

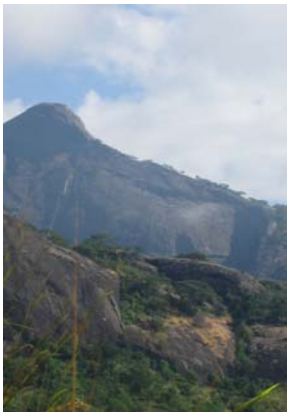


# A Green Revolution in Southern Niassa?

## - A field study from a small farmer perspective about possibilities and obstacles for a Green revolution


**Växjö University**
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Authors: Karin Gatu &
Sofia Rodman

Tutor: Kenneth Hermele &
Anders Nilsson

REPÚBLICA DE
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# Abstract

**Title: A Green Revolution in southern Niassa, Mozambique? - A field study from a small farmer perspective about possibilities and obstacles for a Green Revolution.**

**Authors: Karin Gatu & Sofia Rodman**
**Tutor: Kenneth Hermele & Anders Nilsson**
**Examiner: Manuela Knapp**
The aim of this field study was *to analyze, by taking into consideration the small farmers' perspective, the possibilities and obstacles for an implementation of a Green Revolution in southern Niassa, Northern Mozambique.*
We also highlighted the following question:

- In what sense are the findings in Asia, presented by Djurfeldt, relevant for the situation in southern Niassa?

The analytical framework used is based on the scheme developed by Nitsch and Åkesson. This scheme has been used to understand the small farmer's relationship toward the technology linked to the Green Revolution. The Green Revolution is a result of an initiative to resolve the food crisis by increasing crop yields and augmenting aggregate food supplies. By the 1970s it become known as a 'package' consisting of improved seeds, farm technology, better irrigation, and chemical fertilizers.

We have chosen to use Göran Djurfeldt's, a Swedish professor at the University of Lund, concept of the Green Revolution in Asia. Through his findings, he concludes that the success of the Green Revolution in this area is not only due to the technology but also that the strategy was a state-driven, small-farmer based, and market-mediated which arose due to particular domestic and geopolitical factors.

By taking this in consideration we conclude that neither the state, market nor the geopolitical context are working in favor of a Green Revolution in Mozambique, however the factors are vital if a Green Revolution will succeed in Niassa. The small farmers have to deal with many obstacles if a Green Revolution will be possible. To summarize the small farmer's attitude toward the Green Revolution we look at the individual circumstances, the direct surrounding and the society in general. We first concluded that the small farmer does not have much knowledge about the Green Revolution. This makes it hard for her or him to have an opinion neither about it nor about the techniques related to the Green Revolution. Secondly, the small farmer have several reason to why she or he do not want to implement the Green Revolution, due to risk taking, tradition, former bad experiences with new technique etc. Thirdly, there are also numerous obstacles that hinder the small farmer to implement the Green Revolution technology. Those are the small farmer's health and time, the lack of extension workers, the international and the domestic agricultural politics, and the lack of inputs and credits etc.

**Key words**: Southern Niassa, Green Revolution, Small farmers, Agriculture.

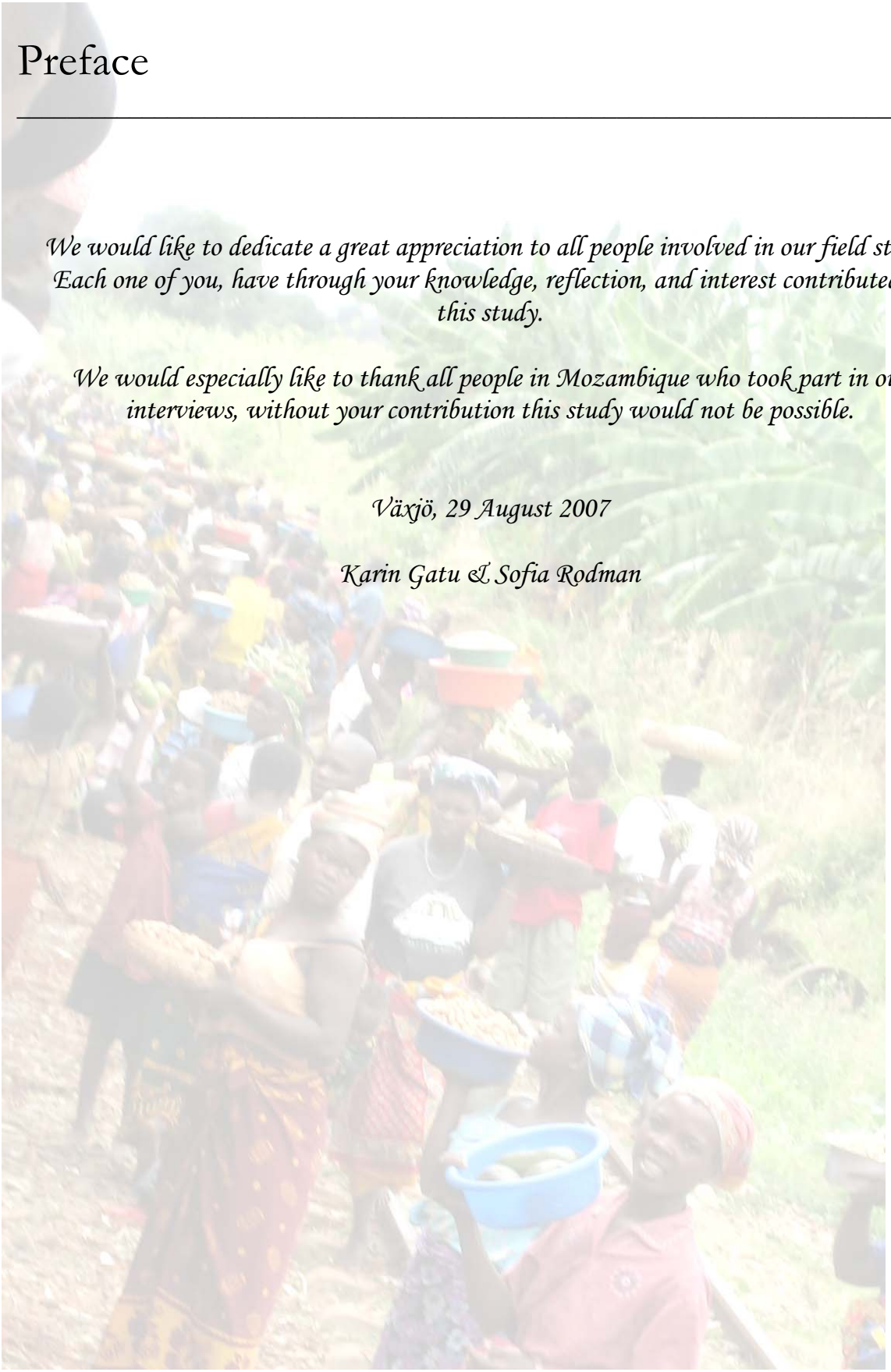
# Preface

*We would like to dedicate a great appreciation to all people involved in our field study. Each one of you, have through your knowledge, reflection, and interest contributed to this study.*

*We would especially like to thank all people in Mozambique who took part in our interviews, without your contribution this study would not be possible.*

*Växjö, 29 August 2007*

*Karin Gatu & Sofia Rodman*



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# Abbreviations and Acronyms

| | |
|---|---|
| Afrint | African Food Crisis Study |
| AMODER | Mozambican Association for Rural Development (Associação Moçambicana para o Desenvolvimento Rural) |
| AoA | Agreement on Agriculture |
| CLUSA | Cooperative League of the United State of America |
| EU | European Union |
| FAO | Food and Agriculture Organisation of the United Nations |
| FRELIMO | Frente de Libertação de Moçambique |
| GAPI | Office for Assistance to Small Industries (Gabinete de Apoio à perquena Indústria) |
| GDP | Gross Domestic Product |
| GR | Green Revolution |
| HDI | Human Development Index |
| HIPC | Heavily Indebted Poor Country |
| HYV | High-yield variety |
| ICM | Mozambique Cereals Institute |
| IFAD | International Found for Agricultural Development |
| IMF | International Monetary Fund |
| INAS | Instituto Nacional de Acção Social |
| LDC | Less Developed Country |
| MADER | Ministry of Agriculture and Rural Development (Ministério de Agricultura e Desenvolvimento Rural) |
| MDG | Millenium Development Goals |
| Mt | Meticais |
| NGO | Non Govermental Organization |
| NDC | Nacala Development Corridor |
| OECD | Organisation for Economic Co-operation and Development |
| PARPA | Action Plan for the Reduction of Absolute Poverty (Programa de Acção para a Redução de Pobreza Absoluta) |
| REMANO | Resistência Nacional Moçambicana |
| PROAGRI | Agriculture Sector Public Expenditure Programme |
| PRSP | Poverty Reduction Strategy Papers |
| SIDA | Swedish International Development Agency |
| SSA | sub-Sahara Africa |
| SADC | South African Development Community |
| SAP | Structure Adjustment Program |
| SEMOC | Sementes de Moçambique |
| SEK | Swedish krona |
| UNDP | United Nations Development Programme |
| WFP | United Nations World Food Programme |
| WB | World Bank |
| WTO | World Trade Organization |
| UN | United Nations |

| | |
|---|---|
| UNAC | União Nacional dos Camponeses |
| USA/US | United States of America |
| USAID | United States Agency for International Development |
| US$ | United States dollar |

**Words in Portuguese and Macua**

| | |
|---|---|
| *Régelo* | Traditional leader |
| *Curranderious* | Traditional doctors |

**Weights and measures**

Metric System

# 1. Introduction

*This chapter gives an introduction to the topic chosen for this study. It also presents the aim and the structure of the study.*

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In many ways Mozambique follows the same pattern as other sub-Saharan African (SSA) – countries. After independence the government introduced a socialist model in which the state became the dominating actor in the agricultural sector. However, an agricultural development could never take place due to several domestic factors such as the 15 year long civil war and several unprofitable investments in capital-intensive factories and state-farms, together with external factors such as the Cold War. Instead, the military and economic situation deteriorated and the country had to turn to the World Bank (WB). In 1987, the first Structural Adjustment Program (SAP) was introduced with the aim of stabilizing the economy through different reforms that among others implied privatization of state-owned companies. However, due to the war, the stabilization policies were hard to achieve. It was not until the war was over in 1992 that the rehabilitation of the country as well as problems of growth, agriculture and human development could be tackled through different programs. As a result of these programs as well as huge donor inflows and the resettlement of farmers, poverty fell from 69 percent in 1996/7 to 54 percent in 2002/3 and per capita income grew from US$120 in the mid 1980s to US$276 in 2004 (Coughlin 2006:2f). Despite these improvements, Mozambique is today one of the world's poorest countries and is ranked 168 out of 177 countries on the Human Development Index (HDI) scale (Human Development Report 2006).

Over 70 percent of the population live in the rural areas and are dependent on agriculture for their survival. The agriculture sector contributes with as much as 22.4 percent to the GDP, but as many as 64 percent of the Mozambican population is food insecure (DRN, ADE, BAASTEL, ECO and NCG 2004:5; WB 2006:3). Mozambique has therefore been searching for new strategies in order to develop the agriculture and thereby guarantee food security and reduce the poverty among the people. One of the discussed strategies was presented by the president of Mozambique, Armando Guebuza in March 2007, when he declared, *"his government is striving for a 'green revolution' to improve and diversify agriculture and raise its productivity"* (African News Update 2007). The Green Revolution was introduced in countries with food shortage in the mid 1900s and is identified as a 'package' consisting of improved seeds, farm technology, better irrigation, and chemical fertilizers. It turned out to be highly successful in increasing crop yields and augmenting aggregate food supplies, especially in the Asian countries.

The question whether a Green Revolution is a possible solution for Africa to reach self-sufficiency and to reduce poverty has been raised as a result of discussions these last few years about strategies for poverty reduction (FAOb 2007). In these discussions the relation between poverty and hunger has been highlighted as well

as the role of the state in the development of agriculture, which, for many years, has been reduced due to the introduction of the SAP.

Göran Djurfeldt, a Swedish professor, argues that an implementation of a Green Revolution might be a solution for SSA – countries that are not self-sufficient in food. In a research project called Afrint, Djurfeldt et al. (2005) have been analyzing the successful Green Revolutions that took place in several Asian countries during the 1960s and 1970s. But he has also been analyzing the less successful attempts African states have made for a Green Revolution and what possibilities there still are for a Green Revolution in Africa (Afrint 2007).

However, our intention with this field study is to analyze the local conditions for the implementation of a Green Revolution strategy in southern Niassa, Mozambique.

### 1.1 Aim and Question

In this study we have chosen to mainly focus on the southern part of the Niassa province, Mozambique. We will analyze the Green Revolution from a small farmer's perspective through a scheme developed by Nitsch and Åkesson. Hence, *our aim with this study is to analyze, by taking into consideration the small farmers' perspective, the possibilities and obstacles for an implementation of a Green Revolution in southern Niassa, Northern Mozambique*[1].

We will also highlight the following question:

- In what sense are the findings in Asia, presented by Djurfeldt, relevant for the situation in southern Niassa?

[1] The area will also be refered to as the 'northern part'.

**Map 1.** *Mozambique*


Source: BUBL LINK (year unknown)

## 1.2 Limitation

As mentioned above, our study focuses on the agricultural development from a local perspective, mainly from the southern Niassa. Information from parts of the Nampula Province will also be analyzed, due to the fact that some interviews were conducted there. We will also give an overview of the national and international aspects as they are both significant for the implementation of a Green Revolution. However, these aspects are both multifaceted and sometimes very complex. This overview will be limited to what we consider to be the most important factors for the implementation of a Green Revolution in the northern area.

With consideration of the time limit at hand, we have chosen to mainly focus on the contemporary situation and the current possibilities for a Green Revolution in the region. However, to be able to understand the contemporary situation it is necessary to give an overview of the history.

## 1.3 Disposition

The methodological framework, as well as the analytical framework is presented in *chapter two*. This is followed by *chapter three*, which presents the concept of the Green Revolution. In *chapter four* we briefly describe the agricultural conditions in the northern part of Mozambique. Thereafter, in *chapters five, six* and *seven*, we present the potential and the difficulties, out of a small farmer perspective, for an implementation of the Green Revolution in the area. We look at the society in general, the direct surrounding, and individual circumstances, in order to answer the aim of this study. In *chapter eight*, we drew our conclusions in a final discussion.

# 2. Methodological framework

*"Acabámos de aterrar em Nampula. Tenha um bom dia e obrigado por voar connosco..." Getting out of the airplane we were directly hit by new impressions and we understood that reaching the goal of this field study was going to be a big challenge. To work in a new environment where we were neither familiar with the culture nor the language does require an awareness of the difficulties that might occur. In the following chapter we will discuss these difficulties and also the methodology that has been used in this field study.*

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## 2.1 Method

This field study was a supervised study within the master program *Peace and Development work*. It was carried out in the provinces of Niassa and Nampula in Mozambique, during the period of April 8 – May 5 in 2007. Our first interviews took place in the city of Nampula and later we continued to Malema and Ribáuè[2] and finally we reached the Cuamba district, in the province of Niassa, where we stayed for two and a half weeks. It was also in this area that the majority of the interviews were conducted. Before going home we also met some representatives at the national level in Maputo.

### 2.1.1 Methodological approach

The method we have used for this study is based on a form of qualitative research called Participatory Rural Appraisal (PRA). It is participatory in the sense that there are several people besides the researcher that take part in the research process, and in this study we have emphasized the participation of the local people who have contributed with valuable information (Mikkelsen 2005:62; Chambers 1991:1). The advantage of the PRA-methods, as we understand, is that the collection of data is based on a broad spectrum of individuals (Mikkelsen 2005:83).
Within the framework of the method there are several tools, methods and techniques that can be used for gathering, sharing and analyzing information; these are all included in the *PRA-catalogue*. The techniques used from the PRA catalogue in this field study are: review of secondary sources, semi-structured interviews, and triangulation (Mikkelsen 2005:63).

### 2.1.2 Semi-structured interviews

We conducted 43 interviews in total, both individual and group interviews (*Appendix I*). The informants were a wide range of people. Key individuals, like professors at the Agricultural Faculty in Cuamba were interviewed for their

[2] Malema and Ribáuè are villages in the province of Nampula.

special knowledge about agriculture and the local conditions. We also interviewed focus groups like small farmers, women and men about gender perspective in small farming, and furthermore authorities, companies and associations within the agriculture sector. This gave us a vital insight at different levels in the society and the agricultural sector in the northern part of the country.

Some of our meetings and interviews were pre-booked before our arrival. However, the majority of the interviews were located by snowball sampling.

Our interviews were based on the model of semi-structured interviews. Only some of the questions and topics were predetermined in a flexible checklist and a guide. Also, the questions were open-ended which gave the interview a conversational character which also allowed new and unexpected issues to be brought up and discussed (Mikkelsen 2005:69,129).

Before our departure, we formulated different interview guides for the wide range of people we were going to meet (*Appendix II*). In other words, we had different guides for authorities, companies, small farmers, and gender. The guides contained questions on knowledge, behavior and reflections about agricultural technology.

The language spoken in Mozambique is Portuguese, together with different local languages like Macua that they speak in the northern part, and since none of us know these languages we were dependent on interpreters in our interviews. Our supervisor, who is fluent in Portuguese, interpreted Portuguese/Swedish at most of the interviews but sometimes we needed interpreters that could interpret from Macua/Portuguese. We were well aware of the problems related to interpretation, namely that information can be lost, incorrect or ignored, and when the interpretation was made in two steps from Macua to Portuguese and then to Swedish the risk for this to happen was even higher. Further, our interpreters, two local male students and our supervisor already had good knowledge about the society, which could help us to better understand certain aspects of the small farmer's life. But their knowledge could also affect their interpretation in the sense that they added their own perspectives into the interpretations. However, to eliminate the risk of misunderstandings and information not being correctly interpreted, we always tried to confirm the information with other informants by triangulation, i.e. interviewed people with different relations to the agricultural sector (Gunnarsson 2002:3).

Apart from this, we were aware of the interviewer effect, i.e. that the way the informant chooses to answer the questions is dependent on how he or she perceives the interviewer. As is stated by Mikkelsen (2004), factors like sex, age and ethnic origins do *"(…) have a bearing on the amount of information the people are willing to divulge and their honesty about what they reveal"* (Mikkelsen 2004:177). In our case we also believe that factors like race and status had an impact. Occasionally in the role of interviewers being white, female and young, we experienced that people became rather suspicious once they saw us but as soon as they understood that we were students who were there because of our interests of their lives there were usually no problems to carry out the interviews.

### 2.1.3 Secondary sources

Although the major part of the study is based on information collected from the interviews, it has been necessary to supplement this information with secondary data. The material used has mainly consisted of books from libraries, and reports found on the internet. In order to judge the reliability of the sources we have used the traditional criteria for criticism of sources *time, independence, genuineness* and *tendency*[3]. We will in the continuous text discuss our most frequently used sources.

The major part of the information was found in reports conducted by the WB, SIDA and the WTO. We are well aware about the fact that they are actors with own interests, which means that they are not always willing to be self-critical. However, we take this into consideration and by using triangulation it is possible to judge whether the information given is reliable or not.

Since statistics on developing countries are rather difficult to find, we have used statistics from international databases such as the WB. Even if these statistics at first glance seem reliable, we are well aware of what we mentioned above, namely that these organizations have their own interests and might therefore avoid giving the authentic picture of reality. As is highlighted by Mikkelsen, statistics are very powerful in the sense that "*they look objective but are seductive and often unreliable"* (Mikkelsen 2005:88).

We also applied triangulation on the secondary data by comparing it with the collected information from the interviews.

One of the other main reports used to acquire a general description about the agricultural sector in the country is written by Peter E. Coughlin (2006). It treats agricultural intensification in Mozambique and contains useful statistics on the agriculture in the provinces. The report is commissioned by the African Food Crisis Study (Afrint) and financed by the Swedish International Development Agency (SIDA). Both these institutions are acknowledged and have long experiences from working in African countries, which gives the report high credibility.

Our study is primarily based on the research presented by Göran Djurfeldt, Swedish senior development researcher and professor of sociology at the University of Lund. He is known internationally and has contributed with a number of researches on agricultural development. Studies and reports made by

[3] *Time,* highlights the importance of finding out when the information has been updated. This is important since there is a risk that the information is incorrect if a long time has passed after the event took place.
*Independence,* underlines the risk that two sources are dependent on each other. If two sources are similar it might mean that one of them is based on the other, alternatively that they are based on the same source.
*Authencity:* emphasizes the possible risk of a source not being reliable, i.e. that the information been falsified
*Tendency:* There might be a risk that the narrator i.e., the source of origin has had self-interests and therefore gives a wrong picture of the reality (Essiason et al. 2004: 307 f).

him that we have used in this study are the following: Mera Mat – Att brödföda en växande befolkning (2001) and Afrikas livsmedelskris (2006). The research report The African Food Crisis (2005), conducted by Djurfeldt, Hans Holmén, Magnus Jirström and Rolf Larsson[4] has also been used. However, we have mainly used the chapters written by Djurfeldt.

Most of the used material has been written in English, but we have also used sources in Swedish and French. Since neither French nor English is our mother tongue, we are well aware about the risk that some of the material used might have been misconstrued. Another language-related problem was that the majority of the reports found were written in Portuguese, and since none of us knows the language, the amount of available material became limited. Furthermore, this has also eliminated the possibility to use quotes from the interviews in the presentation of our results.

## 2.2 Analytical framework

As will be presented in the following chapter, Djurfeldt talks about different components that have been essential in the Asian Green Revolutions and the model he has developed is pointed out not to be used as a normative precept but as an explanatory one. The model is later used as a *heuristic device* in an attempt of explaining the historical as well as the current situation in sub-Saharan Africa (Djurfeldt et al. 2005:4). However, in our opinion Djurfeldt does not enough highlight the role of the small farmers in his model. As has been mentioned and will be discussed more later on, a large number of people in Mozambique, and especially in the northern part, are involved in small scale farming. We believe that it is in the agricultural sector and among the small farmers more effort needs to be taken in order to develop the economy and the country as a whole.

We claim that if a Green Revolution is going to be successfully implemented it is highly dependent on whether the small farmers are willing to adopt the new technology of the Green Revolution or not. Hence, we have chosen to use the scheme developed by Gunilla Åkesson (1994) as our analytical framework in order to reach our aim, which is: *to analyze, by taking into consideration the small farmers perspective, the possibilities and obstacles for an implementation of a Green Revolution in southern Niassa, Northern Mozambique.*

The scheme was first created by Ulrich Nitsch (1978), researcher at The Swedish University of Agricultural Sciences, and it highlights the relationship between the small farmers and new technology. Åkesson identifies two important aspects for the researcher to consider while analyzing how small farmers relate to technical changes. Firstly, the researcher should look upon how the small farmer gets influenced by his/her own opinions, conditions and living circumstances. Secondly, the researcher should observe how the small farmer becomes

[4] Hans Holmén, the Department of Geography, Linköping University, Sweden
Magnus Jirström , the Department of Social and Economic Geography, University of Lund, Sweden
Rolf Larsson, who recently passed away, was positioned at the Department of Sociology, University of Lund, Sweden

influenced by the circumstances in his/hers surroundings, which he/she is in direct control of (Åkesson 1994:79). Åkesson then concludes that the researcher in this way can obtain an understanding of which factors influence the small farmer's opinions about changing his/her farming methods. She divides the small farmer's opinions about new technology into three groups: *does not know*, *does not want to* and *cannot*. Each of these groups is later analyzed on the basis of the farmer's relations towards his/her own surroundings and reality: *Individual circumstances, Direct surrounding,* and *Society in general*. In our study we will start with the Society in general, and continue with Direct surrounding and Individual circumstances.

**Table 1.** *Analytical framework*

| **Reason:** | The farmer 'does not know' | The farmer 'does not want to' | The farmer 'cannot' |
|---|---|---|---|
| **Limitations:** | | | |
| Individual circumstances | | | |
| Direct surrounding | | | |
| Society in general | | | |

# 3. The Green Revolution

*By the 1970s the Green Revolution had become a well-known 'package' consisting of improved seeds, farm technology, better irrigation, and chemical fertilizers. It was claimed to be highly successful at meeting its primary objective, namely increasing crop yields and augmenting aggregate food supplies. Below we will present the history, the description and the critique of the Green Revolution.*

## 3.1 Background

In 1944, American researchers from the Rockfeller Foundation in collaboration with the Mexican government, went to Mexico with the mission to resolve the then prevailing food crisis in the country. The result of this initiative was striking; in 1956, Mexico became self-sufficient in wheat and in 1967 it had doubled its wheat production and could therefore start to export both maize and wheat, which contributed to a blossoming economy. This success is often described as the take off for the Green Revolution and it further encouraged the Rockfeller Foundation to merge with Ford Foundation in order to create the International Rice Research Institute in the Philippines in 1962 (Brown 1971:11).

This foundation started to develop a high yield rice variety, IR-8, that is today known as the 'miracle rice' since it, like the Mexican wheat, doubled the yields, that is to say, if the right conditions such as: irrigation, fertilizers and pesticides were provided (Brown 1971:12). To give one example: in Indonesia the yields of rice increased from 1.76 tonnes per acre to 4.52 per acre (Djurfeldt 2006a:89). The new varieties were, among other countries, introduced in Pakistan, India, The Philippines, Malaysia, Indonesia, Vietnam, and Laos. However, the seeds were introduced in non-Asian countries as well, such as, for example: Kenya, the Ivory Coast, Tunisia, Morocco, Algeria and Brazil (Brown 1971:13). Nevertheless, it was in the Asian countries that the results of the new seeds were the most remarkable. The food crises were successfully stemmed and the countries reached self-sufficiency and even got a surplus of their production, which made it possible for them to start exporting.

## 3.2 The Green Revolution according to Djurfeldt

Even if the discussion on the Green Revolution has been focused on high-yield varieties (HYVs) and technology, the main literature gives a broader perspective. As Jirström (1996) claims, the definition of the Green Revolution is controversial and concludes that the notion seems to *"depend on the senses in which the term is understood",* (Jirström1996:16). Leaf, another researcher of the Green Revolution, summarizes the divergent views:

> The Green Revolution can be construed in a narrow or a broad sense. In the narrow sense it consists primarily in the adoption of the new high-yielding varieties of wheat and rice and associated technologies. In the broad sense it includes not only this but all other economic changes as well as the social and cultural changes that either contributed to the technological and ecological changes or were derived from them (Leaf 1984:23 in Jilström 1996:16).

Djurfeldt is one of the scholars who defines the Green Revolution in a broader sense. He does not only identify the Green Revolution in technical terms, instead he widens the notion to include the world order, national leaders, economy and small farmers. We found this concept interesting and important in the debate of the Green Revolution and have therefore chosen to use in our study of a Green Revolution in the northern part of Mozambique.

Djurfeldt studies focus on the Green Revolution in Asia and its possibilities to be implemented in Africa. According to Djurfeldt, the situation in Asia until the 1960s was very much the same as the current situation in sub-Saharan Africa. Asia was struggling with high population growth, widespread poverty, hunger and undernourishment (Djurfeldt 2005:1). Moreover, Asian states[5] were as African states are today, often described as 'soft states' [6], referring to the lack of 'social discipline' and corruption within the society.

Despite this, the Asian states started to realize that they had to undertake means in order to develop their countries. The reasons were domestic factors, like food riots and social unrest, which caused fear of loosing their governmental power. External, geopolitical factors such as regional conflicts together with the dynamism of the Cold War were of vital importance as well. The US feared that communist revolutions would rise in Asia as a result of food insecurity and poverty. For this reason they chose to support the development of the agricultural technology in Asia. Their solution was to support the domestic food production through agricultural intensification[7] (Djurfeldt et al. 2006a:93). By introducing large-scale programs of subsidies, investments in infrastructure like roads, irrigation systems, and schools, science and consulting, the intensification in Asia became a strategy based on governmental interventions, private sector and small-scale family farms (Jirström 2005:26).

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[5] The notion state is usually used to refer to three distinct concepts; state, government and country. "… a state is an entity that is recognized to exist when a government is in control of a community of people within a defined territory.(…) each state is a country. It is a community of people who interact in the same political system and who have some common values. (…) the state consists of the apparatus of government, in its broadest sense, covering the executive, the legislature, the administration, the judiciary, the armed forces, and the politics" (Willetts 2001:558).

6 The notion *Soft State i*s developed by Myrdahl and can briefly be defined as a state that neglects its obligations towards its citizens and at the same time demandss very little of them. Whether its civil servants and employees, at all levels, will perform their tasks given to them, will not determine on the account of regulation, instead the employees will do their work due to personal profit (Myrdahl 1970:156).

[7] Intensification means that the agricultural production increases on a constant area, instead of which is common where land reserves are still available to increase the production by expanding the area of cultivated land, i.e. expensive growth (Djurfeldt 2005:10).

### 3.2.1 The findings made in Asia

To be able to evaluate if a Green Revolution is possible in Africa, Djurfeldt et al. first tried to identify the factors which characterized the Green Revolution in Asia. Their conclusion was that it was *"(…) a state-driven, market-mediated and small-farmer based strategy to increase the national self-sufficiency in food grains"* (Djurfeldt et al. 2005:3f):

- The G*eopolitical* and the *Domestic political* dimensions, like *"the perceived severity of manifest or potential external threats, food shortages and fear of being cut off from external food-supply, and a high price on staple grains on the world market",* helped to motivate the Asian governments to adopt a national policy in order to obtain S*elf-sufficiency* (Holmén 2005:106).
- In Asia the Green Revolution was S*tate-driven*, i.e. the states were the main actors in taking the initiative of the development of the food-grain commodity.
- The states were *Market-mediated* i.e. the markets and the private actors played an important role in every part of the productive chain.
- The Asian Green Revolutions were focused on the *Small-farmers*[8], and not on large-scale mechanized farming.

(Djurfeldt et al. 2005:3f, 106f)

Below follows a more explanatory summary of the Asian findings:

- Foreign aid was predominant in the process, as a result of the tactical considerations during the Cold War and the anti-communist agenda, which motivated an export of technology. Technology was necessary for making the Asian economies self-sufficient in food grains. Therefore, foreign institutions started to assist the Asian states with research of new varieties, which made it possible for farmers to get not only one but two or three harvests per year. The states could also, on account of foreign aid and the WB, finance the process by introducing different kinds of credit systems. An example of this is when India, with the help from the WB, undertook a program in order to develop the bank system in the rural areas.

- Through extension services, the states could spread information necessary about the new technology. This is understood as an important aspect since farmers need to receive knowledge about the new methods; controlled irrigation and inputs in terms of fertilizers and pesticides.

[8] We have chosen to use Djurfeldt's definition on *familjebruk* to define a small farmer. The notion is created out of the definitions family, household and farm. Djurfeldt believes that these notions are linked together, i.e. the labor on the farm is done by the family, often handed down by heritage. Further the farm provides the household with food, which later is essential for reproduction (Djurfeldt 2001:96).

- The Asian markets were administratively regulated by the state but within the framework of these markets, private commercial activities were of major importance.

- Apart from an active price policy within the agriculture in the Asian countries, their economies could also develop on account of export, due to the high world market prices on cereals at that time.

- Private capital had a great importance when it comes to chemical inputs such as fertilizers and pesticides, needed for the new varieties. Most of the production and the sale of these products were namely controlled by multinational companies. Also the private capital has contributed to the development of some of the irrigation systems. Nevertheless, Djurfeldt et al. underline that it was not the private sector that initiated the process but the state.

- A process of industrialization has in most of the cases in Asia been a necessary precondition for a dynamic agricultural development, i.e. the surplus produced by the farmers was purchased by the industries, which also trigged the farmers to produce more.

(Djurfeldt et al. 2005, 2006a & Djurfeldt 2001)

## 3.3 The possibilities for a Green Revolution in Africa

Even if there have been attempts of a Green Revolution in SSA they have not been successfully implemented. Djurfeldt et al. have therefore examined the difficulties and possibilities for a Green Revolution in this region. Below we will present their conclusions.

### 3.3.1 Intensification

When discussing agricultural development, Djurfeldt refers to Ester Boserups theory on how a growing population pressure can stimulate agricultural intensification. However, he also admits *"the issue of expansion vs. intensification is rather complex to explain since the driving forces are not only a growing population but also market forces in different combinations in time and space"* (Djurfedt 2006b: 37). The agricultural growth in Africa has although, with some few exceptions, in general been characterized by extensive cultivation such as burn beating and fallow-fields. This can be explained by the sparse population and the excess of land. However, this cultivation system was only sustainable as long as the continent was under-populated and the land frontier open and such was the case until the mid 1970s. At this point, the population started to grow which lead to a need for intensification (Djurfeldt 2006a:95). Yet, intensification is difficult to carry out in most countries in Africa, due to the fact that the infrastructure is underdeveloped. One of the reasons is that investing in infrastructure in sparsely

populated countries is more expensive than in a densely populated country (Djurfeldt 2001: 205f).

### 3.3.2 Technology

The new technology, i.e. improved seeds, chemical fertilizers, irrigation and transport systems, were all essential for the Green Revolutions in Asia. Djurfeldt claims that the seeds have to be refined locally and mentions the 'maize revolution' in Zimbabwe as an example. Even before independence the country invested in research and extension, this later resulted in a type of hybrid maize specially made for African conditions. This type was later spread to the small farmers and the country became within some years, self-sufficient in maize (Djurfeldt 2001:220). Maize, Djurfeldt continues, will probably be the crop of huge importance for possibility of the continent to reach self-sufficiency. Rice has become another important food crop in Africa that today is of major importance. Djurfeldt believes that large profit can be made if the continent becomes self-sufficient in rice (Djurfeldt 2001:221).

When discussing agrochemicals, Djurfeldt argues that after bad experiences of the use of pesticides in some parts of the world, they should be used with caution. On the other hand, he claims that the use of chemical fertilizers is necessary for improved yield. However, when the prices on fertilizers in Africa are the highest in the world, and when the subsidies have been removed, the farmers can no longer get a profit out of the yield if fertilizers are used. In order to increase the use of fertilizers, Djurfeldt argues that it is necessary to either increase aid or to increase world prices on cereals (Djurfeldt 2001:221). He believes that none will probably happen as long as world politics prevent Africa from protecting their agricultural sectors which Europe and Asia once had the possibilities to do in order to secure their self-sufficiency (Djurfeldt 2001:221f).

### 3.3.3 Land use rights

In African societies in general, Djurfeldt claims, the lots of land that the small farmer uses normally belongs to the tribe. In other words, the small farmer has a right to use his land as a 'member of his people'. But the system is not democratic; on the contrary it is built up on despotism and oppression, which implies that the small farmers have to share 'the fruit of the labor' with others in the group. In general, young people work for elder, women work for their men and so on. Djurfeldt argues that the effect of this system is that the small farmers become less motivated to make the efforts needed to intensify their production. The small farmers know that the result of their effort will go to someone else. Furthermore, they do not always feel secure that they can keep their land with conflicts about land being a common feature in African societies. This insecurity is another reason why they do not want to intensify their production. Considering all these aspects, Djurfeldt highlights the importance of allotting land use rights to the farmer that cultivates the land since it is a pre-condition for intensification. Today this is not always the case especially not among the weakest groups or women (Djurfeldt 2001:208 f).

### 3.3.4 The role of the state

When describing the Green Revolution, Djurfeldt highlights the importance of the state and he tries to give some explanations to why the attempts in Africa turned out to be unsuccessful. One of the most important reasons, according to him, is that the African states have not been put under pressure from the population to undertake means for development. As has been mentioned, their countries were self-sufficient until the mid-1970s. In other words, there was no approaching food crisis that would jeopardize the power of the government, as was the case in Asia. Moreover, there were no external threats of war since the axiom, after the independence, both in Africa and among the donors, was that the colonial frontiers should be respected.

What also hampered the governments to undertake means for development according to Djurfeldt was the foreign aid that the countries received as a consequence of the Cold War. The foreign aid served as an 'artificial lifeline' since it was given without conditionality as budget support to 'reliable governments' (Djurfeldt 2006b:95f). In the 1970s, the situation changed dramatically due to external as well as internal shocks such as falling prices on raw material, the oil crisis, a growing population and draught. Djurfeldt argues that the African governments realized the need to undertake a leading role in the development of the agriculture. Even if some of the reforms reminded of those in Asia i.e. supply of inputs; fertilizers, pesticides and such, credits, marketing boards and creation of research-programs, there still was one big difference. The Soviet model inspired the sub-Saharan countries and the majority of the investments were therefore made in large-scale irrigation systems and state farms. Subsidies were also given to different large-scale farms. Since the rural population and the small farmers in general were not considered a problem, they were left to self-sufficiency and to a non-profitable production of cash crops.

While private actors in Asia were of great importance, in Africa they implied without exception a state-led monopolization on agricultural inputs and products. This monopolization implied a price setting that was pan-territorial and pan-temporal[9], which resulted in a very stable market. The main objective of the African states was to keep the prices of the consumers low instead of raising the price of the producers. However, this led to a stagnation of the agriculture; moreover the economic situation finally became unsustainable due to undeveloped infrastructure, high transportation costs, credits that were not repaid and high costs for subsidies. The failures of these politics, together with an extremely fast growing population have, according to Djurfeldt, been the main reasons to the current African food crisis (Djurfeldt 2006b:96 f).

Djurfeldt rejects the argument that African states of today are incapable of undertaking means of development due to the fact that many of them are politically weak and corrupt. He counters this argument by claiming that many of the Asian governments were equally described but were still able to make a

[9] This means that all farmers were offered the same price for their products regardless of where they lived and regardless of time period.

change. Instead he points at the fact that the African states do not control their national territorial in the same way as the Asian did, therefore local bosses, clan-leaders and head village-men are co-opted into the clientistic networks of the African state, in other words has the *indirect rule* continued. Instead of, as in Asia, disciplining factional interests the SSA-governments have bought their way into the countryside. As a consequence, credits and inputs in general have ended up at those who are politically well-connected, i.e. large farmers, loyalists etc., instead of being, as was intended, fairly and evenly distributed. In other words the attempts to develop agriculture have not to any bigger extent reached the small farmers. Instead they continued to grow traditional varieties and they used only a small amount of fertilizers and pesticides. In the sense of not being small farmer-based the modernization policies in SSA did therefore not have any revolutionary impact (Djurfeldt 2006b:10).

### 3.3.5 Influence of external actors

For decades, external actors have had a great impact on Africa, in particular the colonial settlers. Not only did they divide the continent into countries and hereby split different groups and their territories, but they also exploited the African population through forced labor and forced cultivation of the so called cash cops such as coffee, tea, peanuts, tobacco and cotton (Djurfeldt 2001:211). The external influence did not cease after independence. As previously mentioned, the African states received development assistance loans during the Cold War that also financed their initiatives of development. However, by the end of the Cold War there was no longer any interest in having allies in the developing world and development assistance was no longer given without strict conditions (Djurfeldt 2006b:98).

Instead SAPs, based on neo-liberal economic theories, were introduced with the intention of reducing the debts of African countries. However, the programs did not fulfill their expectations. Even though one of the SAP priorities was agriculture, the situation for the small farmers worsened when the states were obliged to withdraw subsidies for inputs. The situation also worsened when the African states had to adjust their prices on cereals to the world market, where the prices were and still are artificially low. The explanation is to be found in the subsidized overproduction in the North[10], which is being dumped on the world market, as well as on the domestic market (Djurfeldt 2001:212f & Holmén 2005:107). As a result, the poor countries have difficulties in selling their products. *"[It] has been estimated that the OECD member countries spend about US$75 billion annually on subsidies to their own farmers and agricultural industries (…) which is about six times more than these same developed countries provide to the developing world in official development assistance"* (Holmén 2005:107).

The development policy of the WB has been to encourage the less developed countries to export themselves out of poverty. However, Djurfeldt and Holmén

[10] In this study 'South' refers to the undeveloped and least developed countries, while 'North' refers to the developed counties.

claim that this has complicated the progress since the tariff walls of the rich countries excessively limit the market for their products. The tariffs protect these counties in the sense of prices being higher for products exported by the poor countries than products produced in the rich countries. Moreover, the tariffs are progressively raised *"if poor-county exports try to add value by post harvest processing"* (Holmén 2005:107-108).

Not only has the international community changed policy by providing less support to agriculture, but the rich countries, Holmén states, have also limited their technology support. In the 1960s and 1970s, Green Revolutions in Asia became possible on the account of technology support and cooperation with the rich countries. However, despite new 'African friendly' technology the same effect is being limited by patent of private transnational, agribusiness companies. Consequently, the costs of implementing new technology are higher for African states than the costs were for the Asian states (Holmén 2005:106f).

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Despite the previous discussion, Djurfeldt claims that a Green Revolution in Africa is not impossible. However, Africa today needs a new generation of leaders who want to make a difference and furthermore the African states, together with the international community, have to take a greater responsibility by supporting the development of agriculture. This can be achieved through political interventions such as changes of the international trade conditions, as well as changed priorities in aid and research (Djurfeldt 2001:223f).

## 3.4 The critique against the Green Revolution

### 3.4.1 Vandana Shiva

In 2006, The Gates Foundation announced that it is contributing with US$100 million to launch a new initiative together with the Rockefeller Foundation, viz. to spark a Green Revolution in Africa. The initiators of this project were hoping to avoid some of the mistakes the first and original Green Revolution was criticized for (Paulson 2006). However, the critics of the Green Revolution argued that the Gates Foundation ignores the failure of the first Green Revolution, which was sponsored by the Rockefeller, and Ford foundations (Rosset 2006).

The Green Revolution as a solution to overcome food insecurity and global hunger has been highly questioned by economic analysts, NGOs and farmers in many parts of the world. According to many critics, the Green Revolution is emphasizing on capital-intensive, off-farm chemical inputs and that it can either reinforce yield leveling or decline, it is considered to be an unsuitable package to reduce poverty (Altieri et al. 2000:2). Further criticism has concerned the reduction and the availability of nutritious food crops for the local population, this due to the fact that the poor countries have started to grow cash crops for the rich countries instead of food crops for the people in their own countries (Iowa State University).

Vandana Shiva, an Indian ecologist is one of the critics. She claims that the *"Green revolution is a failure"*, giving Punjab in India as an example (Shiva1991:1). The main critique and Shiva's most important findings and experiences of the effects of the Green Revolution, are summarized below.

The ecological aspects:

- High-yielding varieties are a myth. Shiva starts by pointing out that there is a misunderstanding concerning 'high-yielding varieties'. The seeds are not high yielding themselves; it is rather a question about seeds that are *"highly responsive to certain key inputs such as fertilizers and irrigation water"* (Shiva 1991:1). If these inputs are absent, the new seeds behave poorer than indigenous varieties. Also, from a nutritionist point of view, the HYV mainly consists of water since the artificial fertilizers that are being used cause metabolic problems to the plant that reacts by taking up extra water (Shiva 1991:3).

- The Green Revolution has reduced the genetic diversity and increased the use of pesticides. The critics of the Green Revolution argue that as a consequence of this, the genetic diversity has been reduced due to the wide spread and introduction of varieties that are not locally adapted (Altieri et al. 2000:2). This has resulted in an agriculture that has gone from mixture and rotation of a wide diversity of crops to only monocultures of wheat and rice. Furthermore, the introduced rice and wheat varieties have been claimed to be narrowly genetically based, which has caused further problems due to their vulnerability to pests and diseases. This vulnerability in addition to other aspects of the Green Revolution such as the large-scale monoculture that constitutes high risks for pests has caused a need for an increased use of pesticides. As a consequence of this, it has generated further problems since the seeds become resistant to pesticides and the natural reduction of pest population becomes destroyed (Shiva 1991:2).

- Soil Erosion. According to the critics, the Green Revolution generates soil erosion due to the fact that marginal land and forests have been cleared to make the expansion of agriculture possible. This has resulted in micronutrient deficiencies of different kinds of minerals.

- Water shortage. Since the new seeds need a more intensive irrigation than traditional varieties, the critics argue that the Green Revolution has caused water shortage. To give an example Shiva means that the high-yielding varieties of wheat are estimated to yield over 40 percent more than traditional varieties, but they also need about three times as much water. A consequence of this are conflicts over diminishing water resources (Shiva 1991:4 f).

Social aspects:

- Indebtedness. The Green Revolution in Punjab, India was closely linked to high subsidies and price support. However, these subsidies were not indefinite. After the abolishment of the subsidies, Shiva explains that the situation for the farmers in Punjab became very problematic due to the increase of indebtedness.

- Inequity. The technology only benefits the wealthy farmers and land is controlled by a few after a displacement of vast numbers of small farmers from their land took place after the introduction of the Green Revolution (Shiva 1991:1). It is further argued that the new technology has increased the inequity between small and large farmers. It is also argued that only the big farmers can afford the new technology together with the ones that have the knowledge to adopt it (Shiva 1991:5 f).

- Big farmers and agrochemical companies have been the prime beneficiaries. Shiva claims that small farmers have become more dependent on *off-farm* inputs, such as fertilizers and pesticides, which have resulted in a dependency on the companies that control the inputs. She further explains how the farmer becomes heavily dependent on the seed merchants, as HYVs have to be replaced within five years.

### 3.4.2 Djurfeldt's answer

Djurfeldt acknowledges the criticism concerning the ecological problems but claims that these have been resolved through continued development of the agricultural technology, price politics and education (Djurfeldt 2001:40; Djurfeldt et al. 2006:91). He confronts the criticisms by claiming that:

- Loss of biodiversity is not necessary a result of the Green Revolution since many of the rice monocultures existed long before the Green Revolution. On the contrary, the over all cropping diversity has increased as small farmers in Asia today plant a wider variety of crops than before.

- The Green Revolution has rather had positive affects in view of the fact that millions of acres of wild lands in the developing world have been saved from being cleared for lower yield crops.

- The Green Revolution is more environmentally friendly today given that it now is more adaptable to local agro-ecologies than in the 1960s when it was first introduced.

- The Green Revolution is an example of an industrial agriculture and it would not be possible for the Asian farmers to return to pre-industrial cultivation.

- It is not possible to provide enough food for the rapidly growing population through intensification with the pre-industrial technologies since this procedure would be too slow.

(Djurfeldt et al. 2004; Djurfeldt 2001).

He concludes that the challenge for the future is to create an industrial agriculture that is also ecologically sustainable (Djurfeldt 2001:198f).

Djurfeldt does not to any greater extent confront the criticism concerning the socio-economic consequences since he considers them to be exaggerated. However, in the chapter *Afrikas livsmedelskris*, the authors give a somewhat vague answer on these assumptions by arguing that the technology, on the contrary of what the critics say, has often benefited the small farmers more than the big farmers.

# 4. The agriculture in southern Niassa

*In this chapter we will present a general background of the small farmers and their day to day life in southern Niassa, Mozambique. We will also present the general agricultural conditions in the area.*

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## 4.1 General description of the agriculture

Mozambique has great potential to increase its agricultural production (*Table 2*). However, the environment for agriculture is vulnerable due to the climate and therefore the country is not self-sufficient in food (DRN, ADE, BAASTEL, ECO & NCG 2004:8). Several parts[11] of the coastline and the southern parts are often hit by droughts, while the central part is vulnerable to floods. Consequently, the level of food insecurity is high in these areas (WB 2006:4f). However in the north, the climate does normally not cause any problems for the agriculture. In general, the area is self-sufficient in food and it is usually even capable of producing a surplus of it. But the production is still, as in the rest of the country, vulnerable because of the weather and this makes the food supply unstable. In 2005, parts of southern Niassa were struck by a food crisis due to a drought, while the year after, in 2006, there was a surplus of food (Interview No.13). The overall productivity is low despite the fact that the area has a great agricultural potential due to the fertile soil and the frequent rainfalls, which also would make it possible for an implementation of a Green Revolution (*see also Table 3, Appendix III*). Like in the rest of the country, even if slightly better than in the average, the supply of inputs is low. Apart from this, the area is also facing many obstacles which impede the agricultural development and also the possibilities for a Green Revolution. These obstacles will be described in the following chapters.

**Table 2**. *Actual vs. Potential production by crop*

| Crop | Actual productivity (t/ha) | Potential productivity (t/ha) | Average increase in productivity (%) |
|---|---|---|---|
| Cassava | 4.0 to 5.0 | 5.0 to 10.0 | 67 |
| Beans | 0.3 to 0.6 | 0.5 to 2.5 | 233 |
| Rice | 0.5 to 1.8 | 2.5 to 6.0 | 270 |
| Maize | 0.4 to 1.3 | 5.0 to 6.5 | 576 |

Source: Coughlin 2006:10

[11] Broadly speaking, Mozambique can be divided into three geographical regions: North: Niassa, Cabo Delgado, and Nampula, Center: Zambézia, Tete, Manica, and Sofala, and South: Inhambane, Gaza and, Maputo (WB 2006:5).

**Table 3.** *Agroecological Conditions and Regional Crop Production Patterns*

| Category | North | Center | South |
|---|---|---|---|
| Annual rainfall (mm) | 1,000-1,800 | 1,000-1,200 | 400-1,000 |
| Main food crops | Cassava, maize, rice, sorghum, sweet potatoes, beans | Cassava, sweet potatoes, maize, rice, beans, sorghum, millet | Cassava, maize |
| Main cash crops | Tobacco, cotton, cashew, groundnuts | Tobacco, cotton, groundnuts, horticulture | Only limited agriculture production |
| Livestock | Large pasture areas in Tete province | Pasture areas in Sofala | Pasture areas with rural population raising cattle and goats |

Source: WB 2006:6

## 4.2 The small farmers

According to the WB, *"the smallholder sector in Mozambique is characterized by holding of multiple small plots, multiple crops, low input use, and low productivity"* (WB 2006:5). The average small farmer cultivates between 1-3 hectare of land, a bigger area is not possible to cultivate on due to the lack of labor force (*Appendix IV*). The small farmer and his/her family consume about 1.0-1.2 tonnes a year and can generally get an output on little more than 600 kg/hectare. To uphold the food security but also to get some money for buying clothes, school material, medicine and other things, the small farmers sometimes cultivate both food crops and cash crops. The most common food crops in this area are maize, cassava and mapira and the most common cash crops are cotton, peanuts, tobacco, sesame and soy (*Appendix V*).

What type of crops the small farmer decides to cultivate is determined by his or her current life situation. If the farmer has financial straits he/she chooses to cultivate cotton, tobacco and since recently also sesame. The choice of crops also depends on the work effort related to each crop. Today, sesame is the most profitable, when measuring the work effort it takes to cultivate it. The cultivation of cotton on the other hand, which used to be the most cultivated cash crop, has declined. In general, the small farmers do not have confidence in the cotton companies any longer since they, according to the small farmers, never arrive on time to collect the cotton and, additionally, do not pay until long afterwards (Interviews No. 14-15; 24-32).

Not all small farmers cultivate cash crops; some instead try to sell the surplus of their food crops. For instance, they have a particular partial for cultivating maize that they would like to be able to sell as a cash crop. The small farmers would prefer to concentrate on food crops as this gives them food security. Even though some of the cash crops like sesame and soy are edible, the small farmers do not have the tradition of eating them. Even if they would like to eat them it would not be viable given the fact that they do not have the possibilities to process these crops, which is needed to make them edible. Neither concentrating on one crop, nor cultivating more cash crops, is of their interest i.e. if the yield would be bad one year, they will not have any money to buy food or any food to eat.

The food security is not always guaranteed. If it has not rained much, the small farmer might have problems feeding his/her family and July to December are in general the most difficult months. If it has been a ‘bad year’ and the yields have not been high enough to feed the family, the small farmers, both the men and the women, work temporary on the fields of other farmers in return for food.

To decide whether the time is right or not to sell, depends more on whenever the family needs to make any purchases or require medical care than the current level of prices. Farmers who do not belong to an association usually sell their crops at the nearest market, or in their neighborhood. Members of an association, normally sell their crops through the association. The traders and the association usually contact each other to give information about the amounts of crops they want to buy/sell (Interviews No. 14-15; 24-32).

# 5. The society in general

*In this and the two following chapters we will refer to Åkesson's scheme. We have chosen to structure these chapters by analyzing the small farmer's relations towards his/her own surroundings and reality. We will start with what Åkesson calls the Society in general; here we will identify factors like the international agricultural policy, the national agricultural policy and last we will describe some of the present organizations and associations in the area.*

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## 5.1 The international agricultural policy

Below we will present different international factors that, in one way or another, have affected the Mozambican export of agricultural commodities.

### 5.1.1 Prices on agricultural commodities

High world market prices on cereals was an important component for the success of the Green Revolution in Asia, since it stimulated the farmers to produce a surplus of crops, once the countries had achieved self-sufficiency and could start to export. However, due to today's world politics the situation on the world market is different. The prices on agricultural commodities reached its lowest level in the end of 1990s, and although the prices on cereals have rebounded during the last years they remain low (FAOa 2007). The price decline has had devastating consequences for small farmers in the developing countries. Thus, the world market prices on agricultural commodities hamper both the market of the northern regions' of Mozambique and the country's possibility to make a profit on its agricultural exports. There is a belief that the decline is partly caused by buyers who have oligopoly or monopoly. The decline is also believed to be caused by a large supply on products and high concentration of the market (Rönnbäck 2006:8f). However, this situation is maybe about to change. During 2007 in particular, there has been a new discussion about the world market prices on cereals. Experts like Stefan de Vylder, a Swedish economist, claim that the world market prices on cereals will increase significantly. This, he believes, is partly due to the change in the consumption pattern among the people in Asia. They have, as a consequence of better economy, started to adopt the 'western' consumption pattern. This especially concerns wheat, which will be the most coveted crops on the world market; however the maize prices are also believed to increase due to the increased use of maize in ethanol production (SVT 2007; Världens Natur). The production of ethanol is very questionable because it might imply environmental risks. Despite this, it will have an effect on the world's demand on maize, which in the long term can make the small farmers the southern Niassa of Mozambique motivated to produce a surplus of maize for export production.

### 5.1.2 Trade agreements

In an attempt to improve the situation for the Mozambican export possibilities and the agricultural development, Mozambique has signed different trade agreements (s*ee also Appendix VI*). Ever since independence Mozambique has moved towards a liberalization of the trade in order to enhance the market in the regions, and it is working closely with the Southern African Development Community (SADC)[12] on free trade agreements (Interview No. 1). Mozambique is also engaged in other free trade agreements like the Cotonou Partnership Agreement and Everything-But-Arms Amendment which gives tariff- and quota-free access to the EU market, and the African Growth and Opportunity Act of 2001 that grants African countries tariff- and quota-free access to the US market to 6,500 goods produced in the country (Coughlin 2006:54f). As a LDC, Mozambique also has fewer restrictions within the WTO. Through the first multilateral agreement, Agreement on Agriculture (AoA), the Uruguay Round took a first step towards 'fair competition and a less distorted sector' by *"improved market access and reduce trade-distorting subsidies"* (WTO 2007a, WTO 2007b). Starting in 1995 the agreement allows governmental support to rural economies if it does not disturb the trade. The LDCs on the other hand, like Mozambique were not obliged to reduce subsidies or lower their tariffs, as the developing and developed countries.

Due to the new agreements, the current tariffs are not the biggest problem for Mozambique to enter and survive on the world market. It is rather the subsidies given to the farmers in the rich countries that constitute an obstacle for countries in the South, like Mozambique. Djurfeldt among others claim that this mainly has caused a decline in agricultural commodity prices due to the dumping of agricultural products on the world market. As a result, the development in the South has been hampered. Even though the production costs are lower in the South, the North still exports about 70 percent of the world's total agricultural export (Rönnbäck 2006:23). This debate has been heavily discussed in the WTO, where the critics argue that the AoA is not consistent in its politics related to the North and the South. While it has been expected, and even mandatory for South to liberalize its trade policy due to requirements set up by the WB and IMF, subsidies and high tariffs are still present in the North (Rönnbäck 2006:22). It has been estimated that subsidies in the North have lowered the prices on the world market by 20-25 percent (Rönnbäck 2006:23).

### 5.1.3 Food Aid

A topic not discussed by Djurfeldt, but which is vital for a country's domestic market as well as for export earnings, concerns the food aid. As have been mentioned, Mozambique receives food aid during natural catastrophes; this aid has sometimes come from rich countries like the US, even though provinces in Mozambique, like the northern part, have had a surplus of food (Interview No. 11). This kind of action endangers the national market. Further, the food aid hampers Mozambique's export market when neighboring countries receive food

[12] SADC's member states are: Angola, Botswana, Lesotho, Malawi, Mozambique, Swaziland, United Republic of Tanzania, Zambia and Zimbabwe. Its main objective to reduce the poverty and enhances the standard of life of the people of Southern Africa. Doing this they also hope it will help the region attract more foreign capital and technology (SADC 2007)

aid. The annual cross-border trade between Mozambique and its neighbors is estimated to be between 100,000 to 200,000 tonnes for maize (WB 2006:42); however with another food aid policy this amount could grow larger. Food aid is given in catastrophes for people in need, however the aid also declines a country's possibility to export food crops (Interview No. 11).

### 5.1.4 TRIPS

The TRIPS agreement is mandatory for WTO members and covers several types of intellectual property rights (IPRS), of which patents are the most debated. WTO describes these rights as *"given to persons over the creations of their minds. They usually give the creator an exclusive right of the use of his/her creation for a certain period of time"* (WTO 2007c). Patents, being the most powerful form of IPRS, were developed with the intention of simulating technical development and resolve the free-rider problem. However, critics mean that this agreement have caused nothing but more injustices between South and North. The patents covering living organisms and genetic material, and especially Article 27.3b, have raised the question if patents can be made on plants, animals and essentially biological processes. Some of the arguments against this agreement are (de Vylder et al. 2002:138f):

- The agreement is against the UN Convention on Biological Diversity, i.e. each party shall protect and use biological resources in a sustainable way (Convention on Biological Diversity).
- Much of the genetic material can be found in the South; however much of this material has been patented by private companies in the North, thus local communities get easier exposed to biopiracy[13]. Being exposed to biopiracy, local communities can loose control over their own genetic material. As an indirect consequence of TRIPS small farmers can loose their right to save and change seeds when their seeds are being patented by transnational co-operations.
- Seed companies require monopoly rights in the countries in which they plan to expand their markets. As a result of TRIPS, countries need to pay for the use the patented technology, like improved seeds and HYVs, which can be very expensive for poor countries.

(de Vylder et al. 2002:138f; Kuyek 2002:5).

Djurfeldt does not openly criticize TRIPS and patents as such but he vaguely admits that it constitutes a problem since the North is the possessor of most patents and thereby new technology. Improved seeds are a vital factor of the introduction of the Green Revolution. However to pay for seeds is rather alien for the small farmers in a country like Mozambique, consequently this can impede the development of a Green Revolution in Mozambique.

[13] "Biopiracy is a term when a company patents living organisms or genetic material without acknowledging or compensating the original owner (…)" (de Vylder et al. 2002:140).

## 5.2 The national agricultural policies

### 5.2.1 Background

As is highlighted by Djurfeldt, the role of the state is a predominating factor in the implementation of the Green Revolution. In Mozambique there have been state-led initiatives for the agriculture before. Two years after independence, in 1977, the FRELIMO government presented its development strategy whose objective was rapid industrialization based on the agricultural surplus. Like many other countries in the Third World they saw the opportunity to launch this kind of strategy by using cheap international financial means that was available as a result of the oil crisis 1974/5. Being a Marxist party that was supported by the Soviet Union during and even after its liberation movement, the vision of FRELIMO was to introduce a socialist model (Abrahamsson & Nilsson 1995:36,104). Therefore centralized state farms and cooperatives of small farms were created. The latter were promised technical support and necessary equipment by the state farms (Nilsson & Åkesson 2006:30). However, this support remained absent. In total only 10 percent of all agricultural investments focused on the small farmers, while the rest went to inputs for the state farms (Coughlin 2006:2). The prices were fixed at a low level, which did not stimulate the agricultural development (Munslow 1984:216). In this sense it followed the same pattern as many other SSA-countries and as in these countries the attempts to uphold this kind of politics failed. The investments in the big state farms and state-led cooperatives did namely, in the end, lead to nothing but inefficiency, low productivity, wasted investments and incurred debts (Hermele1987:47). Referring to the terminology of Djurfeldt this failure can partly be explained by the lack of support for the small farmers and that the prices on agricultural products were kept low. Another explanation was the lack of educated labor and cadres in almost every sector due to the mass departure of the Portuguese after independence (Coughlin 2006:2). It became in particular a serious problem for the commercialization and distribution system.

As a result of being unable to sell their products and of not having access to inputs like seeds and fertilizers the small farmers started to produce more food crops for their own consumption. This was mainly visible in the southern Niassa where most small farmers had been cultivating cash crops like cotton and cashew under the colonial period (Munslow 1984:209). This further highlights another aspect of Djurfeldt's terminology, namely the role of the market. As has been mentioned in previous chapters, he stresses the importance of a well-functioning market for the agricultural development. Another reason to the failure of the development was, needless to say, the 15 year long period of war against the Renamo guerillas[14] that followed straight after independence, which had disastrous consequences. Peasants fled from horrific atrocities and farming halted in most rural areas. Around 90 percent of the country's schools and health centers got destroyed, as

[14] Mozambican national resistance, a terror and sabotage-group, formed by Rhodesian intelligence services after that Mozambique had supported Zimbabwe in its struggle for independence. The recruitment base was the special commando and Special Forces created by the colonial army and that consisted of around 100 000 black Mozambican who had fought for the Portuguese side in the liberation war (Hermele 1986:37). First, it was supported by Rhodesians and Portuguese ex-colonialists, and later by apartheid South Africa's Bureau of State Security.

was also the entire rural commercial network, built up by the Portuguese. In total more than one million people were killed and 4.7 million turned in to refugees (Coughlin 2006:3).

As the Asian countries, Mozambique was also highly affected by the Cold War. However, run by a Marxist party supported by the Soviet Union, Mozambique comparing to the Asian countries, was not supported by the US. Consequently the US refused Mozambique part of its international development and emergency aid for a couple of years, which in turn reduced multilateral input into the country. However, in the beginning of the 1980 the support from the Soviet Union decreased (Abrahamsson & Nilsson 1995:98f). At the same time the economic and military situation of the country had become deteriorating due to the war. There was an enormous need for international financing and in 1984 the government finally had to turn to the WB Group and three years later, the first[15] SAP was introduced (Coughlin 2006:4). Although, due to the war, all the requirements of the program could not be met, once the war was over the country continued to move towards a market economy which, among other measures implied devaluation of the currency, liberalization of the market by reducing governmental expenditure and finally, privatizations of the majority of state-owned companies (Coughlin 2006:3). For the agricultural sector this strategy of liberalization failed given that the private sector could not fill the gap after the state concerning food security and agricultural marketing. Consequently, the access to inputs and credits decreased, the liberalization of food services jeopardized the food security, and private traders failed in maintaining the networks of rural markets (Oxfam 2002:4). In other words, it was with the introduction of SAP that the main problems that we have identified among the small farmers today occurred.

### 5.2.2 Poverty Reduction Strategy Program– PROAGRI I

Partly due to these reasons, SAP became highly criticized and instead the Poverty Reduction Strategy Papers (PRSP) were introduced together with the HIPC-initiative. Mozambique obtained its first debt relief in 1999 but as a consequence it was also bound to develop a PRSP. The name of PRSP was *PARPA I* and it lasted for the period 2001-2005. For the agriculture a specific program was developed; *PROAGRI I* in which it was acknowledged that the measures that need to be undertaken for agriculture are outside the field of the sector (*See the box*). The donors' and the governments' main objective with this program was to create a decentralized institutional framework where the Ministry of Agriculture is allowed to take a more active role in the planning and financial management, instead of, as before these activities being highly donor driven (Toselli 2002:50).

However, despite some improvements regarding decentralization and an increase of agricultural production the program has still been criticized for its low number of beneficiaries (Toselli 2002:50f). Also, the PARPA I as such, was criticized for being based on the same neo-liberal assumption as SAP, in other words, that "*the*

[15] In total three SAP-programs were introduced in Mozambique, 1987 to 1990, 1990 to 1994, and 1995 to 2000 (Coughlin 2006:3 f).

| PROAGRI I |
| --- |
| • Infrastructure<br>• Expansion of markets to provide inputs and absorption of agricultural surpluses<br>• Rural financial system to create incentives<br>• Provide credits |

*market will place the capital where returns will be assured and will incline towards growth"* (Negraro 2001:5). Consequently no state interventions were considered necessary, except the measures of letting the market operate without distortions (Negraro 2001:5). This can be explained by the fact that Mozambique's policy framework for 1999-2002 agreed to meet the IMF and WB requirements on improving the environment for the private sector and further liberalization of trade and investments (Africa Recovery 2000). To once again put this discussion in relation to the Green Revolution we can conclude that a neo-liberalist strategy is not the right way to go, since the Green Revolution requires the state to take a leading role for the agricultural development. As Djurfeldt claims, it is important to involve the private actors, but it is not possible to totally rely on the market for development.

### 5.2.3 The agricultural policy today

Due to the kind of criticism of the PRSP that has been mentioned above the international community has realized that the situation would have to change, and to some extent it has. After the Paris declaration[16] on aid effectiveness in 2005 the ownership of the recipients of aid then became highlighted: *"Partnership countries exercise effective authority over their development policies, strategies and national systems when relying, partially or entirely on external resources"* (High-level forum 2005:3). This means that the Mozambican government should be able to make its own decisions about how foreign aid is going to be used, given that it is supposed to be given as budget support and not as sector support as before.

Since as much as 50 percent of the Mozambican budget consists of foreign aid and hence, has a significant impact on the economic development, this is an important change that has been made. The new policy is, according to an informant at the Swedish embassy, supposed to be more democratic as the government is given more opportunities to decide how aid should be used. However, this new policy does not imply that the state is totally released from control of the donor countries. There are namely restrictions that the government has to follow; the most important principals are to maintain the poverty reduction strategy, to uphold democracy and human rights and also to undertake measures against corruption. Moreover, the follow-up of these restrictions is extremely costly. For example Sweden pays around 20 million SEK[17] in administration costs per year for this procedure, money that is taken from the total amount of

[16] "The Paris Declaration, endorsed on 2 March 2005, is an international agreement to which over one hundred Ministers, Heads of Agencies and other Senior Officials adhered and committed their countries and organisations to continue to increase efforts in harmonisation, alignment and managing aid for results with a set of monitorable actions and indicators" OECD 2005).
[17] US$1.00 = 6.4250 SEK (exchange rate effective January 2, 2008)

Sweden's aid to Mozambique. In other words, a major part of the foreign aid is absorbed by administration costs (Interview No.42).

However, the new policy together with the fact that the state has been highlighted for agricultural development in the international discussion has, to some extent, made it possible for the Mozambican government to undertake a more leading role for the agricultural development. As has been highlighted earlier, according to Djurfeldt, this is an important factor of the Green Revolution. Its new agricultural policy PROAGRI II, that was adopted together with the country's second PRSP; *PARPA II* also contains other features which can be understood as a foundation for a Green Revolution (*See box*). One of the measures that have been undertaken within the framework of the policy was an intensification project that was implemented in 2006. The project is still ongoing and its main objective is to increase productivity on food crops such as rice, maize and vegetables by providing HYV, fertilizers and pesticides to small farmers, mainly in the area where there is a good potential for intensification, i.e. the northern parts. However these inputs are not subsidized since it is considered that the increase in production will be profitable enough to cover the costs for the inputs. This strategy is not in accordance with Djurfeldt's opinion about the role of state in the Green Revolution since he highlights the importance of subsidized inputs in order to make them more available for the small farmers. Nevertheless, the reason to why the inputs are not subsidized is probably to be found in the neo liberal values that are prevailing among the donors, which in turn makes it difficult for the government to introduce subsidies.

**PROAGRI II**

- The development of input and output markets
- Rural finance
- Technology
- Natural resource management
- Development of the infrastructure to promote rural development
- Enabling the environment for smallholder and private sector development

Nevertheless, as one of the representatives at the Ministry of Agriculture claimed, the inputs are not the only important factor for the development of agriculture. If the small farmers start to produce more, on account of the inputs that are provided, there must be possibilities for them to sell this surplus. Thus, it is also important for the government to stimulate the market. One step that has been taken in order to realize this is the recent creation, SIMA[18] that is an information system directed to small farmers and tradesmen. SIMA publishes printed data and gives information on the radio on retail, wholesale and producers' price for 28 food products in 21 localities throughout the country. In this way, both small farmers and merchants know the current prices of the nearby markets (Interview No. 43). The small farmers that we talked to knew about the radio program, but the signal did not always reach them. Despite this, they said that they usually did not have any problems to get information about the prices. This can be explained by the fact that many of them were members of an association that usually gets information about prices from the traders.

[18] Information system for agricultural market.

There have been other improvements that will favor the market as well. For example, today the delay to get the permission to create a company only takes 30 days, instead of 6 months. These improvements have been made as a result of the institutionalized instrument for dialog that now exists between the state and the private sector. One time a year there is a meeting between the president and the private companies, every 6 months the companies meet the premiere minister and once every month the companies meet the minister of every sector (Interview No. 39). Although, even if the legislation has improved the access to credits has not, this makes it hard for many newly created companies to survive since they have to find their financing themselves. One informant claimed that as a result, there are tensions between the state and the private sector (Interview No. 40)

The state has also started to motivate the small farmers to create associations and unions as it gives them better opportunities such as information concerning market prices and also access to credits, new technology and methods (s*ee also Appendix VII*). According to the small farmers in Nampacala the membership fee of the association was 5 Mt[19], per year. Also they had to pay a contribution of 10 Mt per year.

The general opinion of the people we talked to was that both the associations and the unions are working well. The reason why some small farmers chose to not become members was that they did not want to sign a contract on commercialization, however even if they were not members there were still no problems for them to sell their products through the association (Interview No. 14).

### 5.2.4 The small farmers' opinions on the national agricultural policies

After having conducted our interviews we understood that the measures undertaken by the state, in order to benefit small farmers, have not reached them. Many small farmers did namely criticize the Ministry of Agriculture for not making enough investments in order to resolve the existing problems in the agriculture. The problem is, as we understood, that the programs that are created at the national level never get implemented at the local level, or at least that it is difficult. The majority of the small farmers expressed their wishes for the state to take a more leading role. In particular they would like the state to create a new Agricom, which was a state led marketing board that was created during the war and that guaranteed the food security in the country (*See next chapter*).

Many of the informants did also express their wishes for a new development bank that could provide the small farmers with credits, since the lack of credits, as we will see, constitutes a big problem for the small farmers (Interview No. 3).

[19] US$1.00 = Mt 25,544.1 (exchange rate effective August 2, 2007)

## 5.3 International and national NGOs

### 5.3.1 NGOs

There are many international and national NGOs in southern Niassa that help small farmers and the small farmers' associations with the production and the commercialization of agricultural products. Our assumption is that this might be an outcome of the national agricultural policies in which the state, for many years, has been more or less passive.

In most cases the NGOs provide associations with tools and seeds. A common agreement between the NGO and the association is that the NGO offers 10 kg of seeds, which the association pays back in crops at the following year's harvest. The seeds are in general cash crop seeds that are bought from PANNAR, a South African seed company, or SIDCOM, a Zimbabwean and Zambian company, and not from Mozambique (Interview No. 22). Apart from providing seeds, the NGOs arrange ABC courses to give the farmers basic knowledge in reading, counting and also in the Portuguese language. A majority of the women that we talked to participated in the ABC courses and they confirmed that to know some Portuguese and how to write their names on their ID-cards give them better self-confidence. Also, they said that traders do not as easily exploit them when they know how to count. The NGO is also providing a network where associations can get in contact with traders and credit institutions (Interview No. 18; 22).

Examples of organizations situated in the northern part:

PAMA – (Portuguese acronym for Agricultural Markets Support Project) is not an NGO in the terms of being non-governmental. It gets financial support from the government and it emerged in order to support the implementation of the government's economic reforms launched in the '90s. PAMA mainly focuses on market organization and access to the market in order to help the small farmers to increase the incomes and food security (Ifad 2007:5, Interview No. 34).

OXFAM UK – has been situated in Cuamba since 1996. Today it launches the *Niassa Food Security and Livelihoods Programme,* in order to improve the farmers and associations access to food. It informs about different agricultural methods and different crops, especially cash crops, seeds to food crops are only distributed in food crisis (Interview No. 22).

CLUSA – has been active in Niassa for 6 years, its main sponsor is USAID. The organization's main objective is to help the farmers' associations to create improved relationships with the commodity traders and other agribusinesses. They also helped the associations to form groups of associations, or 'forums' so that the farmers could coordinate their marketing efforts on a broader scale and even register as legal, rural enterprises. This also facilitates their access to credits, for example at GAPI. The organization has also provided both the associations and the forums with training in marketing, organizational development, agricultural extension and crop management etc. (Interview No. 18; CGAP Agricultural Microfinance 2005:2 f).

### 5.3.2 Opinions about the NGOs

It did not take long before we understood that there was a problem with the coordination of all the organizations in this area. Authorities, representatives at NGOs, and small farmers, were all of the same opinion, namely: that the situation with the network of organizations was unbendable. An agricultural development strategy of any kind is not possible if the actors involved have difficulties to cooperate and if they do not have the same objective. One problem on the organizational level is that each NGO has its own policy on how to reach agricultural development. This implies that there is no consistency among the programs, which creates confusion in the society and among the small farmers when they have to adjust to all these different kinds of programs. Also, there are programs that overlap each other, i.e. there is more than one NGO working with commercialization in the same area (Interview No. 16; 18).

The international NGOs were often criticized for their way of implementing their own programs in the society without consulting the inhabitants. Many of the small farmers had been in contact with NGOs that had tried to implement new crops and new methods. However, small farmers expressed their disappointment with NGOs coming and leaving within 2-5 years and often without fully implementing their programs or holding on to their promises (Interview No. 8; 14). As a result, the small farmers do no longer have confidence in NGOs or in new technology and methods; some of the small farmers told us that they were tired of all these 'new ideas'. This kind of attitude of the small farmers regarding new technology also hampers their willingness to accept the strategy of the Green Revolution.

What also needs to be mentioned is that most of the organizations are working with commercialization of cash crops which is in contrast to what is emphasized by advocates of the Green Revolution and also wanted by the small farmers, namely production of food crops. The new trend is to reach agricultural development through cash crops and the opinions regarding this are less likely to change in the nearest future. Mostly, it is the organizations that provide the small farmers with inputs and new techniques, and as long as the policy among the organizations does not change a strategy based on improved food crops have little or maybe no chance to be realized.

## 5.4 Summary

At the time when the Green Revolution took place in Asia, there was a whole other situation on the world market than there is today. However, experts today do believe that there will be a significant increase of the price on cereals. If the world market price on maize will increase even more this will, we believe, motivate the small farmers in the southern Niassa to accept a strategy such as the Green Revolution, which is based on intensification. Also, the different international agreements that Mozambique is currently involved in are all good means in order to improve the Mozambican export market. Although, Mozambique will never be able to compete with the North, if North does not open their own markets (*see also table 4*).

What is optimistic though is that the world politics with the PRSP and the Paris declaration have granted the Mozambican state to take a more leading role for their national agricultural politics, which is a precondition for the implementation of the Green Revolution. However, so far it seems like the state has not succeeded in implementing the projects that it has initiated. But what needs to be kept in mind is that these projects are in an early stage and it will probably take a while before any results will be visible. Hopefully, the state will also find a way to coordinate all the organizations that are operating in the area so that these organizations can help the state to implement its projects, instead of, as the situation is today, that they hamper the possibilities for the state to act.

**Table 4.** *Small farmers' attitude toward technology of Green Revolution, society in general*

| **Reason**: | The farmer 'does not know' | The farmer 'does not want to' | The farmer 'cannot' |
|---|---|---|---|
| **Limitations**: | | | |
| Society in general | | Lack of good coordination among organizations, which has resulted in bad experience from former new technology | National projects do not reach the farmers<br><br>Several organizations that are operating with different objectives<br><br>Organizations mainly provide seeds for cash crops<br><br>International trade politics – low prices<br>TRIPS<br>'western' subsidies<br>dumping/food aid |

# 6. Direct surrounding

*By examining factors in the direct surrounding such as the local factors and the national agricultural market we can examine what possibilities there are for a Green Revolution in the area.*

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## 6.1 Local factors

### 6.1.1 Land use rights

Land use rights are vital for agricultural development and can therefore spur a Green Revolution. Due to reasons that are related to security, the small farmer is not willing to invest in agriculture if there is a risk of loosing the land. According to the constitution land in the country can neither be sold, nor out-leased or mortgaged, but individuals can obtain land use rights for a duration of 50 years if they have occupied a piece of land for more than 10 years. This was declared in the land law from 1997 when returning refugees from the war wanted their former land back. According to this law, no documents or registration of title are necessary in order to use the land. The only thing needed is an agreement between two persons. Furthermore, the law gave the right to women to become landowners. The law also confirmed that whenever a household wants to expand its land, the inhabitants of the village have to be consulted (Interview No.41). Therefore, if a family wants to expand their land area they normally turn to the traditional *Régelo* who makes an evaluation of the person's background, often by talking to people in the village where the family used to live. If the land is approved to the new family the leader must inform the community but there is no need for registration (Interview No. 14). According to the small farmers that we interviewed there were in general no problems related to land use rights.

### 6.1.2 Expand vs. Intensify

The small farmers, who mostly are women, exclusively use the hoe when cultivating their land. Additional techniques used are burn beating, fallow fields and also rotation systems; the latter is used in order to render cultivation possible all year long and to keep the soil fertile (Interview No.19). Thus, in order to render an intensification of the agriculture possible, mechanization is needed, at least according to the majority of the authorities and professors that we interviewed. They did in particular highlight the importance of introducing oxen and ploughs, but they did at the same time list the following difficulties with this kind of method:

- There is no tradition of animal husbandry in the region.

- The cost of one ox is between 5 000-10,000 Mt, which is very expensive for the small farmers.
- The oxen might need veterinary care, which is not always available it is also very expensive.
- In some of the northern parts, there are a lot of Tse-tse flies, which makes animal husbandry difficult.

Despite these difficulties, the Agricultural Faculty in the Cuamba district has planned some projects with the objective to teach small farmers how to use oxen and ploughs (Interview No. 37; 17). Another ongoing project is the one driven by Instituto Nacional de Acção Social (INAS) with the objective to provide the small farmers with tractors. This project is a part of the government's poverty reduction strategy from 2006. We were told that INAS will let out a tractor on hire to small farmers who join together in associations and who start to cultivate in bigger plots. By participating, each person in the collective will get 420 Mt per month, but the work has to be maintained, otherwise the money will not be forthcoming the following year (Interview No. 14).

However, these projects do not go hand in hand with the strategy of the Green Revolution that is based on intensification and not extension. The Green Revolution does not neglect mechanization, but the strategy does first and foremost focus on intensification through improved seeds and fertilizers, meaning that the small farmers still can use some of their old techniques, like the hoe and at the same time spare labor effort. Professor Stefan de Vylander even claims that the combination of maize, the most common crop among the small farmers in Mozambique, and tractor can have devastating consequences for the environment in Africa since it can increase the erosion of the soil (Världens Natur). Thus, there is much to suggest that the Green Revolution will be easier and better to implement than the mechanization projects, in particular in view of the fact that the vision of the need for mechanization is not fully established among the small farmers. A representative woman from the municipal who worked with gender related issues had noticed that women are not interested in mechanization. Instead they are more concerned about the satisfaction of basic needs such as water, food, maternity welfare, etc. (Interview No. 5). Further, she claimed that mechanization is rather something that men are interested in but since they are not out on the field as much as the women, they do not see what needs there are. Men are rather more concerned about means of transport to be able to go to the market, she concluded.

However, when we talked to the small farmers we did not see this difference between men and women; they all seemed to be equally interested in, or rather uninterested in new techniques, including techniques required for the Green Revolution (Interview No.5; 20). The small farmers were not opposed to new techniques but if they would have the possibility to choose how to intensify their production they would rather choose to expand their land with by using hired labor. Despite this, they had reconsidered to use animals for expanding their land and they had also made an inquiry to the authorities in Cuamba regarding the project led by INAS and to get financial support for animal husbandry but they had not yet received any reply (Interview No. 14). Our interpretation of the situation was that these projects were, as many other projects, not functioning.

The strategy to expand rather than to intensify has its roots in the traditional system to cultivate. Since the access to land has been unlimited the small farmers have never had to think about intensification[20] and as long as there is land available farmers rather choose to expand their land plots instead of increasing the production of the area that is already cultivated. However, when we asked the small farmers about intensification techniques like Green Revolution related inputs, they were not completely opposed to the idea (*See Chapter* 7).

### 6.1.3 Infrastructure

The infrastructure was a recurring subject in our interviews, both among the small farmers and among the traders. The undeveloped infrastructure within the provinces and outside the provinces is namely an essential problem for a dynamic market in this part of the country. During the rain periods the roads can be completely destroyed and the small farmers and traders cannot go anywhere to sell or to buy crops. Also during periods when the roads are in a fair condition they are still in such a bad condition that some traders do not want to go and collect the crops from the farmers. The reason is that there is a high risk that the car/motorbike will break down and therefore needs to be repaired, which is highly expensive. Due to this reason it is in general also difficult to get the possibility of renting a car (Interview No. 13). This situation has had negative effects on the market. This, in turn, also determines whether the small farmer will adopt new techniques or not. If the small farmer does not have the opportunity to sell his or her surplus, which is one of the final goals of the Green Revolution, it is also likely they will not adopt the technology required for a Green Revolution. For instance, we met small farmers that have not been able to sell their harvest from the previous year, and who told us that there is no point to produce more when the harvest only will rot away (Interview No. 8). The dysfunctional infrastructure does also have other consequences. It decreases the opportunities for the small farmers to get access to the techniques needed for a Green Revolution. Not only does it prevent the extension services to reach farmers, it does also affect the access to inputs. As we will see later, the prices on inputs are high, partly because of the high transportation costs.

The majority of the people we have talked to, as well authorities as private traders and small farmers agree on the fact that the infrastructure is the main problem in the area and that it has to be resolved. However the rehabilitation of the roads is highly expensive and, apart from some investments made by PAMA, there are almost no investments made for the rebuilding of the roads (Interview No. 34). On the other hand, investments are about to be made for the rehabilitation of the Nacala corridor, which is a railway that got destroyed during the war. When the

[20] According to Djurfeldt, intensification is in general associated with a situation where there is a deficiency of land and a pressure from a growing population. Although, he further claims that such a situation does not necessarily guarantee a process of intensification (Djurfeldt 2005:10). In Mozambique there is no deficiency of land, in total 47 percent of the land area is cultivable, but only 10 percent of this area is cultivated and 97 percent of that are cultivated by small farmers (Coughlin 2006:4).

program is completed the corridor will stretch from Nacala Port to the Indian Ocean via Malawi into the eastern and northern parts of Zambia. On account of the Nacala corridor, the Southern Niassa of Mozambique has a good potential to export and the railway is also vital for the local, regional, national, and international trade (Nacala Development Corridor). At periods when the rain destroys the roads, the railway is the only mean of transport between the towns and villages. The train is used both for the transportation of goods to the markets but it also serves as a mobile market. The days when the train passes by the villages, the small farmers who live next to the railway take the opportunity of selling their crops to the passengers at the train (Interview No. 2). However, the railway is not always reliable, there are often delays due to break-down of equipment and sometimes there are cuts of the line due to the rain. During the rain period last year the line between Lichinga and Cuamba was shut down for 30 days, which had negative impacts for the trade and the market for both small farmers and traders (Interview No. 2).

Ironically, the bad infrastructure also affects the country's self-sufficiency since the surplus from the fertile fields in the north cannot be transported to the southern parts where there is a shortage on food crops. Instead, the southern provinces have to import from South Africa. Although, even if the roads would be improved it is questionable if transporting the crops from the north to the south would be ecologically sustainable, however it is a fact that the dysfunctional infrastructure in general hampers the domestic market.

### 6.1.4 Irrigation system

Like seeds and fertilizers, irrigation system is also an important technique required to intensify agriculture. Irrigation systems can be used for a wide variety of crops but it is especially used for the cultivation of rice. Today, the production of rice is not believed to be globally profitable, yet sub-Saharan Africa imports more rice than it produces (*Appendix VIII*), (WB 2006:117; Africa Rice Center 2005:20). Djurfeldt emphasizes the production of rice in Africa. Like maize, rice is a stable crop on this continent and with an increased production of rice; he believes that the continent has good opportunities to become self-sufficient in food. In Mozambique, rice is mainly produced in the southern part in the Chokwe area, but according to one of the professors at the Agricultural Faculty of Cuamba there is a good potential to develop an irrigation system in the southern Niassa that can increase the production of all varieties of crops, even rice. The construction of an irrigation system would enable the cultivation of short-term crops and would give as much as four or five harvests per year (Interview No. 18). The professor explained that on account of the local conditions; the frequent rainfall and the way the rivers are constructed, the construction of an irrigation system would not be costly. The water namely runs in steps, which would make it easy to collect the water in dams.

The construction of such a system would therefore theoretically be possible for the small farmers to create if they only could join together in groups and start to

cultivate in bigger areas[21]. Also, to cooperate with other farmers would help them financially since the costs to create an irrigation system are rather high, it is estimated to cost around US$600-800 per hectare (WB 2006:10). However, even though many associations, where small farmers work together, have emerged lately, some of the small farmers that we talked to still have a negative attitude regarding the sharing of fields, they were simply afraid of the free-rider problem. This mistrust among some small farmers can therefore jeopardize an irrigation system project, which would be vital for the introduction of new seeds since they often need more water than the traditional seeds.

### 6.1.5 Extension Services

Mozambique's public-sector rural extension service was institutionalized in 1987, with the creation of the National Directorate for Rural Extension and at the end of the civil war it considerably expanded and became a diversified system, utilizing both public sector and private sector extension (Gemo & Rivera 2001:2f). Nevertheless at the end of the 1990s, due to limited resources and pressure from the international community it cut down the number of extension workers in the country. In 2004, the percentage, according to the idealized coverage at 225 households per extension worker was only 14 percent in the whole country and in Nampula and Niassa 15.6 percent respectively 36.5 percent. However, even if there is an extension office or post available in a village, as many as 80 percent cannot benefit from their services due to the long and impractical distance[22] that either the small farmers or the extension workers have to travel to reach each other (Coughlin 2006:30f).

**Table 5.** *Extension worker density in Niassa and Nampula, 2004*

| **Province** | **Population** | **Extension workers** | | | **Extension workers per 10,000 inhab.** |
|---|---|---|---|---|---|
| | | Gov. | NGOs | Private | Province |
| Niassa | 966,579 | 58 | 135 | 68 | 2.7 |
| Nampula | 3,563,224 | 121 | 291 | n.a* | 1.2 |
| Total of all provinces | 17,898,458 | 708 | 1,309 | 259 | 1.3 |

* n.a.= not available

Source: Coughlin 2006:32

As a result of limited resources, some of the organizations have chosen to only concentrate on the high potential areas, like the Niassa province, since this is supposed to give a higher pay-off than if the extension services are spread all over the countryside. In this matter the strategy follows the means recommended by Djurfeldt, namely that efforts made for the agricultural development first and foremost should be made in high potential areas. However even within these kinds of areas in Mozambique not all small farmers do get advice from the extension

[21] Small farmers do never have bigger fields than three hectares.
[22] Normally around 200 km.

workers since there is no rotation system within the district. Some areas in the southern Niassa are isolated and cannot be reached by the extension workers because of the underdeveloped infrastructure and limited resources. Due to these reasons, technologies related to the Green Revolution, will be hard to spread since the extension workers continue to visit the same farmers in the same villages while others are being neglected.

Another problem is that the extension workers keep repeating the same messages year after year which have limited the impacts since the messages have already been adopted by the small farmers yeas ago (Coughlin 2005:32). This can be illustrated by the following quote by an agricultural officer in a field study made by Eicher (2002) *"…we need new technical messages. We have preached the same messages such as planting on line for 10 years"* (Eicher 2002:26 in Coughlin 2005:33). Our informants also highlighted these problems. Although the major part of the northern area has access to extension workers, there is still a need to provide more advanced training for the extension workers in order to give them improved skills about agricultural techniques that they could transfer to the small farmers. Further, the extension services were criticized for not being able to provide the small farmers with the tools that are necessary to use the new technology, as one small farmer told us, "*I have the knowledge, but I do not have the equipment to use my knowledge…"* (Interview No. 8).

The current situation with an extension service system that is not functioning makes it hard to stimulate a Green Revolution in the area. Even if the small farmers would have access to the new techniques they have to know how to use them. In particular is this important in view of the fact that the use of the techniques for a Green Revolution, for example HYVs and fertilizers implies environmental risks. Also, if they are not used correctly they might not result in higher yields as expected.

## 6.2 The Agricultural market

### 6.2.1 Access to Seeds

To have access to improved or HYVs is essential if a farmer will be able to intensify his/her production and adopt the techniques for a Green Revolution. However there is a lack of access on improved and HYVs in Mozambique. In the southern Niassa the small farmers can mainly receive improved seeds or HYVs from the organizations for certain cash crops. Improved seeds are also available

**General Seed Facts**

Traditional seeds – no-processed seeds usually give fewer yields than improved seeds but keep the same quality through out the years.

Improved seeds – usually open-pollinated, needs to be changed every 5th year to sustain good yields. Improved seeds are also sometimes described to be traditional seeds but where the farmer has singled out the best seeds. Some or no fertilizer needed.

HYV and Hybrid seeds – need fertilizers and pesticides, need also to be changed every year to keep good yields.

through formal channels such as the Mozambican seed company SEMOC[23] which, until recently was the only commercial seed production and distribution entity that operated in Mozambique. But today access to improved seeds can also be reached through foreign companies like PANNAR. Nevertheless, according to the interviewed at district level, the current structure and distribution of seeds are not working *comme il faut*. Coughlin (2006) claims that Mozambique in total looses around US$260 per year in agricultural incomes as a result from the failure of distributing improved seeds of key crops that are developed and tested by the national research service. The current problems have, according to him and other researchers its roots in the monopolistic distribution systems, dependence on both imports and donor aid, and also scant domestic research and production of seeds. All these problems will briefly be presented below (Coughlin 2006:10).

- It is difficult to create a demand for purchased seed among the small farmers after all the years of free distribution. Throughout the civil war the government did namely, with help from foreign donors, distribute seeds for free through different emergency programs (Howard et al.1998:3).

- As a consequence of the free distribution there is also both a lack of retail seed stores in most districts and of domestic production which became a visible problem once the donor's aid decreased in the mid 1990s (Coughlin 2006:12f).

- The regulation of seeds that ensures their quality and appropriateness has been criticized for being overly restrictive and bureaucratic, and hence making fewer varieties available for sale. (Coughlin 2006:12f).

**Table 6.** *Percentage of communities where inputs, seeds, are available in their or the neighboring community*

| Province | Tools | Agrochemicals* | Seeds |
|---|---|---|---|
| Niassa | 17 | 11 | 26 |
| Nampula | 16 | 3 | 20 |
| Weighted average | 14 | 6 | 20 |

*Agrochemicals= fertilizers and pesticides
Source: Coughlin 2006:13

As a result of these problems, the seeds from for example SEMOC, have become very costly for the small farmer. A small farmer needs to pay 39 Mt for 1 kg of seeds for maize and 45 Mt for 1 kg of peanuts (Interview No.7). This kind of structure makes it hard for a Green Revolution to take place when the strategy is build upon the small farmer's access to HYVs to low costs. The bad access to these kinds of seeds decreases the small farmer's possibility to increase his or her yield and to produce a surplus for sale. Also, because of the high prices the small farmer also chooses to use the traditional seeds instead.

[23] SEMOC is a former parasitical that now has been privatized.

Apart from the prices most small farmers are not opposed to use improved or HYVs since they think that it would decrease their amount of work. However, many small farmers have little knowledge about these inputs and have high expectations about them. Consequently, as we have understood, small farmers that have already tried these new inputs were not all satisfied with the results of these inputs since they did not fulfill their expectations. Therefore, they later chose to go back to the use of traditional seeds. Furthermore, HYVs have to be stored in a particular way, which is not always possible due to the scarce resources. This is another reason to why the small farmer prefers to use the traditional seeds. They are namely more sustainable and suitable for the storage of the small farmer than the HYVs. As a consequence we believe that even if the access on HYVs would improve in the area, something that is vital for the implementation of the Green Revolution, it is not certain that all small farmers would be willing to use them.

Also, without a research institute that produces HYVs seeds for local conditions in Mozambique, a more frequently use of HYVs is not likely to be possible.

### 6.2.2 The access to agrochemicals

Techniques related to the Green Revolution are especially fertilizers and pesticides; however Djurfeldt concludes that pesticides should be dealt with caution in Africa. Some small farmers told us there is no need for fertilizers in the area due to the fertile soil, while others, in general, were positive regarding the use of both fertilizers and pesticides. On the other hand, the opinion of the small farmers is that they are too expensive and that it is hard to get access to them. Also, many believe that the yield after using fertilizers or pesticides do not cover the costs of buying them. As a consequence only 2.7 among small farmers in the whole country use fertilizers and 4.5 percent pesticides, and in general it is only contract farmers who use them for cash crops such as cotton and tobacco (Coughlin 2006:19). According to statistics (*Table 6*) Niassa was estimated to have a higher amount of fertilizers and pesticides than the average amount of the whole country.

**Table 7.** *Percentage of communities where inputs, agrochemicals, are available in their or the neighboring community*

| Province | Tools | Agrochemicals* | Seeds |
|---|---|---|---|
| Niassa | 17 | 11 | 26 |
| Nampula | 16 | 3 | 20 |
| Weighted average | 14 | 6 | 20 |

*Agrochemicals= fertilizers and pesticides
Source: Coughlin 2006:13

The high costs and the bad access can be explained by the fact that the two parastal companies; Interquimica and Boror Commercial that imported respectively distributed all agrochemicals throughout the 1980s have been privatized. Also the retail outlets of Boror Commercial have closed which have decreased the access to inputs for small and medium scale farmers. Today most

retail outlets are only to be found around Maputo. The prices are kept high due to the suppliers' regional monopoly, but also because of the high costs of imported agrochemicals and the high local transportation costs (Howard et al.1998:2).

Unlike the small farmers, the authorities and professors that we interviewed were critical regarding the use of chemical products. They were worried that these kinds of products would destroy the soil and the natural flora. Instead, they would prefer an ecological agricultural development in Mozambique (Interview No. 19). This concern is shared by the world's critics of the Green Revolution, who also point out the risks related to the use of fertilizers and pesticides. Our assumption is that since the authorities are negative to these kinds of inputs, the access will probably remain low.

### 6.2.3 The possibility to sell the output

The goal of the Green Revolution is to reach self-sufficiency, when the country later has reached self-sufficiency it can start producing a surplus to sell. However, whether the small farmers will start producing a surplus to sell is determined by the situation of the market. Before the war the commercial network consisted of country shops that bought the crops from the small farmers, in return these shops provided the small farmers with basic products such as salt and soap. However, during the war this system collapsed and instead Agricom became the leading purchaser of the small farmers' surplus. One of its main tasks was to distribute food from areas where there was a surplus of food to areas where there was a shortage. Another of its main tasks was to uphold a storage of food in order to guarantee the food-security in the country. The system was based on the principle that the government set a minimum price for all agricultural commodities. In this way the small farmers always knew how much they would get for their products. Even though the prices were rather low, the small farmers told us that they were satisfied with Agricom because they knew that they always had a buyer (Interview No. 12). However, after the war Agricom was closed down, due to foreign pressure. This has created problems, in particular since Mozambique often is struck by droughts and floods and now they have to rely on food aid or import from South Africa. If the government would rebuild a system, similar to the one of Agricom they would not only be able to provide the population with their own crops but also to support the domestic agriculture.

At the moment when Agricom was closed down another parastatal called ICM took over the role of Agricom. Nevertheless its objective was to eventually diminish the role of the state and instead promote other traders at the market. As a result ambulant traders emerged at the market and ICM became a buyer of last resort, in this way it could still uphold the food security. But ICM faced the problem of not having enough funds and did eventually have to follow the same pattern as other commercial actors, namely let their business be determined by supply and demand. Today ICM exists but does not run any business besides renting a few ware-houses (Interview No. 12). Due to this reason, small farmers in southern Niassa today are mainly dependent on the small traders that visit the villages on their bikes or on their motorbikes after they have been in contact with the farmers' associations. These traders are mainly engaged in produce trade and

not in input supply, which prevents the small farmer's access to pesticides, fertilizers and improved seeds. They stay in the villages for approximately a week in order to collect as much crops as possible. Afterwards they return to town in order to sell to a wholesaler like ICM or to a big mill company like Cimpan[24].

The opinion about the trade system was divided among the district authorities; those who were positive meant that the way it works makes the market more flexible. Further they claimed that it is better for the small farmers since they do not have to pay for the transportation costs. Those who were negative, on the other hand, were pointing at the traders' monopoly in the areas where they operate which keep the agricultural commodities prices low. However the small farmers do not have any other choice than accepting the low prices. Due to the long distance they cannot walk to ICM in Cuamba to sell their crops and then get a higher price, neither can they rent a car nor a truck since it is too expensive. Therefore, they are more or less left out to the traders who come to the villages (Interview No.14; 21). This affects the small farmer's motivation to produce a surplus for sale negatively, which, in turn, also affects the small farmer's motivation to adopt techniques like the one related to the Green Revolution, which is based on higher yields and surplus production. As a result this also impedes the whole country's self-sufficiency and export market.

### 6.2.4 Credits

New technology is expensive, and the one needed for a Green Revolution is no exception. One determining factor for the small farmer's possibility to invest in new technique is therefore the access to credits. At present, the small farmer in the southern Niassa cannot always benefit from the credit system, as there is often a request for security, which small farmers seldom have. As a consequence he/she will not, if interested, have the opportunity to invest in technology related to the Green Revolution such as inputs or an irrigation system. The lack of credits also constitutes an obstacle for the tradesmen, whose problems in turn affect the small farmers. The small-scale traders cannot, due to lack of credits, neither purchase nor distribute the inputs to the small farmer, which hampers the small farmer's access to inputs. One of the tradesmen also claimed that as a consequence of the difficulties in receiving credits and the dysfunctional infrastructure, the costs for the traders are high, which results in unprofitable offers on the small farmer's products (Interview No. 33).

There have been governmental attempts to provide rural finance at subsidized rates through the People's Development Bank, but within the framework of the SAP the bank got privatized and its rural branches closed down which implied the collapse of credit facilities for smallholder farmers (Oxfam 2002:6). Today the whole bank system is privatized and ever since the 1990s there have been some microfinance operations, but the problem is that they remain concentrated in urban centers. Also, no one wants to invest in agriculture since it is a high-risk activity that does not give a good return (Interview No. 36). Gapi and Amoder are

[24] If local traders choose to do business with Cumpan, they can give them advance payment without interest.

the only financial institutions that are established in the rural area but after having interviewed these two institutions we understood that the chances for the small farmers to receive credits from any of these two institutions are fairly low. First of all the interest rates are high; between 20 and 50 percent. Furthermore, in general they are not willing to approve credits to small farmers since it is a high-risk activity. They also require security for their loans, like for example a sellable house[25], vehicles or structures, which is something that small farmers do not have (Interview No 36; 23).

As a result of this system, in which small farmers have difficulties to receive credits, the predominant source of agriculture credit for small farmers in Mozambique is to cultivate cash crops, like tobacco, cotton through agribusiness or trading companies. This kind of credit is of major importance since almost no small farmers have the resources necessary to invest in inputs like seeds, fertilizers and pesticides at the beginning of the season, or to pay for transportation of their harvest sale several months later. The so called 'agribusiness credit' is in most of the cases confirmed with a contract. The small farmers usually get inputs or advance from the company or individual trader and in exchange they agree to sell their crops to the company/trader, in general at a pre-arranged price. In turn, the company is bound to purchase the crops from the farmers (Interview No. 23; CGAP Agricultural Microfinance 2005-2008). This system gives small farmers a good opportunity to receive inputs; however they still face the problem of getting access to inputs for their food crops, which is the main objective of a Green Revolution.

### 6.2.5 Manufactured production

Some traders who have received credits invest in a mill. If the business is profitable they usually make further investments like in a bigger mill or in a vehicle to pick up larger quantities from the small farmers in order to transport crops to the market in Maputo where the prices are higher (Interview No. 33). However, there is an absence of large investments in manufactured production. Especially authorities, ask for manufactured production in the region, such as processing of raw materials to become more competitive at the world market. In order to reach this goal they claim that it would be preferable if the small farmers could get the opportunity to use, for example, machines that can size peanuts, the goal could also be reached by teaching small farmers how to classify crops like maize into first, second and third class (Interview No. 1; 4). An informant at the province department told us that the European Union has requirements on what shape and sizes the crops should have and by introducing this kind of processing at the local level it would be possible to increase the average price of the products (Interview No. 1). This kind of industrialization could also strengthen the agriculture in the country, which could enhance the process of the Green Revolution like it did in Asia. Due to this kind of small industrialization more of the small farmers' crops would be purchased and generate in increased production and more agricultural investments by the private sector. However the process is impeded by the lack of foreign investments and opportunities of credits for those

[25] Sellable house is made in cement and there has to be a document on the house.

who want to invest. A representative on a national organization for private businesses claimed that private companies today are doomed to failure because they need to find their financing themselves. He suggests that the state should create opportunities for an agricultural bank with the objective to distribute credits for investments. This would facilitate the situation for new companies and develop the private sector (Interview No. 1).

## 6.3 Summary

There are some factors in the southern Niassa of Mozambique that indicate that a Green Revolution would be possible. First of all, as mentioned, the soil is fertile and hence, suitable for a Green Revolution. Second the small farmer can make investments for the cultivation of his field without being afraid of loosing it since there is no deficiency of land in the area. But on the other hand, as we have seen, the investments the small farmers would make would rather be in expansion than in intensification, which does not go hand in hand with the policy of the Green Revolution. A third factor is that the small farmers prefer to produce edible crops so called food crops. This indicates that it is rather likely that a Green Revolution would be accepted among the small farmers, the goal of the Green Revolution is, as mentioned, to be self-sufficient in food-crops. However, there are also factors that indicate that a Green Revolution will be hard to implement. These factors will be presented in the box below:

**Table 8.** *Small farmers' attitude toward technology of Green Revolution, Direct surrounding*

| **Reason**: | The farmer 'does not know' | The farmer 'does not want to' | The farmer 'cannot' |
|---|---|---|---|
| **Limitations**: | | | |
| Direct surrounding | Lack of knowledge about intensification techniques due to the traditional way of cultivating.<br><br>Do not have any knowledge about improved or HYVs. | The condition of the infrastructure determines if they are going to produce a surplus.<br><br>Excess of land.<br><br>Monopoly among traders.<br><br>HYVs are sensitive to store.<br><br>Fertile soil; no fertilizers needed. | Lack of good infrastructure which limit the small farmers' access to market, and inputs required for a GR.<br><br>Lack of extension service.<br><br>Lack of access to credit.<br><br>Low manufactured production. |

# 7. Individual circumstances

*The difficulties for an implementation of a Green Revolution in the northern part are many; below we will give a picture of the small farmer's individual circumstances, such as the small farmer's self-confidence and health conditions, to understand the small farmer's attitude regarding the new technology. This attitude determines whether a small farmer will adopt new techniques like those needed for a Green Revolution.*

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## 7.1 Physical and Psychical factors

### 7.1.1 Education, Self-confidence and Risk taking

According to the WB, the country has a high percentage in school enrolment, it is namely as high as 92 percent; however the illiteracy rate for people older than 15 years is only 54 percent and hence still fairly low (WB 2006:27, 2007; DRN, ADE, BAASTEL, ECO & NCG 2004:8 2004:5). Reports from the Governments Offices of Sweden also illustrate major gender disparities and urban-rural imbalances within the education sector (Governments Offices of Sweden 2002:4). The incidence of the education sector among the small farmers in southern Niassa are not known, however, due to the fact that the majority of the people live in the rural areas it is probably lower than the national average. Low illiteracy and insufficient education can hinder small farmers to get the knowledge required to adopt new technology. At the same time, since they have very little knowledge about new technology, which is rather advanced, it is possible that there is not much of an interest to implement new technology. Some of the small farmers in southern Niassa that we talked to had neither heard about HYVs nor about the Green Revolution, to be exact they have very little knowledge about the components of the Green Revolution and could not give their opinion about it.

Some of the new techniques of the Green Revolution interfere with the traditional techniques and to break with the tradition by start using the new technique requires a good self-confidence. If the small farmer lacks self-confidence he/she will underestimate his/her ability to adopt the new method (Åkesson 1994:83). Furthermore, some small farmers feel insecure if they have to abandon their traditional methods in favor of a new one. They believe that the risks are too high and even if the yield will increase as a result of the new method, there is also a prevailing risk of loosing everything they have. Even if the traditional method does not give as high yields as the new one they know that it will always give something. Hence, for them it becomes a matter of survival.

What we noticed was that the most active small farmers have the self-confidence to participate at the demonstrations of the extension workers and are also willing to adopt new techniques and abandon the traditional way of cultivating. But some of them were not willing to do this. One extension worker told us about a small

farmer who had two fields; one of them was a so called demonstration field where the extension worker taught the small farmer how to sow in lines and to leave a certain distance between the plants etc. On this field the yield was high. On the other field the small farmer applied the traditional way of sowing, viz. to spread the seeds with the wind, which resulted in lower yields than in the demonstration field. When the extension worker later asked the small farmer why he did not use the new techniques, he could not answer. The extension worker told us that the traditions and the culture are so deep-rooted that the small farmer sometimes does not have any interest or confidence to start using the new methods (Interview No. 7).

### 7.1.2 Time and Tradition

In general the husband is the head of the household and is therefore responsible for the family's welfare. In order to make some extra money for the households the men usually buy sugar canes which they make spirits off and then sell, it is also common that the men produce and sell coal. Due to tradition, most of the work on the fields is performed by the women. Hence, when talking about the small farmers it is the women that we foremost refer to. The first thing the women do in the morning is sweeping the yard. Once this has been done they go to fetch water and collect firewood before the work on the fields begins. It is the women who are responsible for the production of food, i.e. the food security of the family and it is of tradition that each woman has her own field. While the woman is out working on the field the oldest daughters take care of the household and their brothers and sisters. Due to the heavy burden of work both in the household and on the field, the woman has little time to adopt a new method. Implementing a new method is time consuming and even if the woman would save time by using the new method later on, she might not have the time to learn how to use it (Åkesson 1994:87). A common comment among the small farmers we interviewed was: *I am working from early morning to late night; I do not have the energy for more work*. Also, her position in the family as a woman and wife in a traditional society will also affect her choice of whether or not she will adopt a new technique. Traditions do not always allow changes and therefore, we believe, a Green Revolution has to be implemented in accordance with the traditional techniques. The Green Revolution has a possibility to be accepted due to the fact that the small farmer can continue to cultivate food crops, but with new seeds. Yet, fertilizers and irrigation system might be harder to implement in view of the fact that they are not a part of the traditional techniques.

### 7.1.3 Health

The small farmer's personal health and age can also be decisive for the farmer's decision of trying the techniques of the Green Revolution. As Åkesson claims, elderly farmers believe they do not have the strength to change their methods and routines. Diseases like malaria[26], tuberculosis and diarrhea do daily struck the

[26]In 2006 as many as 6,227,719 people in Mozambique were infected by malaria, and in total 4,985 persons died because of the disease. The primary cause of malaria is in general people's bad

population in Mozambique and in the end they prevent the small farmers to adopt new technology.

HIV/AIDS has become the major obstacle for development and poverty reduction in the whole country; especially in view of the fact that most affected people come from the working population. After independence the mobility among people increased which caused further HIV prevalence. Poverty and limited health conditions also worsened the situation and the official rate in 2005 was 16.1 percent for people between the ages 15-49. The prevalence rate in 2001 was 5.2 percent in Nampula and 6.8 percent in Niassa, however the incidences are believed to be much higher (*Appendix IX*) (CDC 2007; Interview No. 10; Economic Commission for Africa p. 3). The HIV InSit, studies show how countries affected by the HIV/AIDS epidemic loose in average between 1-2 percent of their annual economic growth (HIV InSit 2007). In countries like Mozambique and especially the southern Niassa that is still heavily dependent on agriculture, the deaths caused by AIDS result in labor loss and consequently also food shortages. When a person becomes ill within the agriculture sector this affects the whole family. Not only is the person no longer able to work, he/she needs treatment from the family members which also hinders them to work in the fields or in the households (Interview No. 9).

To deal with this problem, everyone that is tested positive at GATV, an organization in Cuamba, which work with AIDS/HIV-related issues, can receive anti-retrovital drugs and condoms. However, it is difficult to make people go and get tested. The disease has namely not been acknowledged among the rural population in view of the fact that it is a disease that is not visible. People do therefore not realize that it is the virus that is the cause of death of people who get infected by other diseases, like for example malaria. They do not know that it is the virus, which makes the person less resistible to malaria, and that it is this that causes the person's death (Interview No. 10).

## 7.2 Summary

Whether a Green Revolution will be implemented in a society or not is determined by the small farmer's attitude toward its techniques. Our conclusion is that not many small farmers have knowledge about the different techniques that are related to the Green Revolution and therefore they do not have any opinion about it. Hence, even if they would have had this knowledge, there are still other factors in the small farmer's personal life and lifestyle that always will cause difficulties in adopting a new technology or method. These are summarized below.

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health condition. To help infected persons medication can be received for free, the patient only pays 1 Mt for the appointment with the doctor.

**Table 9.** *Small farmers' attitude toward technology of Green Revolution, individual circumstances*

| **Reason**: | The farmer 'does not know' | The farmer 'does not want to' | The farmer 'cannot' |
|---|---|---|---|
| **Limitations**: | | | |
| Individual circumstances | Knowledge and experiences | Willingness and interest<br>Risk taking<br>Self-confidence<br>Traditions<br>Family situation | Health<br>Age<br>Time |

# 8. Final discussion

*By referring to Djurfeldt's approach of picturing the Green Revolutions in Asia we will below have a discussion of our findings in this study. In this discussion we will analyze, from a small farmer perspective, the possibilities and obstacles for an implementation of a Green Revolution in southern Niassa, Northern Mozambique. We will also answer the following question: In what sense are the findings in Asia, presented by Djurfeldt, relevant for the situation in southern Niassa?*

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We believe that the experiences from the Green Revolution in Asia are of great importance when analyzing the possibilities for a Green Revolution in southern Niassa, Mozambique. The geopolitical context, the role of the state, the market and the focus on the small farmers were all, according to Djurfeldt, determining factors for the success of the Green Revolution in Asia. We do agree with Djurfeldt et al. that these factors, as well, are relevant for a Green Revolution in Africa. However we are not certain that a Green Revolution in Niassa is feasible. As Djurfeldt also points out, the African states are not in power of their agricultural politics like the Asian states were. What also needs to be kept in mind is that geopolitical context is no longer the same.

Below we will analyze the situation in Niassa by looking at the different factors that Djurfeldt considered to be determining for the Green Revolutions in Asia.

**The geopolitical context**

In our opinion, the government of Mozambique is 'trapped' in what Djurfeldt calls *the geopolitical context*. Mozambique has for a long time been dependent on foreign aid and loans which, has determined its possibility to undertake measures for the agricultural development. At the time when Asia implemented their Green Revolutions, the US policies stressed the export of technology and the necessity of making countries technologically capable of reaching self-sufficiency in food grains therefore was agricultural technology provided for free. They also supported the Asian countries with other kinds of aid.

Today, the international agricultural research system is no longer controlled by the public domain but by private companies that also have introduced patents on their products, along with the TRIPS-agreement. In other words, adopting the technology of a Green Revolution would today be very costly for Mozambique.

Furthermore, the liberalization is compounded by double standards. This refers to the fact that the donor countries advocate liberalization for poor countries like Mozambique at the same time as they are providing subsidies for their own agricultural sector and small farmers which has resulted in dumping of staple-food in poor countries, which in turn undermines the internal markets in these countries. For the Niassa area this does above all affect the maize production since

subsidized maize is coming in from Europe and US, in particular as food and catastrophe aid. Unless the world politics changes, an implementation of a Green Revolution will be very difficult.

During 2007 the world market prices on cereals have started to increase. It is hard for us to say how this will affect Mozambique. We do believe though, that if this trend continues it might not have the same positive effects as it had in Asia, due to the circumstances that we have discussed above. Still, we definitely believe it will help African countries to develop their agriculture. Hopefully, Mozambique will then be able to export, which in the long term will make the small farmers in southern Niassa of Mozambique motivated to produce a surplus for export production.

**Domestic Factors**

As mentioned before the area has a high agricultural potential and there is a food shortage in the country, which according to Djurfeldt are two important preconditions for the implementation of a Green Revolution. In these kinds of areas, the returns on investment are higher which, eventually, will render investments in other areas possible. Hence, if a Green Revolution will be implemented in the southern Niassa of Mozambique the positive effects will spread to the rest of the country, which in turn, will increase its possibility to reach self-sufficiency in food crops.

**The state**

The current situation in Mozambique is far from what it was at the time when Asian states implemented their Green Revolutions. The Asian's states were seen as the key to development; however, with the introduction of SAP, the Mozambican and other governments in Africa more or less lost their power when the *laissez-faire* of the free market became the norm at the agenda of the world politics.

However, maybe the situation is slightly about to change given that the world politics, within the PRSP framework and the Paris declaration have started to change by acknowledging as well the importance of small farmers as the role of the state for agricultural development. This is also something that can be observed in the PARPA-programs, and for the agriculture: PROAGRI. Although, it is questionable how effective the state is in its actions. Our impression is that the projects of the Mozambican government are not being successfully implemented at the local level. In our interviews both with authorities on district level and small farmers there were only a few who had knowledge about the governmental projects. It was actually not until we met a representative at the national level that we got information about the intensification projects, which, in our opinion, speaks for itself. An explanation to this is to be found, as have been mentioned earlier, in the conditionalites imposed by the donors but also in the centralized governance. Consequently, if the government would decide to implement a Green Revolution, which also seems to be of immediate interest according to the recent statement of the president, there is a risk that it would face difficulties to reach the

small farmers and the traders at the local level. The government also needs to tackle other issues if a Green Revolution will be possible, such as:

- The provision of subsidized inputs within the framework of PROAGRI.
- The creation of credit possibilities.
- The financing of a research institute, which will develop improved crops and fertilizers for the Mozambican conditions.

**The Market**

The market in the Niassa area is today characterized by monopoly and low prices on outputs, and high prices on inputs. The Asian states were key players for the development of the domestic markets, and as we believe, the Mozambican state is also important for the domestic market in Mozambique if a Green Revolution will be successful. The government has already started to tackle one of the problems that have caused this situation, namely the underdeveloped infrastructure. The government is, as we have seen, involved in Nacala corridor project, which will considerably improve the infrastructure in the area and in turn, the conditions for the private sector and the small farmers. Still, there are other measures that have to be undertaken in order to improve the market. The challenges for the state to succeed with a Green Revolution, is to create a financial institution that can provide credits to traders and small farmers. This would allow traders to expand their business and also be engaged in input supply, and not only produce trade as they are today. Also the small farmers would benefit from a better credit system; it would namely give them better opportunities to purchase inputs in which would increase their production.

**The small farmers**

In the following scheme we have presented the relationship between the small farmers and the technology of the Green Revolution. After all, it does not matter if all mentioned challenges and obstacles in the scheme would be faced if the small farmers are not willing to use the new technology. In contrast to Djurfeldt's findings in Asia, our findings show that an implementation of the methods and techniques of the Green Revolution might be difficult among the small farmers. We did experience that some small farmers seemed rather skeptical when we started to talk about technology related to the Green Revolution (s*ee Table 9 below*). However, especially due to negative experiences among the small farmers, we believe, it might be difficult for the state to enter the scene with the vision of implementing new technology within the framework of a Green Revolution. There is namely a general mistrust both of the institution that tries to implement new technology and of the technology itself.

However, not to forget, there were small farmers who were positive about the use of the Green Revolution related inputs. They believed that it would decrease their burden of labor and they held high expectations on the new inputs. Yet, we are afraid that this can lead to disappointment if the expected affects i.e. higher yields fail to come. This has already happened to some small farmers that have tried HYVs and fertilizers. Although, it needs to be highlighted that the Green

Revolution is based on they type of cultivation the small farmer wants to be involved in, namely the cultivation of food crops and not cash crops. This speaks in favor of the Green Revolution compared to other strategies that promote cash crops.

**Table 9.** *A summary of the analytical framework*

| **Reason**: | The farmer 'does not know' | The farmer 'does not want to' | The farmer 'cannot' |
|---|---|---|---|
| **Limitations**: | | | |
| Society in general | | Lack of good coordination among organizations, which has resulted in bad experience from former new technology | National projects do not reach the farmers<br><br>Several organizations that are operating with different objectives<br><br>Organizations mainly provide seeds for cash crops<br><br>International trade politics – low prices<br>TRIPS<br>'western' subsidies<br>dumping/food aid |
| Direct surrounding | Lack of knowledge about intensification techniques due to the traditional way of cultivating.<br><br>Do not have any knowledge about improved or HYVs. | The condition of the infrastructure determines if they are going to produce a surplus.<br><br>Excess of land.<br><br>Monopoly among traders.<br><br>HYVs are sensitive to store.<br><br>Fertile soil; no fertilizers needed. | Lack of good infrastructure which limit the small farmer's access to market, and inputs required for a GR.<br><br>Lack of extension service.<br><br>Lack of access to credit.<br><br>Low manufactured production. |
| Individual circumstances | Knowledge and experiences | Willingness and interest<br>Risk taking<br>Self-confidence<br>Traditions<br>Family situation | Health<br>Age<br>Time |

To conclude, Mozambique should not copy the Green Revolutions of Asia but can learn from the experiences made in Asia. However, Niassa and Mozambique has a long way to go if an implementation of the Green Revolution will take place and succeed. The future is highly dependent on multifaceted factors that all are linked together. Although, we believe, it is questionable if the Green Revolution, which strives for self-sufficiency within the country, is the best way to take in a country like Mozambique. This would mean that the surplus from the North should be transported to the South but it is hard to say whether or not this is the best solution both from an environmental and a financial aspect considering the long distance

between southern and northern Mozambique. Perhaps it would instead be better to concentrate on regional cooperation with the neighboring countries instead, for example that Niassa would sell their surplus to Malawi.

We would like to add as well, that we are just as concerned as the critics about the environmental risks related to the Green Revolution and as have been observed in for example Punjab, India. We also believe that the social aspects of the Green Revolution, pointed out by the critics should be taken more seriously. Our opinion is that Djurfeldt never really tackles this issue. He claims that the inequity has not increased but at the same time he does not present any data that can promote this statement. After our experiences in Mozambique we believe that the scenarios described by the critics might happen also in Africa. There is a risk that small farmers will become dependent on large multinational co-operations and also that they will become indebted. Finally, it is essential to declare that the traditional way of cultivating should not be underestimated. The small farmers have vital knowledge about cultivation, which has to be taken into consideration, together with the tradition when introducing new technology like the Green Revolution. If a small farmer decides to change from traditional techniques to modern, he or she has to have total trust in the new technique. This trust is only possible to obtain if the concerned actors, extension workers, government and farmers, work together.

After all, we believe that the Green Revolution is not a strategy to neglect, it is a fact that 820 million people in the developing countries are undernourished, therefore we welcome all strategies for discussion that want to reduce that number. However, before a Green Revolution gets implemented in a country, we believe, an evaluation of the risks should be made to make all levels of the society aware of the impacts related to the implementation. It is also necessary to provide training for everyone on how to use inputs, especially regarding the environmental risks that exist.

# Appendix I

## Interview list

| Nr. | Occupation | Sex |
|---|---|---|
| | | |
| 1. | District employee | ♂ |
| 2. | Private company | ♂ + ♀ |
| 3. | National organization | ♂ |
| 4. | Private company | ♂ |
| 5. | Municipality employee | ♀ |
| 6. | Province employee | ♀ |
| 7. | District employee, Representative of a national organization | ♂ |
| 8. | District employee, a group of privados | ♂ |
| 9. | Mayor of Cumaba district | ♂ |
| 10. | Representative of a national organization | ♂ |
| 11. | Private company | ♂ |
| 12. | Representative of a national organization | ♀ |
| 13. | Trader | ♂ |
| 14. | Group interview with small farmers | ♂ + ♀ |
| 15. | Group interview with small farmers | ♀ |
| 16. | Group interview with representative of a national organizations | ♂ + ♀ |
| 17. | Professor | ♀ |
| 18. | Representatives of a international NGO | ♂ |
| 19. | Professor | ♂ |
| 20. | Group interview with small farmers | ♂ |
| 21. | Group interview with representatives of unions and associations | ♂ + ♀ |
| 22. | Representatives of a international NGO | ♂ |
| 23. | Financial institute, local level | |
| 24. | Small farmer | ♀ |
| 25. | Small farmer | ♀ |
| 26. | Small farmer | ♂ |
| 27. | Small farmer | ♂ |
| 28. | Small farmer | ♀ |
| 29. | Small farmer | ♀ |

| | | |
|---|---|---|
| 30. | Small farmer | ♀ |
| 31. | Small farmer | ♂ |
| 32. | Small farmer | ♂ |
| 33. | Trader | ♀ |
| 34. | Representative of a national organization | ♂ |
| 35. | Swedish professor | ♂ |
| 36. | Financial institute | |
| 37. | District employee | ♂ |
| 38. | Group interview with representatives of unions and associations | ♂ + ♀ |
| 39. | Trader | ♂ |
| 40. | Representative of a national agricultural organization | ♂ |
| 41. | Former Minister of Agriculture | ♂ |
| 42. | Representative of the Swedish Embassy | ♂ |
| 43. | Representative of the Ministry of Agriculture | ♂ |
| | | |

# Appendix II

## Interview Guide

**1. Introduction**

- Short introduction and presentation of the project

**2. Personal data or presentation of the organization, project etc.**

- Name, position
- Presentation of the informants work

**3.a. Small farmers**

- How does a normal day look like?
- What are the women's/men's responsibilities in the household?
- Type of house?
- Do you have access to land? What do you need to do to get land use rights?
- Good water resources?
- What do you cultivate? Cash/food crops?
- How is the quality of the soil?
- Do you buy your seeds?
- Where do you store them?
- Have you heard about improved seeds and agrochemicals? Have you used them? If yes, what is your opinion about them? If no, do you have an interest using them? Why?
- What kind of tools do you have?
- Do you sell some of your harvest? Where? What? When?
- Are you self-sufficient in food the whole year? What do you do if you have no more food?
- What expensive to you have?
- What kind of projects are there in the area? How are they working?

**3.b. Authorities, Employees, and Organizations within the agricultural sector**

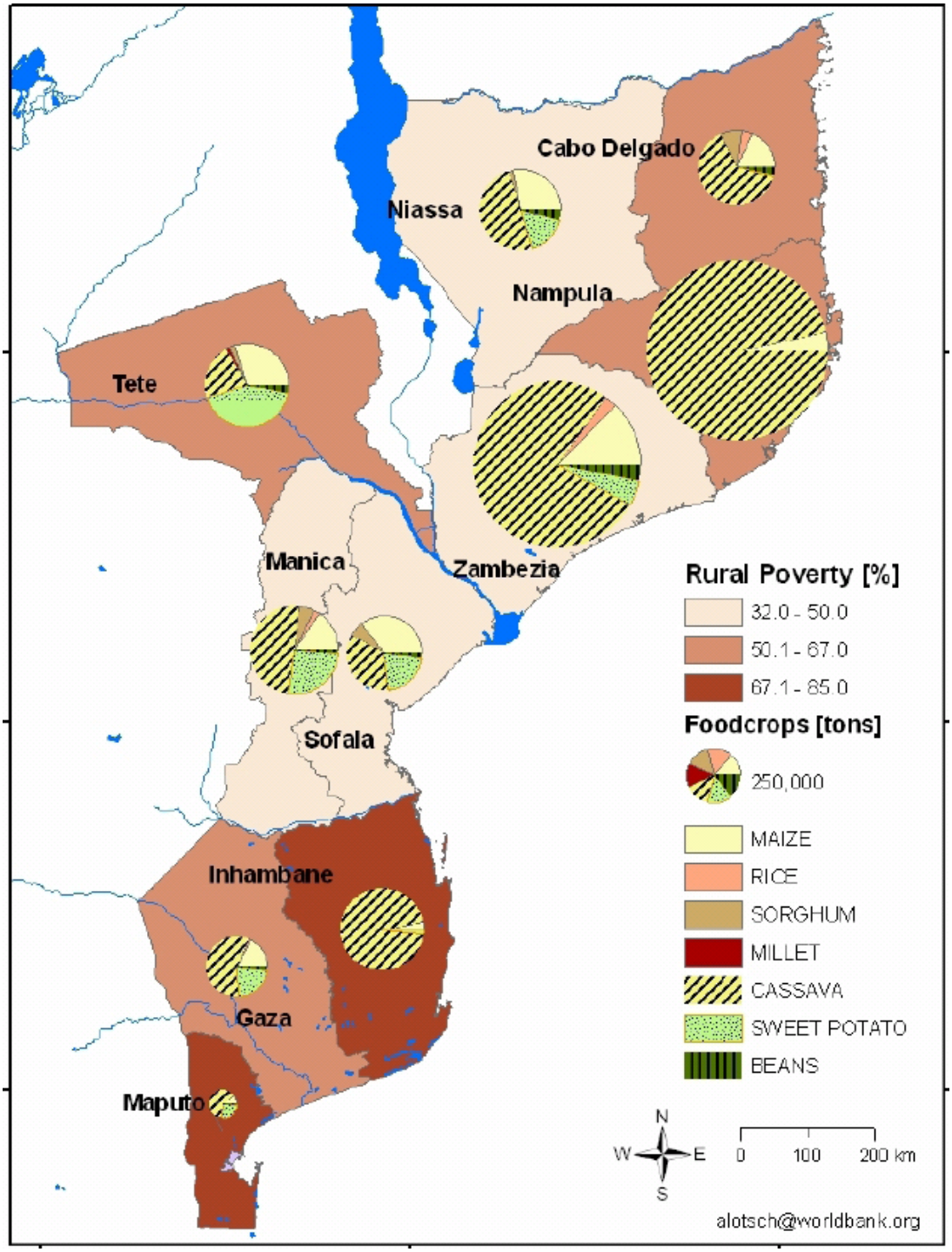
- What projects are introduced at the countryside?
- What are the biggest problems for the small farmers and for the agricultural development in the area?
- What is needed, according to you, to better the situation for the small farmers?
- What are the state's responsibilities in the area and for the agriculture in the country?
- How is the functioning of the market?

- Is there a possibility for building an irrigation system in the area?
- History about crops, market and state
- What is your personal opinion about improved/HYVs, fertilizers etc.?
- Have you ever heard about the Green Revolution? If yes, what is your opinion about it?

# Appendix III

## Major Food Crops and Rural Poverty in Mozambique,

**Figure 1.** *Major Food Crops and Rural Poverty in Mozambique, 2003*




Source: WB 2006:7

# Appendix IV

## Basic Characteristics of the Agriculture Sector, 2000 and 2003

**Table 11.** *Basic Characteristics of the Agriculture Sector, 2000 and 2003*

| | Size of farm enterprise [a] | | | Total | |
|---|---|---|---|---|---|
| **Parameter** | **2000** | **2000** | **2000** | **2000** | **2003** |
| Size | Small | Medium | Large | All farms | All farms [b] |
| Number of farm households ('000) | 3,054.1 | 10.2 | 0.4 | 3,064.7 | 3,172.6 |
| Total cultivated land ('000 ha) | 3,736.6 | 67.7 | 121.0 | 3,925.3 | 4,534.6 |
| Average cultivated land (ha/household) | 1.22 | 6.65 | 282 | 1.26 | 1.41 |
| Area cultivated in food crops (%) | 84.4 | 74.2 | 7.6 | 84.7 | … |

a. As defined in the CAP, small-scale farms are those with less than 10 hectares of cultivated area, medium have 10-50 hectares, and large have over 50 hectares. In some cases, the census employs different criteria for farms with a significant amount of livestock or irrigated area.

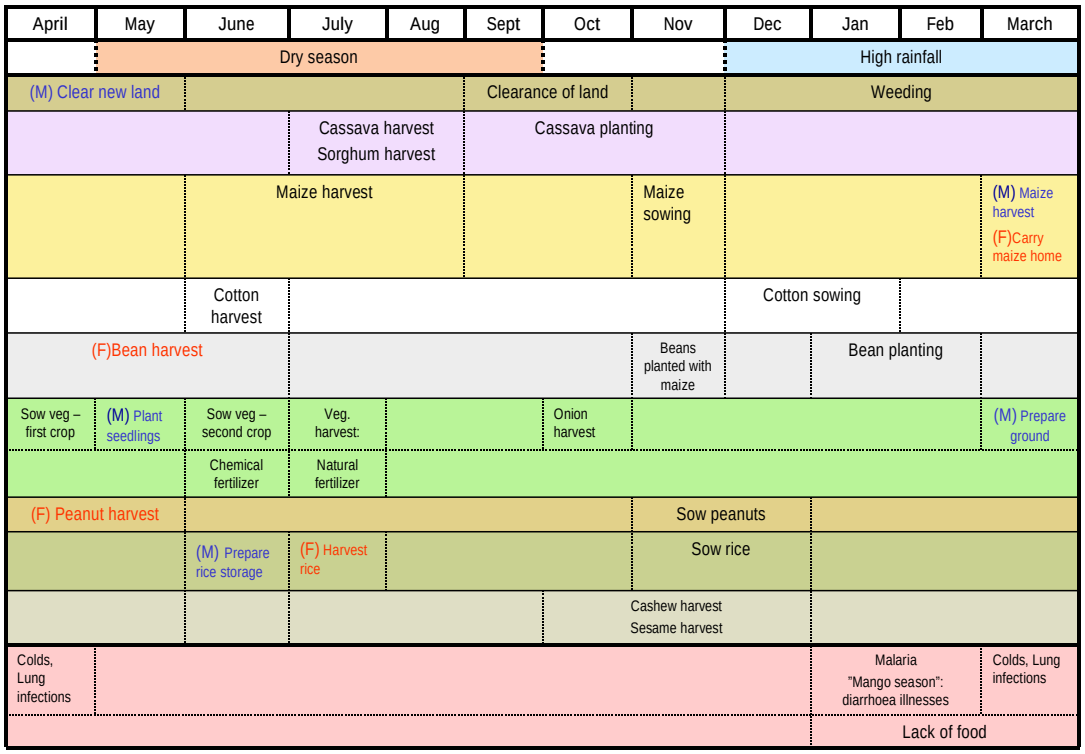
b. The TIA 2002-03 includes small and medium farm enterprises only. More detailed characteristics of the sector are displayed in Table 28 in Appendix 3.

Source: WB 2006:4

# Appendix V

## Agriculture calendar

**Figure: 2.** *Agriculture calendar*




Source: Bernersson & Mortlock 2007:69

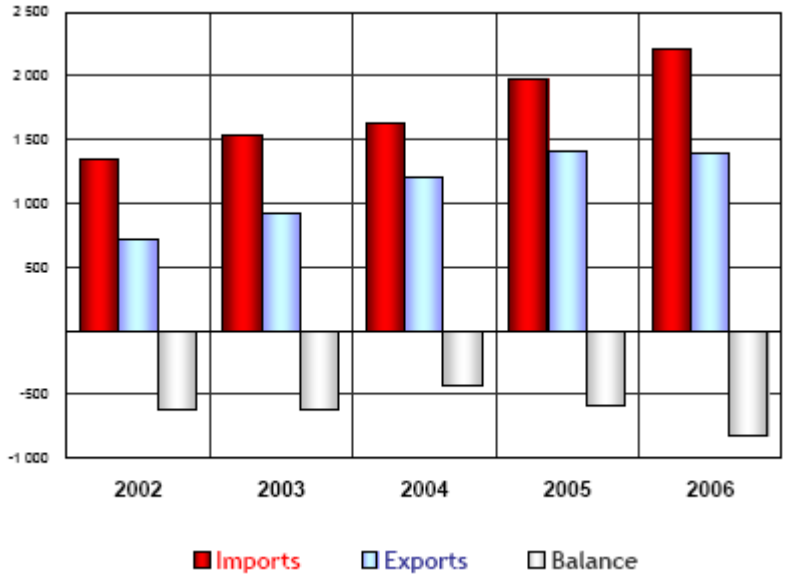
# Appendix VI

## GDP and Trade balance

The real GDP has increased by 62 percent between the years 1996-2002, however due to unfavorable terms of trade and severe floods has lead to a decline, although Mozambique still contains high GDP growth rates. The agricultural sector is 22.4 percent of the real GDP (DRN, ADE, BAASTEL, ECO and NCG 2004:5).

The trade balance is still negative in Mozambique much depends on the import of machinery, iron and steel, but the negative trade balance is especially a cause of the high price on imported fuel (CIA 2007; EU 2005:2). The export is dominated by electricity and aluminum. These export products have recently replaced the agricultural products (CIA – World Fact Book 2007). Export commodities, like cotton and cashews, have constituted the largest part of the export, while the export of food crops never has been high. The northern part of Mozambique has a great potential to cultivate a surplus of maize and in 2006, Mozambique, mainly the northern part, exported 2,000 tonnes of maize to Mexico (Interview No. 11.).

**Figure 3.** *Mozambique, Trade with the World*




Source: EU 2005:2

# Appendix VII

## Union, organization and association

In Mozambique there is a national farmer union called UNAC. A member of this union is UCASNE, which is a province union in southern Niassa.

In Cuamba Town, UCASNE, is a network of farmer associations, and support 8698 members, 207 associations, 100 women associations and 34 unions. One of these unions is UACAL in Lúrio, which is a composition of 13 farmer associations.

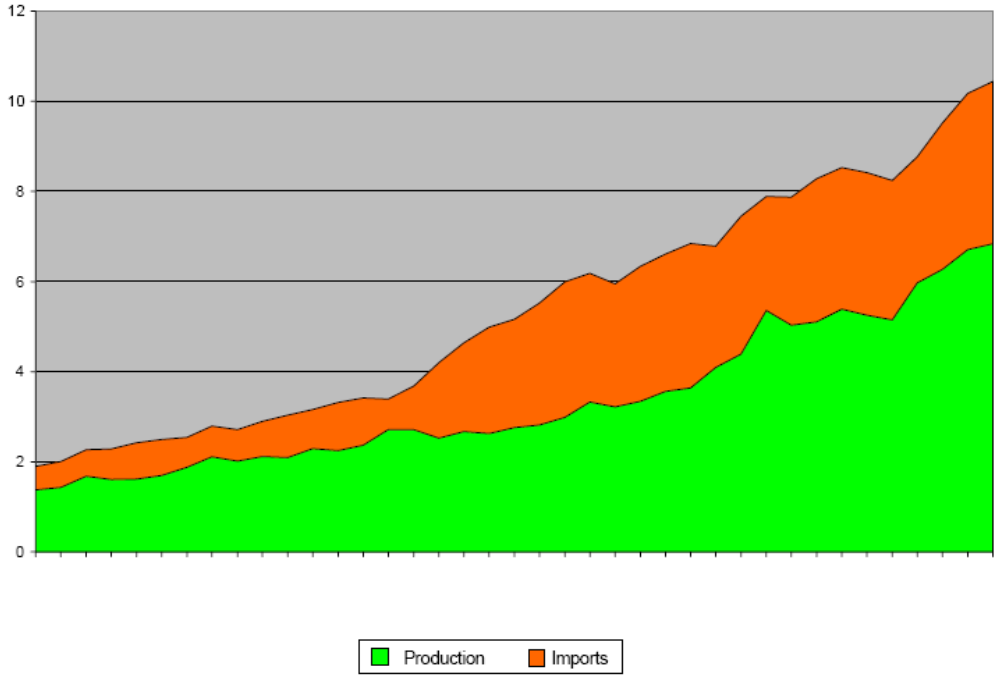
An example on classification of union organisations in Southern Niassa

UNAC
UCASNE
UACAL
Farmer association

# Appendix VIII

## Rice supply and demand in sub-Sahara Africa

**Figure 4.** *Rice supply and demand in sub-Sahara Africa*




Africa Rice Center 2005:20

# Appendix IX

## HIV/AIDS Prevalence rates by region, 2001

**Table 12.** *HIV/AIDS Prevalence rates by region, 2001*

| Region | Province | Provincial rate | Regional rate |
|---|---|---|---|
| South | Maputo city | 13% | 13.2% |
| | Maputo province | 14.3% | |
| | Gaza | 16% | |
| | Inhambane | 9.6% | |
| | Sofala | 18.7% | |
| Center | Manica | 21.1% | 16.5% |
| | Tete | 19.8% | |
| | Zambezia | 12.7% | |
| North | Nampula | 5.2% | 5.7% |
| | | | |
| | Niassa | 6.8% | |
| | Cabo Delgado | 6.4% | |
| | Mozambique national | 12.2% | |

Source: Economic Commission for Africa p. 3

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