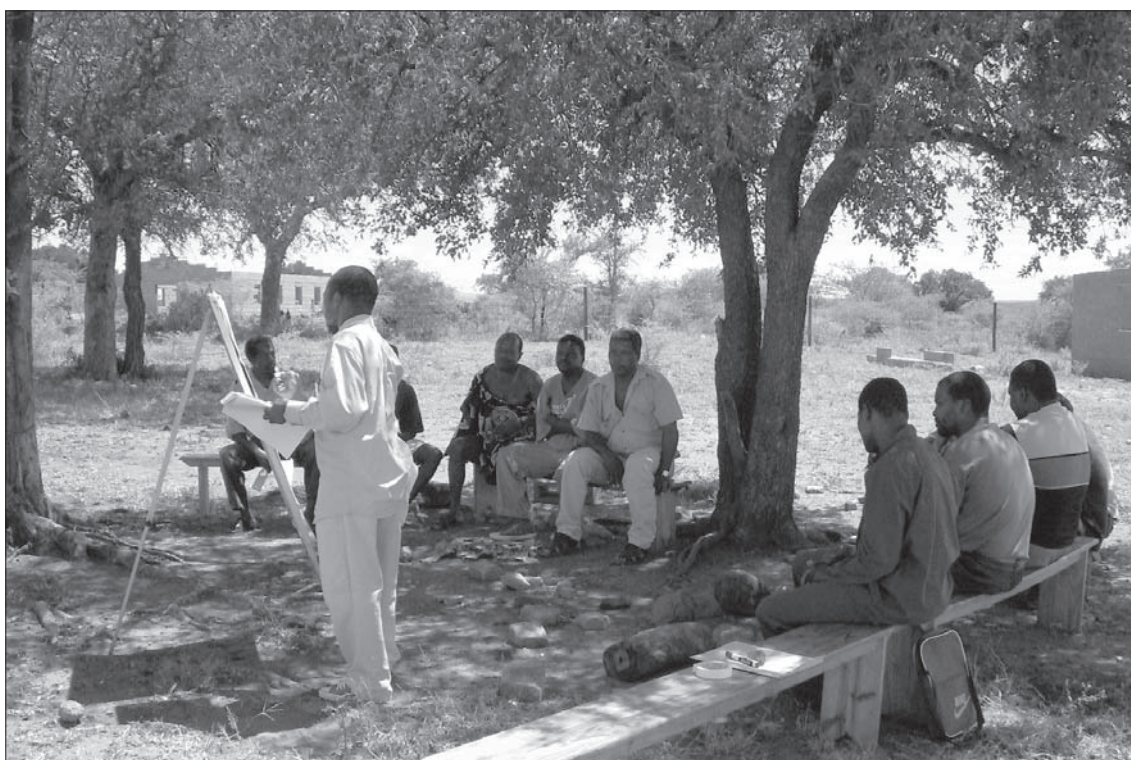
Study methodology

In order to identify the changes in farming systems that occurred following implementation of the KDDP and to assess their socio-economic implications at the community, household and intrahousehold levels, a study was carried out among households from three areas under the KDDP: Mangweni, Vukasidvashini and Entamakuphila (these three areas belong to the Mayiwane Rural Development Area). At the same time, two areas (Mahlabatsini and Maphobeni – both belonging to the Siphofaneni Rural Development Area) under the LUSIP were selected in order to describe the farming systems currently practised in these two areas before implementation of this new water irrigation scheme.

A participatory rural appraisal (PRA) approach was adopted. The PRA tools used for data collection in this study were adapted from the Socio-Economic and Gender Analysis (SEAGA) programme field-level handbook. In particular, a random sample of 20 members (10 men and 10 women) was selected from each area under both the KDDP and the LUSIP for focus-group discussions. Organized by seven researchers from NGOs and the Ministry of Agriculture and Cooperatives, these discussions were held in the local farmers' fields in order to facilitate the active participation of all members. Before conducting the focus-group discussions, the researchers were trained in PRA methods, and a workshop was held among them to discuss objectives of the focus group discussions, issues to be addressed, methodology, research tools, as well as logistical details. During the discussions, men and women were separated in order to gain greater insight into the gender-related dimensions and implications of the issues discussed (Plates 1 and 2).

PLATE 1

A focus-group discussion with male farmers.



At both the KDDP and LUSIP, the focus-group discussions were structured around three main topics. At the LUSIP, which had not been fully implemented when the discussions were held, farmers were only asked to describe the current situation concerning the three topics. The three topics were:

- Trends in crop and livestock productions and sources of income and expenditures: The focus-group members were asked to discuss the changes in crop and livestock productions resulting from implementation of the KDDP. Regarding income and expenditures, farmers were asked to state the most important sources of income and expenditures and the changes that had resulted from their engagement in sugar-cane production; farmers were also asked to state whether they perceived such changes as positive or negative.
- Trends in resources access and control: Farmers were asked to elaborate on issues of access to and control of resources within each household both before and after implementation of the KDDP, including decisions about the allocation of land to different crops and the use of the harvest (i.e. how much to keep for household consumption and/or to sell). Farmers were also asked to discuss issues related to the access and control within the household (both before and after the KDDP) of income from the sale of crops.
- Access to sugar-cane farmers association membership: Farmers were asked to discuss the membership requirements of the sugar-cane farmers associations. The discussions focused on the following questions:
 - Are families or individuals joining the associations?
 - Who qualifies to be a member within the family (men, women or both)?
 - Are sons and daughters allowed to join the association?

PLATE 2

A focus-group discussion with female farmers.



Discussion of results: the KDDP

As emerged from the focus-group discussions held with female and male farmers from the three areas under the KDDP, the implementation of this water irrigation project has transformed the agriculture sector and the prevailing farming practices in this area. These changes are described in detail below.

Land availability and allocation to crops

Farmers stated that, following implementation of the KDDP, drastic changes had occurred in both the availability of land and its allocation to crops in all three areas considered in this study.

The most radical changes took place at Mangweni. As stressed by farmers during the focus-group discussions, local households were resettled and clustered in one area in order to make room for sugar-cane plantations (a government-appointed commissioner oversaw the implementation of this and other resettlements). Before the resettlement took place, each household used to have 4 ha of land available to grow different crops. Generally, cotton and maize used to be allocated more land, followed by legumes such as groundnuts, cowpea, mung beans and sugar beans. After the resettlement, most families were allocated a piece of land of 70 m × 70 m (only a few families have land ranging between 0.5 ha and 1 ha), separated from the sugar-cane plantations, on which they had to build their houses and conduct their farming activities.

At Vukasidvwashini and Entamakuphila, the local communities were not resettled. However, in order to join the sugar-cane associations and start sugar-cane production, farmers had to pledge their fields. Unlike at Mangweni, households in both these areas are located within the sugar-cane fields. At Vukasidvwashini, farmland used to range from 1 ha to 9 ha per homestead; the main crops used to be maize and cotton, followed by legumes. Since implementation of the KDDP, most of the fertile land has been allocated to sugar-cane production, while, for any other crop, farmers have only 1 ha of land available, usually located near the house. At Entamakuphila, each household used to have a relatively large amount of farmland available, ranging from 6 ha to 20 ha. As at Mangweni and Vukasidvwashini, maize and cotton used to be the main crops. Following implementation of the KDDP, each homestead was allocated, within the sugar-cane fields, a radius of 35 m around the house, where farmers practise intercropping. The main crop grown is maize, followed by sweet potato and okra. At Vukasidvwashini, some farmers take advantage of a few streams to irrigate their fields. At Entamakuphila, unlike in the other two study areas, irrigation water is freely available also for the 35m radius around the homesteads. Because of the availability of water, some of the crops grown within this radius can be planted twice per year. Another important difference between Entamakuphila and the other two study areas is that, at Entamakuphila, maize is grown in blocks within the sugar-cane plantations by the association, contributing to a more diversified production system.

In all the three areas considered, implementation of the KDDP and the introduction of sugar-cane production have led to significant changes in the availability of land and its allocation to different crops. Most of the land, especially the most productive land, has been allocated to sugar-cane production, significantly reducing the amount of fertile land available for other crops, including main staple crops such as maize. During the discussions, farmers, especially those from Mangweni and Vukasidvwashini, showed dissatisfaction with the present allocation of land to crops and complained about the

lack of land and irrigation water for other crops besides sugar cane, particularly maize. Farmers at Entamakuphila stressed the importance of the availability of irrigation water for the crops grown around their houses, but, like their colleagues from the other two study areas, complained about the limited amount of land available for such crops.

Another issue raised by the farmers was the potential land-use conflict created by the extremely limited portion of land available to each family both as living space and for growing crops other than sugar cane. This limited land availability is extremely problematic, especially for new generations. As stressed by farmers, while in the past sons would have been allocated a portion of land for their own families when they married, under the new set-up this is no longer possible. Grown-up sons now have to build their own houses within the household premises, further reducing the amount of farmland available for each household. For this reason, families with a large number of children often ask the association chief to be allocated additional land. However, the only available land is located in grazing areas and is characterized by low levels of fertility and a shortage of water.

As emerged during the discussions, the changes in the availability of land and its allocation to crops discussed above have had some gender-related implications. Before the implementation of the KDDP, land used to be owned and controlled by men, who would decide which crops to grow and where. An exception to this was made for widows, who, in consultation with their eldest sons, would decide on land allocation to crops. Following a negotiation process with their husbands, married women could be allocated small portions of land around the house, on which they would decide what to grow in complete autonomy. On this land, most women used to practise intercropping, growing various crops, particularly legumes. Furthermore, women used to have full control of the backyard gardens, where, without having to seek approval from men, they could plant anything they wanted, mainly for household consumption.

As emerged in particular during the discussions with female farmers, with implementation of the KDDP and the introduction of commercial sugar-cane production, most men have claimed back the land they had allocated to their wives; at the same time, backyard gardens have been turned into farmland. As a consequence, women no longer decide independently what to grow on any piece of land and need to obtain approval from their husbands in order to grow a certain crop. Only in a few households at Entamakuphila do men and women decide jointly what to grow and where to grow it.

Another gender-related aspect concerns income generation and distribution within households. According to the farmers that participated in the discussions, both men and women used to be responsible for the sale of the respective crops they used to grow. Although this is still the case (at least in theory), women, with the significant reduction in the amount of land allocated to them owing to the introduction of commercial sugar-cane production, have been responsible for decreasing shares of crop sales. Overall, women's income-generating potential has been considerably reduced compared with that of men. During the discussions, female farmers complained about the lack of income-generating activities and opportunities for them under the new land allocation arrangement.

Regarding income distribution, before implementation of the KDDP, in most households, women had to give the money obtained through crop sales to their husbands regardless of who was responsible for the crop sale. As a result, men had control over the income from all agricultural sales and would decide how to use it. At Vukasidvashini, only in rare cases and after a clear justification of how they were going to use it, would women receive money to spend. The only exception to the general situation of male

control of income was (and still is) represented by some households at Entamakuphila, where women can keep the money from the sale of their crops and decide how to use it. Nothing has changed in this regard.

Crops grown

The changes in the availability of land and its allocation to crops that have occurred following implementation of the KDDP have led to a reduction in both the diversity and the quantity of crops grown in the three areas considered in this study, with potentially negative impacts on the food security of local communities. Most subsistence staple crops traditionally grown by local smallholders in these areas have been almost entirely replaced by cash-crop production (mainly of sugar cane).

TABLE 1 Crops grown before and after implementation of the KDDP

Crop	Mangweni	Vukasidvwashini	Entamakuphila
Maize	✓*	✓*	✓*
Groundnut	✓*	✓*	✓*
Sugar bean	✓*	✓*	✓*
Cowpea	✓*	✓*	✓*
Mung bean	✓*	X	✓*
Cotton	X	✓*	✓*
Okra	✓*	✓*	✓*
Sesame	✓*	X	✓*
Sorghum	✓*	X	X
Sweet potato	✓*	✓*	✓*
Cassava	✓*	✓*	✓*
Taro			✓*
Pumpkin	✓*	✓*	✓*
Melon	✓*	✓	✓*
Gourd	✓*	✓*	✓*
Watermelon	✓*	✓*	✓*
Bambara nut	✓*	✓*	✓*
Calabash		X	
Sweet sorghum	✓*	✓*	✓*
Sugar cane	✓	✓	✓
Vegetables		X	✓*
Tobacco			✓*

Legend: ✓ Still grown in abundance
 ✓* Still grown, but production reduced
 X No longer grown.

However, in addition to the changes prompted by the implementation of the KDDP, in some cases, the type and volume of crops grown have also been affected by other factors. For example, the reduction in the cattle population has affected the production of calabash, traditionally used to make milk containers.

As shown in Table 1, Vukasidwashini has experienced the most significant drop in the number of crops grown (vegetables, calabash, mung beans, and sesame are no longer grown in this area). Cotton has been entirely replaced by sugar cane at Mangweni, while sorghum has practically disappeared from both Entamakuphila and Mangweni (with only one farmer still growing it). At the same time, the number of crop varieties has diminished considerably, with local varieties being the most affected. The loss of crop varieties seems to have been relatively more contained at Entamakuphila; the availability of irrigation water around the houses for other crops besides sugar cane might partly explain the higher number of crop varieties still grown in this area. At both Mangweni and Entamakuphila, farmers used to grow mostly local varieties of maize (including white, yellow, and mixed colour varieties), and only a few maize hybrids. In the last ten years, maize hybrids have become increasingly popular, and only a few local varieties are still grown. Similarly, in these two areas, sweet potatoes are now dominated by Chinese varieties and only a few local varieties remain. Other varieties that are no longer grown include: the spread-out (long-duration, late-maturing) groundnut varieties at Mangweni, and the short variety of cotton at Entamakuphila.

In addition to the reduction in the number and variety of crops grown, the volume of production of all crops (except sugar cane) has dropped in all three locations. According to the farmers that participated in the discussions, this is a consequence not only of the reduced amount of land available for these crops but also of the reduction in the average yields of most crops caused by the adverse climate conditions in Swaziland in the last decade. Vukasidwashini has been the worst-affected area, with negative impacts especially on the production of pumpkins and okra.

Farming practices, inputs, and food storage techniques

The changes in land allocation to crops that have occurred following implementation of the KDDP have also been accompanied by a significant change in prevailing farming practices such as crop rotations.

In the past, most crops used to be grown in rotation in all three areas. For example, in most cases, maize used to be grown in rotation with cotton or legumes; moreover, land often used to be left fallow for a year or two. Both monocropping and intercropping used to be practised. Monocropping used to be common for crops such as bambara nuts, groundnuts, sweet potato, sesame, mung bean, sugar beans and cotton; most of these crops used to be grown in separate fields. On the other hand, in most cases, maize was intercropped with pumpkins, melons, watermelons, okra, sweet melons, gourds or sweet sorghum. Finally, cowpea used to be grown either as a monocrop or intercropped with maize.

Today, rotation is no longer a common practice except at Entamakuphila, where it is still practised even in the small plots around the houses (for example, maize is grown in rotation with sweet potato). Furthermore, owing to the limited land availability, farmers have to plant all crops in one field. Most farmers practise intercropping, which has become even more common than in the past, with each crop being planted in separate

lines. For example, maize is often intercropped with sweet potato (an uncommon practice in the past), as well as with okra or leguminous crops.

As emerged from the discussions with farmers in the three study areas, implementation of the KDDP has transformed every aspect of farming, including the types of inputs utilized and their sources.

For example, farmers used to select and reuse their own crop seeds. In most households (especially at Vukasidvashini), women used to be responsible for seed selection, which was usually done during the harvest. Seeds used to be treated with natural products that were believed to prolong their viability and protect them from pests, and they were then stored in containers, generally made of clay or grass. For example, maize seeds used to be dusted with aloe ashes and then stored in clay pots sealed with sand. Seed sharing used to be a common practice among farmers; after losing a certain crop or variety, a farmer would borrow the seeds from another farmer. After the following harvest, the same amount of seeds received would be given back to the lending farmer.

However, the majority of farmers now purchase seeds on the market (often even seed exchanges among farmers take the form of commercial transactions), and traditional pest-control measures have been partly replaced by chemical-based seed treatments. For example, most seeds are now stored in plastic containers and mixed with paraffin, a chemical pest repellent. However, concerning maize, in the rest of Swaziland, following a government decision to stop providing free seeds to farmers, farmers' purchases of hybrid seeds have declined considerably in recent years, while local open pollinated varieties selected by farmers have gained popularity.

Soil fertilization practices have undergone a similar transformation. Soil fertility used to be managed through the use of organic fertilizers, mainly farmyard manure, with no use of chemicals. Farmers used to broadcast manure in the fields during the winter season; after the first rain, the soil was tilled using draught animal power and the seeds broadcast in the field. Alternatively, seeds of different crops were mixed and broadcast and then the soil was tilled.

Today, most farmers at Mangweni, Vukasidvashini and Entamakuphila purchase chemical fertilizers on the market. However, many still use organic fertilizers as well. According to the Ministry of Agriculture and Cooperatives, more than 60 percent of the farmers on SNL use farmyard manure (FAO/WFP, 2007).

Fields are tilled mainly through the use of tractors. However, the use of draught animal power is still relatively common, with many farmers using cattle (or donkeys to a minor extent) for soil tillage. Draught animal power is still especially important among smallholder farmers on SNL. Despite the leasing of tractors by the government, 55 percent of rural households are estimated to use animals (mainly cattle) for land cultivation (FAO/WFP, 2007).

Soil tillage (no longer practised in winter), fertilization (mainly through inorganic fertilizers), and seed broadcasting are generally done simultaneously (FAO/WFP, 2007).

Pest control measures have evolved along similar lines. Pest control used to be done using locally available plants and materials. For example, aloe ashes were used to control stalk borer. Farmers now control pests using mainly chemical products, especially insecticides, purchased on the market. However, most farmers also continue to use traditional methods.

Another change concerns crop storage practices. In the past, part of the harvest used to be stored in order to ensure the food security of the household throughout the entire

year. Farmers used several techniques in order to keep the harvested crops in a good state of conservation for the longest possible time. For example, after being dried in cribs (Plate 3), maize used to be stored in containers made of either metal or grass, some of which were kept underground, while legumes were stored unshelled in clay pots (Plate 4). Currently, owing to the limited land availability and the drastic reduction in the volumes of crops harvested, the crops tend to be consumed relatively quickly after the harvest, and crop storage is no longer a common practice. As a consequence, farmers' knowledge regarding crop storage practices is being lost.

PLATE 3

Maize cobs tied together in clusters and placed on a crib to dry.



PLATE 4

Unshelled groundnuts stored in a clay pot.



Livestock

The livestock sector has always played a key role in the production system and the livelihoods of smallholders in the three areas, as well as in the rest of Swaziland. As emerged during the discussions, this sector has undergone significant changes in the last few years at Mangweni, Vukasidvwashini and Entamakuphila, due also in part to implementation of the KDDP.

As shown in Table 2, pigs and ducks are no longer present at Entamakuphila, while sheep are no longer present at Entamakuphila and Vukasidvwashini. At the same time, the average number of animals kept by each household has decreased considerably – several households sold a portion of their livestock immediately before starting sugarcane production. Overall, despite the activities undertaken within the KDDP to support the livestock sector (above), the livestock population has dropped at each of the three study areas since implementation of the project. The only exception is represented by donkeys at Vukasidvwashini, whose population has remained relatively stable. As stressed by farmers, in addition to this population decline, there has also been a reduction in the number of breeds available, with local breeds being the most affected. For example, several local breeds of chicken are no longer present at any of the three locations.

TABLE 2 Livestock population before and after implementation of the KDDP

Type	Mangweni	Vukasidvwashini	Entamakuphila
Cattle	✓*	✓*	✓*
Goats	✓*	✓*	✓*
Sheep	✓*	X	X
Pigs	✓*	✓*	X
Geese		✓*	
Chickens	✓*	✓*	✓*
Horses	✓*		
Ducks	✓*	✓*	X
Donkeys	✓*	✓	✓*

Legend: ✓ Present in the area
 ✓* Still present, but population reduced
 x No longer present.

The changes that the livestock sector has undergone in the last few years at Mangweni, Vukasidvashini and Entamakuphila are the result of a combination of factors. First, with implementation of the KDDP and the conversion of most land to sugar-cane production, there has been a significant reduction in the availability of grazing land, an issue about which farmers expressed concern, especially at Vukasidvashini – some homesteads were relocated to the grazing areas, further reducing the availability of land for grazing. This reduced availability of land has had a considerable impact on livestock practices. For example, rotational grazing used to be a common practice. In winter, cattle were left to graze in the fields (mostly on maize stoles after harvesting), while in summer they were moved to graze in non-arable areas. Currently, in winter, it is no longer possible to let cattle graze in maize fields after harvesting because they would damage other crops (e.g. sweet potato) that are intercropped with maize within the small land plots around the houses. As a consequence, rotational grazing is no longer practised, and animals are kept in non-arable areas, often very distant from the houses, throughout the entire year. At Mangweni, some grazing areas for cattle are located 5 km away from the houses.

Implementation of the KDDP has affected the livestock sector of the areas considered in this study also through a reduction in the amount of land allocated to crops that used to represent an important source of food for livestock.

However, other factors not related to the KDDP have also contributed to the changes that have occurred in the last few years in the livestock sector at Mangweni, Vukasidvashini and Entamakuphila. As stressed by farmers, livestock have been negatively affected by the adverse climate conditions experienced by Swaziland in recent years, as well as by several animal diseases, such as foot-and-mouth disease. During the outbreak of foot-and-mouth disease, most cattle at all three locations and most pigs at Mangweni and Entamakuphila were killed. Another factor that has contributed to the reduction in the livestock population has been the increasing mechanization of agriculture and the partial substitution of draught animal power with tractors.

Access to membership

Another important issue addressed during the discussions concerned membership rules and requirements for the different associations in the three areas considered in this study. At Vukasidvashini, farmers had to pledge their land in order to join the association; moreover, a membership fee is payable every year. To become a member of the association at Entamakuphila, each farmer had to pledge at least 3 ha of land. At Mangweni, the association was established in three different phases. In the first two phases (when resettlement took place), households joined the association by pledging their land. In the final phase (following resettlement), individuals could join the association on their own, without pledging any land, by paying a membership fee of E4 000; these new members were allocated new land directly from the chiefdom.

These associations also have different rules regarding access to membership for men, women and new generations.

At Mangweni, only men, as heads of the households, can become members of the association. Occasionally, if a man cannot attend a meeting of the association, he will send his wife. If a man dies, his in-laws meet to choose the person (usually the wife or the eldest son) to take over the membership.

At Vukasidvashini, both men and women within each household can become members of the association (women pledge the land allocated to them by their husbands in order to join the association). If a man has two wives, they can both join the association, for a total of three members from the same household. If the head of the household (always a man) dies, the other family members will pick one of the sons (usually the eldest) to take over, while widows and daughters are not considered. Initially, sons could join the association by pledging land allocated to them by their fathers. However, owing also to the lack of land, it is no longer possible for sons to join the association.

At Entamakuphila, men join the association. If a man dies, either the wife or the eldest son can become members – only in this case can sons join the association.

Another important issue concerns the distribution of dividends from the farmers associations. During the discussions, farmers expressed concern about the way dividends are distributed. Each member receives the same share of dividends although the amount of land committed by different members to join the association is not the same. Furthermore, dividends are the same for all farmers irrespective of the number of household members.

Discussion of results: the LUSIP

At Mahlabatsini and Maphobeni, each household has 1–20 ha of farmland; the largest homesteads are located at Maphobeni, where most households have at least 5 ha. Generally, most farmers do not farm all their land, mainly because of a lack of capital.

In both these areas, the main crops are cotton and maize. Other crops include legumes, fruit, vegetables and sugar cane. Some farmers also sell cotton, sugar cane and livestock. Overall, both Mahlabatsini and Maphobeni are characterized by a high level of crop diversification, which is key to food security (Table 3). Local farmers would like to maintain this after the implementation of the LUSIP and the introduction of sugar-cane production. Monocropping is practised by most farmers growing maize, cotton, beans, bambara and sweet potatoes. However, maize is sometimes intercropped with legumes such as mung beans and cowpea. Crop rotation is not common at either Mahlabatsini or Maphobeni (unless there is a significant decrease in yields), with only a few farmers practising it between maize, cotton and sweet potatoes. Soil fertilization practices, pest control measures and crop storage methods tend to be similar to those adopted at Mangweni and Entamakuphila before implementation of the KDDP, with farmers relying mainly on self-selected crop seeds and organic fertilizers and pesticides, but also on purchased inputs (hybrid seeds and chemical fertilizers and pesticides). Farmers at Mahlabatsini and Maphobeni also keep a wide range of animals including: cattle, sheep, goats, chickens, ducks, pigs, donkeys, horses and geese. Grazing land is abundant and animals are not confined (no specific areas are designated as grazing land).

TABLE 3 Crops grown at Mahlabatsini and Maphobeni (LUSIP)

Crops	Mahlabatsini	Maphobeni
Maize	✓	✓
Groundnuts	✓	✓
Sugar bean	✓	✓
Cowpea	✓	✓
Mung bean	✓	✓
Cotton	✓	✓
Okra	✓	✓
Sesame	✓	✓
Sorghum	✓	✓
Sweet potato	✓	✓
Cassava	✓	✓
Pumpkin	✓	✓
Melon	✓	✓
Gourd	✓	✓
Watermelon	✓	✓
Bambara nut	✓	✓
Calabash		✓
Sweet sorghum	✓	
Sugar cane		✓
Vegetables		✓
Papaw	✓	✓
Blueberry	✓	
Mango	✓	✓
Banana	✓	✓
Peach	✓	
Orange	✓	✓
Naartjie	✓	
Guava	✓	✓
Butternut		✓
Garlic		✓
Chilli pepper		✓

Legend: ✓ Grown in the area.

Despite the relative abundance of land both for farming and livestock activities and the high level of crop diversification, the food security of households at Mahlabatsini and Maphobeni is relatively vulnerable. As emerged during the discussions, if an adequate amount of rain falls at the right time during the growing season, farmers are generally able to produce enough food for household consumption (and sometimes also a surplus to sell). Some farmers sell cotton, sugar cane and livestock (especially cattle) or engage in casual labour to buy food (particularly maize), especially following a poor harvest. However, in the event of drought, local households often have to rely on food assistance.

Food security implications of the KDDP

As shown above, implementation of the KDDP and the introduction of commercial sugar-cane production have transformed the rural livelihoods and the farming systems of the three areas considered, with substantial implications for the food security of local households.

Before implementation of the KDDP, according to the focus group discussions, most households at Mangweni, Vukasidvashini and Entamakuphila were able to satisfy most of their food needs through the crops they used to grow. Food security was ensured mainly through crop diversification and intercropping, with several crops characterized by different growing periods (and, therefore, reaching maturity at different times) being grown simultaneously in the same field. Food availability was also ensured throughout the year through various food storage techniques.

Moreover, the livestock sector used to play a key role in the production system and the livelihoods of smallholder farmers in the three areas. Crop surpluses, as well as livestock and a few cash crops such as cotton, could also be sold by farmers, so providing them with a source of income. This could be used to sustain the household in the event of food shortages (for example, following a drought), or also to purchase other goods and services and pay for health and education expenses. Furthermore, in the event of a food shortage, food sharing and bartering used to be common practices, especially among friends, relatives and neighbours. Similarly, in the event of a poor harvest, seed sharing used to be a relatively common practice.

With implementation of the KDDP and the conversion of most fertile land to commercial sugar-cane production, there has been a significant reduction in the amount of land allocated to other crops, such as maize, which used to play a key role in the food security of most households at Mangweni, Vukasidvashini and Entamakuphila. Under the new land allocation arrangement, women have lost the opportunity to grow various crops used mainly for household consumption, so also reducing their income-generating potential. Overall, the quantity of harvested crops available for household consumption has decreased considerably, and households have started to purchase food on the market. At the same time, owing mainly to a reduction in the availability of grazing land, the livestock population has dropped in each of the three study areas, and there has also been a significant reduction in the number of animal breeds present, particularly local breeds. Furthermore, according to farmers, within this new market-based system, crop storage and food sharing and bartering are no longer common practices.

TABLE 4 Status of selected wild edible plant species in two areas under the KDDP

Species	Mangweni	Vukasidvashini
Sineyi (<i>Berchemia zeyheri</i>)	Virtually extinguished	Population reduced
Emakhiwa (<i>Ficus sur</i>)	Virtually extinguished	Not affected
Tincozi (<i>Syzygium gerrardi</i>)	Population reduced	Not affected
Umtelemba (<i>Annona senegalensis</i>)	Population reduced	Not affected
Emaganu (<i>Sclerocarya birrea</i>)	Population reduced	Not affected
Emathunduluka (<i>Ximenia americana</i>)	Population reduced	Not affected
Emahlala (<i>Strychnos spinosa</i>)	Population reduced	Not affected
Umkhwakwa (<i>Strychnos madagascariensis</i>)	Population reduced	Not affected
Inkhokhokho (<i>Ficus petersii</i>)	Population reduced	∅
Emanyamane (edible caterpillar)	Population reduced	∅
Emanumbela (<i>Englerophytum natalense</i>)	∅	Population reduced
Emayiwane (<i>Hoslundia opposite</i>)	∅	Population reduced
Gugujane (<i>Cyphia bolusii</i>)	∅	Population reduced

Legend: ∅ Data not available.

Implementation of the KDDP has also affected another key component of food security. In the three areas, bush clearing has been carried out in order to make room for commercial sugar-cane plantations. This has led to a reduction in the population of several wild edible plant species traditionally collected by local households and used for various purposes (Table 4). Wild edible plants represent an important source of calories and proteins, and they also supply vitamins and other essential micronutrients. For this reason, a reduction in the habitats of these species has a direct impact on the food security of rural households, particularly poor households, which rely on access to wild foods more than richer ones (IUCN/DFID, no date). In addition to food, wild plants are traditionally used by rural households for fodder and medicinal purposes.

Overall, households have become increasingly dependent on food purchases on the market in all three areas. This growing reliance of most households on food purchases is making their food security increasingly vulnerable to economic shocks. For example, increases in prices, as evidenced in the rising price index for food (above), have limited access to food for poor households (SSA, 2006b).

At the same time, with the shift from subsistence farming to irrigated cash-crop production, smallholder farmers have become increasingly reliant on the market for the purchase of farming inputs, such as hybrid seeds and chemical fertilizers and pesticides. This has exposed farmers to potential shocks occurring in the markets for these inputs and their prices.

BOX 1

Low profitability of sugar-cane production and impacts on smallholder growers

The first aspect to be considered concerns the profitability of sugar-cane production under the KDDP and its impact on the income of participating households. The viability of the KDDP was appraised at a time when the sucrose price was E1 500 per tonne. However, owing to a strengthening of the local currency, the price has declined to E1 200 per tonne, threatening the financial sustainability of the smallholder farmers associations. For some farmers associations, this drop in the price has meant that there is little or no revenue for distribution to members once loan-financing obligations have been met. In addition, the recent reform of the EU sugar regime has further reduced the profitability of the Swazi sugar-cane industry, with negative repercussions for smallholder growers. Since 2001, Swaziland has exported to the EU an average of 163 100 tonnes of sugar per year, of which 30 000 tonnes under the Special Preferential Sugar Agreement; although this is only 30 percent of the annual industry output, it contributes about half of the total industry revenue. A direct impact of the reform of the EU sugar regime will be the financial loss on each tonne of exported sugar as a result of the price cuts. In 2006/07, Swaziland has received EUR496.80 per tonne of sugar exported to the EU (down from EUR523.70 in 2005/06). From 2009/10 onwards, the price will drop to EUR319.50 per tonne, with substantial direct revenue losses to Swaziland and negative repercussions, especially on medium-sized and small growers, which account for a relatively small volume of total production (5 and 1 percent, respectively) but represent the large majority of growers.

Another factor is contributing to the decrease in the profitability of smallholder sugar-cane growing. The average operating costs in the smallholder sugar-cane sector have increased 40 percent since 2002. Moreover, since 2001, the average productivity of smallholder sugar-cane growers has decreased, falling well below industry averages. At a recent workshop in Swaziland to discuss the problems facing smallholder sugar-cane growers, this decline in productivity was attributed to a variety of factors, such as poor irrigation systems and stand-by facilities, inefficiency in farming operations, infighting among members of farmer associations, and chieftaincy disputes (SSA, 2006a, 2006b, 2006c).

All these factors, combined, are contributing to growing levels of indebtedness among smallholder sugar farmers. Currently, newly established smallholder sugar farmers pay on average 31 percent of their total earnings in interest for the loans taken up in order to develop their farms. In many cases, this leaves insufficient funds to cover even the repayment of the loans, providing a direct challenge to the operation of farmers associations (as this leaves no income for distribution to members) (SSA, 2006a, 2006b).

Furthermore, the sugar industry contributes more than E100 million per year to government revenues, both directly through the sugar levy and through corporate and income taxes levied on the industry. The expected revenue losses for the sugar industry will also lead to a loss of government revenue, at a time when demands on the government to take over the running of education, health and public utility provision in sugar-cane growing areas are increasing (SSA, 2006a).

The increasing reliance on food purchases from the market is also making households vulnerable to food insecurity because, under the new set-up, the number of potential income-generating activities for farmers has decreased, especially for women. At the same time, the income needed to purchase food is tied to the profitability of sugar cane, which has been lower than estimated originally (Box 1). For this reason, the dividends from the associations have been relatively low in the first few years, also because the associations have had to pay back the project loan. As a consequence, the dividends received from the associations have not been able to provide households with the financial resources they need in order to satisfy primary needs such as nutrition, health and education. During the focus-group discussions held at Mangweni in February 2005, it emerged that each household had received E2 000 per year as dividends (through a single payment). According to farmers, this amount is not enough to cover all the food, health and education expenses of the average household. At Vukasidvashini, the average annual dividends received by each household were even lower, at E1 500. As described by local farmers during the discussions at Vukasidvashini, the sugar-cane mill pays the price of the sugar cane received from the farmers association to the project financiers. The project financiers deduct the annual loan payment and then distribute the balance to the association. With this amount of money, a household cannot satisfy its basic needs. Similarly, at Entamakuphila, farmers complained about the low dividends received.



CHAPTER 4

CONCLUDING REMARKS AND RECOMMENDATIONS FOR IMPLEMENTATION OF THE LUSIP

Implementation of the KDDP and the introduction of commercial sugar-cane plantations have transformed the farming activities and the livelihoods in the three study areas.

Overall, there has been a significant reduction in agrobiodiversity in these areas. A high degree of agrobiodiversity can make farming systems more stable, robust and sustainable, so ensuring the resilience of rural livelihoods to both exogenous and endogenous biophysical and socio-economic shocks, such as pathogen infestation, uncertain rainfall, fluctuations in the price of cash crops and external inputs, and socio-political disruption. As Lambrou and Laub (2006) state: “the reliance of rural women and men on a variety of genetic sources allows them to adapt their agricultural systems to varying environmental, economic and social conditions”, providing them, at the same time, with additional income-generating possibilities from a wide range of natural resources. Subsistence farmers are particularly reliant on maintaining a wide range of plant and animal varieties adapted to the local environment. These varieties provide the farmers with a continuous and varied food supply, allowing them, at the same time, to protect themselves against crop failure and animal losses (FAO, 1999, 2004a).

The reduction in agrobiodiversity that has occurred in the three study areas has reduced the adaptability of local agro-ecological systems and their resilience, posing a serious threat to rural livelihoods and food security. The reliance on a single crop (sugar cane) and the strong dependence of such systems on external inputs have increased their vulnerability to shocks, such as the severe droughts experienced by Swaziland in recent years, the drop in the price of sugar, and the increase in the price of agricultural inputs and food.

The potential negative impacts of a shift from subsistence to commercial, monoculture-based farming discussed above should be considered in the implementation of the LUSIP. In particular, the negative implications of such a shift on agrobiodiversity should be minimized. At the same time, the potential socio-economic benefits (particularly in

terms of food security) of the water irrigation project that is currently being developed should be maximized. The availability of irrigation water represents a potential benefit for the livelihoods of rural households, reducing their vulnerability to droughts and enhancing their food security. However, in order for these benefits to materialize, the introduction of commercial crops should be integrated with, rather than replace, the existing agro-ecological systems, preserving their diversity and complexity. An adequate amount of land should be kept available for existing farming and livestock activities, and irrigation water should be made available for other crops besides sugar cane. Maintaining a high degree of diversity within the local agro-ecological systems is crucial to the conservation of the extensive knowledge and the traditional set of skills of local farmers in the management of local crops and livestock. This would contribute to the resilience of local agro-ecosystems to socio-economic and climate shocks, so enhancing the long-term food security of local communities.

The establishment of sugar-cane plantations at Mangweni, Vukasidwashini and Entamakuphila has also been accompanied by a reduction in the population of several wild edible plant species. In addition to the food security implications, the reduced availability of such species may increase the vulnerability of rural livelihoods to exogenous shocks by reducing the number of coping mechanisms available. The consumption of wild edible plants is particularly important in areas prone to food shortages. In some cases, it can represent a key survival strategy. For example, in parts of southern Ethiopia, rural households are able to cope with several consecutive years of severe droughts without facing severe food shortages by increasing the consumption of wild food plants. A reduction in the availability of wild edible plants might also threaten the knowledge and skills associated with the collection and the utilization of such species, particularly among women. More broadly speaking, agrobiodiversity shapes and is shaped by local knowledge and culture. For this reason, where agrobiodiversity is reduced, the accompanying local knowledge, culture and skills may also be under threat (FAO, 2004b). Women generally have the primary responsibility of providing their families with food, water, fuel, medicines, fibres, fodder and other products. Due also to such responsibilities, rural women are the most knowledgeable about the patterns and uses of local biodiversity. In particular, women are often responsible for the collection, preparation and consumption of wild edible plants and, thus, have a more highly specialized knowledge than men of the wild plants that can be used for food, fodder and medicine (FAO, 1999, 2004a; Howard, 2003; Guinand and Lemessa, 2000).

The importance of wild edible plants for the food security of rural households, especially poor households and those in areas prone to droughts (as is the LUSIP area), should be considered in the implementation of the LUSIP. The negative impacts of the LUSIP and of any following land-use changes should be considered carefully and minimized in order to avoid the reduction in the population of wild edible plant species that has occurred in the areas under the KDDP. In addition to the positive food security implications, this would also help conserve, particularly among women, the knowledge associated with the collection, preparation and consumption of wild plants for food, fodder and medicinal purposes.

The transformations in the agriculture sector that have accompanied implementation of the KDDP in the three study areas have also had important gender-related implications. At Mangweni, Vukasidwashini and Entamakuphila, most marginal lands and home gardens (where women traditionally used to grow crops for household consumption, rituals and medicinal uses) have been converted to sugar-cane plantations. These plantations, as most commercial crops, are managed mainly by men. This tendency has been documented in several studies that have shown that, when local crops intended

for production-for-use are replaced by introduced crops for commercial purposes, often “men take over from women”, with negative repercussions on the ability of women to meet household obligations, including traditional food provision and food security. The strong dependence on external inputs that characterizes commercial agriculture systems tends to exclude women, who generally lack access to and control over productive resources. The reasons for this are many, including women’s limited access to credit and information, as well as the lack of training opportunities for them (FAO, 2004a, 2004c; Wooten, 2003; World Bank, 2003).

One of the factors that have contributed most to the economic marginalization of women in the three study areas under the KDDP has been the low number of women among the members of the farmers’ associations managing the sugar-cane plantations, and the resulting lack of women’s involvement in the decision-making process of such organizations. The gender-related implications of a shift from subsistence to commercial farming should be assessed carefully and taken into account in the implementation phase of the LUSIP. Maintaining a high level of agrobiodiversity and conserving wild edible plant species, as discussed above, would be key to maintaining an active participation of female farmers in farming activities. Furthermore, in order to ensure that women are not excluded in the shift from subsistence to commercial farming, it is fundamental to ensure their equal access to farmers associations, and their inclusion and active participation in the decision-making process of such organizations.

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