

TURUN YLIOPISTON JULKAISUJA  
ANNALES UNIVERSITATIS TURKUENSIS

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*SARJA - SER. AII OSA - TOM. 265*  
BIOLOGICA - GEOGRAPHICA - GEOLOGICA

# **RURAL FOOD SYSTEM CHANGE IN TANZANIA DURING THE POST-UJAMAA ERA**

*A Case Study from Western Bagamoyo District*

by

Toni Haapanen

TURUN YLIOPISTO  
UNIVERSITY OF TURKU  
Turku 2011

From the Department of Geography and Geology  
Faculty of Mathematics and Natural Sciences  
University of Turku  
Turku, Finland

*Supervised by*

Docent Taimi Sitari  
Department of Geography and Geology  
University of Turku  
Turku, Finland

Professor Jussi S. Jauhiainen  
Department of Geography and Geology  
University of Turku  
Turku, Finland

Professor Pentti Yli-Jokipii  
Department of Geography and Geology  
University of Turku  
Turku, Finland

*Reviewed by*

Professor John Westerholm  
Department of Geosciences and Geography  
University of Helsinki  
Helsinki, Finland

Associate Professor Paul J. Kaldjian  
Department of Geography and Anthropology  
University of Wisconsin at Eau Claire  
Eau Claire, USA

*Opponent*

Professor Juhani Koponen  
Department of Political and Economic Studies  
University of Helsinki  
Helsinki, Finland

Layout: Jarmo Wideman

ISBN 978-951-29-4847-5 (PRINT)

ISBN 978-951-29-4848-2 (PDF)

ISSN 0082-6979

Uniprint – Suomen Yliopistopaino Oy, Turku, Finland 2011

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## Abstract

Food systems in Sub-Saharan Africa have been rapidly transforming during the recent decades with diverse outcomes on human development and environment. This study explores the food system change in rural villages in eastern Tanzania where subsistence agriculture has traditionally been the main source of livelihood.

The focus is on the salient changes in the spatial dimensions and structural composition of the food system in the context of economic liberalization that has taken place after the end of the socialist *ujamaa* era in the mid-1980s. In addition, the linkages of the changes are examined in relation to food security, socio-economic situation, livelihoods, and local environment.

The approach of the study is geographical, but also involves various multi-disciplinary elements, particularly from development studies. The research methods included thematic and questionnaire interviews, participatory tools, and the analysis of land use/cover data and official documents. Several earlier studies that were made in the area during the late 1970s and 1980s provided an important reference base.

The study shows that subsistence farming has lost its dominant role in food provisioning due to the declining productivity of land, livestock losses, and the increasing shift of labour to non-farm sectors. Also rapid population growth has added to the pressure on land and other natural resources. Despite the increasing need for money for buying marketed foods and other necessities, the nutritional situation shows improvement and severe malnutrition has diminished.

However, the long-term sustainability of this transformation raises concerns. Firstly, the food security situation continues to be fragile and prone to shocks such as adverse climatic conditions, crop failures and price hikes. Secondly, the commodification of the food system and livelihoods in general is linked to rapid environmental degradation in the area, particularly the loss of soil fertility and deforestation. The situation calls for efforts that take more determined and holistic approaches towards sustainable development of the rural food system with particular focus on the role and viability of small-scale farming.

Keywords: food system, food security, subsistence farming, pastoralism, liberalization, commodification, livelihood diversification, land use, deforestation, rural development, Tanzania

## Acknowledgements

This dissertation is the outcome of my involvement in the project on *Rural Settlement Development, Land Ownership and Food Security since Ujamaa Era in eastern Tanzania*, which was funded by the Academy of Finland during 2008-2010.

First and foremost, I want to express my gratitude to the numerous people in Lugoba area in Tanzania who participated in this study and dedicated their valuable time and efforts. I wish to thank my supervisors Dr. Taimi Sitari, Prof. Jussi Jauhiainen, and Prof. Pentti Yli-Jokipii for giving me essential guidance and support, as well as the project researchers Dr. Jussi Ylhäisi, Dr. Cosmas Sokoni and Mr. Emmanuel Mhache for fruitful co-working, sharing research materials, and critical commenting on my texts.

Cordial thanks to Mr. Ahmed Nandolo and Mr. Lazaro Ruben Wanga for tirelessly assisting me in the field work, the University of Dar es Salaam and the Tanzanian authorities for co-operating and issuing the permissions for the research, as well as the Embassy of Finland in Dar es Salaam for arranging a seminar where the research findings could be discussed and shared.

I am thankful for the reviewers Prof. John Westerholm and Prof. Paul J. Kaldjian who gave constructive and important criticism, as well as Prof. Juhani Koponen who showed great interest towards my work and agreed to act as an opponent in the defence. I also want to thank my colleagues at our department, especially Dr. Niina Käyhkö and Ms. Nora Fagerholm for advice and good discussions regarding the research topic.

In regard to research funding and providing facilities without which this study would not have been possible, I want to thank Prof. Risto Kalliola and the Department of Geography and Geology in the University of Turku, the Academy of Finland, Turku University Foundation, and Finnish Graduate School in Development Studies (Devestu). Thanks also to Ms. Emmi Seppänen for proofreading the manuscript and Mr. Jarmo Wideman for doing the layout.

Last but not least, I want to thank my parents for their support, Katja for loving care and highly important feedback, as well as dear little Kerttu for cheering up my days.

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## List of abbreviations

AEO	Agricultural Extension Officer
ASDP	Agricultural Sector Development Programme
CATA	Cashewnut Authority of Tanzania
FAO	Food and Agriculture Organization of the United Nations
GAPEX	General Agricultural Products Export Corporation
GDP	Gross domestic product
GoT	Government of Tanzania
GSD	Grain Storage Department
MDG	United Nations Millennium Development Goal
NMC	National Milling Corporation
N-P-K	Nitrogen-Phosphorous-Potash
OECD	Organization for Economic Cooperation and Development
RRA	Rapid Rural Appraisal
TCA	Tanzania Cotton Authority
TZS	Tanzanian shilling
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
USD	The United States dollar
VAT	Value Added Tax
VEO	Village Executive Officer
WEO	Ward Executive Officer

## Glossary of Swahili terms

<i>bega-kwa-bega</i>	shoulder-to-shoulder (block farming)
<i>biashara</i>	business
<i>boma</i>	corral
<i>dala-dala</i>	mini-bus
<i>jua kali</i>	hot sun
<i>kambi</i>	temporary hut
<i>Kilimo kwanza</i>	Agriculture First (governmental initiative)
<i>kiwili</i>	traditional labour exchange (local term)
<i>makande</i>	a dish containing maize grains, beans, and onions
<i>mandazi</i>	doughnut, pastry
<i>masika</i>	long rains (March-April)
<i>mchicha</i>	spinach, amaranth
<i>mchungu</i>	hare's lettuce
<i>mkulima</i>	cultivator
<i>pombe</i>	traditional beer
<i>ugali</i>	maize porridge
<i>ujamaa</i>	extended family, familyhood, socialism
<i>ukame</i>	drought
<i>vuli</i>	short rains (November-December)

## Measurements

1 acre	0.405 hectares
1 hectare	2.471 acres
1 TZS	0.0005 EUR (June 2009)
1 TZS	0.0008 USD (June 2009)
1 EUR	1,805 TZS (June 2009)
1 USD	1,291 TZS (June 2009)

# 1. INTRODUCTION

## 1.1 Background

Like elsewhere in the world, food systems in Sub-Saharan Africa have been rapidly changing during the recent decades. Transformations in production, distribution, and consumption of food have been brought about with globalization and political regime shifts, modernization of societies, population growth, land use and land tenure arrangements, as well as cultural and environmental change in larger scales. In certain parts of the region, conflicts have altered and disrupted the functioning of food systems. Regardless of the presence of the plantation industries and recent trend of outsourcing agricultural lands to investors and large private companies, the clear majority of farmers in the region are still small-scale farmers, many of which produce for subsistence purposes rather than the market (e.g. Bryceson 1989; Smith et al. 2000; FAO 2004; Ericksen 2009). Despite the advocacy for agricultural modernization during the last five decades, the pace of “green revolution” in Sub-Saharan Africa has been slow and the expected increase in productivity has not taken place. Since the 1960s, yields of cereals per hectare in the region have remained at low levels while the yields have grown by manifold in other parts of the world (The World Bank 2007: fig. 7). Yet it is justifiable to ask how viable the approaches that emphasize the commercialization of agriculture and the usage of modern techniques and inputs are for the diverse subsistence farming environments where the ‘logics of the marketplace’ do not necessarily count (see e.g. Hyden 1980; Waters 2007).

Food security status is considered as the primary outcome of a food system and the basic indicator of how well the system functions (Ericksen 2008). Despite the progress towards achieving the UN Millennium Development Goals, Sub-Saharan Africa is lagging behind particularly in regard to the targets for reducing poverty and malnutrition (United Nations 2011). Between 1990–2005, the proportion of people living on less than USD 1.25 per day was estimated to have decreased from 58% to 51%, and the undernourished population from 31% to 26%. Meeting the Goal 1, i.e. halving the proportions of people living in extreme poverty and suffering from hunger from the levels of 1990, seems very unlikely by 2015 (United Nations 2010: 6–12, 2011: 6).

In the United Republic of Tanzania, agriculture continues to provide livelihood for about 80% of the labour force despite the trends towards income diversification and urbanization (Bryceson 1999; Ponte 133–158; GoT 2011). The majority of farmers are smallholders who rely on traditional methods in cultivation and livestock-keeping. The average farm size is less than two hectares per household (Isinika 2007: 128; GoT 2011). Since the mid-1980s, the growth in domestic food production has lagged behind the population growth which has been over 2.5% annually. Especially the per capita production of fresh vegetables, roots and tubers has declined while wheat imports have grown manifold (FAOSTAT 2011; The World Bank 2011). Although there have been no wide-spread famines in Tanzania after the end of the colonial period,

poverty and chronic malnourishment have persisted as severe problems. According to the UNDP (2010a: table 5), about 36% remain below the national poverty line and as many as 89% are estimated to live with less than USD 1.25 per day. The UNDP (2010a: table 8) reports that undernourishment among the whole population increased from 28% to 35% between 1990–2006, thus showing a negative trend. On the other hand, life expectancy in Tanzania has increased from about 50 years in 1980 to 56 years in 2009 (The World Bank 2011). A governmental report also speaks on behalf of positive development by indicating that the share of underweight children below five years reduced from nearly 30% to about 22% between 1990 and 2004 (PHDR 2009: table 13). Still, under five year child mortality is as high as 104 per 1000 births and malnutrition is estimated to be the underlying factor for over 50% of these deaths (UNDP 2010a: table 14; UNDP 2010b). Achieving the MDG Goal 1 is considered very unlikely for Tanzania as well, in spite of the country's high GDP growth of over 5% during the recent years (PHDR 2009: 61, 152).

This study examines the rural food system change that has taken place in the eastern part of Tanzania since circa 1985 up to 2010. Year 1985 is remarkable in the sense that President Julius Nyerere, who had led the nation since its independence<sup>1</sup>, gave the power to his successor President Ali Hassan Mwinyi, who was more in favour of reforming the economy in line with the demands set by the foreign donors (Skarstein 2005). The socialist *ujamaa* period, which had involved the concentration of the scattered rural population in the larger settlements and collectivization of production, came to its end and administrative reforms were implemented in the spirit of structural adjustment and economic liberalization (e.g. Sitari 1983; Bryceson 1993: 27-31; Iliffe 2007: 262). The studied period also involves the shift to multi-party democracy, starting from the parliamentary by-election in 1994. These macro-level shifts in economic policies and governance have brought a wave of changes on rural livelihoods and environment through the increased commercialization of rural spaces (e.g. Bryceson 1993; Kikula 1997; Ponte 2002).

There is still lack of knowledge on how the subsistence-based communities and the food systems from which these depend on are transforming and integrating into the modern markets in the marginal spaces of the world economy, such as the rural villages in Tanzania. Although a relatively large number of studies have dealt with agricultural production, food supply, food security, rural livelihoods, and economic liberalization in Tanzania (e.g. Bryceson 1989, 1993; Coulter & Golob 1993; Delgado & Minot 2000; Meertens 2000; Tapio-Biström 2001; Cooksey 2003; Ellis & Mdoe 2003; Sarris & Mantzou 2005; Skarstein 2005; Sokoni 2008; Birchall & Simmons 2010; Chapoto & Jayne 2010), more information is needed on the responses to the economic reforms and the following commercialization of rural life, including analysis on village and household levels (2002: 175). The commitments to reduce poverty, malnutrition and promoting sustainable development also call for addressing the local outcomes of the

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<sup>1</sup> The mainland, Tanganyika, gained independence from the British rule on 9<sup>th</sup> December in 1961. Tanzania was formed on 26<sup>th</sup> April in 1964 when Tanganyika and Zanzibar were merged.

food system change on food security, socio-economic situation, livelihoods, and natural environment (Ericksen 2008, 2009; Headey et al. 2010). Furthermore, understanding the local realities of the small-scale farmers and the value and dynamics of subsistence food production may be gaining renewed interest, particularly as the world economy is now in turbulence and further food price hikes may occur in the future.

In order to study these processes in a local context, four villages in western Bagamoyo district were chosen for closer examination. The analysis is based on the field work conducted in three phases during 2008–2010, totalling about five months, as well as examination of earlier studies, official documents, and spatial data. In many respects, the study area represents ‘average’ conditions in rural Tanzania and also provides an example from the hinterland of a growing metropolis, Dar es Salaam. Particularly, the roadside villages in the area have increasingly peri-urban characteristics, and the dynamics of food system change in such rapidly transforming socio-economic environment also require further exploration (Lerner & Eakin 2010). As this is a geographical study, the spatial dimensions of the food system are emphasized, particularly the changes in the local land use patterns and the origins of the food on wider scales. Even though the area where the field work was conducted is small, the geographical scope in which the local issues are examined is much larger in scale, as the food system extends through markets far beyond the village boundaries. In addition to the geography of food, and development geography in general, the approach leans towards the traditions in regional geography, as the analysis is essentially based on understanding the physical and socio-economic environment in the study area and the dynamics of local human-nature interaction. Methodologically, the study also has various multi-disciplinary elements.

Many geographers have called for research that examines food systems as entities, because this kind of a holistic approach would reveal the interconnections between different components in the food chains and the dependencies with external actors (e.g. Marsden et al. 1986; Friedmann & McMichael 1989; Goodman & Watts 1994; Whatmore 2002a; Winter 2003; Mononen 2006: 34–36). The food system approach is also capable for analysing a context where part of the consumed foods originate from the non-capitalist sphere of subsistence production and the other part is purchased from the market. However, such research has remained quite marginal so far, especially in regard to empirical studies in developing countries, as also noted by Marsden (1997: 169), Whatmore (2002a) and Mononen (2006: 36). This study is one attempt to fill these gaps in the research. I also wish that this case study will be useful for planning and decision-making on different levels when shaping longer term sustainable development schemes for the growing population in an environment where resources once abundant such as arable land, pastures and forests are becoming scarce.

## 1.2 Objective and research questions

The objective is to explore how the food system from which the villagers in Lugoba ward depend on has changed during the post-*ujamaa* period, extending from approximately 1985 to 2010. The focus is on the salient changes in the spatial dimensions and

structural composition of the rural food system in the context of the political regime shift. In addition, the linkages of these changes are examined in relation to food security, socio-economic situation, livelihoods, and local environment.

Specifically, answers are sought to the following questions:

1. How has the spatial organization and structural composition of the food system, from which the villagers depend on, changed after 1985?
2. How has the local food production changed in terms of cropping patterns, livestock holdings and productivity?
3. How has the food system changed in terms of commodification? In particular, how has the importance of subsistence production, cash crops, and purchasing marketed foods changed in the study area?
4. What have been the roles of the regime shift and governmental steering in these changes?
5. How are these changes interlinked with local food system outcomes including food security in particular, as well as socio-economic situation, livelihoods, and environmental change?

In order to respond to the objective and the research questions, various research methods and materials were used. Qualitative tools such as thematic interviews with key informants and participatory group exercises provided in-depth reflections on a variety of issues that were essential for understanding the basic features of the studied phenomena and helped designing the field work further. Structured questionnaire interviews and data regarding agricultural production and food prices enabled more quantitative examination of the food system. These data sets were complemented with a spatial analysis of the changes in the local environment where the local food production takes place. The nature of the study and the complexity of the food system, together with ambiguities in some of the data called for the use of triangulation so that the conclusions would stand on a firm basis.

### **1.3 Study area**

The study focuses in the western part of Bagamoyo district in the Coast (Pwani) region (figure 1). Four villages in the area were chosen as the primary sites of the field work: Lunga, Makombe, Mindu Tulieni and Msoga. During the studied period, these villages belonged to the same administrative unit, Lugoba ward<sup>2</sup>. The reasons for selecting these villages included the 'average' characteristics of the area in the Tanzanian context in terms of several poverty indicators and the dominant role of subsistence farming as the traditional source of livelihood (PHDR 2005: xiv). The location in the hinterland of Dar es Salaam with relatively good transport connections also enabled observing the influence of a large urban centre and the gradual urbanization processes taking place in the villages themselves. Most importantly, there is a rich body of literature concerning this area and the chosen villages. Studies by Mwelupungwi (1977) and Muro (1979)

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<sup>2</sup> In 2010, Msoga village was separated from Lugoba ward and Msoga ward was established (information from Msoga village committee members and Lugoba ward office, December 2010).



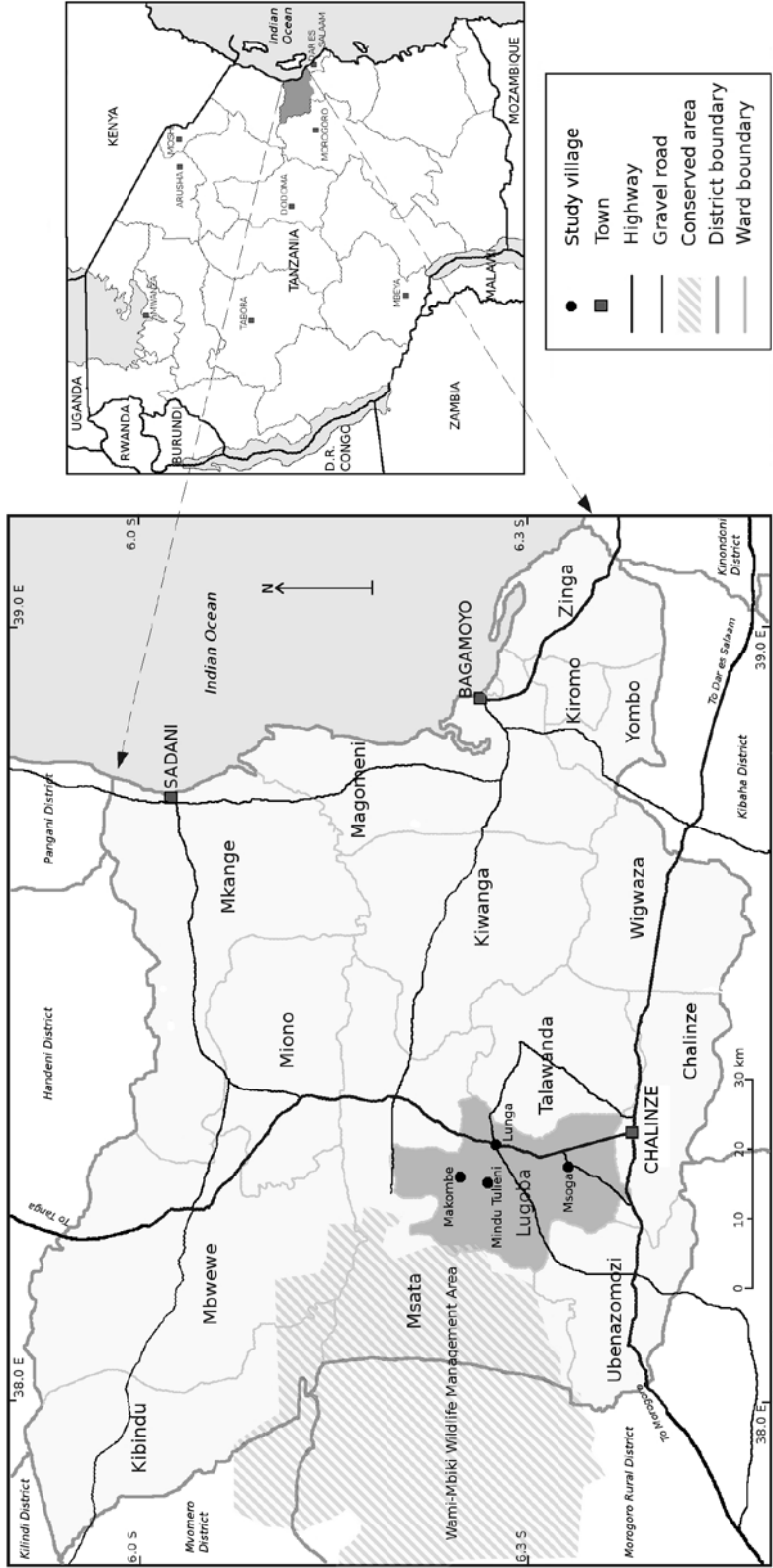


Figure 1. Location of Lugoba ward in Bagamoyo District.

provide essential information regarding the history of the villages in Lugoba ward. During the late 1970s and early 1980s, a project called Jipemoyo focused on the cultural changes that the villagization had brought in western Bagamoyo district. It was implemented in co-operation with Tanzanian and Finnish academics and yielded several publications (e.g. Sitari 1980, 1983; Hurskainen 1984; Vuorela 1987; Mustafa 1989; Jerman 1997). Dr. Taimi Sitari, also a participant in the Jipemoyo project, led a follow-up research in the area together with Dr. Ali M. Sendaro and a group of Finnish and Tanzanian students from December 1989 to January 1990. During the follow-up interview data was collected particularly in regard to livelihoods and agricultural technologies (Sendaro 1992).

These previous works give a good foundation for historical analysis and comparison in a context where official documentation is scanty or lacking. Furthermore, my colleagues in the present research project were also working in this same area, which enabled sharing diverse scientific approaches and field work experiences, exchange of study materials, and building upon the analysis conducted by other researchers from different viewpoints. Especially, the recent articles concerning land and forest management, deforestation, infrastructure development, and rural-urban dynamics have been referred to here for more detailed information on issues that I could have merely touched upon alone (Mhache 2010; Sitari 2010b; Sokoni 2010a, 2010c; Ylhäisi 2010a).

In FAO's classification, the western part of Bagamoyo district falls in the 'maize mixed farming system' category, which is characterized by vulnerability to drought, moderately high population density, modest average farm sizes, and considerable socio-economic differentiation (Dixon, Gulliver & Gibbon 2001: 9–10). The main food crops include maize, cassava, millet, leaf vegetables like spinach and amaranth, as well as legumes like cowpeas (*kunde*), pigeon peas (*mbaazi*), and mung beans (*choroko*). The most common cash crops are sesame and, to a very small extent nowadays, cotton. The usage of improved seeds and agro-chemicals is generally low. Also animal husbandry is practised, but this is mainly the source of livelihood for the pastoralist Parakuyo Maasai, as most of the Kwere, Zigua, and other Bantu groups own small numbers of livestock and have traditionally relied on cultivating (e.g. Hurskainen 1984; Muro 1979: 7; Sendaro 1992; Sitari 1983: 15; Vuorela 1987: 77, 217). The recent growth of non-farm sectors together with the gradual modernization of settlements has proceeded to the extent that in the census of 2002, 53% of the inhabitants in the largest village in the ward, Lunga, were considered as urban dwellers (Sitari 2010b). As shown in the present study, however, virtually all families in the area, including those in Lunga, still practise agriculture at least as a supplementary source of livelihood.

Both Islam and Christianity are common among the people in the area, and different types of animist beliefs have also survived. In addition to their native languages, virtually all people speak Swahili, which is the teaching language also in the primary schools. Concentrations of people with same ethnic background can be identified in certain locations (see also Sitari 1983: 54–56), but often different ethnic groups share the same neighbourhood. According to my observations, ethnic and religious divisions

are usually not much emphasized in the daily life and intermarriages between the different groups are possible.

According to the figures published by the Government of Tanzania, about 40% of the population in Bagamoyo district were below national poverty line in 2001, which was slightly above the national figure (PHDR 2005: table 1, app. table A.10). Although Coast region is not considered to be among the most food insecure regions in Tanzania (WFP 2006: 9), food security continues to be a crucial issue also for the people in the study area. About two-thirds of incomes are spent on food in the region (WFP 2010a: table 6). Furthermore, child mortality under five years in the Bagamoyo district was 174 per 1000 births in 2002 and thus higher than the national average (PHDR 2005: table 10, A.9).

## **1.4 Structure of the study**

Following this introductory part, Chapter 2 elaborates further the food system framework and the related key concepts. Also the main outcomes of the food system—food security, social welfare, environmental welfare—are discussed on basis of the recent theoretically oriented literature. The chapter concludes describing how the food system model is applied in studying the specific environment of the study area.

The literature review regarding the food system development in Tanzania is included in Chapter 3. It follows a chronological order of historical events where different sources are accordingly cited and discussed rather than presented individually. This approach was chosen in order to construct a historical reference base of the food system development and also because there is generally a lack of literature that regards food systems as entities in the Tanzanian context. Some recent statistics regarding food production, trade, and nutrition are also dealt with in the latter part of the chapter.

Chapter 4 explains the methodological choices that have guided this research, describes the field work process and methods, presents the diverse data sets, discusses the ethical issues that emerged during the study, and explains the methods that were used in the analysis.

Chapters 5 to 9 contain the major part of the analysis. The structure of a food system is broadly followed so that the changes in the physical environment are dealt with in Chapter 5, local agricultural production in Chapter 6, food distribution in Chapter 7, livelihoods and household economy in Chapter 8, and food consumption and nutrition in Chapter 9.

The synthesis and summarized responses to the research questions are presented in Chapter 10 together with the discussion on the findings and their contributions to current academic and political debates. The lists of interviewees and RRA exercises, survey questions, origins and prices of food items, as well as a rough estimate of the average nutrient intake are presented in Annexes I–V.

## 2. FOOD SYSTEM AS A THEORETICAL FRAMEWORK

### 2.1 History and definitions of the concept

As Shanahan (2002) has argued, food can be regarded as an inherently geographical subject as food comes from somewhere and is usually associated with place-based identities. To add with, processes in food production, distribution, and consumption are interacting with diverse sets of actors on multiple geographical scales. Food is also an intriguing theme for a geographer as it connects two spheres that have traditionally been understood as 'nature' and 'society', and thus invites the researcher to cross the barriers that are sometimes created between 'physical' and 'human' geographies.

According to Freidberg (2003), 'the first generation' of research within cultural geography and cultural ecology generally studied the historical diffusion of food from the 'culture hearths' to other places through explorers, migrants, and merchants. Although this approach also faced criticism, the research has been acknowledged for its careful analysis on the physical conditions of food production. Only in the 1970s and 1980s, geographers together with rural sociologists began to study the societal aspects of agriculture and food more extensively. This was partly a response to the farm business research within economics, which had been blamed for not being able to explain the responses of the farmers adequately in regard to food shortages and food security (Winter 2005). In particular, the new paradigm dealt with the forms and changes in the social organizations of agriculture. This was made in the spirit of Marxism and revisiting the 'agrarian question' that Karl Kautsky posed already in the end of the 20<sup>th</sup> century (Watts 1996; Silvasti & Mononen 2006: 16). The research on the agrarian question—or the study on the expansion of capitalist relations to agriculture, the role of agriculture in promoting capitalist development, class struggles of the agrarian labourers, and the relations of these with ecology—is still being continued in different disciplines including also geography and development studies (Watts & Goodman 1997; Bernstein 2004; Moore 2008; Maghimbi et al. 2011).

In parallel to the rise of rural sociology, a multi-disciplinary branch of research on farming systems evolved. It focused particularly on the physical factors of agricultural production and land use patterns. However, the farming systems research often lacked strong connections to the research on the cultural geography or the political economy of food. Farming systems research was criticized for not extending the focus beyond the farm gate and thus not paying much attention to the external actors or the commodity chains as entities. On the other hand, while the critics often focused on the destructiveness of modern agriculture their analysis did not pay much attention to spatial differentiation of agricultural change either (Silvasti & Mononen 2006: 15–18; Winter 2005).

To sum up with, until the mid-1980s the research on diverse aspects of food production, distribution, and consumption was mostly practised within different disciplines that did not have much collaboration with each other. This was particularly manifested

in the research on production that treated agriculture as a rather isolated sphere. In addition, most of the geographical research on food, as Winter (2003) has noted, was either focusing on food as a raw commodity or the retail of food in their separate compartments. Both of these branches of research were also confined to studying economic activity. The compartmentalization and the artificial gaps set between the research areas did not promote understanding on the linkages and interaction in the food chain and the relations of these with the rest of the society and nature. However, such understanding was increasingly needed along with the processes of globalization, accelerating cross-border trade of foodstuffs, rapid changes in the consumption cultures, and ecological problems (Winter 2005; Silvasti & Mononen 2006: 15).

The term food system appeared in the research already in the late 1970s and early 1980s, for example in studies on subsistence producer communities in developing countries (Collier et al. 1977; Århem et al. 1981). The OECD adopted the concept as well, by defining an agri-food system as “the set of activities and relationships that interact to determine what, how much, by what method and for whom food is produced and distributed” (Fine 1998: 3). Particularly since the early 1990s, the concept of a food system—or agri-food system, food provisioning system, or agri-food network that are often used as synonyms with slightly different emphasis—has been further developed and applied in numerous research projects (e.g. Marsden & Little 1990; Anyanwu & Jukes 1991; Tansey 1994; Goodman & Watts 1997; Tansey & Worsley 2000; Whatmore 2002a; Ericksen 2008, 2009). The systemic approach arose from the needs for more holistic conceptualization and understanding of complex and multi-causal problems that stem from interactions between interdependent components in the production, distribution, and consumption of food. The food system concept was developed also further by many geographers who were critical towards the positivist and non-political approaches of the contemporary agricultural geography and wanted to link the examination more closely with the political economy of food (e.g. Marsden et al. 1986; Friedmann & McMichael 1989; Goodman & Watts 1994; Whatmore 2002a; Mononen 2006: 34–36).

Food system is usually characterized as a network, which integrates agricultural inputs, food production, processing, distribution and consumption, or as the entity of production chains through which the consumed food products have been acquired. Importantly, a food system can be understood to include also the political and legal frameworks that steer production, marketing, and distribution of food (Tansey 1994; Whatmore 2002a; Ericksen 2008). Whatmore (2002a), for example, has illustrated the modern agro-food system by outlining four interacting components; (a) agri-technologies industry, (b) farming industry, (c) food industry, and (d) food consumption, which are steered and regulated by different agencies that are usually bodies of the state but can also involve commercial or co-operative agencies (figure 2).

The growing versatility in the food systems research and the new conceptualizations have also brought new awareness regarding certain weaknesses in the systemic thinking. Most importantly, if the positivist and non-political approaches are to be avoided, one

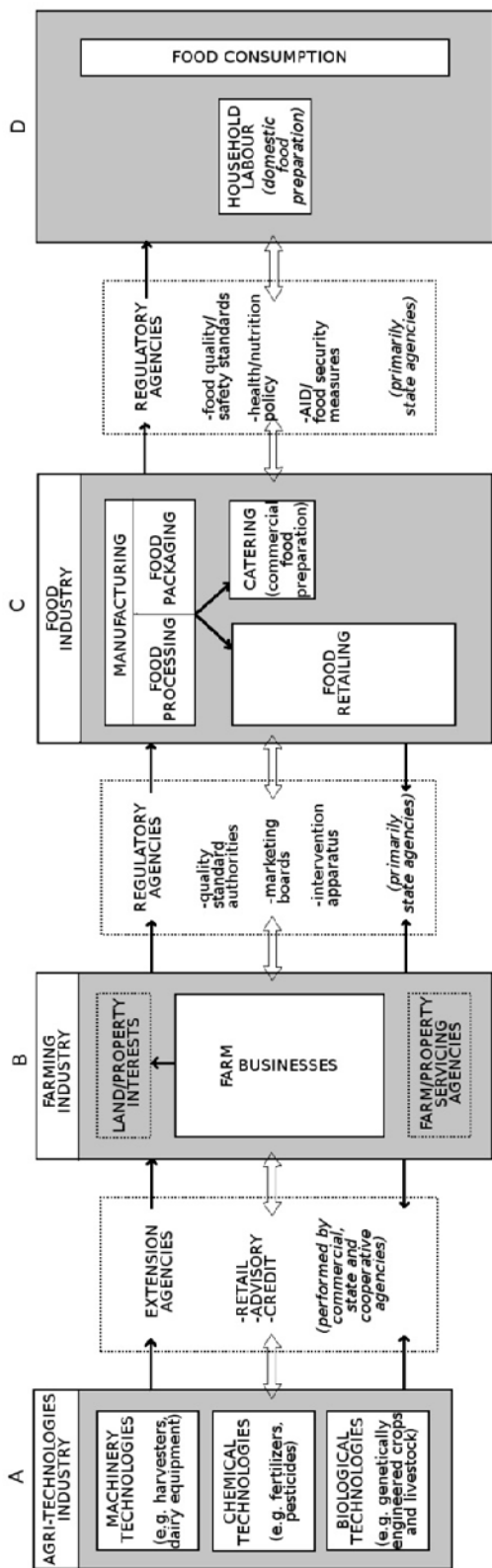


Figure 2. An outline of the contemporary agro-food system according to Whatmore (2002a: fig. 4.1).

has to be careful not to consider the food system a simplistic model functioning merely under some predictable economic principles. Tansey (1994), for example, has criticized the linear type of thinking of food chains and the narrowly economic approaches. According to him, a broader conceptualization of a food system should involve three interconnected aspects of life:

- (1) “biological: the living processes used to produce food and their ecological sustainability;
- (2) economic and political: the power and control which different groups exert over the different parts of the system;
- (3) social and cultural: the personal relations, community values and cultural traditions which affect people’s use of food” (Tansey 1994).

The unity between nature and social, economical and political dimensions in a food system were further underlined by Marsden (2000). He went as far as calling for empirical studies that would assist in abandoning the dichotomy of ‘nature’ and ‘society’ in the food system research and replacing these with hybrid categories as the food itself “from conception to digestion, from plough to plate etc.” is hybridized by different actors in the supply chain. Also Whatmore (2002b: 124–125) has emphasized that the relations in the food chains are not linear or frictionless actions that bring the food from the farm to the plate. She suggests that a Deleuzian concept of a *rhizome*, which has become popular in post-structural research, is better for illustrating these heterogeneous networks, as the geographies of food can be altered through unprecedented turns that stem from the relationships between human and non-human actors (see also Hess 2004).

The food system approach has brought a much needed framework for analysing the geography of food in a manner that is not blind towards the linkages and interactions in the food chains and the connections of these with the rest of the world. The growing interest among the geographers towards studying the spaces of food consumption and ‘alternative’ food systems such as local food and fair trade networks has also brought new connections between the culture, economy and natural environment (Feagan 1997; Hinrichs 2003; Winter 2003; Cook et al. 2006, 2008, 2010; Morgan et al. 2008; Jackson 2010). More recently, the theorization of food systems has benefited from the discussions and initiatives for connecting the food system analysis into larger contexts of global environmental change, food security, poverty, and sustainable livelihoods (Swift & Hamilton 2001; Rakodi 2002; Ericksen 2008, 2009; Bolwig et al. 2010; Codjoe and Owusu 2011).

Although Whatmore’s model (figure 2) illustrates the modern type of capitalist production system, it is possible to apply it in the context of a developing country like Tanzania on certain conditions. The processes and components in the model can be identified in the study area, but the commodity chains of the foods consumed in the villages are geographically shorter and less mechanized than those in the developed countries. The food system also needs to be understood as an entity that incorporates both the industrial food chains and the modes of local subsistence production, as a considerable part of the foods are produced in the studied communities. The steering

institutions are partly local and indigenous and the food system is thus not entirely controlled either by the state or commercial agencies. Furthermore, the environmental factors that influence the local production are directly related to the principal outcome of the system: food security.

It is also possible—and particularly appropriate for this study—to determine the food system in relation to food security, as Codjoe and Owusu (2011) have done: “[f]ood systems comprise certain activities, resources, and infrastructure that collectively determine the food security status of a region or a group of people” (see also Ericksen 2008, 2009). The inclusion of food security and other outcomes in the analysis is further discussed in the following sub-chapters. Before this, however, it is necessary to take a look at two other aspects that are important for understanding the food system development in the studied context, namely food regimes and commodification of food chains and rural life in general.

## **2.2 Food regimes**

On the macro-level, the history of the global food system development has been categorized into food regimes that describe the international relationships of production, forms of regulation, and accumulation of capital, as well as food consumption during a given time. Food regime approach was developed around the discussion on the regulation theory in the 1980s, where capitalist development is seen as periods of accumulation (Friedmann & McMichael 1989; Moran et al. 1996). Against this background, the first food regime emerged in the late 19<sup>th</sup> century when powerful industrialization and urbanization of Western societies began. Agricultural production and markets expanded and became more capitalized. Stock and semi-manufactured foods were imported to North America and West Europe from the colonies in Africa, Asia, and Latin America, while especially capital and people to co-ordinate the production were brought to the colonies from Europe. The first regime is considered to have ended during the Great Depression in the beginning of the 1930s (Friedmann & McMichael 1989; Silvasti & Mononen 2006: 12–15; Pechlaner & Otero 2008).

The second regime was based on the Fordist type of mass production, which began to develop and expand in the 1940s. Farm sizes increased in many countries, agricultural technology was mechanized, and labour demand in the sector diminished. Global trade between large metropolises and former colonies became dominated by big North American and European agro-companies which bought large amounts of raw materials from the tropical areas (Friedmann & McMichael 1989; Silvasti & Mononen 2006: 13–14). Often the growing populations of former colonies that struggled with boosting their domestic production became dependant on the imports of crops that were cultivated by large-scale farmers and subsidized by the governments in the North. In order to pay for the food imports, many countries in Sub-Saharan Africa relied on cash crop production. This effectively superseded traditional small-scale and subsistence farming systems, on which food security in these areas had been formerly based (Friedmann & McMichael 1989; Friedmann 1993).



The oil crises in the 1970s contributed to the crisis of agriculture internationally and severely hampered food security in the Third World countries that faced decreasing returns from traditional cash crops. In Sub-Saharan Africa, including Tanzania, the crisis led to growing dependency on food imports and loan-taking—the impact of which has been disastrously felt in parts of the region up to date (Bryceson 1993: 8; Friedmann 1993; Iliffe 2007: 261–264). These events paved way for the third, presently dominant food regime which is characterized by liberalized markets and free trade agreements, increasing role and power of transnational agro-food corporations, expanding application of biotechnology, fragmentation of consumer demand, as well as increasing vulnerability towards ecological shocks and price fluctuation (Friedmann 1993; Marsden 2000; Ericksen 2008; Pechlaner & Otero 2008; McMichael 2011). This has also meant industrialization of agriculture and a growing distance between production and consumption. These de-localization processes have been made possible especially through technologies that improve the durability in foodstuffs (Whatmore 2002a; Morgan et al. 2008: 54).

Since 1995, the WTO's Agreement on Agriculture has bound the member countries to export-oriented policies that, according to many critics, undermine the states' right to self-reliance and food sovereignty (McMichael 2011). On the other hand, the Doha Development Round of the WTO negotiations has faced deadlocks since its inception in 2001 due to several disputes. One of the major issues is the subsidies that some of the developed countries, particularly the U.S. and the E.U., have continued to channel for their agricultural exports in diverse ways, leading to dumping of foodstuffs to the markets in the developing countries and thus hampering the local markets and producers (Tilzey 2009; McMichael 2011). As Tansey (1994) has noted, the modern globalized food system is heavily in controlled by the economic institutions in the rich nations. This implies that developing countries in general have had rather little say in how the global food markets are shaped by these institutions, investors, and speculators.

### **2.3 Commodification of food systems and rural livelihoods**

In most parts of the world, the diverse forms of subsistence life that were developed during the agrarian revolution thousands of years ago have been abandoned during the last five hundred years. Commodification, or the opening up of new spheres for capital accumulation, is a dominant process under the current food regime, although in many places in the world it had started already by the first food regime, as, for example, the history of colonization in East Africa shows (see Chapter 3.2) (Harvey 2007: 160; Pechlaner & Otero 2008). According to Bryceson (1989), “Commoditization is the process whereby more and more goods valued for their utility, take on an exchange value as well”. In the mainstream development discourse, commodification of the food system, involving specialization on produce that bring high monetary returns, the usage of modern agro-technology, and privatization of the actors of the food system in general, are regarded as stimuli for rural economic growth and development (Kennedy 1988; von Braun 1995; Pingali & Rosengrant 1995). Despite the increase of cash cropping in Tanzania during the colonial period and the following socialist *ujamaa* era,

and the recent growth of non-farm sectors and urbanization, the commodification of the food system and rural livelihoods has nevertheless been slow and impartial in the country (Bryceson 1989; Waters 2007: 155–210). As Waters (2007: 205) writes, the small-scale farmers in Tanzania are probably among the last ones to go through these transformation processes, along with other sparsely populated countries like Congo, Sudan, Central African Republic, or sparsely inhabited islands in Indonesia or areas in the Amazon rain forest.

### *2.3.1 Commercialization of agriculture*

In order to understand what commodification means in the rural context, it is necessary to take a look at the ‘pre-commodification’ situation, or subsistence economy in this case. The farming household involves both the producer and the means of production. The relations of reciprocity and dependency determine the exchange of labour. Accumulation of surplus wealth is difficult when the produced outcomes are not sold. This effectively limits the stratification of wealth within a community (Bryceson 1989). Waters (2007: 2) has described that subsistence peasants are “people who grow what they eat, build their own houses, and live without regularly making purchases in the marketplace”. In general, they are materially poor and do not have the comforts that those who depend on the markets have.

Waters (2007) makes a rather strict divide between subsistence and market economies by pointing out that their inner logics are inherently different. In the subsistence economy, the norms and values developed by the peasants dominate the social life, and production is steered by the needs of the family and the kin. Production of food is usually determined on basis of what the family or a clan needs and prefers for the next year. In the modern market economy, on the other hand, the social relations of production aim at yielding outputs for an impersonal marketplace. In the modern world “time is money”, debts should be collected promptly in order to avoid interest losses, and idleness means wasting economic advantages. The logic of subsistence farmers is a reversal of these maxims. In their point of view, time is not money. The essence of human existence is rather a chance to express sentiment and idleness. Credit is considered a marker of trust, not money, and an important element in maintaining social relationships. (Waters: 2007: 2–3.)

Due to these fundamental differences in world views, the shift from the norms and traditions of the subsistence economy to those of the marketplace is like crossing a socio-ecological divide and is thus slow and complicated. Entering the space of the marketplace looks dangerous and risky for the peasants because the relationships with other people, the marketplace, and the land are fundamentally different. The benefits and risks in the market environment are also different. Importantly, the change may be considered irreversible. In many cases, this process has not been voluntary, but has happened under coercive pressures from outside. Both ecological and political conditions, such as military forces, establishment of political boundaries, diseases, or scarcity of arable land due to population growth have generated these pressures (Hyden 1980: 182–200; Waters: 2007: 2–5).

Concerns have been raised that the commodification processes have by-passed the poor and undermined the traditional modes of production, which has led many researchers to seek for systemic reasons for the failures in improving the nutritional situation in Sub-Saharan Africa (Bryceson 1989; von Braun 1995; Pingali & Rosengrant 1995; Nally 2011). Drawing on examples of farming households that shifted from subsistence farming to cash crops production in Latin America and the Caribbean, Dewey (1989) argued that commodification of food systems affects the diet of rural families both directly and through economic, social, and ecological mechanisms. As a result of commodification, a household has more cash instead of self-produced food. The cash obtained through wage labour, selling agricultural output or other activities may or may not be equivalent to the value of subsistence food that would have else been produced. However, even if the cash now earned equals to the food once produced, significant changes may take place in the diets of household members. Firstly, the variety of food items available at the market can differ from the traditional foods produced in the area. Secondly, peasant families may be unaccustomed to saving relatively large amounts of cash if incomes are received in lump sums, like in the case of selling crops during harvest times. If cash is overspent and not stored in similar manner as food was, food insecurity may increase during certain times of the year. Thirdly, commodification usually involves a larger cultural change, which can profoundly alter the food habits and preferences in the community. Fourthly, and in connection to the previous point, the commercialization process usually covers also other sectors than agriculture, which then leads to increasing allocation of cash to necessities which earlier did not cost or exist, such as education, transportation, housing, health services, or taxation. This may also involve increased consumption of 'luxuries' like electricity, better clothing, TV, motorcycles, tobacco, alcohol, and so on. Dewey noted that in some cases the households may compromise their food security in order to obtain these 'luxuries'.

In a review of studies on agricultural commercialization and nutritional status, DeWalt (1993) found that the rising incomes which may result from the shift to cash crops, do not automatically translate into growing food consumption by households or children. In addition to the policy environment and prices, also the simultaneous protection and stabilization of subsistence production play important roles. Ponte (2000) has found out that the farming households in Tanzania have increasingly shifted to hired labour on a contractual basis to assist in farming activities instead of getting help through social networks that previously provided the main source of additional labour force. This has weakened the position of especially the poorest households that cannot afford to pay the wages while the traditional non-monetary arrangements are getting rare and difficult to organize. As a consequence, the farmers are getting increasingly prone to natural disasters and economical shocks.

Sokoni (2008) has suggested that commercialization of land resources supersedes traditional systems that have governed the access to land through customary laws. According to Ellis and Allison (2004), this may lead to more secure ownership and lessen traditional gender imbalances in regard to land possessions. It also yields new possibilities for leasing or selling land to outside investors, which may bring new job

opportunities and income to the local communities but may also result in adverse developments where the locals lose arable land through undemocratic deals (Cotula et al. 2009; Havnevik 2010b: 267). On the other hand, land titles issued by the state authorities can offer new possibilities to access loans for improving agricultural production. As a downside, setting landholdings as a collateral poses the farmers with a potential risk in the case of crop failure or other shocks, and it may ultimately lead to landlessness and food insecurity, as the relation of debt to farmers' suicides in India and elsewhere shows (see e.g. Gill & Singh 2006, Patel 2007: 50, 64–65).

However, such a 'pure' form of subsistence economy, where households rely completely on subsistence production, hunting, fishing, or gathering, is extremely rare today, and appears to have vanished from the western Bagamoyo district already during the colonial period (Mwelupungwi 1977). Cash crops have never dominated agricultural production in the study area (Mwelupungwi 1977; Sitari 1983: 14; Sendaro 1992; Haapanen 2010). Thus, Dewey's definition for commodification of food systems involving the "use of agricultural goods for sale rather than for home consumption" does not fully apply in the present context. A more appropriate examination in this context should encompass also the diversification of rural livelihoods towards the non-agricultural sectors and into the sphere of cash economy.

### *2.3.2 Livelihood diversification to non-farm sectors*

Rural livelihood diversification in Sub-Saharan Africa and elsewhere in the world has gained renewed attention in development research during the recent years, which relates particularly to the growing needs for understanding the manifestations of globalization and the responses to these in diverse local contexts (de Haan & Zoomers 2003). Rural livelihood diversification concerns the shift from farming to off-farm sector, which means wage work in agriculture, and non-farm sectors that involve wage work in non-agricultural activities, self-employment like trading or handicrafts, as well as other income transfers such as remittances, pensions or rent (Ellis 1998, 2000). The shift to off-farm and particularly non-farm sectors has been accelerating in the region since the mid-1980s (Haggblade et al. 1989; Ellis 1998; Bryceson 1999). According to estimates by Haggblade, Reardon and Hazell (2010: table 1), around 35% of rural incomes in Africa are derived from non-farm sources. However, as Dewey (1989) has emphasized, the transition to cash economy will not be completed as long as there are limited opportunities for generating monetary incomes, thus requiring partial reliance on subsistence labour.

In the mainstream development discourse, livelihood diversification is usually seen as a vital coping strategy and a positive direction for development in the rural contexts (Ellis 1998; Bryceson 1999; Rigg 2006). Bryceson (1999), however, underlines that the process of 'de-peasantization' leads to profound societal changes which may have far-reaching consequences for the political balance of the communities and nations. It may also contribute to the segregation of cultural spheres and economic differentiation. Based on several case studies from different parts of the continent, she has come to the

conclusion that for most rural people the diversification has been necessary in order to meet the daily needs when the returns from agriculture have been decreasing (see also Paavola 2008). She argues that the process has not brought adequate improvements in the levels of welfare, purchasing power, or technical innovation (Bryceson 2002).

According to Barrett, Reardon, and Webb (2001), the push-factors relate to the limited capacity to bearing risks, which stems from poor financial situation, limited availability of agricultural labour, limited access to land, or environmental concerns such as climate change. In addition, low availability of credit for investing on improving the productivity of small-scale agriculture, as well as the scarcity of natural resources in general are usual push-factors (Ellis 2000; Ellis & Allison 2004). Pull-factors are found to occur especially in the vicinity of larger urban centres where the access to infrastructure is sufficient. Education does enhance possibilities for non-farm employment in the rural areas, but as Lanjouw, Quizon, and Sparrow (2001) have presented in their study in Tanzania, this connection appears to be stronger among men than women. They also found out that higher non-farm incomes and per-capita food consumption have a strong positive relationship.

## **2.4 Outcomes and external linkages of the food system**

Ericksen (2008) has reviewed a wide array of food system literature and concluded that a set of activities in the food system yields multiple outcomes including food security, social welfare, and environmental welfare (figure 3). Incorporating these factors requires a broader conceptual and analytical approach, taking into account the interactions in physical and social environments on different levels. This is particularly important when studying food security, a complex issue with various determinants. The following sub-chapters deal with the diverse definitions of food security and the discussion around the concept are dealt with. This is followed by a brief review on issues regarding social and environmental outcomes and linkages of a food system in a rural context.

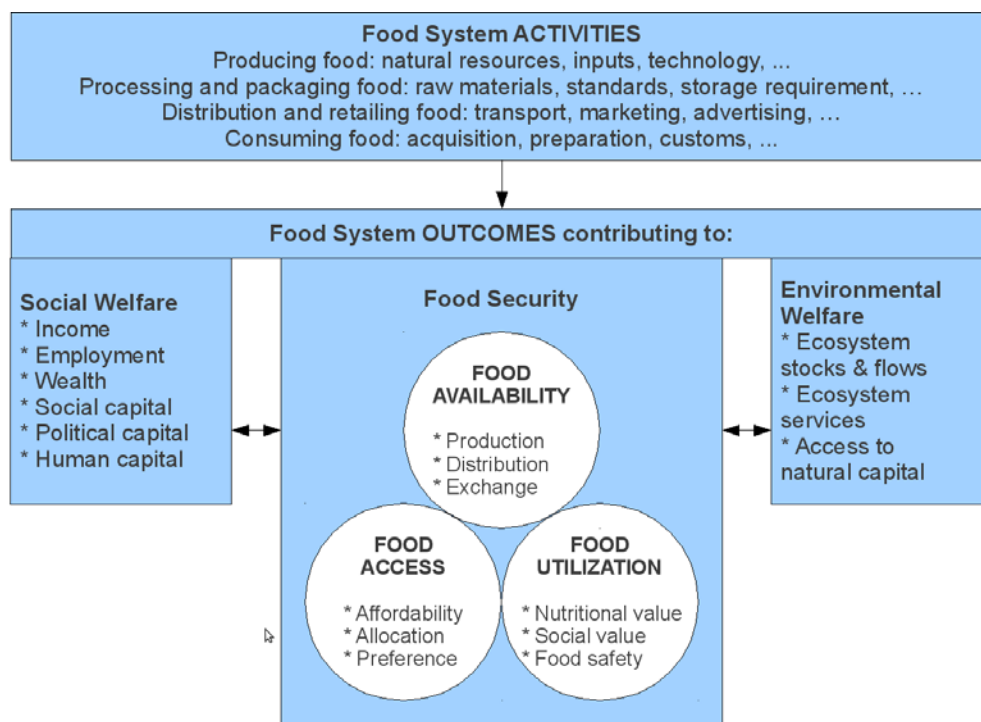


Figure 3. Food system activities and outcomes according to Ericksen (2008: fig. 1, 2009: fig. 1).

### 2.4.1 *Food security*

The World Food Conference of 1974 introduced the concept of food security. After this, the concept has been developed and given a large variety of meanings and definitions. According to Maxwell (1996), the thinking about food security involves three paradigm shifts—or progression in understanding and awareness—which have been partially overlapping. These shifts are briefly presented here, because each of them provides some theoretical insight for the analysis. Also the recent discussion around nutrition security is noted, as it can be seen as the fourth major advancement in how food security and the related factors are understood.

The World Food Conference of 1974 raised concerns on the global food supply and the prices that had spiked along with the oil crisis. Following the conference, the United Nations formulated a definition of food security, which emphasizes these concerns: food security is “*the availability at all times of adequate world supplies of basic food-stuffs [...] to sustain a steady expansion of food consumption [...] and to offset fluctuations in production and prices*” (United Nations 1975; Maxwell 1996). As this early formulation had its focus on food supply, it was becoming increasingly clear that food insecurity and hunger could persist also when the supply was adequate. In the research on the political economy of food, the concept of entitlement started to gain a central position, indicating that an individual or a group has the right to earn one’s keep in acceptable manners in the prevailing social and judicial conditions. The shift that brought the focus

of food security thinking to access to food has been attributed especially to Amartya Sen's entitlement theory, which was based on earlier field studies addressing the issue (Drèze & Sen 1989/2002; Sen 1989; Maxwell & Slater 2003). Food security became increasingly determined in relation to *access* to food, while food production became to be considered a route to entitlement (Maxwell 1996). Accordingly, new definitions of food security emphasized these issues of access and individual entitlement. For example, the World Bank (1986: 1) defined food security as "access by all people at all times to enough food for an active, healthy life".

The second shift took place after 1985, following the observations made especially in regard to famines in Ethiopia and elsewhere in Africa in 1984–85. The assumptions underlying the arguments that considered food security the first fundamental need to be fulfilled were questioned. It was found that people might choose short-term hunger in order to save their means of subsistence, such as seeds or livestock protecting themselves against even worse shocks in the future (Maxwell 1996). Following this, the views on food security became extended to cover *livelihood security*, meaning access to sufficient incomes and other vital resources, as a prerequisite for food security (Chambers & Conway 1991; Scoones 1998; Swift & Hamilton 2001; Lindenberg 2002). This also brought about the recognition that agriculture is not always the primary source of livelihood for rural households, and diversification of income sources on non-agricultural sectors is a common strategy for shielding against failures in agricultural production (Bryceson 2000; Ericksen 2008). Furthermore, in addition to providing food for the people, the natural resource base functions as a vital asset for survival and maintaining food security through providing incomes and buffering against diverse shocks (Scoones 1998; Lindenberg 2002). Through the livelihood approach it was also addressed that institutions at different levels have diverse, and often unintentional, impacts on livelihoods, and food security (Swift & Hamilton 2001; Ericksen 2008).

As the post-modern thoughts and approaches have become increasingly popular in the academic, cultural, and political spheres, the thinking regarding food security went through the third major shift. In particular, this has included the tendency to move from objective to subjective approaches. Instead of the 'conditions of deprivation', the emphasis is laid on the 'feelings of deprivation'. Firstly, there was criticism towards quantitative estimates on nutritional requirements, which are very difficult to set precisely for different environments and population groups that have diverse physical characteristics and activity patterns. As Wandel, Holmboe-Ottesen, and Manu (1992) have found in their case study from Tanzania, many of the factors that relate to nutritional situation, such as the intake and consumption of energy, vary seasonally. On the other hand, the problems of objectivist nutrition research are epistemological in the sense that health and well-being are taken as universal phenomena, which primarily relate to physical existence. There is a danger that the signs and symptoms of malnutrition do not appear self-evidently to the observer (Säävälä 1998). Following Chambers' (1983: 75–101) thoughts, the question of 'whose knowledge counts' was raised and the experience of the food insecure themselves was demanded to have a central role in assessing food security. The third shift in food security thinking is well

manifested in Maxwell's (1988: 10, cit. Maxwell 1996) definition: "*A country and people are food secure when their food system operates in such a way as to remove the fear that there will not be enough to eat. In particular, food security will be achieved when the poor and vulnerable, particularly women and children and those living in marginal areas, have secure access to the food they want*". Also notable in this definition is the usage of food system as an encompassing concept and regarding the system as something that is 'theirs', the people in question.

Since the 1990s, particularly along with the research projects of UNICEF and International Food Policy Research Institute (UNICEF 1990; Ruel et al. 1998), food security has been increasingly attributed to *nutrition security*. This stems from the recognition that access to food is not sufficient alone but needs to be accompanied with adequate health care and hygienic conditions. For example, a person can have access to an amount of food that would otherwise meet the person's physical needs, but the constant suffering from diarrhoea, intestinal worms or other diseases may bring serious and ultimately fatal nutritional imbalances. Therefore, in this study food security will be looked upon also in relation to health conditions and particularly the availability of safe water. Basically, food security will be approached on the basis of a rather simple but broad definition formulated by FAO (1996): "*Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life*". This pre-supposes the sufficient availability of food, but gives the emphasis on entitlement. It also covers individual, household, and community levels, allows attribution to larger contexts such as the food system as an entity, livelihood security and natural resources, and takes into account subjective views on food security without ruling out the quantitative approaches. The definition implies that food security supposes availability, access, utilization, and stability. Availability consists of domestic production on household and state levels, and import capacity, as well as food stocks and food aid. However, availability is worthless without access which covers transport and market infrastructure, and most notably purchasing power or other socially and legally accepted means to acquire food (FAO 2007: 9). Utilization relates to the health status of individuals, i.e., the ability of the body to absorb and utilize the energy and nutrients of the food, albeit it must be noted that the FAO's definition should underline more explicitly the role of health care and hygiene (Weingärtner 2009: 25). Stability involves the protection against the risks that may cause fluctuations in access to food over time (FAO 2007: 9).

#### *2.4.2 Livelihoods and social welfare*

The food system framework presented by Ericksen (2008, 2009) encompasses social and economic factors which can result from the food system activities and also influence food security (figure 3). Food system activities provide sources of livelihood directly to farmers, millers, wholesalers and retailers, for instance. This study focuses particularly on both non-monetary and wage employment in the food system activities and the outcomes generated through these activities. For many people in the study areas, however, primary income sources lie outside the food supply chain. As presented



above, diversification to non-farm sectors is an important mechanism for buffering the rural households against food security shocks, which calls for analysis that goes beyond food security (Ericksen 2008). The applied framework will thus take into account the determinants for food security that are derived from social welfare generated from non-agricultural sectors, thus enabling the analysis in a wider context of livelihood security.

The essential differences in the food system and livelihoods approaches relate to scale, analytical focus, power and environment. While the unit of analysis in the food system is on vertical linkages and dynamics in networks of institutional and corporate actors, livelihoods emphasise actors with horizontal linkages and social relations on the household and individual level (Pimbert et al. 2001; Bolwig et al. 2010). In other words, the local implications of food system change are determined by power relations within the food system on wider scales, and also by local inequalities such as those related to poverty, gender, labour or access to natural resources. The food system perspective enables the identification of the powerful actors that generate profit, while the livelihoods perspective is effective in explaining what actually makes these actors powerful. In relation to environment, the food system approach is capable for analysing the environmental outcomes and feedbacks of the production and supply chains, but the livelihood approach is good at identifying the “right questions” in regard to the human-environment relations in agricultural production and beyond (Pimbert et al. 2001: table 1; Ericksen 2009). However, it would be a mistake to assume that livelihoods are strictly attached to particular places. As elsewhere in the world, the people in the global South are increasingly depending on multi-local livelihoods through to e.g. migration and remittances (de Haan & Zoomers 2001).

The combined framework can be constructed in a manner it places the assets that the household needs to maintain its food security at the centre (figure 4) (Rakodi 2002; Codjoe & Owusu 2011). In part, these assets are influenced by the infrastructure and services, steering political institutions, as well as the ‘vulnerability context’. Factors that cause vulnerability may relate to natural conditions such as loss of soil fertility or climate change, or socio-economic circumstances like conflicts, illnesses, unemployment or market situation. The adaptive capacity of the household (or individual, or community), which depends on both ‘internal’ and ‘external’ factors, determines food security. As successful adaptation generally diminishes the vulnerability towards food insecurity, and improves living conditions, it may in some cases lead to adverse outcomes (Ericksen 2008; Codjoe & Owusu 2011), such as unsustainable usage of water resources, socially unacceptable activities for income generation, or forced migration, which may cause new vulnerabilities in the future.

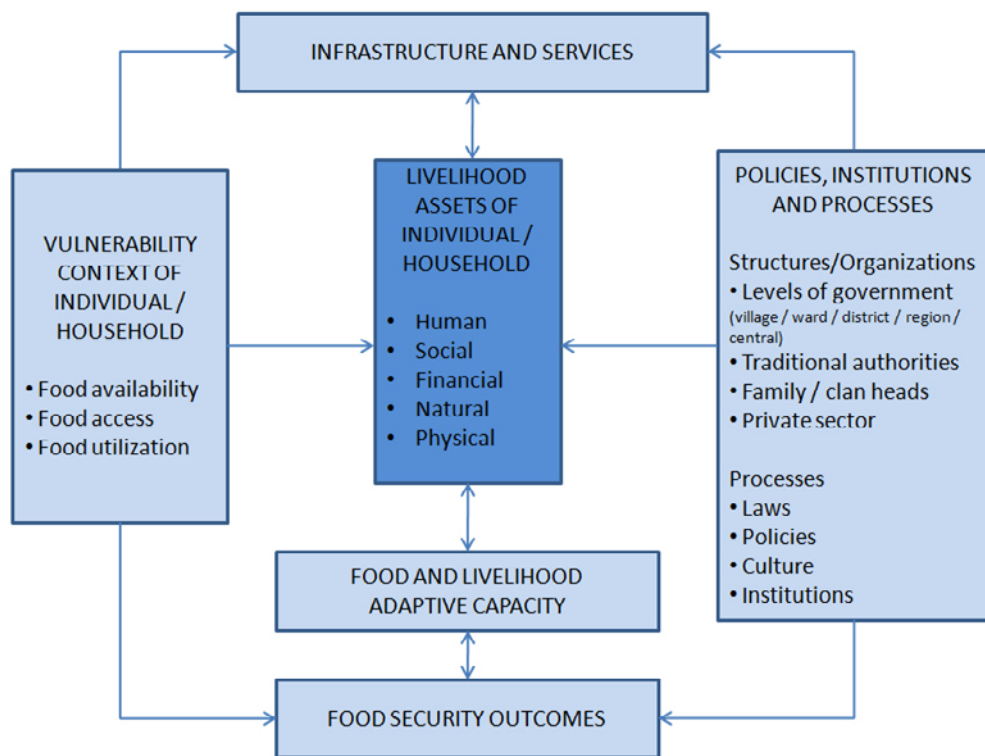


Figure 4. Food security and livelihoods framework according to Rakodi (2002: fig 1.1) and Codjoe and Owusu (2011: fig. 1).

### 2.4.3 *Environmental outcomes and feedbacks*

In addition to financial, social, and physical assets, the natural resource base is vital for the food system (Ericksen 2008; Codjoe & Owusu 2011). This is usually very directly manifested in the local contexts in developing countries, where access to natural resources such as land, water, and biodiversity serves both as a condition to food production and preparation, and as an outcome of food system activities themselves. As populations and income levels increase, the linkages between food system and environmental changes are crucial. Environmental changes can occur due to natural processes, human activities or both. Like social welfare, environmental changes such as biodiversity loss along with the expansion of fields, or changes in the aquatic ecosystems due to nutrient outflows from agriculture, can be outcomes of the food system activities. These outcomes may also function as drivers for food system change through feedbacks. Similarly, food production, processing, and distribution create greenhouse gas emissions that are related to global changes in the climate that again influence the food system (Ericksen 2008, 2009).

The natural environment not only enables food production, but also provides other resources that can be converted to incomes that contribute to food security. As environmental and socio-economic changes may happen simultaneously and take

place on different levels, the relationships are complex and may result to unexpected outcomes (Ericksen 2008). Batterbury (2001), for example, has described how drought, fluctuating rainfall, and soil erosion in Niger has contributed to shaping the local landscape through a decline in the bush fallow cycles, which in turn has contributed to livelihood diversification. A comprehensive analysis of ecosystem and food system outcomes must thus involve examination of interactions between different levels (Maxwell & Slater 2003; Ericksen 2008, 2009; Bolwig et al. 2010). For this study, however, an extensively holistic examination on the environmental factors is not possible. The focus will be put on certain environmental processes that affect local food production, as well as some of the direct and indirect environmental outcomes stemming from the local production and food security situation. Detailed quantitative analysis of these changes is also beyond the scope of this research. Nevertheless, other recent studies conducted in the same area have covered diverse issues relating to land/cover use change, land availability and natural resource management, and thus provide valuable reference (Mhache 2010; Sokoni 2010a; Ylhäisi 2010a, 2010b).

## **2.5 Tracking down a rural food system**

Reviewing the literature on food systems reveals that there is a bias towards studying the food systems from the perspectives of developed countries and focusing on the macro-level analysis. Much of the literature is theoretically oriented and provides few methodological tools for a local context where a considerable part of the food is derived from subsistence farming. Also terminology is often not consistent and the holistic concept of food system is sometimes used even though the focus is limited to only some parts of the system, such as farming practices or dietary habits. There is, however, a growing field of studies that take a region, place, or a group of people as a starting point for the analysis (e.g. Collier et al. 1977; Århem 1981; Parikh 1986; Anyanwu & Jukes 1991; Connors et al. 2001; Smart & Bisogni 2001; Aggarwal et al. 2004; Combs & Hassan 2005; Pingali et al. 2006; Codjoe & Owusu 2011). Some of these focus on the contexts of developing countries and can provide insights for the present analysis.

Probably the first study where food systems of rural villages were examined as entities is a study by Collier, Hadikoesworo, and Saropie (1977) on Javanese coastal villages. The approach of the study incorporates the analysis of diverse traditional food systems, as distinguished by the authors, with income generation and employment. Nutritional aspects are also dealt with, but the focus is mainly on the outputs of agricultural production, fish cultivation and fishing practised by the villagers. Nevertheless, the study makes a valuable contribution towards a holistic approach for considering and examining local agro-food systems as interwoven entities which comprise the basis of subsistence for the villagers. The study concludes that in order to design effective development programs, the entire community or village has to be examined, the internal and external pressures understood and selected traditional structures strengthened (Collier et al. 1977: 138).

A rare example of a comprehensive food system research in a context of subsistence agriculture is a study by Århem, Homewood, and Rodgers (1981) regarding the

food system of the pastoralist Maasai in Ngorongoro in Tanzania. While leaving the theorization of the food system framework aside, the study actually involves a detailed and balanced description that extends from the analysis of domestic livestock production to the dependency on the grain markets and inclusion of several aspects of income generation and food security. The study has relevance both due to its exceptional approach, as well as the fact that it presents some of the prominent issues regarding the culture and subsistence of the Maasai that live also in Bagamoyo district.

Combs and Hassan (2005), in their study on risk factors for rickets, examine the food system of a particular area, Chakaria in Bangladesh. They concentrate mostly on food consumption and nutrition, but also pay attention to agricultural production practised by the studied households. Other studies which approach food systems from the viewpoints of consumption and dietary change of a certain group of people include, e.g., Smart and Bisogni's (2001) study on personal food systems of college hockey players and the study by Connors, Bisogni, Sobal and Devine (2001) on managing values in personal food systems in New York. While it is interesting to note that food systems have been defined even from the viewpoints of individuals, the studies on personal food systems appear to limit their focus almost solely on the dietary habits of the individual and the driving forces behind these, instead of tracking the components and productions chains of these food systems much further.

Some of the conceptualizations in the previous literature beg the question whether multiple food systems can be identified simultaneously in the same place. Dahlberg (1994), for example, distinguishes industrial agriculture from traditional and indigenous food systems. To regard these non-capitalist food chains as distinct food systems from the industrial or market-based food system is one approach for conceptualizing the complicated relationships through which the food is obtained in a farming community. During this research process it turned out, however, that this kind of dualism does not serve very well for the systemic analysis in the studied context and timeframe. It would be difficult or impossible to draw unambiguous boundaries between the assumed subsistence and market-based food systems. For instance, commercial inputs like seeds, hand hoes, and pesticides are used for subsistence production, the governmental extension work focuses on both commercial and subsistence farming, cash is used to trade subsistence products between the villagers, and the regulation of the markets influences both types of farming. This was the case also in the beginning of the studied period in the mid-1980s, as presented for example in the studies by Muro (1979), Sitari (1980), Hurskainen (1984: 85–104), and Vuorela (1987: 128–158). Nevertheless, there is a fundamental difference, especially from the livelihoods perspective, whether a household consumes food that is self-produced or if it buys the food from the market. Thus, special attention is given to the changing role of subsistence production in the study area, but the food system from which the villagers depend on is analysed as a single entity consisting of both locally produced foods and foods traded from outside.

Read and Jones (2002: 38–39) have conceptualized a 'village food system', which can be applied on certain terms in the context of a subsistence farming community in a

developing country such as Tanzania. In their model, the village food system involves both subsistence foods and those traded from outside the village area. The local production consists of domestic crop growing and livestock keeping, and the output can be either sold to the market or consumed by the farming households themselves. While Read and Jones (2002: 38) consider a hunter-gatherer food system a different entity, and a predecessor of the agricultural village food system, it is nevertheless appropriate to incorporate these in the analysis of this study. Firstly, hunting and especially gathering have also seasonal relevance for food security in the area (Muro 1979: 5, 7; Vuorela 1987: 77; Mhache 2010: 29–30). In addition, governmental food aid and social welfare programmes continue to have significance in rural Tanzania (Tapio-Biström 2001; WFP 2011).

Understanding the dynamics of a rural food system can also benefit from the literature on ‘alternative’ or ‘local’ food systems. Feenstra (1997) describes local food economies as collaborative efforts that are rooted in particular places. They aim to build more locally based, sustainable, self-reliant, democratic, and more economically viable systems for the producers and the consumers. Farmers’ markets are one form of such local networks where the farmers themselves sell their products to the consumers. Trading usually takes place at particular market places in urban areas. This used to be the most common form of food trade in many countries before World War II, after which it started to decline along with the development of corporate controlled, long distance based food distribution and the rise of supermarket chains (Maggos 1987, cit. Hinrichs 2000). In addition to the efforts to revive the farmers’ markets in Europe, North America, and elsewhere in Western societies, such movements have recently emerged also in cities in developing countries like India (Rengasamy et al. 2002).

However, it must be noted that the ‘alternative’ food systems usually represent phenomena that are results of responses to the shortcomings of the ‘mainstream’ food system by consumers and producers, and are much more recent and possibly less established than the multiple forms of traditional subsistence food economies. ‘Alternative’ food systems have been mostly built up in the developed countries, but can in some cases also involve producers from elsewhere, as is the case with fair trade and organic food networks, for example. Despite the emphasis in social and environmental aspects in the production chains, these networks are usually overlapping with the ‘mainstream’ system and in a way or another rooted in capitalist commodity relations (Whatmore 1997: 295; Hinrichs 2000). In today’s Tanzania, a form of ‘farmers markets’ described above is actually present in rural villages and urban centres, where the producers sell their excess directly to the consumers—who can also be producers. However, these markets are not a result of any revival movement, but a common mode of exchange in an environment where supermarkets and large food companies do not have a dominant role.

The present study tracks a rural food system by using Whatmore’s (2002a) food system model as a general guide, accompanied with Ericksen’s (2008, 2009) notions on involving also the food security outcomes and the external linkages with the local

socio-economic situation and environment in the analysis. One of the dilemmas in the design of this study was how to outline the boundaries of the food system from which the villagers depend on, as its diverse components are interwoven with countless other factors on different scales than extend far beyond the village boundaries. For instance, an industry which produces agricultural inputs such as machinery, fertilizers, and pesticides cannot survive without oil or other mineral extracting industries, which in turn cannot be examined in this study. Similarly, it was not possible to study the conditions under which most of the foods marketed in the villages have been produced, as these are usually imported from other regions or countries. When the first phase of the field work was carried out, it appeared that the major concerns of the food system change lie in the weakening role of subsistence production by the villagers themselves, local environmental changes, and concerns over household food security. On the other hand, institutional changes in the Tanzanian food markets during the post-*ujamaa* period are rather well documented, as presented in the next chapter, so it was a deliberate choice to focus on the local outcomes of these macro-level changes, and simultaneously explore the local processes that are contributing to the change from 'below'.

### 3. HISTORICAL OVERVIEW OF FOOD SYSTEM CHANGE IN TANZANIA

In order to understand the recent transformations in the rural food system in eastern Tanzania, it is first necessary to look at some of the conditions under which food production, exchange, and consumption have evolved. In particular, taking into account certain cultural aspects, including the “ethos” of the subsistence farmers, calls for taking a glance at what is known of the history of food production, exchange and consumption as far back as in the pre-colonial era. The profound ecological and social changes that occurred during the colonial period, and those along with the socialist *ujamaa* policies after the independence, also need to be noticed in order to gain a deeper understanding of the situation that prevailed when the country started its shift to the open market economy in the 1980s. Most of the previous literature specifically concerning the study area focuses on the developments that took place during and immediately after the villagization. These studies are shortly reviewed together with other literature concerning the *ujamaa* era in Tanzania. More detailed issues from the earlier studies in Bagamoyo district, however, are included in the analysis part in order to make the comparisons between the present and the past more coherent. In the latter part of this chapter, literature and statistics concerning food system development in Tanzania during 1985 to 2010 are discussed to the extent to which they provide relevant information for the studied context.

#### 3.1 Pre-colonial period (before 1890)

The process of change from foraging and hunting to food production was a slow and uneven process which lasted for centuries, even millennia. The first food producers in the area of today’s Tanzania are believed to have included Cushitic-speaking pastoralists who had migrated from the north, as well as Bantu speaking cultivators who had come to the Great Lakes region from the north-west (Koponen 1988: 49; Iliffe 2007: 16). The Bantu speakers may have learned cattle-keeping also from the Nilo-Saharan speakers, who had brought these skills from the Nile Valley. The shift to cultivation in Tanzania has been strongly connected with the development and diffusion of techniques for iron smelting and the usage of iron hoes. Smelting furnaces are estimated to have been in use in the Great Lakes region already by 400 B.C. (Koponen 1988: 48; Iliffe 2007: 16, 34). Nevertheless, most inhabitants in the area remained hunters and gatherers who used stone implements. Only after 1000 A.D. food production is considered to have diffused more widely. In many areas, diverse technological and economical systems co-existed until the colonial period (Koponen 1988: 49–50).

At a very simplistic level, there were two main farming systems: grain-based and banana-based (Iliffe 1979: 14–15). Grain-based cultivation, which continues to be the main form of agriculture in the study area, involved diverse forms of shifting cultivation with fallow periods of varying length. Animal-drawn devices were not used and manure was seldom applied in the fields. Traditionally, shifting cultivation was adapted to dryer areas and required rather sparse population density, but also intensive forms existed in

more densely populated areas. The most popular crops in this category were millet and sorghum and several types of legumes. Banana-based farming, which also continues to exist, was mainly developed in the volcanic highlands where water was available more abundantly. The settlements of banana cultivators were also of a more permanent kind (Koponen 1991: 190–194, 197, 201).

In regard to the pre-colonial events in the study area, or Ukwere, as it was then called, there are few literary sources. Vuorela (1987: 80–82) has documented oral stories from the largest group in this area, the Kwere, which referred to the time when cultivation was not practised and people subsisted on hunting and gathering. The stories link the gradual adoption of millet cultivation to cultural contacts with the Sagara in Kilosa, about 150 km west from the area. In the beginning, the Kwere used simple sticks to dig the seeds in the soil. This practise is still in use, as observed during the field work. More advanced tools such as machetes, axes, hoes, and wooden mortars have been taken to use relatively recently. In addition to cultivation of millet and beans, animal husbandry was practised in a small scale, involving fowls, cattle, goats, sheep, chickens, ducks, and pigeons. Hunting and gathering continued alongside the farming practices. Other Bantu groups in the area, like the Zaramo and the Zigua, were also shifting hoe cultivators. They share many cultural characteristics with the Kwere and their languages have rather high lexical similarities. In addition to agriculture, all groups have practised pottery, basket-making and wood-carving (Beidelman 1967: xii; Sitari 1983: 15; Lewis 2009).

Mwelupungwi (1977), who bases his observations on interviews with the elders in Lugoba ward in 1976, writes that production in pre-colonial Ukwere was solely subsistence based and aimed at meeting the needs of the household. The social organization among the Kwere was based on the clan, but the family had full control and possession of its production. Centralized administration or tribal chiefs were generally not acknowledged (Beidelman 1967: 17, 23, 28; Mwelupungwi 1977). The settlements were organized in small matrilineal groups which were flexible when the food situation required movements to other areas (Beidelman 1967: 30–31; Vuorela 1989: 77–78, 90). The collective forms of production involved the circulating *kiwili* system, or labour exchange where agricultural activities such as tilling, weeding, and harvesting were done jointly and reciprocally with the neighbouring households. As compensation for the work, the participants were usually offered food and home-brewed beer (Mwelupungwi 1977; Muro 1979: 6). Non-monetary exchange was common and the surplus was consumed in communal ceremonies. Accumulation of wealth was difficult because money was not used and it was not possible to store larger amounts of food (Mwelupungwi 1977; Vuorela 1987: 83). On the other hand, the oral stories indicated that slavery also existed among the domestic society and indebted people could give their children for slaves as payments (Vuorela 1987: 91).

The coastal areas were in contact and influenced by merchants from the Arab countries and India at least since the first millennium A.D., and by the Portuguese since the beginning of the 16<sup>th</sup> century. Increasing demand for ivory and slaves was the main driving force for the expanding flows of long-distance trade. Indian, European and



American manufactured goods were traded to local people in exchange. The process was managed from Zanzibar, especially after the Portuguese control of the island was superseded by the Omani Arabs in the early 18<sup>th</sup> century. The Arabs allied with Indian merchants and financiers, and brought slaves from the mainland to maintain the plantation economy that they had established in Zanzibar. Long-distance trade routes were established, connecting the coast with the interior. Goods were obviously also procured in the neighbouring areas of the coastal towns such as Bagamoyo. African traders had active roles in the process as well. In this way, East African interior was 'opened up' and, to an extent, integrated with the emerging world market. (Koponen 1988: 53–55, 69, 83; Iliffe 2007: 186–192.)

The transforming processes outside Africa became stronger during the 19<sup>th</sup> century. One of the major caravan routes that led from Bagamoyo to Tabora and further to Lake Tanganyika and Karagwe passed through the study area (Vuorela 1987: 93; Koponen 1988: 53, 68–76; Koponen 1991: 199). Non-African crops including maize, cassava, sweet potato, and later on also rice, pawpaw, and mango were introduced in the area through the caravan trade (Miracle 1965; Vuorela 1987: 93; Koponen 1991: 200; McCann 2001). Otherwise, as Koponen (1991: 199) argues, the long-distance trade had little impact on indigenous agricultural systems, and there is no evidence that the caravan trade would have stimulated food production in general. On the contrary, increased selling of foodstuffs—which was actually linked to slavery, warfare and the dangers that were attributed to maintaining food storages—was an important reason for the shortages in different parts of the country during the 19<sup>th</sup> century (Koponen 1988: 138–171). According to Mwelupungwi (1977), food plantations were established in Ukwere for fulfilling the needs of the caravans. In order to defend themselves against the traders who also tried to capture slaves and ivory from the area, the Kwere allied with the Doe. However, the Doe demanded tributes from the Kwere in the forms of food, beads, cloth, or salt. This meant that the Kwere had to produce surplus and exchange this to the required items either from the traders in Bagamoyo or the caravans. The Doe leader also appointed middle-men (*wandewa*) among the clans to collect the tributes, which meant the beginning of gradual accumulation and differentiation within the Kwere society.

In the mainland, the adoption of money as a means of exchange, however, took place relatively late, in the latter part of 19<sup>th</sup> century. At first, the Europeans introduced beads, cloths, iron hoes, and ivory as currencies in the caravan trade. Traditionally, cattle had been used in mediating bridewealth, but now it also became an important store of value and means of exchange (Koponen 1988: 121–125). The first coins and notes included Maria Theresa thalers, Indian rupees and copper pice. In the study area, money was adopted by the Kwere and Zigua during late 1870s and early 1880s, which the Catholic missionaries deemed mostly the result of their own influence. However, money was still used by a restricted minority in the societies, and the coins had only subsidiary functions (Mwelupungwi 1977; Koponen 1988: 124).

Following especially the works by Kjekshus (1977a) and Iliffe (1979), historians have debated on the differing views on the social and ecological situation in East Africa at

the eve of European colonialism, or whether the situation represented a 'Merry Africa' vs. 'Primitive Africa' (Koponen 1988: 21–23). Kjekshus (1977a: 29–48) described a 'Merry' pre-colonial Tanzania where advanced agricultural systems existed and provided assured surplus. Along with the increase of caravan trade and colonial exploitation together with the rinderpest epidemics, these agricultural systems were destroyed during the 19<sup>th</sup> century. This took Tanzania on the track of 'de-development' that persisted until the post-colonial times in the latter part of the 20<sup>th</sup> century (1977a: 180–185). Iliffe (1979: 13–15, 70), on the other hand, presented a more 'primitive' Tanzania by emphasizing that famines were frequent in the pre-colonial times due to harsh ecological conditions, poverty, and diseases that the farmers could not cope with. The penetration of capitalist relations could have provided means to escape the situation, but it was vitiated by colonial exploitation (Iliffe 1979: 3, 45, 77). Koponen (1988, 1991) has balanced the understanding between the differing views through in-depth analysis of descriptions written by early travellers and residents, historical works based on oral tradition, and other literature. According to his conclusions, the diverse agricultural systems in late pre-colonial Tanzania were more advanced and technically sophisticated than what is often assumed. The production was relatively sufficient to meet the basic needs. Although food shortages existed, famines were rarely widespread and fatal as the societies had developed effective mechanisms to cope with them (Koponen 1991: 205–207).

### **3.2 Colonial period (1890–1961)**

The rise of the first food regime in the area of today's Tanzania can be attributed to the colonial period, which was started by the Germans in the late 1880s and continued by the British after the World War I. Commodification of food production proceeded along with the expanding agricultural markets and large-scale exports of foods to Europe and elsewhere. New plantations were established in the mainland and production of cash crops such as coffee, tea, cotton, wheat, and sisal grew rapidly. Infrastructure, i.e., roads, harbours, bridges, railways, and dams was built and developed for the needs of the trading system (Mwelupungwi 1977; Ergas 1980; Iliffe 2007: 209–214). At the turn of the century, also food imports began to grow particularly as the plantation workers were fed with Indian rice (Koponen 1994: 209, 611).

After partitioning East Africa with the British in 1886, the German rule was rapidly strengthened as the control by the Sultanate of Zanzibar was superseded in the mainland, Tanganyika. The Sultanate gave in to the Germans' demands to collect taxes in the coastal areas, including Bagamoyo. As a response, resistance movements emerged. They were soon beaten by the Germans, who took over the territory east from Lake Tanganyika. Zanzibar and Pemba islands remained under the rule of the Sultanate. The Germans ordered the local population to extract and cultivate raw materials for use in the mother country. Construction of railroads and road network was started. The Germans imposed their own administrative structures and the new concept of territoriality, which were in sharp contrast with the local ideas of social organization. German East Africa was divided into districts, of which Bagamoyo was one. The

districts were further divided into divisions that were based on ethnicity, even though these divisions did not always comply with the divisions made by the people themselves (Vuorela 1987: 128; Jerman 1997: 184–185, 188). In Ukwere, the Germans appointed *wandewa* middle-men as local leaders, although such authority was traditionally not acknowledged in the Kwere society (Mwelupungwi 1977; Vuorela 1987: 128–129).

During the German rule, agriculture was organized in three production spheres including the white settlers, plantation companies, and African small-scale producers. Africans mostly worked on the lower levels of the marketing system, while export and shipping were in the control of European companies and Asian merchants (Coulson 1982: 36–42, 60; Koponen 1994: 575). The colonial authorities collected taxes from the households in urban and rural areas. In the villages this led to increased selling of livestock, crops and other products and engagement in wage labour. Imports of European hoes together with tax collection forced many craftspeople to engage in cash crop production. People in Ukwere were told to grow cotton and oilseed for export and food for the migrant workers in the plantations in Morogoro (Mwelupungwi 1977; Vuorela 1987: 128, 130). Caning was used as a penalty for failing to meet the production demands (Mwelupungwi 1977). Taxes were collected even during severe famines. If the household was not able to pay, the taxes were collected in kind, which led to losing the scarce food assets (Jerman 1997: 201–204). In different parts of the country, new resistance movements and warfare spurred. The bloodiest was the ‘Maji Maji’ rebellion in 1905–1907, which has been estimated to have caused at least 200,000 deaths of Africans due to fighting and starvation (Iliffe 1979: 165).

Due to the export of foods for the German and later on the British troops fighting in World War I, years 1917–1920 saw another severe food crisis and famine. In addition, drought hampered crop production and caused deaths of a large number of cattle. As a result, famine killed probably as many as 30 000 people in central Tanzania (Maddox 1990). After the defeat of the Germans, the rule of the territory was passed on to the British. Unlike the divide-and-rule strategy practised by the Germans, the British aimed to control the territory through more indirect ways by recruiting local leaders to their service. The British also officially abolished slavery (Iliffe 2007: 213). However, the low position of Africans in the trading system did not change much to (Ponte 2002: 40). The taxation of the rural population and the harsh punishments for not paying continued (Mwelupungwi 1977). In Ukwere, the *kiwili* system was banned by the British who claimed that labour or goods should not be exchanged without cash payments. Accordingly, the ironsmiths were forced to sell their items for cash. Fees for hunting and beer brewing and selling were introduced. Many started to work for money for the richer farmers and the traditional bridewealth payments were more often made in cash (Mwelupungwi 1977, Vuorela 1987: 230). New middle-men, called *walunguzi*, were appointed among the richer peasants to organize labour and buy crops from the remote villages, which enabled them to gradually accumulate wealth and gain control in retail business through establishing shops from which the people were increasingly depending on. Based on the interviews with households who had worked on the fields of these middle-men, Mwelupungwi (1977) has estimated that the people spent more

time working on the *walunguzis'* than their own fields. However, the possessions of the richer peasants in Ukwere were nevertheless quite small in comparison to other rich farmers in Tanganyika.

The British colonial food policy addressed household food-sufficiency, and food aid was delivered in Tanganyika during shortages (Bryceson 1992). Cassava was introduced as a famine relief crop by the British in the early 20<sup>th</sup> century and became very popular because it is drought-resistant and relatively easy to cultivate (Mwelupungwi 1977; Koponen 1991: 200). During World War II, statutory cereal boards were set up in order to ensure bulk purchases of food grains. These boards functioned as monopolies in trading crops at fixed prices. Although the necessity of maintaining such system diminished after the war ended, the state control continued. In 1949, the Grain Storage Department (GSD) was set as the only authorized buyer and distributor of maize and other food crops with the mandate to set the prices. The official control of food crops was temporarily withdrawn from 1955 to 1962, during which the crops were freely traded (Suzuki and Bernard 1987: 3–4).

According to the elderly people interviewed in the study villages, during the British colonial period most farmers in the area continued to dedicate their production primarily on subsistence needs, despite the changes that the growing adherence to cash crops and the market economy had brought. Little food was sold to or bought. If the harvests were not sufficient to fulfil peoples' needs throughout the year, those who could afford it usually took the nearly one-week trip by foot to the market in Bagamoyo. For many families, this was not possible, and, according to Bryceson (1990: 50), severe food shortages were frequent in Bagamoyo district also during the British rule.

### **3.3 Independence and ujamaa (1961–1985)**

Tanganyika gained independence from Great Britain with the lead of Tanganyika African National Union (TANU) in 1961. During the same year, the farmers had a poor harvest and in 1962 there was a complete crop failure. As a response, state control was strengthened again by the newly appointed President Julius Nyerere and his government (Suzuki and Bernard 1987: 3–4). Tanganyika united with Zanzibar in 1964 and the country was named United Republic of Tanzania. The aspiration towards converting Tanzania from a 'survival society' to 'surplus society' continued to characterize the development efforts after the independence, but the approach was now to replace the capitalist structures on the one hand, and traditional modes of production on the other, with a socialist agenda for modernization and collectivization (Ergas 1980; Bryceson 1993: 7–31; Havnevik 2010a). In part, the food system development during the *ujamaa* era involved elements of the second food regime described by Friedmann (1993). This was particularly due to the governmental emphasis on agricultural modernization and fostering the cash crop production that had started during the colonial period. However, as the following literature review shows, these goals were only partially met. In some cases, the socialist policies led to adverse outcomes and increased reliance on subsistence farming (Bryceson 1982; Skarstein 2005).

*Ujamaa*, which refers to an extended family or familyhood in Swahili, is a designation for the period of 'African socialism' in Tanzania, and advocated by president Nyerere's administration. *Ujamaa* era started in 1967 with the Arusha Declaration where Nyerere set the outline for the country's new development discourse (Ergas 1980; Sitari 1983: 45). It is considered to have ended in the mid-1980s, particularly along with Nyerere's resignation in 1985 and the signing of the agreement on the Economic Recovery Program with the IMF in 1986 (Ponte 2000). During *ujamaa*, the reorganization of agriculture and other productive sectors aimed at a changeover from private to collective production. Simultaneously, the agricultural sector was due to be modernized by the techniques and inputs of the Green Revolution. The 'single-channel system' was solely maintained by the state, the only official provider of inputs and marketing services. Parastatal corporations and co-operative unions were given a monopoly over the marketing of most food and export crops, but illegal parallel markets also continued to exist and actually dominated much of the crop trade (Bryceson 1990: 212–213, 1992; Coulter & Golob 1992; Ponte 2000).

The socialist administration considered the rural village a basic corporate production unit where land is cultivated collectively. The primary society, or a village co-operative, was set to function as the lowest level of the marketing system that linked the farmers in the village with the national distribution system. At first, the upper two levels of the three-tier marketing system consisted of regional cooperative unions and the umbrella agency, the Cooperative Union of Tanganyika. In 1975, the regional cooperative unions were replaced by parastatal crop authorities and the government control over the agricultural marketing system became even stronger (Ergas 1980; Kimario 1992: 64–88; Bryceson 1993: 70–71). Prices were fixed pan-territorially, i.e. the government set prices uniformly for the country, regardless of location or transportation costs (Suzuki and Bernard 1987: 1; Ponte 2000). Private intermediaries were considered exploitative and were thus eliminated from the cereal markets. Most private shops were closed. The trade of staple foods including maize, rice, cassava, millet, and beans was channelled through the National Milling Corporation (NMC). This arrangement lasted until 1984 when regional cooperative unions were re-introduced by the government (Bryceson 1993: 70–90; Ponte 2000).

*Ujamaa* policies implied a shift from the scattered rural settlements and seasonal huts built beside the fields to permanent and more modern type of settlements (Sitari 1983: 2, 85). This villagization program required development of village centres along the main roads where access to services such as schools and health clinics was made possible. Homesteads were moved voluntarily at first and later also forcibly to these village centres (Ergas 1980; McCabe 2010). It has been estimated that over 10 million people, or 90% of the rural population, lived in the *ujamaa* villages by 1977, of whom at least five million had been re-settled, making villagization in Tanzania the largest planned re-settlement scheme in Third World countries (Hyden 1980: 230; Bryceson 1982; Sitari 1983: 2, table 1; McCall 1985a: 123). Nyerere's party Chama Cha Mapinduzi (CCM), which had succeeded TANU in 1977, was the only political party allowed. It functioned as the central decision-maker in regard to land and natural resource management in the mainland (Havnevik 2010a: 27).

Local customs and institutions were often undermined by the state authorities. For example, the villagization also concerned the semi-nomadic pastoralists such as the Maasai who were now advised to form permanent village structures and start cultivating (Mustafa 1989: 52–53; Havnevik 2010a: 23; McCabe 2010). Many examples, however, manifest that people in different areas did not comply with such requirements. Several Maasai settlements were formed with the assumption that they will not become permanent, that change to other grazing areas will be possible later (McCabe 2010). In the pastoralist village of Mindu Tulienu in the study area, most of the villagers continued to reside in dispersed homesteads outside the established village centre (Sitari 1983: 48). The re-settling of the cultivator groups was not frictionless either. In Bagamoyo district, the people's resistance to move led to establishing 70 *ujamaa* villages instead of the 49 that were initially planned (Sitari 2010b: 12). Conflicts regarding land use arose between the cultivators and the pastoralists, as livestock grazing and expansion of cultivation areas caused increasing pressure on the local environment (Sitari 1983: 48, 69; Vuorela 1987: 211–212; Mustafa 1989: 53, 67). Overall, the planning for the villagization has been accused for being inadequate. Water supply and soil quality was often worse in the new locations than in the earlier living areas (Porter 2006: 73).

Production in the study area was organized in line with the state policies: people were expected to work on communal farms and give a part of their own production for a collective use. These included co-operative farms, where usually cotton was jointly produced, as well as block farms which consisted of large areas that were parcelled out to smaller plots (Muro 1979: 10–13; see also Kikula 1997: 73). Each able-bodied adult was due to participate in the co-operative farming, as well as produce one acre of cash crops and one acre of food crops on the block farms. However, the village-level production targets were often not met, as many people were reluctant or for various reasons unable to work on the communal farms. Furthermore, despite some collective features in the culture of the Kwere and other ethnic groups in the western Bagamoyo district, the type of co-operative production that the socialist administration required had not belonged to their traditions, as the production was primarily based on individual and the family (Muro 1979: 14–18; see also Ergas 1980; Vuorela 1987: 145–147). Most importantly, the authorities from above imposed the entire process and the decision-making and the control over the production were not genuinely in the hands of the villagers (e.g. Hyden 1980: 91–92, 152; Vuorela 1987: 134, 145–147; Havnevik 1993). Often the profits from the crop sales were not used for common good, but kept by the individual producers (Muro 1979: 16–17; Vuorela 1987: 134–137; Kikula 1997: 73). The primary societies were totally depending on outside funding and thus purchasing could be sporadic and payments to the farmers often delayed. Both the NMC and cooperative unions were found to be inefficient and the official support to these was seen to deteriorate the financial ability of the state (Ergas 1980; Bryceson 1982; Goulter & Golob 1992).

Despite some steps towards modernization, the expected growth in agricultural production did not generally take place. This was due to several shortcomings in the planning and implementation of the *ujamaa* programme (Ergas 1980; Ponte 2002:

51–53). In some cases, the migration under villagization was ill-timed, seriously hampering the production. For instance in Handeni district, which lies north from the present study area, people were reportedly forced to move after they had already planted crops. They had to clear new areas and sow new seeds, which was too late and the harvest failed (Sumra 1979: 202). Secondly, the collectivization of production did not proceed as planned. Although large communal farms were established—usually for cotton, maize or wheat cultivation, which was aimed to bring incomes to the primary society and the village—these were given second priority in most villages, and the outputs were low (Ergas 1980). On the other hand, pan-territorial pricing was criticized, especially by the World Bank, to have led to production of crops in areas where the transportation costs became too high due to poor infrastructure and lack of storing facilities (Bryceson 1992; Tapio-Biström 2001: 92).

Although the state had forcefully invested in literacy programs for the rural villages, women's improving level of basic education was not turning into lower birth rates (Waters 2006). The population of Tanzania grew rapidly, from about 13.2 million in 1967 to 21.8 million in 1985 (The World Bank 2011). As the *ujamaa* villages grew in size, arable land became scarcer in the vicinity of villages, which meant diminishing possibilities to practise shifting cultivation. The plan was to maintain the productivity of the land by introducing the farmers with chemical fertilizers, improved seeds, and tractors (Hyden 1980: 148–149; Kikula 1997: 14, 105–106; Waters 2007: 84; Sokoni 2010a). However, most farmers did not adopt them either because they were not accustomed to using the modern inputs or due to the sporadic availability and high prices (Sendaro 1992: 161–162; Ponte: 2000; The World Bank 2000: 28). When pressure on the land increased near the expanding *ujamaa* villages but the technological transformation of agriculture did not take place, degradation of soils and consequent decline in the yields followed (Kikula 1997).

It has also been claimed that the small-scale farmers did not have incentives to increase their own production, because they lacked the access to buy incentive goods. As consumers, they had to face strict rationing and unreliable supplies in the official markets (Vuorela 1987: 217–219; Ponte 2000; Tapio-Biström 2001: 61–62). On the other hand, the state monopoly had led to the expansion of the unofficial and unregulated food market, where the prices were determined on basis of supply and demand. However, the availability of food supplies was often sporadic also in the parallel markets (Coulter & Golob 1992; Bryceson 1993: 61–90; Tapio-Biström 2001: 16, 90). By the late 1980s the majority of marketed food grains was estimated to be channelled by private operators. Nevertheless, the amounts of maize purchased officially by the state agencies never exceeded 14% of the total estimated maize production, while clear majority of the maize was consumed by the farming households (Coulter and Golob 1992; Moshi et al. 2007).

During the first years after independence, Tanzania had been self-sufficient with food; in some years even exported food. Although increasing amounts of cash crops were produced, and despite the outstanding problems in the strictly regulated official

markets and in the parallel illegal markets, there were no serious food shortages during the 1960s. In the 1970s, the situation rapidly deteriorated. This was caused by several factors: the droughts that severely hampered production in 1973–1975, the oil crises, the war against Idi Amin's regime in Uganda during 1978–1979, as well as poor government policies and false expectations in regard to the implementation of *ujamaa* (Bryceson 1993: 75; Waters 2007: 181–185). In 1973, 25,000 tons of maize had to be imported in the country. Between March 1974 and 1975, the volume of maize imports jumped up to 483,000 tons, and the government had to spend total USD 250 million for grain imports. This rapidly drained the foreign exchange reserves, and in August 1975 president Nyerere announced that the country would not be able to import more foodstuffs (Ergas 1980). Tanzania became increasingly dependent on foreign aid. During some years since the late 1970s until the early 1990s nearly all cereal imports were food aid (Tapio-Biström 2001: fig. 4.2).

More detailed references to farming, food distribution, and food security in the study villages during *ujamaa* era are included in the analysis part in Chapters 5 to 9.

### **3.4 Economic liberalization (1985 –)**

In the beginning of 1980s, Tanzania was in severe economic decline. From 1981 to 1983, the GDP decreased and the fiscal deficits grew. The industrial output was decreasing and the agricultural output nearly stagnant. Widespread shortages of goods occurred. The foreign donors cut their support, and there were grave concerns that the economy would sink (Mans 1994: 352; Meertens 2000; Ponte 2000). The reforms that eventually lead to economic liberalization were first proposed in the 'Berg Report' in 1981, where the World Bank suggested that low economic growth in Sub-Saharan Africa was a result of poor macro-economic policies. It was proposed that they had also prevented the increase of agricultural output in Tanzania. Therefore, major reforms were required to overcome these obstacles (Ponte 2000). Economic reforms were also used as a condition for mobilizing foreign exchange. Already in 1980, the Tanzanian government had agreed to start negotiations with the IMF, but the negotiations did not meet the expectations. In 1981 and 1982 'domestic' reform programs, National Economic Survival Program (NESP) and Structural Adjustment Program (SAP), were launched, which eventually resulted in abandoning panterritorial pricing, doubling governmental expenditures on agriculture, lifting the limit for transporting foodstuffs up to 500 kg, increasing producer prices, removing consumer subsidies for maize, and the devaluation of Tanzanian shilling (Bryceson 1989: 22–28; Ponte 2000; Cooksey 2003; Skarstein 2005).

However, Tanzania's terms of trade kept worsening. Shortages of petroleum and running water, as well as the need for additional loans fostered the process of making a new agreement with the IMF. In addition to the IMF and the World Bank, the pressure for liberalization came from the bilateral donors, and also, to some extent, from internal politics (Bryceson 1989: 31; Ponte 2000; Skarstein 2005). The process was further spurred by the retirement of president Nyerere in 1985. He was succeeded



by Ali Assan Mwinyi, considered more reform-minded by many donors. In 1986, an Economic Recovery Program (ERP) was started with an aim to wider liberalization of the economy (Bryceson 1993: 28–29; Ponte 2000; Cooksey 2003; Skarstein 2005). The reforms that followed the ERP brought considerable changes in the food sector. In 1987, all limitations on transport of grains were removed. The private traders were allowed to enter the market legally and buy directly from the co-operative unions and, from 1988 onwards, also from the NMC (Ponte 2000). Yet a new reform programme, Economic Recovery Programme II - Economic and Social Action Programme (ERP II-ESAP), was carried out during 1989–1992. Private traders were finally allowed to buy grains directly from the farmers and bypass the primary societies. Most of the remaining co-operatives ceased their functions. All restrictions for trading between the regions and amounts transported were now lifted, the role of the private sector in export marketing was recognized, and export restrictions were relaxed. These reforms were continued during the Enhanced Structural Adjustment Facility (ESAF), which was also supported by the IMF, until 1994 (Coulter & Golob 1992; Ponte 2000; Tapio-Biström 2001: 34; Ponte 2002: 62; Chapoto & Jayne 2010).

The reforms aimed at creating new market opportunities for farming households, crop diversification, specialization, and increasing farm incomes (Coulter & Golob 1992; Ponte 1998). The proponents for liberalization also argued that it would boost agricultural production and enhance labour productivity. In the late 1990s, the IMF and the World Bank concluded that the structural adjustment in Tanzania had been successful, mostly basing this on the interpretation of GDP growth (Tapio-Biström 2001: 34; Ponte 2002: 64). According to Skarstein (2005), however, the promises were not fulfilled by the end of the 1990s, as labour productivity, yields, and per-capita production of food grains had remained stagnant or even declined since the ‘crisis years’ preceding the liberalization. Cooksey (2003) has pointed out that while the internal inputs and output markets were largely liberalized, the liberalization of export crop markets such as those for tobacco and coffee was only partial due to reluctance by the political-bureaucratic class to follow the donor-inspired agenda. Despite becoming a member of the WTO in 1995, the ‘economic freedom index’ of Tanzania has remained more or less stagnant and slightly below the world average during 1995–2010 (WTO 2008; The Heritage Foundation and The Wall Street Journal 2011).

Nevertheless, the economic restructuring during the post-*ujamaa* era brought the next major wave of changes in farming practices and rural livelihoods, and can be regarded as the beginning of the third and yet prevailing food regime in Tanzania. During the structural adjustment process, the World Bank argued that the government interference in the fertilizer market through subsidies “constrains supply” of both parastatals and private traders, and thus has to be removed. The subsidies, which had constituted about 50–75% of the market price during *ujamaa*, were gradually phased out between 1990 and 1995 (Bates 1981: fig. 1; Cooksey 2003; Skarstein 2005). The share of farmers using fertilisers dropped from about 27% to 15% within a few years (The World Bank 2000: 39). Subsidies were re-targeted to private importers, which led to over-supply, unsold stocks and large losses (Cooksey 2003). When the inputs became even

less accessible to the farmers, it affected particularly the poorer farmers and those in remote areas with improper road connections adversely (Ponte 2002: 35). On the other hand, as Cooksey (2003) has pointed out, a clear minority of Tanzanian farmers used any fertilizers even during the years when the imports were highest, and the fertilizers were mostly applied for maize in Southern Highlands, coffee in Kilimanjaro area, and tobacco production in Tabora. The removal of subsidies had little impact on national maize yields in general, from which Cooksey draws the conclusion that also the majority of commercial farmers used only insignificant amounts of fertilizers already before the phase-out. Since the early 2000s, the government has again introduced subsidies for the fertilizers with an aim to raise their usage considerably. Still, fertilizers are applied by less than one out of six farmers by average (Isinika 2007: 128; Agola 2011; WRI 2011).

Between 1985–2009, Tanzania's population nearly doubled from 21.8 million to 42.5 million (The World Bank 2011). During the same period, the domestic production of maize grew by about 65% from 2.1 million tons to 3.7 million tons, indicating a decline from about 102 kg to 86 kg per capita (FAOSTAT 2011). The declining or stagnating trend in production quantities per capita is apparent also for other main food crops, excluding pulses, during the last three decades (figures 5 and 6). The per-capita production of roots and tubers (particularly cassava), and fresh vegetables has dropped most dramatically, nearly 50% since the early 1980s. The increase in the per-capita production of pulses may have resulted from a tendency by the farmers to revert to 'fast crops' that mature in less than four months, instead of 'slow crops' like maize, sunflower, and paddy that take longer to harvest. Ponte (1998) has attributed this shift to 'fast crops' to the increasing commercialization of rural life and growing expenditures for which the farming households need quick returns throughout the year. Production of meat and milk has remained at the same relatively low level (figure 7). Nevertheless, it has to be noted that the official statistics can be far from comprehensive due to inefficiencies in data collection on village and district levels (see Chapter 6.3.1), as well as unreported domestic trading actions and smuggling with neighbouring countries through porous borders (Meertens 2000; Skarstein 2005).

Since the late 1990s, Tanzania's net cereal imports have been increasing again, which apparently is related to the overall decline in domestic food production in contrast to population growth (figure 8). Especially the imports of wheat flour and palm oil have steeply grown since the markets were liberalized (figure 9). This also results from the growing popularity of pastries like *sambusas*, cakes, scones, and especially non-sugared doughnuts and *chapattis*, which have, to an extent, replaced cassava as the main breakfast item (FAOSTAT 2011). Over 90% of the wheat is imported, as cassava is not much, if at all, traded across the boundaries (Leyaro et al. 2010). During most years, Tanzania has been a net importer of maize, but annual variation in the imports has been large. Rice has partly replaced maize as a staple especially in better-off families, which has contributed to higher rice imports (FAO 2009b). The imports of protein-rich foods like legumes and animal products have been almost negligible. The only exceptions are dairy products and especially the popular dry milk, even though its imports have also been declining. The imports of highly processed and packed foods have increased

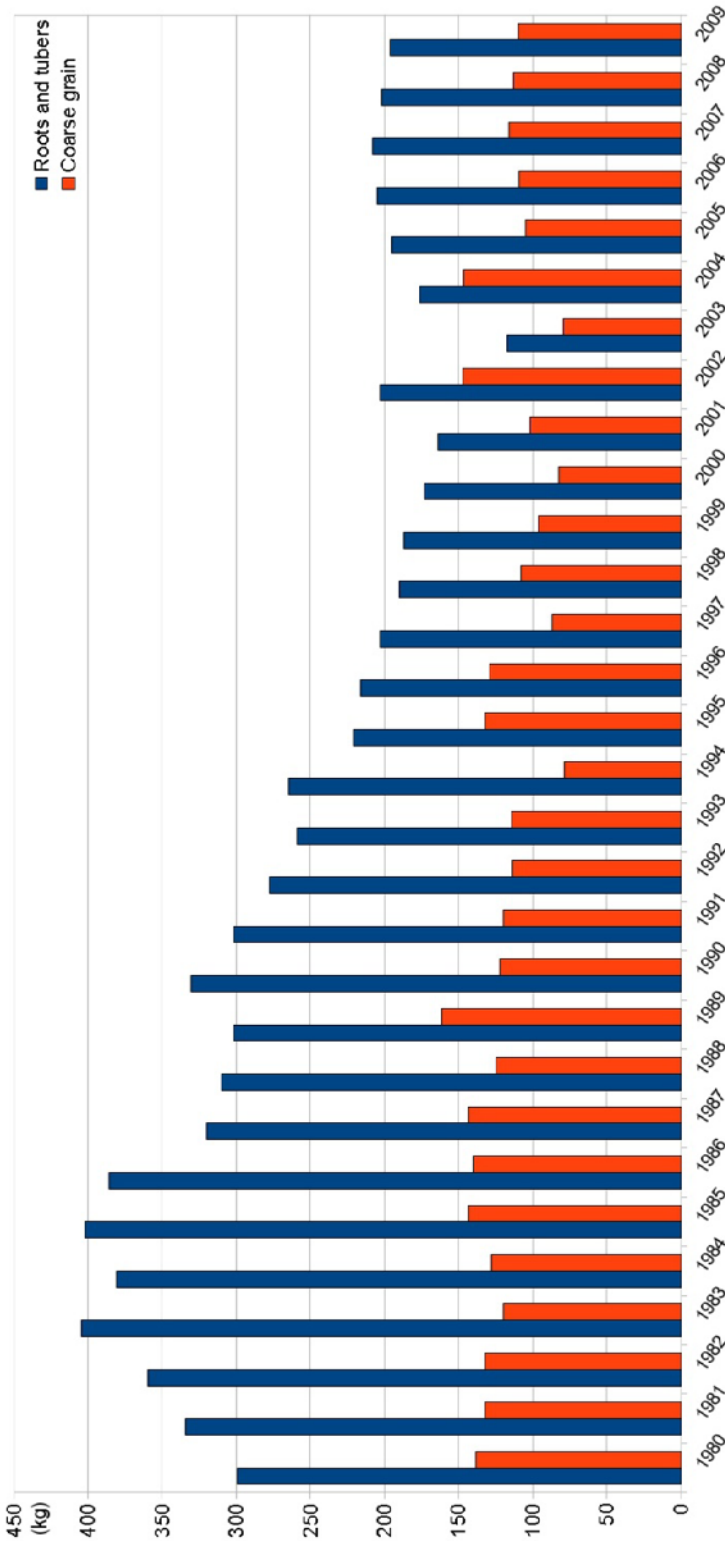


Figure 5. Per capita production (kg) of roots and tubers, as well as coarse grains in Tanzania during 1980–2009 (FAOSTAT 2011; The World Bank 2011).

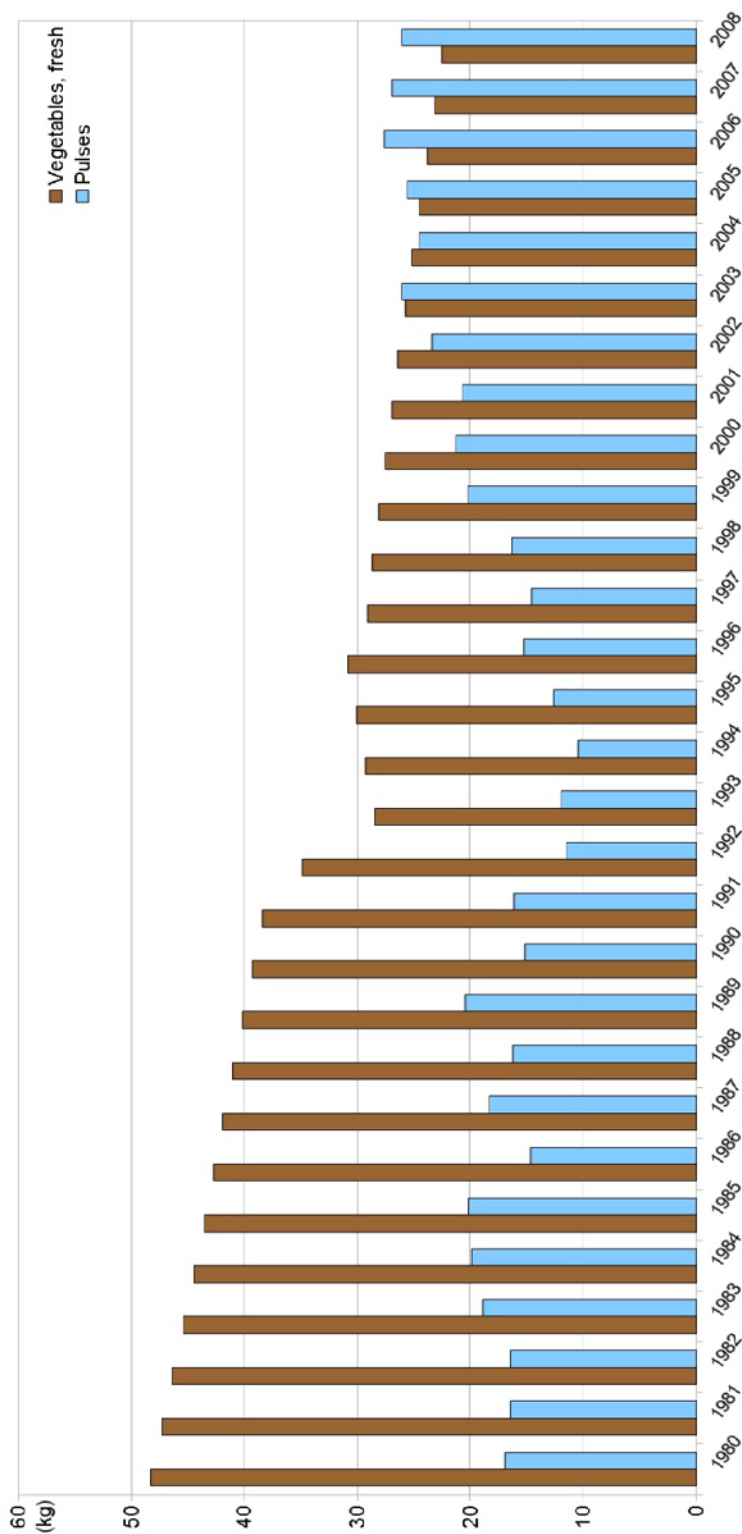


Figure 6. Per capita production (kg) of fresh vegetables and pulses in Tanzania during 1980–2009 (FAOSTAT 2011; The World Bank 2011).

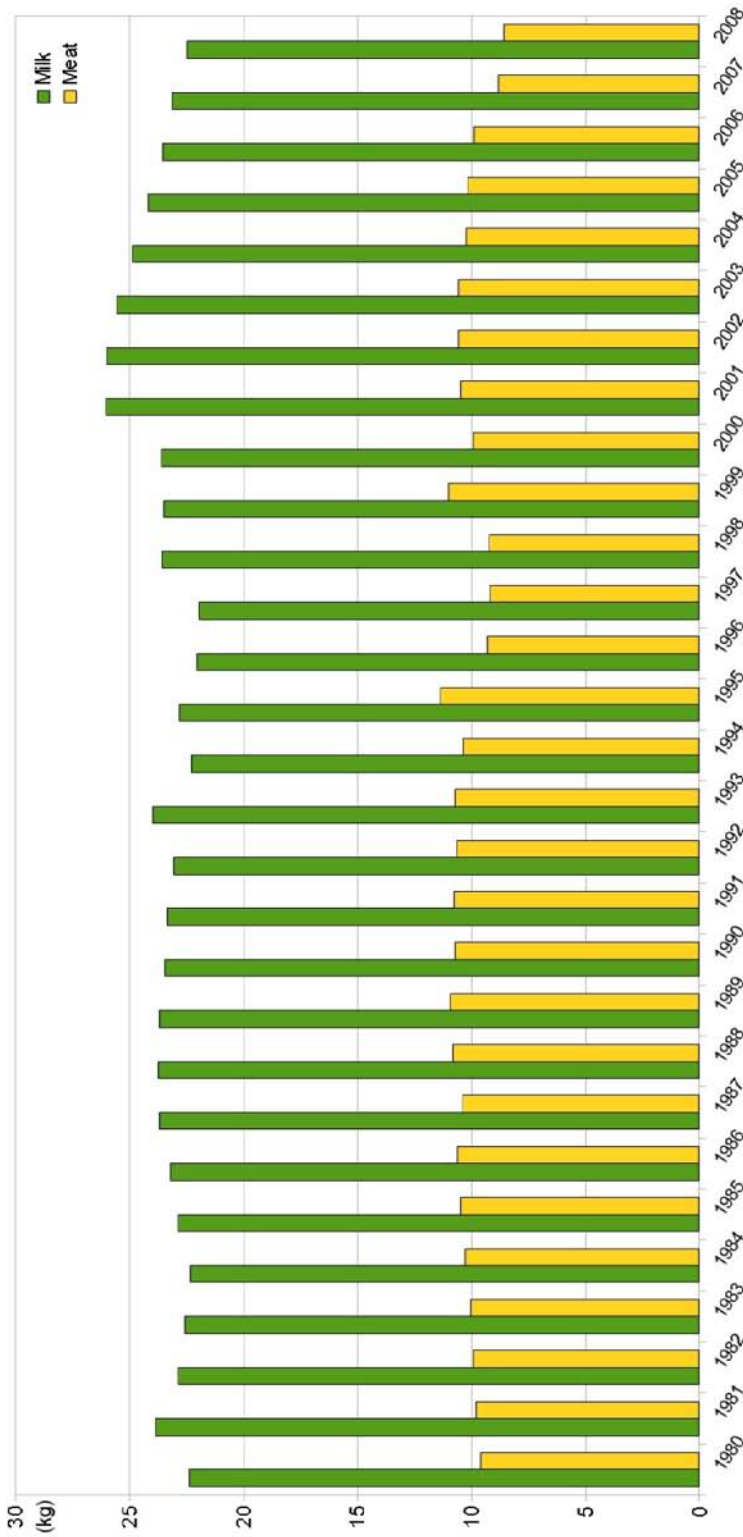


Figure 7. Per capita production (kg) of milk and meat in Tanzania during 1980–2009 (FAOSTAT 2011; The World Bank 2011).

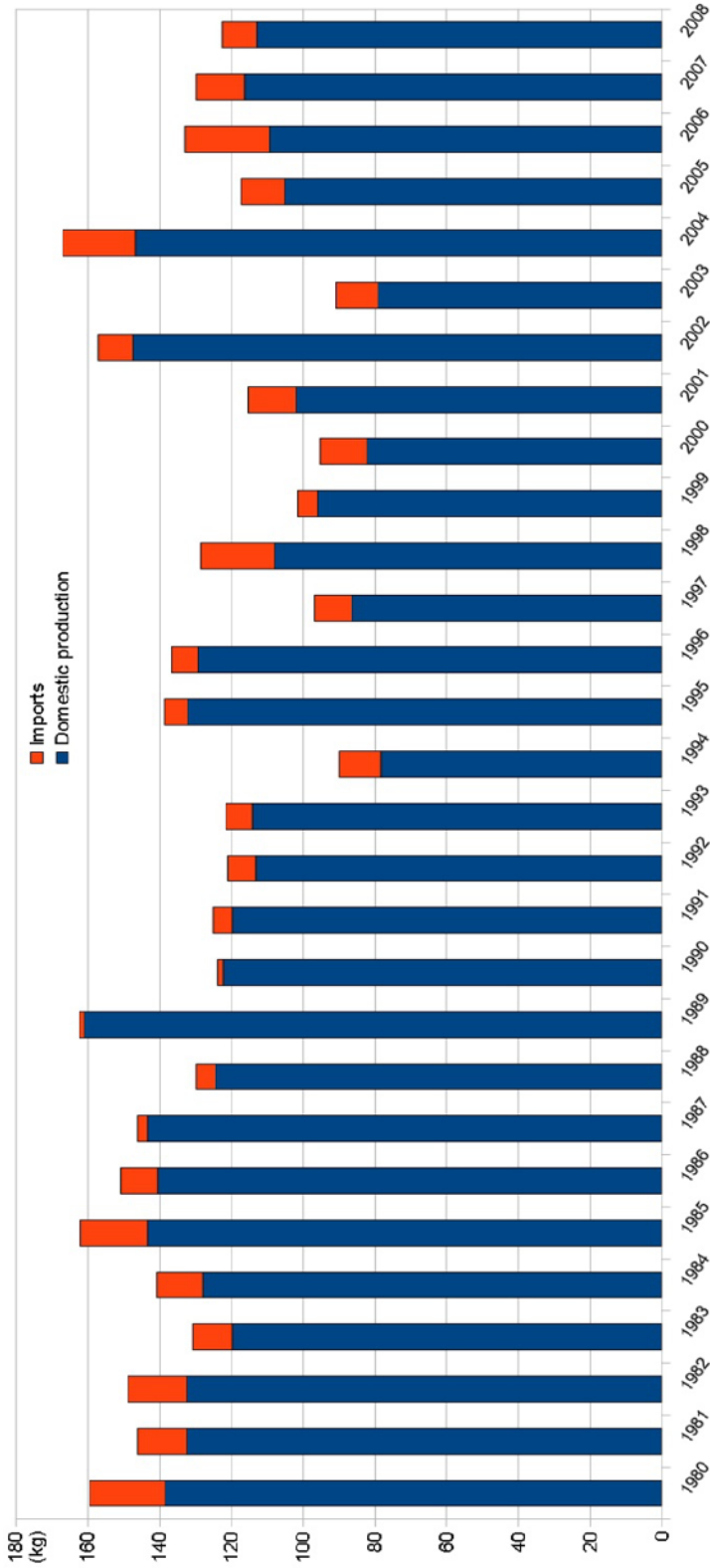


Figure 8. Per-capita cereal imports and domestic production during 1980–2008 (FAOSTAT 2011; The World Bank 2011).

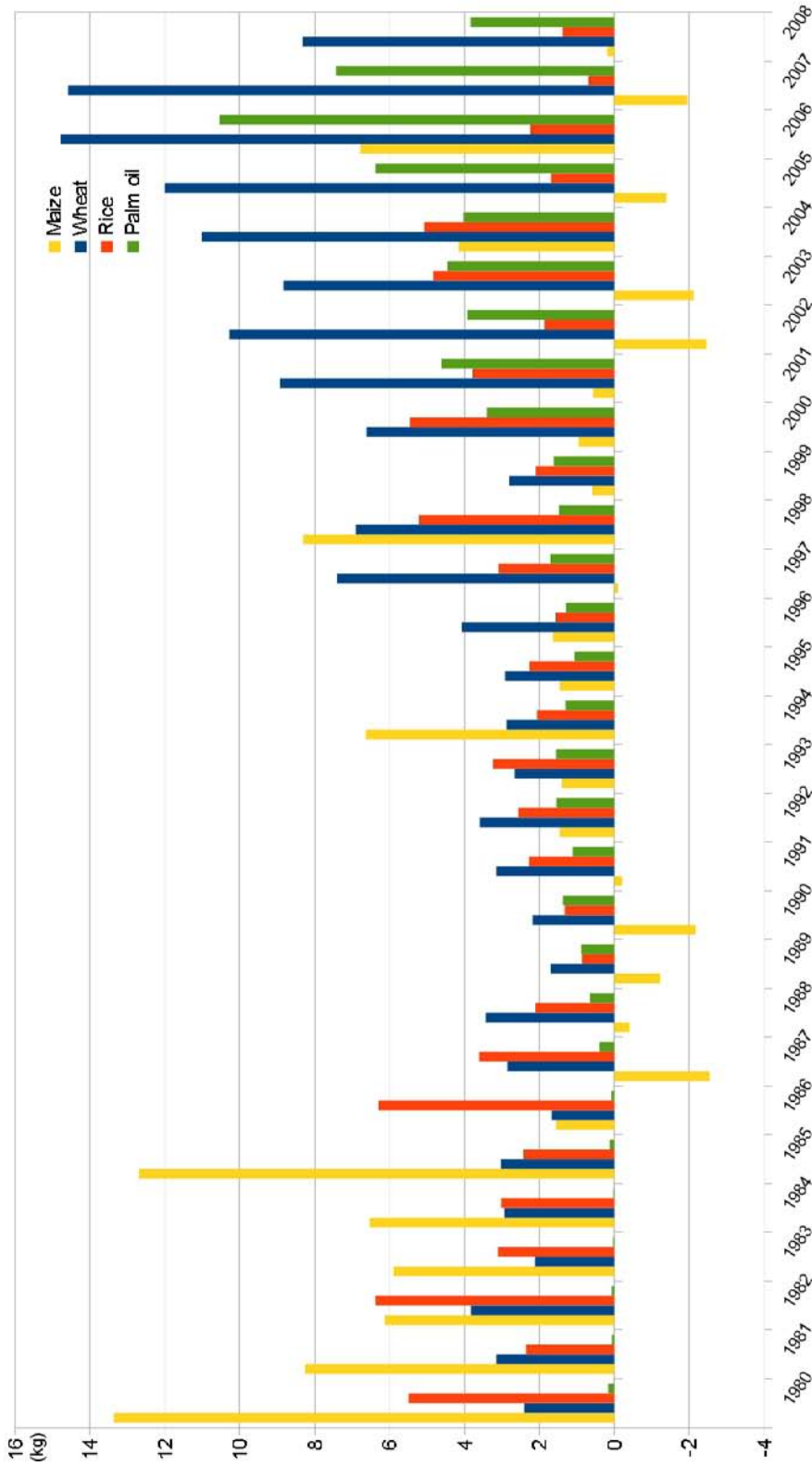


Figure 9. Net imports of main food items per capita (kg) during 1980–2008 (FAOSTAT 2011; The World Bank 2011).

by over five-fold since the mid-1980s, but these are still mostly ‘luxury items’, as Tanzanians spent on average only USD 0.50 on such products in 2008 (FAOSTAT 2011). In general terms, the total share of food imports in the consumption basket is still relatively small, and the country continues to rely mostly on foods that are produced within its boundaries.

The trend in food aid deliveries paid by the foreign donors have been on the increase since the late 1980s, but annual fluctuation has been high (figure 10). In 2010, about 23% of the households in the country were reported to receive some kind of food aid. The aid has been mostly delivered to central and north-western parts of the country, but smaller amounts are also distributed in the study area during shortages (GoT 2005; WFP 2010a: 101). Tapio-Biström (2001) has studied the impact of food aid and its “disincentive effect” on maize production in Tanzania. According to the disincentive hypothesis, food aid tends to lower food prices, reduce domestic production, and thus worsen economic problems in the country. However, Tapio-Biström did not find a significant disincentive effect on maize production, as the higher prices on the unofficial markets drove the farmers to produce more (Tapio-Biström 2001: 12, 33, 45, 97). During scarcities, the government can also release stocks from the Strategic Grain Reserves, which however are rather modest in comparison to the volumes of the grain markets. Another powerful and contested state intervention is the banning of maize exports, which has been argued for on basis that surplus produced in one region often more easily traded to the neighbouring countries than the deficit regions inside the country. Since 1991, when the Food Security Department gained the authority to impose the bans, they have been put into practice frequently, also during several years in the 2000s (Chapoto & Jayne 2010).

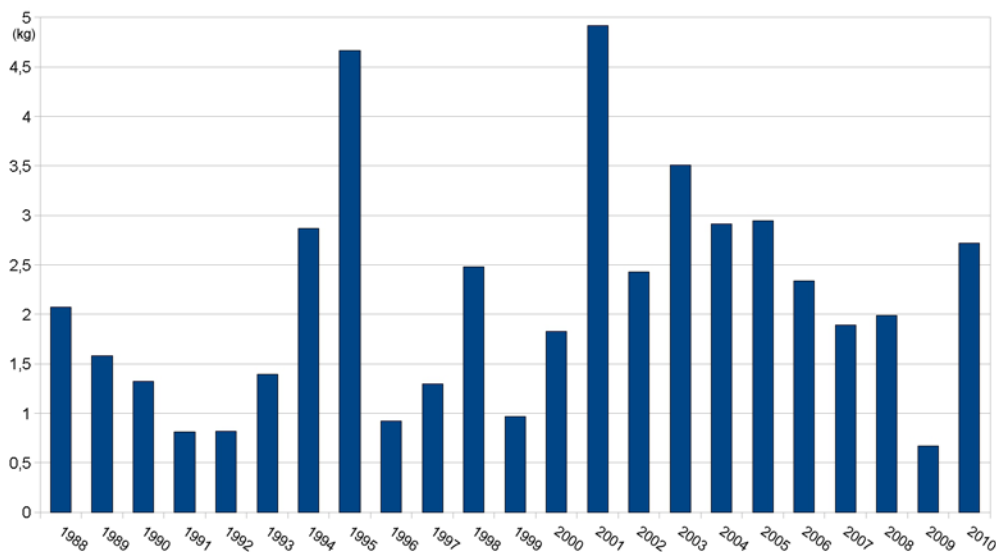


Figure 10. Per capita food aid deliveries (kg) to Tanzania during 1988–2010 (Mgwabati 2010; WFP 2011; The World Bank 2011).



Misselhorn (2005), who has studied the relationship between the national-scale per capita kilocalorie production from cereals and the weight-for-age indexes in Sub-Saharan Africa, found a rather weak correlation coefficient of 0.56, indicating that other factors than the national kilocalorie supply are also strongly affecting malnutrition on the local level. Smith, El Obeid and Jensen (2000) arrived at similar outcomes; they concluded that food insecurity was most widely caused by poverty during the 1990s. Against this background, it can be assumed that the net food imports have not increased more because the poorer sections of the society have not afforded to buy more. According to the FAO, total food supply in Tanzania, or the total amount of food available for the consumers, has declined from over 2200 kcal per capita in a day in early 1980s to about 2000 kcal per capita in a day in 2000s (FAOSTAT 2011). Protein supply has fallen from about 54 g to about 50 g, although fat supply has slightly increased from about 31 g to 34 g (FAOSTAT 2011). On the other hand, obesity has probably increased slightly too, especially in urban areas, but comparable data in this regard is scarce. In rural areas, however, the obesity prevalence is likely to be less than 5% (WHO 2011a).

All agricultural land in Tanzania is considered as public land that is vested in the President as a trustee (Shivji 1999; Ojalammi 2007: 1). Most of these lands are allocated by village governments, a practise which was started during *ujamaa*, as well as through traditional ownership systems and customary law (Sokoni 2008; Ylhäisi 2010). The farming households are generally not issued with genuine ownership but usage rights which are usually delivered through inheritance, marriage, village-level negotiating, or lending. Women's position in these arrangements is not equal to that of men, especially because the woman receives the land use rights from her husband through marriage and loses these in the case of divorce (Yngström 2002). The process for formalizing the landownership on individual level, which would secure the rights to the holdings and also in the case of divorce, has been going since the early 1990s, but this has proceeded sluggishly (Shivji 1999; Ylhäisi 2010). After the adoption of the new Land Acts in 1999, the boundaries of most villages have been demarcated and land registries have been established in some villages, but the majority of farmers in the country have still not been issued with land titles. On the other hand, the new acts also enable the private investors to buy lands from a village and receive titles for these holdings (Ylhäisi 2010), which may further increase competition over natural resources between different interest groups. While the promoters of the new liberal policies see private investments as a vital and necessary force for agricultural intensification and increasing the stagnating production, it is also possible that the poorer farmers lose their livelihoods: as their access to the traditional holdings are not ensured, they cannot afford to buy new areas for cultivation (Sokoni 2008), or if the female landholders in particular are not aware of their rights (Isinika & Mutabazi 2010).

Despite the aspirations of the government to transform Tanzania into a semi-industrialized economy, crop and livestock production continue to be major contributors with about a 22.4% share of the GDP in 2009 (GoT 2010: table 1). After the liberalization, however, other sectors and especially services have grown much faster, as the share of agriculture was as high as about 45% yet in the mid-1980s (The World

Bank 2000: table 1.1). Although the official estimates show that the 80% of the labour force is still engaged in the agricultural sector (GoT 2011), this figure hides the extent to which those working in agriculture are also operating in other sectors. It is obvious that a large part of the labour force has shifted at least partly to non-farm sectors also in the rural areas, a fact related to the rising prices of consumer items in contrast to real producer prices, the increasing cash expenditures on basic needs, urbanization, and other cultural and environmental issues (Ponte 1998: 316–317; Bryceson 1999; The World Bank 2000: 17).

During the late 1990s, the budget allocation to the Ministry of Agriculture and Cooperatives declined sharply. This was connected to the trends in international development co-operation, as on average nearly half of the funding for the ministry is derived from foreign sources (The World Bank 2000: tables 2.2, 2.3). Nevertheless, the governmental emphasis on the sector has been recently revitalized to an extent (GoT 2011). Along with the commitments of the African Union to increase expenditure on rural development, Tanzania's budget allocations for agriculture have again increased in the 2000s, reaching a level of 6.4% in the national budget in 2008–2009 (African Union 2003; Agricultural Council of Tanzania 2011).

To conclude with, the food system in Tanzania continues to involve mostly domestic production despite the increasing role of imports and the influence of international actors in shaping the national food policies. Most farming still takes place in small-scale family farms by traditional methods. About 70% of the fields are cultivated with a hand hoe, 20% with an ox plough and 10% with a tractor (GoT 2011). Only about 15% use chemical fertilizers, 27% use improved seeds and 18% use pesticides. It is estimated that about 5% of the cultivated area is irrigated, which continues to make the production prone to droughts and other changes in the climate (Isinika 2007: 128). A considerable part of the production is subsistence-oriented. For example, it has been estimated that the farming households in Tanzania consume 75–80% of the maize that they have produced themselves (Moshi et al. 2007: 75). This also means that the VAT, one of the principal sources of tax revenue for the nation, is not included in a major part of the food transactions (Leyaro et al. 2010). Despite the recent national efforts such as the Agricultural Sector Development Programme (ASDP) and the Kilimo kwanza (Agriculture First) initiative—which continue to aim towards national self-sufficiency through modernization, intensification and commercialization—the increasing budgeting on agricultural development during the 2000s has not yet resulted in narrowing the gap between production and population growth. For the majority of Tanzanians this has meant a slightly growing consumption of imported foods, but probably also weakening food security for the poorer sections of the society.

## **4. RESEARCH APPROACH, MATERIALS AND METHODS**

### **4.1 Methodological framework**

As the food system is inherently a network connecting ‘nature’ and ‘society’, and as these relations are very directly manifested in the studied context, the roles of bio-physical processes and their interactions of these with the human activities are emphasized especially when analysing the changes at the local level. The methodological framework is thus multi-disciplinary and combines both qualitative and quantitative methods. Concepts that are common in human and physical geography, development studies, agricultural and environmental sciences, economics, as well as anthropology are applied. In part, the study has a theory-bound approach, as the food system framework was chosen as the starting point for the analysis early on during the research process. The materials are deductively reflected against the framework, which is again being applied in an environment where the model has been relatively little used before, namely a community partly depending on subsistence farming and pre-capitalist relations. On the other hand, the approach also involves inductive elements, as the analysis is heavily based on the empirical work and issues that gained more emphasis—such as the linkages to charcoal production—were not defined beforehand. Certain weaknesses in the food system models, particularly in regard to the inclusion of subsistence production, called for further response on the basis of the household and village level analysis.

As a considerable part of the analysis is based on qualitative methods such as participant observation and thematic interviews, the approach leans towards the traditions of humanities. Especially the notions of the interviewed people on food security require the inclusion of their subjective meanings and experiences, as underlined in phenomenology (Johnston 1986: 56–65). On the other hand, mapping landscape changes from aerial photographs and satellite data, which forms another important component of this study, involves apparently positivist interpretations (e.g. Lupton & Mather 1997; Malczewski 2004). The same could well apply to the attempts to estimate the productivity of subsistence food production. To build a synthesis from the diverse data sets, triangulation is widely applied in the analysis (Mikkelsen 2005: 96–97; Nightingale 2009). Nevertheless, the nature of the studied subject together with the fuzziness and sensitivity of part of the data and the researcher’s subjective interpretations as an outsider required that the general emphasis is on describing and understanding of the processes shaping the food system rather than quantitative or numerically accurate representation (see also Chambers 1983).

The concept of participation deserves some elaboration as it is one of the central aspects in development studies and concerns also the subject and the field work of this research. As I resided in the study area during most of the field work, participant observation was naturally one of the central methods. Participatory group discussions and exercises were organized for collecting the data and reflecting the findings. To some extent, the ‘snow-ball method’ was also applied to finding key informants, so that the interviewed persons could suggest other people with knowledge on the studied issues to

be interviewed. It has to be acknowledged that in general terms, however, the research was mostly externally-driven by the researcher and the studied community had rather little ownership of the process. The framework and objectives of the study were to a large part designed before starting the field work, although the study questions were adjusted along with the observations and responses gained from the field. For example, people agreed to be interviewed, joined the group sessions, discussed specific themes and created illustrations after they were asked to do so, but these events were not initiated by the people themselves. Except for a few cases, they did not participate in choosing the interview themes or designing the group exercises, even though some of these decisions were guided by earlier information given by the villagers. Reports including the information on this study and its tentative findings were distributed to the villages, but they did not reach all participants of the study, and neither were any of the villagers involved in conducting the analysis. Hence, people's 'participation' was in most cases restricted to providing information for the researcher. This is also the reason why the group exercises are labelled here under the category of the 'old-fashioned' Rapid Rural Appraisal (RRA) techniques, where the degree of participation is considerably lower than in RRA's later incarnation, Participatory Rural Appraisal (PRA). (see also The World Bank 1996: 191; Chambers 1997: 115; FAO 1997b; Callens & Seiffert 2003; Mikkelsen 2005: 53–62.)

#### **4.2. Selection and characteristics of the study villages**

Four villages, Lunga, Makombe, Msoga, and Mindu Tuliene, were selected for a closer analysis from the western part of Bagamoyo district because these villages differ from each other in regard to size, environment, distance from the main road, accessibility, availability of basic services, and ethnic composition (figure 11). Availability of earlier studies and materials also strongly influenced the selection, as most of the publications of Jipemoyo project concerned or at least mentioned these villages (e.g. Swantz & Jerman 1977; Sitari 1983; Hurskainen 1984; Vuorela 1987; Mustafa 1989; Jerman 1997). Other studies by Tanzanian scholars were also available from the same locality (Mwelupungwi 1977; Muro 1979; Sendaro 1992). At the time of beginning the field work in 2008, all study villages were within the administrative boundaries of Lugoba ward. In 2010, however, the ward boundaries were amended. Msoga ward was re-established and Msoga village regained its earlier status as a ward headquarters, while the other study villages remained under Lugoba ward.

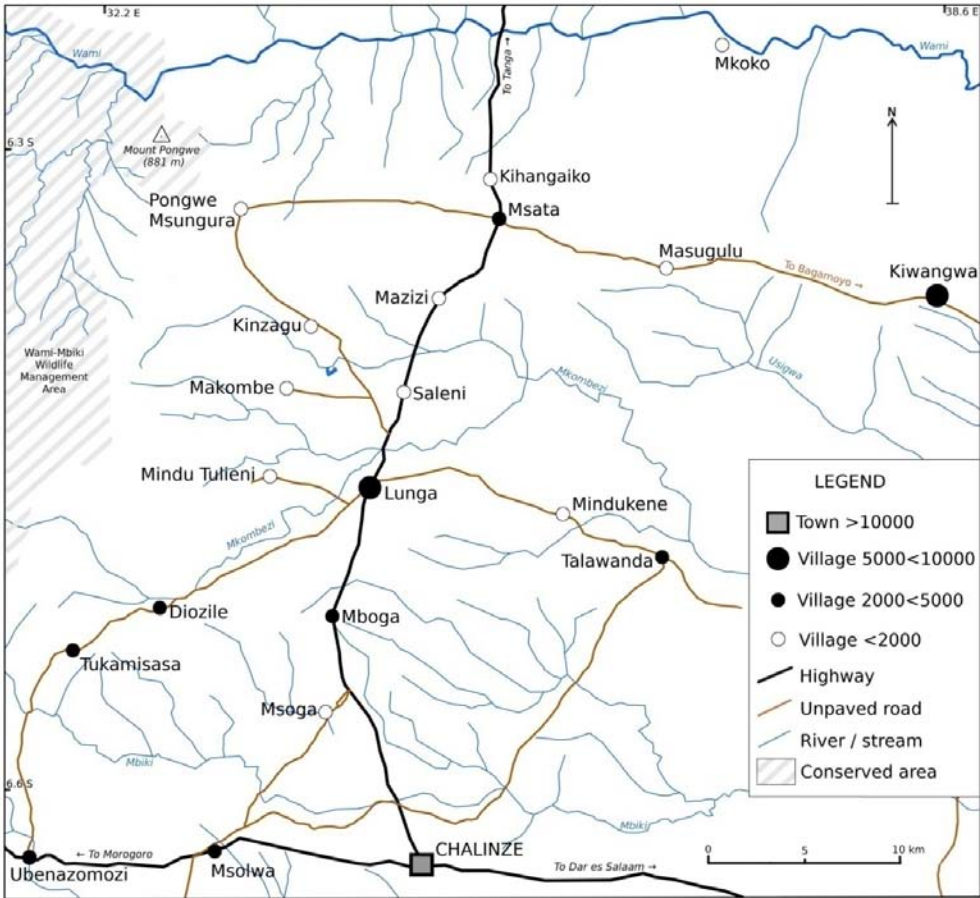


Figure 11. Map of the study area.

The population in the study area has grown rapidly during the last decades, by over 3% annually. According to the data from the ward officials, the population in Lugoba ward nearly doubled from 9,086 to 17,924 between 1984 and 2006 (table 1). The population density increased from about 18.5 to 36.5 persons per km<sup>2</sup>. Direct causes for the increase include high birth rates and, to a lesser extent, in-migration especially to semi-urbanized villages such as Lunga along the highway. However, it has to be noted that official demarcation of boundary posts was implemented only in 2007, which may have influenced the accuracy of the census (Sitari 2010b; Ylhäisi 2010). The average size of households has remained rather stagnant, being 5.3 persons in 2006.

Table 1. Population and number of households in the study villages (HH = household, NA = not available) (Vuorela 1987: app. table 1; NBS 1988; NBS 2005; Lugoba Ward Office 2008; USAID 2008a: table 5).

Village	Population 1984			Population 1988			Population 2002			Population 2006			Population change 1984-2006 (%)	Annual growth rate 1984-2006 (%)	
	Total	HHs	HH size	Total	HHs	HH size	Total	HHs	HH size	Total	HHs	HH size			
Lugoba ward, total	9086	1718	5.3	12885	2321	5.6	15917	NA	NA	NA	17924	3356	5.3	97.3	3.14
Lunga	3313	600	5.5	4284	NA	NA	5805	NA	NA	NA	6222	1272	4.9	87.8	2.91
Diozile	1343	239	5.7	1870	NA	NA	2067	NA	NA	NA	2215	388	5.7	64.9	2.30
Kinzagu	375	110	3.4	509	NA	NA	652	NA	NA	NA	699	203	3.4	86.4	2.87
Makombe	539	142	3.8	680	NA	NA	745	NA	NA	NA	999	210	4.8	85.3	2.84
Mboga	2010	297	6.7	3066	NA	NA	3232	NA	NA	NA	3825	633	6.0	90.3	2.97
Mindu T.	459	107	4.3	984	NA	NA	1706	NA	NA	NA	2132	287	7.4	364.5	7.23
Msoga	682	150	4.5	970	NA	NA	1121	NA	NA	NA	1201	228	5.3	76.1	2.61
Saleni	364	73	5.0	522	NA	NA	589	NA	NA	NA	631	135	4.7	73.4	2.53

Ethnic composition in the area is reflected in crude terms through the tribal background of the respondents who participated in a survey made for the present study in 2008-09 (figure 12). The majority of the respondents, about 63%, are the Kwere who have traditionally been subsistence cultivators like the Zigua and most of the other Bantu groups in the area. The share of traditional pastoralists, the Maasai and the Gogo, is around 16% of the interviewed, and they were mostly living in Mindu Tulieni. During the thematic interviews or the RRA and group discussions ethnicity was usually not asked, because traditional means of livelihood and present occupation are of higher importance for the study. A brief characterization of the study villages is provided below.

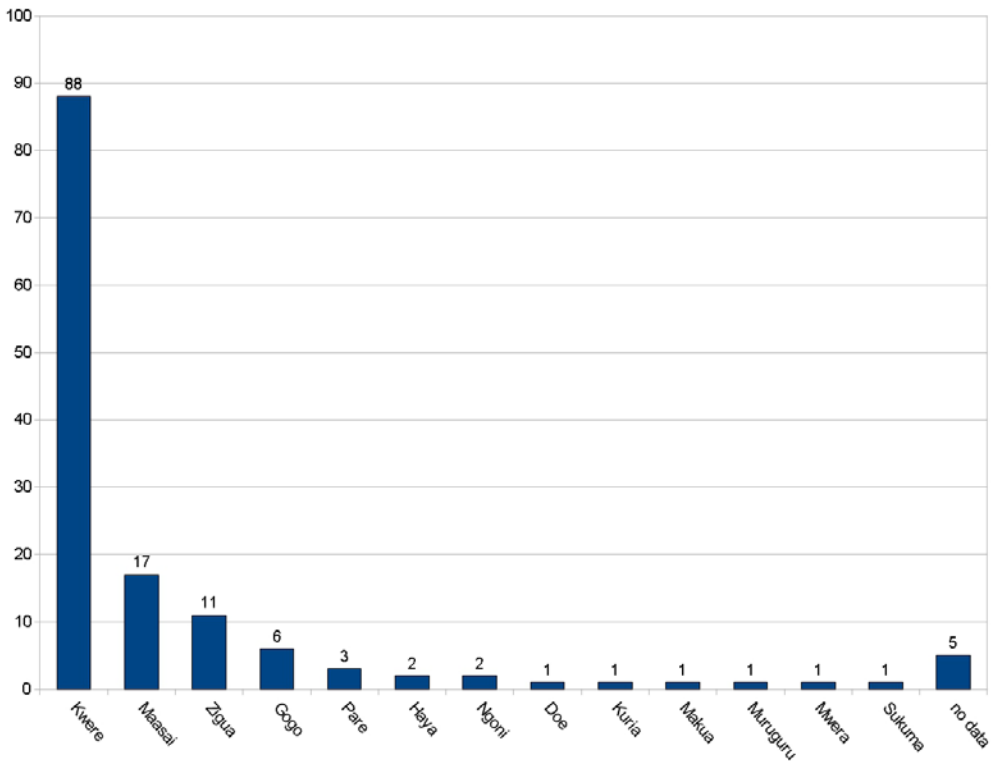


Figure 12. Ethnic composition of the respondents in the questionnaire survey conducted during 2008-2009 in Lugoba ward (n=140).

**Lunga** is the largest of the four studied villages. It is located along the national highway which connects Dar es Salaam and the northern parts of the country. The village initially grew around a Roman Catholic Mission, which moved there in 1911 (Vuorela 1987: 128). The village gained a rank of an administrative centre during the villagization in the 1970s, while the importance of the previous centre Msoga declined (Sitari 1983: 44). Lunga hosts now the headquarters of Lugoba ward, a health centre, primary and secondary schools, a court of justice, as well as a thriving market area, which attracts traders also from the neighbouring wards and Dar es Salaam. The population of Lunga grew from 3313 inhabitants in 1984 to around 6222 inhabitants in 2006. Main livelihoods are small-scale agriculture, petty trade and services, as well as charcoal production. Agricultural production of maize, cassava, beans, leaf vegetables,

fruits and other crops is predominantly subsistence oriented, but sesame and excess of other crops is also being sold. A clear minority of the inhabitants have other livestock than a few chickens or ducks. Since the early 2000s, all villagers have had access to safe water from communal taps. The village got electricity in the 1980s, but only a minority of the houses have been connected to the grid.

**Makombe** is a smaller, remote village that has its centre at about 6.5 km distance from Lunga to north-west. The village was established during the *ujamaa* era, when people were moved some 3 km away from Old Makombe to the new location (Sitari 1983: 42–43). However, Makombe still lies some 5 km off the highway, and the gravel road connection is rather poor. Like Lunga, Makombe has also grown steadily during the post-*ujamaa* period. In 1984, its population was 539 and in 2006 it was 999. The inhabitants are mainly engaged in cultivation, charcoal production and working at the stone quarries nearby the village. Agricultural production has similar characteristics as in Lunga, but the production is slightly more organized and intensive, probably due to narrower scope of other available livelihood sources. The village does not have electricity or running water. Water has to be collected from the neighbouring village Mindu Tulieni at a three-kilometre distance or from Saleni at almost a six-kilometre distance from Makombe. The village has a primary school, but the nearest health centre is in Lunga. People in Makombe have traditionally had close relationships with the Maasai who live in the neighbouring areas (Mwelupungwi 1977).

**Msoga** is another smaller village, lying some 12 km south from Lunga. Its location used to be central location along a caravan route during the colonial period, but this position was not permanent since the Chalinze-Tanga highway was built in the 1960s, making Msoga a ‘bush village’ off the road (Vuorela 1987: 76). At the beginning of the *ujamaa* period, the people of Msoga were ordered to move to Mboga along the main road, but the people refused due to better availability of water and fertile soil in Msoga. Eventually, Msoga was allowed to remain as an *ujamaa* village at its traditional location, some 1.5 km west from the new highway (Vuorela 1987: 132–133). During *ujamaa*, Msoga’s population fluctuated a lot, and the 1978 census actually showed that nearly 1400 people lived in the village (Vuorela 1987: 76). By 1984, however, the population had diminished to 682 from which it grew up to 1201 by 2006. Agricultural production is by far the most important source of livelihood. The production has similar characteristics as in other villages, but vegetables are more commonly grown in Msoga. A few houses have electricity. The village has also a primary school and a dispensary. The gravel road leading to the main highway is in good condition. Another special feature of Msoga is that it is the home village of the current president of Tanzania, Jakaya Kikwete. This has brought additional attention to the village, where several development projects are currently being implemented.

**Mindu Tulieni** is predominantly a pastoral village located around 2–5 km west from Lunga. According to Kilongozi, Kengera, and Leshongo (2005), the Parakuyo Maasai arrived in the area from Handeni district in the north during the 1920s and 1930s. Also other cattle-keepers and cultivators such as the Pare, Gogo and Haya now reside in



the village. The settlements are highly dispersed in comparison to other villages in the area, and there is no clear centre in the village. The population of Mindu Tulieni has been growing more rapidly than in other villages in the ward, from 459 in 1984 up to 2132 in 2006. While this growth may have been contributed by the inflow of migrant workers, as Madulu (2005) suggests, also non-static boundaries and difficulties to count the scattered population may explain some of the fluctuation. Livestock keeping is the main livelihood in Mindu Tulieni, even though subsistence cultivation and small trading have also gained importance since the late 1970s (Sitari 1983: 48; Hurskainen 1984: 121–122). The villagers get income especially from selling milk, cattle, goats, and sheep. The pastoralists in Mindu Tulieni have thus an important economic relationship with the cultivator groups in the neighbouring villages. Mindu Tulieni has a few communal water taps and a primary school, but no electricity. The road connections are poor especially during the rainy season. The village has no shops or a health centre, so most of the villagers frequently visit Lunga for these services.

### 4.3 Field work methods and data

An essential part of the research materials and data were collected during two field work periods in October–December 2008 and June–August 2009. A third, shorter visit to the study area was made in December 2010. Altogether, the field work was carried out for about five months, of which the most was spent in the study villages and a few weeks in Bagamoyo town, Chalinze, and Dar es Salaam where additional information from traders and governmental agencies was collected. The field work methods included participant observation, 89 thematic interviews with key informants, 20 RRA exercises and group discussions, as well as 140 structured questionnaire interviews (table 2).

Table 2. Number of thematic interviews, RRA exercises and group discussions, and questionnaire interviews in different locations during 2008–2010.

Location	Thematic interviews	RRA and group discussions	Questionnaire interviews
Lunga	24	3	66
Mindu Tulieni	12	4	29
Msoga	13	5	25
Makombe	11	2	20
Other villages in the study area	2	4	-
Lugoba ward offices / schools	11	-	-
Bagamoyo town	3	1	-
Chalinze	10	-	-
Dar es Salaam	3	1	-
TOTAL	89	20	140

The field work was conducted with the help of translators and local assistants. Mr. Ahmed Nandolo who resides in Lunga village translated about half of the interviews and group sessions. The rest were mostly translated by Mr. Emmanuel Mhache from

the University of Dar es Salaam. I participated in each discussion and exercise except for 43 questionnaire interviews that Mr. Mhache conducted without my presence. Most of the RRA sessions and group discussions were accompanied by other members of the research project and translators. Mr. Lazaro Ruben Wanga from Lunga village assisted with organizing interviews with the Maasai and also translated from Maasai language in the few cases when the respondent had difficulties with speaking Swahili. Many of the thematic interviews and RRA exercises were recorded, which enabled transcribing the discussions afterwards. 32 thematic interviews were made directly in English: mostly those with the government officials and other highly educated respondents. During the daily interaction with the villagers, I also made several simple queries without a translator in Swahili, such as asking information regarding traded foods and agricultural production.

#### *4.3.1. Participant observation*

Participant observation is a classical method of anthropology through which essential information on local circumstances can be gained. It also helps with choosing central questions for the study process (Chambers 1997: 116; Mikkelsen 2005: 88). In this study, observing was practised continuously in all phases of the field work. Being mostly accommodated in guest houses in Lunga enabled observing and participating in the daily life of the villagers, and helped understand diverse issues and practices in more concrete ways than what the interviews alone could have provided. Direct observation was particularly useful in regard to information on physical structures, land use practises, cropping patterns, livestock keeping, trading, food preparation and consumption, livelihood opportunities, share of labour between sexes and age groups, the role of forest products and especially charcoal production, water collection, operations of government officials, and other cultural phenomena such as relations between different ethnic and religious groups. The observations were usually written up afterwards during the same day. Also photographs and short films were taken with a digital camera quite extensively.

#### *4.3.2 Thematic interviews*

Thematic interviewing of diverse key informants on a variety of issues was a central method of the field work. A 'key informant' is understood as a person who has specific knowledge on an issue that is relevant for the study purpose. Thus, the person does not necessarily have to be a leader of a community or a professional, but any individual who has particular insights on the research themes (Mikkelsen 2005: 89). In this study, the interviewees included village elders, farmers, pastoralists, charcoal producers, village council<sup>3</sup> members and other local leaders, extension workers and other government

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<sup>3</sup> Village councils are institutions that were created during *ujamaa* period. The members of the council are elected by adult villagers. The council is led by Village Chairman and his subordinate Village Executive Officer. Each village has also committees focusing on issues covering finance, social development, natural resources, security, education, health, trade and construction. The villages were further divided into several sub-villages during *ujamaa*. Leaders of the sub-villages are elected, and they represent the sub-village in the village council (Juntunen 2001: 52-53).

officials (on village, ward and district levels), health centre personnel, traditional healers, milk collectors, butchers, millers, traders, former co-operative personnel, caterers, wholesalers, teachers, and other key informants such as an influential employer and a person responsible for food security monitoring in an aid organization. Many interviewees belonged to more than one category, particularly as many were also farming in addition to their other activities.

Most of the interviews were appointed beforehand with the interviewee. None of the people who were asked disagreed to participate. These semi-structured interviews were usually based on written checklists or broad questions designed before the appointment. The order in which the issues were raised varied according to the flow of the discussion and additional questions were made as needs arose. A few interviews started also from non-appointed informal discussions where important issues related to the themes of the study appeared. Out of the total 89 thematic interviews, 61 were written down during or immediately after the interview, and 28 were recorded and later transcribed into a written form. The average length was about 30 minutes and nearly all lasted less than an hour, but the lengths varied from five-minute interviews with the shopkeepers to nearly two-hour discussions with a few farmers and officials.

The social networks of the local translators may have influenced the selection of the interviewees to some extent. Village officials—usually involving the chairman or the VEO and sometimes also village committee members—also pointed out some of the key informants. This was practically unavoidable, as the researcher is always expected to first contact the village administration to agree on the course of the study in the village. Most interviews were made with individuals with the presence of the translator and the researcher only. Sometimes children, other family members or passers-by listened or commented the discussion. If the interviewed person did not ask the others to leave, I usually did not do it either, as I felt it would have been inappropriate.

Despite the intention to interview both sexes equally, the thematic interviews had a male bias, as only 25 (28%) of the informants were women. Although this can be partly due to the researcher and the assistants being men, it also reflects the patriarchal structures in the society. For instance, most of the government officials, wholesalers, and traditional healers appeared to be men. A more detailed list of the informants is presented in Annex I.

### *4.3.3 RRA exercises and group discussions*

The techniques of Rapid Rural Appraisal (RRA) have been developed especially among the farming systems research, extension and development work from the 1970s onward. RRA methods—such as various kinds of group discussions, exercises, transect walks and graphic illustrations of local realities—emerged as a response to more traditional methods such as formal surveys that were seen costly and lacking in data reliability especially in rural contexts of developing countries. Later on, as participation became an increasingly popular concept and a ‘must’ in development work, the RRA techniques

were absorbed and further developed in Participatory Rapid Appraisal (PRA). (IISD 1995; Chambers 1997: 102–129; FAO 1997a; Mikkelsen 2005: 55–57.)

The application of RRA methods provided effective means of collecting information on issues such as land holdings, land use, annual cycles of agricultural production and other livelihoods, food security charcoal production, and forest management. Most RRA exercises were implemented during the first phase of the field work in order to get an overall comprehension of the surroundings, central issues concerning food system change, and other development challenges rather quickly. In total, 20 sessions were held including 6 transect walks, 4 seasonal calendar exercises and 10 group discussions. The number of participants, excluding the project team members and assistants, varied from 2 to 48, the average being 9 participants per session. Again, the gender balance was unequal as only about 30% of the participants were women. Particularly the transect walks and the group discussions with village council members were male-dominated, while men and women were more equally present in the seasonal calendar exercises. As many sessions were organized together with other members of the project team, and included thus a variety of different topics, the sessions became lengthy, nearly two hours by average. A list of the implemented sessions is in Annex II.

Rather accurate maps and a good series of aerial photographs and satellite data from the area already exist: the transect walks did not thus aim at drawing a rough maps of the villages (Mikkelsen 2005: 90) but rather at getting to know the environment better and ground-truthing some of the features in the satellite data. During the walks across and around the villages, the important places, soil types, main cultivation areas, cultivation patterns, grazing lands and patterns, as well as forest resources were identified and discussed with the participants. Important places were also photographed or videoed and located with a GPS device. The transect walks usually involved only a few people, usually farmers or pastoralists who knew the area well. However, several other villagers who passed by the group gave their comments too.

Seasonal calendar exercises focused on the annual cycles of food production, variations in food sources and availability, agricultural practices and workload, food security, incomes, and non-agricultural labour opportunities (see also Callens & Seiffert 2003). People of different age groups and sexes were invited to the sessions. The primary outputs of these exercises were calendars indicating the monthly variations in the food system during recent years and in 1985. This reconstruction of the past was naturally based on the participants' memories and their preferences on how to present things. Repeating the same exercise in a similar manner in all four study villages gave some grounds for comparison and verification, which were then further reflected with earlier studies and other available data.

Focus group discussions did not directly contribute to graphical output such as mapping important places or drawing a calendar. However, the group discussions were probably more participatory than the other RRA exercises, because the role of the researcher was more that of a facilitator of the discussion than a leader who determined the exercise

process. Certain topics and questions were set beforehand, but many more emerged during the lengthy discussions. The participants included mostly village council members. Central themes concerned issues regarding land use and landholdings, agricultural production, extension work, food security, administration, and also non-agricultural sectors such as charcoal production.

During the last visit to the study area in December 2010, tentative results of the study were discussed in a seminar with 48 participants including village and ward officials and other key informants. This event was organized by the research project in Msata. Swahili-language study reports on the main findings were also delivered (Haapanen 2010; Sokoni 2010c). A few days later, another meeting was held with policy-makers and researchers at the Embassy of Finland in Dar es Salaam. Both these seminars were essential for critical reflection of the study process and its outcomes, receiving some further information about the salient issues, as well as updating researchers' knowledge on the situation. Especially the villagers and local authorities were enthusiastic to discuss the focal issues of the studies and they expressed high hopes and demands for overcoming the addressed problems in the food system and rural development in general. From the researcher's point of view, it was also relieving to know that the main findings were generally approved by the participants in both seminars.

#### *4.3.4 Questionnaire survey*

At the initial stage of planning the field work, I wondered whether or not to use the survey method due to the possible inflexibilities set by a strict set of questions with limited answer options, and the fear that essential issues may fall outside the focus, or that the findings are misleading when mechanically conducting a large number of repetitive interviews that include sensitive issues (see also Chambers 1983: 51–59). However, while observing, facilitating the first RRA exercises, and especially making the first thematic interviews, it appeared that particularly the questions regarding agricultural production and sources of food were generally not considered touchy. On the other hand, crude estimations about several aspects of the food system called for a more easily quantifiable approach than what the survey could provide. Also, an earlier survey made by the team of Sitari and Sendaro in 1989–90 gave good points of reference. Thus, the decision to conduct a survey was made and the questionnaire was designed with the help of the local assistants and other project members already during the first phase of the field work.

During the first phase, 67 interviews were made where the questionnaire included questions regarding the sources of foods consumed in the household, land holdings, cultivated crops, livestock assets, food consumption, food security, and incomes. These interviews were conducted by, or together with, Mr. Mhache, who also included questions for his own study regarding the impact of population increase on forests and woodlands. Some of the responses, particularly the background information about the household and its member, education level of respondent, as well as land holdings, have been used in both studies. In the second phase, the interviews were mostly conducted

together with Mr. Nandolo as a translator. The questionnaire was extended with additional questions on the livelihood sources of each household member, cultivation techniques, usage of inputs, livestock diseases, as well as agricultural output and sales. The reason why these questions were added in the second phase was practical. In the first phase, it was efficient to conduct the interviews together with Mr. Mhache for both studies simultaneously, but the number of questions regarding the food system had to be limited, as the interviews were lengthy already, around 35 to 50 minutes. Nevertheless, the core questions regarding the changes in food sources and consumption were included in both phases.

The relatively high average age of the respondents made it possible to ask about the past events and particularly the situation in the mid-1980s. In order to put more weight on the historical analysis, several questions from the earlier survey conducted in 1989–90 were also included with a similar wording. Such questions concerned especially livelihoods and agricultural production. During the second phase of the survey, respondents were also given more time to take up additional issues if such appeared. This lent a bit of informality to the interview and some important issues came up that could have otherwise been neglected. The survey questions are presented in Annex III; it is indicated which questions were presented in the first and second phases in the 2008–09, and which questions were the same as in the 1989–90 survey.

As it was difficult to get comprehensive and up-to-date lists of the households from the village offices, random sampling was applied in a manner that the assistants or the researcher walked criss-cross through different sub-villages and selected approximately every 20th household for the interview. If the representative of the household did not agree for the interview, or was absent, we asked from the neighbouring house, and so forth. After an agreement was reached, the interview was usually done after a few hours or during the following day. The question list was translated into Swahili, and the assistant posed the questions to the interviewees. The assistant interpreted the answers simultaneously into English, and I wrote down the answers in most cases (97 interviews), except those interviews that were conducted by Mr. Mhache without my presence (43 interviews). In the latter phase of the field work I could also write down a good part of the answers directly, as my Swahili skills improved.

In total 140 structured questionnaire interviews were conducted with people who currently lived in the study villages. Out of these, 66 interviews were made in Lunga, 29 in Mindu Tulieni, 25 in Msoga, and 20 in Makombe (table 3). The interviewees included 70 adult women and 70 adult men who were regarded as representatives of their households. A household was chosen as the basic unit for the interviews as it has traditionally been the primary unit of production and consumption in rural Tanzania (Bryceson 1990: 19). For identifying a household, a definition adopted by FAO was used here: “A household is a group of people who eat from a common pot, and share a common stake in perpetuating and improving their socio-economic status from one generation to the next” (Carloni & Crowley 2005: 2). As a minority of the families, about 15%, are polygamous, this was not always very straightforward. Most people

were interviewed at their home yard and the rule of thumb was that the household was defined to people living in that homestead and sharing the same eating pot. However, the question of household assets was complex in a few cases, where the husband shared his land or livestock with other households. Furthermore, polygamous men may reside in several houses. Another issue, which may have more significantly affected the validity of the results, is the representation of a whole household by one individual. For instance, it is questionable to what extent the representative can give responses that correspond with the experiences of food security by all household members (Webb et al. 2006). Approaching the households as entities was also not capable of providing much detailed information on the intra-household relationships in acquiring and accessing food, especially within the limits set by the length of the questionnaire and the focus of the study.

Table 3. Number of surveyed households in the study villages (HH = household) (Lugoba Ward Office 2008).

Area / village	Population 2006			No. of surveyed HHs	% of surveyed HHs
	Total	HHs	HH size		
Lunga	6222	1272	4.9	66	5.2
Mindu Tulieni	2132	287	7.4	29	9.9
Msoga	1201	228	5.3	25	9.1
Makombe	999	210	4.8	20	10.5
Total, study villages	10554	1997	5.3	140	7.0
Total, Lugoba ward	17924	3356	5.3	140	4.2

The average age of the surveyed was 48 years, the youngest interviewee being 21 and the oldest 101 years. The sample involved about 7.0% of the total number of households in the studied villages according to the population figure from 2006. This means a margin of error of 8.0% with a 95% confidence level for the questions asked from all respondents. On the ward level, the sample included about 4.2% of households, giving a margin of error of 8.1% with a 95% confidence level. In reality, however, the percentages of the surveyed households are slightly less and margins of error slightly higher due to expected population increase after 2006. Perhaps a more meaningful indication of the survey being representative is, however, the notion that towards the latter stage of the survey exercise the variability of the answers appeared to be low, or remained mostly within certain ranges, and new issues were seldom raised in the open-ended questions. From a more qualitative point of view, this would imply that a 'saturation point' had been well reached (see also Guest et al. 2006).

## **4.4 Other data sets**

### *4.4.1 Survey data from 1989–90*

In part, the data collected in the earlier survey in 1989–90 was analysed in articles by Sendaro (1992) and Sitari (2010b). However, the access to the original questionnaire forms gave additional advantages and reference points for this study as well. The 1989–90 survey was conducted in the large roadside villages in Lugoba ward and the neighbouring Msata ward. The questions covered several issues related to livelihoods, land use, cultivation methods, and marketing of agricultural products. The survey included 92 households, of which 30 were in Lunga, 32 in Mboga and 30 in Msata, representing about 5% of the current population in these villages (NBS 1988). The reasoning behind only one of these villages being selected for the present study was that also remote off-road villages were necessary to include in the research in order to create a more comprehensive picture of the situation (see also Chambers 1983: 13–16). Moreover, Sitari (2010b) did her own follow-up, including also Msata and Mboga, interviewing several people who had participated in the earlier study.

### *4.4.2 Demographic data*

Official population data from the area, including numbers of households and age groups by sexes, is available in national censuses made in 1988 and 2002 (NBS 1988; NBS 2005). Regarding year 1984, population figures given by the Ward Party (CCM) Secretary is presented by Vuorela (1987: app. table 1). Lugoba ward office also provided village level statistics regarding the population in 2006.

### *4.4.3 Meteorological data*

Rainfall data from Lunga village is available only from 1964 to 1993. The nearest weather station that has been collecting both precipitation and temperature data during the studied period is at the District Agricultural Office in Bagamoyo town, about 65 km east from Lunga. The coastal location of Bagamoyo may cause variation in temperature and rainfall patterns in comparison to Lunga and the study area. However, there are reasons to believe that the differences are not too big to give indicative results, as the data from Bagamoyo was compared also to similar data collected from weather stations in Morogoro (Paavola 2008) which lies about 85 km to south-west, as well as Dar es Salaam (KNMI 2010) which is about 115 km south-east from Lugoba.

### *4.4.4 Land use and land cover data*

A time series of aerial photographs and satellite images from the study area provide the basis for examining the historical change in the physical structures and surroundings of the study villages. Aerial photographs of the study area in 1966 and 1982 were collected from the Department of Maps and Surveys. The most recent layer of the time series includes Ikonos-2 satellite data, taken in February and July 2007 with about one meter



resolution. The aerial photographs are less sharp, but locations of fields and settlements can be identified after scanning with a high resolution (1200 dpi). Ground-truthing was made for checking certain aspects of the satellite data of 2007, such as checking the appearance of fields and forests, and in order to find out the most recent developments in the land use, such as construction of dams. The land use plan of Msoga village also provided some further information (Msoga Village Council 2007).

#### *4.4.5 Crop and livestock data*

Agricultural Extension Workers or Veterinary Officers collect information annually for village level land records through interviewing a representative from each farming household. These records show the names of the landholders, main types of crops cultivated, as well as the acreages under each crop during the *masika* (long-rains) season. In Lugoba ward, the data from different villages is compiled by the Veterinary Officer, who sends a ward-level summary to the District Agricultural Office in Bagamoyo. District-level crop data, including estimates for total annual yields, were available for years 1998–2007 (Bagamoyo District Office 2008, Coast Region Socio-Economic Profile 2007). Earlier studies (Sitari 1980, 1983: 14; Sendaro 1991) also provided some information on production on the district level. A closer look at the official statistics, however, revealed serious inconsistencies.

Also the numbers of cattle, goats, sheep, and pigs owned by households are collected by the veterinary officer in Lugoba ward. These data sets were similarly incomplete, but in any case indicative. The data collected in May–June 2009 was obtained, but neither the veterinary officer nor the district officers had preserved older statistics. Earlier figures were available in the studies by Hurskainen (1984: 87, table 6) and Mustafa (1989: 111, table 3). By supplementing the crop and livestock figures with information from the household surveys made in 1989–90 and 2008–2009, the most salient changes in the importance and productivity of main crops and livestock categories could nevertheless be constructed.

#### *4.4.6 Market data*

Information on wholesale prices was collected from officers at Tandale and Kariakoo wholesale markets in Dar es Salaam and the Eastern Africa Grain Council. Local market prices of different food items were asked and cross-checked from several traders and villagers. Prices of agricultural inputs such as fertilizers, pesticides, seeds, and livestock medicines were asked from sellers in Lunga and Chalinze, as well as from several farmers. There were no statistics on the amounts of food items and other agricultural products traded in or out of the villages, but qualitative estimates on these product flows were asked from local traders and wholesalers. The origins of the main food items were tracked through interviews of traders and wholesalers and cross-checking with several key informants. Alleged origins of imported foods were also compared to national import figures provided by the FAO (FAOSTAT 2011).

#### *4.4.7 Nutrition and health data*

For indicators on nutrition, weight-for-age indexes of children under 5 years were collected from the governmental health centre in Lunga and the dispensary in Msoga. Children's weight-for-age index is used in the diagnosis for under- and malnourishment by, e.g., the WHO and it is considered to be one of the key indicators that reflect the nutritional situation of the whole community (Shetty et al. 1994). Weight-for-age indexes also form the largest entity of nutritional data locally. However, the registers are available only from the mid-1990s onwards. Before this, data was either not collected systematically, or it was destroyed, as was revealed in the interviews with the health workers. In addition, annual summaries compiled by health officers provide information on cases of anaemia and other nutritional disorders in the area. The analysis of the changes in nutrition is complemented with answers related to food security related questions in the household surveys, as well as interviews of health workers, traditional healers, and elderly people. Also, studies made during the Jipemoyo project (Sitari 1980; Hurskainen 1984; Vuorela 1987) give indications on the overall situation in the beginning of the 1980s. Further qualitative evidence is provided also in photographs of especially children in the area that Taimi Sitari has taken in the late 1970s. Information regarding food aid distributed in the study area was collected from Lugoba ward office, but exact amounts were not given.

### **4.5 Data analysis**

The analysis was started already during the early phases of the field work, so that data collection could be focused on issues and groups that are important for the studied phenomena. Most of the analysis, however, was made after the second field work period, and it continued until the latter phases of the whole writing process. Usage of different qualitative and quantitative methods enabled triangulation, a form of cross-checking (Mikkelsen 2005: 96–97; Nightingale 2009).

For examination of thematic interviews, group discussions, and conversations that stemmed up during the RRA exercises, the main method was textual analysis involving latent content analysis and matrix displays. Latent content means researcher's subjective interpretation and summarization of particular themes in the texts, which in this case were transcribed interviews. These themes, such as poor availability of rains or food shortages, are not necessarily represented with the same wording by different sources, and thus interpretation is needed (McBurney & White 2009: 234–235). After identifying different themes, the text excerpts were categorized under the main components of the food system framework. As content analysis is based on a systematic scientific method, it can also involve quantification (Neuendorf 2002: 4, 10, 14–15). For a more quantitative interpretation of the interview materials, matrix displays were used to categorize the data (Mikkelsen 2005: 183), particularly in regard to availability and alleged origins of traded foods, as well as food prices.

Descriptive statistics such as percentage, mean, median, standard deviation, and histograms were used to analyse quantified information that was collected through

the questionnaire interviews, as well as the data collected from the officials regarding agricultural production, nutrition, rainfall patterns and temperatures. The reasons for relying on descriptive tools instead of inductive statistics derive partly from the research objectives and approach, and also from certain weaknesses in the data sets described earlier and in the following chapters. Some of the survey questions yielded highly subjective answers, such as those regarding crop yields, incomes, and food security, and especially those that concerned the past events during the end of *ujamaa*. The data sets obtained from the authorities turned out to be incomplete and partly inconsistent in regard to their validity and collection methods, so the application of more complex analysis with the data was not considered meaningful.

Maps showing the current administrative boundaries of villages in Lugoba ward were prepared by the Coast Region secretariat in 2007. The spatial analysis of land use in the study villages is based on the demarcation given in these maps, although it must be noted that the perceptions of the villagers regarding the village borders can differ from those of the officials, for example when the boundaries sometimes cross traditional land holdings (Sitari 1983: 68–69; Ylhäisi 2010). Topographic maps at a scale of 1:50000 were also used as reference for the spatial analysis. The most recent topographic maps of the area are based on air photographs taken in 1982. Visual interpretation was used for digitizing the aerial photographs and satellite data at a scale of 1:6000.

As all aforementioned data sets had their strengths and weaknesses, triangulation was an essential element in the analysis. The most common approach was to seek for convergence by cross-checking the results derived from different sets. This was an important practice for assessing the validity of information, and it was applied already during the field work. However, different kinds of methods may produce different kinds of understanding about the reality (Mikkelsen 2005: 96–97; Nightingale 2009), as the comparison between the survey data and the governmental health data proved, for example. Furthermore, a considerable part of the analysis depends on the ability of informants to recall events and situations in the past. As McCabe, Leslie and DeLuca (2010) have pointed out, the dependence on retrospective data brings difficulties such as imperfect recalling, or biased selection of the provided information. Thus, triangulation also involved seeking for complementarity and divergence between the data sets, which actually revealed some important insights in how things were understood and represented to a foreign researcher. It was also beneficial to work with a research team, as the materials collected by other team members overlapped with mine in certain parts, revealing how different methodological approaches affected the results.

## 4.6 Ethical issues

Ethical questions are crucial when dealing with the information collected from people and reporting the findings (Chambers 1983, 1997; Mikkelsen 2005: 325–345). In this study, the salient ethical issues concern the approval by the interviewed people and the local authorities for conducting the study, representation of different social groups, anonymity, payments to the respondents, sharing the results, and the possible misuse

of the findings. Undoubtedly, also my foreign background, sex, age, occupation, and educational status are critical factors in regard to the stand the interviewees took and thus influence the reliability of the research. For example, sensitive issues related to food security or illegal charcoal production may have been kept concealed or represented in a different light according to the researcher's characters.

Research permits for the field work were granted by the Vice-Chancellor of the University of Dar es Salaam on behalf of the Tanzania Commission for Science and Technology. In addition to consultancies of authorities on region, district and ward levels, meetings were held with the village councils in each study village in order to inform them about the study process and its goals and ask for their approval for conducting the study. These meetings turned out to be good starting points for the research, for the council members gave valuable background information about the villages and addressed some of the crucial issues in regard to food production, environment, and food security.

As discussed earlier, it was difficult to strive towards equal representation of different social groups, especially men and women. This concerns particularly the selection of key informants for thematic interviews and group discussions, as most of the officials, village authorities and other people in influential positions in regard to controlling the food system are men. The gender balance was however reached in regard to the questionnaire interviews, where equal number of men and women were selected on purpose. Another group under-represented in the study is the youth, as the questionnaire was aimed to the adult representatives of households, and also the key informants were predominantly adults or elderly. The aim was to also involve representatives of different ethnic groups and religions in an equal manner. In this regard, the comparison of materials and experiences with other project team members did not indicate that major flaws would have appeared.

Anonymity was assured to all people who participated in the study, with the exception of the persons who held administrative positions. This was due to two reasons. As I do not consider the topic of the research so sensitive that it would require hiding the names of the villages where it was conducted, the authorities interviewed in these villages could be easily identified in any case. I also think that their position as civil servants allows for a certain degree of public evaluation.

Payment for interviews has generally been regarded as bad practice in social studies. However, assessing this principle in the present context and considering the fact that the interviewees dedicate their valuable time and efforts for the research, the researchers in the project agreed that the participants are given a nominal compensation. The payments ranged from TZS 1,000 to 2,000 according to the length of the interview. These sums are modest but however somewhat meaningful considering the common daily income levels in the area. In the group discussions payments were not usually delivered, but the participants were offered some food or snacks. Major problems or complaints in regard to these remunerations did not occur. I did not meet anyone who

offered himself or herself to be interviewed; all interviewees were first contacted by the research team.

The feedback seminars in Msata and Dar es Salaam were arranged and the reports including the main findings of the research project were delivered because the publication of the studies would have prolonged the disclosing of the research outcomes. Furthermore, it is questionable whether an English-written dissertation would ever reach the people whom it concerns in the first hand. When the results are made public it is always possible that they are utilized in a manner that is somehow harmful for the studied people and communities (Mikkelsen 2005: 339–340). The central concerns in this regard may relate to the largely illegal production of charcoal in the area, which is referred to in several points of the analysis. However, names of the charcoal producers are not revealed, and the fact that wood resources are overexploited in the area due to charcoal and other purposes is widely acknowledged among the authorities and also dealt with publicly in the media (e.g. Peter & Sander 2009; Rowan 2009; Beyadi 2010, 2011; The World Bank 2010). Another possible misuse could concern the ease of acquiring lands from the study area for private businesses, which may be in conflict with the land use interests of the villagers. However, these procedures are not dealt with in detail in this study.

## 5. CHANGES IN THE PHYSICAL ENVIRONMENT

In this chapter, main features and recent changes of the physical environment in the study are analysed. The focus is on climatic conditions, topography, soil, water resources, as well as human influence on the landscape in terms of features and processes that essentially determine local food production.

### 5.1 Climatic conditions and water availability

The study villages lie between 6.3 to 6.6 degrees southern latitude and 38.2 to 38.4 degrees eastern longitude. The proximity to the equator, the altitude of about 200 to 350 meters, and the impact of the monsoon cycles in the Indian Ocean make the climate hot and relatively humid. As most parts in western and northern Tanzania, the area has two rainy seasons. Most food production takes place during the long rains (*masika* season) which occur around March-April, and to a lesser extent during the short rains (*vuli* season) around November-December (figure 13). The driest period is from June to August. The average annual rainfall is 930 mm, but annual variation is large and the susceptibility to drought is moderately high. The probability for annual rainfall to exceed 800 mm is only 80% while the same to 1000 mm is as low as 43%. In addition to low annual rainfall, erratic timing of rains is also challenging for the local farmers who are almost completely relying on rain-fed agriculture. There are no established irrigation mechanisms in the study villages, but a recently built dam in Msoga was due to bring irrigation to some of the fields, starting in 2011. Two major rivers, Wami in the north and Ruvu in the east, cut through the district, but the study area only enjoys of their minor tributaries.

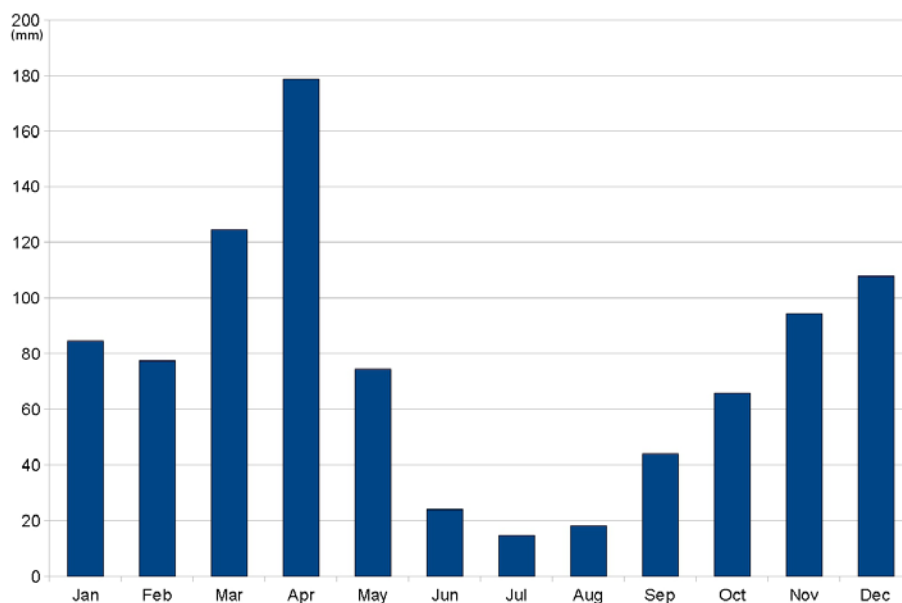


Figure 13. Average monthly rainfall at Lugoba Mission during 1964–1993 (Yanda & Munishi 2007: fig. 22; KNMI 2010).

Although a detailed climatic analysis is not in the focus of this study, a basic understanding of the local conditions is necessary. Thus, two of the most important variables, rainfall and temperature, are briefly dealt with here in the light of the available data. Meteorological stations have been functioning in the western Bagamoyo district at least since 1964. The station at Lugoba Mission in Lunga village, like others nearby in Mandera and Chalinze, stopped collecting data around 1993 (Yanda & Munishi 2007: fig. 22; Remtula 2009). According to the interviewed officials and a father at Lugoba Mission, these shutdowns were caused by decreasing governmental funds for the weather station network, as well as “lack of interest” by the higher level officials in Dar es Salaam towards the data that they were receiving from the stations. Also, while rainfall data was available from Lugoba regarding 1964–1993, temperature data was not found. More recent rainfall and temperature data was available only from Bagamoyo town, but not elsewhere in the district.<sup>4</sup> Furthermore, the most recent data for 2008–2010 could not be obtained from Bagamoyo either, despite several attempts.

The annual rainfall at Lugoba Mission shows a positive linear relationship with that in Bagamoyo town (figure 14). The correlation between the two data sets during 1964–1993 is 0.44 which is statistically significant ( $p < 0.05$ ). Together with the proximity of the periodical averages, this suggests that the rainfall patterns are quite similar in the two locations. The rainfall in Bagamoyo town shows a slightly declining overall trend for 1964–2007, but high annual variation throughout the period rules out any far-reaching conclusions. Two of the lowest rainfalls in the 43-year period were recorded in 2001 and 2003. According to the seasonal calendar exercises conducted in all four study villages, farmers usually plant maize in February or March for the *masika* season, and September or October for the *vuli* season. As Trærup and Mertz (2010) have concluded in a study concerning northern Tanzania, the timing of rainfall can be a more important factor in causing harvest shocks than the total annual rainfall. Several farmers interviewed for the present study emphasized this as well. When there are signs for the rainy season to begin, the farmers sow the seeds. If, however, the rains do not continue as expected, the germs soon die and new seeds have to be planted. The comparison of standard deviations in monthly data regarding February–March and September–October between the periods of 1964–1985 and 1986–2007 for Bagamoyo does not suggest that the variability would have drastically changed during the post-*ujamaa* period. As presented in table 4, the variability would have actually decreased for February, March and September, and slightly increased for October. Unfortunately, daily rainfall data was not available from Bagamoyo district, so more detailed analysis of variability during the cropping seasons is not possible. Slegers (2008), however, has concluded that long-term studies from Sub-Saharan Africa do not indicate that the droughts would have become generally more frequent.

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<sup>4</sup> According to the District Agricultural Officer, however, nine new stations were to be established in the district by 2010.

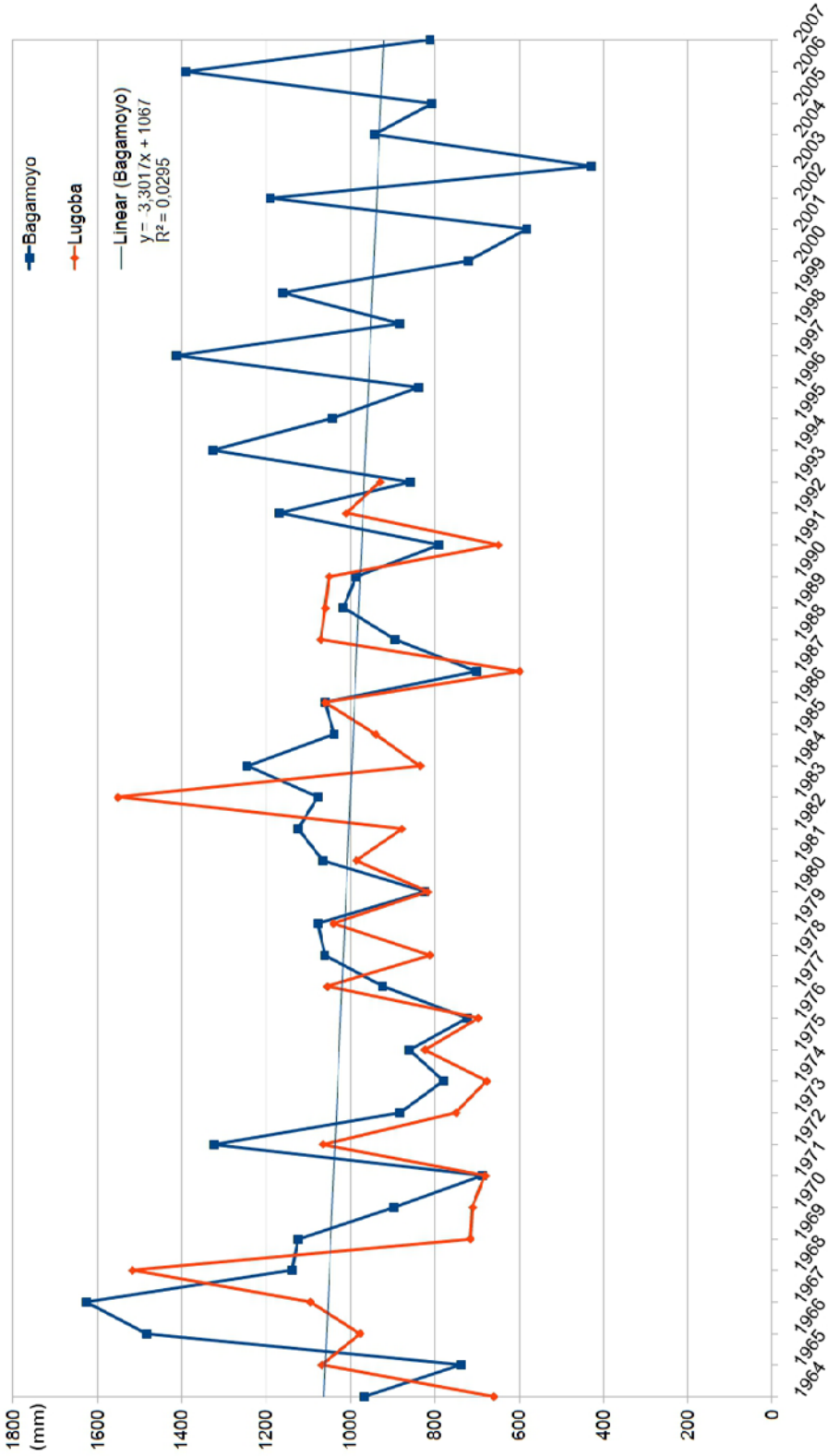


Figure 14. Annual rainfall at Bagamoyo district office during 1964–2007 and Lugoba Mission during 1964–1993 (Yanda & Munishi 2007: fig 22; KNNMI 2010; TMA 2010).



Table 4. Standard deviation in rainfall during selected months in 1964–1985 and 1986–2007.

Month	Std. 1964-1985 Lugoba	Std. 1964-1985 Bagamoyo	Std. 1986-2007 Bagamoyo
February	67.9	73.08	47.04
March	94.42	95.33	70.45
September	42.14	34.56	12.5
October	73.77	54.42	62.12

The temperature data from Bagamoyo shows that the warmest months are from November to March, when the mean maximum temperatures vary between 31.4–32.5 C° and the mean minimum temperatures between 21.6–23.9 C°. The coolest months are from June to September with mean maximum temperatures between 29.1–30.6 C° and minimum between 18.3–19.4 C°. By average, monthly variations are thus relatively low. The examination of the available temperature data from 1978 to 2008, however, reveals considerable changes in the long-term trends. Linear regression shows over a 1.5-degree increase in minimum temperatures, and a less steep increase of about 0.25 degrees in maximum temperatures (figures 15 and 16). Upward trends in temperatures is also found in the data from meteorological stations in the neighbouring Morogoro and Tanga regions, as well as in Dar es Salaam (URT 2006: 6; KNMI 2010).

To sum it up, the available data suggests rising temperatures but does not provide convincing evidence for drastic changes in rainfall in terms of total annual precipitation or monthly variability during the growing seasons. The rising temperature increases evaporation from soil and water bodies and increases transpiration rates of plants, which is likely to affect food production in the area. According to most estimates, mean temperatures in eastern Africa are predicted to rise by 1.5–4 C° by the end of the 21st century if greenhouse gas concentrations continue to grow (Hulme et al. 2001; Boko et al. 2007: 443; Ahmed et al. 2011). However, a recent study points out that land cover/use factors and particularly the change in albedo that follows agricultural expansion may bring considerable cooling effects in many locations, including the study area (Moore et al. 2011). Also, according to the IPCC estimations eastern Africa would to be one of the few regions where rainfall is likely to increase: approximately 7% by 2100 (Boko et al. 2007, see also Moore et al. 2011: fig. 1d). Nevertheless, most prediction models suggest that overall climate volatility will grow, causing shifts in agro-ecological zones and possibly adverse effects on the production and food security (Boko et al. 2007; Hertel et al. 2010; Ahmed et al. 2011).

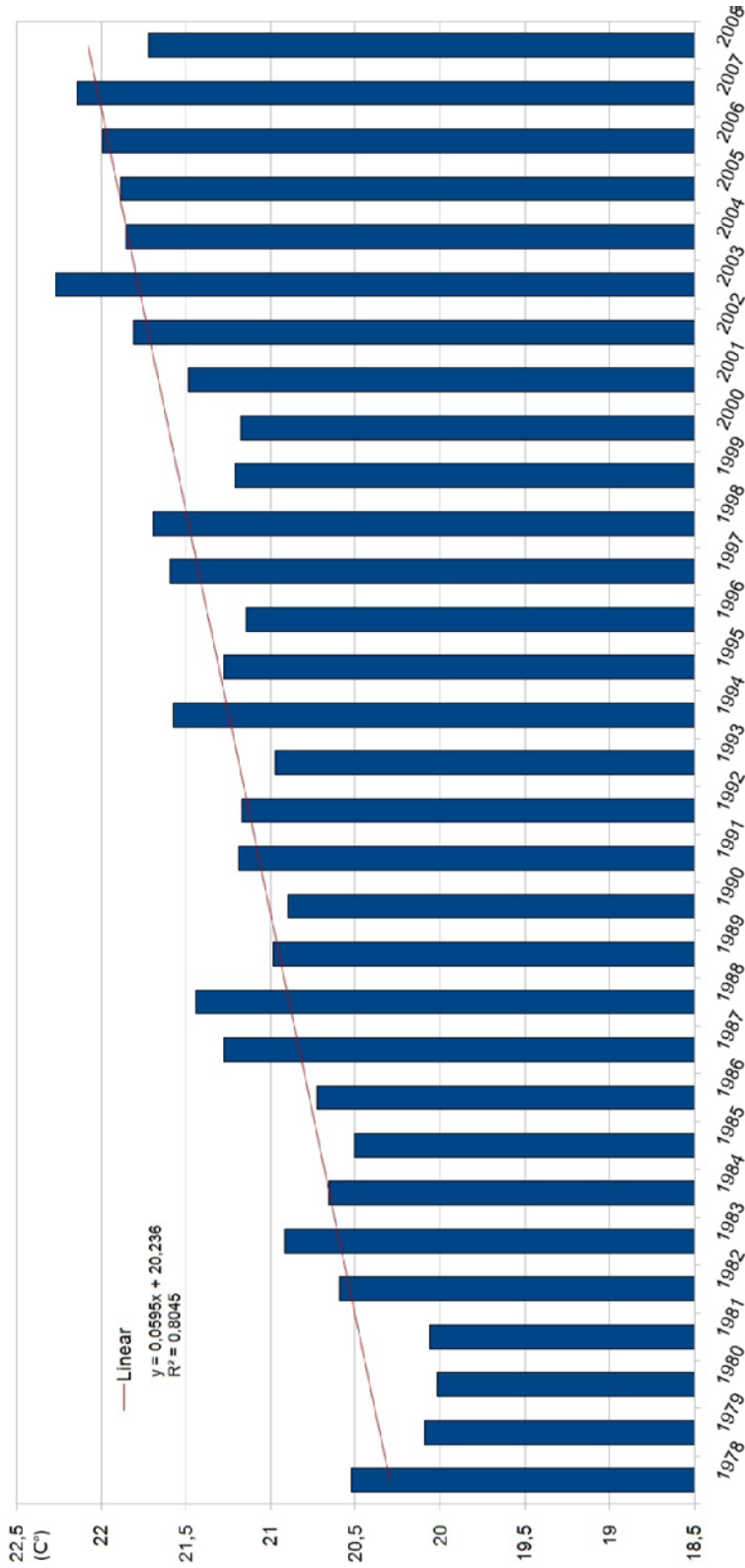


Figure 15. Mean minimum temperature in Bagamoyo town during 1978–2008 (TMA 2010).

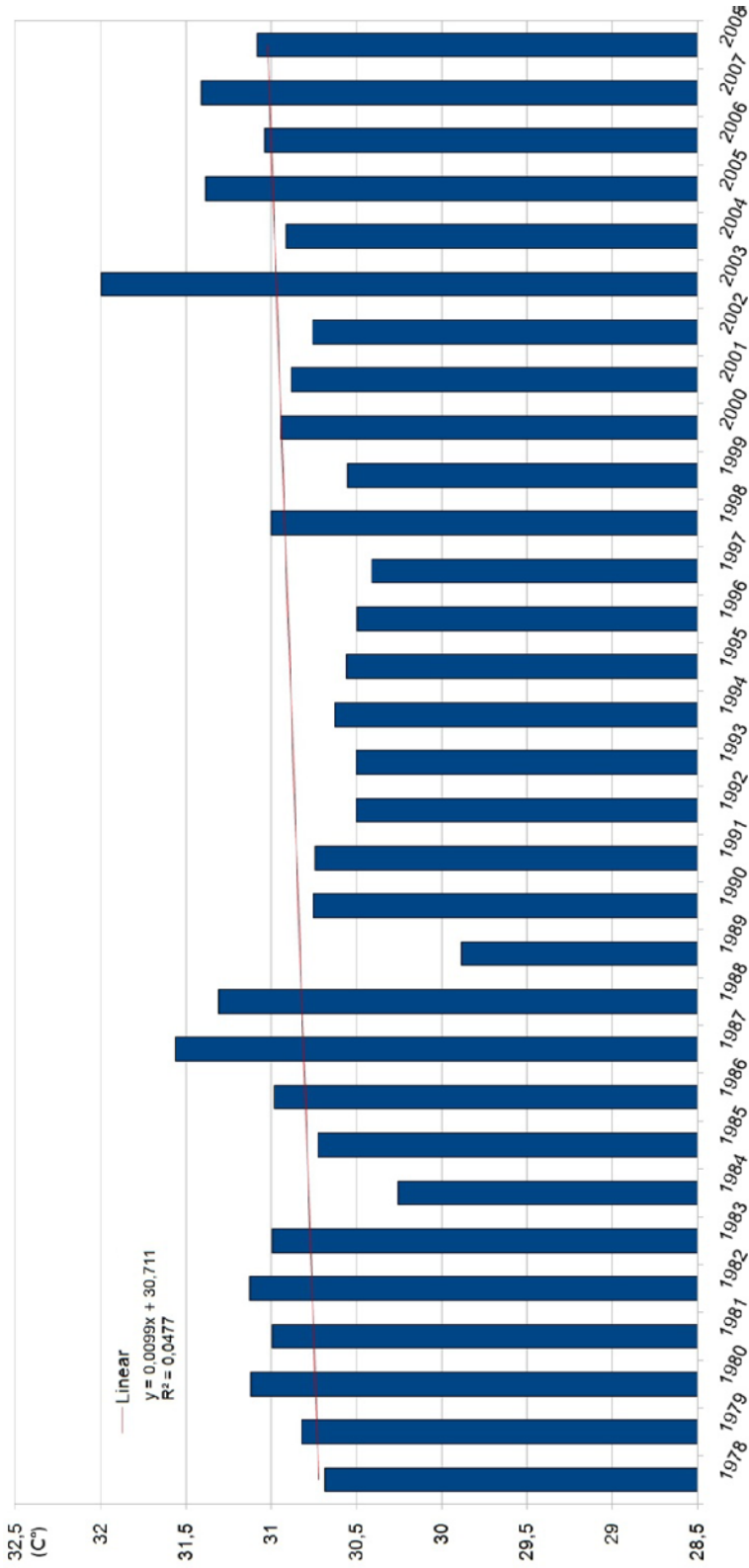


Figure 16. Mean maximum temperature in Bagamoyo town during 1978–2008 (TMA 2010).

In the beginning of 2000s a large water supply project was completed, providing water for villages downstream of the Wami River. The project involved constructing pipelines with the support from the Chinese government (USAID 2008a: 10). By the end of the decade about 160 km of pipelines brought about 7,200 m<sup>3</sup> water to over 100,000 residents. Before this, the villages in the area relied on surface water from streams, ponds and a small piped scheme from the dam in Mindu Tulieni, as well as wells and potholes dug by the villagers. These wells often dried up during the dry season, causing acute shortages of water (Madulu 2005; USAID 2008a: 10). According to the interviews with health officers, the water supply project improved the availability and safety of fresh water drastically, shortened the distances and workloads of fetching water for households and significantly contributed to the decrease of several water-borne diseases. However, some villages further off the main road still lack water taps or have only poorly functioning ones and the residents have to fetch water from other villages. The water provided through the pipeline is also not sufficient for irrigation at any larger scale.

## 5.2 Land use and land cover

The gently undulating topography of the area results from the bedrock consisting of Cambrian sedimentary rocks of the Mozambique Belt (Sitari 1983: 11). There are no mountains in the area, except the 881-metre-high Mount Pongwe in the neighbouring Msata ward in the north (figure 17). FAO (2010) has identified the dominant soil types in the area as deep, clayey red soils (nitosols) and black clay soils (andosols). This type of red soil is common in the entire Tanzanian coastal zone, while the type of volcanic black soil is particularly common in a relatively narrow strip extending southwards from Tanga region, north from Bagamoyo district (Berry 1971: 28–29). Both main soil types are considered to have relatively low or moderate natural fertility, but marked differences appear between sites (GoT 2008).

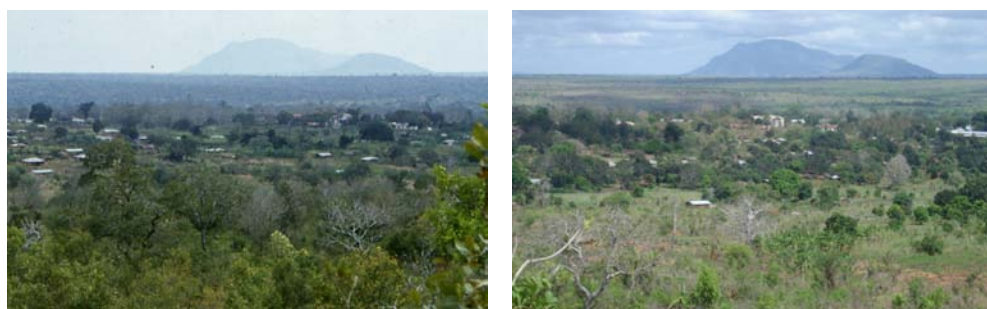


Figure 17. Landscape in Lunga in 1978 (left, photo by Taimi Sitari) and in 2008 (right, photo by the author). Mount Pongwe lies in the background.

Natural vegetation in most of the western Bagamoyo district consists of bush land, park savannah and sparse *miombo* forests. As a result of human activities, the majority of the vegetation has been secondary of origin at least since the villagization in the 1970s (Sitari 1983: 13), and large-scale deforestation has taken place during the last decades. From the two pictures above, taken from the same hill in Lunga in 1978 and 2008, it

can be seen that the forests outside the settlement area have largely vanished. Within the settlement area in this part of Lunga, however, the foliage cover appears to have expanded, which may be due to the growth of especially mango trees.

Major changes in the landscape are confirmed through the spatial analysis. The areas under settlements, fields, and forests were digitized and calculated from the aerial photographs taken in 1982 and the satellite data obtained in 2007. The resulting two maps (figures 18 and 19) visualize the land use/cover change in the study villages, while the areas and percentages under the different categories are presented in table 5. The analysis covers Lunga and Msoga villages entirely. From Makombe and Mindu Tuliene the coverages were 59% and 63% respectively, including a clear majority of the settlements and agricultural areas in these villages.

Table 5. Areas under different land use/cover categories in the study villages in 1982 and 2007.

Village	Year	Settlements		Field		Forest		Other		Total analysed area	
		ha	%	ha	%	ha	%	Ha	%	ha	%
Lunga	1982	107	1.8	472	8.0	1331	22.7	3957	67.4	5867	100
	2007	173	2.9	721	12.3	364	6.2	4609	78.6	5867	100
Makombe	1982	6	0.2	99	4.0	1001	40.3	1375	55.4	2481	100
	2007	17	0.7	143	5.8	220	8.9	2101	84.7	2481	100
Mindu Tuliene	1982	32	0.7	159	3.3	1939	40.8	2622	55.2	4752	100
	2007	50	1.1	363	7.6	475	10.0	3864	81.3	4752	100
Msoga	1982	37	1.2	278	9.1	1480	48.2	1272	41.5	3067	100
	2007	55	1.8	434	14.2	205	6.7	2373	77.4	3067	100
Total	1982	182	1.1	1008	6.2	5751	35.6	9226	57.1	16167	100
	2007	295	1.8	1661	10.3	1264	7.8	12947	80.1	16167	100

Large settlement concentrations, major cultivation areas, and mature forests were easily identified in the images. However, especially scattered settlements with thatch-roofed houses, fallow fields, and younger forests were more difficult to spot and distinguish from the other categories. This was particularly a problem with the black-and-white photographs of 1982. Hence, the maps and the area calculations should be regarded as indicative rather than absolute representations of the situation. Forests were identified through FAO's (2000: 5) definition, which includes wooded areas holding over 10% crown cover of trees above 5 meters' height in the minimum area of 0.5 hectares (see also Neeff et al. 2006: 3-4). In this study, however, areas under agro-forestry where fruit trees are grown on crop fields were classified as cultivated fields and not forests.

The analysis shows that the settled areas have expanded by about 62% between 1982 and 2007, although the population in these villages doubled during the same period. The slower rate of settlement expansion, especially in Lunga and Msoga, is explained by the increased density of house construction and abandoning most of the gardens

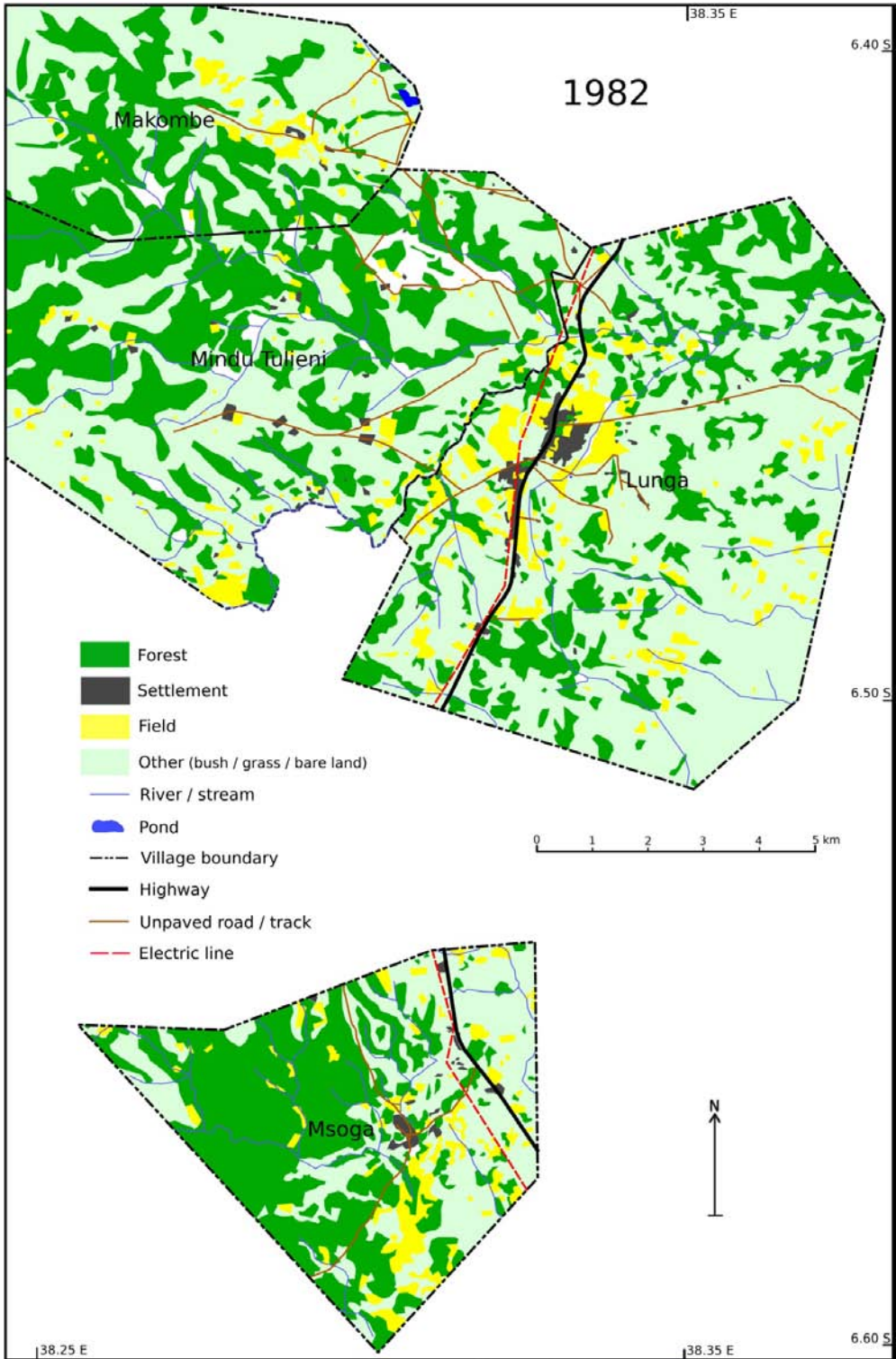


Figure 18. Land use/cover in Lunga, Msoga and eastern parts of Mindu Tulieni and Makombe villages in 1982.

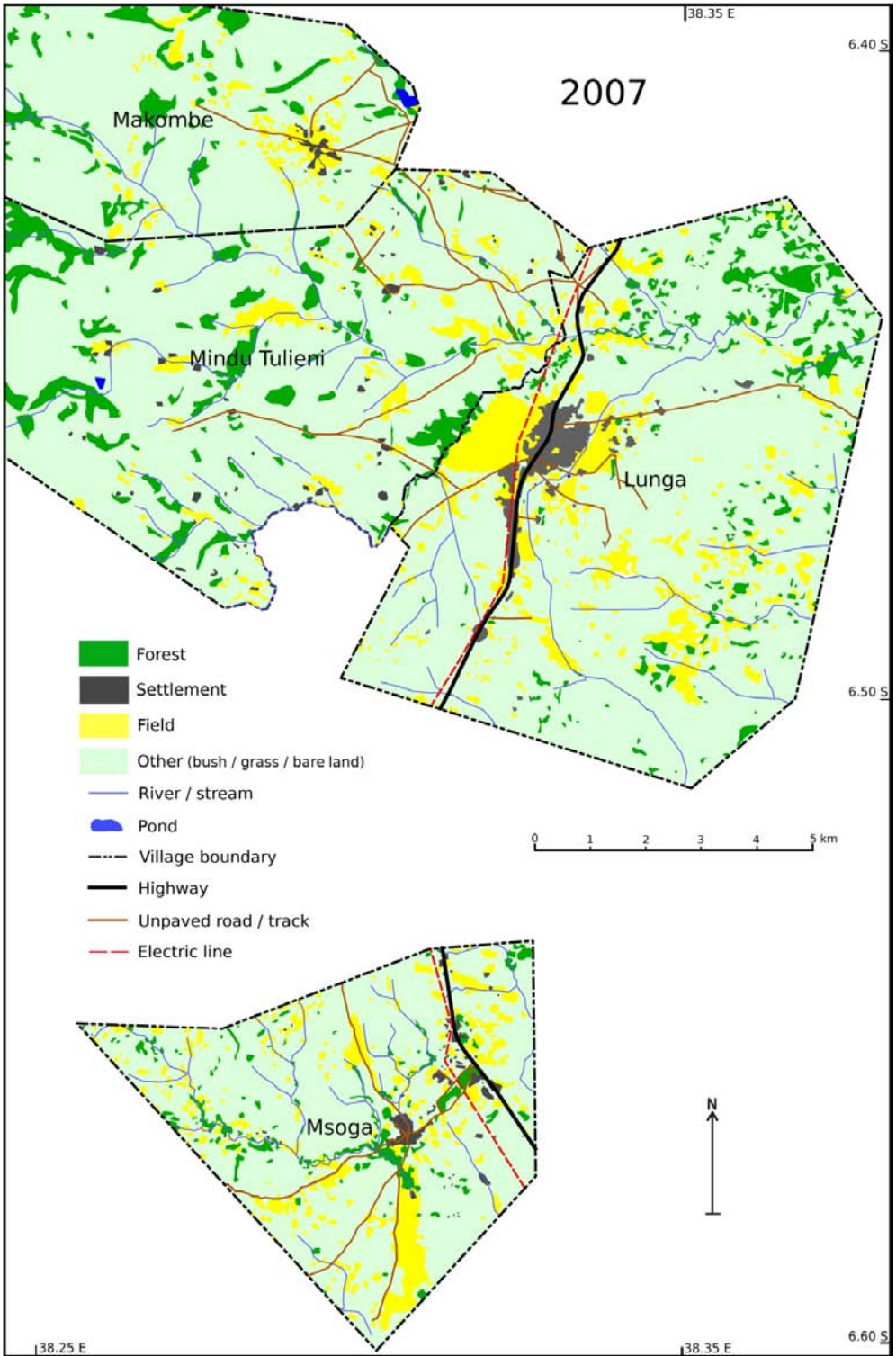


Figure 19. Land use/cover in Lunga, Msoga and eastern parts of Mindu Tuliemi and Makombe villages in 2007.

that were established in-between the houses during *ujamaa* (Sitari 2010b; Sokoni 2010a). Overall, the settlements occupy less than 2% of the total area. They are mostly concentrated around the village centres, except in Mindu Tulieni where the settlement structure has remained highly dispersed due to the need of space for corrals and grazing areas around the houses.

The areas under cultivation have increased by about 65% in total, indicating that the expansion of fields has also lagged behind the population growth. Most of the fields continue to be located within a two kilometre radius from the settlements, but new fields have also been cleared in the more distant parts of the villages and particularly in depressions along or nearby river beds. The streams are seasonal, except for the main channels of Mkombezi that runs through Lunga and Mindu Tulieni, as well as Mbiki that runs through Msoga. Apparently, as also indicated in several interviews, most arable lands in the vicinity of the settlements have already been taken to use in Lunga, Makombe and Msoga (also noted in Sitari 2010b). In the more distant corners of the villages, however, more arable lands could be found for conversion to agriculture, as also indicated by some of the farmers. In Mindu Tulieni the availability of arable land is somewhat better, which has led some farmers from outside to occupy fields in the village.

The analysis confirms that the forest area has diminished vastly in all four study villages. By average, almost four-fifths of the forests disappeared between 1982 and 2007. When nearly 36% of the total land area was forested in 1982, the figure had dropped down to around 8% by 2007. Visual comparison of the images to the aerial photographs taken in the area in 1966 reveals that some forest degradation occurred already during the *ujamaa* period. According to the interviews with the pastoralists, trees were felled particularly in Mindu Tulieni during the 1970s in order to reduce the tse-tse fly infestation. However, the major wave of deforestation has occurred only after 1982. During the recent decades, forest degradation and deforestation have been caused especially by the extensive production of charcoal, collection of firewood for cooking and making bricks, livestock grazing and burning the undergrowth for growing fodder, extension of fields and continued shifting cultivation practices, as well as extracting wood for construction and carpentry (Mhache 2010; Ylhäisi 2010a, 2010b). The remaining relics of natural forests are usually conserved due to their sacred nature for the locals (Ylhäisi 2006). Since 1997, the westernmost part of Bagamoyo district, including portions of Mindu Tulieni and Makombe, has been dedicated as reserved lands for Wami-Mbiki wildlife management areas, where hunting and agricultural activities are not allowed (figure 11) (Ylhäisi 2010a, 2010b).

It appears that fuel wood extraction and particularly charcoal production are by far the most prominent contributors to deforestation, although it was not possible to assess this in quantitative terms. Charcoal is now the most common fuel for cooking in Dar es Salaam and other urban centres, and the study area is within the peri-urban zone that has access to both forest resources and the urban markets; thus the people in the area gain a substantial part of their income from charcoal (Monela et al. 1993; Malimbwi &



Zahabu 2008; Ylhäisi 2010a, 2010b). Legislative efforts to restrict charcoal production have not been successful in bringing the production to a sustainable level and the halting quantity of now largely illegal logging activities (Havnevik 1993: 248; Luoga et al. 2005; Madulu 2005; Malimbwi & Zahabu 2008). Felling cycles from 8 to 15 years are recommended for sustainable charcoal production in the area, provided the use of trees with the minimum size of 10 cm diameter at breast height (Malimbwi et al. 2005). However, sufficient regeneration is obviously not let to take place in the study area.

The 'other' category in table 5, or the light green areas in the maps in figures 18 and 19, includes bush land where the tree height appears not to exceed five meters, as well as grass and bare land. The areas under this category have increased by about 40% from covering about 57% to as much as 80% of the total area between 1982 and 2007. The proportions of bush, grass and bare land were not calculated as it was not possible to distinguish sufficiently the different sub-categories, especially in the aerial photographs. Nevertheless, the visual interpretation of the images and satellite data together with ground-truthing indicate that bush and grass lands now dominate the landscape. These have particularly appeared on locations which were formerly forested, while the expansion of fields seems to explain a much lesser amount of the deforestation. Also bare lands have expanded, especially along the cattle tracks.

## 6. CHANGES IN AGRICULTURAL PRODUCTION

### 6.1 Land tenure and management

Like elsewhere in Tanzania since independence, the majority of land areas in Bagamoyo district are public village lands (Ylhäisi 2010a, 2010b). The farmers hold the right to use the dedicated land areas for housing and cultivation, but they do not legally own these lands. When people were settled in *ujamaa* villages in the 1970s, the village councils allocated them with land for cultivation within the village boundaries. Each family also got a one-acre plot for building a house and establishing a garden (Sitari 2010b). Those who already lived in these villages continued to occupy the lands that belonged to their family's or clan's customary holdings. At first, the availability of arable land was generally not an issue. When the population in the villages increased, or the farmers wanted to expand their existing fields, the village council allocated new areas for the residents. This process was, and still is, free of cost. The council keeps record on the landholdings, but the records do not cover all cultivated lands. New land areas have been and are still being cleared for cultivation, some with and some without the authorization of the council. Farmers have also had the possibility to 'borrow' their excess lands to the use of other villagers, and usually there was no monetary compensation required. On the basis of several interviews during the field work, this system has worked rather well even if there is a lack of written documents that lay the foundation for modern commercial landownership. When land disputes occur, these are dealt with the sub-village leaders who act as mediators, or alternatively with the village council.

Common property also remains as the basis for the management of grazing areas (McCabe et al. 2010; Ylhäisi 2010). The grazing areas in the study villages have not been clearly defined, which means that grazing may take place practically anywhere, usually in the areas where forests have been cleared (Ylhäisi 2010). According to several interviews, this is a continuing source of tension between the pastoralists and the cultivators in regard to the use of limited surface water resources. Another issue between the groups is the practice of taking the cattle on the fields to eat the plant remains immediately after the harvest. According to several cultivators, the cattle severely tread the ground causing loss of vital porosity of the soil. On the other hand, the concentration of most of the pastoralist population in Mindu Tulieni through villagization and the establishment of permanent dwellings in contrast to the previously semi-nomadic life-style have limited the availability and access to common pastures, which inevitably increases the local environmental pressure and contributes to conflicts between different interest groups. Furthermore, the Maasai traditionally consider that they have right to use all suitable lands as grazing areas as they do not acknowledge that land can be 'owned' (Rigby 1980: 45). The land-planning policies have also continued to favour intensive agricultural production and overlook nomadic pastoralism (Havnevik 2010a: 23; Ojalampi 2007; Waters 2007: 192–193). For example, this attitude was directly expressed in a speech that president Kikwete made to the parliament on 30th December 2005:

*“Mr. Speaker, we must modernize animal husbandry. We will have no alternative. We must abandon altogether nomadic pastoralism which makes the whole country pastureland [...] The cattle are bony and the pastoralists are sacks of skeletons. We cannot move forward with this type of pastoralism in the twenty first century.” (translation by Ndaskoi 2009: 6)*

Among the Bantu groups in the area, land rights are traditionally inherited within the matri-clans (Beidelman 1967: 23, 67). Particularly among the Kwere, it is usual that wife and husband cultivate their own plots and control their produce separately, although this is not a rule (Beidelman 1967: 24; Muro 1979: 14). Such practices were also pointed out in some of the farmers’ interviews for the present study. In case of divorce, the wife is often expected to make over her lands to husband, although the matrilineal traditions and access to lands allocated by the village council may also protect the woman’s rights to the holdings (see also Muro 1979: 28; Vuorela 1987: 177–178).

Following the Tanzania Investment Act of 1997, private landholdings have been increasingly allocated to investors in different parts of Tanzania, and Bagamoyo district does not make an exception in this regard (Slegers 2008; Sokoni 2008, 2010a; Havnevik 2010b: 267). Some farmers have also started to lease land use rights to others against money or other assets although they do not have official titles for their holdings. During the recent years, village councils in the study area have also begun to lease land areas to non-residents against payments. The village council can allow the outsider to occupy the land area for up to 99 years, but it cannot grant full ownership to lands. Often the outsiders make deals directly with the farmers without consulting the village councils, as revealed in the key informant interviews and in the group discussion in Msata. Also, if a village resident wants to receive land use rights to larger areas, like over 10 acres, monetary compensation is usually required (Shomvi 2008). Land areas have been leased for larger scale cultivation, cattle keeping, housing, and establishing stone quarries (Simba 2008).

The interviews indicated that there are no clearly defined rules for these commercial transactions within the otherwise customary land tenure system, but it is mostly based on bargaining and negotiation. Many villagers also expressed fears about losing vital parts of the arable village lands to non-resident investors in the future. According to the *Diwani* (Ward Councilor) of Lugoba (2009), at least half a dozen outsiders have bought land areas from the ward for commercial cultivation. The largest area owned by an outsider is nearly 300 acres farm in Mboga village. Furthermore, in Msoga over 200 acres had been allocated for the president’s ranch. Elsewhere in Lugoba ward, particularly in Kinzagu and Saleni, several hundreds of acres had already been leased by the village councils for the stone quarries, of which many are run by foreign companies. According to Ylhäisi (2010a), rights to these lands have been sold with very low prices, and many of these transactions have not been transparent. In a group discussion in December 2010, the village authorities from Lugoba ward claimed that they have also been surpassed in some of these processes, as the district administration has intervened and allowed leasing rights to larger areas than what the village councils had agreed.

According to the 2008–09 survey, around 50% of the arable lands occupied by the respondent households were customary holdings that had been inherited from parents or obtained through marriage (figure 20). About 12% of the lands had been received through allocation by the village council and some 11% had been cleared from bush or forest for cultivation without official allocation. Rights for about 14% of the lands had been given for free from other landholders and about 13% had been rented. Comparing to the survey made in Msata, Lunga and Mboga villages in 1989–90, the means of land acquisition has remained quite similar in the area over the last 20 years. In 1989–90, around 55% of the respondents’ land holdings had been inherited or obtained through marriage, 14% received from other villagers and 8% received through allocation by the village council. About 19% had converted bush or forest to fields. In regard to leasing land areas, there is a notable difference, as only one respondent had rented land in 1989–90. The interviews also indicated that many now considered leasing to be permanent so that the user rights had been transferred for good, albeit this is an unofficial procedure.

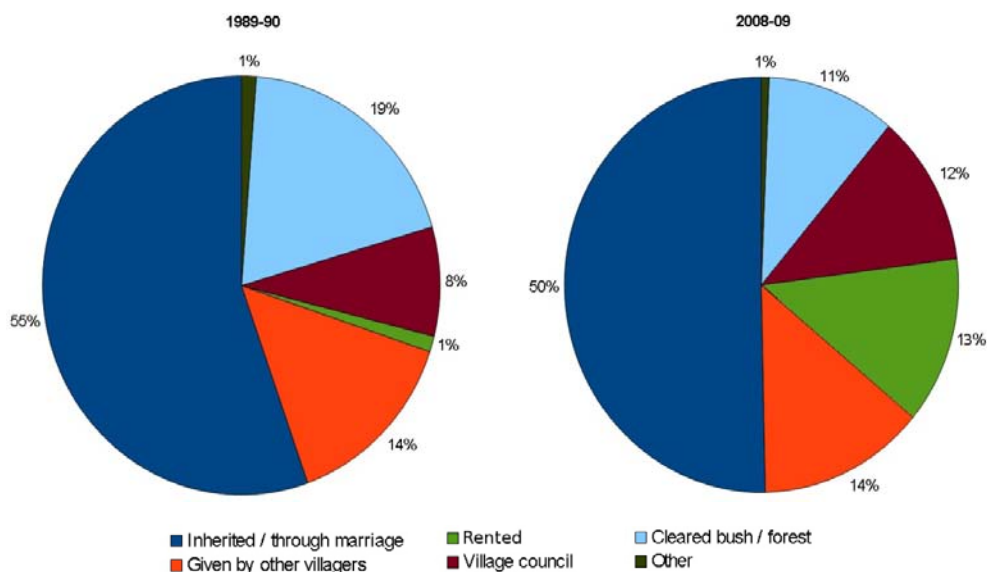


Figure 20. Ways of obtaining arable land in 1989–90 (n=79) and 2008–09 (n=126).

Along with the growing population and decreasing availability of suitable areas for cultivation, the role of land as a commodity is becoming increasingly acknowledged (Sitari 2010b; Sokoni 2010a). Of the study villages, the scarcity is most acute in Lunga, where the density of population per village area is the highest. Also many of those families who lost their traditional holdings during villagization have not been satisfied with the amount of new lands that they have been dedicated. Furthermore, most house yard gardens have been lost, because the villages have predominantly grown through building new houses within the settlement areas. New homes have been commonly built for family members next to their elders’ homes, so there is now much less open space in between the houses (Sitari 2010b). Home gardening has been abandoned especially in Lunga, while in Msoga, Makombe, and Mindu Tulieni some home gardens were still kept in 2009.

Through the implementation of Village Land Act 1999, land use plans have been designed in collaboration of officials and villagers in order to clearly dedicate areas for cultivation, livestock keeping, forestry, and wildlife conservation (McCabe et al. 2010; Ylhäisi 2010a). Such plans have been designed for Makombe and Mindu Tulieni in 2006 and Msoga in 2007, but they have not been realized in a large scale (Halmashauri ya wilaya ya Bagamoyo 2010). Lunga does not have a land use plan, but like those of most of the villages in Bagamoyo district, also the borders of Lunga were demarcated in 2007, paving way for the planning process. The land use plans for Makombe and Mindu Tulieni focus on the conserved areas under the Wami-Mbiki forest, the planning process paid by Danish hunting association. According to Ylhäisi (2010a), the investor thus has an option to lease the land after the plan has been put into effect. The process has been more comprehensive only in Msoga, where the plan includes schemes for housing structure, forest management, water resources, grazing areas and fields. Many of the planned activities had been started by December 2010, including the construction of the dam for leading water for irrigation and cattle. Msoga is also one of the six pilot villages in Bagamoyo district where land register systems are being renewed and a building for land management and archives has been constructed. In the near future, similar land administrative reforms are due to be carried out in other villages in the area as well. The land use planning process would also legitimize the rights of the pastoralists over the grazing areas.

By December 2010, none of the villagers in the district, including farmers in Msoga, had received land titles. According to the interviews, the majority of farmers were aware of the titling process and some had already left their applications several years ago. The general benefit that the farmers considered to have from land titling was the collateral to get loans from official institutions such as governmental micro-credit schemes, private banks, or non-governmental organizations. On the other hand, farmers said that selling land after getting the land title would be possible, but they believed it is a costly and lengthy process which takes several months. Especially the older farmers considered that the existing holdings guaranteed through the village administration or under traditional law were sufficient and official titles were not necessary.

According to Ylhäisi (2010a), the sluggish process with the land use plans relates to the historical roles of the land commissioner and forest officials as authorities to whom the villages are accountable. The district officials may be reluctant to shift their power to the villages. The non-implementation of the plans also means that the open access situation regarding the use of natural resources continues in practical terms, when areas for different land use categories and forest conservation are not defined and the by-laws set by the village authorities for regulating the usage of these areas have not been approved on the district level. Immediately after a seminar held by the project team with policy makers in Dar es Salaam in December 2010, however, a follow-up was made by the Tanzanian National Land Authority. Within a week, the district council announced that the village authorities in 31 out of 82 villages in the district had received an endorsement for the land use plans and the related by-laws (Mkusa 2010).

## 6.2 Cultivation patterns

During the *ujamaa* period, the government policies required all physically fit adults over 18 years in rural villages to participate in collective cultivation on co-operative farms. In the study area, these farms mainly concentrated on growing cotton as a cash crop, as well as maize (Muro 1979: 11; Vuorela 1987: 135). The co-operative farms occupied between 100 to 300 acres in Lunga, Makombe and Msoga, but such farms were not established in Mindu Tulieni. In Diozile in Lugoba ward, Muro (1979: 16) observed that the villagers were generally reluctant in participating in collective farming. The same was confirmed in other villages during the interviews for the present study, although a few also expressed more positive attitudes about these practices. The attendance improved only after the Lugoba ward secretary announced in 1979 that those who refuse from working on the communal farms will be fined or imprisoned. The reasons for the unwillingness included the inflexible schedules that were set for the work by the authorities, which caused interruptions to the management of farming households' individual plots (Vuorela 1987: 135). For example, in a group discussion with elderly farmers in Lunga it was told that when tilling was due to be made with ten people in the co-operative farm, only a few people actually appeared to do the work. However, all ten members expected to share the benefits. There was also lack of demand for the produced crops in the official channels, as the purchasing agents from the NMC and other governmental bodies did not come to buy the output as expected. Instead, the village leadership sold the output locally to the parallel markets.

Another form of mandatory farming in the *ujamaa* villages of the area was block farming, or *bega-kwa-bega* ('shoulder-to-shoulder') system. All able-bodied adults were expected to cultivate at least two acres of food crops, which was supposed to make the village self-sufficient in food. In some villages, such as Lunga, the other acre could also involve cash crops, usually cotton. Participation in the scheme was primarily supervised by the sub-village leaders. The idea was that that the food crops are stored on behalf of the whole village in order to collect buffer reserves for years with poor harvests, but according to the interviews and Muro (1979: 18) such granaries were not established in any of the villages in the study area. The produce were usually stored and consumed by the respective farm owners, which obscured the difference between block farming and cultivation on individual holdings (Muro 1979: 18). The real benefit of the *bega-kwa-bega* system was, as expressed by many interviewees, that the block farms were sometimes tilled by tractors, which was supported by the government. The downside was that this did not happen every year due to lack of functioning tractors in the ward (see also Vuorela 1987: 134–135).

According to the interviews with former village co-operative members, the state-led communal cultivation of fields was finished in the area in the beginning of the 1980s. When the team of Sitari and Sendaro worked in the area during 1989–90, the co-operative and block farms had already been fully abandoned, and all fields became occupied individually by households. People did not want to continue these collective practices, as they were not mandatory any more. The communal fields were distributed

among the households and converted to regular type of fields, where farmers could cultivate crops chosen by their own decision. However, the traditional *kiwili* sessions were said to be organized yet in 2008–09, although they had become very rare events, since wage labour is now much more commonly used by the small-scale farmers as well. Explanations for this were increasing demands for cash and lack of surplus that could be shared with the *kiwili* participants.

Cultivation continues to be an inherent part of the local culture, which is manifested by the fact that all surveyed households were still engaged in cultivation and had at least a portion of land in 2008–09. This was the case even in the semi-urbanized village of Lunga and the pastoralist village of Mindu Tulieni. The clear majority of the agricultural land continued to be occupied by small-scale farmers, as most of the interviewed households, 65%, cultivated less than 4 acres (figure 21). It was common for a family to have a right to use several plots in different areas, the average being 1.7 plots. A minority had holdings outside their home villages, where the lands had been obtained either through family ties or renting. The mean cultivated area per household was 3.8 acres and median 3.0 acres (table 6). Only 8.5% cultivated more than 10 acres, the largest area being 21 acres for one household in Msoga. The the largest mean cultivated area was also in Msoga, where water resources are better than in other study villages. In Mindu Tulieni, the cultivated areas were however surprisingly large (mean 3.6 acres, median 2.3 acres), taking into account that the Maasai have traditionally regarded cultivation as a business of the non-Maasai, while the Maasai should ideally subsist on pastoral products and other such products which do not require breaking the ground, like honey (Hurskainen 1984: 89).

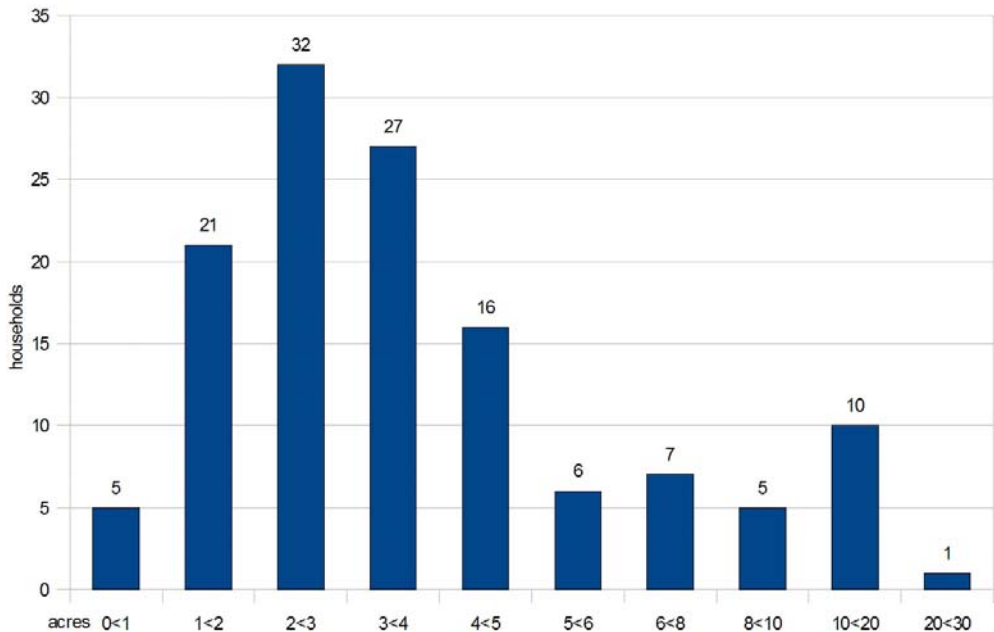


Figure 21. Acres cultivated by surveyed households in 2008–09 (n=130).

Table 6. Cultivated areas (acres) per household in the study villages in 2008–09 (n=130).

Village	Mean	Median
Lunga	3.6	3.0
Makombe	2.9	2.8
Mindu Tulieni	3.6	2.3
Msoga	5.2	3.5
All	3.8	3.0

Comparison of the acreages in table 6 with the amounts of fields digitized in the spatial analysis, and the total numbers of households in these villages, indicates that the survey responses roughly correspond with the spatial analysis for Mindu Tulieni and Msoga. For Lunga and Makombe, the spatial analysis indicates respectively 60% and 40% smaller cultivated areas than what the survey responses do. This may relate to errors in digitizing, as some fields may have left unnoticed. Furthermore, some of the fields in Makombe are located in the western part of the village where spatial data was not available. In Lunga, several respondents told that they also have fields in the neighbouring villages and wards. In addition, the sizes of the holdings are not determined by the farmers or the authorities with exact measures, but estimated by, e.g., footsteps.

Lunga is the only village from which historical data collected by officers is available. This data concerns years 1993–2008, but it shows far too high annual fluctuation, between 2.64 and 7.5 acres per household, in order to be taken seriously. Such differences in cultivated areas during successive years cannot be explained with changes in rainfall pattern or changes in livelihood options. Thus, an attempt was made to compare the survey results from 2008–09 with those of 1989–90, but also here difficulties were encountered. In the 2008–09 survey the respondents were asked what the total area presently cultivated by his or her household is, while in the 1989–90 survey the phrasing went along the lines of “how much do *you yourself* cultivate”. If the responses given in 1989–90 are multiplied by two, assuming that there are two able-bodied adults in the household by average, the results of the data sets seem roughly comparable. With this approach, the mean cultivated area per household would have been around 4.6 acres with median 3.0 acres in 1989–90. In comparison to the figures derived from the 2008–09 survey, this indicates that the mean cultivated areas would have slightly decreased during the last two decades, but the median size has remained the same.

Figure 22 suggests that the share of households cultivating less than 2 acres and also those cultivating from 2 to 4 acres would have increased between 1989–90 to 2008–09, while the share of mid-scale farming households with 4–6 acres would have decreased. This may reflect the increase of non-agricultural sources of livelihood that will be discussed later. The figure also shows that the number of those cultivating over 10 acres would have grown, possibly indicating the small but increasing share of households that have striven to extend their farming activities. However, these findings have to be dealt with



caution as the differences are small in comparison to the sample sizes and the underlying assumptions. In 1989–90, different household members may also have cultivated the same plot. Although many of the Kwere families in the area have traditionally divided fields between the husband and wife, as Muro (1979: 6) has addressed, this is certainly not true for all households. A minority of households—most of these among the Maasai—are polygamous, so that men may have two or more wives, and of course there are households with only one or more than two cultivating adults. It also appeared that usually the husband and wife in the household are responsible for cultivation, while elders and youth, who also participated in the 1989–90 survey, may help in agricultural work. It should also be noted that the 1989–90 survey covered only roadside villages.

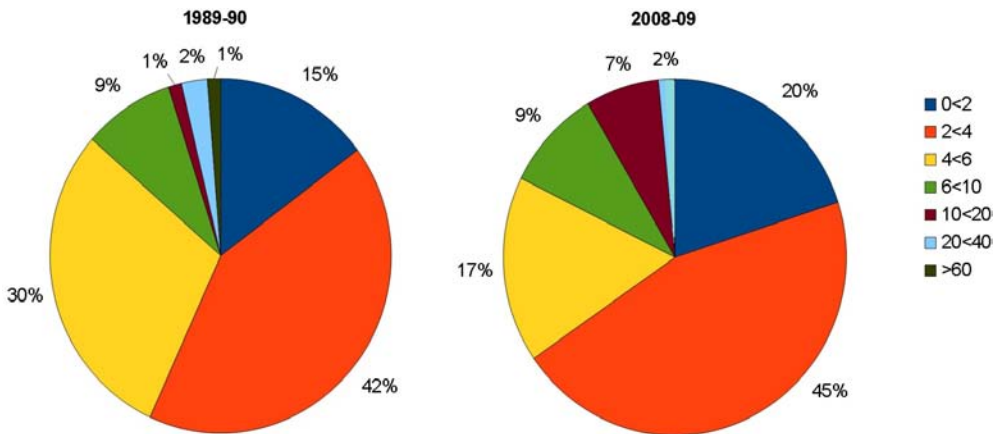


Figure 22. Distribution of household categories according to acres cultivated in 1989–90 (n=81) and 2008–09 (n=130).

Villagization was intended to minimize distances to services and markets through moving the rural population from scattered dwellings to nucleated settlements. However, the process increased the distance between the new homes and productive fields; when villages became larger in size, more people were occupying the surrounding fields and also the block and co-operative farms were located outside the main settlement areas (Kjekshus 1977b; Kikula 1997: 73; Sokoni 2010a). This had an adverse impact on agricultural production through reducing the time available for farming. Also the application of manure on fields decreased when domestic animals were no longer kept in the vicinity of the fields (McCall 1985b; Williams 1999). Sokoni (2010a) has studied the home-to-field distances in western Bagamoyo district in more detail. His study also included Lungu. Sokoni found out that when agricultural land nearby the villages has become exhausted due to continuous cultivation without adequate use of external inputs, farmers have acquired lands from longer distances by purchasing, clearing new fields, or re-occupying areas that have earlier belonged to their family’s customary holdings.

According to the survey made for the present study, the average home-to-field distance is 2.5 km and about half of the households have a mean plot distance less than 2 km from home (figure 23). The majority of people in the area walk to their fields, but it has to be noted that a growing amount of people, albeit usually only men, also use

bicycle. The longest average distance, 3.4 km is in Lunga. Assuming that the walking speed is approximately 5 km per hour, this means 41 minutes per direction, or over 80 minutes walking per day (table 7). Sokoni’s (2010a) survey had a similar question where the informants gave answers in minutes. He found even longer average home-to-field distance for Lunga, 59 minutes per direction. In Makombe and Msoga, however, the distances were almost half of that in Lunga. The shortest average distance is in Mindu Tulieni, which results from the scattered structure of the settlements, where the fields are usually located in the immediate vicinity of the home yards. It can be concluded that the farmers spend a considerable amount of their working day, usually from 45 minutes to two hours, for the transition. As some of the fields are now even outside the village boundaries, it can be assumed that the home-to-field distances have increased during the post-ujamaa period.

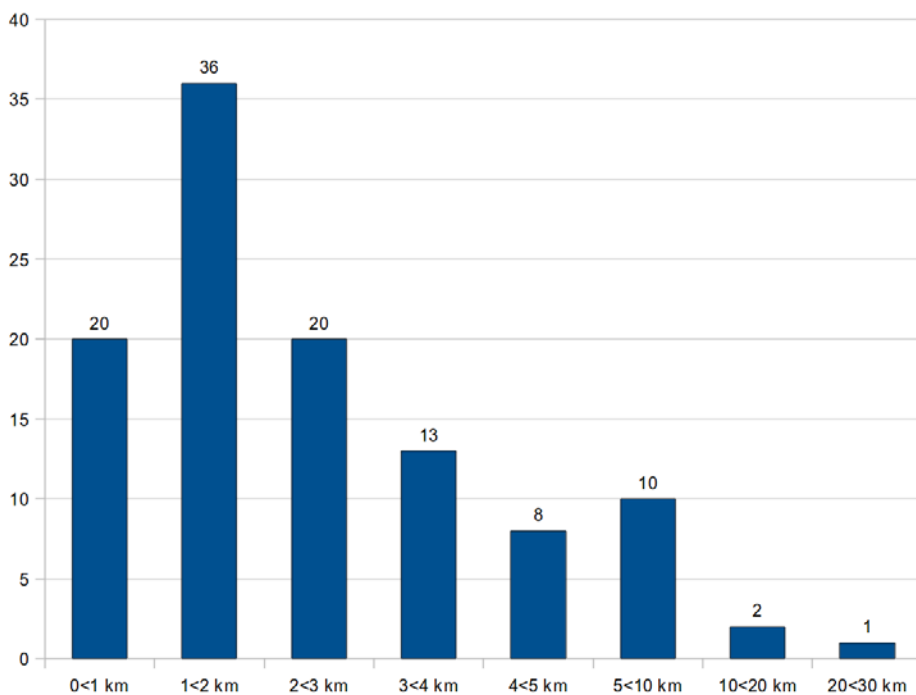


Figure 23. Mean home-to-field distances of respondent households in 2008-09 (n=110).

Table 7. Average home-to-field distance in the study villages (n=108).

Village	Mean (km)	Std. (km)	Median (km)	Mean (min)
Lunga	3.4	4.4	2.5	41
Makombe	1.8	1.0	1.5	22
Mindu Tulieni	0.6	0.6	0.9	7
Msoga	1.9	1.5	1.5	23
All	2.5	3.5	1.8	30

It is also rather common practice to seasonally move to a temporary hut, *kambi*, constructed by the more distant fields at around 3 km or more from the village. This was reported by several farmers in Makombe and a few non-Maasai farmers in Mindu Tulieni, and further discussed by Sokoni (2010a). Usually the farmers reside in *kambis* from April until the time harvest in July, which is the period of high demand of labour in the cropping cycle. A common explanation for this practice was that the fields that are located nearer to the Wami-Mbiki forest reserve area have to be guarded in order to prevent the wild animals, especially elephants and monkeys, from harming the crops. The main problem with the usage of seasonal huts is the lack of fresh water, which has to be collected by bicycles from the taps to which the distance is 4 km or more. Surface water, when available, is also used.

Interviews with the village elders confirmed that the Kwere and most other cultivator groups in the area practised shifting cultivation before villagization. After a few years when soil fertility in one location had decreased, new areas were cleared for fields and the old ones were left to regenerate. Along with the villagization, cultivation practices became more sedentary as the settlements became permanent, availability of land nearby the settlements became scarcer, and the village councils started to control the allocation of new areas for cultivation (see also Sokoni 2010a). As presented in the previous chapter, clearing new areas may have further decreased during the last two decades. After clearing the area, the remaining vegetation is still usually burned (Rugemalira 2008; Simba 2008). Also after harvesting, it is common practice to burn the plant remains on the spot.

Despite the emerging land scarcity for some farmers, however, many still occupy more land than what they currently cultivate. In 2008–09 about 60% of respondent households were rotating their fields. Most of these movements are fallow rotation that takes place within the existing landholdings, which are usually less than double the size of the cultivated area, so the rotation takes place between two or maximum three locations. According to the interviews, the shifting cycle ranges from 1 to 10 years, the average being about 3.5 years, which is also close to the 1989–90 survey results (Sendaro 1992: 164). While the population growth and on-going schemes for land titling may further diminish the possibilities for fallow rotation, also the growing fears of land-grabbing may affect this. The former Veterinary Officer of Lugoba ward expressed his views in this manner:

*“But now it [shifting cultivation] is decreasing, because people are holding land nowadays. So, if you shift from one land, and if you come back, that land will not be yours. (laughs) [...] Actually it is going to stop totally, because [the numbers of] people are increasing, and people are trying to own land for the future. People are serious with the land now. Because even foreigners are coming.” (James Rugemalira 21.10.2008)*

Most of the production by far takes place during the long rains, the *masika* season. The typical cultivation technique involves mixed cropping of maize, millet, or cassava, with beans. Other combinations were also found, involving also different types of vegetables, sesame, or fruits (figures 24 and 25). Although these patterns may appear even chaotic to an outsider, the traditional mixed cropping techniques are well adapted to reduce

evaporation and the risk of pest attacks, which prevent against crop failure (e.g. Richards 1983: 26; Koponen 1991: 194). The extension workers have been promoting for cultivating in straight rows, and many farmers had already adopted this technique especially on maize fields. However, the distance between individual maize plants is surprisingly long on many fields, almost one meter, even when other plants are not grown in the same field. Many interviewees shared a belief that if maize is planted more densely, only one cob per plant will develop, while the longer distance increases the possibility for having two cobs. According to a retired veterinary officer, the practice of mixed cropping has nowadays decreased and more farmers now cultivate only one or two crops in the same field and in neater rows (Shomvi 2008). Cassava is a much-favoured crop due to its stabilizing role for food security (see also Prudencio & Al-Hassan 1994). Since the tubers of a single cassava plant can be harvested at different occasions, part of the yield can be left growing and stored in the ground, which helps bridging seasonal food gaps of the farming households. Vegetables are usually cultivated separately in their own plots. Fruit trees such as mango, papaya and coconut are more often grown on crop fields nearby farmer's homes, and the same applies to banana plants (see also Sokoni 2010a).



Figure 24. Mixed cropping of cassava, beans, sweet potato, banana, and mangoes.



Figure 25. Mixed cropping of maize and sweet potato.

During the *vuli* season of short rains, water is less available and thus plants that require more water such as tomatoes and other vegetables are usually not cultivated. Drought-resistant millets have been traditionally preferred, but they are usually planted during the later stage of *vuli*, and harvested as late as July or August. Other *vuli* crops include maize, cassava, cow peas, and mung beans. Vegetables are usually not cultivated during the *vuli* season. The seasonal calendar exercises showed that cultivation during the short rains has generally decreased after the end of *ujamaa*. Many farmers did not consider cultivation in the *vuli* season worth the effort and investments due to irregularities in rainfall and the poor yields.

## 6.3 Crop production

### 6.3.1 Shortcomings of the official crop data

Official data on cultivation in the study villages is generally lacking or unsteady, and earlier studies do not provide very accurate information either. The 1989–90 survey did not include questions regarding the amounts of yields or acreages under different crops. In Lugoba ward, as elsewhere in the district, production data is due to be collected from farmers by agricultural extension officers together with village authorities. The crop data is compiled on the ward level by the officer responsible, in this case the veterinary officer. He sends the village-wise data to a statistician at the District Agricultural Office (Chiwaligo 2008; Nyamgassa 2009; Remtula 2009).

There are several reasons for the inconsistencies in the official data. It is a laborious task for the extension officers to collect the required information from all farmers living in their work area. The officers are often responsible for several villages, potentially consisting of thousand or more households in total. During the field work, it seemed that part of the households and sometimes entire villages had been left out of the data collection. Mixed cropping makes it difficult and sometimes impossible to determine how many acres are under which crops. As the co-operative system has been dismantled and the state control of the food chain largely transferred to the private agents, the means of data collection have further diminished. The extension officers may now have less contact with the farmers who they are now supposed to monitor, as the government does not generally supply the farmers with subsidized inputs any more (see Chapter 6.6).

It is also worth noting here that the area unit that is used by the farmers and officers on village and ward levels is acre. However, the district level statistics are presented in hectares, which creates confusion. Usually, when informants on different levels spoke about hectares, it turned out that they actually meant acres. More profoundly, there is no tradition for maintaining archives. The whole system of collecting quantified data about production was introduced by the colonialists, and both the officers and the farmers may not consider such data important, particularly in regard to subsistence crops that are not marketed (see also Waters 2007: 226). When asked about crop data concerning the previous years, village level authorities referred to ward level officers, who advised to turn to district officers, who in turn told that the data should be available back at the village offices. An often heard explanation for the state of archiving was the lack of cupboards or computers to store the data. At each of these administrative levels, archives consisted of piles of hand-written papers, where some pieces information could be found, but which remained far too inconsistent or unreliable for drawing any conclusions on the amounts of production. Also, the rotation of agricultural and veterinary officers on different levels was considered a problem; when the officers do not usually hand over their documents to their successors.

During the field work, it appeared that the farmers are basically asked how many acres they cultivate each main crop, but they are not asked to estimate how many kilograms or bags they got for the yield. Nevertheless, the Coast Region Socio-Economic Profile 2007, which is a governmental publication, presents accurate figures on total yields in tons produced in Bagamoyo district. More recent data was also available at the district office. A glimpse on these data sets raises serious concerns on reliability. For example, the annual maize yields would have fluctuated between 9474 tons in 1998–99 to 40470 tons in 2005–06. These differences seem too vast in order to be explained by rainfall or the market situation. Other main crops such as cassava and rice have similarly suspicious fluctuations. Likewise, the figures on the areas under different crops in the district raise equally severe doubts. According to the data, the area under maize cultivation would have increased by over three-fold between 1998–99 and 2002–03, then suddenly dropped down by half in 2003–04, then raised by over 2.7 times in 2004–2005 and again dropped by half in 2006–07 (NBS & Coast Regional Commissioner's Office 2007: tables 3.4, 3.5, 3.6, 3.7; Nyamgassa 2008). This cannot

be explained with sudden changes in farmers' preferences. Similar irrationally high annual variation is found from earlier figures regarding food crop production that were collected from Bagamoyo district office in the late 1970s (Sitari 1983: fig. 8) and 1980s (Sendaro 1992: table 10.2).

The 'secret' of these figures unravels when the number of tons produced was divided by the areas cultivated. In regard to maize, for example, the results showed exactly 500 kg or other even amounts for most of the years. For other crops the results show similarly round and recurrent numbers. When the district agricultural officer was asked for an explanation, he admitted that the official production figures for the district are based on estimations that are made by the officers in Bagamoyo. In other words, these statistics are not founded on a data collected from the farmers on a broader scale, although some sampling may have been used. As presented by Sendaro (1992: 156), and also addressed in a seminar with policy makers and researchers in Dar es Salaam in December 2010, this kind of cursory approach is common in other parts of Tanzania as well. If so, the validity of the national figures on production should be questioned, which is unfortunate in the sense that agricultural monitoring is one of the key components for estimating the state of food security and need for food aid and other interventions across the country.

In regard to the study villages, the figures on cultivated areas that were based on the information collected by agricultural extension officers and VEOs during the *masika* season in 2008 seem somewhat trustworthier than the district level statistics. However, this only counts to Makombe and Msoga, as comprehensive data from Lunga and Mindu Tuliene was lacking. The figures from Makombe and Msoga cover most households in these villages, showing the acreages under maize, cassava, millet, and sesame (table 8). Other crops such as legumes, fruits, and vegetables that were obviously cultivated in the same fields are not included in the data. Any trustworthy figures from the earlier years were unavailable and the officers stated in several interviews that a more systematic data collection had been started only recently.

Table 8. Areas under main crops (% of total cultivated area) in Makombe and Msoga during the *masika* season in 2008 according to information collected by village and ward officers.

Village	Total area cultivated (acres)	Maize		Cassava		Millet		Sesame		Other	
		Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
Makombe	629	407	65	164	26	14	2	44	7	0	0
Msoga	1375	729	53	193	14	138	10	275	20	41	3

### 6.3.2 Changes in crop preferences

According to the interviews with the farmers, there have not been drastic changes in regard to the proportions of food crops cultivated in the area since the end of the *ujamaa* period. This is understandable, as most crops are produced for household consumption and not for sale, and there has not been much change in the usual diet—

where maize porridge, beans, vegetables and cassava have a central role—during the recent decades (see Chapter 9.2). In 2008–09, nearly all respondent households (96%) cultivated maize and about two-thirds cassava (69%) and beans (66%) (figure 26). The clear majority of beans are cow peas, pigeon peas, and mung beans, while some farmers cultivate also small amounts of soya and red kidney beans. One-fourth (25%) of the households cultivate millet. Different types of vegetables (including, e.g., pumpkins, tomatoes, white tomatoes, cabbage, and okra) and greens (like spinach, hare’s lettuce, and amaranth) were cultivated by 21% and sweet potatoes by 6%. According to the interviews, the cultivation of tomatoes and cucumbers has recently become more popular even though it is still rather marginal, mainly due to lack of irrigation. The cultivation of these vegetables was also considered to require expensive pesticides, applying of which cost about TZS 18,000 per acre. Engagement in cash crop cultivation is rather low, when 21% cultivate sesame and only a few households grow sugarcane, cotton, ground nuts, or cashew nuts. Five households in Msoga cultivate also dry land rice. The farmers told that there are plans to further promote rice cultivation in the village after a new dam and irrigation channels start functioning.

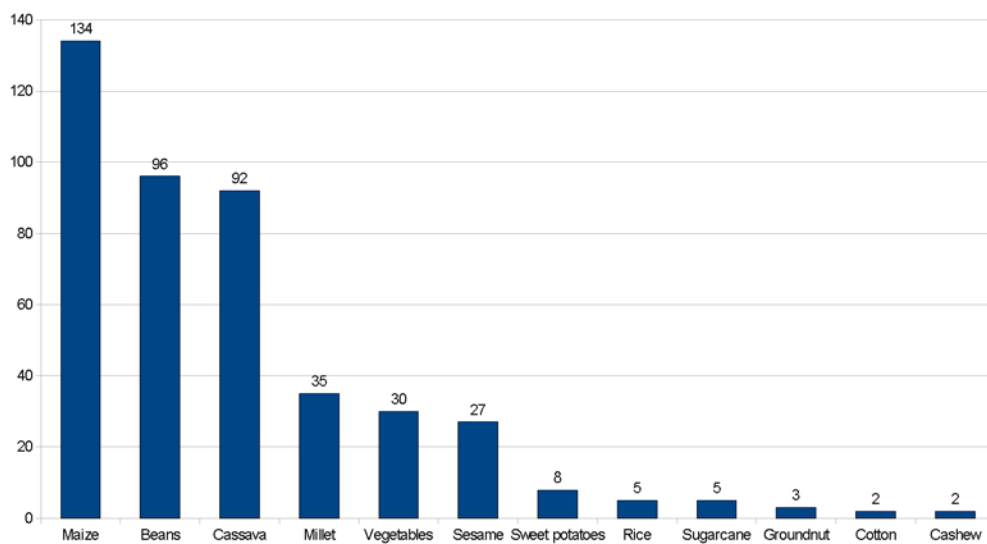


Figure 26. Crops cultivated by respondent households in 2008–09 (n=140).

The majority (62%) also grew fruits in their home yard or on the crop fields. Mangoes were grown by 41%, bananas by 35%, oranges by 32%, papayas by 26%, coconuts by 9%, custard apples by 9% and jack-fruits by 6% of the respondent households. During the harvest time from late November to February, mangoes form a considerable supplement to farmers’ incomes especially in Msoga and also to some extent in Lunga and Makombe. Large mango trees are usually grown on maize fields. Four respondents were also cultivating pineapples. Their pineapple farms were located about 40 km away in Kiwangwa, where the soil is more suitable for pineapples.

Probably the most considerable change in the preferences for food crops is the decrease in millet cultivation. For example, people in Msoga village cultivated equal amounts



of maize and millet in acres in 1976, while in 1983 the village cultivated 110 acres of maize and as much as 314 acres millet (Vuorela 1987: 134). In 2008 however, the area under maize in Msoga, 729 acres, was more than five times larger than that under millet, 138 acres. An often heard explanation for the decrease in millet cultivation is that children are no more scaring the birds away from the fields. Nowadays practically all children go to primary school and most of them complete standard 7 (Second Head Master of Lugoba Secondary School 2009), while the attendance during the colonial period and still in the late 1970s was significantly lower and shorter (Muro 1979: 2,8; Sitari 1983: 79). Furthermore, millet was used earlier both as a staple and for making traditional beer, *pombe*. According to interviews with elderly villagers and Vuorela's (1987: 215) remarks, the usage of millet as a staple had largely vanished already by the time of villagization. Large amounts of *pombe* are still brewed and sold locally to other villagers, which means that millet can now be regarded more as a cash crop. However, now factory-made beers from national and foreign breweries also have entered the markets with prices that are affordable for the better-off people.

In regard to other cash crops, there have been some changes since the mid-1980s. The most significant in the area is the fall in the production of cotton which rapidly started to concentrate in the more productive areas such as Mwanza and Shinyanga regions after the dismantling of co-operative system. The interest of cotton dealers to buy from Bagamoyo district decreased because the quantities produced there were lower than in other areas (Rugemalira 2008). The farmers realized that there were no more markets for their cotton, and people started looking for other options for income generation. By the beginning of the 1990s, cotton cultivation had virtually stopped in the study area. The areas under the co-operative cotton fields in Lunga, Msoga, and Makombe were redistributed to the villagers and converted mainly to food crop cultivation. To date, cotton has not been revived in the area, as only two surveyed households (n=140) were cultivating it in 2008–09.

Cultivation of tobacco and cashew nuts, important sources of income for some families during *ujamaa* (Muro 1979: 10–11; Sitari 1983: 14), has also ended. The only cash crop to become more popular is sesame, especially during the recent years as its market price has risen. Some amounts of other food crops and fruits were also cultivated for sale. In regard to total crop production, however, it seems that a smaller proportion is nowadays sold to the market. Sesame cultivation has not reached the levels that cotton, tobacco and millet had earlier, and farmers also produce less excess of food crops which could be sold, as further discussed in Chapter 7.2.

### *6.3.3 Changes in crop productivity*

As the official data is insufficient, it is difficult to establish how productivity has exactly changed during the post-*ujamaa* period. However, combining official data (i.e., estimates made by the agricultural officers) from several years' time together with the survey results and information in the earlier studies provide means to assess the change at least in rough terms.

In the study area, the farmers do not usually use weights to measure their yields, but nowadays most of them use polythene bags for storing maize after separating it from the cobs and drying it in the sun. One bag contains about 90–100 kg corn that has been separated from the cobs but has not been milled. The number of bags can be thus used for making crude estimations about productivity. Such estimations were only asked from those 73 respondents who were surveyed in 2009, and 59 of these gave an answer. During these already quite lengthy interviews it was not possible to delve deeper into how much, if any, other crops were mixed in the same fields with maize. On average, the respondents said that their household got about three bags, or about 270–300 kg, of maize per one acre from the latest *masika* harvest in 2008. About 27% had received only one bag or less. On the other hand, there were large variations, as around 20% of the respondents had gained five bags or more, the highest amount being 12 bags per acre (figure 27). A clear majority, 104 (74%), of the survey respondents reported an overall decline in the productivity of the main crops since the mid-1980s. Fourteen (10%) respondents did not think there had been a notable change and six (4%) considered that the per-acre yields had increased. 16 (11%) respondents could not answer to the question, usually because they were too young or they had lived in other areas during the 1980s.

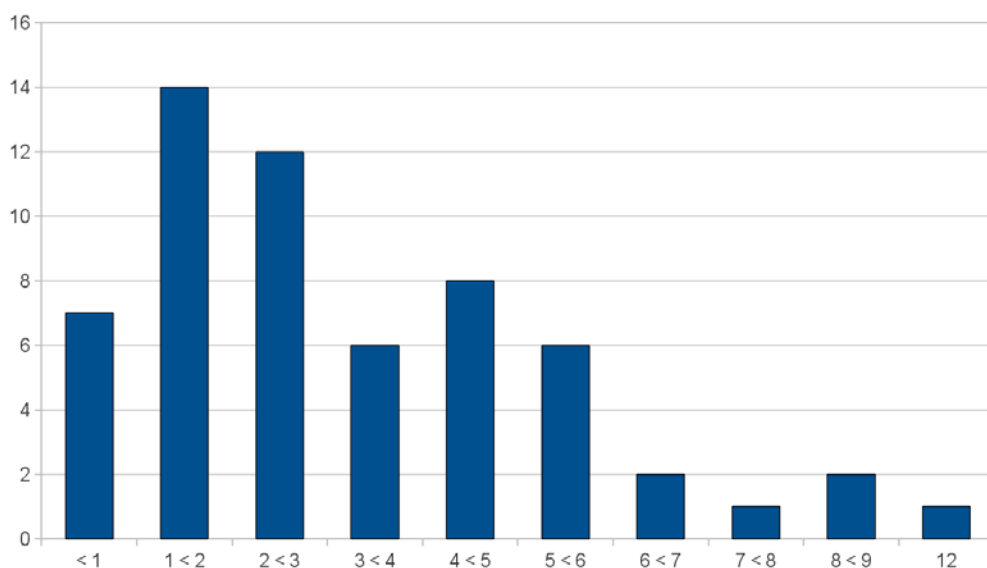


Figure 27. Bags of maize gained by the respondent households (n=59) per one acre from *masika* harvest in 2008. One bag contains about 90–100 kg maize grains.

The respondents claimed that they would have gained on average as much as over eight bags of maize per acre in the mid-1980s. During that time, however, many families still used traditional bamboo granaries instead of the polythene bags, which made estimating earlier yields more difficult. There may also have been a tendency among the respondents to exaggerate the change. However, agricultural officers also reported a decline, albeit somewhat smaller. A retired extension officer, who had worked in Lunga and other parts of the region from 1976 until 2005, estimated that the average yield

in the study area in mid-1980s would have been maximum five bags per acre. Vuorela (1987: 138) writes about the people in Msoga memorizing 'the olden days' when they had to have several food stores in the house due to much larger yields, as opposed to the one store that was generally sufficed for a household in mid-1980s. Sendaro (1992: 151) also observed the decline in productivity. He based this argument partly on the district level figures which are rather inconsistent as discussed before, but also on the decreasing farm sizes since the time of independence, as indicated by the responses to the 1989-90 survey (Sendaro 1992: 156-158).

If average yields for periods 1985-1989 and 2003-2007 are calculated on the basis of the district level data, and these estimations made by the officers are assumed to be at least roughly indicative, the results show that the average per acre yield has dropped by over 30% from about 352 kg to 243 kg. In comparison to the 2008-09 survey data, these figures indicate a similar trend, although they also suggest that the farmers exaggerate the change since the 1980s. Nevertheless, serious decline does seem to have taken place. Another indicator that supports the notion of falling productivity is the number of months in a year during which the subsistence farming households eat maize that they have produced themselves. This aspect is further discussed in Chapter 9.1. While the statistics indicate declining per-acre maize yields in the study area, and more broadly in Tanzania since the late 1980s, the productivity figures show opposite development for the whole Africa and the world (table 9). The yields in Bagamoyo district are also very small, only a bit over half of the average in whole Tanzania, and as much as eight times smaller than the world average. Of course, these differences are partly explained by the mixed cropping techniques in Bagamoyo district.

Table 9. Comparison of maize yields (kg / ha, kg / acre) reported from Bagamoyo district, Tanzania, Africa, and the world (Sendaro 1992: table 10.2; Coast Region Economic Profile 2007: tables 3.4, 3.5, 3.6, 3.7; Bagamoyo District Statistical Officer 2008; FAOSTAT 2011).

Year	Bagamoyo district	Tanzania	Africa	World
2007	834 kg / ha	1180 kg / ha	1701 kg / ha	4969 kg / ha
2006	500 kg / ha	1141 kg / ha	1740 kg / ha	4753 kg / ha
2005	667 kg / ha	1007 kg / ha	1757 kg / ha	4842 kg / ha
2004	500 kg / ha	1466 kg / ha	1737 kg / ha	4945 kg / ha
2003	500 kg / ha	755 kg / ha	1616 kg / ha	4460 kg / ha
<b>Mean per ha 2003-2007</b>	<b>600 kg / ha</b>	<b>1110 kg / ha</b>	<b>1710 kg / ha</b>	<b>4794 kg / ha</b>
<i>Mean per acre 2003-2007</i>	<i>243 kg / acre</i>	<i>449 kg / acre</i>	<i>692 kg / acre</i>	<i>1940 kg / acre</i>
1989	1000 kg / ha	1580 kg / ha	1693 kg / ha	3619 kg / ha
1988	247 kg / ha	1264 kg / ha	1507 kg / ha	3100 kg / ha
1987	1800 kg / ha	1368 kg / ha	1341 kg / ha	3487 kg / ha
1986	800 kg / ha	1160 kg / ha	1449 kg / ha	3628 kg / ha
1985	499 kg / ha	1327 kg / ha	1499 kg / ha	3720 kg / ha
<b>Mean per ha 1985-89</b>	<b>869 kg / ha</b>	<b>1340 kg / ha</b>	<b>1498 kg / ha</b>	<b>3511 kg / ha</b>
<i>Mean per acre 1985-89</i>	<i>352 kg / acre</i>	<i>542 kg / acre</i>	<i>606 kg / acre</i>	<i>1421 kg / acre</i>

Half (50%) of those survey respondents in 2008-09 whose yields had decreased (n=104) reasoned that it was due to poor or untimely rainfall which was often attributed to larger changes in the climate pattern and, although less often, the loss of forests in the area. Another common reason, declining soil fertility, was given by 38 respondents (37%). In addition, ten respondents (10%) considered that the yields had decreased due to poor farming techniques, especially the usage of hand hoe and lack of tractors. Notably, however, only four respondents thought that the non-usage of organic manure or chemical fertilizers had contributed to the loss of productivity. Other reasons, like increase in the numbers of pests and plant diseases, loss of soil porosity due to grazing on the fields, farmers' old age and illnesses in the family, were given by a few respondents. Those few whose yields had increased explained it with increased use of cow dung as manure, as well as more intensive or motivated work on the fields. Generally, there were no significant differences in these answers regarding productivity between the study villages.

In a study on farmers' perceptions of rainfall and drought in Dodoma region in central Tanzania, Slegers (2008) addressed the fact that local farmers consider drought to be the main reason for the loss in productivity, while scientists are more concerned about the role of soil degradation. However, Slegers found that the farmers did not perceive drought (*ukame*) only as shortage of rainfall, erratic rainfall, or no rainfall at all. This term was also used to describe more broadly a situation where production was negatively affected by unfavourable weather conditions such as strong sunshine (*jua kali*) or high temperature. Importantly, by far the most common indicator for drought to the farmers was that the seeds do not germinate or the plants dry up (Slegers 2008: table 4). This implies that the farmers attribute drought to wider contexts than what the scientific definitions do. Thus, the farmers may explain a crop failure broadly as an outcome of *ukame* or *jua kali*. During the field work for the current study it was also observed that some farmers in Lugoba area equalled soil moisture to soil fertility.

#### *6.3.4 Usage of inputs for cultivation*

Table 10 illustrates the stagnation in the usage of agricultural inputs for cultivation based on the survey results in 1989-90 and 2008-09. It seems that the governmental efforts for promoting the 'green revolution' have not had much effect. Generally, there were no significant differences in answers given in regard to changes in productivity between the study villages.

Table 10. Usage of inputs for cultivation by respondent households in 1989–90 (Sendaro 1992: tables 10.5, 10.6) and 2008–09 (n=127).

<b>Input</b>	<b>% who used in 1989–90</b>	<b>% who used in 2008–2009</b>
Hand hoe	100	96
Tractor	12	7
Plough	0	1
Improved seeds	36	58
Chemical fertilizer	22	5
Organic manure	28	27
Pesticide for cultivating	4	7
Pesticide for storing	49	51

Hand hoe is the traditional tool for the cultivator groups in the area (Beidelman 1967: xii) (figure 28). In 2008–09, nearly all respondent households, 96%, continued to till the land with hand hoes. When using a hand hoe, farmers till the topmost layer of the soil from the depth of approximately 15–25 cm. The soil can be tilled deeper with a plough or a tractor. However, very few farmers in the area have experience with the use of an ox to pull a plough. Common explanations included that the majority of farmers do not own cattle, the technique is unknown, or that the oxen are not trained for this.



Figure 28. Long-handled hoe.

The first tractors came to the area in the mid-1970s. During *ujamaa*, there was a government backed system where the tractor tilled the fields under collective production on block fields. Many older respondents in Lunga and Msoga considered that this practice was very beneficial and it also contributed to better yields. However, the tractor services that were provided by the district authorities were unreliable, because the tractor did not always appear on time, if at all (see also Vuorela 1987: 140). The interviewees said that during the 1980s the availability of tractor services declined further. During the 1990s the government provided a new tractor which the farmers could hire. This tractor functioned for a few years. In the 2000s, a few private entrepreneurs have started to offer tractor services. In 2009 there were two tractors in Lunga and one in Msoga, but none in Makombe or Mindu Tulieni.

Not many farmers can afford hiring a tractor; the costs were from TZS 40,000 to 70,000 per acre in 2008–09. Another problem was the timely availability of this service. As all farmers in the area need to till their lands about the same time, the few tractors operating in the area cannot meet the demand, especially if the rains begin early. If the ordered tractor does not arrive, the farmer is in trouble because tilling an acre of land with a hand hoe is laborious and may take even ten days. The need for a tractor to till the lands properly was raised during nearly all interviews with the farmers and officials, and it was almost unanimously felt that the availability of tractors would drastically improve the yields and food security in the area. The common opinion was that the government should provide this service for individual farmers, or alternatively arrange tractors to till larger areas at once like the block fields were operated during the *ujamaa* period. A few also suggested that the service could be paid afterwards once they would have harvested the yield. In December 2010, some of the villages in the area, including Lunga, had received power tillers through the governmental Kilimo kwanza initiative. Renting these was a bit more affordable, about TZS 25,000 to 30,000 per acre, but one power tiller per village was not by far sufficient to meet the needs of the whole community.

The availability of improved seeds, which was quite sporadic during *ujamaa*, has somewhat improved. In the early 1980s, people in Msoga complained about the seeds arriving too late, or that they were of poor quality and did not germinate. The farmers mostly relied on the various types of local seeds, which they either saved from the previous harvest or obtained from other villagers (Vuorela (1987: 135). The results of the survey made in 1989–90 showed that 36% used improved seeds. By 2008–09, the usage had increased up to 58% of the interviewed households. According to the farmers, the most important benefit of using improved maize seeds is that they mature more quickly than the traditional varieties. Many farmers also said that they buy seeds from the market not only because these may bring better yields, but due to the fact that surplus crops that could be used as seeds for the next sowing are rarely harvested. The difficulties with insects and fungi that harm seeds during preservation were also mentioned as a reason for relying on marketed seeds. However, farmers often also recycle the hybrid seeds which potentially contributes to yield losses (see also Moshi et al. 2007: 78).

The improved varieties include mainly maize, sesame, millet, and green leafy vegetables. Some improved cow pea, pigeon pea, tomato and okra varieties are also used. Cassava and different types of fruits are mainly local varieties. The common improved maize seeds are the short Kito and Katumani, and the medium-height Staha varieties, all of which in 2008 cost around TZS 1,500 per kg. Improved seeds are developed and distributed by several companies and institutions. Until the early 1990s, a parastatal called Tanseed had the state monopoly to register, produce and market improved varieties. When the sector was liberalized, several seed companies entered the market. The majority of improved seeds are imported, but also domestic development is being done (Delgado & Minot 2000: 40; Agola 2009). Previously, improved seeds were delivered by the extension officers, but now they are mostly bought from markets in Lunga or Chalinze.

The use of pesticides during cultivation has remained at a low level. In 2008–09, less than one out of ten respondents was using insecticides, herbicides, or fungicides for cultivation. These were applied for pineapples, vegetables, cotton, and very rarely for maize, millet, or cassava. Chemical fertilizers have never been used much in the area, even when subsidized fertilizers were sometimes available during the *ujamaa* period. The former Veterinary Officer of Lugoba Ward, who was in charge of agricultural monitoring in the area, told that when he came in the area in 1984 the government was supplying fertilizers even for free, but the majority of farmers were reluctant to use them (see also Vuorela 1987: 140). According to the survey results, the use of chemical fertilizers has further fallen during the post-*ujamaa* period, from 22% in 1989–90 to 5% in 2008–09. The extension officers confirmed that only few of the richest farmers in the area are willing—and can afford—to use fertilizers. These consist of pineapple cultivators in particular, who have their fields in Kiwangwa area at some 40 kilometres' distance away, but who reside in Lunga.

In 2009, chemical fertilizers were not at all available in Lunga or the nearest town, Chalinze. The nearest places to buy them were in Mlandizi, about 70 km from Lunga, or Dar es Salaam. A 50 kilogram bag of N-P-K, which was said to be sufficient for roughly one acre, cost about TZS 40,000, which accounts for a month's incomes of the majority of working adults. Most farmers did not consider better availability of fertilizers as a top priority. Although many were concerned about the loss of soil degradation, several other interviewees expressed a firm belief that the soil itself is fertile and it does not require external inputs, and the loss of productivity is rather caused by poor rains and climate change in general. Some farmers were also concerned about the health consequences of using the chemicals.

The survey results indicate also that the share of farmers using organic manure has remained at a stagnant level, below 30%. The principal reason to the low usage is that most of the cattle are owned by the pastoralist minority in the area. Not surprisingly, the usage of cow-dung was most common in Mindu Tulieni, where 59% of households applied manure on their fields in 2008–09; the figure was 27% in Lunga, 10% in Makombe and 9% in Msoga. The Maasai keep their cattle overnight in corrals, *bomas*,

which are usually round-shaped enclosures fenced with tree branches and thorny bushes (figure 29). The Maasai change the location of the *boma* in a few years' cycle and plant their crops in the fertile land of the previous *boma*. Several Maasai informants told that they usually give the dung for free to those who ask, because it is abundantly available in the *bomas*. According to the AEOs, they have tried to promote the usage of manure among the cultivators, but the response from the farmers has not been very approving. Common explanations are that the transportation from the *bomas* would be difficult and the collection of cow-dung nearer the non-Maasai settlements is not possible because the cattle graze there freely. Hiring a lorry would be costly and many of the fields are inaccessible by bigger vehicles. On the other hand, those farmers who do use manure often bring it to their fields with bicycles. As in regard to the usage of chemical fertilizers, many farmers believe that the soil is fertile and would not benefit from the usage of manure. The Veterinary Officer of Lugoba ward also pointed this out. Many of the Kwere and other Bantu interviewees indicated that they are not used to applying cow-dung in their fields, since it is not part of their traditional cultivation pattern. A few said that they do not know about the methods and timing for mixing the dung in the soil, or doing that with a hand-hoe would be too difficult. Some also feared that the manure would harm the soil or the crops.



Figure 29. A *boma* in Mindu Tulieni.

Some of the banana growers in Makombe were using and experimenting with organic fertilizing in 2009. These farmers also appeared to be the only ones in the area who used composting. The technique involved planting bananas in a pit where at least 50 litres of manure was poured. This was said to provide much better results than the conventional methods where manure or pits are not used. The technique was said to have been brought here from the Moshi area by a Chagga farmer. Human waste is



not utilized for farming in any of the villages. Mulching was practised by farmers in different villages, mostly on plots where vegetables are grown, but not on the other fields with crops like maize, cassava, millets, or beans.

Based on these observations and interview results, it can be concluded that the majority of farmers bring very little if any external nutrient inputs to their fields. A quantitative analysis of nutrient flows and soil conditions is beyond the scope of this study, but based on observations and farmers' interviews, it can be stated that the rate of nutrient loss is somewhat restrained nevertheless. Farmers do not clear-cut the fields after the harvest, but the crop remains are generally left on the field. Only the cobs of maize and ears of millet are usually harvested, and the same applies to other crops too. The remains of different kinds of crops decompose rather quickly in the tropical environment and thus a large part of the nutrients may remain in the fields. Many farmers, 38% of the respondents, have a practice to burn the crop remains and weeds on the field after the harvest. Mixed cropping of beans with maize also enhances the availability of nitrogen in the soil. Nevertheless, the flow of nutrients in the cropping cycle is apparently not closed. Together with the increasing sedentarization of fields and diminishing rotation, this can severely degrade the nutrient content of the soil. It is very likely that the gradual decrease of soil fertility is more severe than what many farmers believe. This concern was also shared by the agricultural officials working in the ward and district levels.

### *6.3.5 Storage losses*

About half of the interviewed households use insecticides for storing maize and other foods, and that was also the case twenty years ago (table 10). The farmers in the study area used DDT for this purpose until it was banned in agriculture in 1992 (Henry & Kishimba 2003). In 2008–09, the most popularly used insecticides included a mix of pirimiphos-methyl and permethrin. Applying them for one bag of maize cost about TZS 800. Rat poison was also commonly used for preventing storage losses. These chemicals are rather widely available in the local market. Those who do not use pesticides for storing use the traditional method of burning leaves under the crops. The smoke kills and drives away the pests. This can be done under a granary, which is constructed on poles at around one meter height from the ground and it can store maize up to ten months (figure 30) (see also Coulter & Golob 1992). However, few families have such granaries, which some interviewees explained by the fear of thieves. Most farmers store their maize and other crops near the ceiling inside their houses, so that the smoke generated during cooking kills the pests. Nowadays it is also common to put the maize in polythene bags after smoking. Beans are usually stored in pots or glass containers. Cassava cannot be stored as it gets spoiled in a few days after harvesting. As cassava is a perennial, the tubers can be kept in the ground instead and harvested when required without rooting out the whole plant.



Figure 30. A food granary in Msoga.

Among the surveyed households the food storage losses were estimated to be about 5% or less, which corresponds with the conclusion by Coulter & Golob (1992) that on-farm storage losses for local or locally improved maize varieties in East Africa are generally quite low. There were no significant differences between households using traditional storage methods and those using pesticides. Nearly all farmers considered that their losses are minimal and do not pose a risk for their food security or livelihood. Small amounts of fungus in the maize were not considered a problem if they do not spoil the taste of the maize porridge, *ugali*. If some of the crops were considered inedible by humans the spoiled part were usually fed to chickens. There were a few households who had occasionally had more substantial losses, but none said to have ever lost more than half of their yields due to pests.

## 6.4 Grazing patterns

Despite their move to permanent settlements, many of the pastoralists in the area follow annual cycles in the use of grazing areas. These movements are essentially connected with the availability of water and grasses suitable as cattle feed. The seasonal calendar exercises and interviews revealed that during the dry season, which lasts from June or July to September or October, most of the cattle in the study area are taken to the banks of the Wami River, some 20–25 km north from Mindu Tulieni. This practice has been common in the area since villagization. The downside of the Wami area is that it is infested by tse-tse flies and thus the cattle has to be taken back to Lugoba immediately when the *vuli* rains start. Since more people have migrated into the Wami

basin and the population pressure has increased, there have also been conflicts between different interest groups over water use have occurred (Madulu 2005). Goats and sheep are not taken to the Wami river; they are usually kept grazing inside Lugoba ward throughout the year. As the grazing areas in Lugoba ward provide animal feed rather well during the rainier months, some pastoralists from villages outside the ward also reside in Mindu Tulieni and elsewhere in the ward with their cattle between October and June.

While not grazing at the banks of the Wami, the cattle are taken to drink and bathe in the ponds and streams in Mindu Tulieni and the surrounding areas. There are two large ponds getting their water from surface flow and streams during the rainy seasons. The older pond is shared with Mindu Tulieni, Makombe and Kinzagu (figure 31). A new pond was constructed in the western part of Mindu Tulieni in co-operation of the state and the villagers in 2007. According to several pastoralists, it has provided significant benefits. Many of them can now spend less time grazing their cattle by the Wami River, since more water is available in Lugoba throughout the year. The newly constructed water posts for the cattle in Msoga are also expected to relieve some of the tensions between the pastoralists and the cultivators, who were earlier depending partly from the same water resources. Overall, however, nearly all pastoralists complained that the amount of rainfall would have decreased during the last decades, negatively affecting the availability of fodder and causing water scarcity. Like some of the cultivators, the pastoralists connected the alleged decrease in the rainfall to deforestation in the area.



Figure 31. Cattle at a pond in Mindu Tulieni in October 2008.

## 6.5 Livestock holdings

Official statistics on livestock in the study area have similar shortcomings as those regarding cultivation. Ambiguities in the data were already noticed by Hurskainen (1984: 87), and a closer look at the more recent data does not imply that the situation would have significantly improved. It is difficult to track all households who have livestock when the animals are grazing across the village and ward boundaries according to wherever good pastures and water are available. Furthermore, the interviews showed that the Maasai are often unwilling to reveal exact number of their holdings to the outsiders, which is understandable in the sense that the livestock traditionally equals to their wealth. Thus, the figures on livestock holdings that are presented here have to be dealt with some caution and rather taken as indicative rather than absolute.

Table 11 presents the official numbers of livestock in Lugoba ward in 1973–2008. Hurskainen (1984: 88) and Mustafa (1989: 113) estimate that the drop in the numbers of cattle between 1973 and 1978 is linked to the spread of tse-tse epidemics and drought in 1974–75, but is also due to de-stocking in the livestock markets. Unfortunately, any data from 1980s or 1990s was not available in village, ward, or district offices, and issues regarding livestock keeping were not included in the 1989–90 questionnaire either. In 2009, even the most basic archiving facilities such as proper folders and shelves were lacking at the veterinary office of Lugoba ward.

Table 11. Livestock holdings in Lugoba ward in 1973–2008 (Hurskainen 1984: table 6; Mustafa 1989:113; Veterinary Officer of Lugoba ward 2008).

Livestock	1973	1978	2008
Cattle	16,321	9,508	15,354
Goats	1,476	984	12,089
Sheep	1,086	667	8,525

The interviews and the survey results support the notion that, despite the rapid growth of human population, the number of cattle in the area has remained more or less stagnant since the 1970s. Furthermore, the numbers for 1973 and 1978 did not involve the holdings by the non-Maasai, as those for 2008 did. On the other hand, the number of goats and sheep seems to have increased as much as by ten-fold since the 1970s. One explanation is that buying new cows or bulls is very costly in comparison to buying goats. An adult bovine of local breed at the Lunga market cost around TZS 150,000 to 300,000 and beyond, depending on its size and sex. Foreign breeds cost as much as TZS 300,000 to 600,000 per head. The prices of goats and sheep varied from TZS 28,000 to 60,000 per head. Another explanation given by interviewees was that goats and sheep are preferred because they are not affected by East Coast Fever (ECF, theileriosis), the most lethal cattle disease during the recent decades. In addition, the prices of goat and sheep meat can be even higher than that of beef (see Chapter 7.4).

The majority of cattle in the area belong to an indigenous short horn breed of East African Zebu. The interviewees considered it to be well adapted to the local climatic conditions and quite resistant to diseases, but slow in growing up. A small number of foreign breeds have also been introduced in the area, including European breeds such as Friesian, Ayshire, and Jersey for milk production, as well as Kenyan Boran for beef production. Similarly, the majority of goats, sheep, and chickens are local indigenous breeds. Some heads of foreign Saanen, Toggenburg, and Anglo-Nubian goat breeds, as well as Blackhead Persian sheep breeds, have been introduced in the area.

The 2008–09 survey indicates that very few of the cultivators in the area owned any livestock except poultry. The Maasai own by far the most cattle, goats, and sheep. Among the respondents, only six households in Lunga and none in Makombe or Msoga had cows, while in Mindu Tulieni 25 out of 29 (86%) of respondent households had cows (table 12). The same pattern applies to goats. While nine households in Lunga and none in Makombe or Msoga had goats, about half of the households in Mindu Tulieni had them. Similar differences between the villages are also shown in the statistics collected by the veterinary officer (Chiwaligo 2009). The majority of households in the study villages keep chickens, but their numbers are generally quite small, the mean being 12.5 heads per chicken-owning household with the median value of 7. This corresponds quite well with the figure given by the ward office in October 2008, according to which there were about 26,000 chickens in the area, or by average 7.8 chickens per *each* household. Chickens cost TZS 2,000 to 10,000 per head, which is quite affordable for many. Chickens are usually kept free in the house yard, since there are no hen-houses in these villages. Many interviewees said that chicken's reproduction is well taken care of, meaning that eggs are quite rarely eaten. A few farmers also had ducks and pigs.

Table 12. Number of respondent households that owned livestock in 2008–09.

	All study villages (n=140)		Lunga (n=66)		Makombe (n=20)		Mindu Tulieni (n=29)		Msoga (n=25)	
	#	%	#	%	#	%	#	%	#	%
Has cattle	31	22	6	9	0	0	25	86	0	0
Has goats	24	17	9	14	0	0	15	52	0	0
Has sheep	5	4	0	0	0	0	5	17	0	0
Has pigs	3	2	3	5	0	0	0	0	0	0
Has chickens	97	70	36	55	17	85	21	72	23	92
Has ducks	11	8	6	9	0	0	0	0	5	20

Even among the Maasai, ownership structure of livestock is skewed. Among those households having animals, the mean holdings were less than 25 heads for cattle, goats, or sheep in 2008–09, but the standard deviation values were rather high (table 13). For example, the richest family in Mindu Tulieni had 570 heads of cattle in 2009, while 20.5% of the households had no cattle and 13.3% did not have any livestock except a few chickens (Chiwaligo 2009). On the other hand, many of the families without livestock are non-Maasai cultivators, a minority in Mindu Tulieni. Some comparison can also be made between the situation in the village in 1977 and that of 2009, based

on the data collected by Mustafa (1989: 111, table 3) and the veterinary officer of Lugoba in 2009. However, it has to be noted that Mustafa's sample was small, covering only 23 pastoralist households, which implies that the figures regarding the situation in 1977 have to be dealt with caution. The division of cattle owners to three groups shows that the total share of cattle owned by the richest households—having more than 100 heads of cattle—has remained rather high at 44%. However, the holdings in this group are likely to have decreased as well. When the richest the richest cattle owner in the Lugoba area had almost 3,000 heads of cattle in 1976, the richest owner had only 570 heads in 2009 (Hurskainen 2004: 76; Chiwaligo 2009). According to the data, the share of households in the poorest group with less than 50 heads of cattle appears to have increased, while those in the middle group with 50–100 heads and rich group with over 100 heads have decreased (table 14). This reflects the overall decline in cattle holdings in the area. In Mindu Tulieni, the cattle holdings dropped from about 93 heads per household in 1977 to as low as 30 heads in 2009 (Mustafa 1989: 111; Chiwaligo 2009). However, the change has likely not have been as big as these figures suggest, because the mean size of a household in Mindu Tulieni was 11.4 persons in the sample from 1977, and only 7.4 according to a village census in 2006 (Lugoba Ward Office 2008; Mustafa 1989: 111). This is probably related to different definitions for a Maasai household, as it appears on basis of the interviews that polygamy was more common in the past.<sup>5</sup>

Table 13. Average livestock holdings of respondent households in 2008–09.

Livestock	Mean	Std.	Median
Cattle	23	32	12
Goats	23	40	10
Sheep	21	18	12

Table 14. Distribution of cattle among the Parakuyo Maasai households in Mindu Tulieni village in 1977 (n=23) and 2009 (n=166) (Mustafa 1989: 111, table 3; Lugoba Veterinary Officer 2009).

Category	Rich group > 100 cattle	Middle group 50–100 cattle	Poor group < 50 cattle
1977: % of households	26	22	52
1977: % of cattle	62	20	18
2009: % of households	7	11	83
2009: % of cattle	44	25	31

<sup>5</sup> The house, enkaji, consisting of a wife and her children is the smallest unit in the Maasai society. The next social unit, enkishomi, which is formed by a man, his wives and dependants, is responsible for the livestock. In the past, it was also more common that several enkishomis lived together and formed a unit called engang (Hurskainen 1984: 153–154; McCabe et al. 2010).

According to Beidelman (1967: 66) and Muro (1979: 7), the cultivators in the area kept a greater number of domestic animals in the past. During the colonial period, the stocks were affected especially by rinderpest, the spread of tse-tse flies and trypanosomiasis, as well as ECF (Mustafa 1989: 27–50). ECF reportedly killed nearly all cattle during the famine in 1933–1934 and the outbreaks continued until the 1940s (Giblin 1990). Elderly people in Makombe told that the cultivators did not revive their livestock holdings after these events due to lack of money to buy new animals, fear of losing more animals due to diseases, as well as fear of thieves and conflicts with the Maasai who had now moved to the area. Some interviewees also believed that there would not be enough time and labour force to take care of cultivation, if more emphasis should be given to the livestock keeping, as the example of the Maasai was considered to show.

During the recent decades, ECF has continued to be the most lethal cattle disease in the area. The colonial administration built cattle dips where the cattle were treated with tick-killing acaricides, and the practice continued during the independence. Dipping seemed to effectively prevent ECF from spreading. However, many pastoralists did not follow instructions for regular dipping, or they could not afford to pay the dipping fees. The dipping treatments declined by the end of 1960s and ECF started to become more common again. The situation turned severe by the beginning of the 1980s when the government could no longer provide support for maintaining the dips. The scarcity and high prices of acaricides and trypanicides also led to diluting them for the black market and thus the deaths of the cattle started to increase (Giblin 1990). For example, the richest cattle-keeper in Lugoba ward lost about 2500 heads of cattle to diseases between 1976 and 1980 (Hurskainen 2004: 76). The situation was further worsened by the increasing human population and scarcity of grazing lands, so that the pastoralists could no longer avoid areas that they acknowledged as dangerous in regard to tick infestations (Giblin 1990).

According to the interviewed pastoralists, sellers of veterinary medicine, and livestock officers, other common livestock diseases include pneumonia and intestinal worms, as well as tick-borne diseases like anaplasmosis, heartwater, and red water. Bovine tuberculosis and especially bovine brucellosis are also rather common in the area (Weinhaupl et al. 2000). Animal trypanosomiasis is less common nowadays, because the tse-tse flies have decreased along with forest degradation. However, tse-tse flies continue to pose a significant threat in more forested grazing areas further to west from Lugoba and in the north at the banks of the Wami River. Common diseases among goats and sheep are intestinal worms, foot-and-mouth disease, and lung infections. In 2010, a great number of goats and sheep was also said to have died due to lack of suitable grasses. Chickens suffer especially from Newcastle virus, diarrhoea, and intestinal worms, but only few respondents complained considerable losses of chickens due to diseases.

Against this background, it is no wonder that all pastoralists interviewed in 2008–09 reported considerable losses of cattle. Many had lost as much as half of their stocks since the mid-1980s, even though it was difficult to get exact information on the household-

level losses through the interviews. Agricultural officers estimated that several thousands of cattle had died due to ECF alone in Lugoba ward since 2000. The lethality of ECF was reported being nearly 100% without a treatment. Some of the pastoralists told that they may still sell or eat the meat of an animal that has died due to ECF, but the price is considerably lower and the meat has to be dried before preparation. There were still no functioning cattle dips in the ward, but those who could afford sprayed their cattle with acaricide against the ticks. Some also took their cattle to the neighbouring wards for the dipping.

## **6.6 Extension services and monitoring**

Although the distribution of agricultural inputs and outputs has been almost completely transferred from the local officials to the private sector along with liberalization and subsidy cuts, the governmental extension services continue to be provided at the local level (Due et al. 1997; Sokoni 2008). Presently, the emphasis is on providing free information and education to the farmers on crops and livestock, as well as monitoring the production. In 2009, there was one agricultural officer working for Lunga and one for Msoga, but none for Makombe. Both officers were women. Since the late 1980s, the Ministry of Agriculture has put more emphasis on recruiting female officers, having recognized that women are often responsible for more of the agricultural labour than men and may prefer advice from female extension workers due to cultural reasons (Due et al. 1997). The agricultural officers are supervised by the Lugoba ward veterinary officer who also gives advice for cultivation, but mostly concentrates on the needs of the livestock keepers in the ward.

Thematic and questionnaire interviews show that extension services are underutilized by both cultivators and pastoralists. Only 23 out of 73 (32%) survey respondents said that they had been in contact with the extension officers. There were no significant differences between female and male respondents in this regard. The situation was worst in Makombe where only two out of twenty had discussed with the officers. The most common advice that the cultivators had received concerned seeds; what kind of seeds to select and buy, how seeds need to be prepared, when to sow the seeds, at what distance the seeds need to be sown, and how to sow them in straight lines. Many had also received instructions regarding pest management and pesticides. Advice for using fertilizers and manure was mentioned by few. Livestock keepers had mostly received help in regard to vaccinating and treating diseases. The officers had discussed these issues with the cultivators and pastoralists through individual and group meetings. A few farmers had also received small amounts of free inputs including agro-chemicals, seeds, and veterinary medicines.

The extension officers complained the lack of adequate resources for the work. The officers pay all their travelling costs from their own salary, which limits the frequency of visiting the more remote areas and villages such as Makombe. Only the veterinary officer has a motorbike, others go by foot or use small buses. The officers also expressed frustration towards the interest and economical capabilities of the majority of farmers



to modernize their production. On the other hand, some farmers claimed that the officers are mainly interested in serving the needs of the few large-scale farmers who can afford the modern inputs. Contrary to these claims, however, the survey results do not indicate significant bias of extension services towards those having larger amounts of land or livestock. Some expressed also scepticism towards the modern methods that the officers promote and told that they rather rely on the traditional knowledge that they gain from the elders and neighbours. Still, many of those who had been in contact with the extension workers told that they had received good advice, helping them to gain better yields and cure or prevent livestock diseases.

## 7. CHANGES IN FOOD DISTRIBUTION

### 7.1 Rise and fall of co-operatives in Lugoba ward

Elderly interviewees told that the first co-operative in Lugoba ward was established in Lunga already before *ujamaa* in 1965. It functioned until 1969, when it was charged with misuse of funds. The co-operative had bought produce from the members on credit, and the farmers claimed that they did not receive their payments. A new farmers' co-operative was established, eventually facing similar problems. After villagization in 1978, it was replaced by the village primary society. Primary societies were also started in Makombe and Msoga. In Mindu Tulieni, the primary society delivered inputs for livestock keepers, but the trade of animal products and crops was kept outside the state control. For the local consumers, there was also a co-operative shop in Lunga and a regional trading company traded maize in Chalinze (see also Vuorela 1987: 217).

The primary societies in Lugoba ward traded the staple crops with the National Milling Corporation (NMC) and the cotton with Tanzania Cotton Authority (TCA). Sesame and cashew nuts were also sold through General Agricultural Products Export Corporation (GAPEX) and Cashewnut Authority of Tanzania (CATA) (Muro 1979: 17). As the primary societies were prohibited from buying on credit, the government allocated loans to the primary societies, so that these could buy the crops from the farmers and make the payments instantly. The NMC was also due to make the payments in advance to the societies (Bryceson 1993: 70). Nevertheless, several interviewees said that purchases from the farmers were sporadic and payments often delayed. Contrary to the initial purpose of collective cultivation, the profits were generally not invested in developing the village infrastructure, but distributed among the men and women who worked on the farms. Many interviewees also reported misappropriation of funds in the village administration (see also Muro 1979: 11–12). Furthermore, transportation from the remote villages was difficult and the costs had to be covered by the villagers (Muro 1979: 16). The ward level body that dealt with the co-operative marketing was also accused for misuse of funds and lack of auditing. Above all, the co-operative development was greatly hampered by the lack of education that the primary society officers had in regard to accounting and planning, as stated by the former veterinary officer of Lugoba ward (Shomvi 2008).

As discussed earlier, the primary societies were set to control all distribution of food and cash crops in and out of the villages, but in practice a considerable part of the trade in Lugoba ward went through the parallel markets (see also Muro 1979: 11; Vuorela 1987: 218). Usually there were middle-men dealing between the village level and the unofficial markets in Dar es Salaam. Farmers also continued to trade and exchange their produce directly with other villagers in the area. In addition to the administrative problems in the official system there were also practical reasons to preferring the alternative channels. More remote villages such as Makombe were under the primary society of Lugoba, and the farmers in Makombe were expected to bring their produce to Lunga, which was laborious without transport facilities. However, according to

several respondents, the trade of cotton, maize and millet was mostly conducted under the official system, and black markets of these items were not of major importance in the area.

Along with the changing government policies and the general lack of support from many of the villagers, the role of the co-operative system started decreasing in the area in the beginning of 1980s. According to the interviews, practically all food crops in Lugoba ward were sold through the private agents by the end of the decade. The state control at the village level was largely replaced by the increasing number of middle-men who channelled the farmers' produce to the market and dealt between private mills, wholesalers, and retail sellers. The TCA, which had controlled cotton trade, ceased to exist in 1988, after which the cotton production rapidly collapsed (Rugemalira 2008). Former co-operative members told that the primary societies phased out completely by 1994. The interviews and group discussions indicate that the people in the area generally welcomed this change towards the liberalized trading environment. On the other hand, there were also many respondents who considered that state control, despite its several weaknesses, was better than the present trading environment, particularly concerning the guaranteed markets for the crops.

After the dismantling of the governmental distribution system an independent milk producers' co-operative, Enaboishu, was started by cattle-owners of Lugoba ward in 1994. This initiative was supported by an NGO, the Austro-Project Association, but the ownership was in the hands of the pastoralists. The majority of Enaboishu's 76 members were Maasai and it was dealing with a substantial share of the milk produced in the area. The co-operative also established the first milk collection unit with a cooler tank in Lunga in 1996 (Weinhäupl et al. 2000). Most of the milk was sold to a company called Royal Dairy Company in Dar es Salaam, and a smaller part was sold locally. The cattle-owners were paid on a weekly basis. Many respondents thought that it was a well developed system, which functioned appropriately at first. However, later on misuses came about, and some of the producers were left without their payments. The disputed co-operative had stopped functioning by 2006.

When the field work was conducted, there were no co-operatives or farmers' associations functioning in Lugoba ward, and all trading was channelled through the private agents. Three milk collection units with refrigeration facilities were now operational in Lunga, but these were all run by companies based in Dar es Salaam. Some of the milk producers complained that they sometimes receive the payments with a delay, up to ten days after delivering the milk to the centre. Also the middle-men, who usually come from Chalinze or Dar es Salaam, collect milk directly from the cattle-keepers. They take a substantial margin of the producer price, but the benefit for the producer is that the payment is usually received instantly and the middle-men take care of bringing the milk to the cooling units. Many of the milk producers considered that the current procedures were not secure and the profits were low due to overproduction. There were also plans to revive the milk co-operative with a better approach.

## 7.2 Agricultural sales

Nearly two-thirds (64%) of the households who were interviewed regarding their agricultural sales had sold some of their agricultural output during the last 12 months (n=74). The most common crops that were sold included sesame (30%), cassava (14%), beans (11%), maize (9%), millet (7%), and mangoes (7%). With the exception of sesame, mangoes, milk, and meat, which are mostly produced for sale, a lesser share of the other produce was usually sold. Most food crops were kept for the households' own consumption, as the households produced little surplus, if any. The Veterinary Officer of Lugoba ward and the AEO of Lunga estimated that the farmers in the area sell approximately one quarter of their total harvest, but the survey responses indicate that the proportion could be even smaller. Of course, this proportion varies annually depending upon the market prices and how the yields have succeeded. Some farmers also said that they sell food crops despite not gaining any surplus if they are in need of money, lack storage facilities, or prefer to buy other food items such as rice.

In the households cultivating sesame, the areas under this crop were generally small, from 0.5 to 3 acres, the mean being about one acre. However, due to the rising prices, some of the farmers were planning to expand their sesame fields in the near future. Sesame is harvested in July after which the farmers usually sell the whole amount to the traders at the market in Lunga or Chalinze. A successful harvest was said to yield about 200-300 kg per acre. In 2009, the producer price of sesame reached TZS 1,400, which means that the sesame producers could gain about TZS 280,000-420,000 from one acre, or accounting some 13-19% of the average household incomes annually (see Chapter 8.5).

Those owning several mango trees also made considerable profits, which could be particularly helpful as the mango season starts in December when many families have already consumed their subsistence food stocks. In regard to the other crops, there were only a few respondents who reported that they had recently sold more than half of the yield. The total incomes generated from the agricultural sales were not specifically asked in the questionnaire, but on the basis of the information presented in this study it can be concluded that these clearly form a minority of the average household incomes, with the exception of the pastoralists who sold most of their milk and meat and were less engaged in non-farm work.

The survey respondents were also asked to estimate whether their household's total agricultural sales have changed since the mid-1980s. More than half, 57%, said that their sales had generally decreased, while 27% indicated an increase and 16% figured there had not been a notable change. Most interviewees felt that it is easy to sell their produce nowadays, with the exception of selling milk (see Chapter 7.4), but the producer prices for food were considered too low, especially during the harvest time when the competition is fiercest. Some also complained the lack of uniformity regarding the weighs used by the traders and middle-men.

After liberalization, the middle-men have gained an influential role in the marketing chain. The margins that they take are high, usually ranging between from 20% up to 50%. However, especially in more remote villages like Msoga and Makombe many farmers said that they prefer to sell their crops to the middle-men because they take care of and pay for the transportation and the harvest can be sold on the spot. In this regard, the farmers in the roadside villages such as Lunga are in a better position. Lunga hosts a weekly market where numerous traders, wholesalers and middle-men from Dar es Salaam and other areas buy and sell foods and other items.

Barter and non-reciprocal contributions between the subsistence producers still happen, although it has greatly diminished and given room for monetary exchange. More than three out of four respondents (n=62) said that they practised barter with other villagers in the mid-1980s. Half of the respondents were still practising, but nearly all of them said that barter is now much rarer than earlier. An often-heard argument was that there is “nothing to barter” since surplus is not available. Non-monetary exchange continued to be somewhat common among the Maasai, who usually exchange meat, milk or maize to other items. Nevertheless, money is now by far the most common means of exchange also among the pastoralists.

### **7.3 Food availability and market prices**

The variety of food items marketed in the study area has increased remarkably during the last three decades. According to Sitari’s field work notes from 1979, there were total 28 different food items provided by about twenty traders in total at the Lunga market in 1979. Most of these items were unprocessed basic food items such as cassava, beans, fruits and vegetables. Processed items included mostly maize and wheat flour, dried fish, meat, sugar, salt, cashew nuts, baby milk powder and tea. Nearly all foods had likely been produced either locally or in the neighbouring regions in Tanzania, except some spices and baby milk powder, which had obviously been imported.

Vuorela (1987: 218) writes that in 1984 the only stalls at the market place in Msoga sold dried fish, groundnut, banana bread, local tomatoes, and sometimes seasonal fruits such as mangoes, sugar cane, or papaya, which had been grown in the village. Thus, shopping was often made in Lunga or Chalinze, although the market places in these villages could also lack basic food items. During years of poor harvest, it was also usual for the people to go to Dar es Salaam to purchase maize flour. According to the interviews made in Makombe and Mindu Tuliene, the situation was rather similar there in the mid-1980s. People went to Lunga, Bagamoyo, or even Dar es Salaam to do shopping.

In 2008–09, the total number of shops, market stalls and street vendors was more than one hundred in Lunga, seven in Msoga and eleven in Makombe (figures 32–34). Mindu Tuliene still has no shops or market place, but vendors from other villages visit different sub-villages of Mindu Tuliene. People rarely travel from the remoter parts of the village to Lunga to do shopping, usually only once per week. In Lunga about 70

different food items were now available, and if different varieties of processed foods are counted, the number was far beyond one hundred. Most basic food items, except meat and fish, were also available in Msoga and Makombe. In Msoga, the sales of food stuffs and other products have recently also increased due to the presence of construction workers and other outsiders who work in various development projects in the village, and at the president's ranch. The majority of foodstuffs sold in Makombe are brought from Lunga, where the local wholesalers and shopkeepers buy products from Chalinze or Dar es Salaam. The same applies to shopkeepers in Msoga.

According to the interviews, there had not been severe shortages of basic items at the markets since the liberalization of food markets, although the availability of vegetables and fruits naturally vary according to the season. In this regard, the situation has notably improved since the end of *ujamaa* era. If the sellers do not have the desired items, villagers usually go to Chalinze, where the variety is even higher than in Lunga. The owners of larger shops usually buy bulk items from the wholesalers in Kariakoo or Tandale market places in Dar es Salaam.



Figure 32. Foods at a small shop in Lunga.



Figure 33. A small shop in Makombe.



Figure 34. A larger shop in Msoga.

In 2009, there were two wholesalers in Lunga and more than ten in Chalinze. Some of these wholesalers had started their businesses in small shops and market stalls in the area in the 1970s, after which their businesses had expanded so that they were now dominant players in the trading chain. The wholesalers mostly sell items to shops and small vendors in the area. The secondary school in Lunga is also an important buyer. Bulk amounts are also sold directly to consumers. Based on the interviews, the margins of the wholesalers are between 10 to 40%, from which they also have to cover the carriage. Most wholesalers do not own lorries, but do hire them. For 100 kg cargo, the transport costs usually varied between TZS 1,200–3,500 from Dar es Salaam, TZS 1,000–3,000 from Morogoro and TZS 300–500 from Chalinze, depending on the volumes transported.

According to the interviews with storekeepers and wholesalers, the best selling food items in the area are maize flour, red kidney beans, sugar and cooking oil. Other top-selling products are other types of beans, rice, dried fish, onions, salt, and vegetables such as tomatoes, amaranth and spinach. When most households do not have electricity and face difficulties with storing food due to rats and pests, the amounts that are bought from the market at a time are small, usually just enough for the needs of the day. Another reason is that labourers get their payments on day-fare basis.

There were also 26 restaurants or bars operating in Lunga, three in Msoga, and four in Makombe. Usually these serve either tea and breakfast items like *mandazi* doughnuts or chapatti, soft drinks, alcohol, fried potato chips, or meals including *ugali* or rice with beans and green leafy vegetables (*mchicha*). A few serve also fish and meat. The interviews showed that the villagers, especially women, rarely eat in the restaurants; they serve mostly the people travelling through the area and the migrant workers. In the evening time, however, some of the villagers, of whom the clear majority are men, gather in the bars. The most popular beverages in these are *pombe*, bottled beer and soft drinks.

Consumer prices of main food items were collected from traders in the study area in December 2008 and August 2009. They are presented in Annex IV. Historical price data from the villages was only sporadically available, but the market prices in Dar es Salaam have been well-documented. Inflation adjusted real wholesale prices from Dar es Salaam show that maize, beans and rice became relatively cheaper for the consumers in the late 1990s, but started to increase in 2005 and have since remained on a high level. In 2010, however, the prices somewhat descended again (figure 35). The global food price crisis in 2007–08 was felt in Tanzania when maize prices at Dar es Salaam markets rapidly doubled, but otherwise the linkages between local and global prices of staples have been generally weak due to low levels of international trade (Sarris & Manzhou 2005; USAID 2008b; Minot 2010). On a national level, Leyaro, Morrissey and Owens (2010) estimate that the real food price increases since 1991 have reduced the household welfare by about 20% on average, and that the reduction has been even higher, 27%, in rural areas. Furthermore, the deficit food production regions such as Coast region generally experience the higher staple food prices than the surplus producing areas, and the households that do not produce surplus and mostly rely on



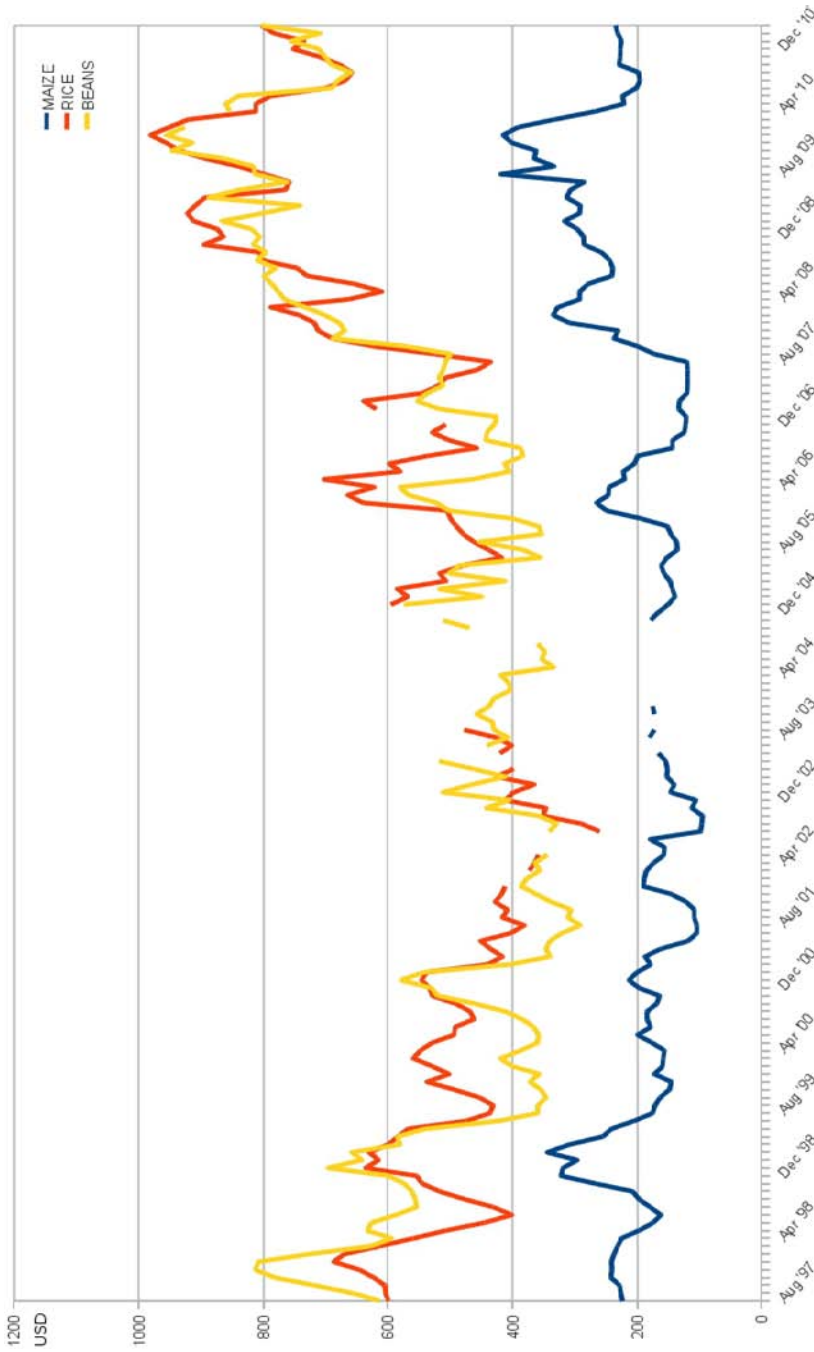


Figure 35. Real wholesale prices (USD per ton) of maize, rice, and beans in Dar es Salaam from August 1997 to December 2010 (EAGC 2011).

subsistence crops do not benefit from the increased producer prices either (Minot 2010; Ahmed et al. 2011). Seasonal fluctuation is also considerable. For example, the price of maize grain in Dar es Salaam is usually at its highest from March to May and lowest during the following harvest time in June–July, but these patterns are not very clear each year. The year-to-year fluctuation in the ratio of highest in relation to lowest monthly prices has been 1.82 by average and the ratio shows an increasing trend for the 2000s (Chapoto & Jayne 2010: table 4).

## **7.4 Origins of marketed food**

Information regarding the origins and retail prices of the most common food items marketed in the area was collected from the traders in the study villages and Chalinze town. As presented in Annex IV, a clear majority of the food items are produced within the borders of Tanzania. Due to its location along the highway to the north, and near the Morogoro highway to the east, most of the food items are brought to the study area from the central and northern parts of the country. There are clearly fewer items coming from the southern and far-eastern parts of the country. The majority of the products travel through the commercial hubs in Chalinze or Dar es Salaam. The cereals that are imported from other countries include most of the wheat flour, and to a much lesser extent, maize, rice and kidney beans. Otherwise, most of the imported items include highly processed foods such as cooking oils, dry yeast, tomato paste, spices, beverages, sweets and biscuits. The majority of them originate from South Africa, Swaziland, Kenya or United Arab Emirates, and some also from India and Europe (FAOSTAT 2011). Palm oil, which is by far the most common oil for cooking, is imported mainly from Malaysia, Indonesia or Argentina, and further processed by Tanzanian companies in Dar es Salaam.

The majority of maize that was available at the local market was produced in Dodoma region in central Tanzania, but depending on the season and rainfall, maize is transported also from several other regions. The traders and wholesalers estimated that less than 20% of their maize is locally produced in Lugoba or the neighbouring wards, and that the share of locally produced maize that they sell had considerably diminished during the last two decades. Most of the maize imports, which however constitute a minor share of the total consumption, have been sourced from the United States and South Africa (Sarris & Mantzou 2005).

In 2008–09, there were four maize mills operating in Lunga, three in Msoga, but none in Makombe or Mindu Tulieni, from where the maize usually is taken to Lunga or Chalinze for milling. The first motorized mills in the area were started in the late 1970s. Earlier, they ran with diesel power, but nowadays mostly with electricity. In the first phase of the milling process the husk is removed and the resulting grains are ground to flour during the second phase. Both phases cost 40 TZS per kg each. Thus in total, grinding 100 kg of maize costs TZS 8,000. The husk is usually fed to animals. In Makombe, where electricity is not available for most of the households, maize was still pounded using wooden mortars.

Rice originates primarily from Tanzania's main production areas in the Kilombero Valley in Morogoro region and in the flood plains of Lake Nyasa in Mbeya region. As with maize, the milling of rice and wheat usually takes place near the place where it has been produced. Most of the wheat is imported, while its domestic production is mostly concentrated to Mbeya and Arusha regions. Azam company, which belongs to the Tanzanian Bakhresa Group, has large wheat and maize mills in Dar es Salaam, and it is one of the dominant players in the country's wheat market. Millets are largely from Dodoma region or locally grown. Marketed cassava is mostly locally produced, since it is extensively cultivated here and its durability is low. Until a few years back, potatoes were not consumed much, but recently oil-fried potato chips have become increasingly popular, especially among the youth. Chips are mostly sold in restaurants and small stands along the highway in Lunga, but there was one stand also in Makombe. Potatoes are now transported seasonally from Tanga, Iringa or Arusha regions. Most of the cow peas, mung beans and pigeon peas are produced in Lugoba ward or its neighbouring villages. Small-scale farmers sell their beans to the local traders, or sometimes they sell their produce at the local market themselves. Soya and kidney beans are not grown in the area, so they are mostly imported from other regions. During shortages, kidney beans are also imported from the neighbouring countries.

Quickly perishable items such as fruits and vegetables are generally brought from shorter distances than cereals and beans. The most common are green leafy vegetables such as amaranth and spinach, which are used for making a relish called *mchicha*. These are mostly grown in the study area and sometimes brought also from the neighbouring Tanga region. Tomatoes are seasonally harvested in Lunga and Msoga villages, but otherwise tomatoes are brought from other parts of Bagamoyo district (esp. Ruvu) and other eastern regions. Okra, cabbage, and red chilli are also grown in the study area and the neighbouring villages. Carrots and green pepper are from Morogoro region, but they are not consumed much. Onions and garlic are mostly brought from the central and northern parts of the country. Fruits are available at the local markets throughout the year, but most of them are locally grown and thus available only seasonally. When fruits are brought from other areas, they are often considered expensive luxury items which are mostly sold to passengers along the main road.

Dried fish is a common item and it is available at the local market around the year. Fishes include sardines, anchovies, barbs, pellonias, cyprinids and sprats, among others. The prices of dried fish vary from TZS 1,500 to 2,000 per kg, which makes fish much more affordable than meat to the majority of villagers. There is usually no fresh fish available, because the fishermen and dealers in Bagamoyo, Sadani and Tanga by the Indian Ocean generally lack refrigeration devices, or because the transportation of fresh fish from other areas such as Mwanza and Bukoba by Lake Victoria would be too costly. Some small fish can be also caught at the pond nearby Mindu Tulieni and Makombe.

Practically all meat at the market is from animals raised by the villagers in Lugoba ward, and sold immediately after slaughtering. In 2008–09, beef was marketed only in Lunga where two butchers operate, and less openly in Mindu Tulieni where the pastoralists

themselves slaughter the cattle. There were no butchers in Msoga or Makombe. By July 2009 the price of beef had climbed up to TZS 4,000 per kg. Goat and sheep meat was even higher, TZS 5,000 per kg. Chickens are sold alive at the market or directly between the villagers. Chicken prices are also relatively high, 6,000–10,000 TZS per head, and eggs cost around TZS 200–250 per piece. Eggs and chickens are also brought from a large poultry farm in Msata.

Like meat, all fresh milk that is sold in the study villages is local. The milk collection units buy the milk from the cattle-keepers or middle-men for TZS 250–350 per litre. The purpose of the unit is also to inspect the milk in case of dilution and keep the milk cool. None of these have pasteurization facilities. The capacity is about 1,000 litres in each unit, but they are not emptied every day. The centres are owned by private companies, and they take the milk from the centres to consumers in Dar es Salaam. Several cattle-keepers expressed dissatisfaction for the prices offered for milk. They also complained that the capacity of the collection units is far lower than the volume of milk production in the area. The local milk market cannot absorb the oddment milk, while the milk market in Dar es Salaam was said to involve fierce competition. The retail price of cooled milk was TZS 500 per litre in July in 2009, which on the other hand was considered too costly by many consumers. Others than the Maasai do not normally drink plain milk, but use it only for tea. The Maasai also consume goat milk, but it is usually not available at the public market.

Tea originates from the main production areas in Mbeya, Iringa and Tanga regions. The local tea markets are dominated by two companies: Afri Tea and Coffee Blenders (1963) Ltd., and Chai Bora Ltd. They both have Tanzanian backgrounds, but the latter was sold to Kenya-headquartered holding company, Trans Century Group, in 2008 (Chai Bora Ltd. 2011, Afri Tea and Coffee Blenders (1963) Ltd. 2011). Most of the coffee is the instant blend of Tanzanian Africafe, also marketed by Afri Tea and Coffee Blenders (1963) Ltd, but it is not widely consumed in the area. The majority of beer consumed in the villages is the local millet brew, *pombe*, but especially the roadside restaurants also sell labelled beers such as Kilimanjaro, Serengeti and Safari, and imported beers are also available. The two domestic competitors in the beer industry are Tanzania Breweries Limited, which controls 80% of the market, and Serengeti Breweries Limited (Kircher-Allen 2009). Soft drink markets are entirely dominated by Pepsi and Coca-Cola companies; they both have plants in Dar es Salaam. In the bottled water market, these companies have also Tanzanian competitors, such as the Bakhresa Group's Azam. In addition to cereals and soft drinks, Bakhresa's bread and other bakery items are also sold in the area (Bakhresa 2011).

## **8. CHANGES IN LIVELIHOODS, INCOMES AND EXPENDITURE**

### **8.1 Working-age population and dependants**

Due to the rapid population growth, the age structure of the people in the area continues to involve a high proportion of children (figure 36). The census data from 2002 shows that 39.3% of people in Lugoba ward were under 15 years, 42.9% between 15 to 44 years and 17.8% above 45 years, which indicates a slight drop in the share of children since 1978 (Sitari 1980, 1983: 16, fig. 12; National Bureau of Statistics 2002). Also, increasing life expectancy suggests that some of the elders might be able to work until older age than before. Nevertheless, the dependency ratio has remained at a high level, being around 1.66 dependants per working adult in 2006 (Lugoba Ward Office 2008). Outmigration is also continuingly common, especially among the youth who seek for labour in nearby towns; Dar es Salaam in particular (Sitari 2010b; Sokoni 2010c). The population pyramid is also skewed sex-wise. Already in 1978, there were less than 85 men in Lunga in contrast to 100 women in the 15–44-year-olds' category, and as little as 71 men to 100 women in the 25–34-year-olds' category (Sitari 1980). According to the data from 2002, the sex ratio is especially skewed in age groups between 20 to 30 years where the rate is approximately 830 men per 1000 women. There is also a drastic difference between the age groups of 15–19 and 20–24 for both sexes. This is likely to imply that many young women have also moved away from the area at around 20 years of age, even though outmigration is more common among young men. Sitari (2010b: 20) found out that over 30% of the children of those interviewed in the area in 1989–90 had moved away by 2010. A significant proportion of her informants' children had established private businesses or were practising artisan skills, and were generally not much interested in farming.

The age structure is rather similar in the selected four study villages (figure 37). The largest share of children under 15 years is in Mindu Tuliene (46%) where the population has grown most rapidly during the last few decades. The highest share of young adults between 15 to 29 years (30%) is in Lunga, which is obviously due to the better employment opportunities in the village, but their share is not much less in the other villages either. The share of adults between 30–44 is rather similar, 15% to 18% in each four villages. The higher share of elderly people, 11%, is in Msoga, in contrast to 6–8% in other villages, which may indicate that out-migration has been most common from Msoga.

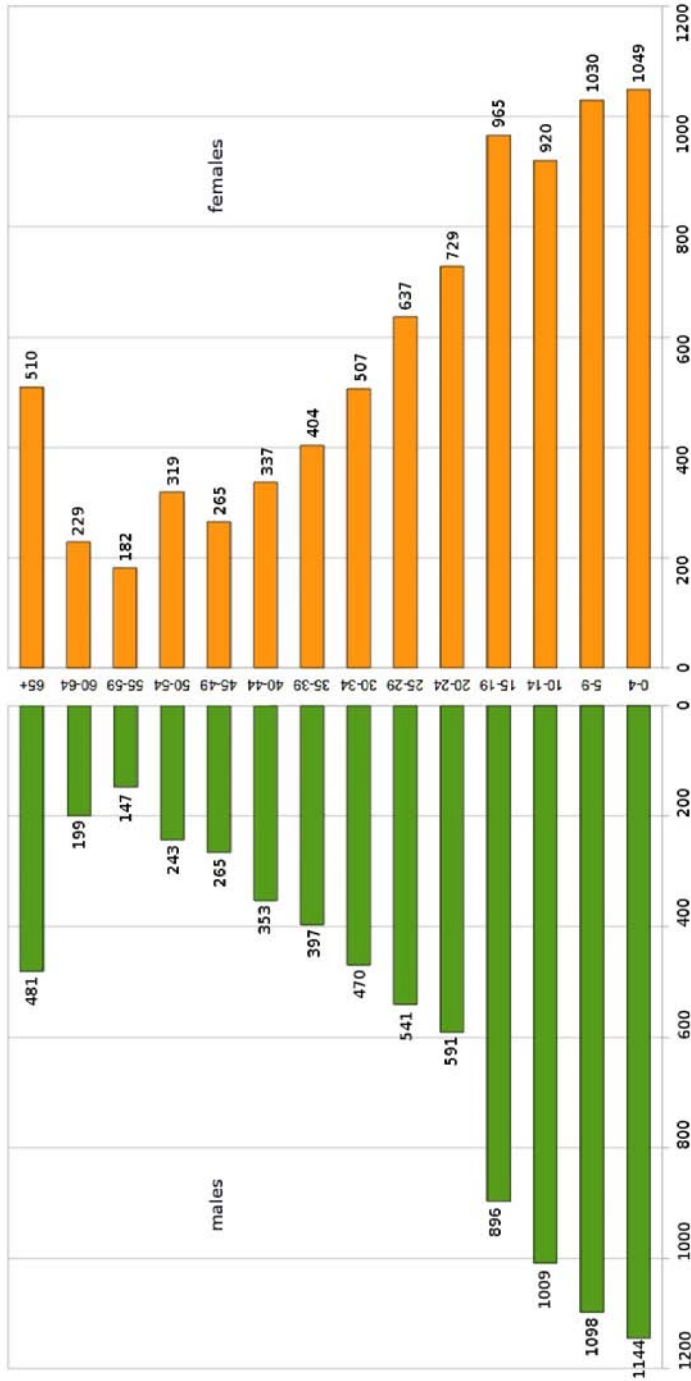


Figure 36. Population per age group in Lugoba ward in 2002 (x-axis = population, y-axis = age group) (National Bureau of Statistics 2002).

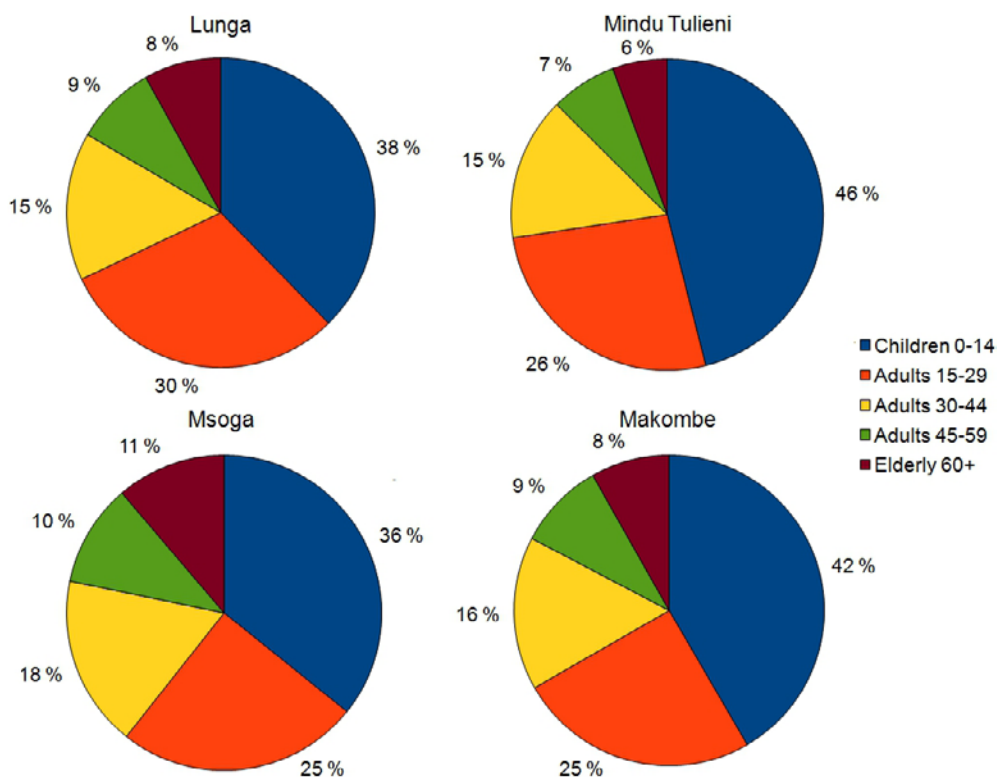


Figure 37. Population by age category in the study villages in 2002 (National Bureau of Statistics 2002).

## 8.2 Livelihood diversification

### 8.2.1 *The diminishing role of agriculture*

In the 1989–90 survey the respondents were asked about their household members' economic activities during the time of villagization in 1975. Sendaro (1992: 156–159, table 10.3) has analysed this data and concluded that the share of total population that was engaged in agriculture, including working children and elders, decreased from 75% during villagization to 57% by the end of 1980s. He explains this change by suggesting that fewer youths have taken up cultivation to replace the elderly farmers. Another obvious explanation is the increased school enrolment rate. According to the 2008–09 survey results, the total share of people engaged in agriculture, full or part-time, had further diminished to 43%.

Most of the survey respondents, however, were actively working, and nearly all identified themselves primarily as farmers (figure 38). Most Bantu respondents, 90% (n=120), said that they are cultivators (*mkulima*). All interviewed Maasai respondents regarded themselves primarily as livestock keepers, except one young Maasai man who was relying on stone quarry work. To questions regarding the most important source of livelihood for the household, 71% answered cultivation and 10% livestock keeping, indicating that agriculture is still the most important source of livelihood for over

four-fifths of the households. There were also lots of cases where the respondent called farming the most important source of livelihood for his or her household, although the total production by the household had been negligible during the previous year. Obviously, the people in the area identify themselves strongly as farmers, even though the role of agriculture has clearly decreased. On the other hand, the survey results also indicate that for many the non-agricultural activities should be more important source of income and subsistence than cultivation or livestock-keeping. This suggests that, among the interviewed adults at least, the cultural identities of subsistence farmers and pastoralists remain strong.

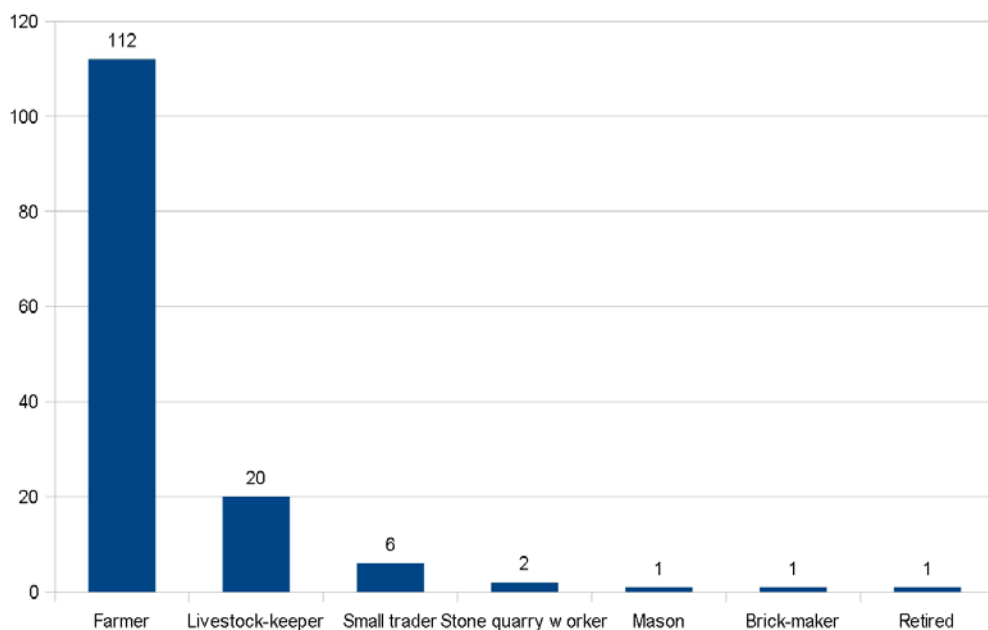


Figure 38. Primary occupation of the respondents (n=140).

More than half of the respondents, 57% (n=62), said that they sometimes hire additional labour to work on their fields. Similarly, many were occasionally working on the other farmers' fields. Additional labour is particularly needed for hoeing, planting and weeding. The workers were mostly hired from the same or neighbouring village, and the payments were usually made in cash. The common payment for a day's work varied now from TZS 2,000 to 3,000. Some also said that they prefer paying according to the area that had been prepared instead of the time spent on the field. Despite the decline of the *kiwili* system, reciprocal help without monetary compensation was still sometimes given between the families. Also food-for-work payments were said to exist but having become a rare practice during the last few decades.

All of the Maasai households were now also engaged in growing crops, while cultivation was not very common among the group in the late 1970s. As reported by Hurskainen (1984: 89), they relied mostly on hiring the non-Maasai to cultivate their fields. In 2008–09, the Maasai were cultivating much more by themselves and without additional



labour, which implies a strong cultural change. Several Maasai interviewees stated that more families adopted cultivation in the 1980s, and it became increasingly common from the late 1990s onwards. Some respondents had started to cultivate only a few years ago. A usual reason given for this cultural turn was considerable losses of cattle due to the diseases. Many families had not had means to acquire new animals due to the high prices. Also the shift to sedentary settlements, increasing interaction with the Bantu groups and changes in diet preferences were mentioned<sup>6</sup>. Especially the younger Maasai appeared to prefer the Kwere style diet of maize porridge (*ugali*), beans, and vegetables instead of the traditional Maasai diet, which relies heavily on animal products (see also Chapter 9.2). In 2008–09 all interviewed Maasai people cultivated maize and most of them also cultivated cassava or beans. Some grew vegetables such as cabbage, amaranth, and spinach, as well as fruits and sesame. The agricultural officers claimed that the areas cultivated by the Maasai continue to be negligible, but as presented earlier (table 6) the size of cultivated area was generally not much smaller among the respondents in Mindu Tulieni than in the other villages where the Kwere and other traditional cultivators are the dominant groups.

### *8.2.2 Non-agricultural work opportunities*

Non-farm livelihoods, involving full-time traders, service providers, craftsmen, in addition to farmers who practise part-time petty trading, have enormously increased in the area after the end of *ujamaa*. According to Sitari's findings (2010: 20), 45% of the children of those who were interviewed in 1989–90 in the roadside villages had adopted non-agricultural work as their main occupation by 2010. In addition, 26% were housewives, while only 11% were farmers.

According to the responses to my survey in 2008–09, more than two-thirds (71%) of the households had one or more non-agricultural income sources, of which the most important were small trading (24%), remittances (24%), charcoal production (11%), stone quarry work (11%), brick-making (5%), employment in governmental jobs (4%) and beer-brewing (4%) (figure 39). Village-wise comparison shows that the involvement of households in non-farm activities is less common in Mindu Tulieni and Msoga, where the rates are 52% and 62% respectively. In both Lunga and Makombe the rate is as high as 80%, which obviously relates to the location of Lunga along the main highway (providing better opportunities for petty trade), as in the case of Makombe to the several stone quarries located nearby. Also charcoal production appears to be more common in Makombe, around which wood resources are less scarce than in other villages. On the other hand, it is likely that charcoal business is actually much more widespread in all study villages, as further discussed below.

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6 Basing on data from Arusha region, Bishop (2007) has attributed the uptake and expansion of cultivation by the Maasai also to the influence of schooling.

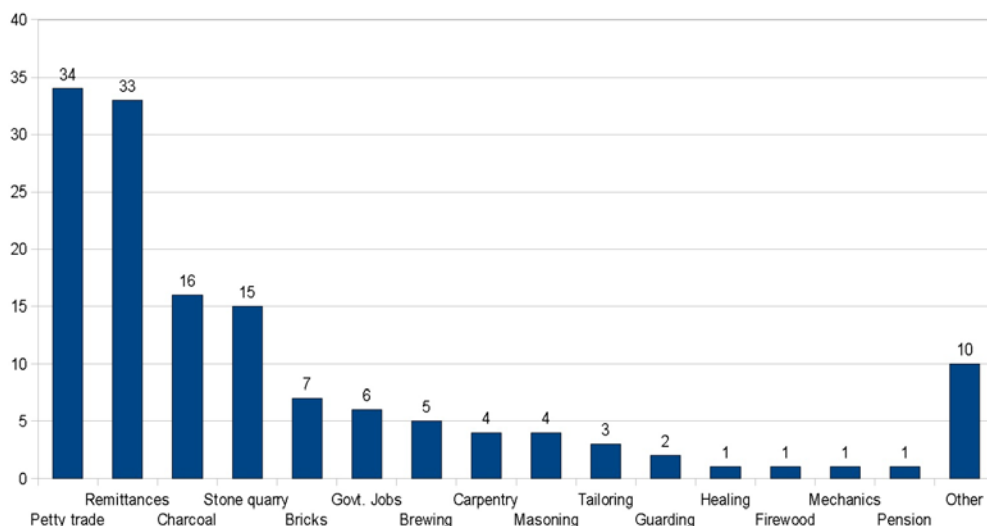


Figure 39. Non-agricultural income sources of the surveyed households (n=140).

Women and men are quite equally involved in the non-farm activities. However, women are more often involved in trading as street vendors or in shops and restaurants, while men are often working as middle-men. They also take care of livestock sales. Other gender specific activities are, e.g., beer brewing, which is done by women, as well as carpentry, masoning, tailoring and guarding, which are done by men. Charcoal business and stone quarry work are carried out by both men and women, albeit some of the tasks related to these are also gender-based.

One reason to the improvement in business opportunities is the increase of traffic on the highway that passes through the area. The passing vehicles were counted during a weekday by the assistant Lazaro Ruben in 1979 and again in 2010. The results showed that during daytime approximately 11 vehicles per hour passed Lunga in 1979 and 55 vehicles in 2010 (Sitari 2010a). Especially the number of small cars had increased, but there were also more lorries and buses. This has enhanced the possibilities to gain profit from selling services, foods and other goods to the travellers. A road extension, which was finished in Lunga in 2009, further increased the number of trucks staying overnight in the village. In addition to restaurants that serve meals, tea, and drinks, the roadside shops provide a variety of food stuffs and other consumer items (figure 40). Numerous vendors also sell fruits, cashew nuts, sweets, cookies, and soft drinks. These vendors are often boys and young men, and the competition can be harsh. Usually these small entrepreneurs work for dealers who take a provision of the sales. Many women gain incomes from baking *mandazi*, cakes, chapatti, bread, or cookies that they sell at the market places or in the restaurants. Lunga has also several guest houses, employing locals, and such houses have recently emerged also in Msoga where several outsiders work especially at the construction sites. Some of the guest houses along the highway also function as brothels, and prostitution is clearly one of the income sources for the villagers, but its extent was not revealed through the interviews. One of the serious

downsides of this phenomenon is the transmission of HIV, which has been steeply increasing in the area, reaching 11% in Bagamoyo district in 2010 (Saiboko 2010).



Figure 40. Market stalls along the highway in Lunga.

*Pombe* is usually served in restaurants that are further away from the highway, since the customers are mostly locals. *Pombe* is also sold directly from the producers' homes. According to observations, beer brewing is much more common than what the survey results imply, probably because it was vaguely labelled under 'business' (*biashara*) by the respondents. There are also several carpenter workshops selling furniture in the villages, as well as repair shops for cars, bicycles, and electronic devices. Several tailors, who are usually men, operate in Lunga. The need for masoning and brick-making has also grown. Brick production requires firewood, which is collected (and sometimes sold) particularly by women. Lunga has a few stationary shops, hairdressers and barbers, private pharmacies and small cinemas, which are more established and have higher turnover. Schools, health centres and the ward office offer secured and highly valued governmental jobs for the highly educated minority. In the village administration, however, only the Village Executive Officer (VEO) receives a salary, since the other posts in the village committee are based on voluntary work. Lunga hosts also a courthouse.

The first stone quarries were established nearby Msoga already in the 1980s, but as many as fifteen more were set up in Kinzagu and Saleni villages during 1990s and 2000s. These provide work opportunities for hundreds of people in the area. Most of the quarry operators are Chinese and Indian companies. According to the respondents, monthly salary at the quarry is about TZS 60,000, or about TZS 2,000 per day. The

interviewed stone workers said that they do not have free days, not even Sundays. Working days are long, eight to nine hours, and some work also in night shifts. The labor is mostly manual and physically demanding, although some of the quarries now also have machinery. Some interviewees complained that they have got rashes and wounds in their limbs and suffered from other illnesses due to the stone dust. Many are also employed at the quarries as guards, cooks and drivers.

Charcoal production has been practised in the area at least for decades for both domestic use and income generation. According to the interviews, however, few people were making charcoal in the 1970s, which was explained by better opportunities to gain food and income from agriculture, as well as lesser needs for money in general. Since the 1980s, charcoal business in the periphery of Dar es Salaam has been booming and today charcoal making is one of the most important sources of income in the study villages (Mhache 2010; Ylhäisi 2010a, 2010b). Some respondents claimed that the production would have slightly declined since the late 1990s due to stricter control by the authorities. However, all respondents did not share this view and insisted that the production rate had rather increased further. In any case, yet in 2010 truckloads of charcoal were transported from the area every day. According to Malimbwi & Zahabu (2008) and an interview with the forest officers in Bagamoyo (Kaijunga 2009, Msaki 2009), only about one fifth or less of the charcoal that is sold to Dar es Salaam is legally produced, i.e., an appropriate licence is obtained and the taxes are paid at the check-points.

The seasonal calendar exercise made in Makombe revealed that charcoal is mostly produced during times when there is less work to do on fields, starting after the *masika* harvest in July. However, some interviewees considered that charcoal production reaches its peak already before the *masika* harvest when incomes are quickly needed for food purchases. During *vuli* season fields are cultivated less intensively, so the high season for charcoal continues well until December. Both men and women were said to be involved in the business. According to the observations, most of the actual producers were young men from different ethnic groups, but adults and older people were also cutting the wood and operating the kilns. Charcoal is largely sold to the growing markets in Dar es Salaam, while a minor part is consumed locally in roadside restaurants and wealthier families (figure 41).



Figure 41. Charcoal bags ready for transportation to Dar es Salaam.

The group discussions, as well as the additional open-ended questions that were made during the questionnaire interviews, clearly indicate that charcoal is produced more during the years when the crop harvests have been poor. As one respondent put it, answering to a question on how to overcome food insecure periods:

*“I just take an axe and go to the forest.” (Farmer, Makombe)*

Several interviewees considered that they are now making more charcoal than in the 1980s, because they get less produce from agriculture and need money for food and other necessities. The same was concluded by the group of over forty village leaders and ward officials in the seminar in Msata in December 2010. On the other hand, the causality also holds to the opposing direction. Agricultural produce may have decreased partly due to the higher involvement in charcoal production which gives guaranteed returns within a few weeks after felling the trees. Studies along the Dar es Salaam-Morogoro highway show that the household incomes from charcoal reached USD 645 per year in 2002 already, exceeding the minimum wages of most employees in public and private sectors (Malimbwi & Zahabu 2008: 96). Unlike most crops, charcoal can be produced throughout the year, or when the need for additional incomes arises. The former veterinary officer of Lugoba said:

*“It is a quick business for getting money nowadays. Young people are running to the forest to make charcoal. That’s why they are not cultivating.” (Rugemalira 22.10.2008)*

An elderly participant in a seasonal calendar exercise in Lunga said:

*“If someone has to pay for school fees, he goes and cuts, any time of the year.”*

In 2008–09, only 11% of the survey respondents declared that their household produces charcoal. Some interviewees said that the charcoal production in the area is mostly conducted by migrant workers who sell their produce to buyers from Dar es Salaam. However, a survey conducted by Emmanuel Mhache in Lugoba and Msata wards during the same period indicates a considerably larger number of local producers, nearly 32% of the interviewed households (Mhache 2010: 27). This difference could be explained at least partly by the fact that Mhache is Tanzanian and I am a foreigner. Respondents may have been unwilling to reveal to a foreigner that they are involved in illegal charcoal business. Mhache also posed several questions regarding the extraction of forest products and asked more explicitly about charcoal production. On the other hand, in a group discussion which Ylhäisi (2010a) arranged with tens of villagers in Msata, one participant said that virtually every family in the area is involved in charcoal production or trade. When Ylhäisi asked the other participants whether this is true, the group generally accepted the view. Thus, in reality, the share of households involved in charcoal business may well be higher than what my or Mhache's surveys indicate, as there is no good reason to believe that the situation in Lugoba ward differs much from that in the neighbouring Msata ward.

### 8.3 Unemployment and underemployment

Official data regarding unemployment in the villages was not available, but according to the interviews, unemployment is most common among the young adults. When the latter part of the questionnaire survey was made in June–August 2009, more detailed information was asked regarding the nature of employment in the households. The results show that 6% of women and 16% of men between 15 and 30 years currently had no work (table 15). More than half of men (52%) and women (61%) in this age group were working only part-time. Usually this meant helping the parents with cultivation, as most of these young adults were unmarried and still lived with their parents. Another common form of part-time work was petty trade at the local market. On the other hand, these figures do not reveal the amount of domestic work, which means that actually many of these young women may be more fully employed than young men. It is also likely that this age group involves many charcoal producers, but this was not revealed in the survey answers. 16% of men and 15% of women in this age group were said to work full-time, while 16% and 18% respectively were studying.

Table 15. Employment in age group 15–30 years in June–August 2009 (n=72 households).

Employment	Men	Women
No work	8 (16%)	4 (6%)
Part-time work	26 (52%)	38 (61%)
Full time work	8 (16%)	9 (15%)
Student	8 (16%)	11 (18%)
Total	50 (100%)	62 (100%)

Many interviewees considered the employment situation of the young adults noticeably worse since the end of *ujamaa*. Severe underemployment in the area, of men in particular, was observed by Sitari (1980) in the late 1970s already. She wrote that men's work input could be several times higher if they worked for, e.g., eight hours per day and all year round. Muro (1979) and Vuorela (1987) also addressed the skewed division of labour between the sexes. My observations support the notion that many women continue to work considerably more than men, particularly when taking into account domestic tasks such as housekeeping, collecting water and firewood, washing clothes, cooking and child care. However, I did not witness major differences between men and women in regard to working on the fields, but this was not verified through quantification.

Lugoba ward office (2008) reports that about one percent of the working age adults of 15–59 years are disabled. In reality, the share of those unable to work may be higher, considering the staggering HIV/AIDS rates in the area (see also Barnett et al. 1995). According to my observations, serious alcohol-related problems are also rather common in many families, especially among men, which obviously hampering their ability to work.

## **8.4 Remittances**

According to Sokoni (2010c: 77), almost all households in the area have at least one former member who has out-migrated. A clear majority of these, about 80%, lived in Dar es Salaam. Despite the proximity of smaller cities and towns including Bagamoyo, Tanga, Chalinze, Morogoro and Kibaha, less than 13% had moved to these minor centres. However, his findings indicate that the migrants' contribution to the rural households are generally negligible, and only in few cases the remittances or physical assets sent by migrants had a significant impact on community development. There were also cases where the out-migrated household members had moved back to their previous homes. This usually happened due to hardships encountered in the urban areas and the return-migrants were rather considered a burden to the community.

According to the survey made for this study, 22% of the households (n=140) were receiving money from their relatives who live in other areas. It was difficult to gain exact information about the amounts received, but most respondents generally considered them to be small contributions. A few older respondents said that they were essentially depending on these money transfers. Some had also received food, most often bags of maize, from their relatives living in the cities. According to data collected by Aikaeli (2010: 11) from different regions across Tanzania, the remittances received by rural households were only TZS 15,000 per year on average. This is in line with earlier findings from large size household surveys that indicated that the share of remittances have varied between 1.1 and 4.8% during independence (Ellis 1999, cit. Lanjouw et al. 2001). In April 2008, however, Vodacom company launched the M-PESA money transfer service in Tanzania, which is likely to accelerate the flow of remittances (IFC 2010: 1). Through M-PESA, the transfers can be done via mobile phones instead of physically visiting the relatives, as very few people in the rural areas have bank accounts.

## 8.5 Household incomes and expenditure

The survey respondents were asked to estimate the total incomes earned by their household members either during a day, week, month, or year, according to what they considered the most convenient time-frame. This question was difficult due to several reasons. Obviously, many respondents were unwilling to reveal information about their real incomes. Amounts and sources of incomes may also vary considerably during different times of the year. Cultivators receive their payments as lump sums if they choose to sell their harvest. Milk producers get their payments usually once per week. Many labourers and petty traders get their wages and payments on a daily basis. There were also a few who received monthly salary, most often from governmental jobs. The incomes of a single household are thus collected in diverse ways from several sources, and the respondents may not even have been aware of these all.

Due to these reasons, only 69 out of 140 could or wanted to give an answer on their incomes. Among these, the mean daily household income was TZS 6,070 with a median value of TZS 5,000 and standard deviation of 7,799. When household incomes are divided by the respective household sizes, the mean income per person is TZS 1,165 with median TZS 833 and standard deviation 1,157. The results suggest that about 67% live with less than one dollar per day and as much as 92% with less than two dollars per day. However, it has to be noticed that these figures do not involve the value of subsistence production which continues to have a vital role for the wealth of the majority. Only in three households incomes exceeded TZS 3,000 per member in a day, the highest being TZS 8,125 in a family that was involved in charcoal and other businesses and also produced some cotton (figure 42).

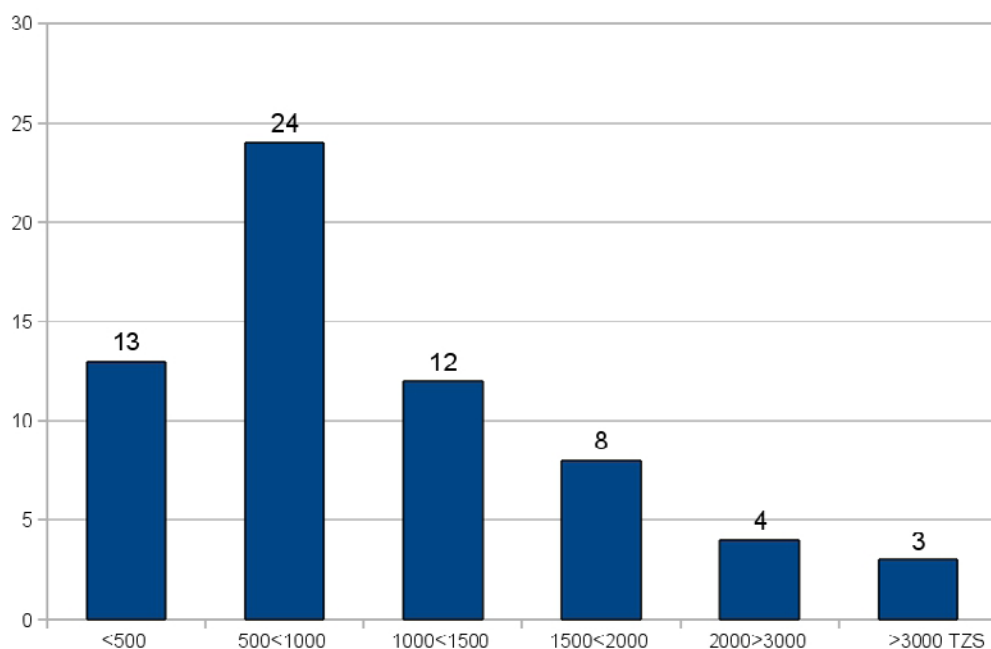


Figure 42. Daily incomes per household member in 2008-09 (n=64).



All those who gave information about their household incomes were spending majority of their money on food. The average share of food expenditures was 62%, which in general terms corresponds with the national figures calculated by Leyaro, Morrissey, and Owens (2010). The question regarding daily food expenditures appeared to be much easier for the survey respondents, and thus replies were gained from most households (n=129). The mean daily food expenditure per household was TZS 3,770 with median TZS 3,500 and standard deviation 1,756. Per household member, the mean food expenditure was TZS 686 with median TZS 600 and standard deviation 367. Figure 43 shows how food expenditures divided between respondent households. Alarmingly, 13 out of 69 (19%) claimed that their household's food expenses were currently higher than total incomes. Although some of these may have involved miscalculations, it also became clear that many families are indebted to the local traders, as discussed in the next sub-chapter.

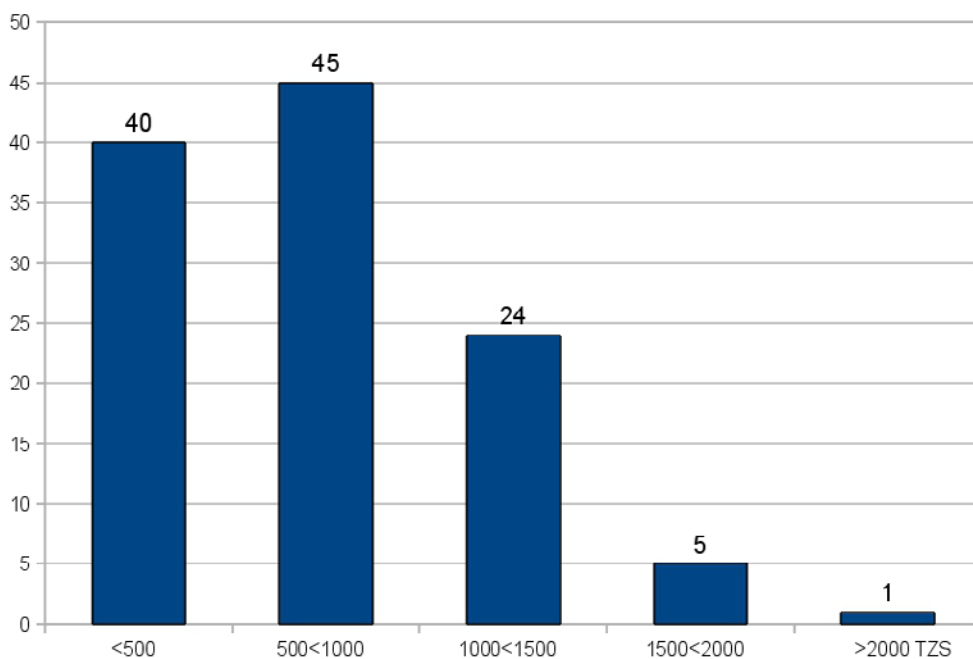


Figure 43. Daily expenditure on food per household member in 2008-09 (n=115).

Before the pipelines for purified water were built in the early 2000s, the fresh water brought by trucks cost as much as TZS 400 per bucket, which in practice meant that most people drank non-purified surface or rain water. Now the payments for tapped water are generally low, TZS 30-50 per 20 litre bucket. The fees are usually collected by entrusted people who live nearest to the taps. The money is further delivered to The Wami-Chalinze water supply project (USAID 2008a: 10). The usage of water is controlled through meters, and if the collected fees do not balance with the meter readings, the people in charge of the tap have to reimburse the missing payments.

There are dozens of water taps in different parts of the ward, but the ones in the more remote villages such as Mindu Tulieni and Makombe are often out of service. At the

primary school of Mindu Tulieni there is a water tap, which the people in Makombe also depend on. However, during 2008–09 the tap was functioning only few months in total, so people had to fetch water either from the eastern part of Mindu Tulieni, or more often, from Lunga or Saleni. Fetching a bucket of water by bicycle takes well over one hour. There are also dealers who bring water to these villages, but they charge TZS 400–500 per bucket, which many households in Makombe cannot afford. Many respondents told that they still use rain and surface water if they lack money or possibilities to get water from the distant taps. Water is usually not boiled before drinking.

The interviews and group discussions indicated a vast consensus that expenditures on both food and non-food items have become relatively higher and rural life in general increasingly commercialized since the mid-1980s. Particularly the increasing food prices, school fees and health care costs were common concerns among the people. In addition, cash is needed for transportation, housing, furniture, utensils, electricity, kerosene and other fuels, farming inputs, trading facilities, personal care, clothing and footwear, other necessities, and ‘luxuries’ such as tobacco, tickets to movie theatres that play DVDs, electric devices etc. In addition, when a son gets married, the family usually pays bridewealth to the bride’s family. According to the interviews, the bridewealth among the cultivator groups is usually up to TZS 200,000. The pastoralists usually give cows instead of money, but the high numbers reported earlier, 27–80 cows per marriage (Rigby 1980: 45), are in most cases not possible anymore.

The mean length of education of the interviewed household heads or their spouses was 5.3 years (median 7, Std. 2.8) and only 7.7% had studied at secondary school (n=130). On average, the respondents in Lunga had been to school for 6.3 years (median 7, Std. 2.2), in Makombe 4.75 years (median 6, Std. 2.9), in Msoga 5.3 years (median 7, Std. 2.9), and in Mindu Tulieni only 3.3 years (median 3, Std. 3.3). 17% of respondents, most commonly in Mindu Tulieni, had not been to school at all. It is thus obvious that the families spend much more on their children’s education than earlier. On the basis of the survey results and interviews, nowadays over 90% of the children complete Standard 7 in primary school. About one in four continue to forms 1–4 in secondary school, which is a considerable increase from the situation in the 1980s (Second Head Master of Lugoba Secondary School 2009, see also Al-Samarrai & Peasgood 1997). Primary school costs about TZS 9,000 per year for a student, including school uniforms, books and stationary. Primary schools do not offer meals, so the children usually go to their homes to have lunch. Secondary schools are much more costly, since they are boarding schools. The total expenses are around TZS 300,000 for a pupil per year, including three meals per day, accommodation, medical contributions, school uniforms, books, stationary and administrative fees. Higher education for girls is still not considered as important as for boys. In 2007, the total number of students in the secondary school was 1021, of whom 39% were girls (Lugoba Ward Office 2007).

Other increasing items of expenditure are the payments for health services and medicines. According to the interviews, the governmental health centres and

dispensaries started to collect service fees in the early 2000s. Before this the services had been free of cost. However, antenatal care, services for children under 5 years and care of certain chronic diseases are still provided for free (see also Mæstad & Mwisongo 2010). The TZS 500 service fee should include medicines, but they are not always available at the centre and the patients have to buy them from the private pharmacies. The governmental health centre in Lunga and the dispensary in Msoga do not have any qualified doctors, only clinic officers who also conduct small operations and deliveries. More demanding patients are diverted to Kibaha or Dar es Salaam. There are also private clinics with varying standards and generally higher fees. In addition, tens of traditional healers operate in the area and their services continue to be popular.

Expenditures on transportation are increasingly common, as people need to visit Chalinze, Dar es Salaam or other urban centres due to business or other purposes. A one-way trip with a small bus, *dala-dala*, from Lunga to Chalinze cost TZS 800–1,000 in 2009, and to Ubungu in Dar es Salaam about TZS 4,500. People rarely make visits to Bagamoyo town, as there are no buses operating between Msata and Kiwangwa and taking a motorcycle ride is costly. If there is a need to visit Bagamoyo, people prefer to travel via Dar es Salaam. Bicycles are common means of transport in the villages and there are also those who hire bicycles for a low cost, about TZS 200 per day.

The housing structure in the area has gradually changed so that now there are more houses with brick or concrete walls, even though those kinds of houses require more investments than building and maintaining the traditional type of houses. In 2008–09, 5% of the respondent's houses had mud-walls, 16% brick-walls and 9% concrete walls. Lunga had proportionally more brick and concrete houses than other villages. 70% of the houses had tin roofs and 30% thatched roofs. Tin roofs were more common in Lunga than in the other villages. Paying rent continues to be very rare. Only two respondents were tenants and the rents that they paid were rather low, less than TZS 7,000 per month.

In 2008–09, 12% of the respondent households had electricity, of which the majority were in Lunga. A few better-off houses in Msoga have electricity too. In those households where electricity is available, the consumption is relatively low and mostly limited to lightning, and no-one uses electricity for cooking. Electricity is expensive, the total price rising up to about TZS 150 per kWh. Depending on the availability and usage of electric devices, the bills usually vary between TZS 8,000 to 30,000 per month. Connecting a house to the grid was said to cost from TZS 250,000 up to one million.

To a question regarding the overall economic situation of their household, 37% answered that the situation had improved, 12% figured there had not been significant change and 51% said their situation had gone worse since 1985 (n=109). Decrease in rainfall and declining yields were the most common reasons given by those who elaborated further the ill change in their economic situation (n=36). Other reasons stated by several respondents included high food prices, death of a household member, old age, many dependants, loss of livestock and unemployment.

On the other hand, many key informant interviews with the local officials and other villagers with different backgrounds gave more positive assessments about the change in the area. They often referred to improved infrastructure, housing, clothing and increased availability of non-food consumer items. Also Sitari (2010b) and Ylhäisi (2010a) have observed an increase of material wealth in the villages during the recent decades. It appeared that many survey respondents strongly connected their decreasing crop production with the overall economic situation (*hali ya uchumi*) even if the emerge of non-agricultural income sources could have been sufficient for their basic needs. However, these perceptions should not be undermined, especially when there were those who had clearly suffered losses during the studied period. Furthermore, some respondents seemed to connect the change in the economic situation to a larger cultural change that has followed from the decline in agriculture, and these losses cannot be measured in material or monetary terms.

## **8.6 Availability and usage of credit**

Along with the increasing monetary expenditures, the availability of credit has become highly important for the majority of villagers. 69% of the survey respondents had taken credit during the last two years. The most common sources for credit include shopkeepers (62%), relatives or friends (36%), micro-credit schemes (33%) and local money lenders (14%). Only two respondents had taken a loan from a bank. People said that shopkeepers, relatives and friends do not usually collect interest. The amounts that the respondents owed to these sources varied from a few thousands to hundreds of thousands of shillings. Local money lenders operate on the informal sector, and they usually also collect interest with varying rates.

Micro-credit is offered by several governmental, private and non-governmental organizations that have become more prominent in the area since the early 2000s. In 2009, the largest micro-credit lenders were Presidential Trust Fund for Self-Reliance (PTF), Savings and Credit Co-operative Societies (SACCOS), Village Community Banks (VICOBA) and Small Industries Development Organization (SIDO). The interest rates of these organizations are high, typically over 20% for one year, which is lower than the global 35% average for micro-credits, however (Kneiding and Rosenberg 2008). The usual sizes of micro-credit loans taken by the respondent households varied between TZS 100,000 to 500,000. These loans are usually granted for maximum 12 months. The loan-takers form groups of five or more members that have to secure the members' re-payments.

Despite the recent increase of established loan providers, several interviews stated that official sources of credit for agriculture are generally lacking. Micro-credit is usually targeted only for expanding different types of non-farm businesses. Only a few interviewed farmers had received micro-credit for buying improved seeds, hiring agricultural labour or buying goats. Some also said that they had used the micro-credit for school fees or medical treatment instead of any income generating activities. Micro-credit institutions and banks are generally reluctant to deliver loans to small-scale

farming, because the risks of crop failure or livestock losses are relatively high and most farmers lack assets such as official landownership that are sufficient for the collateral (Rugemalira 2008) (see also Harper 2005; Sendi & Anderson 2010). Another obstacle perceived by the interviewees was the common requirement of the micro-credit institutions that the first re-payment be made already within one month after taking the loan and after this on a weekly basis. This makes it virtually impossible to invest in agriculture, which provides yields only after several months.

## 9. CHANGES IN FOOD CONSUMPTION

### 9.1 From subsistence production to reliance on food markets

On the basis of the interviews, it is clear that there has been a substantial shift from consuming self produced food to buying food from the markets. Most respondents, 93%, said that the proportion of food that their household buys from the market has increased “much” or “to some extent” since 1985. Only 5% said that their household is now buying proportionally less food items from the market than earlier (figure 44). Respondents were also asked to estimate the proportion of all consumed foods that were bought from the market during the recent year and the same in 1985. The alternatives given were “none”, “quarter”, “half”, “three quarters” and “all”. Due to time constraints and difficulty of the question, only 51 gave an answer. The rough outcome is that less than quarter of foods were bought from the market around 1985 and clearly more than half in 2008–09.

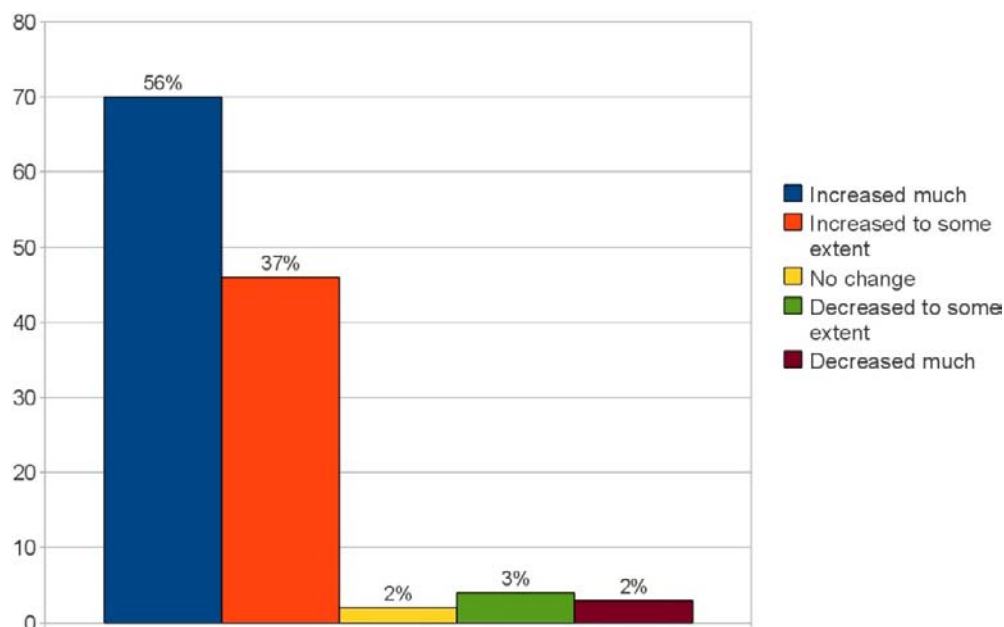


Figure 44. Change of the amount of food bought from the market by the interviewed households since 1985 (n=125).

As another indicator for this change the respondents were asked how many months they consume self-produced maize. On average, the respondent households had consumed their own maize for 5 months during the previous year, while they said that in mid-1980s their maize was usually sufficient for more than 11 months per year. Many respondents claimed that they very seldom bought any maize during those days and some also pointed out that maize flour was hardly available in local shops then. For example, according to Sitari’s field work notes from 1979 there was only one maize vendor in the village that time. In regard to Msoga, however, Vuorela (1987: 217)

wrote: “apart from the basic staples, the village is by no means self-reliant”. Items that were commonly bought in the mid-1980s included non-staples like vegetables, kidney beans, salt, and spices, but in 2008–09 also the basic staples were purchased more than produced locally. This radical change was also acknowledged by the interviewed agricultural officers and other senior officials, who had been working in the area for a longer time. Considering the fact that the availability and consumption of non-food incentives have also increased, these changes reflect a wider shift from the sphere of traditional subsistence economies to involvement in the capitalist system. “Money is now needed for everything”, as a farmer in Msoga described the present situation.

## 9.2 Changes in food habits and diet

Cooking continues to be a woman’s task. On basis of the interviews and observations, food is usually prepared by the youngest adult women in the family. For 82% of the households firewood was the primary cooking fuel (n=111). Cooking takes normally place either in front of the house or inside on three stones that are selected for the purpose (figure 45). Women are usually also responsible for collecting the firewood. Charcoal was used as primary cooking fuel by 18% and secondary fuel with wood by 37% of the households. Charcoal was used especially by the better-off families, as its usage cost TZS 15,000–30,000 per month, or even more, for a household. Charcoal is also preferred when preparing *mandazi* or chapatti for selling, and it is solely used in the restaurants. None of the respondent households used gas or electricity for cooking.



Figure 45. Cooking *ugali* with firewood.

The energy efficiency of the three stone stoves is low, approximately 8–12%. However, the usage of charcoal that has been produced with traditional methods in earth kilns wastes even more energy. Through introducing improved stoves, energy efficiency could be at least doubled (Peter & Sander 2009: tables 3.1, 3.2). Another factor that contributes to high wood fuel usage in the area is the common practice of boiling dried beans without steeping them first, which means that the beans have to be boiled for about three hours. Keeping them in the water over night would reduce the boiling time drastically and thus reduce the need for cooking fuel. This is a remarkable issue when practically all households eat beans every day. Reasons for not steeping the beans included fears that the beans would get spoiled, gain bad taste or that the composition or colour of the beans would change in unwanted ways.

73% of respondents said that their household usually eats three meals and 25% two meals per day (n=139). Two respondent households, one in Lunga and one in Msoga, were having only one meal per day. The majority of those eating twice per day usually do not take breakfast. Among this group, however, there were also those who do not have lunch or dinner that are usually much heavier meals than breakfast. All respondents said that normally all family members, except youngest children, eat the same food. However, some Maasai respondents told that men eat generally more meat and milk. Nowadays many families eat together, but the old tradition that men eat first and women last lives strong, and the majority of households were still following this pattern. Some families also practised the old tradition of eating from common pots, but the usage of plates for each person had become increasingly common. Washing hands before and after the meal is a norm.

Most families took a light breakfast, which includes boiled cassava bites and tea with sugar. Instead of cassava, many ate also chapatti, *mandazi*, bread or boiled sweet potatoes. Heavier breakfasts were only eaten by the pastoralist Pare people, who have a habit of taking boiled milk, beans, and vegetables in the morning. Lunch and dinner are usually similar in most households, including most often *ugali*, beans, and green leafy vegetables as an additional relish (figure 46). The beans included most often self-produced cow peas, pigeon peas, or mung beans rather than kidney beans, which need to be purchased. Vegetables included mostly different types of amaranth or spinach, hare's lettuce, or cassava leaves. Rice, meat and fish were more often included in the dinner than the lunch. *Makande*, which is made by mixing maize grains, beans and onions, was sometimes prepared instead of *ugali*. Some Maasai families also cooked maize porridge with milk, and a few families who had migrated from the northern parts of Tanzania sometimes cooked plantains as a main dish. Especially in Msoga and Makombe some families also cooked millet instead of maize *ugali*, but this practice had clearly decreased. People seemed aware about the better nutritional content of millet, but preferred maize due to its easier preparation and taste. Millet was also considered by some to cause problems with digestion. Most families ate rice about once per week or less, but particularly during the festivals such as Eid al-Fitr, Eid al-Haj, Easter, and Christmas.





Figure 46. *Ugali* with mung beans, cow peas, and hare lettuce.

In between the meals, 13% of respondents said that their household members often take snacks, and 61% at least sometimes. The common snacks included different types of fruits, which are seasonally available and often grown by the families themselves. Less common snacks were tea, milk, soft-drinks, and juices made of concentrates, which are popular especially among the school children.

To a question regarding the change in the use of animal products since the mid-1980s, 19% replied that they now eat more, while 55% considered that they now eat less animal products, especially meat and milk. 12% figured that there had not been any significant change in this regard and 14% could not give an answer. By far the most common reasons to decreasing consumption of animal products were high prices, and among the Maasai, considerable losses of livestock.

The respondents were also asked to estimate how often animal products are eaten in their households nowadays. Some gave per-week replies, some per-month or other meaningful time periods. The replies were converted to per-month form, as presented in table 16. On average, the respondent households ate meat four times per month, but the median value was only 2.5 times per month. 29% took meat once or twice per week and 11% more than twice per week. 34% ate meat once or less per month and 7% said that they never eat meat. Contrary to expectations, meat consumption among the Maasai did not differ significantly from the other groups.

Table 16. Consumption of animal products (meals eaten per month) in respondent households in 2008–09.

Animal product	n	Mean	Min.	Max.	Median	Std.
Meat	119	3.9	0	17	2.5	3.8
Fish	119	5.2	0	30	4.0	5.5
Milk	113	16.4	0	91	11	17.5
Eggs	109	1.7	0	30	0	4.2

Fish was eaten more often than meat, slightly more than once per week on average. Half of the respondents said that their household has fish at least once per week or more, while 22% said that they never eat fish. In addition to lack of money and cultural preferences of especially the Maasai, some considered that the sun-dried fish is bad and not healthy to eat. About 35% of the households had milk almost every day, 27% two to four times per week, while 38% took milk less frequently. However, all Maasai households consumed milk at least once per day, and in much larger quantities than the other groups. Eggs were eaten rarely, less than twice per month on average. As many as 70% of the respondents said that they never eat eggs. This was explained by low productivity of free chickens, as well as the high market price of eggs. Also the taboo observed by Muro (1979: 40) that people, especially pregnant women, should not eat eggs, still persisted as indicated in a few interviews.

The interviews and observations show that there is generally little variation in the basic composition of the diet, and that the diet has remained largely the same during the recent decades. The major differences between the households were in the usage of animal products, which the better-off could afford to consume more often than the poorer households. In addition, rice is now eaten more commonly in most households in different ethnic groups, as it was considered a rare feast day food still in the end of the 1970s (Sitari 1980). Potatoes are also now eaten more commonly as several chips stands have emerged along the main road, but potatoes are generally not used for cooking in households.

The findings also show that the cultivator and pastoralist groups have nowadays rather similar food habits. The Maasai have increasingly replaced their traditional diet—which relied heavily on the usage of milk, meat, and blood—with a Bantu-style diet. Several Maasai respondents said that they have reduced ritual killings of cattle, which according to Hurskainen (1984: 95) have traditionally been the main occasions when meat is consumed. Many respondents also drew a linkage between the livestock diseases, particularly the ECF epidemics, and the dietary shift. On the other hand, the Maasai youth who participated in a seasonal calendar exercise in Mindu Tulieni stated that they preferred the ‘new’ diet over the extensive consumption of animal products.

Wild foods continue to have some dietary importance, although their availability and usage has decreased considerably along with forest degradation. In 2008–09, fruits, leaves, tubers or mushrooms were still collected by 72% of the respondent households

(n=139). These foods included especially hare's lettuce (*mchungu*), which is commonly used as a relish. Other forest foods such as leaves of knob wood and fruits of wild persimmon, false brandy bush, wild custard-apple, wild tamarind, and several types of mushrooms were collected seasonally, but these usually had only supplementary and marginal role in the diet. Numerous plants were also used for medicinal purposes. Honey collection was quite common, and insects were caught and fried especially by young boys. Hunting was practised only by few, about 6% of the households. Hunting was said to be more common earlier, but having drastically reduced due to fewer wild animals and the ban of hunting in the Wami-Mbiki reserve area. However, Vuorela (1987: 215) noted that bush meat was rarely eaten in Msoga already in the 1980s. Nevertheless, the access to forest foods can still be important for the poorest households during the scarcities. Some of the interviewees said that at least during the drought in 2003, roots of *mdudu* tree (*Maerua tryphylla*) were eaten as crisis foods.

### 9.3 Nutritional content of the 'average' diet

Detailed analysis of the nutritional intake in different social, age and sex groups is beyond the scope of this study, but an attempt was made to roughly estimate the content of 'average' meals taken during a day. It was presumed that a person needs 2,000 kcal per day and the nutrient needs correspond with the directive amounts set in the USDA National Nutrient Database (USDA 2010). In reality, the energy and nutrient needs vary considerably depending on age, sex, body mass index, amount of physical labour, health disorders such as worm infestation etc. Other conjectures included that a person eats cassava bites with tea and milk for breakfast, *ugali* with kidney beans for lunch, one mango as a snack, and *ugali* with kidney beans and spinach for dinner. The daily need for maize flour was estimated to be 400 g based on Sitari's (1980) observation that a family with 10 members uses about 2 kg flour for cooking one meal. In addition, it was assumed that small amount of cooking oil is used, and that the meals are supplemented with small amounts of fish and meat that correspond with the average consumption among the surveyed households. Tomatoes, okra, cabbage or other vegetables that are sometimes used as relish were not included, and neither were the small amounts of onions, garlic or chilli that are usually included in the relishes. The nutritional content of this kind of daily food intake are presented in annex V.

The analysis shows that the diet is heavily based on carbon hydrates from starches, but is quite rich in protein too. However, protein deficiencies may arise when fish or meat are not eaten at all, or if the plate includes only small amounts of beans, as was observed in some families. The intake of several essential micro-nutrients also raises concerns. Spinach and mango are pretty much the only sources of vitamin A in this type of diet, and they are generally not consumed every day. Furthermore, most families seemed to eat green vegetables weekly but not every day (see also Mwanri, Worsley, Ryan & Masika 2001: tables 7, 8), and the seasonal consumption of fruits may cause temporary gaps in vitamin intakes. When milk is used only for tea, the diet severely lacks calcium, which may hamper physical growth and cause osteoporosis. Especially vitamin B-12 and vitamin E are also missing, which can lead to neurological and gastrointestinal

symptoms, anaemia, and several other health disorders. Iron content of diet does not meet the recommendations either, and the iron intake may be further hampered by the high amounts of tannins and phytates in maize which can decrease the iron absorption (Mwanri et al. 2000).

School meals in Lugoba Secondary School are served three times per day (table 17). For breakfast, the students have maize porridge with sugar and milk. Lunch and dinner contain *ugali* or rice with beans, or alternatively *makande*. In all these dishes red kidney beans are always used. Meat is served once per week. Obviously, this kind of diet is also unbalanced, since the students rarely have any vegetables or fruits.

Table 17. Weekly menu in Lugoba Secondary School (Storekeeper of Lugoba Secondary School 2009).

	<b>Breakfast</b>	<b>Lunch</b>	<b>Dinner</b>
Monday	Porridge	Rice & beans	Ugali & beans
Tuesday	Porridge	Ugali & beans	Ugali & beans
Wednesday	Porridge	Ugali & meat	Ugali & beans
Thursday	Porridge	Ugali & beans	Ugali & beans
Friday	Porridge	Rice & beans	Ugali & beans
Saturday	Porridge	Makande	Makande
Sunday	Porridge	Ugali & beans	Ugali & beans

## 9.4 Development of food security

In communities that depend on subsistence agriculture, the annual harvest cycle often causes variation in dietary intake. Seasonal hunger does not necessarily have fatal or long-term consequences on health, but it debilitates the community in general and may increase under-nutrition especially among the children (Bryceson 1989). According to seasonal calendar exercises (made with 6–10 participants in each study village), as well as answers given to the survey, the most food insecure months annually are between April and July, when there is least self-produced food available in the households and the food prices are high. This sometimes leads to harvesting unripe maize, against which the extension officers have been campaigning (Chiwaligo 2008). After harvesting the *masika* crops in July–August, the situation generally improves. August and September are considered as the most food secure months during the year. However, many considered the next-in-line October food insecure; indicating that the period when self-produced food is eaten is only a few months long annually in many households. The informants did not consider that the *vuli* harvest in January–February would significantly contribute to their food security, further addressing the decreasing importance of cultivation during the short rains. Generally, the informants connected food security and availability of self-produced crops strongly together, while dependency on buying food from the markets were often seen to cause food insecurity and deficiency in food intake.

The government distributes food aid during those years when yields are considered exceptionally low. The requests for aid are submitted to the district administration by agricultural and veterinary officers who monitor the food security situation together with village and ward level administration. According to the officials, aid has been delivered in the area almost every other year since the late 1990s. During some years aid has been delivered more than once (GoT 2005: annex III; Diwani of Lugoba 2008; Msofe 2008). The prior targets are the elderly people, the disabled, and the female-headed families, but also others in need can receive the aid packages. The food aid usually consists only of maize, but during some years also rice and beans have also been included. The packages are delivered against a nominal cost of TZS 50 per kg. According to the officials and the survey results, the amounts of food aid delivered in the area is generally negligible in comparison to the overall consumption needs. Usually the recipient household gets around 2 to 4 kg of maize per household member. However, some families had received more, up to 60 kg per household per year. Some respondents complained that the timing of aid often fails as it is delivered too late. In 2009, the delivery was delayed once again, and it finally arriving during the harvest time in July, when most households already had their storages filled with self-produced foods.

Any quantitative data of the nutritional situation in the study area in the 1970s or 1980s is unfortunately lacking, but all interviews with the health officials and traditional healers suggest that the situation was worse during the *ujamaa* period. This perception is supported by photographs that Taimi Sitari took in the area during 1978–79. In the pictures many children have pot-bellies, but these were very rarely seen in 2008–2010. The environmental health officer of Lugoba confirmed that marasmus does not exist in the area any more, but some cases of kwashiorkor and other severe nutritional disorders are found annually in the ward. Three interviewed healers in Lunga, Msoga and Makombe also considered kwashiorkor and marasmus to have been common during *ujamaa* (see also Vuorela 1987: 216), but having clearly decreased during the recent years. Nevertheless, the situation may turn more severe due to crop failures, losses of livestock, deaths or illnesses of household members, increase in food prices or other shocks.

Tanzanian health officials consider that a child is undernourished when his or her weight-for-age index is between 60–80% of the national target level, which broadly corresponds with the standards of the WHO (2011b). Girls and boys are measured with the same chart. The child is severely malnourished when the index falls below 60%. The weight-for-age follow-up is continued from the birth up to 5 years. According to the interviewed health centre personnel, most mothers in the area regularly bring their children for these free check-ups. However, the child health registries concerning the villages appeared to have major inconsistencies. At Msoga Dispensary, where people from Msoga and Mboga villages are received, the registries were only available from 1999 onwards. These included far too few notes on the weight-for-age indexes in order to be representative. Apparently, the indexes had been marked in the follow-up cards that are held by mothers, but this information had not been included in the registries

at the dispensary. Older registries were not found, and the nurse admitted that these had been burned due to lack of cupboards for archiving. The summary reports only contained the information that none of the measured children in the village had had an index below 60% in 2001 and 2007, indicating that cases of severe malnourishment had not been diagnosed in Msoga or Mboga (Msoga Dispensary 2001, 2007). Five cases of nutritional disorders in 2007 were reported, however. Among the population over 5 years the most common diseases were listed as malaria, pneumonia, acute respiratory infections, diarrhoea, intestinal worms and anaemia, of which the last three are directly related to nutrition. The general opinion of the interviewed health workers and traditional healers was that severe malnutrition and child mortality had significantly decreased in Msoga and elsewhere in the area since the mid-1980s.

At Lugoba Primary Health Centre in Lunga more information on the nutritional conditions was available, albeit quite sporadic and mostly only concerning a period starting from 1997. The weight-for-age index notes in the registries range from a few entries up 980 entries per year. Year-wise comparison between the villages is thus not meaningful, but grouping the data for the three-year periods of 1997–99 and 2007–09 gives sufficiently large samples (table 18). Yet a question arises whether some criteria was used when taking up the notes on a child's index in the registry, but the interviewed nurses and the environmental health officer of Lugoba ward assured that such criteria did not exist; the samples were randomly collected. The compiled data suggests that the proportion of underweight children under 5 years would have decreased since the late 1990s, from about 16.1% to 13.7%. However, the children of Lunga are here disproportionally represented. For Makombe, the figures show a much steeper decrease from 23.6% to 13.4%. The figures for Mindu Tuliene are lower than those of other villages, indicating a drop from 12.9% to 9.8%. The responsible health officer of Lugoba ward explained these differences by rising incomes and improving awareness on nutrition, as well as by much higher milk consumption in Mindu Tuliene (Msofe 2009). Although the results have to be dealt with some caution, it appears that the prevalence of underweight among children under 5 years in the area has remained below the national average of 22% (HDR 2009: 178).

Table 18. Percentage of children under 5 years whose weight-for-age index falls below 80% of normal in Lunga, Makombe, and Mindu Tuliene during 1997–1999 and 2007–2009 (data from child patient registries at Lugoba Primary Health Centre 2008, 2009).

Village	1997–1999			2007–2009		
	n	< 80%	underweight	n	< 80%	underweight
Lunga	1442	226	15.7%	360	53	14.7%
Makombe	161	38	23.6%	104	14	13.4%
Mindu Tuliene	170	22	12.9%	82	8	9.8%
TOTAL	1773	286	16.1%	546	75	13.7%

While severe malnutrition has obviously been alleviated, mild under-nutrition or lack of essential micro-nutrients continues to be a severe problem in the area. The most

common is iron deficiency, which is manifested through high levels of anaemia. In 2007, total 220 anaemia cases were diagnosed at the health centre in Lugoba (table 19), and during the drought year of 2003 as many as 779 (Lugoba Primary Health Centre 2003). Furthermore, most anaemia cases may remain unnoticed, as revealed in a study made in three primary schools in Bagamoyo district where 70% of students were found to be anaemic (Mwanri et al. 2000). A few people were also said to suffer from night blindness, which can relate to lack of vitamin A, but there now treatment is available. Other common nutrition-related illnesses include diarrhoea and intestinal worms, which were said to have reduced drastically after the water pipes from the purification plant were built in the area. The much improved availability of safe water has thus been a significant factor that has positively contributed to nutrition security. According to the health workers, however, diarrhoea is still more common in Makombe due to high consumption of surface water. Yet by far the most common disease is malaria, not directly a nutrition-related ailment. The number of malaria cases, 3,629 in 2007, is very high considering that the total population of the ward is about 18 000 and patients from Msoga and Mboga were not even included in the statistical summary. This means that on average, every household loses several, possibly dozens of working days annually due to malaria, and thus malaria may also contribute to food insecurity. Another heavy burden for the communities is HIV/AIDS, but it was not explicitly dealt with in the available statistics.

Table 19. Cases of selected diseases diagnosed at the health centre in Lugoba in 2007 (Lugoba Primary Health Centre 2007; Lugoba ward Office 2007).

<b>Diagnose</b>	<b>&lt; 5 years</b>	<b>5 + years</b>	<b>Total</b>
Malaria	1252	2377	3629
Acute respiratory infections	479	849	1328
Diarrhoea	281	307	588
Urinary tract infections	212	205	417
Intestinal worms	192	153	345
Pneumonia	200	97	297
Anaemia	110	110	220
Sexually transmitted infections	12	160	172
Surgical conditions	52	72	124
Eye infections	49	49	98
Skin infections	31	41	72
Nutritional disorders	13	1	14
Protein-calorie malnutrition	8	0	8

In 2008–09, as many as two-thirds (67%) of the questionnaire respondents said that their household has sometimes had food insecure periods, and almost as many (63%) said that they had had to skip meals during the last 12 months due to lack of food (n=131). 27% considered that the amount of food that they have access to usually

being not sufficient for the needs of the whole household (n=138). Particularly food insecure years were 1994, 1999, 2003–04, 2007, and 2008; during those years many families had to skip meals for longer periods. As an extreme example, two children were said to have died of malnutrition in Mindu Tulieni in early 2000s due to drought and losses of cattle. On the other hand, people tend to remember the weather extremes and food shortages during the last few years better than those during the 1990s or 1980s (Meze-Hausken 2004; Slegers 2008). Slightly less than half of the respondents (49%) said that the quantity of food available per person had decreased since the mid-1980s, 19% figured that there had not been significant change, and 32% said that the food availability per person had improved (n=118) (figure 47).

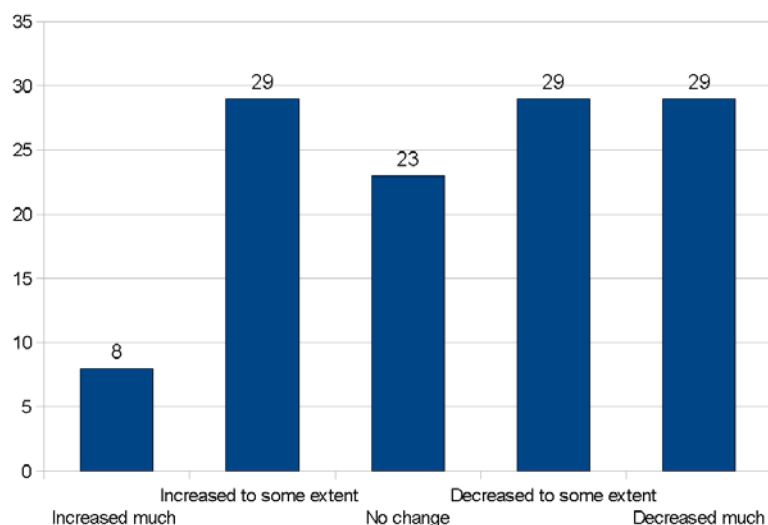


Figure 47. Change in the quantity of food eaten per person in the households from the mid-1980s to 2008–09 according to the survey responses (n=118).

Among those households where there had been food insecurity (n=82), the most common (68%) means to getting over the period was seeking for additional labour opportunities, including charcoal production, agricultural coolie work, and other casual work. Another common strategy was to borrow or ask help from friends, relatives, or shopkeepers, mentioned by 55%. Receiving governmental food aid was mentioned by 28%, although the amount of aid was generally considered insufficient. Selling animals or other assets was mentioned by 16%, and 10% said that they simply reduce the amount of food or meals that they eat. A few also said that they collect tubers and other wild foods during scarcity, but that this is nowadays difficult because the availability of edible plants in the woodlands has decreased.

Respondents were also asked to assess how the food security situation in their household had changed in general terms since the mid-1980s. 37% considered that their situation had improved, 20% thought there had not been a notable change, and 43% figured that their household food security had worsened (n=85). These results are broadly in line with the answers regarding the changes in food availability (figure 47). Most often



the reasons given to the worsening food security related to insufficient or decreasing agricultural production by the household (table 20). Another often mentioned reason included increased food prices and availability of labour force within the household due to death, divorce, ageing or increasing number of dependants. There were no major differences in answers given by female or male respondents, but in village-wise comparison notable differences occurred. While in Lunga as many as 50% said that the food security situation had improved, only about 30% shared this view in the other villages. This obviously relates to the better non-farm income opportunities in Lunga.

Table 20. Reasons given by survey respondents to the worsening food security situation in their household (n=60).

Climate change/lack of rains	38
Increased food prices	23
Not enough own production	11
Death of household member	9
Wild animals or livestock harm crops	7
Getting old	5
Usage of hand hoe	5
Soil fertility decreased	6
Serious illness or accident of household member	4
Unusually high number of pests/diseases	3
Increased number of dependants	3
Unemployment	2
Other expenses (school fees, medicines) increased	2
Decreased amount of livestock	2
Energy content of food decreased	1
Population increase	1
Unprofitable business	1
Increased water prices	1
Divorce	1

The quality of food, however, was deemed satisfactory by the majority (81%) of the respondents (n=94). 42% felt that the quality had improved since mid-1980s, 30% said that it has remained the same, and 28% said it had worsened. There was dissatisfaction towards lack of nutrients and energy content, as well as “always eating the same food”. Some also disliked the foods that have been cultivated with agro-chemicals. On the other hand, many felt that they now have more variety in the foods than earlier. In particular, it was mentioned that they can now eat rice more often and use cooking oil, which was not generally available before the end of *ujamaa*.

Generally, the survey results indicate that nutrition-related diseases would not be very common in the respondent households. 15% said that at least one member in their household has suffered from such diseases during the last 25 years (n=71). The most commonly mentioned and possibly nutrition-related diseases included skin ailments, anaemia, and diarrhoea. Kwashiorkor was reported from three households, and none had had marasmus. On the other hand, the respondents may not have wanted to tell everything or been aware of all the diseases that their household members have, as suggested by the other sources dealt with above.

In regard to the change of food availability and security after *ujamaa*, the data sets presented here imply certain contradictions. Outcomes of the interviews with the health workers and traditional healers, analysis of available health data and evidence provided by old photographs support the comprehension that the nutritional situation has generally improved. However, about two-thirds of the survey respondents thought that food availability or security in their household had not got better. Although some respondents may have wanted to present their situation in a negative light e.g. due to expectations attributed to the research project, there is no doubt that part of the families—such as those who lack able-bodied adult workers, have a large number of dependants, possess small landholdings, or those with high expenses on health care, education or alcohol—have suffered severe setbacks. On the other hand, the access to safe water in the early 2000s and the following steep decrease in the occurrence of diarrhoea and intestinal worms undeniably explains part of these contradictions. It may well be that in many households the access to food has not actually improved, but food utilization has due to better health and hygienic conditions.

There are also cultural and subjective aspects that need to be taken into account when interpreting the answers, as discussed in Chapter 2.4.1. The responses to a question in the survey regarding the reasons for the negative change in food security provide examples for this (table 20). Most of those respondents whose situation had worsened explained this by the fall in subsistence production, while very few referred to low incomes from non-agricultural sources, unemployment, or increasing expenses for other needs than food. As Ylhäisi (2010a) has put it, there is now “more money than ever” in the villages, especially due to gains from natural resources, including particularly the selling of charcoal. Some of the survey responses and thematic interviews proved that many farmers connect food availability, food security and subsistence production strongly together. On the other hand, many appeared to give less value on maintaining food security through non-farm employment and buying foods from the market. One explanation to this may be the relatively old age of the survey respondents. Most of them have been born to a society where subsistence harvests and livestock wealth equalled to food security. This perspective should not be overridden by mere statistics on improving nutritional situation and conditions of physical health. The analysis of food security should also encompass people’s access to food that they prefer, be it self-produced maize, beans, and vegetables, or meat and milk. Many complained that they only can afford to eat the same inexpensive food from day to day and longed for more variation in the diet.

## 10. CONCLUSIONS AND DISCUSSION

This study has explored the transformation of a rural food system in the villages in eastern Tanzania during a period when the state abandoned the socialist policy approaches, dismantled its strict control over the production and distribution, and shifted to more open and liberalized market economy. By approaching the food system as an entity, a complex set of processes and relationships have been discovered that are essential for understanding the obstacles in local food production, commodification of food chains and livelihoods, changes in food security, and ultimately the longer-term sustainability and survival of the communities.

Methodologically, the chosen approach has required the combination of diverse qualitative and quantitative tools including different types of interviews, participatory exercises, spatial analysis, and examination of official data and documents. Triangulation was also an important part of the analysis. I argue that this kind of holistic research approach is needed for understanding the drivers and outcomes of food system change on the village and household level.

The findings in regard to each research question are summarized below. In the latter part of the chapter the results are discussed in relation to the future development challenges in the area, earlier studies, and the applied theoretical framework. Also suggestions are made for further research.

### 10.1 Spatial expansion and structural changes in the food system

Key characteristics of the examined food system in approximately 1985 and 2009 are summarized in table 21, which follows broadly the outline presented by Whatmore (2002a: fig. 4.1) (see also figure 2). The summary table presents the geographical origins, provider institutions, and level of application of different actors under the components of the food system, as perceived through the analysis of the study materials and previous literature. Although the spatial categories are not always easily defined as the activities take place on multiple levels, certain prominent trends can be identified. These include the widening spatial scope of the system from predominantly local and national levels towards national and foreign (or global) levels. Basically, this results from the increasing consumption of foods that have not been produced locally in the study area. Much of the foods are now brought especially from surplus areas elsewhere in Tanzania. Along with the growing popularity and better availability of wheat, rice and highly processed food items, the share of foods imported from abroad has also expanded, even though their segment on the 'average' food plate is still rather small. This implies also that the globalization of the Tanzanian food economy has not been as extensive as in many other parts of the world.

Table 21. A simplified summary of the characteristics of the food system in approximately 1985 and 2009.

Food system component	Actor	1985			2009		
		Origin	Provider	Application	Origin	Provider	Application
<b>A. Agri-technologies</b>	Machinery	Local / National / Foreign	Priv. / Govt.	Low	National / Foreign	Priv.	Medium
	Chemicals	National / Foreign	Govt. / Priv.	Low	National / Foreign	Priv.	Medium
	Breeding, improvement	National (/ Foreign)	Govt. (/ Priv.)	Low	National / Foreign	Priv. / Govt.	Medium
Extension agencies (for A-B)	Retail	National / Foreign	Govt. / Priv.	Low	National / Foreign	Priv. / Govt.	Medium
	Advisory	Local / National	Trad. / Govt.	Medium	Local / National	Trad. / Govt.	Medium
<b>B. Farming</b>	Credit	Local	Priv.	Low	Local / National	Priv. / NGOs / Govt.	Medium
	Land / property holdings	Local / National	Trad. / Govt.	Medium	Local / National / Foreign	Trad. / Govt. / Priv.	High
	Crop production	Local / National	Trad. / Govt.	High	National / Local / Foreign	Priv.	High
Regulatory agencies (for B-C)	Livestock production	Local	Trad. / Priv.	Medium	Local	Trad. / Priv.	Medium
	Co-operatives	Local	Govt.	High	-	-	-
	Marketing boards	National	Govt.	High	-	-	-
	Quality std. authorities	National	Govt.	Low	National	Govt.	Medium
<b>C. Food processing and distribution</b>	Storing	Local / National	Trad. / Govt.	High	National / Local / Foreign	Priv. / Trad. Govt.	High
	Food processing	Local / National	Trad. / Govt.	Low	National / Foreign / Local	Priv. (/ Trad.)	Medium
	Packaging	National	Govt.	Low	National / Foreign	Priv.	Medium
	Retail	Local / National	Priv. / Govt.	Medium	National / Local / Foreign	Priv.	High
Regulatory agencies (for C-D)	Catering	Local	Priv.	Low	Local	Priv.	Medium
	Health / nutrition policy	National	Govt.	Low	National	Govt.	Medium
	Food aid	Foreign	Govt.	Low	National / Foreign	Govt.	Low
<b>D. Food consumption</b>	Quality std. authorities	National	Govt.	Low	National	Govt.	Medium
	Cooking	Local	Trad.	High	Local	Trad.	High
	Self-produced foods	Local	Trad.	High	Local	Trad.	Medium
	Purchased foods	National / Local	Govt. / Priv.	Low	National / Local / Foreign	Priv.	High
	Waste management	Local	Trad.	Low	Local	Trad.	Low

The role of modern agri-technologies in the food system has increased (see table 21). This is not due to modernization of the local production, but because more foods are now imported from other areas where these inputs are applied. Similarly, the share of industrially processed foods has become larger along with the rise in the consumption of particularly cooking oil, sweets, and beverages that are imported from the factories in urban centres in Tanzania or abroad. On the other hand, with the exception of maize that is now milled with electricity, the technologies and processing level for the basic staples that are produced locally have not changed much during the period.

As seen in table 21, after the dismantling of the state-led co-operative system by the late 1980s, the governmental control over the agricultural production and trade on the village level has been diminished. The farmers are now free to decide what they produce. The unauthorized markets, which existed during the ujamaa era in parallel with the official distribution system, received a legal status by the early 1990s. The government has retained control over extension services, food quality monitoring, food aid, and strategic reserves, although none of these have had a central role for the food security of the majority of people in the study area. In many respects, subsistence farming takes place outside the state control. A considerable part of the traded foods also never enter the sphere where the governmental agencies operate, as the trade is now in the hands of private agents, and much of it remains undocumented by the officials.

## **10.2 Changes in local food production**

Subsistence farming continues to be a major source of livelihood and food security for the people in the area, although its role has remarkably declined since the mid-1980s. The process towards growing sedentarization of fields was initiated already through the ujamaa villagization policies that concentrated the people to large nucleated villages. After this, shifting cultivation and rotation of fields have further diminished along with the growing scarcity of arable lands in the vicinity of the villages as the population has doubled since the mid-1980s. Regardless of the sedentarization, many farmers continue to apply traditional cultivation techniques that were adapted to the rotation of the fields and low usage of external inputs. The fields are still mostly tilled by hand hoes. The usage of improved seeds is common, but the application of chemical fertilizers has further fallen since the late 1980s. Despite the re-introduction of subsidies, fertilizers remain too expensive for the majority of farmers. Only about one-fourth use organic manure or cow-dung on their fields. This is due to cultural reasons and the fact that the pastoralists own most of the cattle. Apparently, most of the fields suffer from the outflow of nutrients and gradual loss of soil fertility. The available weather data does not support well the notion that the rainfall would have decreased or become more irregular, but the increase in mean temperatures may have caused more evaporation and thus further hampered crop production.

As an example, the agricultural officers estimated that the productivity of maize fields had dropped by around 30%. The farmers suggested an even more dramatic decrease of about 60%. According to the interviews, the households consumed self-produced

maize for about 11 months in a year in the mid-1980s, while their maize lasted only for about 5 months on average in 2008–09. Nearly all respondents also reported that their crop sales had declined since the mid-1980s. The most significant change in regard to cash crops is the fall of cotton production after the markets were liberalized. Sesame cultivation has become more popular due to high market prices, but its production has not reached the levels that cotton had during ujamaa. The decline in the agricultural production also relates to the diminishing involvement in farming activities in general.

Livestock-keeping has also stagnated or reduced. During the recent decades, especially East Coast Fever and other diseases have killed thousands of cattle in the area. Among the pastoralists, the holdings declined from 93 cattle heads per household in 1977 to as low as 30 heads in 2009. Despite the diminishing stocks, the markets that are particularly in Dar es Salaam cannot absorb all the milk produced in the area, and the local demand is rather low. Together with other cultural changes, the diminishing returns from cattle holdings have encouraged most traditional pastoralists to adopt cultivation. As the ECF only affects cattle, however, the keeping of goats and sheep has increased.

Hunting and gathering, have become marginal means to acquire food. This is especially due to extensive deforestation and prohibition of hunting in the Wami-Mbiki forest reserve. Wild foods are still collected by many, but the amounts are generally small. During severe droughts, however, wild roots and tubers can still be important emergency foods for the poorest households.

### **10.3 Commodification and the roles of self-produced foods vs. purchased foods**

The food system has become increasingly commodified during the post-ujamaa period (see table 21). This has not happened through an increase in cash cropping but due to the decline in farming in general and the shift of labour to non-farm sectors. The growing use of wage labour to help in subsistence production and commercialization of land resources has also accelerated the commodification process. The share of people engaged in any agricultural activities has notably decreased, from about three-fourths during the villagization to below half in 2008–09. The majority of households have now one or more non-farm income sources, of which the most important were petty trade, remittances, charcoal production and stone quarry work. The survey indicates that in 1985, about a quarter of foods consumed by an average household were purchased, while the share was clearly over half in 2008–09.

The number of traders has rapidly increased in the study villages, as has the availability of different foods at the market. In contrast to the shortages that were common during the ujamaa period, all basic food items are now available at the market year-round. All surveyed households were spending the majority of their incomes on food, although relatively more money is nowadays also needed for school fees, health care, housing, electricity, clothing, transport, leisure and other things. This implies a considerable change in the livelihood structure, and greater involvement in the cash economy in

general. On the other hand, the continuing reliance on subsistence production means that the shift between the two social spaces—subsistence relations and capitalist economy—is by no means complete.

In the meanwhile, the role of traditional institutions in production and exchange has weakened (see table 21). Non-monetary and in-kind exchange of food and labour have become much less common, generally due to lack of surplus foods that could be exchanged, as well as the growing need for cash. Traditional labour exchange sessions that were common yet during the ujamaa era have now become very rare events. Probably the most drastic cultural change has taken place among the pastoralist Parakuyo Maasai who are no longer practising many of their rituals where slaughtering of cows or goats were involved.

#### **10.4 Roles of regime shift and governmental steering**

The macro-level shift from socialism to a liberalized market economy changed the production, marketing, and availability of food in the study area. The village primary societies, which had not functioned satisfactorily during the ujamaa period, were dismantled by the late 1980s. Communal and co-operative farms were abandoned and the selling of crop output to external agents became practically free of restrictions. Economic liberalization and the underlying theories suggest generating a trading environment where free competition enables the flourishing of such activities that hold local comparative advantages (see e.g. Singh 2002; Harvey 2005: 64-64, 76). In broad terms, the economic development in the study area has followed this principle. Cotton production in Lugoba ward ceased in the late 1980s as the co-operative system stopped buying cotton and pan-territorial pricing was abandoned. The private buyers concentrated on areas that could produce cotton in much larger quantities. On the other hand, the study area holds such advantages such as the proximity to a large urban centre, good road connections, as well as wood resources that hold potential for charcoal production. Against this background, it is understandable why the involvement in petty trade particularly along the highway has increased by many-fold and the charcoal sector has blossomed, while the agriculture has declined.

Along with cutting funds from the agricultural sector, extension services were reduced to providing free information and education to the farmers, as well as monitoring the production. The distribution of inputs and outputs was almost completely transferred to the hands of the private sector. This has not contributed to more extensive coverage of farming guidance or better information systems regarding the production. Only about one-third of the respondents had ever been in contact with the extension workers. A closer analysis of the district level production figures shows considerable deficiencies in the official data, which obviously relates to the lack of resources for the extension work and administration.

Despite the adoption of the new Land Acts in 1999, land holding procedures continue to be based on the traditional clan holdings and the village land allocation system,

which provide user rights but not true ownership over the land. Drastic changes have not occurred in regard to ways of obtaining the user rights, except that clearing new areas for cultivation may have slightly diminished and leasing or 'selling' the rights has somewhat increased. None of the interviewed people had received official land titles although many had applied for them. Grazing areas also continue to be regarded as common property, but there are undergoing plans to dedicate defined areas for livestock-keeping.

## **10.5 Linkages between food security, socio-economic situation and environmental change**

The interviews with the health workers and the analysis of children's weight-for-age indexes indicate that the nutritional situation has gradually improved in the area during the post-ujamaa period. Fresh water availability has also improved and positively contributed to the nutrition security after the pipeline was established in the area in the beginning of 2000s; albeit that some remote villages do not have piped water yet.

The survey responses, however, present a somewhat different picture, as nearly half of the respondents said that food availability and security in their household had gone worse since the mid-1980s. Essentially, nutritional intake and perceptions on food security should not be equalled. The interviews suggest that many people are discontented with the decreasing availability of self-produced food, and the weakening roles of subsistence cultivation and pastoralism that their cultural identities have been based on. For example, most respondents identified themselves as farmers even if their main sources of livelihood were clearly on non-farm sectors.

Alarmingly, the average diet continues to lack sufficient amounts of several basic nutrients. The nutritional situation is severe in many families and it can easily get worse along with, e.g., crop failure, loss of livestock, death or illness of a household member, increase in food prices, or other shocks. Many families can afford to eat only twice per day and nearly two-thirds had been forced to skip meals recently. The most common means to get over food insecure periods included seeking additional sources of income such as charcoal production, agricultural wage labour, or other casual work. Borrowing was another common strategy and many families have become indebted to shopkeepers. Governmental food aid, which has been delivered about every second years, was considered to be insufficient for alleviating the situation for any longer period than a few days at a time.

Among other factors, the diminishing returns from agriculture have contributed to the increasing reliance on non-farm activities, of which charcoal business is one of the most important. Several interviews and group discussions pointed out that maintaining food security is a primary motive for making charcoal together with the increasing need for money for other necessities such as school fees and health services. In comparison to small-scale farming in the present situation, charcoal is lucrative business as it can bring secured returns quickly and throughout the year. However, most of the charcoal



production is illegal and the producers often have to work fearing a penalty. As more people produce charcoal, also less labour force is available for agriculture, so the increase of the charcoal production is not only a result of the food system change but also contributing to it. The analysis of aerial photographs and satellite data shows that the forest cover was greatly reduced between 1982 and 2007; from covering nearly 36% of the villages in 1982 to around 8% by 2007. As Luoga, Witkowski and Balkwill (2000) have pointed out, the commercialization of wood resources provides income for the people, but it also causes deforestation at a level which threatens the subsistence base of the rural communities in the long run.

## **10.6 Future challenges of food system development**

Despite certain positive developments in the study area such as better availability of foods at the market throughout the year and improving nutritional situation, the sustainability of the food system and the related activities for maintaining food security raise some serious concerns. The urgent ecological challenges include halting the outflow of nutrients from the fields, arranging irrigation and other adaptation measures for safeguarding against the predicted changes in the climate, and reducing the extraction of wood resources to a sustainable level. These are interlinked in diverse ways to the rapid population growth, high level of poverty, and lack of resources and credibility in the administration so that the unsustainable processes would be effectively halted. Failing to preserve the rural areas viable inevitably contributes to outmigration to cities, particularly Dar es Salaam.

Kaoneka & Solberg (1997) assessed the economical sustainability of farming systems in a village level study in Usambara mountains, some 150 km north from Lugoba. According to their estimates, the farming systems could sustain the growing population in the area for a maximum of 30 years. They suggest that reaching economical sustainability would require improvements in farming technology that boost crop production. Also an increase of incomes from other sources is necessary. It is likely that the future prospects for farming in western Bagamoyo district are similarly alarming and require thus urgent rethinking of development directions.

Along with the Maputo declaration of the African Union, Tanzania is committed to fostering agricultural production through lifting the share of agricultural spending in the national budget to 10% in 2011, and progressively extending this during the forthcoming years (TNBC 2009). When planning for future interventions it should be recognized that obstacles for rural food system development not only relate to the lack of resources by the farmers to modernize their production, but also to more profound issues when traditional cultures encounter with modernity. A narrow focus on boosting the productivity as a sole means for improving food security may even lead to adverse results and marginalize the poorer farmers. Formalization of landholdings in order to qualify the farmers for taking credit could increase their investments in production, but this involves risks that should be taken into account, as the attribution of indebtedness to farmers' suicides in India and elsewhere shows (see e.g. Gill & Singh 2006, Patel

2007: 50, 64–65). Furthermore, the logics and norms under which the authorized lending institutions operate may differ fundamentally from those of the local money lenders and traditions of subsistence farmers, as Waters (2007: 2–3) has noted. The land titling process can also further diminish rotation of the fields and contribute to land degradation if the outflow of nutrients is not balanced.

On the other hand, the average farm size in the area may be too small for the farmers to modernize their production individually. In this regard, re-introduction of block farms and collective sharing of tractor expenses were proposed by some respondents. Similarly, several pastoralists raised the issue of reviving co-operatives for livestock-keepers. The agricultural policies should be designed with an approach that encompasses all people who are willing to do farming, and not be focused only on those who can afford the modernization. For example, the concentration of large development projects in the president's home village hardly shows a desirable direction; these pilot projects should be expanded so that they cover the area more evenly. Also, small-scale farmers should be able to continue to hold their rights for their livelihoods without the fears of land-grabbing by rich farmers and foreign companies being realized.

More attention could also be given to sustainable livelihood diversification to non-farm sectors and long-term planning for rural development in general. Agricultural policies that aim at sustainable development cannot be designed in isolation from other policy sectors—such as revenue collection, education, health, and infrastructure—that concern rural development and rural-urban interaction. The development interventions should take into account the impacts of the on-going processes of de-peasantization and gradual urbanization of rural spaces (see also Lerner & Eakin 2010). Furthermore, the restoration of decision-making power on the village level in regard to natural resources could help conserve the remaining forest resources, define areas for charcoal, and protect and improve areas for cultivation and grazing, as examples from different parts of Tanzania show (Ylhäisi 2010a).

## **10.7 Reflections against previous literature**

Expectations related to abandoning the socialist structures and liberalizing the economy included that in a free trading environment where 'trade distorting' state interventions such as input subsidies are eliminated, the producers will react to the price incentives by specialization, accumulation and innovation. However, as Skarstein (2005) has put it, the free markets in Tanzania have not accelerated agricultural growth because the agricultural structures are predominantly pre-capitalist and the trading environment is not developed. This notion—which is supported by the findings in the present study—is unfortunate particularly in light of Hårsmar's (2010) findings which indicate that growth in agriculture is much more efficient than growth in other sectors for reducing poverty among the poorest in Sub-Saharan Africa.

The results of this study generally correspond with the findings on increasing commodification of food production and commercialization of rural life in Tanzania,

as observed by, e.g., Bryceson (1989, 1993), Ponte (1998, 2002), Skarstein (2005), and Sokoni (2008). Instead of focusing on cash crops, however, most farmers in western Bagamoyo district adhere to the declining subsistence farming, while at the same time diversifying their livelihoods to non-farm sectors. Particularly in contrast to findings from the Irangi Hills in central Tanzania by Kangalawe, Christiansson and Östberg (2008), most farmers in the study area are not responding to soil degradation and the reducing potential for agriculture by intensifying the land use in more productive ways. Particularly the young generations are abandoning farming altogether and finding other means of subsistence.

Even when this micro-scale case study focused only on one administrative ward, it is possible that many of the findings also apply to other parts of rural Tanzania and Sub-Saharan Africa, particularly those in the semi-periphery of large urban centres. Especially the phenomenon of shifting from subsistence agriculture to “eating the forests”, i.e., producing charcoal in order to maintain food security, is obviously common not only in the studied villages but also in other areas where road connections to urban centres are good and wood resources are available. According to Malimbwi and Zahabu (2008: fig. 1), nearly the entire coastal zone and also districts as far as in Iringa and Tabora regions produce charcoal for the growing number of consumers in Dar es Salaam. Madulu (2005) has connected increasing charcoal production with poverty in communities at the Wami River. Eriksen, Brown, and Kelly (2005), who studied coping strategies in Kenya and Tanzania, observed that when one strategy failed another one, such as charcoal making, was adopted. Barrett (2008) has also briefly discussed the linkages between the appeal for charcoal production and diminishing returns from agriculture, and the reports by the Ministry of Agriculture and Food Security, USAID and FAO mention the possible of connections of these with droughts and food security in Tanzania (GoT 2005: 3, 9; USAID 2010a, 2010b), Kenya (USAID 2009), Uganda (2010c) and elsewhere in Africa (FAO 2009a: 3).

In the studied context, several cultural features such as adherence to traditional identities of subsistence cultivators or pastoralists, suspicions towards using modern inputs and even cow-dung, as well as widespread favouring of rather one-sided traditional diet are in contrast with the ‘logics of the marketplace’ (see also Waters 2007). Expectations of ‘outsiders’, such as the assumption that most peasant families set specialization, modernization of the production, or more diversified diets as top priorities, become challenged in the local reality. Cultural, economic, and ecological inabilities to increase the production can trigger diversification of livelihoods to non-farm sectors that, at least temporarily, improves the access to food. Against this background, I strongly agree with Eriksen (2008, 2009) and Codjoe and Owusu (2011) that the inclusion of livelihoods in the analysis is necessary for understanding the processes that function as drivers and feedbacks of the food system change, and for assessing the sustainability of development more in general.

## 10.8 Suggestions for further research

In this study the food system framework has been applied in a context which essentially differs from that of most of the other food system research. The methodological choices and findings of this study could provide examples for more theoretically oriented approaches to conceptualize food systems in environments where people continue to depend on subsistence activities and exchange relations that have evolved during the pre-capitalist era, while being partly involved in the modern market economy.

Although the subsistence relations play significant roles for the food security of people in diverse environments around the world (e.g. Bryceson 2000; Waters 2007; WFP 2009: 36, 2010b: 18), most of the food system literature barely touches upon these 'marginal' spaces. As Waters (2007: 226) has noted, the 'subsistence world' has little to do with the 'written world' that the modern society and science have created. Therefore, the scientists' interpretations on the 'subsistence world' remain as impartial reflections on the life-worlds of the peasants themselves. Yet this does not imply that these 'marginal' spaces should be ignored. According to Whatmore (2002a: 65–66), this kind of 'marginal' producer and consumer relations should not be seen as "black holes" of the global agri-food system. Rather, they should be seen as tangential spaces to the global system where the plurality of agri-food relations is manifested. Understanding why these spaces continue to exist, what their inner logics are, how they are connected to or in conflict with the modern societies, how they shape the landscapes, and what are the threats and possibilities that these spaces involve, could gain much more emphasis within the food system research. Such studies could also provide insights on how to bring the current global food system on a more sustainable development track, as well as for building and strengthening the alternatives such as the local food networks and the farmers' market initiatives.

The stagnation in the agricultural technology is not only a matter of lacking the economic resources to modernization. This study has shown that not only poverty but also the traditions and cultural preferences of the small-scale cultivators and pastoralists play significant roles in the slow or reluctant response to adopting the new techniques. While Rudengren (1981), Hyden (1980), and later on Waters (2007: 155–214) have explored the ethos of Tanzanian peasants, it would be essential to study what the inclusion of the farmers' views and preferences would actually require from the development discourse in the present situation (see also Lerner & Eakin 2010). In addition, it appears that the culture of the pastoralists has probably gone through greater changes than those of the cultivator groups in the area during the recent decades. This prompts several topics for further research, which could, for example, focus on the relations between the changes in the livelihoods and the cosmologies of the different ethnic groups.

On a more practical level, several questions arise from the results that are worth further researching. Most importantly, the dynamics between agricultural stagnation, food and livelihood security, as well as unsustainable usage of forest resources provide

highly important research themes that should be applied in different environments in Sub-Saharan Africa. Such research could also focus more deeply on the dynamics of intra-household division of labour and, for example, the changing roles of gender and age in acquisition of food and livelihood diversification. Another critical issue that calls for further analysis is the implementation of land titling in ways that could bring security and sustainability to the farmers. A central question is how to ensure democratic processes when deciding on the land contracts with the non-residents, so that the arrangements will benefit the local communities. As Ylhäisi (2010a, 2010b) has underlined, the current legislation already guarantees these rights to the villages, but these are often not realized in practise. Last but not least, the problematics and possible measures for promoting sustainable livelihoods in rural and increasingly peri-urban environments, where the educational level is generally low, call for more attention and further exploration.

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## **ANNEX I – List of interviewed key informants**

### **Lunga**

Mr. Ahmed Nandolo, Chairman of SACCOS (Lunga), shopkeeper 27.10.2008, 29.10.2008, 28.11.2008, 17.06.2009, 28.07.2009

Traditional healer (M) 03.11.2008

Farmer (M) 04.11.2008

Farmer (F) 04.11.2008

Farmer (M) 05.11.2008

Farmer (F) 10.11.2008

Pesticide trader (M) 10.11.2008

Animal medicine trader (F) 10.11.2008

Primary school teacher (M) 10.11.2008

Maize mill worker I (M) 10.11.2008

Maize mill worker II (M) 10.11.2008

Maize mill worker III (M) 10.11.2008

Ms. Lemna Simba, Agricultural Extension Officer (Lunga) 11.11.2008

Cattle-keeper, farmer (M) 11.11.2008, 30.07.2009

Milk collector (F) 12.11.2008

Milk collector (M) 12.11.2008

Butcher (M) 12.11.2008

Wholesaler (M) 12.11.2008

Wholesaler (M) 12.11.2008

Ms. Coleta Uchungo, Village Primary Society official (former) 28.07.2009

Father, Catholic Mission 28.07.2009

Guest house worker (M) 10.12.2010

Restaurant keeper (F) 10.12.2010

Livestock keeper (M) 10.12.2010

### **Makombe**

Mr. Gallus Mwikala, Village Executive Officer 05.12.2008

Mr. Shabami A. Kondokaia, Village Chairman 05.12.2008

Traditional healer (M) 01.08.2009

Shopkeeper (F) 01.08.2009

Shopkeeper (F) 01.08.2009

Shopkeeper (M) 01.08.2009

Shopkeeper (F) 01.08.2009

Shopkeeper (F) 01.08.2009

Shopkeeper (M) 01.08.2009

Shopkeeper (F) 01.08.2009

Shopkeeper (F) 01.08.2009



**Mindu Tulieni**

Mr. Lazaro Ruben Wanga, Chairman of Enaboishu (former) 28.10.2008, 29.10.2008, 01.11.2008, 03.12.2008, 28.07.2009, 13.12.2010

Mr. Niniyai L. Samsindo, Village Chairman 06.12.2008

Pastoralist (M) 06.12.2008

Pastoralist (M) 06.12.2008

Pastoralist (M) 06.12.2008

Driver (M) 01.08.2009

Pastoralist, trader (M)

**Msoga**

Ms. Elizabeth Mandia, Agricultural Extension Officer (Msoga) 21.11.2008

Environmental Teacher, Msoga Primary School (M) 22.11.2008

Farmer (M) 22.11.2008

Farmer (M) 22.11.2008

Shopkeeper (F) 23.11.2008 F

Shopkeeper (M) 23.11.2008

Shopkeeper (M) 23.11.2008

Farmer (F) 23.11.2008

Traditional healer (M) 23.11.2008

Farmer (F) 23.11.2008

Farmer (M) 26.11.2008

Nurse, Msoga health centre (F) 4.12.2008

Farmer (M) 28.06.2009

**Lugoba Ward – Officers**

Mr. James Rugemalira, Veterinary Officer (currently in Msata, previously in Lugoba ward), 21.10.2008

Mr. Simon Chiwaligo, Veterinary Officer (Lugoba ward) 24.10.2008, 23.11.23, 28.07.2009

Mr. Shomvi, Veterinary Officer (Lugoba ward, retired) 03.11.2008, 01.08.2009

Ms. Flaviana Msofe, Health and Environment Officer (Lugoba ward) 04.11.2008, 04.12.2008, 31.07.2009

Diwani of Lugoba Ward (M) 19.11.2008

Mr. Athumani Mohami, Ward Executive Officer, Lugoba 24.11.2008

Storekeeper, Lugoba Secondary School (M) 30.07.2009

Second Head Master, Lugoba Secondary School (M) 30.07.2009

**Chalinze**

Wholesaler (F) 01.12.2008  
Wholesaler (M) 01.12.2008  
Wholesaler (F) 01.12.2008  
Wholesaler (F) 01.12.2008  
Wholesaler (M) 01.12.2008  
Wholesaler (M) 01.12.2008  
Wholesaler (M) 01.12.2008  
Wholesaler (M) 01.12.2008  
Maize mill owner (M) 01.12.2008  
Agro-input trader (M) 01.12.2008

**Bagamoyo District – Officers**

Ms. Batuli Nyamgassa, District Statistical Officer 11.14.2008  
Mr. Joseph Msaki, District Forest Officer 06.07.2009  
Mr. Dand Kaijunga, District Beekeeping Officer 06.07.2009

**Others**

Mr. Juvenal Kisanga, WFP Programme Officer, UN, Dar es Salaam 06.11.2008  
Stone quarry manager, Kinzagu (M) 18.06.2009  
Mr. Emmanuel Mhache, Researcher (Lunga) 29.07.2009  
Mr. Nicanor Omollo, Manager, Kariakoo market, Dar es Salaam 04.08.2009  
Mr. Mwindadi Mbukusi, Manager, Tandale market, Dar es Salaam, 04.08.2009

## ANNEX II – RRA exercises and group discussions

<b>RRA exercises</b>	<b>Date</b>	<b>Village</b>	<b>Participants</b>	<b>Occupations</b>	<b>Length (min)</b>
Agro-ecosystems transect 1	28.10.2008	Mindu Tuliene	2 M	Pastoralist, cooperative member	60
Agro-ecosystems transect	31.10.2008	Lunga	3 M	Trader, farmers	180
Agro-ecosystems transect 2	01.11.2008	Mindu Tuliene	2 M	Trader, retired farmer	90
Seasonal Calendar	05.11.2008	Lunga	3 F, 3 M	Farmers, trader	160
Agro-ecosystems transect 1	22.11.2008	Msoga	2 M	Farmers	120
Agro-ecosystems transect 2	26.11.2008	Msoga	3 M	Farmers	180
Seasonal Calendar	02.12.2008	Msoga	3 F, 3 M	Farmers	90
Seasonal Calendar	04.12.2008	Mindu Tuliene	4 F, 3 M	Pastoralists	90
Agro-ecosystems transect	24.06.2009	Makombe	4 M	Village chairman, farmers	120
Seasonal Calendar	01.08.2009	Makombe	3 F, 2 M	Charcoal producers, farmers	60
<b>Group discussions</b>					
Various issues	21.10.2008	Saleni	10	Village council members	30
Various issues	22.10.2008	Lunga	2 F, 1M	Village council members	30
Various issues	22.10.2008	Msata	25	Village council members	45
Various issues	24.10.2008	Mboga	7 F, 7 M	Village council and forest committee members	30
Various issues	27.10.2008	Msoga	5 F, 7 M	Village council members	60
Various issues	28.10.2008	Mindu Tuliene	3 F, 10 M	Village council members	120
Agricultural development	06.07.2009	Bagamoyo	7 M	District Agricultural Officer, ward level officers	60
Village development and irrigation scheme	11.12.2010	Msoga	1 F, 1 M	Village council members	60
Feedback on project findings	14.12.2010	Msata	9 F, 39 M	Village and ward officials, other key informants	360
Feedback on project findings	16.12.2010	Dar es Salaam	5 F, 16 M	Government officials, Finnish Embassy representatives, researchers, journalists	180

## ANNEX III – Household survey questions

<sup>a</sup> Survey 1989-90

<sup>b</sup> Survey 2008

<sup>c</sup> Survey 2009

ID: .....

Date: .....

Village: .....

Sub-village: .....

Interviewed by: .....

### A. Respondent's background information

1. Name of respondent (not necessary) <sup>(a, b, c)</sup> .....

2. Main occupation <sup>(b, c)</sup> .....

3. Age <sup>(a, b, c)</sup> ..... years

4. Sex <sup>(a, b, c)</sup>: M / F

5. Tribe <sup>(b, c)</sup> .....

6. Religion <sup>(b, c)</sup> .....

7. Type of house <sup>(b, c)</sup>

1	Mud-walled, thatched roof	
2	Mud-walled, tin roof	
3	Brick house	
4	Concrete house	
5	Other .....	

8. Electricity <sup>(b, c)</sup> Yes / No

9. Do you pay rent for your house? <sup>(c)</sup> Yes / No  
If Yes, how much per month? ..... TZS

10. Where were you born? <sup>(a, b, c)</sup>

1	In this village	
2	In a neighboring village (same ward) Which? .....	
3	Another place within a district (different ward) Which? .....	
4	Another place within a region (different district) Which? .....	
5	Outside this region Where? .....	

11. Level of Education <sup>(b, c)</sup>:  
 i. None ..... ii. Primary incomplete .....  
 iii. Primary completed ..... iv. Secondary incomplete .....  
 v. Secondary completed ..... vi. Adult education .....  
 vii. Other (specify) .....

12. If not born in this area (12) when and where did you migrate from? <sup>(a, b, c)</sup>

Village	Ward	District	Region	Year



15. Do you have family members in other villages or cities who send money to your household? <sup>(c)</sup>

No.	Name (not necessary)	Relation	Sex	Age	Activities
1					
2					
3					

16. How much does your household (in total) earn per day / week / month? <sup>(b, c)</sup> ..... TZS

17. How the overall economic situation of your household has changed since 1985? <sup>(c)</sup>

1	Improved much	
2	Improved to some extent	
3	No change	
4	Worsened to some extent	
5	Worsened much	
6	Don't know / No answer	

18. Why these changes in the economic situation of your household have taken place? <sup>(c)</sup>

.....

.....

.....

**C. Credit**

19. During the last two years, have your household members taken any credit? <sup>(c)</sup> Yes / No

20. If Yes, from which sources? <sup>(c)</sup>

1	Relatives / friends	
2	SACCOS	
3	Other NGOs	
4	Local money lenders	
5	Local traders	
6	Other sources .....	

21. If Yes, for which purposes? <sup>(c)</sup> .....

.....

22. If Yes, how much do you owe at the moment? <sup>(c)</sup> ..... TZS

23. Have you ever purchased food on credit or borrowed money to purchase food? <sup>(c)</sup> Yes / No

If Yes, when? .....

24. Are you currently in debt for food? <sup>(c)</sup> Yes / No

25. If you are currently in debt for food, how much? <sup>(c)</sup> ..... TZS

**D. Food sources**26. Where do you normally get food for your household? (in order of importance) <sup>(b, c)</sup>

S/N	Source	Food items	Importance
1	Market / shops		
2	Own field / vegetable garden		
3	Own fruit trees		
4	Own livestock		
5	Gathering		
6	Hunting		
7	Barter		
8	Restaurant		
9	Food aid / govt. food scheme		
10	Other .....		

27. During the last 12 months, have you eaten more your own food or food bought from the market in your household? How much (%) approximately from your own subsistence production? <sup>(b, c)</sup>

No own production	
About 25 % own production	
About 50 % own production	
About 75 % own production	
Nearly 100 % own production	

28. Around year 1985, did you eat more your own food or food bought from the market in your household? How much (%) approximately from your own subsistence production? <sup>(b, c)</sup>

No own production	
About 25 % own production	
About 50 % own production	
About 75 % own production	
Nearly 100 % own production	

29. If the importance of own production has changed since 1985, why? <sup>(c)</sup> .....

30. How much money do you usually spend on food in your household (per day)? <sup>(b, c)</sup> ..... TZS

31. Has the proportion of incomes, which you spend on food, increased or decreased since 1985? <sup>(b, c)</sup>

1	Increased much	
2	Increased to some extent	
3	No change	
4	Decreased to some extent	
5	Decreased much	
6	Does not know	

32. If the proportion spent on food has decreased, to which purposes do you spend (proportionally) more money nowadays? (e.g. housing, agricultural inputs, transportation, education, health services, clothes, alcohol) <sup>(c)</sup>

.....

**E. Meals**

33. How many times per day do you normally cook in your household? <sup>(b, c)</sup> ..... times

34. Who prepares the food usually? <sup>(c)</sup> .....

35. What fuel do you usually use for cooking? <sup>(b, c)</sup>

1	Gas	
2	Electricity	
3	Firewood	
4	Charcoal	
5	Kerosene	
6	Other, specify .....	



36. What do you usually eat during the meals? <sup>(b, c)</sup>

	Time	Food items presently	Food items around 1985
Meal 1			
Meal 2			
Meal 3			
Meal 4			

37. How often do you eat <sup>(b, c)</sup>

Meat ..... per day / week / month / year  
 Fish ..... per day / week / month / year  
 Milk ..... per day / week / month / year  
 Eggs ..... per day / week / month / year

38. Has there been changes in regard to the amounts of meat, fish, milk and eggs that you are eating (in your household) since 1985? <sup>(c)</sup> Yes / No

If Yes, what changes? .....

39. Do you take snacks (chai, fruits etc.) in between the meals? <sup>(b, c)</sup>

1	Often	
2	Sometimes	
3	Never	
4	No answer	

\*If Often or Sometimes, what kind of snacks? <sup>(b, c)</sup> .....

40. Do a) adults and children b) male and female members in your household eat as many meals per day? <sup>(c)</sup> Yes / No

If No, what kind of differences there are? .....

41. Do a) adults and children b) male and female members in your household eat the same food? <sup>(c)</sup>

Yes / No

If No, what kind of differences there are? .....

#### F. Food security

42. Are you satisfied with the quantity of food that you are usually eating in your household? <sup>(b, c)</sup> Yes / No

If No, why? .....

43. Have you been forced to skip meals during the last 12 months? <sup>(c)</sup> Yes / No

If Yes, why? .....

44. Has the quantity of food that you eat in your household (per person) increased or decreased since the mid-1980s? <sup>(b, c)</sup>

1	Increased much	
2	Increased to some extent	
3	No change	
4	Decreased to some extent	
5	Decreased much	
6	Don't know / No answer	

45. Have you ever experienced food insecure periods in your household? <sup>(b, c)</sup> Yes / No

If Yes, when have they occurred? .....

Is there certain food insecure periods that repeat annually? .....

How do you get over the food insecure periods? .....

46. Since 1985, has the food security situation in your household improved or worsened? <sup>(b, c)</sup>

1	Improved much	
2	Improved to some extent	
3	No change	
4	Worsened to some extent	
5	Worsened much	
6	Don't know / No answer	

47. If the food security situation in your household has improved, what have been the main causes for this? (by order of importance) <sup>(c)</sup> .....

48. If the food security situation in your household has worsened, what have been the main causes for this? (by order of importance) <sup>(c)</sup>

A	Drought/irregular rains, prolonged dry spell	
B	Floods	
C	Land erosion	
D	Unusually high level of crop pests / disease	
E	Unusually high level of livestock diseases	
F	Lack of employment	
G	Unusually high level of human disease	
H	Prices of food	
I	Prices of agricultural inputs (seeds, fertilizers, pesticides, tractor usage etc.)	
J	Loss of employment for a household member	
K	Reduced income of a household member	
L	Serious illness or accident of household member	
M	Death of a working household member	
N	Death of other household member	
O	Theft of productive resources	
P	Insecurity / violence	
Q	Other, specify .....	

49. Are you satisfied with the quality of food you are eating in your household? <sup>(b, c)</sup> Yes / No  
If No, why? .....

50. Has the quality of food that you consume in your household improved or worsened since 1985? <sup>(b, c)</sup>

1	Improved much	
2	Improved to some extent	
3	No change	
4	Worsened to some extent	
5	Worsened much	
6	Don't know / No answer	

51. What are the reasons for the changes in the quality of food? (by order of importance) <sup>(b, c)</sup>

.....  
.....

### G. Health situation

52. Has any of your household members experienced malnutrition related diseased (anemia, kwashiorkor, marasmus, night blindness, prolonged diarrhea, discoloration of skin / hair etc.) during last two years? <sup>(c)</sup> Yes / No

\*If Yes, who and which diseases?

.....

53. Since 1985, has any of your household members experienced malnutrition related diseased (anemia, kwashiorkor, marasmus, night blindness, proloned diarrhea, discoloration of skin / hair etc.)? <sup>(c)</sup> Yes / No

\*If Yes, who? Which diseases? When?

.....

54. Since 1985, how the general health situation in your household has changed? <sup>(c)</sup>

1	Improved much	
2	Improved to some extent	
3	No change	
4	Worsened to some extent	
5	Worsened much	
6	Don't know / No answer	

### H. Cultivation

55. What are the size(s) of your plot(s) (including fallow) and which crops do you grow currently? <sup>(a, b, c)</sup>

Plot #	Size of farm (acres)	Distance from home (km)	Crops
1			
2			
3			
4			
5			

56. How and when did you obtain the land you are using now? <sup>(a, b, c)</sup>

Plot #	Year obtained	How obtained: inherited from parents (1), bought (2), given by government (3), given by clan (4), rented for money (5), borrowed for free (6), exchanged (7), other (8)
1		
2		
3		
4		
5		

57. Do you have a land title? <sup>(a, b, c)</sup> Yes / No  
 If Yes, for how many acres? ..... acres

58. Do you intend to or have you applied for a title? <sup>(a, c)</sup> Yes / No  
 If No, why? .....

59. How much yield did you get from the latest harvest? <sup>(c)</sup>

Crop	Acres	kgs/bags per acre

60. How the productivity of your lands has changed since 1985? <sup>(b, c)</sup>

1	Increased much	
2	Increased to some extent	
3	No change	
4	Decreased to some extent	
5	Decreasing much	
6	I don't know	

61. Why the productivity has changed? .....

62. What percentage of the maize yield do you usually lose / becomes spoiled after harvesting? <sup>(c)</sup> ..... %

63. How many kg/bags of maize per acre did you get around year 1985? <sup>(c)</sup> .....

64. During how many months per year do you nowadays have to buy maize flour? <sup>(c)</sup> ..... months

65. During how many months per year did you have to buy maize flour in 1985? <sup>(c)</sup> ..... months

66. Cultivation pattern: For how many years do you cultivate the same field? <sup>(a, c)</sup>

Nowadays .....

In 1985 .....

67. Which crops have increased or decreased in importance since 1985? <sup>(a, c)</sup>

Importance	Cash crops	Food crops
Increased		
Decreased		

**I. Livestock keeping**

68. If you own livestock, what type and how much livestock do you have? <sup>(b, c)</sup>

Type of livestock	Quantity
Cattle	
Goats	
Sheep	
Pigs	
Poultry	
Others (list/specify)	

69. If the amounts of livestock has significantly changed since 1985, why these changes have taken place? <sup>(c)</sup>

.....  
 .....

70. Where do you graze your livestock? <sup>(b, c)</sup>

S/N	Place	
1	Inside the forest reserve	
2	Public land not in the reserve	
3	On fallow land (other people's lands)	
4	On my fallow land	
5	On my homestead	
6	Others (list/specify)	

71. Do you burn land to make fodder grow? <sup>(c)</sup> Yes / No

**J. Labour**

72. Do you hire labour to help in agricultural work? <sup>(a, c)</sup> Yes / No

If Yes, how many people you usually hire? .....

73. Do these people come from this village or outside? <sup>(a, c)</sup> .....

**K. Inputs**

74. Do you use chemical fertilizers? <sup>(a, b, c)</sup> Yes / No

If No, why? .....

If Yes, what kind of chemical fertilizers? .....

If Yes, where do you get them? .....

If Yes, when did you start using them? .....

75. How much money do you spend on chemical fertilizers annually? <sup>(c)</sup> ..... TZS

76. Since 1985, has the use of chemical fertilizers (by your household) been <sup>(c)</sup>

a) increasing

b) staying the same

b) decreasing

77. Do you use organic manure? <sup>(a, b, c)</sup> Yes / No

If No, why? .....

If Yes, what kind of organic manure? .....

If Yes, where do you get it? .....

If Yes, when did you start using them? .....

78. Since 1985, has the use of organic manure been <sup>(c)</sup>

- a) increasing
- b) staying the same
- b) decreasing

79. Do you use chemical pesticides? <sup>(a,b,c)</sup> Yes / No

If No, why? .....

If Yes, what kind of chemical pesticides? .....

If Yes, where do you get them? .....

If Yes, when did you start using them? .....

80. Since 1985, has the use of chemical pesticides been <sup>(c)</sup>

- a) increasing
- b) staying the same
- b) decreasing

81. Where do you get seeds? <sup>(a,c)</sup>

Source	Type of seed
Previous yield	
From the market	
From neighbours	
From extension workers	
From farmers' association	
Other .....	

82. Do you use irrigation? <sup>(c)</sup> Yes / No

If Yes, what kind of irrigation? .....

83. Do you burn the land before cultivating? <sup>(c)</sup> Yes / No

84. What kind of tools do you use nowadays in agriculture? <sup>(a,b,c)</sup>

	Hand hoe	
	Sickle	
	Plough	
	Tractor	
	Others, specify .....	

**L. Marketing of agricultural products**

85. What crops / animal products do you sell? <sup>(a,c)</sup>

Presently .....

86. What proportion of your production do you sell nowadays (approximately)? <sup>(c)</sup>

Crop / animal product	%

87. Since 1985, have the agricultural sales of your household (proportionally) <sup>(c)</sup>

Increased	
Stayed the same	
Decreased	

88. Who usually buys your products (middle-men, wholesalers, customers at market, neighbours, companies, co-operatives, others)? <sup>(a, c)</sup>

Crop / animal product	Buyer

89. Since 1985, has there been any major changes in regard to whom you are selling your products? <sup>(c)</sup>

Yes / No

If Yes, what kind of changes? .....

.....

90. Have you recently had problems with selling your products? <sup>(c)</sup> Yes / No

If Yes, what are the main problems you face to sell your products? (By order of importance)

A	Not enough buyers	
B	Price offered too low	
C	Problem of storage	
D	Lack of money	
E	Lack of transportation	
F	Long distance to selling	
G	Theft, looting	
H	Others, specify	

91. Has the situation changed in regard to marketing problems since 1985? <sup>(c)</sup> Yes / No

If Yes, how? .....

**M. Extension work**

92. When did you last discuss with extension worker or veterinary officer? <sup>(c)</sup> .....

93. What kind of guidance have you got from the agricultural extension workers or veterinary officers? <sup>(c)</sup>

.....

94. What kind of benefits (knowledge, seeds, fertilizers, tools, medicine, credit etc.) have you received from them? <sup>(c)</sup>

.....

**N. Additional issues**

95. Is there anything else you would like to add to any of the issues we have discussed during this interview? <sup>(a, b, c)</sup>

.....

.....

## ANNEX IV – Origins and prices of common food items marketed in the study area

Food item	Price (TZS)	Origin
Banana	100–200 / piece	Lugoba ward, Bagamoyo district, Morogoro region
Beef	3,500–4,000 / kg	Lugoba ward
Beer (traditional / pombe)	300–500 / bottle	Lugoba ward
Beer (bottled)	1,200–1,800 / bottle	Dar es Salaam, Moshi, foreign
Bread	500–1,500 / piece	Lugoba ward (home-made), Dar es Salaam (factory-baked)
Cabbage	200–400 / piece	Lugoba ward
Cake	150 / piece	Lugoba ward
Carrot	100 / piece	Morogoro region
Cashew nuts	10,000 / kg	Coast region
Cassava	300–500 / kg	Lugoba ward
Chapati	200 / piece	Lugoba ward
Chicken	6,000–10,000 / head	Lugoba ward, Msata, ward
Coconut	200–400 / piece	Bagamoyo district, Tanga region
Cooking oil (palm oil, sesame)	2,000–2,700 / litre	Foreign (processed in Dar es Salaam)
Cooking oil (sunflower)	3,000 / litre	Morogoro region, foreign (processed in Dar es Salaam)
Cowpea	1,000 / kg	Lugoba ward
Eggs	5,500 / 30 pieces	Msata ward, Coast region, Dar es Salaam
Fish (dried)	1,500–2,000 / kg	Bagamoyo district, Morogoro, Dodoma, Singida, Mwanza, Tanga, Kagera, Tabora, Bukoba regions
Garlic	50–200 / piece	Arusha region
Goat meat	2,000–5,000 / kg	Lugoba ward
Chili	100 / piece	Bagamoyo district, Morogoro, Kilimanjaro regions
Groundnuts	1,600 / kg	Malawi
Kidney beans	1,200 / kg	Tanga, Morogoro, Mbeya, Iringa, Bukoba, Arusha regions
Lemon	50 / piece	Lugoba ward
Mandazi (baked)	50–100 / piece	Lugoba ward
Maize flour	650–800 / kg	Dodoma, Manyara, Arusha, Iringa, Tanga, Mbeya, Ruvuma, Morogoro regions, United States, South Africa, Lugoba ward (<20%)
Mango	50–200 / piece	Lugoba ward, Morogoro, Iringa regions
Leafy green vegetables	100–200 / bunch	Lugoba ward, Tanga region
Milk	500 / liter	Lugoba ward
Millet	500 / kg	Dodoma region, Lugoba ward
Mung bean	1,200 / kg	Lugoba ward
Okra	100 / 4 pieces	Lugoba ward
Onions	100 / piece	Iringa, Arusha, Singida regions
Oranges	50–100 / piece	Lugoba ward, Bagamoyo district, Tanga region
Papaya	500–800 / piece	Lugoba ward
Pigeon peas	1,000 / kg	Morogoro, Dodoma regions
Pineapple	1,000–2,000 / piece	Bagamoyo district
Potatoes	600 / kg	Tanga, Iringa, Arusha regions
Rice	1,200–1,400 / kg	Morogoro, Mbeya, Shinyanga regions, Pakistan and other foreign countries (~10%)
Salt	800 / kg	Kigoma, Tanga regions
Sheep meat	5,000 / kg	Lugoba ward
Soft drinks	500–800 / bottle	Dar es Salaam, Moshi
Soya beans	1,200–1,500 / kg	Tanga, Morogoro regions
Sugar	1,400 / kg	Morogoro, Kagera regions, foreign
Tea	700–1,900 / 100 g (tea bags)	Tanga, Iringa, Mbeya regions
Tomato	50–75 / piece	Morogoro, Iringa, Kilimanjaro, Coast regions, Lugoba ward
Water (bottled)	500 / 1 litre	Dar es Salaam, Moshi
Water (tapped)	40 / 20 litres	Wami river
Wheat flour	1,000 / kg	United States, Canada, Russia, other foreign countries (total imports > 90%), Mbeya, Arusha regions



## ANNEX V – Nutritional content of the estimated average daily food intake

	Maize <sup>1</sup>	Beans <sup>2</sup>	Cassava	Spinach <sup>3</sup>	Milk <sup>4</sup>	Cooking oil <sup>5</sup>	Mango	Fish <sup>6</sup>	Beef <sup>7</sup>	Total
	400 g	200 g	100g	50 g	100 g	20 g	200 g	50 g	25 g	%
	%	%	%	%	%	%	%	%	%	%
Calories	75	13	8	1	3	9	6	3	3	121
Total carbohydrates	110	15	13	1	2	0	11	0	0	152
Protein	45	35	3	3	6	0	2	20	14	128
Fiber	30	51	7	5	0	0	14	0	0	107
Total Fat	9	1	0	0	5	27	1	4	5	52
Sat Fat	3	1	0	0	9	49	1	3	7	73
Mono Fat	3	0	0	0	2	22	1	2	4	34
Poly Fat	35	7	1	1	2	23	1	10	1	81
Omega-6	58	5	1	0	3	39	1	1	2	110
Omega-3	3	10	1	1	2	1	2	23	0	43
Cholesterol	0	0	0	0	3	0	0	10	7	20
Vitamin A	17	0	0	105	2	0	31	1	0	156
Thiamin	20	21	6	3	3	0	8	2	2	65
Riboflavin	14	7	3	7	11	0	7	8	3	60
Niacin	53	6	4	1	1	0	6	35	6	112
Vitamin B-6	19	12	4	6	2	0	13	4	3	63
Vitamin B-12	0	0	0	0	7	0	0	5	11	23
Vitamin C	0	4	34	8	0	0	92	0	0	138
Vitamin E	3	9	1	5	0	16	11	1	0	46
Vitamin K	2	8	2	308	0	2	10	0	1	333
Calcium	1	6	2	7	11	0	2	7	0	36
Copper	28	24	5	4	1	0	11	5	1	79
Iron	20	33	1	10	0	0	1	9	4	78
Magnesium	18	22	5	11	2	0	4	5	2	69
Phosphorus	24	28	3	3	9	0	2	9	5	83
Potassium	13	23	8	7	4	0	9	5	3	72
Selenium	46	3	1	1	5	0	2	26	8	92
Sodium	0	20	1	6	2	0	0	2	1	32
Zinc	10	14	2	3	3	0	1	6	12	51

<sup>1</sup> Degermed, unenriched maize flour

<sup>2</sup> Kidney beans, boiled with salt

<sup>3</sup> Boiled, drained, with salt

<sup>4</sup> Whole milk

<sup>5</sup> Palm oil

<sup>6</sup> Anchovy

<sup>7</sup> Rib, cooked / roasted

Calories: 100% = 2000 kcal

Percentages of required daily intake according to U.S. Department of Agriculture, Agricultural Research Service. 2010. USDA National Nutrient Database for Standard Reference, Release 23. Nutrient Data Laboratory. Accessed 24.7.2010. <<http://www.ars.usda.gov/ba/bhnrc/nd/>>

Calculated with NUT-Nutrition application v. 14.4.