CONSTRAINTS ON CROP PRODUCTION IN MABUA, SOUTH AFRICA

Project in Interdisciplinary Land Use and Natural Resource Management, SLUSE

Thilde M. Funder, International Development Studies & Geography, Roskilde University
Abdullahi Hassan Hirsi, Agronomy, Royal Veterinary and Agricultural University
Mette Vestergård Madsen, Biology, University of Copenhagen

Supervisors: Anita Veihe and Thorsten Treue

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SUMMARY

Data for this report was collected by a group of South African and Danish students in the village Mabua in the former Transkei, South Africa. Smallholders in Mabua complained that the productivity of their fields has declined since the introduction of chemical fertilizers and hybrid seeds, and some farmers in the village have stopped cultivating their fields. In order to identify factors limiting the crop production, the land use history, land tenure system and crop production of the village were investigated. Semi-structured interviews were conducted with key informants and current and former farmers. Current farmers were asked to score the primary crops grown in a matrix scoring exercise, and a seasonal calendar was developed with a focus group of farmers. pH, texture, macro nutrient- and organic matter content of soil samples from fields was determined. The soil fertility is in general low prompting constraints on the production of the primary crop, maize. Many farmers lack capital to purchase sufficient agricultural inputs like fertilizers, seeds and traction for ploughing, and stock theft was reported to restrict the accessibility to manure and animal traction. Crop production is primarily subsistence oriented, and crop production does not seem to be an income generating activity due to poor market access and low yields.

1. INTRODUCTION

1.1. CROP PRODUCTION IN THE FORMER TRANSKEI

This study focuses primarily on crop production in Mabua, a sub-village in Tsita in Maluti District in the Republic of South Africa. At the time being there seems to be some confusion as to whether Maluti District is part of the Eastern Cape Province or KwaZulu-Natal. During the apartheid era this area was part of the Transkei homeland (Turner, 1999) that was independent of the Republic of South Africa.

The former Transkei has a high potential for crop production in terms of water availability, but the soils of the region are erodible and poor in fertility (Fox, 2000). The principal cereal crop produced in the region is maize, but despite a pronounced population increase from approximately 800.000 people in 1904 to more than 2,6 mill. in 1981 the production of maize has declined from 180.000 tons in 1930 to 120.000 tons in the late 1980s (Fox, 2000). In Fox (2000) it is suggested that agriculturalists in Transkei have abandoned the arable land because of declining productivity, and that a number of interrelated reasons caused this decline:
The soils were poor and erodible, the fallowing periods became too short, and the application of fertilizers was either too low or non-existent, men were not taking part in the agricultural production, because they were occupied in the urban sector, and it became hard to establish cattle teams for ploughing. Instead, it is claimed (Fox, 2000), the agriculturalists switched to cultivation of small kitchen gardens that are more easily managed since organic household waste can be used as fertilizers, and because they are easier fenced than fields. In addition women can manage the kitchen gardens.

1.1.1. LAND TENURE

Under the apartheid regime the state made itself the owner of land and resources in Maluti District (Turner, 1999). Only few of the villages in a survey made in Maluti District (Turner, 1999) still allocate arable land, and all the arable land was allocated to people long ago. Turner (1999) notes that people refer to a ‘Permission to Occupy’ (PTO) as documentation of their right to use certain fields.

According to Turner (1999) the fields cannot be sold but are inherited from generation to generation within the family. This practice makes it almost impossible for newcomers to get usufruct right to arable land.

The PTO system stems from old land administration regulations like the Black Land or 'R188' regulations from 1927 (Greenberg, 1999). When allocating land according to these regulations tribal authorities made recommendations about the allocation, but the departmental government officials in the district magistrate's office did the legal and formal confirmation. Greenberg (1999) states that the current land administration systems are not functioning and the security of land right holders is not sufficient, because the administration is in a state of transition from the former Transkei system to the regulation and legislation of the Republic of South Africa.

In theory unused fields could be expropriated, but in practice this rarely happens because of fear of conflicts associated with this practice (Greenberg, 1999).

Traditionally women do not have the same rights to arable land as men do. Unmarried and married women cannot be allocated usufruct rights to arable land, but all the household's rights to land are normally transferred to the widow on the death of a male household head (Greenberg, 1999).

1.2. INTRODUCTION TO THE STUDY AREA

Mabua is a sub-village of Tsita situated in the former Transkei at the foothills of the Drakensberg Mountains close to the border to Lesotho. The nearest towns are Maluti and Matatiele, and a dirt road connects Mabua to the tarmac road connecting these towns. The distance to the towns is about 20-25 km. There is one daily bus service to Matatiele.

The majority of the population are Sotho, but Xhosa and Hlubi are also represented in the village.

The residential area of the village is situated on a slope running from a rock formation towards an alluvial plain close to the river. The fields are situated further down the slope and on the alluvial plain adjacent to the river. The fields on the slope are contour ploughed. The primary crop produced on the fields is maize, but millet and turnips are also grown there to a lesser extent. Most households also produce crops at the residential sites, and vegetables are primarily grown in these home gardens.

Fig.1: Fields on plain.

All arable land in Mabua has been allocated, but new comers are allocated residential sites on the village margin.

An extension officer responsible for Tsita and neighbouring Madlangala provides agricultural extension services.

The access to piped clean water is relatively good since several water taps are placed in the village.

There is one primary school in Mabua, and students attending advanced levels of education have to leave the village.

1.3. MAIN OBJECTIVE

As outlined above, it is stated (Fox, 2000) that many farmers in the former Transkei have abandoned their fields. In June 2001 our supervisors visited the study area, and they also got the impression that many fields in the study area were not cultivated (pers. comm., Anita Veihe & Thorsten Treue).

Based on that we decided to investigate the reasons why people in the area had decided to stop cultivating their fields, and our preliminary main objective was:

"Why is a significant part of the arable land in the area seemingly not cultivated at the time being?"

The underlying assumption was that villagers had stopped farming because they lacked access, in some way or the other, to agricultural inputs and / or possibilities of economic returns. We would try to determine the reasons that the villagers had stopped cultivating by investigating the constraints on agricultural production in the area. Thus we developed a set of sub-objectives covering topics that we hypothesized might be limiting the crop production. During our stay in the field we quickly realised that contrary to our expectation most of the arable land in Mabua is actually being cultivated. But still we found that the agricultural sector in Mabua faces severe constraints and the yields and economic returns from cultivating the fields are insufficient to fulfil the basic needs of farmers in Mabua.
Since most of the arable land is cultivated we have to change our main objective to:

What factors are limiting crop production in Mabua?

We found that our sub-objectives have helped us identify many of the constraints faced by farmers in Mabua.

1.3.1. DEFINITIONS

Uncultivated fields: Fields that have not been cropped for three consecutive years (pers.comm., Mr. Gwala at the Agricultural Extension Office in Maluti).
Vegetable gardens / home gardens: Cultivated land within the individual household´s residential plot
Former farmer: Tenant of fields who has not cultivated the fields for at least the three last years.
Current farmer: Farmer who has been cultivating his/her fields for at least the last three consecutive years.

1.4. SUB-OBJECTIVES

The sub-objectives that we want to investigate fall under three headings:

- Land tenure

- Land use history
- Crop production

The three sub-objectives are not equally weighed in this report, thus we think that land tenure and history of land use could be contributing factors to an overall declining agricultural sector, but probably not an explanation by themselves. The sub-objective concerning crop production cover several specific topics, like use of fertilizers, access to markets, and labour inputs, and the crop production will be relatively more dominant in this report.
In the following section we will elaborate on the specific nature of the sub-objectives.

1.4.1. LAND TENURE

The tenure system could be a disincentive for intensifying the land use. If people in the area perceive their rights to arable land to be uncertain, unreliable or in some way limited they may not think that it is worth the effort to invest time and money in cultivating the land. With this in mind we wanted to investigate how the tenure system works and how people in the area perceive it.

1.4.2. LAND USE HISTORY

In order to identify factors that could have led to an extensification of the crop production we wanted to know if changes in the production methods, land use in general, population increase or other factors could have led farmers to the conclusion that the returns from crop production are not sufficient anymore.
Specifically we intended to investigate if there have been changes as to which crops and varieties farmers produce, if the use of technology and equipment has changed, if the production methods have changed, if the soil quality has declined, if the yields have declined, and of course what have been the consequences if there have been changes.
Occurrence of erosion or natural disasters like drought or flooding could have a negative impact on the crop production. Our investigation on the history of the area should therefore also focus on the frequency of natural disasters and whether people perceive erosion and natural disasters as significant problem in relation to crop production.

1.4.3. CROP PRODUCTION

To understand mechanisms constraining crop production it is obvious that a description of the production is needed. Our description should cover the following topics:

- Crop types and varieties produced in the area.
- Which crops are grown on the fields, and which are produced in home gardens?
- Which crops are preferred in relation to cost, income, labour input, and consumption?
- Agricultural practices and activities (i.e. farming systems, when are farming-related activities carried out, which equipment is being used, to what extent are fertilizers and manure applied, integration / interaction between livestock and crop production).
- Is the production used solely for subsistence or is a surplus produced?

As stated by Fox (2000) the soil fertility in the former Transkei is low. A response to low soil fertility could have been the adoption of alternative cropping procedures that could ensure higher yields or the application of fertilizers or manure. A potential set of reasons as to why there has been an extensification of the agricultural production could be that people in the area are not able to switch to alternative cropping procedures because of lack of knowledge of these alternatives. Intensification of the agricultural production is often associated with the investment in new technology like fertilizers or expensive machinery. Even if people know that the application of such technologies could lead to higher yields they may not be able to adopt these technologies because of lack of capital or investment opportunities. We therefore intended to investigate to what extent people in the area have access to information about alternative cropping methods and what financial opportunities they have.

The matter of manure is related to low soil fertility. Constraints faced by farmers could be an insufficient amount of manure in the area or that the management and accessibility of manure is inadequate. Another related problem could be difficulties in organising animal traction for ploughing. Based on these hypotheses we wanted to investigate the interaction/integration between livestock and crop production.

We also thought that the location of fields could be a reason for not cultivating; the fields not in use might for instance be considered to be located too far away from the village. Therefore we wanted to investigate if the cultivated and uncultivated fields share any common characteristics according to location.

Lack of labour may also hamper crop production. As many men in the former Transkei are occupied in the urban sector (Fox, 2000) the absence of male labour could be yet another reason for people not to cultivate their fields. To investigate these matters we were interested in obtaining information about alternative income possibilities and the significance of such compared to crop production.

It is also important to investigate if the agricultural production is solely for the household's own consumption or if it is possible to make a reliable and reasonable income from this production. Commercial production is only possible if the production is sufficiently high and if it is possible to sell the surplus at a reasonable price. The latter could be hampered by low or unreliable market opportunities or if the access to markets is insufficient. Related to this we wanted to investigate if some farmers are able to produce a surplus, how the market access is, and if they were able to sell it at reasonable prices or not.

1.5. PROBLEM TREE

The following problem tree has been developed in order to illustrate the problems faced by farmers in Mabua, and how these problems are interrelated. Throughout the report we will elaborate on the statements of the problem tree and our perception of the connections between these statements. The problem tree is presented at this point to introduce the overall frame of analysis.

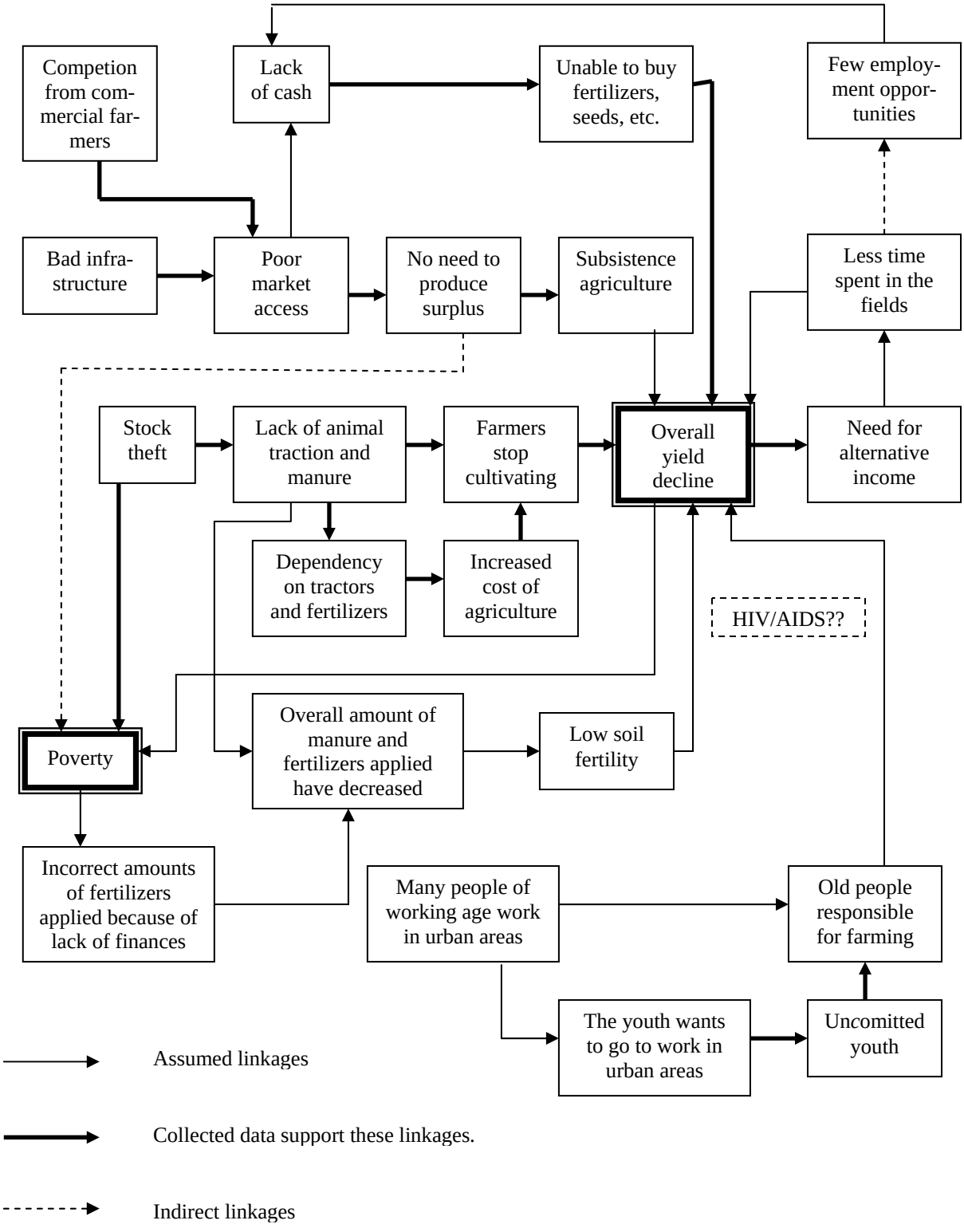

Fig. 2: Problem tree.

2. METHODOLOGY

2.1. INTRODUCTION

In this chapter we will describe the methods used to gather information for this report. First we discuss which effects the methodological limitations pose on our conclusions. Then we will describe the scientific nature of our methods, and then we move on to describing each method theoretically, and the way they are applied for this study. Next we will describe which methods were used according to the three sub-objectives, and describe how we have attempted to use different methods in order to triangulate the data.

2.2. LIMITATIONS

We only had five working days in the field, and it is obvious that for a baseline study of this kind much more time is needed to get trustworthy results. Besides, a low number of interviews would make the reliability of any overall conclusions on the agriculture in Mabua questionable. We are aware that we can only make conclusions based on the people we have interviewed, and the quality of the information gathered through these interviews can also be questioned, as we did not have time to get familiar with the community. But it is our opinion that the data from the various methods were roughly consistent and therefore we believe that it is possible to make assumptions about some general trends in agriculture in Mabua.
These methodological limitations will be discussed throughout the report.

2.3. SOCIAL AND NATURAL SCIENTIFIC METHODS

The methods used comprise of both social and natural scientific methods, though the social scientific methods are most dominant. We found that for our purpose, and with the relative small amount of information we had about the area prior to our field stay, we would get most information from interviewing people, as the farmers and villagers themselves obviously holds most of the answers to our questions. The social scientific methods used are interviews and a couple of PRA techniques.

The natural scientific method we used is soil testing. We wanted to investigate the soil properties in order to asses the necessity of manure and / or chemical fertilizers. Finally we have also used the GPS mapping method in an attempt to estimate how much of the arable land that is cultivated compared to the uncultivated area.

2.4. INTERVIEWS

As mentioned above, the interview method constitutes a major part of our study. We used different types of interviews but they share some general characteristics that will be described in this section.

The interviews were all qualitative and semi-structured. As Mikkelsen (1995) outlines, the semi-structured interview is more conversational than the traditional structured interview, and we formulated many open ended questions during the interview. Using Mikkelsen's terms we used the 'interview guide approach', meaning that the topics to be covered are outlined in advance (Mikkelsen, 1995). We found that we needed a couple of quantitative questions in the beginning of the interview i.e. informant's age, household members, etc. The interview guides (Appendix A) deals with questions concerning land use history, land tenure issues, which crops (if any) the household are growing, what is the surplus (if any) used for, etc. These questions helped to let the informant know what topics we would like to cover, and it also raised a lot of additional questions on our part.

2.4.1. INFORMANTS

Two key informants were interviewed about the land use history in Mabua. Both of them have been living in Mabua for approximately fifty years and they are both engaged in agriculture. We believe that it is necessary to obtain information on land use history from people who have been using the land for a long time, and the informants we chose suited this purpose.
Representatives of households were interviewed about land tenure issues and issues regarding crop production.

The households were not sampled randomly. Instead we asked community members to identify households that were farming and not farming anymore. The distinction between households who are still cultivating their fields and households who are not cultivating their fields anymore was made in order to compare and identify factors that are constraining crop production in Mabua. This strategy allows us to identify whether farmers who have stopped cultivating their fields differ in any specific ways from farmers who are still cultivating their fields and could thus help us identify if there is a pattern of reasons as to why some farmers have stopped producing crops on their fields.

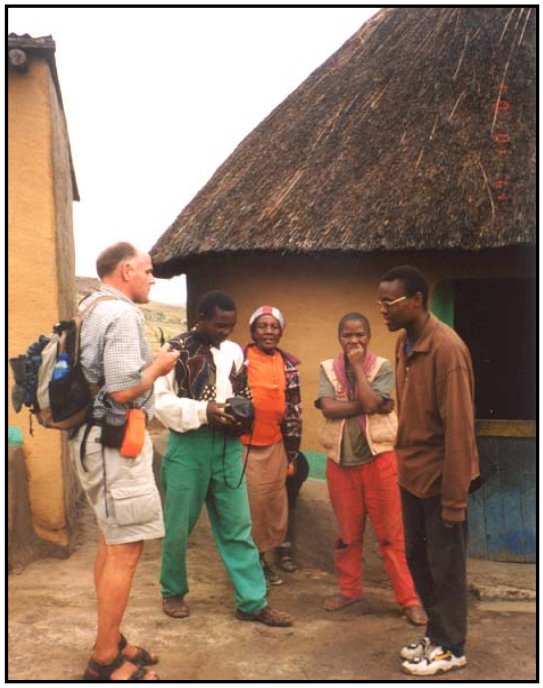

Fig. 3: Interviewing a household in Mabua. From left: Torben Birch-Thomsen (field supervisor), Mphod Dlothi (farmer), Mrs. Dlothi, visitor and Sizo Mkhize.

The number of households interviewed is unfortunately rather limited. We only interviewed informants from five households still farming and three households not farming anymore. In total there was approximately 80 households in Mabua (pers. comm. Louise Martinsen, Sanne Kok, Kasper Schmidt). As mentioned, we were not interested in a random sample of households, but our sample might not be very representative of the farmers in Mabua, especially in terms of age. We mostly interviewed old people and we did not see many middle-aged people in the village and at farmers meeting there were only old farmers. The reason for this could be that middle-aged farmers were working in the cities due to the season or it could be that there simply are no middle-aged farmers.

Furthermore we interviewed two key informants: the Agricultural Extension Officer and the Land Registration Officer. We talked to the Agricultural Extension Officer, Mr. Sobhuza, twice. The first time he was interviewed in Mabua, the other was at his office at the Agricultural Extension Service in Maluti. The Land Registration Officer, Mr. Gwala was also present at the second interview, and we interviewed both of them. The fact that we had the opportunity to discuss and reflect over Mr. Sobhuza's answers was a great advantage and we

could be more specific the second time we saw him and try to ask some of the same questions again in a different manner. Mr. Sobhuza was interviewed about issues regarding crop production, and both key informants were interviewed in order to clarify how the official land tenure system is supposed to work.

Another interesting informant could have been the chief as he seems to be an important stakeholder in land tenure issues and we had hoped to conduct an interview with him. Unfortunately we were not able to locate the chief of Mabua. Instead we made several appointments with the chief of the neighbouring village, Makomoreng, but the chief never showed up for these appointments.

During the field study some of the old farmers mentioned that the young generation is not interested in agriculture. To triangulate this information and to investigate why this generation is not motivated towards agriculture we conducted interviews with five younger people.

2.5. PRA TECHNIQUES

In this section we will shortly outline the background of the participatory rural appraisal (PRA). Next we will describe the two PRA methods we applied in this study: matrix scoring and seasonal calendar with a group of farmers.

The PRA method is a learning and communication approach, and was developed in the 1970's and is widely used especially by NGO's and development researchers. There are many techniques, which can be used in PRA including seasonal calendar, direct observation, stories told by key informants etc. For the NGO's, dialogue, facilitation and empowerment are some of the key words, and it is used to assess the needs and to facilitate the locals to plan and act on their own premises. For researchers the PRA is mostly used for acquiring knowledge about a specific community (Chambers, 1997 & Mikkelsen, 1995).

2.5.1. MATRIX SCORING

The matrix scoring is usually combined with a ranking, and is used to assess people's expectations, preferences, and opinions (Mikkelsen, 1995). We only did a scoring, as we

thought that it was too time consuming and difficult for the informants to do the ranking as well.

We created a table with a number of different categories concerning cost, time- and labour input, etc. in the agricultural production (Appendix B). We did the matrix scoring with individual farmers and in some cases their wives, after we had finished the questionnaire. Informants were asked to score their main crops by distributing beans to the above-mentioned categories. The matrix scoring served two purposes: one was to facilitate and guide a discussion with the informants and prompt volunteering of information that might otherwise not be accessible. Another purpose was to triangulate information of other informants. Through the matrix scoring we gained insight into various aspects including the dominant species in the fields, and why the people prefer such species.

2.5.2. SEASONAL CALENDAR

A seasonal calendar can be used to estimate the seasonal variety of a number of different issues, i.e. workload, diet and food consumption, and crop cycles, usually throughout a year (Chambers, 1997). We were interested in the seasonal fieldwork in order to ascertain if there were any bottleneck problems concerning labour, livestock / tractors, and capital (Appendix B). We also wanted to triangulate information obtained through interviews and the matrix scoring. We drew a calendar on a chart and met with a focus group of farmers who told us when they performed various agricultural activities. The Agricultural Extension Officer was present at the meeting and this participatory process. The farmers were reluctant to answer specific questions about seasonal timing of agricultural activities, and the Agricultural Extension Officer, who spoke English, dominated the exercise. We tried to accommodate a discussion by posing questions directly to the farmers and this approach turned out to be fertile. The seasonal calendar itself was not of much use to us, and the most important aspect of this exercise turned out to be this discussion between the farmers and us, where the farmers apparently spoke openly about their difficulties.

The meeting with a focus group of farmers took place right after the Agricultural Extension Officer had had a meeting with the farmers. We used the questions from the interview guide (Appendix A) and used Mr. Mashai Dlothi as an interpreter as most of the farmers only spoke Sotho.

Fig. 4: Meeting with a group of farmers in Mabua.

The products of the PRA techniques, the matrix scoring- and calendar charts will not be analysed explicitly in this report, as the reliability of these products are too questionable for further analysis. The techniques provided us with useful information that will be used throughout the report.

2.6. CASE STUDY

A case study operates with a certain phenomenon also covering the contextual conditions in which the phenomenon is placed, and the case is covered using various methods in order to obtain a comprehensive description of the phenomenon.

Yin (1994) also states that case studies are especially useful for answering 'how'- and 'why'-questions. Yin (1994) defines a case study as:

> "[…]an empirical enquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident [...] copes with the technically distinctive situations in which there will be many more variables of interest than data points, and as one result relies on multiple sources of evidence, with data needing to converge in a triangulation fashion, and as another result benefits from the prior development of theoretical propositions to guide data collection and analysis."

Our general impression is that farmers in Mabua are facing severe constraints resulting in a low crop production. In the neighbouring village, Makomoreng, there is one farmer who actually seems to be doing quite well. We decided to conduct a case study on this farmer in

order to identify how he differs from the majority of less successful farmers. These differences could help us identify factors that hamper the crop production of other farmers.
The 'how' and 'why' in this case relates to asking, *"how did the farmer of this particular case study achieve his success"* and *"why has he been able to do so"*. It is obvious that these questions can only be answered when viewing the farmer as part of a context. In other words, it is highly unlikely that the farmer has only achieved his success because he possesses some intrinsic characteristics.
As the extent of this case study is rather limited only a few different methods were applied. We interviewed the farmer using the interview guide that was also used for interviews with current and former farmers in Mabua (Appendix A), and the matrix scoring (Appendix B) was done by both the farmer and his wife. Furthermore, the farmer showed us his fields and equipment, and as he was very eager to tell about his crop production and his own situation in general as well as the conditions in the area, we obtained a lot of valuable information.

2.7. MAPPING

We mapped all arable land allocated for fields. The purpose was to estimate the amount of currently cultivated and uncultivated fields. Through the mapping we also got an impression of the location of uncultivated fields, according to topography, distance to village, and soil quality.

We used a GPS to mark every single field that belonged to Mabua village. A local person told us where the boundaries between Mabua and neighbouring villages where located. Later we would have used the GIS to make a map of the fields and to find out the exact amount of uncultivated fields. But as none of us has had any previous experiences with GPS we later found out that the sizes of the individual fields were far too small for the GPS. Meaning that the uncertainty of each GPS point, which is 4-8 m (pers. comm. Ole Mertz) is larger than most of the fields, thus the overall uncertainty is unacceptable for our purpose.

2.8. SOIL TESTING

There is no question that the fertility of the soil is an important aspect, especially in areas where the agricultural sector is the backbone of the community life (Charman & Murphy,

2000). When we defined the main objective, we focused on the main factors that could have a direct link to it. Soil tests of the study area's fields were selected because we wanted to triangulate results from the interviews, and our own observations. Furthermore, we find that knowledge of soil properties is a fundamental prerequisite to meet the many natural resource challenges that the community face. Therefore we carried out soil testing, determining the macronutrients contents of the fields, pH of the soil, texture and organic matter level of the fields. Details on the analysis are in Appendix C.

Aron and Stout proposed the term 'essential mineral nutrient' in 1939 (Marschner, 1998). These authors concluded that, for an element to be considered essential three criteria must be met:

- A given plant must be unable to complete its life cycle in the absence of the mineral element.
- The function of the element must not be replaceable by another mineral element.
- The element must be directly involved in plant metabolism.

These minerals have been divided into two main categories namely the macro-and micronutrients (Marschner, 1998).

NPK (Nitrogen, Phosphorus and Potassium) are major macronutrients, which the plant cannot spare. They are the essential constituents of chemical fertilizers. A low soil content of NPK could thus be a constraint for agricultural production. Hence we determined the NPK level of the sampled soils.

The content of organic matter is an important indicator of the soil quality, and its functions in the soil ecosystem are numerous. Nutrients are released upon the biological decomposition of organic matter increasing the soil fertility for crop production (Woomer et al., 1994). Decomposition of plant material leads to the accumulation of a pool of recalcitrant organic matter in the soil. This pool increases the availability of micronutrients because the soil particles are charged by the recalcitrant organic matter whereby the cation and anion exchange capacity of the soil particles is increased (Woomer et al., 1994).

The activity of soil micro organisms and soil fauna, which is related to the organic matter content, leads to the production of large amounts of extra cellular polysaccharides that promotes soil aggregate formation (Killham, 1994). The level of aggregation is important because soil aggregates in some instances reduce erosion and facilitates greater infiltration

rates (Woomer et al., 1994 & Lal et al., 1999). Furthermore the formation of stable aggregates increases the water holding capacity of the soil reducing the risk of crops being exposed to water deficiency.
The aeration of soils is also enhanced with a higher level of soil aggregates.
Toxic aluminium and manganese species is a problem in many highly weathered tropical soils. Decomposition of organic matter leads to the release of labile carbon compounds that complex these toxic species. This means that a high level of organic matter of fields can reduce the negative impacts on crop yields of such toxic species (Woomer et al., 1994).
As soil organic matter can in many ways facilitate an improved soil environment for the growth of plants we determined the organic matter content of the samples.

Soil texture refers to the fineness or coarseness of soil particles. It is determined by the proportions of sand, silt and clay that make up the fine soil particle (< 2mm diameter) fraction of a soil. It is an important property that can influence soil physical properties such as permeability, water retention etc. as well as chemical fertilities (Brady & Weil, 1999)
Soil texture is generally measured in a laboratory using particle size analysis technique.
Alternatively, soil texture can be determined by using a manual field test. As we didn't have the relevant laboratory, we determined the soil texture according to the manual field test.

The samples were collected according to the topography as well as the utilisation of the fields. Fields have been divided into two main categories namely cultivated and uncultivated fields. Two soil samples were taken with an auger from two uncultivated and three cultivated fields. In order to cover the topographical variation soil was sampled from fields located on the slope and on the flat alluvial area for both uncultivated and cultivated fields. In relation to our soil sampling, owners of the sampled fields were interviewed because we wanted to know which fields were cultivated and which were not, and which crops had been produced on the fields in the previous years. The depths of the samples were 0-20 cm. The number of fields sampled is rather limited, but as the test results revealed, there is a low variation in nutrient content, and as the time was rather limited we decided to limit the number of soil analyses.

2.9. TRIANGULATION

In the following section we will describe how we have mixed methods to gain knowledge on our three sub-objectives. We have tried to triangulate most of our information, as this is very important in qualitative studies.

2.9.1. LAND TENURE & LAND USE HISTORY

The information on local perceptions of the land tenure system was triangulated through the interview with the Land Registration Officer and the Agricultural Extension Officer as representatives of the official land tenure system.

In relation to the land use history of Mabua the information was gathered through individual semi-structured interviews with two older men. We interviewed two key informants, and triangulated the information from our interview with the focus group of farmers, and through the interview with the Agricultural Extension Officer.

2.9.2. CROP PRODUCTION

For information on food production we used all of the above-mentioned methods. We compared data from interviews, the matrix scoring, the seasonal calendar, and the soil testing to see if data from the different methods were contradictory or pointing in the same direction.
Most of our data on crop production stems from the individual interviews. We also got important data from the discussion with the focus group of farmers; we used this opportunity to ask some of the same questions again, to see if the answers differed from the answers we got from the individual interviews. Both the matrix scoring and the seasonal calendar were used to facilitate a discussion and to attempt to triangulate the information from interviews. The use of a case study is used for comparison between a successful farmer and the less successful farmers.
The soil testing is meant to triangulate information obtained from data on the need for soil inputs, i.e. fertilizers and manure. We interviewed the people whose fields we sampled.

2.10. PROBLEMS ENCOUNTERED DURING THE FIELD STUDY

In this section we will summarize some of the methodological problems we encountered at the field site.

We intended to do field walks with the farmers we interviewed because being at the actual site of crop production could have facilitated more detailed descriptions of this activity. However, we did not feel comfortable about asking the farmers to go to the fields with us since the fields are not situated close to the residential sites where we met the farmers for interviews.
During the time of our field study farmers were not working in their fields. If we had been in the village at another time of year we might have succeeded in meeting the farmers in the field. On the other hand, we might have experienced that farmers did not have the time to talk with us because they were busy working in the fields. But this would of course also have given us the opportunity to do a lot of direct observation on how crop production is carried out.

Though most of the households did not mind talking to us we found that a few households were not interested, even if we had made an appointment with them beforehand. Whether this reluctance to be interviewed is a result of suspicion we do not know. We were aware that people could be suspicious towards us if they did not know why we wanted to interview them, so we thoroughly explained that we were students who were in the area to learn about agriculture.

The number of households interviewed was also limited due to the fact that many people in Mabua work outside the village, either in urban areas or in projects in the local area. Thus in many households people were not available for interviews during our stay in the village. Several times we experienced that household members said that they did not know enough of agriculture for an interview, but that other household members (usually the household head) responsible for agriculture were at work.

We found that the making of appointments was very time consuming, and would have been almost impossible without help from our supervisor Mussa Khanyile, Mr. Mashai Dlothi, and Mr. Victor Spambo who knew the local language and customs. This demonstrates that

investigations of this kind require the researcher / student to stay in the village for an extended period of time in order to get familiar with the community members.

Having prepared questions specifically concerning issues like the crop types and the cropping methods used in the past we were able to explain the informants what kind of information we were interested in. But the informants were also allowed and encouraged to add information that we did not ask specifically for. This was done because we were aware that we did not have sufficient knowledge about the area when we were preparing the interview guide, and thereby relevant issues could be unknown to us. This way we obtained a lot of valuable information, but a lot of time was also spent on issues not particularly relevant for the study, because informants in some instances elaborated on details that we were not really interested in. In situations like that it is important that the interviewers are capable of controlling the interview in a polite way. However, we found that this is a very difficult task as we were very eager to note everything in order not to loose any information, and we did not feel very comfortable about asking the informants to leave irrelevant issues. This made it clear to us that it is very important to critically evaluate the importance of the information offered during the interview instead of uncritically noting everything. Having prepared certain polite standard phrases that could be used for controlling the interview could also be useful.

3. RESULTS ON LAND TENURE

In this chapter we will present the information we have gathered on the issue of land tenure. We will start out by describing how the farmers and former farmers perceive the land tenure system. Next we will describe how this corresponds to the official legislation regarding land tenure. Finally, we will summarise how the land tenure system works in Mabua, and ascertain whether land tenure is a constraint to crop production in Mabua or not.

3.1. LOCAL PERCEPTION OF LAND TENURE

3.1.1. PERCEPTIONS OF OWNERSHIP

According to Turner (1999) and Greenberg (1999) the land in Maluti District is owned by the state and administered by state officials and the chiefs of the individual villages. However, this is not the perception of people in Mabua.

Household (head) owns land	Chief owns land	Land is communally owned*
75,0% (6)	12,5% (1)	12,5% (1)

Table 1: Perception of ownership of land. Based on eight interviews in Mabua village. Figures in parenthesis refer to the number of informants.

*But the chief allocates land.

As seen in Table 1 none of the informants perceive the state as the owner of the land.

According to Mr. Dlothi (Sr.) the land is owned by the community, and a council chosen by the chief sees to the administration of the land. But Mr. Dlothi also said that this council cannot decide who is allowed to use the land. Instead he said that these decisions are made by the chief.

On the other hand, when asked about ownership of land 6 other informants replied that either the household or the household head owns the land. But one of these informants said that the chief makes decisions regarding the land. The last informant replied that the chief owns the land. When asked if unused land could be taken away from a farmer the general answer was that this has never happened, but that it has been discussed with the chief. According to Mr. Mzima Zeku land is inherited from generation to generation within the family.

The lack of consensus about the issue of ownership could be an expression of different perceptions of the word 'ownership'. In our group we had a common perception of the term 'ownership': People who own land decide what to use the land for, the land cannot be taken away from them, and they have the right to sell the land. Some things indicate that this is not perception of all of the informants. Especially the fact that it has been discussed to take away land from people who do not use it indicate that our perception of ownership differs from the general perception in Mabua. If we had put the questions about land tenure in a more specified way we would probably have got a better description of people's land rights. Instead of asking who owns the land and who makes decisions about the use of land, the issue would have been covered more fully if we had put questions like: *"How did you obtain your land?"*, *"Did you pay for the land?"*, *"Do you pay rent for the land?"*, *"Are you allowed to sell your land?"*. Of course, the issue would also have been covered more fully, if we had conducted an interview with the chief, as he seems to be involved in land right issues.

3.1.2. DECISIONMAKING REGARDING LAND USE

The various informants have interpreted the question regarding who makes decisions about land use differently.

Chief decides who can use the land	Household (head) makes decisions about land use	Chief makes decisions about land
14,3% (1)	71,4% (5)	14,3% (1)

Table 2: Perception of who has the authority to make decisions about land. Based on seven interviews in Mabua village. Figures in parenthesis refer to the number of informants.

From Table 2 it is seen that one informant replied that the chief decides *who* can use the land while five informants replied that the household or the household head decides *how* to use the land. This reflects that the question has been perceived differently. The former informant perceived the question as relating to the allocation of land while the latter informants were talking about the use of land after it has been allocated. From Table 2 it is also seen that one informant replied that the chief makes decisions about land. Whether this applies to the allocation of land or the use of land is hard to unravel.

Again, this issue would have been covered more fully if we had posed more specific questions. It also reflects that the question might have been perceived differently among the

members of our group. Some group members have perceived the question as relating to land allocation while others have perceived it as a matter of who decides to grow crops on the land and what kind of crops to grow. This confusion among group members might have been avoided if we had made trial interviews with all group members present. During such trials conflicting perceptions of the question might have been unravelled and solved.

3.2. OFFICIAL LAND TENURE SYSTEM

Through interviews with the Agricultural Extension Officer, Mr. Mandla Sobhuza, and the Land Registration Officer, Mr. Gwala, we learned that the land tenure regulations is prone to legal pluralism in the sense that the official land tenure system is quite different from the perception of people in Mabua. According to the official system the state is the owner of the land, people are supposed to pay an annual tax of R20 per field to the state, and when arable land is allocated the chief goes to the Land Registration Officer with recommendations on who to allocate the land to, but the decision is made by the Land Registration Officer. To our knowledge no landholders in Mabua pays this tax. We did not ask our informants explicitly if they are paying the tax, but according to a local, Mr. Victor Spambo, this tax does not exist. He went with us to the interview with the Land Registration Officer, and in fact the information made him quite upset. After the interview he claimed that the Land Registration Officer was lying to us about the tax. This indicates that the issue of tax on land is quite sensitive, and that the local people do not pay this tax.

Another example of legal pluralism is that, according to Mr. Thola, married women can own land, while the Land Registration Officer said that women cannot be allocated land.

3.3. CONCLUSIONS ON LAND TENURE

As outlined above, our impression is that the authority of land allocation is believed to belong to the chief. One reason that the people believe that this authority belongs to the chief could be that the chief does not tell them that he has to go to the Land Registration Officer for approval of land allocation matters in order not to loose respect and authority in the village. As all arable land has been allocated this issue is of limited significance at the time being. It is quite obvious that the official version of the land tenure system has not been implemented in Mabua. One reason for this could be that the land legislation is unclear. According to Mr.

Sobhuza this is a result of the state of transition that the legislation of the region is in, because the regulations of the former Transkei is being replaced by the new legislation of the post-apartheid Republic of South Africa.

Despite the limitations, we are convinced that the issue of land tenure is not perceived as a constraint for crop production since none of the former farmers interviewed gave this as a reason for not cultivating their fields and since arable land has never been taken away from any farmers in Mabua. In other words, until now people with fields in Mabua seem confident that they cannot loose their fields.

4. RESULTS ON HISTORY OF LAND USE

This chapter will contain a presentation on our results on land use history, and a conclusion on the importance of this history in relation to crop production in Mabua.

4.1. LAND USE DURING THE PAST FIFTY YEARS

We gained most of our knowledge about the history of land use in Mabua through interviews with Mr. Dlothi (Sr.) and Mr. Thola. Mr. Dlothi arrived in Mabua in 1952, and used to run a grocery shop in Mabua. His son is now in charge of the shop, but Mr. Dlothi is still engaged in farming, brick production and owns two tractors that he uses for goods transportation and hires to other farmers for ploughing. Mr. Thola is a farmer born in Mabua in 1949.

The crop types produced have not changed during the last fifty years. When Mr. Dlothi arrived in 1952 the area was cultivated with maize, millet, potatoes, beans, cabbage and spinach. Mr. Thola added that pumpkins have also been grown for at least the last fifty years.
The crop production in Mabua does not seem to be restricted by natural disasters, but floodings of the fields adjacent to the river and droughts were reported. Flooding is not a problem anymore since drainage tunnels have been created, and the droughts do not occur too frequently and are not severe enough for farmers to really consider them as a problem.
According to Mr. Dlothi erosion on fields located on the slopes used to be a problem, but contours have been created to mitigate the erosion (Fig. 5). The first Agricultural Extension Officer in Mabua introduced the contours in 1976.
Although the actual crops produced in Mabua have not changed during the last fifty years a mechanisation of the crop production has taken place. Before this mechanisation the fields were prepared with hoes or ploughs pulled by oxen, and seeds were spread randomly. Weeding was done with hoes. With the introduction of planters farmers shifted to planting in rows, and Mr. Thola also said that weeding has been mechanised, although we did not get a precise description of this mechanisation. At the meeting with a group of farmers we got the impression that weeding is still done by hoe, and that farmers need extra labour for the weeding. Presently many farmers are using tractors instead of oxen for ploughing. According to Mr. Thola the tractors have not been subsidised, but some people decided to buy tractors because of the lack of animal traction due to cattle theft. The tractors are hired out to farmers

Fig. 5: Contoured land in Mabua.

without tractors. The matter of cattle theft seems to play a big role in the area. According to the livestock group the number of cattle has dropped by 70% since 1985 (pers. comm. Marcelino Gaugain, Sesselja Barnadottir, Zoran Brkic, Kim Raben).

In the mid 1980s hybrid seeds and fertilizers were introduced by the Agricultural Extension Officer. Before the introduction of chemical fertilizers, cattle manure was applied to secure the fertility of the soil, and manure is still applied to some extent.
The number of inhabitants in Mabua has been increasing which means that there is now a shortage of residential land. Earlier people had unlimited access to land, but now all the arable land has been allocated, and the allocation of residential land now needs more planning. This means that newcomers cannot obtain fields, and every household is only allocated a 50 by 50 yards plot for residence.

4.2. CONCLUSIONS ON HISTORY OF LAND USE

The agricultural system of Mabua has changed over the last 15 years. The major changes have been: theft of cattle, introduction of HYV (high yielding variety) maize, fertilizers, and tractors. These factors have, according to the farmers and former farmers contributed to an overall yield decline in Mabua.

Thus the history of land use is an important aspect in the account of constraints on crop production in Mabua. A more detailed description on the impacts of introduction of new technologies and stock theft will follow in the next chapter on crop production.

5. RESULTS ON CROP PRODUCTION

In this chapter we will investigate what constraints the farmers of Mabua are facing. First our soil analysis results are presented, and then we will outline the nature of the farming system. Next we will identify some characteristics of current farming households and former farming households. Then we will present our findings on marketing possibilities, to assess whether this aspect is constraining the agricultural production. A description of our case follows, and we will discuss the differences in opportunities between our case and our general impression of the farmers of Mabua. We will then briefly describe some young people's attitude towards agriculture. Finally, we touch upon the issue of governmental support in relation to crop production.

5.1. DESCRIPTION OF THE NATURAL RESOURCE BASE

Generally speaking there are two types of soil in Mabua. The soil on the plain adjacent to the river is brownish while the soil on the slope is red. The texture of these soils also differs, as the soils on the plain can be characterised as silt loam to loam and the soils on the slope are sandy (Appendix C). The low clay content on the slope is disadvantageous for crop production as the cation exchange capacity (CEC) of the soil depend the clay content (Havlin et al., 1999).

The organic matter content is higher on the fields on the plain ranging from 4,34% to 7,85% compared to a range from 2,05% to 2,86% on the slope (Appendix C). As the maize plant has a shallow root system, which cannot reach the deeper layer of the soil, it is very important to have a field with a relatively high organic matter in the topsoil. This will ensure the maize plant an easy accessibility to available nutrients.

The pH of the fields is near neutral (Appendix C), but the content of plant available NPK of the samples is generally low (Appendix C). Especially the content of the nitrogen-species, ammonium and nitrate, and potassium is low ranging from '0 to very low' to 'low' for the nitrogen species, whereas the potassium content of all samples turned out as 'low'. The phosphorus content varies a bit more ranging from 'low' to 'medium to high'. Samples with the lowest phosphorus content were from cultivated fields, but there was also variation among samples from these fields.

Soil fertility amendment is a pre-requisite of high maize yields. The overall assessment is thus that the plant available macronutrient content of the sampled fields seems to be low compared to the demands of a crop like maize.

5.2. FARMING SYSTEM

Through the interviews we found that the foremost crop production in Mabua village is subsistence farming; we will elaborate more on the reasons for this later in this chapter.
Traditionally the farming system in Mabua consisted of three components: fields, home gardens, and livestock. But the relative part played by each of these components has been changing over the years.

5.2.1. FIELDS

Topographically the fields are situated both on the slope and the flat alluvial areas, the most fertile land being on the flat areas. Our soil analyses show that the content of plant available macronutrient is in general low (Appendix C). The farmers at the farmers meeting also complained that the fertility of their fields have been declining resulting in reduced yields. Most of the fields are not fenced.
The prevailing cereal crops grown on the fields are maize, sorghum, wheat, and millet. Most of the farmers are cultivating hybrid maize or millet as a monoculture, but one farmer said that he exercised rotational and mixed farming consisting of different cereals and certain legume crops, beans and peas. Maize is considered to be stable food crop in the area and it represents a great deal of the cultivated crops on the fields. Crop residues are left on the fields for livestock forage.
Most of the cultivation is governed by factors such as fences for security against grazing livestock, and the availability of different agricultural inputs, such as seeds, fertilizers, oxen and other ploughing machinery. When asked about labour input and availability the farmers said that labour is especially necessary for harvesting and weeding. But they also mentioned that there is no problem in finding people to help in the fields. Usually these people will get a part of the harvest for their work. Also none of our informants complained about the water

accessibility.

Fig. 6: Fields on plain.

It seemed that the fields play a decreasing role in the overall crop production, as many of the inputs like fertilisers, seeds and tractors for ploughing are too expensive for the farmers.

5.2.2. HOME GARDENS

The home gardens are located in the village on the hill. A wide variety of vegetables are grown in these gardens, the most common are: potatoes, beans, spinach, cabbage, carrots, tomatoes, pulses, and turnips. In many cases oxen or hoes are used for ploughing, as the plots are too small for tractors to manoeuvre. Manure is used as fertilizer. According to the livestock group, the women are usually responsible for the home garden.

In our opinion the home gardens are becoming increasingly important to the villagers. It is not our impression that the cultivation of home gardens has been intensified, but since the number of farmers has declined, the relative importance of home gardens, in terms of food security, has increased. The home gardens offer a source of food security for former farmers, pensioners and others as a supplement to buying food.

5.2.3. LIVESTOCK

The livestock in Mabua are mainly: cattle, goats, sheep, pigs, chicken, and to a lesser degree horses.

From the livestock group we learned that pigs and chicken are kept near the houses, and are commonly the responsibility of the women. When there are no crops on the fields the other livestock are allowed to graze freely on the arable land. When the cultivation starts in November the livestock are being led to the mountains to for grazing since the fields are not fenced. Children or men are herding the livestock to prevent theft. As mentioned, especially the cattle play an important role in the crop production for ploughing and as a source of manure. The wool from the sheep provides an alternative income to some farmers. The other kinds of livestock are used for own consumption.

Fig. 7: Livestock in Mabua

While cattle are still an important component, livestock theft has meant that many farmers are considering cattle a risky investment or do not have the financial opportunities to replace stolen cattle and thus prefer or are forced to hire tractors and use chemical fertilizers. One farmer also mentioned that he prefer hiring a tractor for ploughing even though he has enough cattle for ploughing, but the use of tractors reduce the time spent on ploughing. The other kinds of livestock are helping the households to diversify their food consumption, Wool is a source of income to some, and the Extension Officer was giving demonstrations on sheep shearing.

5.3. ANALYSIS OF DIFFERENCES BETWEEN CURRENT AND FORMER FARMERS

The Extension Officer, Mr. Sobhuza mentioned that the number of farmers in Mabua had halved in the five years he had been in the area. In this section we will investigate the major differences between people that are currently farming and people who used to farm in order to identify reasons for not cultivating. We realise that the low number of interviews that we have conducted are not able to provide us with exact knowledge about agriculture in Mabua. But we think that our informants are representative for the general trends in Mabua.

5.3.1. HOUSEHOLD INCOME

We have divided the informants in to two groups: Current farmers and former farmers.

	Monthly income (Rands)	Number of household members	Income/ household member	Alternative income sources	Food generation
Current farmers					
1	-	-	-	Shop, brick production, tractor hiring	
2	810-900	7-9	90-129	Wool	Subsistence farming
3	>1000	9	>111	Shop, tractor hiring, 2 pensions	Subsistence farming, buys food
4*	<500	3	<167	Sells grass for roofing	Subsistence farming, buys food
5	<500	>10	<50	Father works in urban area, brother self-employed in Durban, 1 pension, relative help purchasing fertilizers	Subsistence farming
Former farmers					
1	<500	8	<63	1 pension	Subsistence farming in home garden, buys food
2	None	5	None	None	Subsistence farming in home garden and community garden, share cropping, work for food in other fields
3	<500	11	<45	1 pension, occasional piece works in village, mother occasional work at community pre school	Buys food

Table 3: Comparison of households presently farming and households who do not cultivate their fields anymore.

*The informant is not going to cultivate her fields in the coming season.

There is a slight tendency to current farmers having a higher income per household member than former farmers (Table 3), although this difference is not significant (unfortunately we do not have data on income for one of the current farmers). But it is worth noting that one of the former farming households does not have any income at all whereas the two others depend primarily on one of the household members receiving a pension (about R350). Mr. Mphod Dlothi from one of the currently farming households mentioned that the household income is less than R500 per month, but this household receives financial support from a relative for buying fertilizers. Two currently farming households have a higher income, and the last household still farming includes 3 members that share a low income. The head of this household, Mrs. Mhlokwane, said that she will not be able to cultivate her fields in the coming season due to insufficient funds for agricultural inputs.

The overall impression is thus that the income per household member is lower in households that have stopped cultivating their fields than households still using their fields, and that the currently farming household with the lowest income per household member receives financial support for purchasing fertilizers, whereas Mrs. Mhlokwane is now forced to give up cultivating her fields because of lack of capital.

5.3.2. REASONS FOR NOT CULTIVATING

In relation to the low income of former farmers all former farmers interviewed gave the lack of capital as the reason for having stopped cultivating the fields. Capital is needed for agricultural input.

For instance Mr. Mzima Zeku mentioned that he used to own cattle and used them for ploughing his fields. But his cattle were stolen, and now he does not have the money for buying new cattle or for hiring a tractor. He also lacks money for fertilizers. Mr. Mzima Zeku and his wife takes care of six grand children and spend his pension, which is their sole income on school fees for the children's education since they do not receive any remittances from the parents of the grand children who are staying in Pietermaritzburg and Durban.

Cattle theft also forced Mr. Bawar Leqheke to stop cultivating his fields. He used to own 20 heads of cattle, but they were stolen in 1994, and he has not been able to cultivate since this occasion. As he has no income at all it is obvious that he is not able to purchase the inputs

needed for crop production. This does not mean that his fields lie fallow. Instead he lends his land to another member of the community and receives 1/3 of the yield as payment.

The last household that has stopped cultivating their fields abandoned their fields in 1998 upon the death of an elder household member. We interviewed the grandson Mr. Tefo Mokhnatso who said that this death led to the loss of one pension, and the household now only receives the pension of one elder household member. This is not enough for purchasing sufficient agricultural input. Some of the household members earn some money through occasional occupation, but these income sources are limited and unreliable.

The three informants from former farming households could thus identify lack of financial input as the single factor that forced them to stop cultivating their fields. Loss of cattle or pension put them in a situation where they could not afford the input needed for agricultural production. Hence they had not been able to accumulate capital through their former agricultural activities for buffering them against such events.

Mr. Dlothi (Sr.) mentioned that the price of hiring a tractor is R300-400 per field, and Mr. Thola said that he pays R250-400 per field ploughed. Compared to the limited income of the former farmers it is quite obvious that they cannot afford both hiring a tractor and purchasing other agricultural inputs like seeds and fertilizers. In a review of surveys of the agricultural sector in Transkei (Porter & Phillips-Howard, 1997) it is also concluded that smallholders consider the lack of capital for fertilizers, seeds and ploughing as a major problem. Likewise, in a survey of 106 small farm households in two districts in the Northern Province of South Africa (Kolajo, 1998) high input prices was averagely identified as the second largest problem confronting smallholders[1].

5.3.3. ALTERNATIVE INCOME

In relation to this it is interesting that the households with a relatively high income (>R800 per month) that are currently farming do not rely solely on agriculture, but have a variety of income sources. For instance, Mrs. Tillie Mzozoyane mentioned that both she and her husband receive pensions, and in addition to this they own a shop and a tractor that they hire to other people in the community. The same goes for Mr. Dlothi (Sr.) who also produces

[1]The highest-ranking problem to these farmers was drought. As the Northern Province has a drier climate than our study area drought is not considered as a big problem in Mabua.

bricks. Mr. Mphod Dlothi said that his grandmother's pension is used for hiring a tractor, and his father, who is a migrant worker, sends money for fertilizers and seeds. This indicates that in order to make a fairly high income a household cannot rely solely on agriculture.

It is particularly striking that tractors seem to be a very lucrative investment. As mentioned, people with tractors have a substantial income from hiring their tractors to other community members for ploughing. In addition to this the group researching the use of wattle in the area found that some people with tractors transport wattle for firewood for other villagers and thereby have an extra income (pers. comm. Jens Jakobsen & David Raitzer)

In summary the lack of capital restricts the former farmers interviewed from cultivating their fields. As we only interviewed three former farming households we cannot conclude that this is the primary reason for abandoning crop production in Mabua. The sample of currently farming households is also rather small, but the data reflects that all of them except one rely on other income sources than agriculture and thus have a diverse livelihood strategy. This could indicate that they cannot rely solely on agriculture as an income-generating source. It was also expressed by the farmers at the farmers' meeting that input for agriculture is expensive, and the Agricultural Extension Officer also gave the high input prices as a reason for the general yield decline in Mabua. These findings indicate that financial constraints seem to be a limiting factor for crop production in Mabua.

5.4. MARKET ACCESS

As mentioned the agricultural production is primarily based on subsistence, nevertheless this does not mean commercial farming does not exist in the area to some extent.

Only one of five farmers interviewed occasionally produces a surplus, which is sold to people in the village and local shops. Another farmer said that he produces a surplus, but he uses it as animal fodder for his livestock, and he said that he does not produce enough to take it to the market. Two other informants also said that their production is used for own consumption. The last informant said that potentially he could produce a surplus, but he has decided not to plant more than the household will consume, because he is not able to sell a surplus locally because most people in the village are either farming or get some part of the surplus. This means that the local demand for agricultural products is very low.

The Agricultural Extension Officer considers poor access to the market in Matatiele as a major reason for the low crop production in Mabua. This market access is low because

farmers face severe market competition from the giant commercial farms that are able to produce crops at lower costs and thereby sell at lower prices. Transport of the goods to the market place is another problem as the dirt roads are in very bad condition and most farmers do not have access to any means of transportation.

It is the expressed feeling of both the Agricultural Extension Officer, Mr. Sobhuza and some of the farmers that this may threaten the sustainability and the continuity of Mabua farmers.

5.5. CASE STUDY

Mr. Mararene is a 60 years old farmer. He is the only farmer in Makomoreng, and he is relatively successful. He used to be a railway police officer, but started farming in 1979 after retiring from the railways. He used his pension from the railway as the initial investment for the farming activities. He is the head of the eight people in his household, and he makes approximately R2000 each month. Besides being a farmer he is also the Chairman of the Tourism Board, and he owns two cattle dipping tanks, one in Makomoreng and one in Mabua.
Mr. Mararene is cultivating a wide range of crops. Maize, millet and wheat are produced in the fields located at some distance from his house. Sugar beets, peas, carrots, potatoes, tomatoes and turnips are grown on a field closer to his house.
He owns a tractor that is used for ploughing and planting, and he uses oxen for transportation. Mr. Mararene told us that he made his money from sugar beets, but he obtained a loan from the Land Bank in East London for the tractor. The loan for the tractor was granted as part of a project where three people must go together to get a loan for a tractor. Mr. Mararene could not find two other persons who wanted to apply for the loan, so he put his own name and the names of his wife and his son on the application.
Mr. Mararene's crop production is very well organised, and he uses a well-planned crop rotation system. He has also constructed a dam that he uses for crop irrigation. The recycling of nutrients is also well organised. Mr. Mararene uses manure and chemical fertiliser on his fields, but in addition to this he also compost crop residues and applies the compost as fertilizer.

Fig. 8: Mr. Mararene's irrigation system, Makomoreng.

He produces a surplus which he sells part of in Matatiele. The crops are sent to Matatiele by the local bus and a friend in Matatiele sells it for him. Another part of the surplus is sold locally. The rest of the surplus is used to feed the livestock in the winter. Mr. Mararene owns cattle, sheep, goats and chicken. The cattle get beets and weeds every second day during the winter, and the other days they feed on concentrates. According to Mr. Mararene ½ ha of maize feeds the household, the chicken, sheep and goats. The maize is ready three months after planting, and he uses a traditional maize variety that he can replant for ten years. Mr. Mararene prefers this variety to hybrid varieties as he considers it less vulnerable and less expensive.

Mr. Mararene is currently not cultivating all of his land because of lack of financial resources, but he is not afraid of losing his land, although he said that in principle the chief can take unused land away. But, as he said, this has never happened since no one else in Makomoreng shows any interest in agriculture. Like most of the people interviewed in Mabua, Mr. Mararene states that he owns the land, and he said that the chief gave it to him.

As noted Mr. Mararene's crop production is very well organised. He has only primary education, but talked to commercial farmers before starting farming on his own and thereby got the information that helped him becoming a successful farmer. His motivation for working hard, he said, is the fear of hunger and poverty.

5.5.1. COMPARISON OF OPPORTUNITIES

It is our impression that Mr. Mararene is the most successful farmer in the area. He has managed to get an income from his agriculture. The reasons for his success are hard to disentangle, but his initial input of capital, i.e. his pension from the railway, has meant that he had the money to buy some of the agricultural inputs needed. Most of the farmers of Mabua have been farming all their life and they have not been able to accumulate the same amount of capital for agricultural inputs. This seems to be the general case in the former Transkei; in the beginning of the 1990s there was less than 150 small-scale irrigation farmers, and the majority of these farmers are, like Mr. Mararene, older men who have had an initial capital from other businesses or salaries (Porter & Phillips-Howard, 1997).

The main difference related to the agricultural system of Mr. Mararene's and the agricultural system of Mabua is that Mr. Mararene has intensified his crop production by constructing an irrigation system and rationalising the nutrient cycling whereas the general response to declining yields in Mabua has been an extensification. He has also returned to the use of traditional and cheaper seed varieties. His options seem better than the options of farmers in Mabua since he has market access and had initial capital.

Mr. Mararene is the only farmer in Makomoreng and this means that there is a local demand for especially cereals. This is contrary to the information from farmers in Mabua who said that they could not sell their products locally, as most people, if not farming themselves, got some part of the yields.

Apart from farming Mr. Mararene also owns two dipping tanks, which provide him with an extra source of income, that he can use for agricultural inputs. The farmers in Mabua are also relying heavily on alternative incomes, but few have had the success that Mr. Mararene has had.

Another important aspect could be that Mr. Mararene has contacts in Maluti and Matatiele. He knows people in Matatiele who sell his products for him. He also has a relative who works at the Agricultural Extension Service in Maluti; this could mean that he has access to knowledge and privileges that the farmers of Mabua do not have.

Mr. Mararene has developed an irrigation system and he produces a variety of crops on his fields. In Mabua maize and to an extent millet is produced on the fields while they produce vegetables on a small scale in the home gardens. Even though the farmers of Mabua did not see access to water as problem, they might be able to increase the production and diversify the

crop types on their fields if they could also develop an irrigation system like Mr. Mararene. But if they are not able to sell such a production it is reasonable that they do not feel the need for intensifying the production by investing in irrigation systems.

One of the most significant reasons for Mr. Mararene's success is perhaps his personality. He is a very innovative and resourceful person, and we got the impression that he was determined to make the agriculture work. This can be exemplified by the way he obtained the loan for his tractor. He could not find anyone in the village that was prepared to apply the loan with him, but that did not stop him. Instead he chose to by-pass the rules and put the names of his son and wife on the application.

5.6. YOUTH AND AGRICULTURE

When asked about the future of agriculture in Mabua the older farmers expressed that they do not think that there will be any future agriculture in Mabua. Their concern is that the young generation is not motivated towards the agricultural sector. The older generation perceive the youth as being lazy and partly blamed the schools for this development. They believe that the lack of integration between the school system and agriculture discourages the young generation to engage in agricultural activities.

It was our impression form talking to young people not interested in agriculture, that they knew about the problems of the agricultural sector and had decided that the workload was too high compared to the economic returns. They said that they prefer to work in the urban areas, as they perceive employment in urban areas as a more reliable source of income.

Considering the many obstacles that farmers in Mabua are facing it does not seem likely, that more emphasis on agriculture in schools would change the attitudes of the younger generation towards agriculture, as the agricultural problems cannot be expected to be reduced by increased knowledge on agricultural practices.

5.7. GOVERNMENTAL SUPPORT

Both the farmers and the Extension Officer said that there are no agricultural subsidies from the South African Government. But the Agricultural Extension Officer told us that soil samples is being analysed in Pietermaritzburg for the price of R10 a sample, the real price is R30, and the government pays the difference.

We asked the Extension Officer and the Land Registration Officer in Maluti whether there are any plans for improvement of the agricultural sector in Mabua in the near future, and they replied that, as far as they know, there are no such plans.

In general the most important help from the government is the allocation of the Extension Officer to the area. The Extension Officer told us that he is available for the farmers most of the time, and have consultation sessions with the farmers. It is unusual, however, that he carries out any other practical activities in the fields such as soil testing.

5.8. CONCLUSIONS ON CROP PRODUCTION

Due to the low soil fertility of the fields production on the fields requires a relatively high input of fertilizers and/or manure. However, the lack of capital and livestock restricts the accessibility to these inputs. Furthermore, the lack of cattle has made farmers dependent on tractors for ploughing and has thus led to an additional need for capital.

The crop production is mainly subsistence oriented, and reliable access to markets is limited.

Our analysis indicates that the current farming households have a higher income than households that have stopped cultivating their fields. Shortage of funds was also mentioned as the major reason for not cultivating fields. Moreover, there is a tendency that currently farming households have a diversified livelihood strategy consisting of several income sources.

The case study shows that intensification of crop production may be possible provided that farmers have access to proper inputs and marketing possibilities.

6. DISCUSSION

6.1. INTRODUCTION

The following chapter will contain a discussion of our results and methods. All the issues that we have described in the last three chapters are interrelated. Thus the reasons for the difficulties in the agricultural sector in Mabua are not to be viewed as separate and independent of the specific context. Accordingly, we attempt to link the various factors identified during our study. In order to do this we are going to make use of certain assumptions and hypothesis that we were not able to fully verify in the field. These assumptions and hypothesis seem logical to us, but we are aware that more thorough research might reach other conclusions.

6.2. CONSTRAINTS ON CROP PRODUCTION

Our point of departure is the most dominant limitation to crop production that the farmers and former farmers identified; lack of capital for the necessary inputs.

6.2.1. LACK OF CAPITAL

We have earlier described how the farmers need capital to buy fertilizers, buy or hire tractors, and HYV seeds. We assume that this capital input is a relatively new phenomenon as the farmers were formerly using manure, cattle traction, and traditional seeds. The lack of capital has forced the farmers to diversify and capital generating activities. Capital is obtained in a number of ways, i.e. pensions, work in projects, employment in urban areas, etc., and it is our impression that farmers engage in these activities in order to accumulate cash for the agricultural production on the fields, especially because the possibilities for selling a surplus seem quite limited. This means that the possibilities for earning cash from crop production is limited. This situation corresponds well to the findings of a study in Matukeng in Lesotho (Boehm, 2000). Many men from this community have been employed in mines in South Africa, but from 1993 to 1999 many of these men were retrenched from the mines meaning that the percentage of people employed in the mines fell from 10,4% to 5,1%. Alternative income possibilities in the same period were limited. As Boehm (2000) notes, it could be expected that the retrenched miners would then fall back on agriculture in Matukeng to

support at least their subsistence. But this did not happen; instead the percentage of people employed as farmers decreased from 6,2% in 1993 to 5,2% in 1999, because the income from the mines had been an economic prerequisite for farming.

Unfortunately we do not have data to assess the importance of alternative incomes compared to agriculture in Mabua, but the fact that the former farmers interviewed had close none or very unreliable alternative income sources indicates that crop production in Mabua depends on capital input from other sources.

6.2.2. HYV MAIZE

All the farmers we interviewed in Mabua were cultivating HYV maize that needs a relatively high input of fertilizers (Dixon, 1990). The farmers said that yields had declined after the introduction of fertilizers, and it is our assumption that most farmers cannot afford to apply the necessary amounts of fertilizers to get higher yields. In addition to this they said that buying seeds was very expensive to them. Furthermore, they found that the HYV's were vulnerable to climatic variations, like late or early rains. These were the reasons that Mr. Mararene had stopped using HYV's and instead used the traditional varieties, but we were not able to identify why the farmers of Mabua had not done the same. They all said that the old farming system was far better than the new one and that they would like to go back to the old system. The reason they did not do that was, they said, that they lacked livestock, especially cattle.

6.2.3. LACK OF LIVESTOCK

The fact that the livestock has been decimated due to theft was a topic that almost all farmers mentioned to have had a great negative impact on the agricultural sector. Two of the three previous farmers mentioned that theft of cattle was the reason that they had stopped farming. They would like to start farming again but they did not have the money to hire a tractor. The loss of livestock also meant that the farmers that are still farming, lack input of manure and access to cheap traction for ploughing. Manure is still used but has to be mixed with chemical fertilizers, and still there is an overall deficit of fertilizers. In a survey in Shixini in Transkei (Heron, 1991) a positive relationship was also found between the livestock holding of a household and the household's maize yield which is in accordance with our impression that

lack of livestock is a constraint for crop production. According to the issue of tractors, we got the impression from the interviews and the focus group that most farmers actually prefer to use tractors even if they do have oxen. They said that it limits the time they have to spend on ploughing. Animal traction is mostly used for ploughing the home gardens. The tractors served several purposes, thus they were used for transportation of goods and fuel wood, and additionally hiring of tractors provided an extra income for the owners.
As mentioned in section 4.1 the number of cattle has dropped by 70%, and we believe that the lack of cattle imposes a greater need for capital input for crop production.

6.2.4. SOIL FERTILITY

Our soil analysis results give the impression that the soil fertility is in general low, and the soil organic matter content is especially low on the slopes.
As outlined in section 2.8 organic matter constitutes a nutrient reservoir, promotes the aeration of the soil, increases the water holding capacity, reduces the toxic impact of aluminium and manganese and increases the cation and anion exchange capacity of the soil particles thereby increasing the availability of charged micro nutrients (Woomer et al., 1994).
The content of soil organic carbon is reduced under inadequately fertilised monocrop systems (Lal et al., 1999), and Fig. 9 also shows that successive maize cultivation without any crop residue- and nutrients inputs, either manure or chemical fertilizers, drastically decreases the soil organic matter content. The soil organic matter is depleted by the continuous cultivation of maize, because the available minerals are extracted without any compensation to the soil (Brady & Weil, 1999).

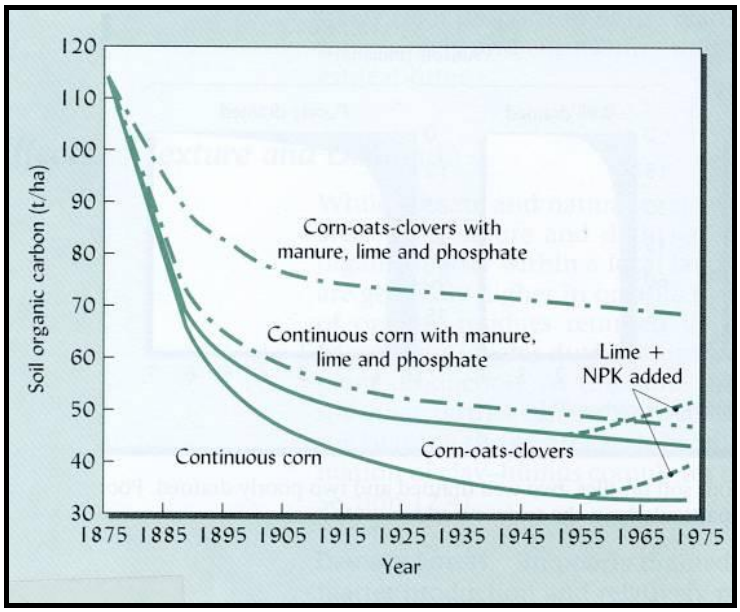

Fig. 9: Relationship between the continuous maize planting and soil organic matters (adapted from Brady & Weil, 1999).

Farmers complained about the high cost of fertilizers and the reduced access to manure, and all agreed that yields have declined after the introduction of fertilizers and hybrid seeds. It could be hypothesized that farmers cannot afford sufficient amounts of fertilizers, and that the reduced yields might partly be caused by the application of an insufficient amount of fertilizers or manure leading to a reduced content of organic matter. The Agricultural Extension Officer said that farmers who apply the amount of fertilizers that he recommends have not experienced yield decline. We did not meet any farmers that agreed on this. We do not have data on the amounts of fertilizers applied so we can only speculate that insufficient amounts are applied. But as our soil analyses show the general nutrient content of the fields is very low indicating that a high amount of nutrient input prerequisites a high yield of maize.

6.2.5. MARKET ACCESS

Mr. Sobhuza considered the poor market access to be the most important constraint to the farmers. The farmers have a hard time selling their products at the markets, he said, because of bad infrastructure and competition from commercial farms. In 1994 maize produced in Transkei was on sale in western Transkei at approximately R1100 per tonne whereas maize produced the Republic of South Africa was sold at R515 per tonne (Porter & Phillips-Howard, 1997). If this gap between the market prices of maize produced in the former

Transkei and in other parts of South Africa still exists, it is obvious that Transkeian maize is not competitive.

In Mr. Sobhuza's opinion this lack of economic incentives has made the farmers produce for subsistence only. In other words, if farmers were able to sell their products they would intensify the crop production. Whether this is true or not is hard to ascertain, but our guess is that even if the farmers had better market access and low competition they would still not be able to produce a surplus big enough to rely on. This would take an initial economic input that is not within the farmers' reach. The farmers would first of all need to be able to buy seeds and the correct amounts of fertilizers, secondly they would need some means of transport to get their goods to the market place. It seems unlikely that the farmers would be able to buy these inputs without any support. Even possibilities of obtaining loans are questionable, since the livestock group told us that one of their informants had said that the villagers did not want to obtain loans, because they were afraid that they would not be able to pay back the money. Besides, most of the farmers are old men, who would probably not be granted a loan anyway. The age issue is another constraint on the future of agriculture in Mabua.

6.2.6. MIGRANT WORKERS

We got the impression that Mabua is mostly inhabited by old people and children. We were told from a number of households that household members of working age were living and working in urban areas. This impression could be wrong though, it could be that the middle-aged people are working in nearby towns and come back to the village after work or maybe the jobs in urban areas are only seasonal and they would come back when the agricultural activities start. Nevertheless, it is striking that most of the farmers were 60 years and older. When we asked these farmers what they thought of the future of agriculture they were very pessimistic and said that there would not be any agriculture in Mabua. The reason for this was, they almost unanimously agreed, that the young generation is lazy and not interested in agriculture; they would rather play soccer than help with the farming. Through an interview with a group of young people, we were told that they would rather work in the urban areas, because this would provide them with a more reliable income. The reason the informants have not left yet is that they do not have money to pay for a place to stay. We got the impression that the young people see themselves as being in a waiting position, and therefore they do not fully engage in the community. Considering the constraints that farmers in Mabua are facing

it is not surprising that many young people do not feel attracted to a life as a farmer. Whether the majority of these young people will actually be able to make a better and more reliable income in urban areas is questionable, given the economic situation of South Africa, but they seem confident that this is a better option than staying as farmers in Mabua.

6.3. SUMMARY OF DISCUSSION

The lack of livestock and the introduction of HYV maize have made the agricultural production more dependent on capital input for fertilizers, seeds and tractors. It seems that many farmers do not have the necessary capital, which we think have led to reduced yields because the amount of fertilizers applied has been insufficient. The yield decline and the limited market access only make the production even more subsistence oriented, which does not increase the financial opportunities for farmers. This can be seen as a spiral only leading to even more severe yield declines, as the need for agricultural inputs cannot be met without accumulation of capital. Many households have responded to this by diversifying their livelihood strategy meaning that the capital input is gained through non-agricultural activities. Others have given up cultivating their land because they have not been able to withdraw capital from other income sources.

In other words, crop production does not seem to be an income-generating activity in Mabua. Rather, it looks like it is actually a capital sink. In this respect one could wonder why there are still a lot of cultivated land in Mabua. To us it seems that the older farmers feel very attached to the idea of being a farmer. Older farmers were sorry that the young generation is not motivated towards preceding this life-style, and the two former farmers interviewed who belong to the older generation said that they would start cultivating their land again if they would get the financial opportunity to do so. One of them, Mr. Zeku, even said that he has been trying to accumulate the necessary capital even though he only has one pension to support the livelihood of himself, his wife and their six grandchildren. During our field study his wife had actually gone to Pietermaritzburg to visit their daughter and ask her to help them financially to get the crop production started again.

7. CONCLUSIONS

In this report we have investigated whether land tenure, land use history, and / or crop production-related issues have caused constraints on the overall crop production in Mabua. As we have conducted a rather limited number of interviews we are aware that the conclusions drawn from this study might be modified or changed upon a more thorough investigation.

The issue of land tenure does not appear to cause any problems, though it might be a problem in the future. There are two contradictory systems: the official system and the local system. It is our opinion that it is the latter system that is functioning in Mabua. But as both current and former farmers do not fear losing their fields, land tenure does not pose a problem for crop production.

Our data shows that the following factors in the history of land use have led to the current difficulties in the agricultural sector:

- Theft of livestock
- Introduction of HYV seeds.
- Introduction of fertilizers.

In terms of the current crop production these historic factors have caused problems such as:

- Increased need for financial inputs.
- Low soil fertility.

In addition, the Agricultural Extension Officer mentioned:

- Poor market access.

But as we have discussed earlier, we find that the effect of this may be limited.

Based on our data it seems that crop production in Mabua is subsistence oriented and that it prerequisites a financial input rather than supplementing the income of farming households. The demand for financial input has increased since the introduction of HYV maize, as the farmers must buy new seeds for planting every year. The seeds of the traditional variety can, according to Mr. Mararene, be replanted for ten years, and as HYV maize requires a higher input of fertilizers. Cattle theft has only imposed even higher demands for financial inputs on the farmers, because the loss of cattle have reduced the amount of manure and the accessibility to cheap animal traction for ploughing. Cattle theft has thus increased the dependence on financial inputs for hiring tractors for ploughing and for purchasing chemical fertilizers.

It seems that the crop yields have declined after the introduction of HYV maize and chemical fertilizers. The reason for this could be that farmers have not had sufficient financial opportunities for applying adequate amounts of fertilizers. The combination of insufficient amounts of fertilizers and permanent cultivation causes the soil fertility to decline.

Whether interventions aiming at increasing the yields would improve the livelihood of farming households in terms of their financial status is questionable since the possibilities for selling a surplus seem limited. First of all transportation to markets is restricted by bad infrastructure, secondly big commercial farmers seem to be able to market crops at more competitive prices than the smallholders of Mabua.

This reflects the need for an interdisciplinary approach when aiming at improving the livelihood of smallholders. Natural science can contribute measures for increasing the productivity of farming systems, but these measures will only have a positive impact in terms of increased income if the institutional framework is investigated in detail and if the specific rural area is seen as part of a bigger economic and political setting.

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BIBLIOGRAPHY

Boehm, C. (2000): *"Muddling through in Matukeng": Changing Livelihood Strategies in Lesotho in the Face of Mass Retrenchment of Basotho Men from the South African Mines.* Multiple livelihoods and social change – working paper series, Institute of Development Policy and Management, University of Manchester, UK.

Brady, N.C. & Weil R.R. (1999): *The Nature and Properties of Soils.* 12th Ed. Prentice Hall. USA

Chambers, R. (1997): *Whose Reality Counts? Putting the first last.* ITDG Publishing, London, United Kingdom.

Charman, P.E.V. & Murphy B.W. (2000): *Soils, their Properties and Management.* 2nd Ed. Oxford University Press

Dixon, C. (1990): *Rural Development in the Third World.* Routledge, London

Fox, R. (2000): *Agriculture and Rural Development,* pp. 211-232 in: Fox R., Rowntree K. (eds.): The Geography of South Africa in a Changing World. Oxford University Press Southern Africa, Cape Town.

Greenberg, S. (1999): *Land Management and Tenure Reforms in Communal Areas – an Environment and Developmental Agency Policy Discussion Paper.* EDA Trust.

Heron, G.S. (1991): *The Household, Economic Differentiation and Agricultural Production in Shixini, Transkei.* Development Southern Africa 8(1): 47-60.

Killham, K. (1994): *Soil Ecology.* Cambridge University Press, Cambridge.

Kolajo, E.F. (1998): *Analysis of Problems on Small Farms in South Africa.* Quarterly Journal of International Agriculture 37(3): 238-247.

Lal, R., Mokma D. & Lowery B. (1999): *Relation Between Soil Quality and Soil Erosion,* pp. 237-257 in: Lal R. (ed.): Soil Quality and Soil Erosion. Soil and Water Conservation Society.

Marschner, H. (1998): *Mineral Nutrition of Higher Plants.* 2nd Ed. Academic Press

Mikkelsen, B. (1995): *Methods for Development Work and Research. A guide for Practitioners.* Sage Publications, New Delhi, India.

Morgan, R.P.C. (1995): *Soil Erosion & Conservation.* 2nd ed. Harlow: Longman.

Porter, G. & Phillips-Howard K. (1997): *Agricultural Issues in the Former Homelands of South Africa: the Transkei.* Review of African Political Economy 72: 185-202.

Turner, S. (1999): *Land Rights and Land Administration in Herschel and Maluti Districts, Eastern Cape.* Land Reform and Agrarian Change in Southern Africa – An Occasional Paper Series, Programme for Land and Agrarian Studies, School of Government, University of Western Cape.

Woomer, P.L., Martin, A., Albrecht, A., Resck, D.V.S. & Scharpenseel H.W. (1994): *The Importance of Management of Soil Organic Matter in the Tropics,* pp. 47-79 in: Woomer P.L., Swift M.J. (eds.): The Biological Management of Tropical Soil Fertility. Wiley, Chichester.

Yin R.K. (1994): *Case study research: design and methods.* Sage Publications, Thousand Oaks.

APPENDIX A: INTERVIEWS

INTERVIEW GUIDE

The open-ended questions covered all our sub-objectives, history of land use, land tenure, and crop production. This approach allowed us to compare quantitatively the households still farming and those not farming anymore according to income per household member, to what extent the household rely on non-agricultural income generating activities, how the food requirements are obtained, and how the land tenure system is perceived. Interviews with households still cultivating their fields also gave us insights as to whether a surplus was produced, and what the surplus, if any, was used for.

CONDUCTING INTERVIEWS

During interviews at least two interviewers were present. One interviewer posed the questions listed in the interview guide and noted the answers in the interview guide while the other group member(s) made additional notes. All interviewers posed clarifying and additional questions when the questions in the interview guide were finished. Two of the group members spoke Zulu, and they usually posed the questions from the interview guide when interviewing Xhosa-speaking informants, since Zulu and Xhosa are closely related languages. As Sotho is the main language in Mabua most of our interviews were conducted using a local interpreter. In some cases our supervisor Mussa Khanyile also helped us interpreting. It was a great advantage that group members were able to conduct some of the interviews without an outside interpreter, because we were then certain that the questions were posed in the way we had agreed on, and the exact nature of the answers were known to us.

We were fortunate that Mr. Mashai Dlothi could help us as a local interpreter (for free). He has advanced education and has been living in Durban for some years before returning to Mabua. He seemed to enjoy respect in the community, and the communication between him and our group worked very well. This demonstrates that an interpreter from the community who does not feel alienated towards outsiders, like a team of researchers, facilitates a better understanding between researchers and community members.

QUESTIONNAIRE AND INTERVIEWGUIDES

QUESTIONNAIRE: RESPONDENT'S DETAILS (ALL INFORMANTS)

1. Name:
   _____

2. Village:
   _____

3. Respondents:

Age	Gender	Education	Relation	Monthly income	Household number	Males incl. Head

3.1. How many people in the household are employed?

Farm workers	Comm. prog.	Urban areas	Self-employed	Other – specify

HISTORY OF LAND USE

1. How long have you stayed in the village?
   _____

2. Which crops types used to be cultivated?
   _____

3. Have there been any changes in terms of crop types?

Yes	No

   3.1. If yes, what changes and why?
   _____

4. Have there been any changes in the way crops are produced?

Yes	No

   4.1. If yes, what changes and why?
   _____

5. Have there been any government subsidies?
   _____

6. Have there been any natural disasters, e.g. floodings, droughts, etc.? _____

LAND TENURE

1. Do you own your land as a family?

Yes	No

2. Who makes the decisions about the use of land?

_____

3. Is there any arrangement that if you do not use the land; the right to use it will be taken away from you?

Yes	No

3.1. If yes, who has the authority to do so?

_____

4. Is the land at your disposal being used to the maximum?

Yes	No

4.1. If no, why?

_____

CROP PRODUCTION

1. How do you obtain / generate food for the household?

_____

2. Who is responsible for crop production?

_____

3. Types of goods produced:

Wheat	Cabbage	Maize	Millet	Other-specify	Other-specify	Other-specify

4. Are you producing a surplus?

Yes	No

4.1 If yes:

4.1.2. What are you doing with the surplus?

_____

4.1.3. If not taken to the market, why?

_____

4.2. If no,

4.2.1. How do you meet your requirements for food?

_____

4.2.2. Why are you not producing a surplus?

_____

Keywords for all interviews:

- Alternative income
- Land tenure
- Market access
- Capital
- Technology
- Labour
- Soil fertility

APPENDIX B: PRA TECHNIQUES

MATRIX SCORING

PROBLEMS ENCOUNTERED WITH MATRIX SCORING

As we have mentioned in section 2.5.1, the matrix scoring was meant to facilitate and structure a discussion with the informant, but also it was supposed to provide us with data that we could quantify and use in this report. This last purpose has not worked, and in this section we will elaborate on why this has not been done.

First of all we did not make enough matrix scorings to be able to quantify the data. We found that the exercise was to time consuming for the informants and us. We tried to condense it but still the older people found it difficult to put costs, time spent, workload, etc. into numbers. Some of the informants got tired, and the scores of the last categories were placed almost randomly. This means that the first couple of categories in the tables are probably more reliable than the last ones.

Another problem is that the categories in some cases have scored very differently. For instance Mr. Thola and his wife estimated the cost of cabbage to score 1 whereas Mrs. Mzozoyana's in matrix scoring the cost of cabbage is 10. We do not know the reasons for this but we can speculate that the three different interpreters we used may have interpreted the questions differently. Using the same interpreter for all the matrix scorings could then have solved this problem. Other factors that pose problems is that though it was interesting to get the women's scoring, their work in the agriculture is very different from the men's work, e.g. women do not plough, and therefore we cannot combine the scorings of women and men to get an quantify the overall workload for each crop.

Our general impression of working with the matrix scoring activity is that it is a fine tool to facilitate a discussion, but if the data has to quantified, the matrix scoring should probably be changed a couple of times to get it right.

RESULTS ON MATRIX SCORING

Table 1. Mr. Mararene, Makomoreng.

	Time	Labour	Weeding	Cost	Harvesting	Processing	Cooking	Palata-bility	Secondary products
Cabbage	4	3	6	8	3	-	3	3	6
Maize	3	6	6	3	5	6	10	5	8
Millet	3	6	6	6	5	6	4	6	6
Wheat	2	3	-	8	6	6	6	6	6
Sugarbeet	2	3	6	8	3	2	10	6	6
Peas	2	3	-	4	3	2	3	3	6
Carrot	2	1	1	3	2	-	4	6	2
Potato	3	4	6	10	5	4	8	2	2
Tomato	4	2	2	3	3	3	8	6	4
Turnips	2	3	2	4	2	1	10	2	1

Table 2:Mrs. Mararene; Makomoreng.

	Time	Labour	Weeding	Cost	Harvesting	Processing	Cooking	Palata-bility	Secondary products
Cabbage	3	3	3	4	2	2	2	2	5
Maize	1	3	6	5	7	10	5	5	5
Millet	1	3	6	5	7	10	5	5	5
Wheat	1	2	-	3	8	10	5	5	5
Sugarbeet	1	3	3	4	4	4	5	6	5
Peas	1	3	-	2	3	3	5	6	5
Carrot	1	1	3	2	1	1	5	6	5
Potato	3	4	6	6	5	6	7	6	5
Tomato	3	2	3	3	4	4	9	8	5
Turnips	1	2	-	3	6	5	9	4	3

Table 3: Mr. & Mrs. Thola, Mabua.

	Time	Labour	Weeding	Cost	Harvesting	Processing	Cooking	Palata-bility	Secondary products
Cabbage	3	1	1	1	1	-	1	1	-
Maize	4	2	5	5	5	6	6	5	4
Millet	4	2	5	5	5	6	6	5	4
Wheat	4	1	-	5	5	6	2	4	4
Peas	4	1	-	5	5	6	6	4	4
Carrot	3	1	3	1	1	-	1	1	1
Potato	3	1	3	5	5	-	6	1	2
Turnips	2	1	-	2	5	-	4	4	4
Beans	4	1	5	5	5	-	6	1	2
Pumpkins	4	1	1	1	1	-	6	1	1

Table 4: Mrs. Mzozoyana, Mabua.

	Time	Labour	Weeding	Cost	Harvesting	Processing	Cooking	Palata-bility	Secondary products
Cabbage	10	5	10	10	5	-	2	6	-
Maize	8	10	8	10	9	10	2	5	10
Sugarbeet	3-4	3	3	3	3	-	2	2	2
Peas	3-4	4	-	3	5	5	4	3	-
Carrot	5	2	2	2	2	-	1	3	3
Potato	8	6	8	6	8	-	2	5	-
Beans	5	5	3	5	7	5	4	4	-
Pumpkins	5	3	3	3	6	-	3	5	-
Onion	5-6	2	2	4	4	-	1	2	-

Table 5: Mr. Mphod Dlothi, Mabua.

	Time	Labour	Cost	Palata-bility	Secondary products
Maize	8	6	7	4	1
Potato	7	3	5	3	-
Tomato	7	1	1	10	-
Turnips	2	1	4	5	-
Beans	3	1	1	10	-

APPENDIX C: SOIL TESTING

SOIL SAMPLING AND TESTING

The soil samples were collected by auger and tested for plant-available nitrogen, phosphorus and potassium and pH in the village. We used a small soil testing kit from Kasetsart University in Thailand. The kit contained different chemicals and a short instruction. Although it was suitable on the study site, it had a limited capability in terms of soil properties examination. We could only inspect the overall levels of the plant available macronutrients. It shows an estimation of the different levels of the nutrient contents without any adequate quantitative measures. After air-drying individual samples were mixed and tested for plant available nitrogen in the forms of NH_4^+ and NO_3^-, phosphorus in the form of P_2O_5, potassium in the form of K_2O and pH using the soil test kit.

At the laboratory at KVL we estimated the organic matter content of samples of each field as weight loss after dry combustion. Approximately 5 g of each sample was weighed and dried for 24 hours at 100°C. The sub samples were then weighed again before being burned at 600°C for three hours. The organic matter content was estimated as the weight difference between burned and dried sub samples.

TEXTURE CLASSIFICATION

SOIL TEST RESULTS

VL = very low; L = low; M = medium; H = high.

UNCULTIVATED FIELDS

Located on slope

Sample	pH	Ammonium	Nitrate	Phosphorus	Potassium
1	5,0	VL-L	L-M	L	L
2	5,0	VL-L	0-VL	VL-L	L

Texture: sand.

Located on the plain.

Sample	pH	Ammonium	Nitrate	Phosphorus	Potassium
1	7	VL – L	VL	L	L
2	6,5	VL – L	0 – VL	L	L

Texture: silt loam

CULTIVATED FIELDS

Located on slope.

Sample	pH	Ammonium	Nitrate	Phosphorus	Potassium
1	6,0 – 6,5	VL	0 – VL	L	L
2	6,5	VL	VL	L – M	L

Texture: sand

Located on the plain.

Sample	pH	Ammonium	Nitrate	Phosphorus	Potassium
1	6,5	VL	0 – VL	L – M	L
2	6,5	VL	VL	L – M	L

Texture: loam

Located on the plain.

Sample	pH	Ammonium	Nitrate	Phosphorus	Potassium
1	6,5	VL-L	VL-L	M-H	L
2a	6,5	VL – L	VL	VL	L
2b	6,5	VL	VL	M – H	L

Texture: loam

ORGANIC MATTER CONTENT

	Mean org. matter content (%)	Range
Fields on plain	5,66	4,34-7,85
Fields on slope	2,46	2,05-2,86